NIT NO	**AOCYB/32/2024-25**
DATE	**10-06-2024**

PROPOSED INTERIOR, ELECTRICAL & HVAC (AIR-CONDITIONING) WORKS FOR RBO RC PURAM, AO CYBERAB, GACHIBOWLI

Contractors who are on the panel of SBI, Hyderabad Circle, (LHO) in the appropriate category are only eligible. (Contractors should submit proof of the same)

SINGLE BID TENDER SCHEDULE

Last date for submission of Sealed Tender: 15.00 P.M. (IST) on 18/06/2024

Opening of Sealed Tenders: 15.10 P. M. (IST) on 18/06/2024

Tender to be submitted to:

The Chief Manager (Ops),
State Bank of India,
AO Cyberabad
Gachibowli, Hyderabad.
Email: cmops.aocyb@sbi.co.in

TENDER SCHEDULE FOR

PROPOSED INTERIOR, ELECTRICAL & HVAC (AIR-CONDITIONING) WORKS FOR STATE BANK STAFF COLLEGE,

RBO RC PURAM, AO CYBERABAD,

HYDERABAD (TELANGANA)

Name of the Contractor to whom issued:

_____

Address:

_____

_____

_____

_____

_____

_____

CLIENTS:

The Chief Manager (Ops),
State Bank of India,
AO Cyberabad
Gachibowli, Hyderabad.
Email: cmops.aocyb@sbi.co.in

NOTICE INVITING TENDER (NIT)

Online E-Tenders are invited from composite contractors who are on the Banks approved panel of SBI LHO Hyderabad in the appropriate category as per eligibility for INTERIOR, ELECTRICAL & HVAC (AIR-CONDITIONING) WORKS FOR RBO RC PURAM, AO CYBERAB, GACHIBOWLI

1	Estimated cost of work:	RS. 1,22,00,000/- (Estimate value is Exclusive of GST. GST will be paid extra as applicable.) (EXCLUDING HVAC AMC)
2	Time of Completion:	60 DAYS.
3	Date of download of tender documents from Bank's web site http://www.sbi.co.in under "procurement news ".	From 11/06/2024 to 18/06/2024
4	Last date and time for submission of online e-tender.	Date: 18/06/2024 by 3.00 P.M. at https://sbi.abcprocure.com
5	Earnest Money Deposit. (EMD)	Rs1,22,000/- in favour **The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in (Exempted for MSME/ one time EMD)**
6	EMD to be submitted at:	EMD should be submitted physically at **The The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in.** Before 18/06/2024 by 3.00 P.M.
7	Date and Time of opening of e-Tenders: (Technical Bid and Price Bid)	Date: 18/06/2024 at 3.10 P. M. (IST) at above office address. Technical Bid of those firms / contractors who do not submit EMD shall be rejected. Representatives of Bidder may be present during opening of Bids. However Bids would be opened even in the absence of any or all the bidder's representatives.
9	Bidder Contact Details.	Bidder to provide following information. 1) Name of Company. 2) Contact Person. 3) Mailing address with Pin Code. 4) Telephone number and Fax number. 5) Mobile Number and E-MAIL.
10	Agency for arranging online bidding.	M/S e-procurement Technologies limited, Ahmedabad. E-tendering guidelines may be obtained from Ms. Shubhangi Banodiya. Phone:- 079 – 68136826/6824/6868, Cell: +91- 9879996111. E-mail: shubhangi@auctiotiger.net

		Mr. Samjadkhan. Phone:- 079 – 68136868. Cell: +91-9265871720. E-mail: samjad@auctiotiger.net

The Chief Manager (Ops), The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in reserves the right to accept or reject any or all the tenders without assigning any reason whatsoever.

INSTRUCTIONS TO CONTRACTORS

1. **This tender is for the** "Proposed Interior, Electrical & HVAC (Air-Conditioning) Works for State Bank AO Cyberabad RBO RC PURAM, AO CYBERABAD, and Hyderabad. (Telangana)" It **is a Single Bid containing Technical and Price Bid.**

In their own interest the contractors are advised to use their own specific seals and desist from using currency coins for the purpose. Tenders with incomplete or broken seals are liable to be rejected, the matter solely resting at the discretion of the EMPLOYER / ARCHITECTS. If a Contractor does not quote for one or more items, the Tender will be considered as incomplete and will be rejected.

2.Clients/Architects reserve to itself the right to accept or reject any tender without assigning any reason for doing so and does not bind itself to accept the lowest or any other tender.

3.General Specifications are for guidance only. The latest ISI codes and Specifications and mode of measurements will be referred to during execution.

4. **The term "THE ARCHITECTS" in the said conditions shall mean:** Not applicable

5. Employer or Client shall mean, **The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in**

6. Tenders are to be uploaded directly to M/S e-procurement Technologies Limited. E-mail: shubhangi@auctiotiger.net

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1. TENDER FORM

PROJECT: PROPOSED INTERIOR, ELECTRICAL & HVAC (AIR-CONDITIONING) WORKS FOR STATE BANK AO CYBERABADRBO RC PURAM, AO CYBERABAD, HYDERABAD. (TELANGANA)

REF : INTERIOR, ELECTRICAL & HVAC (AIR-CONDITIONING).

Dear Sirs,

I/We the undersigned have carefully gone through and clearly understood after visiting the site and the Tender drawings and tender documents comprising of the tender form, Notice to contractors, and conditions for building contract, Special Conditions, Specifications and Schedule of Probable quantities and Draft Agreement prepared by your Architects **Not Applicable.**

I/We do hereby undertake to execute and complete the whole or part of the work (as desired by you) at the respective rates which/I/We have quoted for the respective items of the Probable Bill of Quantities and at which rate the items specified amount to RS.

I/We are depositing as Earnest Money a sum of RS. in favor of **The Chief Manager (Ops),** STATE BANK OF INDIA, 3rd Floor, Premises & Estate, Local Head Office, Bank Street, Koti, **HYDERABAD – 500 001**along with this tender for due execution of the work at my/our tendered rates together with any variations which shall be adjusted by the Architects at prices based on our tendered rates. I/We shall deposit further sum equivalent to 2% of tender amount, less EMD paid in the event of my/our tender being accepted, towards initial security deposit.

In the event of this Tender being accepted I/We agree to enter into an agreement as and when required and execute the contract according to your form of Agreement, within 15 days of receipt of work order, in default thereof, I/We do hereby bind my-self/ourselves to forfeit the aforesaid initial security deposit.

I/We further agree to complete the work covered in the said schedule of quantities within 60 DAYS from the 15th day reckoned from the date of issue of the work order to commence the work or on which contractor is instructed to take possession of the site, whichever is later.

I/We agree not to employ Sub-contractors other than those that may be specifically approved by your Architects for this contract work.

I/We agree to and to get the work, workers, employees (of contractor, Architect & Employer) engaged on the work at site and all materials at site for execution of the work shall be insured comprehensive insurance including fire/accidents/ rain/ floods/riots/CAR policy (contractor's all risk insurance policy) and the insurance shall cover the period from date of start of work to date of actual completion of work plus 3 months. In case part work is taken over by the Employer before final completion of the whole work, such parts may not be covered by the insurance from the date of taking over that part of work by the Employer. Draft Insurance deed will be got vetted by the Architect, before obtaining the same. All the rates quoted by me/ us are inclusive of the same in full and nothing extra shall be claimed anytime on account of any of these.

I/We agree to pay Income tax, to be deducted at source, at the rate prevailing from time to time on the Gross value of the work done, and the rates quoted by me/we are inclusive of same.

Yours faithfully,

Contractor’s Signature

Address: Date:

_____

_____

_____

_____

2. NOTICE TO CONTRACTOR

ADDRESS:

_____

_____

_____

PROJECT: PROPOSED INTERIOR, ELECTRICAL & HVAC (AIR-CONDITIONING) WORKS FOR STATE BANK AO CYBERABADRBO RC PURAM, AO CYBERABAD, HYDERABAD. (TELANGANA)

REF : INTERIOR, ELECTRICAL & HVAC (AIR-CONDITIONING).

Dear Sirs,

On behalf of our clients**, The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in.**

1. We have pleasure in inviting you to tender for the aforesaid work.

   The scope of work broadly as given below is for Proposed Interiors for *PROPOSED INTERIOR, ELECTRICAL & HVAC (AIR-CONDITIONING) WORKS FOR STATE BANK AO CYBERABAD RBO RC PURAM, AO CYBERABAD, HYDERABAD. (TELANGANA)*

2. Tender Documents should be filled and uploaded on the site of **M/S e-procurement Technologies Limited. E-mail:** shubhangi@auctiotiger.net

3. The tenderer must obtain for himself, on his own responsibility and at his own expenses, all the information which may be necessary for the purpose of filling this tender and for entering into a contract for the execution of the same and must examine the drawings and inspect the site of the work and acquaint himself with all local conditions and matters pertaining thereto.

5. Each of the tender documents page is required to be signed by the person or persons submitting the tender in token of his/their having acquainted himself/themselves with the General conditions etc., as laid down. Any tender with any of the documents not so signed will be rejected.

6. The tender documents must be filled in English and all the entries must be made by hand and written in ink. If any of the documents are missing or un-signed, the tender shall be considered invalid.

7. Each and every one of all erasures and additions/alterations made, while filling the tender, must be attested by initials of the tenderer. Over-writing of figures must be attested by initials of the tenderer. Overwriting of figures is not permitted. Failure to comply with either of these conditions will render the tender void. After submission of the tender no advice or any change in rate or conditions will be entertained. All the rates should be quoted both in figures and words.

In-case of any discrepancy in rates quoted in words/figures and the amounts, the rate quoted in words shall be taken as final and binding.

8. The tender shall be valid for a period of 30 DAYS from the date of opening.

9 TOTAL SECURITY DEPOSIT: shall comprise of:

a. Earnest Money deposit
b. Initial Security deposit
c. Retention money

9.1 The intending tenderer shall deposit with **The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in**, by Demand Draft a sum of RS. Damages, in the event of any evasive/direct refusal or delay in starting the work and or signing the contract. The deposit of the unsuccessful tenderers will be returned, without interest, immediately after a decision is taken regarding the award of the contract. The Earnest money of the successful tenderer will be adjusted towards Security Deposit. A tender not accompanied by Earnest money deposit will not be considered.

9.2 The successful tenderer will have to pay further sum equivalent to 2% of his contract value, less EMD already paid, as initial Security Deposit (ISD) by means of a D.D./Banker's cheque in favour of **The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in** within 14 days from the date of issue of work order to commence work. The EMD and Security deposit thus paid shall be held by the State Bank of India as Security deposit, for due execution and fulfillment of the contract, till the completion of the work and defect liability period in all respects and shall not bear any interest.

9.3 Together with the money paid under clause 9.1 & 9.2 above, further retention of 10% of the value of the work done will be deducted from every running bill, till total retention, including EMD and initial SD paid earlier, comes to 5% of the contract value, and same shall be held by the Bank as Total Security Deposit. On the Architect's certifying the completion of work, 50% of the total security deposit shall be released to the contractor along with the final certificate of payment, and the balance amount will be retained in the manner stated elsewhere for a further period of twelve months after the completion date recorded in completion certificate, issued by the Architects and agreed to by the Bank. Also refer condition 23(ii) on Page 7 of Volume 1.

10. Within one month of the receipt of intimation from the Architects of the acceptance of his/their tender, the successful tenderer shall be bound to sign an agreement, on a stamp paper in accordance with the Draft Agreement and conditions of contract attached herewith, but the work order or the written acceptance of a tender by the Employer will constitute a binding agreement between the Employer and the person tendering whether such formal contract is or not signed by the contractor.

11. All compensation or other sums of money payable by the contractors to the clients, under the terms of this contract, may be deducted from the Security Deposit or from any sum that may be or may become due to the contractor on any account whatsoever, and in the event of the Security deposit being reduced by reasons of any such deductions, the contractor shall within 15 days of being asked to do so make good in cash or cheque, any sum which have been deducted from his security deposit.

12. The rates quoted by the Contractor shall include all eventualities, such as heavy rain, sudden floods, accidents, fire, riots etc., which may cause damage to the executed work or which may totally wash out the work. Until the completion certificate is issued to the Contractors, neither the Architect nor the clients will be responsible for such damage or wash out of the construction work.

13. Time is the essence of the contract. The work should be completed **within 60 DAYS** from the date of commencement. The date of commencement shall be within ONE WEEK after confirmation.

a) The day two weeks from the date of issue of work order.

Or

b) The day on which the contractor receives the possession of the site whichever is later.

Or

c) The contractor is asked in writing to take over the possession of the site.

The successful contractor will have to give a CPM/PERT chart of various activities of work to be done so that the work gets completed within the stipulated time. The chart shall be submitted within 15 days from the date of acceptance of the tender.

14. If the contractor fails to complete the work by the Scheduled date of completion or within any sanctioned extended time, he will have to pay liquidated damages at the rate of ½% of contract amount for each week of delay the work remains incomplete beyond the completion(Original/extended date), subject to maximum of 5% of the contract value (without extra items) as per clause 31 of the General conditions of contract.

15. The quantities contained in the Schedule are only indicative. The work as actually carried out and done will be measured up from time to time, for which payment will be made subject to the terms and conditions of contract.

16. The unit prices shall be deemed to be fixed prices. In case of extra items, a record of labour charges paid shall be maintained and shall be presented every month for extra/substituted items regularly to the Architects for checking. The settlement will be made based on figures arrived at jointly and taking into account unit prices of items of work mentioned in the contract assigned to the successful tenderers. In case, of extra items, where similar or comparable items are quoted in the tender, extra rates shall invariably be based on those tender rates to the extent reasonable.

17. Our clients, **The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in**, do not bind themselves to accept the lowest or any tender and reserve to themselves the right to accept or reject any or all tenders, either in whole or in part, without assigning any reason whatsoever for doing so.

18. No employee of the SBI Bank is allowed to work as a contractor for a period of two years of his retirement from bank service, without the previous permission of the bank. This 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 bank as aforesaid before submission of the tender or engagement in the contractor's service.

19. The tenderer, apart from being a competent contractor must associate himself with agencies of the appropriate class who are eligible to tender for (1) INTERIOR (2) Air-conditioning works (3) Fire fighting systems & (6) Interiors (fixed furniture), as the case maybe.

20. Release of security deposit:

i) 50% of the total security deposit will be released along with the final certificate of payments as stipulated under para 9 on page 12 of Volume I, Appendix to General Conditions of contract,

ii) Balance 50% of Retention money will also be released as noted under (i) above, subject to submission of a Bank Guarantee, to the satisfaction of SBI for an equivalent amount. This Bank Guarantee shall be valid up to completion of defects/removal liability period plus 3 months.

3. ARTICLES OF AGREEMENT

ARTICLES OF AGREEMENT made the _____ day of _____ 2024 between_____ _____of_____ _____(hereinafter called the "Employer") of the one part and _____of _____ (hereinafter called "The Contractor") of the other part, where as the Employer is desirous of getting the work of "_____" executed and has caused drawings, conditions of contract, specifications and schedule of quantities etc., describing the works prepared by **Not Applicable.**

AND WHEREAS the SAID DRAWINGS numbered as per list attached inclusive of and the conditions of contract, specifications and schedule of quantities etc., have been signed by or on behalf of the parties hereto.

AND WHEREAS THE CONTRACTOR has agreed to execute upon and subject to the conditions set forth in the Schedule hereto (hereinafter referred to as "Said Conditions") the works shown upon the said drawings and described in the same specifications and included in the said schedule of quantities for such sum as may be ascertained to be payable in terms of the Bills of Quantities, and which sum is estimated to be Rs. _____ (Rupees_____ (hereinafter referred to as "Said Contract Amount").

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. In consideration of the said sum to be paid at the times and in the manner set forth in the said conditions, the contractor shall upon and subject to the said conditions, execute and complete the work shown in the said drawings and described in the said specifications.

2. The Employer shall pay the contractor the said sum or such sums as shall become payable hereunder at the times and in the manner specified in the said conditions.

3. The term "Architect" in the said conditions shall mean the said **Not Applicable**, or in the event of their ceasing to be the Architect for the purpose of this contract, such other person as shall be nominated for that purpose by the Employer , not being a person to whom the contractor shall object for reasons considered to be sufficient by the Arbitrator mentioned in the said conditions provided always that no persons subsequently appointed to be the Architect under this contract shall be entitled to disregard or over-rule any previous decision or approval or direction given or expressed by the Architect for the time being.

4. Tender documents containing work order Notice to the Contractor, Conditions of Contract, Appendix thereto, Special Conditions of Contract, Specifications and Schedule of Quantities with the rates entered therein, shall be read and studied as forming part of this agreement and the parties hereto shall respectively abide by and submit themselves to the conditions and stipulations and perform the agreement on their part respectively in such conditions contained.

5. The contract is neither a fixed lumpsum contract or a piece work contract, but is a contract to carry out work in respect of the entire works to be paid for according to actual measured

quantities, including variations from BOQ at the rates contained in the Schedule of rates and Probable bill of quantities or as provided in the said conditions.

6. The Employer through the Architect, reserves to himself the right of altering the drawings and natures of the work, of adding/substitution to or omitting any items of work or having portions of the same carried out through alternate agencies without prejudice to this contract.

7. Time shall be considered a the essence of this agreement and the contractor hereby agrees to commence the work soon after the site is handed over to him but within 15 days reckoned from the date of issue of work order to execute the work, as provided for in the said conditions and complete the entire work in **60 DAYS** subject to nevertheless to the provisions for extension of time.

8. This agreement and contract shall be deemed to have been made in Hyderabad and any questions or dispute rising out of or in any way connected with this Agreement and Contract shall be deemed to have arisen in Hyderabad and only the courts in Hyderabad shall have jurisdiction to determine the same. The limitation period will be 30 DAYS from the date of dispute having arisen.

AS WITNESS our hand this _____ day of _____ 2024

Signed by the said in the presence of:

WITNESS: SIGNATURE

NAME :

ADDRESS: EMPLOYER

WITNESS: SIGNATURE

NAME :

ADDRESS:

4. APPENDIX TO GENERAL CONDITIONS OF CONTRACT

1.	Earnest Money Deposit (EMD)	:	RS. 1,20,000/-
2.	Initial Security Deposit (ISD)	:	2% of contract value including EMD.
3.	Period of completion	:	60 DAYS
4.	Defects Liability period	:	12 months after completion as Recorded in the completion certificate
5.	Agreed Liquidated Damages	:	½% of contract amount per week of delay subjected to a maximum of 5% of contract value.
6.	Period of final measurement	:	Three months after completion as recorded in the completion certificate.
7.	Minimum value of work to be Executed for issue of interim Certificates for making payment	:	40 Lakhs each running bill
8.a)	Retention money from each bill	:	10% of gross value of each interim bill, subject to 8(b) below.
b)	Total retention money including Earnest money and initial security Deposit	:	5% of the contract value.
9.	Release of Security deposit after Virtual completion.	:	50% of the total security to be released along with final certificate of payment, but only after removing all his materials, equipment, labour, huts/force, temporary sheds/stores, all his installations, machinery etc., from the site. Balance payment to be released on submission of Bank Guarantee on any Scheduled Bank, Other than SBI, and its associated banks in the prescribed manner and valid till the completion of defects liability period of 12 months.
10.	Period for honouring certificate	:	15 working days from date of Architects certificate of payment for interim bills and 45 working days for final certificate.

WITNESS :

DATE : SIGNATURE OF THE CONTRACTOR WITH DATE

5. INDEX TO GENERAL CONDITIONS OF CONTRACT

23. Removal of improper work and materials
24. Defects after completion
25. Certificate of virtual completion
26. Other persons engaged by the Employer
27. Insurance in respect of damage to persons and property
28. Contractor's All risk policy
29. Minimum amount of third party Insurance
30. Commencement and completion
31. Delay and extension of time
32. Damages for Non-completion
33. Failure by contractor to comply with Architect's instructions
34. Architect's delay in progress.
35. Supervision of works
36. Prime cost and provisional sums
37. Certificates and payments
38. Notices
39. Termination of contract by the Employer.
40. Termination of contract by the contractor.
41. Matters to be finally determined by the Architects
42. Settlement of dispute (Arbitration)

6. GENERAL CONDITIONS OF CONTRACT

INTERPRETATIONS:

In constructing these conditions and the specifications, schedule of quantities and contract agreement, the following words shall have the meaning herein assigned to them except where the subject or context otherwise required:

a. "Employer" shall mean **The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in** and shall include his/their heirs, legal representatives, assignees and successors.

b. "Contractor" shall mean _____
_____
and shall include his/their heirs, legal representatives, assignees and successors.

c. "Banks Engineer" shall mean any Engineer who is employed by SBI or any other Engineer appointed from time to time by the Employer, and certified in writing to the Architect and the contractor, to act as Engineer for the purpose of the Contract in place of the said engineer.

d. "Architects" shall mean any Engineer/ representative appointed by **Not Applicable**.

e. "Works" shall mean the works to be executed in accordance with contract specifications, quantities etc.

f. "Contract" shall mean the Articles of Agreement, the General Conditions, Special Conditions, the Appendix, the Schedule of Quantities, Specifications and drawings, work order etc., attached hereto and duly signed.

g. "Contract Price" shall mean the sum named in the Tender, subject to such amount additions thereto or deductions there from as may be made under the provisions, hereinafter contained.

h. "Site" shall mean the Premises, on which the works are to be, provided, by the Employer or Architect for the purpose of the Contract.

i. "Drawings" shall mean the drawings referred to in the contract etc., and any modifications of such drawings approved in writing by the Architect and the Bank and such other drawings as may from time to time be furnished or approved in writing by the Architect and Employer.

j. "Notice in Writing" or written notice shall mean a notice in writing, typed or printed characters sent (unless delivered personally or otherwise provided to have been received)

by registered post to the last known private or business address or registered office of the address and shall be deemed to have been received, when in the ordinary course of post, it would have been delivered.

k. "Act of Insolvency" shall mean any Act of Insolvency as defined by the Presidency Towns Insolvency Act, or the Provincial Insolvency Act or any act amending such original.

l. "Net Prices" if in arriving at the Contract Amount, the contractor has added to or deducted from the total of the items of the Tender any sum, either as a percentage or otherwise, then the net price of any items, in the tender, shall be the sum arrived at by adding to or deducting from the actual figure appearing in the Tender, as the price of that item, a similar percentage or proportionate sum. Provided always that in determining the percentage or proportion of the sum so added or deducted by the contractor, the total amount of any Prime cost items and provisional sums of money shall be deducted from the total amount of the Tender. The expression "net rates" or "net prices" when used with reference to the contract or account shall be held to mean rates or prices so arrived at.

m. "Virtual Completion" shall mean that the building is in the opinion of the Architect and Employer, sufficiently completed for occupation by the Employer, in relation to the scope of work of this contract.

n. Words importing persons include firms and corporations. Words importing the singular only, also include the plural and vice versa, where the context requires.

SCOPE OF CONTRACT:

The contractor shall carry out and complete the said work in every respect in accordance with this contract with the directions of and to the satisfaction of the Architect and Employer. Architect, with the approval of the Employer, may issue further drawings and/or written instructions, details, directions and explanations, which are hereafter collectively referred to as "Architect's Instructions" in regard to:

a. The variations or modifications of the designs, quality or quantity of works or the addition or omission or substitution of any work.

b. Any discrepancy in the drawings or between the Schedule of Quantities/ or drawings and/or specifications etc.

c. The removal and/or re-execution or any works executed by the contractor.

d. The removal from the site of any material brought there on by the contractor, and the substitution of any other material there from.

e. The dismissal from the works of any person employed thereupon.

f. The opening up for inspection of any work covered up.

g. The amending and making good of any defects under clause 24 "Removal of Improper works and Materials".

The contractor shall forthwith comply and fully execute any work comprised in such Architect's instruction, provided always that instructions, directions and explanations given to the contractor or his representative upon the works by the Architect shall, if involving a variation, be confirmed in writing by the contractor or within 7 days, and if not dissented from in writing within further 7 days by the Architect, such shall be deemed to be the Architects instructions within the scope of contract.

If compliance with the Architect's instructions as aforesaid involved work and/or expense and/or loss beyond that contemplated by the contract, then unless the same were issued owing to some breach of this contract by the contractors, the employer shall pay to the Contractor on the Architect's certificate, the price of the said work (as an extra to be valued as herein after provided) and/or expense and/or loss.

DRAWINGS AND SPECIFICATIONS:

The works shall be carried out to the entire satisfaction of the EMPLOYER and the Architect, in accordance with the signed contract document, drawings and specifications and such further drawings and details as may be provided by the Architect, and in accordance with such written instructions, directions and explanations, as may from time to be given by the Architect and the SBI, whose decision as to the sufficiency and quality of the work and materials shall be final and binding on the contractor. If the work shown on any such further drawings or work that may be necessary to comply with any such instructions, directions or explanations, be in the opinion of the contractor outside the scope of work or reasonably could not be inferred from the contract, he shall before proceeding with such work, give notice in writing to this effect to the Architect and the SBI, and in the event of the Architects and the SBI agreeing to the same in writing, the contractor shall be entitled to an allowance in respect of such extra work as an authorized extra. If the Architect and the contractor fail to agree, as to whether or not there is an extra, then, if the Architect decided that the contractor is to carry out the said work, the contractor shall do so, and the question whether or not there is any extra and if so, the amount thereof, shall failing agreement be settled by Arbitration as hereinafter provided, but such reference shall in no way delay the fulfillment of this contract.

No drawing shall be taken as in itself an order for variation, unless in addition to the Architect's signature, it bears express works stating that it is intended to be such an order or bears a remark "VALID FOR CONSTRUCTION". No claim for payment for extra work shall be allowed, unless the said work shall have been executed under the provisions of clause 8 (Authorities, notices, patents, rights and royalties) or by the authorities, of directions in drawing of the Architect as herein mentioned.

One complete set of the signed drawings and a copy of contract document (specifications and schedule of quantities etc) shall be furnished by the Architect to the contractor. The Architect shall furnish within such time as he may consider reasonable, one copy of any additional drawings, which in his opinion may be necessary for the execution of any part of the work. Such copies shall be kept at the works, and the Architect or hiss representatives shall, at all reasonable times have access to the same and shall be returned to the Architect by the Contractor, before the issue of the final certificate. The original contract documents shall remain in the custody of employer.

Please refer clause 36 of Special conditions of contract.

SCHEDULE OF QUANTITIES:

The Schedule of Quantities unless otherwise stated shall be deemed to have been prepared in accordance with the Standard Procedure of the Architects and shall be considered to be approximate and no liability shall attach to the Architect for any error/variations that may be discovered therein.

Please refer Clause 5, 6 and 40 of Special conditions of contract.

SUFFICIENCY OF SCHEDULE OF QUANTITIES:

The contract shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the prices stated in the schedule of Quantities and/or the Schedule of Rates and Prices, which rates and prices shall cover all things necessary for the proper completion of the works.

Please refer clauses 5, 6 and 39 of Special Conditions of Contact.

ERRORS IN SCHEDULE OF QUANTITIES:

Should any error appear in the Schedule of Quantities, other than in the Contractor's prices and calculations, it shall be rectified and such rectification shall not vitiate the contract but shall constitute a variation of the contract and be dealt with as an authorised extra or deduction.

CONTRACTOR TO PROVIDE EVERYTHING NECESSARY:

The contractor shall provide everything necessary for the proper execution of works according to the true intent and meaning of the drawings, specifications and the Schedule of Quantities etc., taken together, whether the same may or may not be particularly shown or described there in, provided the same can be inferred therefrom. The several document forming the contract are to be taken as mutually explanatory to one another; detailed drawings and figured dimensions in preference to scale, and special conditions in preference to General conditions and particular specifications in preference to General specifications.

In case of discrepancy between the Schedule of Quantities, the specifications and/or the drawings, the following order of preference shall be observed:-

i) Description of Schedule of Quantities.
ii) Particular specifications and special condition, if any.
iii) Drawings.
iv) C.P.W.D. specifications.
v) Indian Standard specifications of B.I.S.

If there are varying or conflicting provisions made in any document forming part of the contract, the Architect shall be the deciding authority, with regard to the intention of the document and his decision shall be final and binding on the contractor.

Any error in description, quantity or rate in schedule of quantities or any omission there from shall not vitiate the contract or release the contractor from the execution of the whole or any part of the works expressed therein according to drawings and specifications or from any of his obligations under the contract.

The contractor shall make his own arrangements for providing water, for carrying out the work, at his own cost. If water from any source other than Municipal main is to be used for construction, the same shall be tested at the contractor's cost, and a report submitted to the Architect for his approval, before such water is used for the works. Temporary INTERIOR connections shall be obtained by the contractor to facilitate execution and completion of work at their cost and all the charges there of should be borne by them.

The contractor shall supply, fix and maintain at his cost, during the execution of any works, all the necessary scaffolding, staging, hoarding, watching and lighting during nights as well as by day required not only for the proper execution and protection of the said works, but also for the protection of the public and the safety of any adjacent road, streets, cellars, vaults, pavements, walls, houses, buildings and all other erections, matters or things. The Contractor shall take down and remove any or all such scaffolding, staging, etc., as occasion shall require or when ordered or so to do, and shall fully reinstate at his own cost and make good all the matters and things disturbed during the execution of the works to the satisfaction of the Architects.

Please refer clause 7 of Special conditions of contract.

AUTHORITIES, NOTICES, PATENT RIGHTS AND ROYALTIES:

The contractor shall conform to the provisions of the statutes relating to the works, and to the regulation and by laws of any local authority, and of any water, lighting and other companies or authorities, with whose systems the structures are proposed to be connected; and shall before making any variation from the drawings or specifications, that may be necessitated by so conforming, give to the Architects a written notice, specifying the variations proposed to be made and the reason for making it and apply for instruction thereon. In case, the contractor shall not within ten days receive such instructions, he shall proceed with the work conforming with the provisions, regulations or by laws in question.

The contractor shall bring to the attention of the Architect all notices required by the said acts, regulations or bylaws to be given to any authority, and pay to such authority or to any Public Officer all fees that may be properly chargeable in respect of the works, and lodge the receipts with the Architects.

The contractor shall indemnify the Employer against all claims in respect of patent rights, designs, trademarks or name or other protected rights in respect of any constructional plant, machine, work or material used for or in connection with works or temporary works and from and against all claims, demands, proceedings, damages, costs, charges, and expenses whatsoever in respect thereof or in relation thereto. The Contractor shall defend all actions arising from such claims, unless he has informed the Architects, before any such infringement and received their permission to proceed, and shall himself pay all royalties, license fees, damages, cost and changes of all and every sort that may be legally incurred in respect thereof.
Please refer clause 23 of special conditions of contract.

9. **MATERIALS AND WORKMANSHIP TO CONFORM DESCRIPTION:**

All materials and workmanship shall, so far as procurable be of the respective kinds specified in the Schedule of Quantities and/or specifications and in accordance with the Architect's instructions and the contractor shall on the request of the Architects furnish to them all invoices, accounts, receipts and the other vouchers to prove that the materials comply therewith. The contractor shall at his own cost arrange for and/or carry any test of any materials, which the Architect & Employer may require. The costs of materials used for testing, packing, transportation and testing shall be borne by the contractor and his quoted rates/amounts shall include all such expenses/contingencies.

9a. In case of non-availability of specified Make/brand of any material the alternate make/brand will be given by the Employer/Architect.

10. THE SETTING OUT:

The Contractor shall at his own expense, set out the works accurately in accordance with the plans and to the complete satisfaction of the Architect. The Contractor shall be solely responsible for the true and perfect setting out of the same and for the correctness of the positions, levels, dimensions and alignment of all parts thereof. If at any time any error shall appear during the progress or on completion of any part of the work, the contractor shall at his cost rectify such error if called upon to the satisfaction of the Architects/Employer. The work shall from time to time be inspected by the Architect and/or his representatives, but such inspections shall not exonerate the contractor in any way form his obligation to remedy any defects, which may be found to exist at any stage of the work or after the same is completed, at his own cost.

11. **REMOVAL OF ALL OFFENSIVE MATTERS:**

All debris arising out of the work shall be disposed off as per the rules and regulations of the Local authorities concerned.

12. **OPENING UP WORKS:**

In the event of the Architect / Employer feels that the work is not carried out as per tender specifications, contractor at his cost shall open the concealed work at his cost for which no Extra cost will be paid.

CONTRACTOR'S SUPERINTENDENCE & REPRESENTATIVE ON THE WORKS:

The contractor shall give all necessary personal superintendence during the execution of the works and so long thereafter as the Architect may consider it necessary until the expiration of the "Defects Liability Period" stated in clause 25. The Contractor shall meet the Architect or his representative, whenever required and so informed by the Architect.

The Contractor shall maintain and be represented at site at all times, while the work is in progress, by a responsible and efficient foreman, approved by the Architect and who must thoroughly understand all the trades entailed and be constantly in attendance while the men are at work. Any directions, explanations, instructions or notices give by the Architect & Employer to such foreman shall be deemed to have been given to the contractor and shall be binding as such on the

contractor. The Foreman shall be thoroughly conversant with the English language and should be able to read, write and speak English.

DISMISSAL OF WORKMEN:

The contractor shall on the request of the Architect and Employer immediately dismiss from the works any person employed thereon who may, in the opinion of the Architect and Employer be unsuitable or incompetent or who may misconduct himself, and such person shall not again be employed or allowed on the works without the permission of the Architect & Employer.

ACCESS TO WORKS:

The Architect, the Employer and any person authorised by them shall at all reasonable times have free access to the works and to the workshops, factories or other places where materials are being prepared or constructed by the contract and also to any place where the materials are lying or from which they are being obtained. The Contractor shall give every facility to the Architect and the Employer and their representatives for inspection and examination and test of the materials and workmanship. No person, unless authorised by the Architect or the Employer, except the representatives of Public authorities, shall be allowed on the works at any time. If any work is to be done at a place other than the site of works, the contractor shall obtain the written permission of the Architect for doing so.

EMPLOYER'S REPRESENTATIVE/PMC:

The Employer may appoint an assistant to the Engineer, any Site Engineer or Project Management Consultant (PMC), who shall be the representative of the Employer. The duties of the Employer's representatives are to watch and supervise the works and to test any materials to be used and of workmanship employed in connection with the works. He shall have no authority either to relieve the contractor of any of his duties or obligations under the contract, or except those expressly provided hereunder, to order any work involving delay or any extra payment by the Employer or any variation of or in the works.

The contractor shall afford the Employer's representative every facility and assistance for examining the works and materials and checking and measuring item and materials. Neither the Employer's representative nor any assistant to the Architect shall have power to revoke, alter, enlarge or relax the requirements of this contract, or to sanction any new-work, additions, alterations, deviations or omissions unless such an authority may be specially conferred by a written order of the Architect and Employer.

The Employer's representative shall have to give notice to the Contractor or his representating about the non-approval of any work or materials and such works shall be suspended or the use of such materials should be discontinued until the decision of the Architect is obtained. The work will from time to time be examined by the Architect or the Employer's representative, but such examinations shall not in any way exonerate the contractor from the obligation to remedy any defects, which may be found to exist at any stage of the work or after the same is completed. Subject to the limitations of the clause, the contractor shall take instructions only from the Architect and Employer.

ASSIGNMENT OF SUB-LETTING:

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

SUB-CONTRACTORS:

All specialists, merchants, tradesmen, and others, executing any work or supply and fixing any goods for which prime cost prices or provisional sums are included in the Schedule of Quantities and/or specifications, who may be nominated or selected by the Architect and employer and hereby declared to be sub-contractors employed by the Contractor, are herein referred to as nominated sub-contractors. No nominated sub-contractors shall be employed on or in connection with the works, against whom the contractor shall make reasonable objection or (see where the Architect and contractor shall otherwise agree), who will not enter into a contract provided.

a. The nominated sub-contractors shall indemnify the contractor against the same obligations in respect of the sub-contract as the contractor is under, in respect of this contract.

b. The nominated sub-contractors shall indemnify the contractor against claims in respect of any negligence by the sub-contractor, his servants or agents or any misuse by him or them of any scaffolding or other plant, the property of the contractor or under any Workman's Compensation Act in force.

c. Payment shall be made by the contractor to the nominated sub-contractor, within 14 days of receipt of the Architect's certificate, provided that before any certificate is issued, the contractor shall upon request furnish to the Architect proof that all nominated sub-contractor's account included in the previous certificates have been duly discharged; in default whereof the Employer may pay the same upon a certificate of the Architect and deduct the amount thereof from any sums due to the contractor. The exercise of this power shall not create any contract between Employer and Sub-contractor.

VARIATIONS NOT TO VITIATE CONTRACT:

The contractor shall when directed in writing by the Architect, omit from or vary works shown upon the drawings or described in the specifications or included in the priced schedule of quantities, but the contractor shall not make any alterations or additions to or omissions from the works or any deviations from the provisions of the Contract without such authorizations or direction in writing from the Architect and Employer.

No claim for any extra item or deviations shall be allowed, unless it shall have been executed by the Authority of the Architect and Employer as herein mentioned. Any such extra item or deviation is hereinafter referred to as an authorised extra item or deviation. No variations i.e., additions, omissions or substitutions shall vitiate the contract.

The rate of items not included in the bill of quantities shall be settled by the Architect and Employer in accordance with the provisions of clause 21, hereof.

MEASUREMENTS OF WORKS:

The Architect/PMC may from time to time intimate the Contractor that he requires the works to be measured and the contractor shall forthwith attend or send a qualified agent to assist PMC/Architect's representative in taking measurements and calculations, and to furnish all particulars or give all assistance required by either of them.

Should the contractor no attend or neglect or omit to send such an agent, then the measurements and calculations, and to furnish all particulars or give all assistance required by either of them.

Should the contractor not attend or neglect or omit to send such an agent, then the measurements taken by the PMC/Architects representative approved by them shall be taken to be the correct measurements. The mode of measurements wherever not mentioned in contract documents be taken in accordance with the Indian Standard of Method of measurements of building works (I.S.1200 – 1958) and its revisions, if any. In case of any discrepancy between various contract documents on mode of measurements, the mode given in Bill of Quantities will take precedence over others.

The contractor or his agent may at the time of measurement take such notes and measurements as he may require.

All authorised extra works, omissions and all variations made without the Architect's knowledge, if substantially sanctioned by him in writing shall be included in such measurements.

22. **PRICES FOR SUBSTITUTIONS/EXTRA ETC., ASCERTAINMENT OF:**

Should it be found after the completion of the works from measurements taken (in accordance with the previous paragraph) that any of the quantities or amounts specified for the works in the priced schedule of quantities of work thus ascertained are less or greater than the amounts and/or tender or that any variations, is made, and any substituted/ extra (new) items have been executed, the valuation of such quantities/items, amounts or variations, unless previously or otherwise agreed upon, shall be made in accordance with the following rules:

a. The net rates or prices in the original tender shall determine the valuation of the extra (additional quantities and or extra/substituted item of work), where that work is of a similar character and executed under similar conditions of the work priced therein. This applied to extra and substituted items of work to the extent, they are similar in nature to the items in the contract.

b. The net prices given in the original ender shall determine the value of the items omitted, provided if omissions vary the conditions under which any remaining items of work are carried out, the prices for the same shall be valued under thereof.

c. Where extra/substituted item of works are not of similar character (either partly & fully) and/or executed under similar conditions as aforesaid or where the omissions vary the conditions under which any remaining items of works are carried out or if the amount of any omission or additions relative to the amount of the whole of the contract works or to be any part thereof shall be such that in the opinion of the Architects the net rate or price contained in the priced schedule of quantities or tender or for any item of the work

involves less or more beyond that reasonably contemplated by the Contractor or is by reason of such omission or addition rendered unreasonable for in-applicable, the Architect shall fix in consultation with the Employer such other rates or prices as in the circumstances he shall think reasonable and proper, which shall be final and binding on the contractor. For extra and substituted items this will apply for portions of the items for which, items of similar nature are not available in the contract.

d. Where extra and or substituted items of work cannot be properly measured or valued, the contractor shall be allowed based on the net local day work rates and wages for the district and prevalent market rates for materials etc., at the time of ordering that item; provided that in either case vouchers for wages paid specifying the daily time (and if required by the Architect, the workmen's name) and materials employed at or before the end of the week following that in which the work has been executed.
The measurements and valuations in respect of the extra and substituted items of work shall be completed within the "Period of final measurement" or within 3 (three) months from the completion of the contract works as defined under clause No.26 (certificate of virtual completion. See Special Conditions of Contract Clause 44.

23. UNFIXED MATERIALS:

When any materials intended for the works shall have been placed at site by the contractor, such materials shall not be removed there from (except for the purposes of being used on the works) without the written authority of the Architect and Employer and when the contractor shall have received payment in respect of any certificate in which the architect shall have stated that he has taken into account the value of such unfixed materials on the works such materials shall become the property of the Employer and the Contractor shall be liable for any loss or damage to any such materials.

24. REMOVAL OF IMPROPER WORK AND MATERIALS:

The Architect shall, during the progress of the works, have power to order in writing from time to time the removal from the works, within such reasonable times as may be specified in the order, of any materials which in the opinion of the Architect and Employer are not in accordance with the specifications or the instructions of the Architect and Employer; and the substitution with proper materials and the removal and proper re-execution of any work, which has be executed with materials or workmanship, not in accordance with the contract/drawings and specifications or instructions etc., the contractor shall forthwith carry out such orders at his own cost. In case of default on the part of the contractor to carry out such orders, the Employer shall have the power to employ and pay other persons to carry out the same and all expenses consequent thereon or incidental thereto shall be borne by the Contractor, and shall be recoverable from the contractor by the Employer, or may be deducted by the Architect, from any money due or may become due to the contractor for this work or on any other account.
Instead of this procedure for work not done in accordance with the contract, the Architect and Employer may allow such work to remain, and in that case may make allowance for the difference in value together with such further allowance for damages to the Employer, as in his opinion may be reasonable. This allowance shall be recoverable from the contractor by the Employer, or may be deducted by the Architect, from any money due or may become due to the contractor for this work or on any other accounts. The decision of Architects in these matters shall be final and binding on the contractor.

25. **DEFECTS AFTER COMPLETION:**

Any defect, shrinkage, settlement or other faults which may appear with in the "Defects Liability Period" stated in the Appendix on Page 10 i.e. within 12 months after the virtual completion of the works arising in the opinion of the Architect and the Bank, from materials or workmanship not in accordance with the contract, shall upon the directions and writing of the Architect and Employer and within such reasonable time as shall be specified therein, be rectified and made good by the Contractor at his own cost. In case of default, the Employer may employ any other person to amend and make good such defects, shrinkage, settlements or other faults. All damages, loss and expenses consequent therein or incidental thereto shall be made good and borne by the contractor and such damage, loss and expenses shall be recoverable from him by the employer or may be deducted by the Employer, the damages, loss and expenses from any sums that may be due to the contractor or amount retained under condition 38 (Certificate and payment) and in event of the amount retained being insufficient recover the balance from the amount held against EMD & Security deposit under clause 10.1 & 10.2 on Page 5 or any other amounts due or may become due later.

26. **CERTIFICATE OF VIRTUAL COMPLETION:**

The contractors shall intimate in writing to the Architects, as and when the works are complete in all respects in order to enable the Architect to intimate the Employer to take possession of the same. The works shall not be considered as virtually completed, until the Architect has certified in writing that the same have been "Virtually completed" and accepted by the employed. The defects liability period shall commence, only from the date of such virtual completion certificate.

27. **OTHER PERSONS ENGAGED BY THE EMPLOYER:**

The Employer reserves the right to use the premises and any portions of the site for the execution of any work not included in this contract which he may desire to carry out through other persons, and the contractor is to allow all reasonable facilities for the execution of such work, except by special arrangement with the Employer. Such work shall be carried out in such a manner a not to impede the progress of the works included in the contract, and the contractor shall not be responsible for any damage or delay which may happen to or be occasioned by such work.

28. **INSURANCE IN RESPECT OF DAMAGE TO PERSONS AND PROPERTY:**

The contractor shall be responsible for all injury to persons, animals or things and for all structural and decorative damage to property, which may arise from operation or neglect of himself or any of his or sub-contractor's employees, whether or any other cause whatever in any way connected with the carrying out of this contract. This clause shall be held to include, interalia any damage to buildings, whether immediately adjacent or otherwise, any damage to roads, caused to the buildings and works forming the subject of this contract by frost or other inclement weather. The contractor shall indemnify the employer and hold him harmless in respect of all and any expenses arising from any such injury or damage to persons or property as aforesaid and also in respect of any claim made in respect of injury or damage under any acts of government or otherwise, and also in respect of any award of compensation or damages consequent upon such claim.

The Contractor shall reinstate all damages of every sort mentioned in this clause, so as to deliver up the whole of the contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of third parties.

The contractor shall indemnify the Employer against all claims which may be made against the Employer, by any member of the Public or other party, in respect of anything which may arise in respect of the works or in consequence thereof and shall at his own cost, effect and maintain until one month after the works are taken over by the Employer or three months after the date of completion of the contract with an approved office, a policy of Insurance in the joint names of the Employer and the contractor against such risks and signing of the contract. The contract shall also indemnify the employer against all claims which may be made upon the Employer whether under the Workmen's compensation act or any other statute in force during the currency of this contract or at common law in respect of any employees of the contractor or of any sub-contractor and shall at his own expense effect and maintain until one month beyond the virtual completion of the contract, with an approved office. A policy of Insurance in the joint names of the Employer and the Contractor against such risks and deposit such policy or policies with the Architects from time to time, during the currency of the contract. In default of the contractor insuring as provided above, the Architect on behalf of the Employer may so insure and may deduct the premiums paid from any money due or which may become due to the contractor.

The contractor shall be responsible for anything which may be excluded from the Insurance Policies above referred to and also for all other damages to any property arising out of and incidental to the negligent or defective carrying out of this contract however, such damage shall be caused.
The Contractor shall also indemnify the Employer in respect of any costs, charges or expenses arising out of any claim or proceedings and also in respect of any Award of or compensation of damages arising therefrom.

The Employer with the concurrence of the Architect shall be at liberty and is hereby empowered to deduct the amount of any damages, compensations, costs, charges and expenses arising or occurring from or in respect of any such claims of damages from any sums due or to become due to the contractor.

29. CONTRACTOR'S ALL RISK POLICY:

The contractor shall within 14 days from the date of commencement of the work insure the works at his cost and keep them insured until one month after the works are taken over by the Employer or three months after the date of completion whichever is earlier, against loss or damage by fire and usual risks other than fire against which insurers generally provide cover in a CONTRACTOR'S ALL RISK POLICY, with an insurer to be approved the Architects, in the joint names of the Employer and contractor (the name of the former being placed first in the policy), progressively for the full amount of the contract, in three stages, beginning with 1/3 of the contract value, and for any further sum as called upon to do so by the Architect, with the prior written consent of the Employer, the premium of such further sum being allowed to the contractor as an authorised extra. Such policy shall cover the property of the Employer only and Architects and surveyor's fees for assessing the claim and in connection with his services generally in reinstatement and shall not cover any property of the contractor of any subcontractor or employee. The contractor shall deposit the policy and receipts for the premiums paid with the Architects, within twenty one days of the date of commencement of work, unless otherwise

instructed, as provided above failing which the employer or the Architect on his behalf may insure and may deduct the premium paid from any money that may be due or that may become due to the contractor. The contractor shall as soon as the claim under the policy is settled, or the work reinstated by the insurers should they elect to do so, proceed with all due diligence with the completion of the works in the same manner as though the fire or other such risk had not occurred and in all respects under the same conditions of contract.

The contractor in case of rebuilding or reinstatement after fire or other such usual risk shall be entitled to such extension of time for completion as recommended by the Architect.

Please refer Special Conditions of Contract, clauses.

30. **MINIMUM AMOUNT OF THIRD PARTY INSURANCE:**

Such insurance shall be affected with an insurer and in terms approved by the SBI which approval shall not be reasonably withheld and for at least the amount stated below. The contractor shall, whenever required, produce to the Architect/Consultant the policy or policies of insurance cover and receipts for payment of the current premium.

The minimum insurance cover for physical property, injury, and death is Rs. 20.00 lakhs per occurrence with the number of occurrences limited to four. After each occurrence contractor will pay additional premium necessary to make insurance valid for four occurrences always.

31. **COMMENCEMENT AND COMPLETION:**

The contractor shall be allowed admittance to the site on the "Date of Commencement" stated in the Appendix, and he shall thereupon and forthwith begin the works and shall regularly proceed with and complete the same (except such painting or other decorative work as the Architect may desire to delay) on or before the 'Day of Completion" started in the Appendix subject nevertheless to the provisions for extension of time hereinafter contained.

Refer clause 9 & 36 of Special Conditions of Contract.

32. **DELAY AND EXTENSION OF TIME:**

If in the opinion of the Architect the works be delayed:

a. by force majeure, or

b. by reason of any exceptionally inclement weather, or

c. by reason of proceedings taken on threatened by or dispute with adjoining or neighbouring owners or public authorities arising otherwise, than through the contractor's own default, or

d. by the works or delays of the contractors or tradesmen engaged or nominated by the Employer or Architect and not referred to in the Schedule of Quantities and/or specifications, or

e. by reason of civil, commotion, local combination of workmen or strike or lock-out affecting any of the buildings/traders, or

f. by reason of the Architect's instructions as per clause 2, or

g. In consequence of the contractor not having in due time, necessary instructions from the Architect, for which he shall have specifically applied in writing ahead of time, giving reasonable time to prepare such instructions.

The Architect shall make a fair and reasonable assessment for extension of time, for completion of the contract works which may be approved by the Employer.

In case of such strike or lock-out, the contractor shall as soon as possible, give written notice thereof to the Architect, but the contractor shall nevertheless constantly use his endeavours to prevent delay and shall do all that may reasonably be required, to the satisfaction of the Architect to proceed with the work.

33. DAMAGES FOR NON-COMPLETION:

If the contractor fails to complete the works by the date stated in clause 31 (date of completion) or within any extended time certified under clause 32 (extension of time) and if the Architect shall certify in writing on or before the date of issue of the certificate for the last payment to which the contractor may become entitled hereunder that the works could have been reasonably completed by the said date or within the said extended time, then the contractor shall pay to the Employer or allow the employer to recover from dues to the contractor on any account the sum stated in clause 16 of "Notice to contractors" (Page 6) (liquidated damages and not by way of penalty), subject to a maximum amount of 5% as stated in Appendix of General Conditions of contract (page 10) and as stated in clause 16 of "Notice to contractors"(Page 6) and such damages may be deducted from any money due or which may become due to the contractor.

The deduction of such sums shall not, however, absolve the contractor of his responsibility and obligations to complete the work in its entirety.

Please refer clauses 9 & 36 of special conditions of contract.

34. FAILURE BY CONTRACTOR TO COMPLY WITH ARCHITECT'S INSTRUCTIONS:

If the contractor after receipt of written notice from the Architect requiring compliance with such further drawings and/or Architects instruction, fails within seven days to comply with the same, the Architect and Employer may employ and pay other persons to execute any such work whatsoever as may be necessary to give effect thereto and all costs incurred in connection therewith shall be recoverable from the contractors by the employer on a Certificate by the Architect as a debit or may be deducted by him from any money due or which may become due to the contractors.

35. ARCHITECT'S DELAY IN PROGRESS:

The Architect may delay the progress of the works in case of rains or otherwise, without vitiating the contract and grant such extension of time with the approval of the Employer for the

completion of the contract as he may think proper and sufficient in consequence of such delay, and the contractor shall not make any claim for compensation or damage in relation thereto.

36. **SUSPENSION OF WORKS:**

If the contractor, except on account of any legal restraint upon the employer preventing the continuance of the works, or on account of any of the causes mentioned in the clause "Extension of time" or in the case of certificate being withheld or not paid when due, shall suspend works or in the opinion of the Architects, shall neglect or fail to proceed with due diligence in the performance of his part of the contract or if he shall more than once make default in the respects mentioned in clause 24 (removal of improper work and materials), the Employer through the Architect shall have the power to give notice in writing to the contractor required that the works be provided within a reasonable manner, and with reasonable despatch, such notice shall not be unreasonably given and must signify that it purports to be a notice under the provisions of this clause and must specify the acts or defaults on the part of the contractor upon which it is based. After such notice shall have been given, the contractor shall not be at liberty to remove from the site of works, or from any ground contiguous thereto, the site of works, or from any ground contiguous thereto, any plant or materials belonging to him which shall have been placed thereon for the purpose of work, and the Employer shall have lien upon such plants and materials to subsist from date of such notice being given until the notice shall has been complied with, provided always that such line shall not under any circumstances subsist after the expiration of 30 (thirty) day from the date of such notice given, unless the employer shall have entered upon and taken possession of the works and site, as hereinafter provided.

If the contractor shall fail for seven days after such notice has been given, to proceed with the works as therein prescribed, the Employer may enter upon and take possession of the works and site, and of all such plants, machinery and materials thereon intended to be used for the works, and the Employer shall retain and hold a lien upon all such plants, machinery and materials until the work shall have been completed, under powers hereinafter conferred upon him;

If the Employer shall exercise the above power, he may engage any other person to complete the works and exclude the contractor, his agents and servants from entry upon or access to the same, except that the contractor or any person appointed in writing may have access at all times during the progress of the works to inspect, survey and measure the works. Such written appointments or a copy thereof shall be delivered to the Architects before the person appointed comes on to the works and the Employer shall take such steps as in the opinion of the Architect may be reasonably necessary for completion the works, without undue delay or expenses using for that purpose the plant, machinery and materials above mentioned in so far as they as they are suitable and adopted to such use.

Upon the completion of the works, the Architects shall certify the amount of the expenses properly incurred consequent on and incidental to the default of the contractor as aforesaid and in completion the works by other persons.

Should the amount so certified as the expenses properly incurred be less than amount which should have been due to the contractor upon the completion of the works by him, the difference shall be paid to the contractor by the Employer, should the amount of the former exceed the later, the difference shall be paid by the contractor to the Employer. The Employer shall not be liable to make any further payments or compensations to the contractor for or on accounts of the proper

use of the plant for the completion of the works under the provisions herein before mentioned other than such payments as is included in the contract.

After the works shall have been so completed by persons other than the contractor, under the provisions herein before contained, the Architect shall give notice to the contractor to remove his plan and all surplus materials as may not have been used in the completion of the works from the site.

If such plant and materials are not removed within a period of 14 days after the notice shall have been given, the Employer may remove and sell the same, holding the proceeds less the cost of the removal and sale, to the credit of the contractor. The Employer shall not be responsible for any loss sustained by the Contractor from the sale of the plant in the event of the Contractor not removing it after notice.

37. **PRIME COST AND PROVISIONAL SUMS:**

a. Where "Prime Cost" (P.C.) prices or provisional sums of money are considered for any goods or works in the specifications or Schedule of quantities or deviations hereof, the same are exclusive of any trade discounts, or allowances, discount for cash, or profit which the contractor may require and or carriage and fixing.

All goods or work, for which prime cost prices or provisional sums of money are considered may be selected or ordered from any manufacturer's or firms, at the discretion of the Architect or the Employer. The Employer reserves to himself the right of paying directly for any such goods or work and the Architect may deduct the said prices or sums from the amount of the contract. Should any goods or works for which prime cost prices or provisional sums are considered or portions of same be not required, such prices or sums, together with the profits allowed for such additional amount as the Contractor may have allowed for carriage and fixing will be deducted in full from the amount of the Contract. Whether the goods be ordered by the Contractor or otherwise, the contractor shall at his own cost fix the same, if called upon to do so, and the contractor shall also receive and sign for such goods and be responsible for their safe custody as and from the date of their delivery upon the works.

b. In cases in which provisional quantities of items/materials are contained in the contract, the contractor shall provide such materials and or execute such items to such amounts or to greater or lesser amounts as the Architect shall direct in his schedule of quantities.

c. No prime cost sum or sums (or any portion thereof) shall be included in any certificate for payment to the contractor until the receipted accounts relating to them have been produced by the contractor to the Architect. Such accounts shall show all discounts and any sum or sums in respect of such discounts shall be treated as a trade discount. Provided always, that should the contractor in lieu of producing such receipted accounts, request the Architect in writing to issue a certificate to the Employer for such sum or sums, due either on account or in settlement to a sub-contractor direct, the Architect shall, upon satisfying himself that the sub-contractor is entitled to the same, so issue the certificate and such sum or sums be deducted from the amount of the contractor, at the settlement of accounts and any profit or sum to which the contractor is properly entitled, in respect of such sub-contract, and which is in conformity with the terms of contract as though the amount of such certificates to the sub-contractor has been included in a certificate drawn in favour of the contractor.

d. If the contractor neither produces the receipt not gives authority to the Architect to issue a certificate in favour of such sub-contractor direct, the Architect may upon giving the contractor SEVEN DAYS NOTICE in writing of his intentions to do so, issue to the sub-contractor such certificate direct to the Employer and obtain a receipt from the sub-contractor, which receipt shall be deemed as a discharge for the amount of such certificates, as though given by the contractor. In such event, the contractor shall not be allowed any profit he may have added in the Schedule of Quantities upon such sub-contract.

e. The exercise of the option before referred to by the Contractor and the issue of certificates, as before described to sub-contractor direct of certificates by the Architect, shall not however, relieve the contractor from any of the liabilities in respect of insufficient, faulty of incompleted work of the sub-contractor for which he may be liable under the terms of the contract.

38. CERTIFICATES AND PAYMENTS:

The contractor shall be paid by the Employer after due checking and after making necessary correction from time to time, by installments under Interim Certificates to be issued by the Architect on account of the works executed by the contractor based on the joint measurements taken by the PMC, the Architects representative and the contractors representative when in the opinion of the Architect, work to the approximate value named in the Appendix on Page 10 as "Value of work for Interim Certificates", (or less at the reasonable discretion of the Architect & Employer) has be executed in accordance with the Contract, subject however, to a retention of the percentage of such value named in the Appendix hereto mentioned as "Retention Percentage for Interim Certificates", until the total amount retained shall reach the sum named in the appendix as Total Retention Money, after which time the installments shall be upto the full value of the work subsequently so executed plus such amount as he may consider proper on account of materials delivered upon the site by the contractor for use in the work and available on the date of billing.

And when the works have been virtually completed and the Architect shall have certified in writing that they have been so completed, the contractor shall be paid by the Employer after satisfying himself in accordance with the certificate to be issued by the Architect, the sum of money named in the Appendix as 'Installment after Virtual Completion' being a part of the said Total Retention Money.

The Contractor shall be entitled to the payment of the final balance (balance security deposit/retention money) in accordance with the final certificate to be issued in writing by the Architect at the expiration of the period referred to as 'The Defects Liquidation Liability period' in appendix on page 10 hereto, from the date of virtual completion or as soon after the expiration of such period as the work shall have been finally completed and all defects made good according to the true intent and meaning hereof, whichever shall happen, provided always that the issue by the Architect of any Certificate during the progress of the works or after the completion shall not relieve the contractor from his liabilities in cases of fraud, dishonesty or fraudulent concealment relating to the works or materials or any matter dealt within the certificate, and in case of all such defects and insufficiencies in the works or materials, which reasonable examination would have disclosed. No certificate of the Architect shall by itself be conclusive evidence that any works or materials to which it relates are in accordance with the contract.

The Architect shall have power to withhold any Certificate, if the works or any parts thereof are not being carried out to his and employers satisfaction. The Architect may by any certificate make any correction in any previous Certificate, which shall have been issued by him. Payment upon the Architect's Certificates shall be made within the period named in the Appendix as 'Period of Honoring of Certificates, after such certificates have been delivered to Employer.

Please refer clause 37 & 46 of Special conditions of agreement.

39. **NOTICES:**

Notices for the Employer, the Architect, or the Contractor may be served personally or by being left at or sent by registered post to the last known place of abode or business of the party to whom the same is to be given or in the case of the contractor by being left on the works. In case of a company or corporation, notices may be served at or sent by registered post to the Registered Offices of the Company or Corporation. Any notice sent by registered post shall be deemed to be served at the time, when in the ordinary course of post it would be delivered.

40. **TERMINATION OF CONTRACT BY THE EMPLOYER:**

If the contractor being an individual or a firm, commit any act of insolvency, or shall be adjudged as Insolvent or being an incorporated Company shall have an order for compulsory winding up made against it or pass an effective resolution for winding up voluntarily or subject to the Supervision of the Court and of the Official Assignee of the Liquidator in such acts of insolvency or winding up, shall be unable within seven days after notice to him requiring him to do so, to show to the reasonable satisfaction of the Architect that he is able to carry out and fulfill the contract, and to give security thereof, if so required by the Architect.

Or if the contractor (whether an individual, firm or incorporated Co.) shall suffer execution to be issued.

Or shall suffer any payment under this contract to be attached by or on behalf of any of the creditors of the contractor.

Or shall assign or sublet this contract without the consent in writing of the Architects/Employer first obtained.

Or shall charge or encumber this Contract or any payments due or which may be due to the Contract there under.

Or if the Architect shall certify in writing to the Employer that the contractor,

a. has abandoned the contract or

b. has failed to commence the works, or has without any lawful excuse under these conditions suspended the progress of the works for 14 days, after receiving from the Architect written notice to proceed, or

c. has failed to proceed with the works with such due diligence and failed to make such due progress as would enable the works to be completed within the time agreed upon, or

d. has failed to remove materials from the site or to pull down and replace work for 7 days after receiving from the Architect written notice that the said materials or work were condemned and rejected by the Architect under these conditions, or

e. has neglected persistently to observe and perform all or any of the acts, matters or things by this contract to the observed and performed by the Contractors for 7 days after written notice shall have been given to the contractor requiring the contractor to observe or perform the same, or

f. has to the determent of good workmanship or in defiance of the Architect's instructions to the contrary, sublet any part of the contract.

Then and in any of the said cases the Employer with written consent of the Architect, may notwithstanding any previous waiver, after giving 7 days notice in writing to the contractor, determine the contract, but without hereby affecting the powers of the Architect to continue in force as full as if the contract has not been so determined and as if the works subsequently executed has been executed by or on behalf of the contractor.

And further, the Employer under recommendations of the Architect, by his Agents, or servants may enter upon and take possession of the works and all plants, tools, scaffoldings, sheds, machinery, and other equipment and materials also laying upon the premises or the adjoining lands or roads, and use the same as his own property or may employ the same by means of his own servants and workmen in carrying on and completion the works or by employing any other contractors or other persons to complete the works and the contractor shall not in any way interrupt or do not act, matter or thing to prevent or hinder such other contractor or other persons or person employed for completing and finishing or using the materials and plant for the works. When the works shall be completed or soon thereafter as convenient, the Architect shall give a notice in writing to the contractor to remove his surplus materials and plant, and should the contractor fail to do so, within a period of 14 days, after receipt thereof by him, the Employer shall sell the same by publication and shall give credit to the contractor for the amount realised. The Architect shall thereafter ascertain and certify in writing under his hand when (if anything) what shall be due to or payable by the Employer for the value of the said plant and materials so taken possession of by the Employer, and the expense or loss, which the Employer shall have incurred due to the contractor, and the amount which shall be so certified shall thereupon be paid by the Employer to the contractor or by the contractor to the Employer, as the case may be.

41. **TERMINATION OF CONTRACT BY CONTRACTOR:**

If payment of the amount payable by the Employer under certificate of the Architect as provided for hereinafter shall be in arrears and unpaid for 30 (thirty) days after notice in writing requiring payment of the amount, as aforesaid shall have been given by the Contractor to the Employer, or if the Employer obstructs the issue of any such certificates, or if the employer commits any Act of insolvency, or if the Employer (being an incorporated company) shall have an order made against him or pass an effective.

Resolution for winding up, either compulsorily or subject to the supervision of the Court or voluntarily, or if the Official Liquidator or the Employer shall repudiate the contract, or if the if the Official Liquidator in any such winding up shall be unable within 15 days notice to him requiring him to do so, to the reasonable satisfaction of the contractor that he is not able to carry out and fulfill the contract and to give security for the same (including Earnest money), or if the works be stopped for any payments due, and to become due there under and if required under the order of the Architects or the Employer or by an injunction or other order of any court of law, then in any of the said cases, the contractor shall be at liberty to determine the contract by notice in writing to the Employer/Architect, and he shall be entitled to recover from the Employer, payment for all works executed and for any losses he may sustain, upon any plant or materials supplied or purchased or prepared for the purpose of the contract.

In arriving at the amount of such payment, the net rates contained in the contract shall be followed, or where the same may not apply, valuation shall be made in accordance with clause 22 thereof.

42. Matters to be finally determined by the Architects and the Bank (Called excepted matters) – (refer 43(a) below), which shall be final, conclusive and binding on the following matters:

a) Instructions
b) Transactions with local authorities
c) Proof of quality of materials
d) Assigning or under letting of the contract,
e) Certificate as to the causes of delay on the part of the contractor and justifying extension of time or otherwise,
f) Rectification of defects pointed out during the defects liability period.
g) Notice to the contractor to the effect that he is not proceeding with due diligence.
h) Certificate that the contractor has abandoned the contract.
i) Notice for determination of the contract by the Employer.

43. **ARBITRATION:**

a. When the contractor is dissatisfied with the decision of the Architect/Employer, the contractor is required to give a notice to the Employer within 60 DAYS of the receipt of such decision, for the appointment of the Arbitrator for the settlement of the outstanding disputes.

b. **The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in** shall be appointed to refer those disputes for adjudication to a sole arbitration.

c. It is also a term of the contract that if the contractor does not make any demand for Arbitrator in respect of any claims within 30 DAYS of receiving the intimation from the Bank that the final bill is ready for payment, the claims if any received after 30 DAYS period shall be absolutely barred from reference to the Arbitrator.

d. All disputes or differences of any kind whatsoever, which shall at any time arise between the parties hereto touching or concerning the works or the execution or maintenance thereof this contract, or the rights touching or of this contract, effect thereof, or to the rights or liabilities of the parties arising out of or in relation thereto, whether during progress or after determination, foreclosure or breach of the contract (other than those in respect of which the decision expressed to be final and binding in cases listed out in condition 40 above), Architects shall, after written notice to either party to the contract and to the appointing Authority, who shall be appointed for this purpose by the employer refer those disputes for adjudication to a sole arbitrator, to be appointed as hereinafter provided.

e. For the purpose of appointing the sole arbitrator referred to above, the Appointing authority will send, within thirty days of receipt by him of the written notice aforesaid, to the contractor a panel of three names of persons, who shall be presently unconnected with the organization for which the work executed.

f. The contractor shall on receipt by him of the names as aforesaid, select any one of the persons named to be appointed as a sole arbitrator and communicate his name to be appointed as a sole arbitrator to the Appointing Authority, within thirty days of receipt of the names by him. The Appointing Authority shall thereupon without any delay appoint the said person as the sole arbitrator. If the contractor fails to communicate such selection as provided above within the period specified, the Appointing Authority shall make the selection and appoint the selected person as the sole arbitrator.

g. If the Appointing Authority fails to send to the contractor the panel of three names as aforesaid within the period specified, the contractor shall send to the appointing authority a panel of three names of persons, who shall be unconnected with either party. The Appointing Authority shall on receipt by him of the names as aforesaid select any one of the persons named and appoint his as the sole arbitrator. If the Appointing Authority fails to select the person and appoint him as the sole arbitrator within 60 DAYS of receipt by him of the panel and inform the contractor accordingly, the contractor shall be entitled to appoint one of the persons from the panel as the sole arbitrator and communicate his name to the Appointing Authority.

h. If the Arbitrator so appointed is unable or unwilling to act or resigns his appointment or vacates his office due to any reasons whatsoever, another sole arbitrator shall be appointed as aforesaid.

i. The work under the contract, shall however, continue during the arbitration proceedings and no payment due or payable to the contractor shall be withheld on account of such proceedings.

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

k. The arbitrator may from time to time, with the consent of the parties, enlarge the time for making and publishing the award.

l. The Arbitrator shall give a separate award in respect of each dispute or difference referred to him. The Arbitrator shall decide each dispute in accordance with the terms of the contract and give a reasoned award. The venue of arbitration shall be such a place, as may be fixed by the Arbitrator in his sole discretion.

The fees, if any, of the Arbitrator, if required to be paid before the award is made and published, shall be paid half and half by each of the parties. The costs of the reference and of the award including the fees, if any, of the Arbitrator, who may direct to any by whom and in what manner such costs or any part there of shall be paid and may fix or settle the amount of costs to be so paid.

m. The award of the Arbitrator shall be final and binding on both the parties.

n. Subject to aforesaid, the provisions of the Arbitration and Conciliation Act, 1996, or any statutory modifications or re-enactments thereof, and the rules made thereunder, and for time being in force, shall apply to the arbitration proceedings under this clause.

7. INDEX TO SPECIAL CONDITIONS OF CONTRACT

1. Inspection of drawings
2. Contractor to visit site
3. Execution of work (Prices to include)
4. Schedule of Quantities

6a. Quantities liable to alterations

b. Filling of tenders

7. Access for inspection

8. Dimensions

9. Program of works

10. Water and Electricity

11. Procurement of materials

12 Facilities to other contractors

13 Testing

14. Site meetings

15 Custody and security of materials

16 Treasure trove

17. Notices

18. Statutory regulations

19. Measurements to be recorded before work is covered up.

20. Working at night or on holidays.

21. Working on holidays

22. Action where there is no specification

23. Reporting of accident

24. Cleaning the site on completion/determination of work

25. Possession of buildings/work completed

26. Typographic, Clerical and other errors.

27. Information to be supplied by the Contractors.

28. Bench marks

Force Majeure

Architect’s drawings and instructions

Completion of work and liquidated damages

Bill of payments

Workmanship

Schedule of quantities

Site Supervision

Engagement of Apprentices

Rates

Income tax

Extra items rates

Service drawings/shop drawings/catalogue

Payment

Permission

Maintaining Registers at site

Agreement

Insurance

Indebtedness and liens

Work performed at contractor’s risk

Photographs

Inspection by the Chief Technical Examiner

Special conditions of contract

B.I.S. Codes

8. SPECIAL CONDITIONS OF CONTRACT

1. **INSPECTION OF DRAWINGS:**

Before filling in the tender, the contractor will have to check up all drawings and Schedule of quantities, and will have to get immediate clarifications from the Architect on any point, that he feels is vague or uncertain. No claim/damages or compensation will be entertained on this account.

2. **CONTRACTOR TO VISIT SITE:**

Each tenderer must, before submitting his tender, visit the site of works, so as to ascertain the physical site conditions prices and availability and quality of materials according to specifications before submitting the quotations. No excuse regarding non-availability of any materials or changes in the price will be entertained or extra allowed on that account.

The existing adjacent buildings belonging to Govt/private which are in close proximity of the proposed Interiors, hence the contractor shall cater for all arrangements to carry out the work without causing any disturbance to the occupants by providing screens with bamboo matting or other suitable material approved by Architects/Engineer. The contractor shall ensure that no dust or construction material falls near/around the existing buildings.

5. **SCHEDULE OF QUANTITIES:**

The Schedule of quantities forms part of the contract, but the Employer reserves the right to modify the same or any part thereof as per variation clause stated herein below. The contractor shall not be allowed any compensation or damages for the work which is so omitted or cancelled or added or substituted by the Architect & Employer.

Please refer clause 4 of General Conditions of Contract.

6.a. **QUANTITIES LIABLE TO VARY:**

This clause applies for unlimited variations (+ or -) for items of foundations and those executed below plinth level. For all other items, only in case where + variations of any item exceeds 100% of Quantities of respective items given in the schedule of quantities of the contract, such additional quantities of those items shall be treated as extra items and valued as per clause 45 of special conditions of contract, considering of that rates for these items cannot be derived from the contracted items of work.

The quantities indicated in the bill of quantities are only approximate, and hence may vary on either side (+ or -) for accomplishing the works enunciated under the scope of works, in accordance with designs, drawings and specifications and or instructions of the Architect & Employer. Variations may also occur, consequent upon addition or deletion or substitution of particular items, change of designs or specifications during the course of execution. The contractor, in either case, is bound to carry out the modified quantities upto +100% (plus one hundred percent) variation, without any enhancement in rates and at the same rates as per accepted original tendered rates.

Please refer clause 4, 5 & 6 of General conditions of contract.

b. **FILLING OF TENDERS: as per e tender policy**

7. **ACCESS OF INSPECTION:**

The contractor is to provide at all times, during the progress of the works and the maintenance period, means of access with ladders, gangways etc., and the necessary attendants to move and adopt the same as directed for the inspection or measurement of the work by the Architect and Employer or any other agency employed by the client.

Refer clause 7 of General Conditions of Contract.

8. **DIMENSIONS:**

In all cases figured dimensions are to be accepted in preference to scaled sizes. Large scale details shall take precedence over small scale details/drawings. In case of any discrepancy, the contractor shall ask for a clarification, before proceeding with the work. Accordingly, if any work is executed without prior clarification, it is liable to be rejected and shall not be paid for,

9. **PROGRAMME OF WORKS:**

The contractor on starting the work shall furnish to the Employer and Architect a PERT/CPM programme, for carrying out the work stage by stage in the stipulated time, for the approval of Architects and Employer, and follow strictly the approved time schedule by incorporating changes, if any, so authorised by the Architect and Employer, to ensure the completion of construction work ins stipulated time. A graph or chart on individual item/group of items/trades of work shall be maintained, showing the progress both in terms of quantities and value, week by week. The contractor shall submit to the Employer and Architect a weekly progress report stating the number of skilled and unskilled labourers employed on the work, working hours done, quantity of cement, steel and other major items of materials (quantity and value wise) used and corresponding place, type and quantity of work done during the period.

The contractor must inform the Architects, 10 days in advance of requirement of respective drawings and details by him, from time to time. The contractor shall strictly adhere to the approved programme and arrange for the materials and labour etc., accordingly.

Despite repeated instructions, if the contractor fails to show satisfactory progress of the work, the Employer/Architect may take suitable action as deemed fit, including levying of liquidated damages not exceeding ½% of contract price for delay of every week or part thereof, subject to a limit of total liquidated damages levied under this clause to 5% of contract price without prejudice to any terms and conditions of the contract.

Please refer clause 29 & 30 of General Conditions of contract.

10. **OFFICES, STORES, SHEDS ETC., ON THE SITE:**

a. The contractor shall provide for all necessary storage on the site, in a specified area for all materials, in such a manner that all such materials, tools etc., shall be duly protected from damages by weather or any other cause. Stores for storage of cement shall have all weather proof floors, walls and roof and have proper locking arrangements and must be secure. All these must be maintained till the work is completed and so certified by the Architect. Necessary and adequate watch and ward for all such accommodations and stores shall be provided for by the contractor at his cost and same included in the rates/amounts quoted by him. All such stores shall be cleared away and the ground left in good and proper order on completion of this contract unless otherwise expressly mentioned herein.

b. All materials which are stored on the site such as plywood, false ceiling material etc., shall be stacked in such a manner as to facilitate rapid and easy checking of quantities of such materials and prevent deterioration in quality due to water etc.

11. WATER AND ELECTRICITY:

Contractor shall make his own and adequate arrangements for water required for drinking and construction purposes and also for required electric supply at site for satisfactory execution and completion of the work, at his own cost. The contractor shall get the water used for construction purpose tested periodically as per relevant BIS codes at his cost, and shall get the same approved from Architect and clients before using such water for the work.

12. PROCUREMENT OF MATERIALS:

Contractor shall procure all the materials for the work from the open market. Time is the essence of the contract. Acceptance of the completion date by the contractor shall mean that he has taken into consideration the availability of all materials of approved make and quality in sufficient quantities at respective markets/sources, to enable him to complete the entire work in the stipulated period.

Contractor will get samples of all materials approved by the Architect and employer, before placing order/purchase/procurement. They shall conform to relevant B.I.S. codes and or tender specifications as applicable.

For all materials, the contractor shall quote for the best quality of the materials of best make/source or supply and they should be got approved by the architect and employer, before procurement.

In case sufficient quantities of approved quality materials from approved sources are not available in time, contractor may have to procure the same from neighboring areas even with longer leads, as required and directed, at no extra cost.

Please refer clause 9 of General Conditions of contract.

13. SANITARY ACCOMMODATION IN SITE:

The contractor shall provide and maintain at his own cost and expense adequate closet and sanitary accommodation for the use of his workmen and others in accordance with the rules and regulations of the relevant local authorities.

14. **FACILITIES TO OTHER CONTRACTORS:**

The contractor shall give full facilities and co-operation to all other contractors working at site doing plumbing, INTERIOR, civil works etc., as directed by the Architect & Employer and shall arrange his programme of work, so as not to hinder the progress of other works. The decision of the Architect & Employer, on any point of disputes between the various contractors, shall be final and binding on all parties concerned.

15. **TESTING:**

The contractor shall, as and when directed by the Architect & Employer, arrange to test materials and/or portions of the work at site in any approved laboratory at his own cost, in order to provide their soundness and efficiency. The contractor shall transport all the materials from site to the approved laboratory at his own cost. The contractor shall carryout all the mandatory tests as per list attached at the frequencies stated therein. Even after such tests, any materials brought to site or incorporated in the works are found to be defective or unsound or not as per approved samples, the contractor shall remove the same and re-erect at his own cost and without any additional time/period for the same, with reference to the date fixed for completing the work. In case these tests are not carried out at the frequencies stated, then proportionate costs of materials not so tested, including cost of testing and quantities of items of work executed with such materials, if otherwise accepted for retention in the work, will be deducted from the dues to the contractor. The deductions will be worked out by the Architect/client and shall be final and binding on him.

Tolerance on various material and items of work shall be allowed laid down in the documents below and the order of precedence shall be:

a) Relevant Indian Standards Specifications.
b) CPWD norms.
c) Manufacturer's Specifications.

In absence of above Architect's decision basing on the general practice being following shall be final.

17. **SITE MEETINGS:**

A senior representative of the contractor shall attend weekly meetings at works site; and in additions, meetings as and when arranged by Architect & Employer to discuss the progress of the work and sort out problems, if any, and ensure that the work is completed in the stipulated time.

18. **CUSTODY AND SECURITY OF MATERIALS:**

The contractor shall be responsible for the custody and security of all materials and equipment at site and he will provide full time watchman/watchmen to look after his materials, stores,

equipments etc., including cement and steel at site and ensure that at no time unauthorised persons gains any access at works site.

23. **NOTICES:**

The contractor shall give all notices and pay all necessary and relevant fees and shall comply with all Acts and Regulations, for the successful completion of the contract work.

Please refer clause 8 of General Conditions of Contract.

24. **STATUTORY REGULATIONS:**

The whole of the work including sanitation and INTERIOR is to be complied with, as per the requirements and bylaws of the relevant statutory authorities, including Contract Labour (Regulation and Abolition) Act, 1970 of Central Government.

25. **MEASUREMENT TO BE RECORDED BEFORE WORK IS COVERED UP:**

The contractor shall take joint measurements with the Employer's representative (Project Management Consultant or any Engineer identified by the Bank) and Architect's representative before covering up or otherwise placing beyond the reach of measurement any item of work. Should the contractor neglect to do so, the same shall be uncovered at the contractor's expense or in default thereof, no payment or allowance shall be made for such work or the materials with which the same was executed.
Refer clause 20 of General Conditions of Contract.

26. **WORKING AT NIGHT OR ON HOLIDAYS:**

The contractor can carry out major work at night, only with prior permission of the Site Engineer of Employer/Architect and with proper supervision. However, all concrete work will be carried out only during the day light.

WORKS AT NIGHT:

If the contractor is required to do preliminary works at night, in order to complete the work within the Time Schedule, the contractor shall provide and maintain at his own cost necessary and sufficient barricades/lights etc., to enable the work to proceed satisfactorily without danger. Approaches to the site also shall be sufficiently lighted by the contractor.

27. **WORKING ON HOLIDAYS:**

No work shall be done on Sunday or other Bank holidays that may be notified by the Architect & Employer, without the specific sanction in writing of the Architect & employer or his representatives.

28.**ACTION WHERE THERE IS NO SPECIFICATION:**

In case of any item/class of work, for which there is no specification mentioned (either in part or full), the same will be carried out in accordance with the relevant CPWD specifications (only for the specifications missing in the contract) and if not available even there (either in part or full) in, relevant standards of BIS shall be followed (only for the portions of specifications missing in the contract specifications and CPWD specifications). Indian standard specifications, subject to the approval of the Architect & Employer.

30. **REPORTING OF ACCIDENT TO:**

The contractor shall be responsible for the safety of all persons employed by him on the works and shall report serious accidents to any of them, whenever and wherever occurring one the works, to Employer who shall make every arrangement to render all possible assistance. This shall be without prejudice to the responsibility of the Contractor, under the Insurance clause of the General

Conditions. Contractor shall take all the precautions as detailed in the safety code attached separately.

30. **CLEARING THE SITE ON COMPLETION/DETERMINATION OF WORKS:**

The contractor shall clear the site of works as per the instructions of the Architect. The site of works shall be cleared of all men, materials, sheds, huts etc., belonging to the contractor. The site shall be delivered in a clean and neat condition, as required by Architect, within a period one week after the job is completed. In case of failure by the contractor, the Employer, under advice to the Architect, have the right to get the site cleared to his satisfaction at the risk and cost of the contractor.

31. **POSSESSION OF BUILDINGS/WORK COMPLETED:**

The contractor shall hand over to the Employer possession of the completed works in stages, as and when required, and as directed by the Architect & Employer.
The Employer will take over the possession of completed works in stages as directed by the Architect, and defects liability period will commence only from the date of final handing over of all the work accordingly.
Please refer Appendix to General Conditions of contract.

32. **TYPOGRAPHIC, CLERICAL AND OTHER ERRORS:**

The Architects/Employer's clarification regarding partially omitted particulars or typographical, clerical and other errors shall be final and binding on the contractors.

33. **INFORMATION TO BE SUPPLIED BY THE CONTRACTOR:**

The contractor shall furnish to the architect & Employer the following from time to time:
Detailed industrial statistics regarding the labour employed by him, etc., every month (within 5th of succeeding month),
The Power of Attorney, name and signature of his authorised representative, who will be in charge for the execution of work.
The list of technically qualified persons (to be approved by the Architect) employed by him for the execution of the work within 15 days from date of start of work,
The total quantity and quality of materials used for the works, every month within 5th of succeeding month.
Last para of clause 33:

Failure to submit any of these details in time, shall be treated as a breach of the contract and likely to result in,

i) Levying a fine of Rs.500 for each default for each month, and or
ii) Withholding payments, otherwise due.
iii) For the periods for which name of technically qualified persons are not given or for which such persons are not employed, recoveries shall be made at Rs.7,500/- per month for each month of default.

In all these matters the decision of the Architect shall be final and binding.

See clause 41 also.

34. **FORCE MAJEURE :**

Neither party shall be held responsible by the other for breach of any condition of this Agreement, attributable to any "Act of God", Act of State, Strike, lock-out or control or any other reason, beyond the control of the parties and any breach of clauses arising from such Force Majeure conditions as aforesaid shall not be regarded as breach of the provisions of this Agreement.

35. **ARCHITECT'S DRAWINGS AND INSTRUCTIONS:**

A set of major drawings, along with the contract documents shall be provided to the contractor. If any clarification or further drawings are required by the Contractor during or before the start of construction work, the contractor shall inform the Architects and the SBI sufficiently in advance in writing to provide the same. Working details will be given to the Contractor from time to time, during the progress of work, as and when required. In case, any other drawing/detail is required by the contractor, he will give a minimum of fifteen days notice to the Architect.
Refer clause 2 & 3 of General conditions of contract.

37. **COMPLETION OF WORK AND LIQUIDATED DAMAGES:**

The work shall be completed in 30 DAYS , and reckoned as under: WITHIN ONE WEEK AFTER CONFIRMATION.

(a) The day two weeks from the date of issue of work order.

or

(b) The day on which the contractor receives the possession of the site – whichever is later.

or

(c) The contractor is asked in writing to take over the possession of the site.

Time is the essence of the Contract. The Contractor shall strictly adhere to the programme/chart agreed to. In case the contractor fails to complete the work as mentioned above, the liquidated damages may be imposed at the rate of 0.5% per each week (or part thereof) of delay, subject to a maximum of 5% of contract amount. Refer clause 30 & 31 of General Conditions of contract.

38. **BILLS OF PAYMENTS:**

The minimum value of work for interim payments will be only first and final , as stated in Appendix. The contractor shall submit interim bills, once a month on the basis of joint measurements recorded at site by the contractor's Employer's and the Architects representatives. The bill will be certified by the Architect within 15 working days from the date of submission of the bill by the contractor, and the Employer will make payment as stated in the Appendix to General Conditions of Contract. All such interim payments shall not be considered as an admission of the due performance of the contract or any part thereof in any respect and shall not preclude the requiring of bad unsound and imperfect or unskilled work to be removed and taken away and reconstructed or re-erected at contractor's cost, all as per Employer and Architect's instruction and directions.

39. **WORKMANSHIP:**

Quality of materials and workmanship shall conform strictly to specifications given/stipulated in the tender/contract, and contractor will ensure that the best quality of work will be done to the satisfaction of the Architect and Employer, with strict control on the materials, workmanship and supervision.

Refer clause 9 of General Conditions of Contract.

40. **SCHEDULE OF QUANTITES:**

Quantities mentioned in the Schedule of Quantities, included in the contract, are approximate and are subjected to variations as per actual site conditions & requirements and as directed by the Architect & Employer. The work shall be executed and completed accordingly.

Refer clause 4, 5 and 6 of General Conditions of Contract.

41. **SITE SUPERVISION:**

The contractor shall appoint at his own cost competent and adequate number of qualified Engineers at site, for (1a) joint measurements and preparations of bills. (2b) for testing materials at site and outside laboratory. (c) for concreting and reinforcement work. (d) for other general supervision. Their appointment shall be approved by the Architect & Employer. The site engineers shall not be removed from the site without the written consent of the Architect & Employer.

See clause 33 above also.

42. **ENGAGEMENT OF APPRENTICES:**

The Contractor shall during the currency of the contract, when called upon by the clients, engage and also ensure engagement by sub-contractors and others employed by the contractor in connection with the works such number of apprentices in the categories mentioned in the act and for such period as may be required by the clients. The contractor shall train them as required under the Apprentice Act 1961 and the Rules made thereunder and shall be responsible for all obligations of the clients under the said Act, including the liability to make payment of apprentices, as required under the said Act.

43. **RATES:**

Contractor shall quote all the rates both in figures and in words and any alterations shall have to be initialled by the contractor. Rates quoted by the contractor for the same item in different schedules shall be same, and incase different rates are quoted, the lowest will be taken as correct and the schedule corrected accordingly. In case of discrepancy between rates given in words and figures or in the amount worked out, the following procedure will be followed:

In case of item rate tender:

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

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

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

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

44. INCOME TAX:

Income tax shall be deducted at source by the client from the contractor's interim and final bill payments as required by law.

45. EXTRA/SUBSTITUTED ITEM RATES:

Such items shall be executed as per directions/instructions of the Architects of the employer.

The work on extra/substituted items shall be started only after the receipt of written order from the client/Architect. Rates for additional/extra or substituted (altered) items of work, which are not covered in the contract cannot be derived from the contract item rates either in full or partly, shall be calculated on the basis of actual costs plus 15% for overhead and profit etc., only to the extent not derivable from the contract item rates.

See clause 21 of General Conditions of Contract.

46. SERVICES DRAWINGS/SHOP DRAWINGS/CATALOGUE:

After getting approval from the Architect & Employer, the contractor shall submit to the concerned local authorities' necessary services drawings showing layouts etc., for getting approval of the schemes. On completion, the contractor shall arrange to get Drainage Completion Certificate and other Certificate necessary for obtaining Building Completion certificate. The contractor shall furnish completion drawings of all services in triplicate, showing the work as actual executed, along with levels. Contractor shall submit for approval 4 copies of shop drawings/ catalogue/ equipment characteristics/ manufacturer's specifications, drawings etc., as and when required and directed by the Architect & Employer. Costs of all these are deemed to have been included in the respective item rates quoted by the contractor and nothing extra shall be paid on account of any of these requirement/acts.

47. **PAYMENT:**

No payment whatsoever shall be made by the Employer, if the Contractor abandons the work, due to any site difficulties etc.,

See clause 36 & 37 of General conditions of contract.

48. **PERMISSION:**

The contractor shall also obtain necessary permission approvals from the relevant authorities shall be obtained by the contractor at no extra cost.

49. **MAINTAINING REGISTERS AT SITE:**

The contractor shall maintain registers for consumption of various specials, testing of materials etc., in the proforma which shall be given by the Architect & Employer from time to time.

50. **AGREEMENT:**

The successful contractor shall be required to enter into an agreement in accordance with the Draft Agreement and Schedule of Conditions etc., within 15 days from the date the contractor is advised by the Architect & Employer that his tender has been accepted. The contractor shall pay for all stamps and legal expenses incidental thereto. However, the written acceptance of the tender by the Employer, will constitute as a binding contract between the Employer and contractor, whose tender has been accepted, whether such formal agreement is or is not subsequently executed.

51. **INSURANCE:**

The contractor shall provide insurance in respect of damage to persons and property and firm insurance as per clause 27 and 28 of General conditions of contract. In addition he will also insure against riots and civil commotion. The insurance shall also cover third party and all the persons working at site and visitors including contractor's, worker's, Architect's and clients people, other contractor's workers etc. The contractor shall indemnify the Employer against any claim or compensation or mishaps of whatsoever nature at site during the progress of work.

The contractor shall prove to the Architect/Client from time to time that he has taken out all the insurance policies as required and directed and has paid the necessary premium for keeping the policies valid as per clause 27 & 28 of the General Conditions of Contract.

In case of failure by the Contractor or sub-contractor to effect and keep in force the insurance policies, then the client, without being bound to, may pay such premiums as may be necessary and deduct the same from any money due or which may become due to the contractor or recover the same as a debt due from the contractor.

52. **INDEBTEDNESS AND LIENS:**

The contractor agrees to furnish the Employer from time to time, during the progress of the work as requested, verified statement showing the contractor's total outstanding indebtedness in connection with the work covered by the contract. Before final payment is made, the Employer may require the contractor to furnish the Employer with satisfactory proof that there are no outstanding debts or liens in connection with the contract. If during the progress of the work, the contractor shall allow any indebtedness to accrue to sub-contractor or other and shall fail to pay or discharge same within five (5) days after demand, then the Employer may withhold any money due to the contractor until such indebtedness is paid, or apply the same towards the discharge thereof.

53. WORK PERFORMED AT CONTRACTOR'S RISK:

The contractor shall take all precautions necessary and shall be responsible for the safety of the work and shall maintain all lights, guards, signs, barricades, temporary passages or other protection necessary for the purpose. All work shall be done at the contractor's risk and if any loss or damage shall result from fire or from any other cause, the contractor shall promptly repair or replace such loss or damage free from all expenses to the Employer. The Contractor shall be responsible for any loss or damage to materials, tools or other articles used or held for use in connection with the work. The work shall be carried on to Employer or of others and without interference with the operation of existing machinery or equipment, if any.

54. PHOTOGRAPHS:

The contractor at his own cost shall take photographs of site and individual buildings during the progress of the work as directed by the Architect/Client and submit two copies of each photograph with minimum size 20 cm x 15 cm to the client/Architect.

55. INSPECTION BY THE CHIEF TECHNICAL EXAMINERS (VIGILANCE):

The proposed work covered under this tender, during the progress and/ or after completion, can also be inspected by the Chief Technical Examiner/ Technical Examiner or Officers of the Central Vigilance Commission, Government of India, on behalf of Architect & Employer to ascertain that the execution of the work has been done with materials and workmanship all as stipulated in the contract and as directed.

Contractor shall afford all reasonable facilities to the above vigilance staff and also provide them with ladders, tapes, plum bob, level etc., as required and directed and also necessary labourers skilled/unskilled to enable them to complete their inspection/study/technical scrutiny and no extra shall be admissible to the contractor on this account.

56. SPECIAL CONDITIONS OF CONTRACT:

In the event of any discrepancy with clauses mentioned anywhere else in the tender with the clauses mentioned within special conditions of contract, the clauses mentioned within the special conditions of contract shall supersede there mentioned elsewhere.

57. BIS CODES

It is compulsory for the contractor to keep all the B.I.S. codes mentioned in this tender document at his cost at the site to ensure the proper supervision/quality of work and materials.

58. **AS BUILT DRAWINGS**

The contractor shall prepare and submit a set of as-built drawings, duly certified by the Architect. The set consists of 2 soft copies and 3 sets of hard copies.

9. GENERAL AND TECHNICAL SPECIFICATIONS

1. These specifications are for the work to done, items to be supplied and materials to be used in the works as shown and defined on the drawings and described herein all under the supervision and to the satisfaction of the Consultant/Bank.

2. The workmanship is to the best available and of a high standard, use must be made of 'specialist' tradesman in all aspects of the work and allowance must be made in the rates for doing so.

3. The materials and items to be provided by the contractor shall be the best of their respective kinds and as approved by the consultant/Bank in accordance with samples, which may be submitted for approval and generally in accordance with the specifications.

4. Samples of all materials including these specified by name of the manufacturer or the brands, trades name or the Consultant/Bank for their approval before the contractor either orders or delivers in bulk to the site. Samples together with their packings are to be provided by the contractor free of any charge and should any materials be rejected, the same will be removed from the site at the expenses of the contractor.

5. The contractor is also required to submit specimen finishes of all colours, fabrics, polish shades, etc., for approval of the Consultant/Bank before proceeding with such works.

6. Should it be necessary to prepare shop drawings, the contractor at his own expenses prepare and submit atleast four sets of such drawings to Consultant/ Bank for approval.

7. The contractor shall produce all invoices, vouchers or receipts account of all purchases done by him for materials if called upon to do so either by consultants or the Bank.

8. The contractor should verify all measurements given in the drawing at the site before commencing the work. Any difference should be clarified with the Consultant before commencing the work.

9. Partition line out shall be done at the site before starting the work and got approved from the Consultants.

10. The contractor shall submit Bar chart (CPM Method) for the complete work within one week of letter of acceptance of tender and get the same approved from Consultant/Bank. In advance to co-ordinate the work with other agencies.

11. In order to complete the work in time, the contractor may have to work in more than one shift and beyond office hours. He will do so without any extra charges and without causing any disturbance/inconvenience to the neighborhood.

12. The contractor shall make necessary security arrangements at the site for the safety of his tools, materials and equipment etc., at his own cost.

13. The contractor shall quote his rate including the cost of materials as specified, corresponding wastages, labour, sales tax or any other taxes and duties, octroi, transportation to worksite etc.

The rates are firm and no escalation on any account shall be allowed on accepted rates.

14. Timber: Hardwood and Teakwood shall be the best wood locally available and should be well & properly seasoned of mature growth, free from worm holes, large loose or dead knots or other defects and will not suffer warping, splitting or other defects through improper handling.

Teakwood to be either CP or Ballarshah and shall be of best quality, free from soft heart, worm & bee holes and other defects.

All wrought timber is to be sawn, planned or works to correct sizes and shapes as shown in the drawings. An allowance of 2mm shall be permitted for each wrought face.

All wooden members shall be liberally coated and treated with antitermite paint before fixing.

15. **Plywood:**

Plywood shall be of urea formaldehyde phenol bonded of approved B.W.P. type, make, brand, etc. Thickness of plywood shall be as per details given in the drawings/specifications.

16. **Workmanship for Joinery:**

Timber is to be cut to required size and length and the joinery should start immediately after the line out is finalised. It should be framed up (but not bonded) and stored until required for fixing position. At this stage it should be bonded and wedged up. Any portion that warps or develops shakes or other defects shall be replaced before wedging up. The whole work is to be framed and finished in a proper line and level and as detailed in the drawings and fitted with all necessary metal ties, straps, bolts, screws.

Twining bonded joints are to be cross tongued with teak tongues.

17. The contractor shall be responsible for providing and maintaining temporary coverage required for the protection of dressed, finished or semi-finished works if left unprotected. He is also to clean out all shavings, cut ends and other wastages from all parts of the work at his expenses.

18. Laminate sheeting shall be of specified thickness, make and either plain, sued, satin or with design finish samples showing the surface texture and pattern are to be submitted in proper sizes for approval before use.

The laminates shall be fixed with proper adhesive of approved grade and brand.

19. The contact surface of dowels, tenons, wedges etc., shall be glued with proper adhesive. Wherever joinery and carpentry works is likely to come in contract with moisture the adhesive shall be water proof.

20. **List of Indian Standards referred to:**

IS : 1200 : Latest	Measurements of buildings & Civil Engineering works , methods of
IS : 287 – 1973	Recommendation for maximum permissible Moisture content of timber.
IS : 1141 – 1973	Code of practice for seasoning of timber.
IS : 3845 – 1966	Code of practice for joints used in wooden furniture.
IS : 3548 – 1966	Glazing in Buildings.
IS : 1137 – 1965 IS : 113 – 1950 IS : 133 – 1975 IS : 110 – 1968 IS : 129 – 1950	Specification for ready mixed paint brushing matt or egg shell flat/wooden coating under-coating/finishing, Grey filler etc., for interiors.
IS : 1948	Aluminium doors, windows & partitions.

26. **Inspection and Testing:**

The Consultant/Bank shall be entitled at all times at the risk of contractor to inspect and/or test by itself or through an independent agency appointed by the Bank to inspect, and/or test all the materials, components, and items of work at the expenses of the contractor. All such tests shall be done as per ISI guidelines and as directed by Consultants/Bank.

10. MODE OF MEASUREMENTS

1.	Partition Panelling	:	Sq.mt. area – one side only panelling finished length x finished height (frame work including vertical/horizontal members above the false ceiling will not be included in measurements and such members shall be treated as included in this mode of measurement in the case of partition having difference finished heights on either sides average height shall be considered eg.2400mm and 2500 then 2450mm will be average height. This will also include T.W. bends.
2.	Storage Units	:	Sq.mt area – front elevation finished length x finished height
3.	False ceiling	:	Sq.mt area finished length x finished width No. deduction of AC grills, lights, cutouts, cornices, drops etc., to be measured separate in Sq.mt.

4.	Soffits	:	Sq.mt total finished length x total finished depth (width including drops of pelment, if any).
5.	Rounding off measurements	:	All measurements shall be rounded off to the nearest second decimal point eg.21 465m will be 21.47m.
6.	Measurement for Venetian blinds	:	Area of the window opening in Sqm. to which it is specified.
7.	PVC flooring	:	Sq.mts area Finished length x Finished width (deducting Shall be made for columns, cutouts, etc) only finished area shall be paid.

Wherever not mentioned measurements shall be measured as per ISI S.P.No.27.

14. SAFETY CODE

Suitable scaffolds should be provided for workman for all the works that cannot safely be done from the ground or from solid construction, except in cases of short duration works, which can be done safely from ladders. When a ladder is used, an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, it shall be of rigid construction made either of good quality wood or steel. The steps shall have a minimum width of 450mm and a maximum rise of 300mm. Suitable foot and hand holds of good quality wood or steel shall be provided and the ladder shall be given an inclination not steeper than 1 in 4 (1 horizontal to 4 vertical).

Scaffolding or staging more than 300mm above the ground or floor, swung or suspended from an overhead support, shall be erected with stationery supports and shall have guard rails properly attached, bolted, braced and otherwise secured and atleast 900mm high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends there of with only such openings as may necessary for the access of persons and delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

Working platform, gangways and stairways should be so constructed that they should not sag unduly or unequally and if the height of the platform or the gangway or the stairway is more than 3-6m above ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened, as described in (ii) above.

Every opening in the floor of a building or in a working platform be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing, whose minimum height shall be 900mm.

Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 M in length while the width between side rails in ring ladder shall be in no case be less than 300mm. For longer ladders, this width should be increased atleast 6mm for each additional foot of length. Spacing of steps shall be uniform and shall not exceed 300mm.

Adequate precautions shall be taken to prevent danger from INTERIOR equipment. At the work site, no materials shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall also provide all necessary fencing and lights to protect the public from accident, and shall be bound to bear the expenses of defence of every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay damages and costs, which may be awarded in such suit, action or proceedings to any such persons or which may with the consent of the contractor be paid to compromise any claim by any such person.

II. **Demolition:**

Before any demolition work is commenced and also during the progress of the work.

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

b. No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by the operator shall remain INTERIORly charged.

c. All practical steps shall be taken to prevent danger to persons employed, from the risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so over-loaded with debris or materials, so as to render it unsafe.

III. All necessary personal safety equipments as considered adequate by the Architects should be kept available for the use of the persons employed on the site and maintained in a condition suitable for immediate use and the contractor should take adequate steps to ensure proper use of equipment by the concerned.

a. Workers employed in mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective gloves.

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

c. Those engaged in welding works shall be provided with welder's protective (eye) shields.

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

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

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

i) No paint containing lead or lead products shall be used except in the form of paste or readymade paint.

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

iii) Overalls shall be supplied by the contractors to the workers and adequate facilities for washing shall be provided to the working painters during and on cessation of work.

IX. When the work is done near any place, where there is risk of drowning, all necessary equipment should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provisions should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

X. Use of hoisting machine and shackle including their attachments, in charge and supports shall conform to the following standards or conditions.

1.a. These shall be of good mechanical construction, sound material and adequate strength and free from any patent defects and shall be kept in good working order.

b. Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength and free from patent defects.

2. Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years should be in charge of any hoisting machine including any scaffolding or give signals to the operator.

3. In case of every hoisting machine and of every chain, ring hook, shackle swivel and pulley block used in hoisting or lowering or as means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load, each safe working load and the condition under which it is applicable shall be clearly indicated. No part of any machine or any gear referred above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

4. In case of departmental machines, the safe working load shall be notified by the clients. As regards contractor's machines the contractor shall notify the safe working load of the machines to the consultants, whenever he brings any machinery to site of work and get it verified by the consultants.

XI. Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Hoisting appliances should be provided with such means as will reduce and minimise the risk of accidental descent of loads. Adequate precautions should be taken to reduce to the minimum risks of any part of a suspended load becoming accidentally displaced. Sleeves and boots as may be necessary should be provided, whenever workers are employed on INTERIOR installations. The workers should not wear any rings, watches and carry keys or other materials, which are good conductors of electricity.

XII. All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition. No scaffold, ladder, or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near place of work.

XIII. To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangements made by the contractor shall be open to inspection by the clients or the Architect.

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

XV. Notwithstanding the above clauses for (i) to (xiv), there is nothing in these to exempt the contractor from the operation of any other Act or Rules in force in the Republic of India.

15. LABOUR LAWS AND RULES

The Site Engineer shall ensure that the contractor maintains relevant records and fulfils all conditions and requirements in accordance with

a. The payment of Wages Act

b. Employer's Liability Act

c. Workmen's Compensation Act

d. Contract Labour (Regulations & Abolition) Act 1970 and Central Rules 1971.

e. Apprentices Act 1961.

f. Any other Act or enactment relating thereto and rules framed there under from time to time.

The Site Engineer shall refrain from involving himself and the supervisors under him by comments/advice/attempts at mediation in any kind of labour dispute at site. His job is only to report to his superiors any happenings of the sort in an objective manner.

EMPLOYER'S RESPONSIBILITY – CONTRACT LABOUR (REGULATIONS AND ABOLITION) ACT 1970 AND RULES 1971

With a view to ensuring that the provisions of the Act are not contravened, the Site Engineer should give particular attention to the following points and see that all the provisions of the Act are enforced:

1. Principal Employer (Banks) is registered as per the Act.

2. Contractor holds a license under the Act from the Local Labour Commissioner for the appointment of Contract labour.

3. Required notice boards, registers and records as provided in section 29 of the Act are maintained by the contractor.

4. Payments of proper wages as per the rules are effected within the prescribed time limits by the contractor.

5. Prescribed facilities and amenities are provided by the contractor.

6. Proper efforts are made by the contractor to set right contravention of law, as soon as the notice pointing out the same is received from the Labour Enforcement Officer, and reports "on action taken" are sent to the Labour Enforcement officer at the earliest with copies to the Employer.

SPECIAL CONDITIONS.

1. **Contractor shall not be entitled to any compensation for any loss suffered by him on account of delays in commencing or executing the work, whatever the cause of the delays may be, including delays arising out of modifications to the work entrusted to him or in any subcontract connected there with or delays in awarding contracts for other trades of the project or in commencement or completion of such works in obtaining water and power connections for construction purpose or for any other reason what so ever and the Employer shall not be liable for any claim in respect thereof. The Employer does not accept liabilities for any sum besides the tender amount, subject to such variations as are provided for herein.**

2. **The successful tenderer is bound to carry out any items of work necessary for completion of the job if such instructions in respect of such additional items and their quantities will be issued in writing by the Architects with the prior consent in writing of the Employer.**

3. **The contractor must bear in mind that the work shall be carried out strictly in accordance with specifications made by the Architects.**

4. **The rates quoted in tender shall also include electric consumption charges for power. If no power is available at site the contractor shall have to make his own arrangement to obtain power connection and maintain at his expense an efficient service of electric light and power and shall pay for the electricity consumed. The Employer shall give all possible assistance to the contractor to obtain the requisite permission from the various authorities, but the responsibility for obtaining the same shall be that of contractor.**

5. **Contractor shall strictly comply with the provisions of safety code in addition to all local rules and regulations.**

6. **The contractor shall be responsible for the observance of all rules and regulations framed by the government under the contract labour act. The Employer shall be entitled to deduct all losses, damages that he might suffer on account of non-observance of these rules by the contractor, from the amount payable to the contractor.**

7. **Time shall be considered the essence of this contract. The entire work must be completed within 60 days from the commencement of the work. If the completion of the work is delayed beyond 1 month, a penalty at the rate of ½ % per week over the contract value will be imposed subjected to a maximum of 5%.**

   If the work is delayed beyond 60 DAYS after the date of completion, the remaining work will be carried out through other agencies at the risk and cost of the contractors under the contract with prevailing market rates.

8. **The successful tenderer shall submit the phased programme of execution of different items of work within 2 days after receipt of acceptance letter.**

9. **Payment will be made subjected to a minimum of 40 lakhs and will be made within a period of TWO weeks after the bill is submitted to the Employer's Office with Architects Certificate.**

10. Before filling in the tender the contractor will check all the drawings and schedule of quantities and will get an immediate clarification from the employer / Architects on item not clearly understood. No claims for any loss or compensation will be entertained on this account.

11. All the work shall be carried out as per detail drawings and specifications or as directed by employer / Architects.

12. The rates quoted in the tender shall be for the finished items of work They shall include all the charges labour, materials, transportation of material equipment, double scaffolding water and electric charges, tool and plants, marking out and cleaning of site, to do all things necessary to provide complete finished item for work consistent with the specifications attached to this tender document. The rates shall be inclusive of octroi duty, excise duty, packing and forwarding, loading or unloading or any other duties or fees levied by any government, public or local bodies. The rates shall be firm and shall not be subject to exchange variations, labour conditions or any other conditions whatsoever.

13. The calculations made by the tenderer should be based upon the probable quantities of the several items of work which are furnished for the tenderer's convenience in the schedule of quantities ,but it must be clearly understood that the contract is not a lumpsum contract , that neither the probable quantities nor the value of individual items nor the aggregate value of the entire tender will form part of the contract and that the employer / Architects do not in any way assure the tenderer or guarantee that the work would correspond there to.

14. Adequate engineering and technical staff to be appointed at site. INTERIOR contractor should inform of their number and qualification. An Approval of employer / Architects should be taken prior to appointing such technical staff on site.

15. The contractor shall keep the tender submitted by him open for acceptance for a minimum period of three months from the date of itssubmission **.When once the tender is accepted the rates quoted by the successful tenderer shall be firm and the variation in rates of any one or all the items on any account shall not be allowed during the entire duration of the contract.**

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

17. No claim for extra item or deviation from specification shall be entertained unless the same is pointed out and accepted as such before the work is taken in hand or within 15 days of work by the successful tenderer.

18. The contractor shall comply with all bye- laws and tax regulations (including GST) of local and other statutory authorities having jurisdiction over the works and shall be responsible for the payment of all the fees and other charges and for giving and receiving of all necessary notices drawings and test certificates.

19. The successful tenders shall properly safeguard against damage or injury to the public and to any property or thing and shall alone be responsible for any such damage and injury to any person or persons or thing arising in connection with its execution of work .The successful tenderer shall protect and hold harmless the employer against any or all claims for any such injury or damage.

20. The work in every respect during the progress and till final acceptance by the employer, including raw materials delivered at the site to be incorporated or used in INTERIOR work by the successful tenderer will be at his own risk. Any loss or damage to any such material or work shall immediately be replaced by the successful tenderer at his own expense.

21. The employer shall have the right to direct the contractor to purchase and use the materials from any source for proper execution of work.

22. The employer / Architects or their authorized representatives shall have full power for inspecting the contractor's works or at any place from which the material is obtained. Acceptances of any such materials shall no way relieve the contractor of his responsibility for meeting the requirements and /or analysis not called for in the specifications shall be borne by the employer in case the material or work is found defective or of inferior quality .tests and /or analysis shall be done in the laboratory approved by the client and the contractor shall permit SBI and or the client's or their authorized representative to be present during any of the tests and /or analysis.

23. INSURANCE

The contractor shall indemnify the employer up to CAR Policy (Contractor's All Risk Policy) against all claim which may be made against SBI by any member of the public or third party in respect of anything which may arise in consequence thereof and shall at his own expense arrange to effect and maintain up to one month, after the virtual completion from an office approved by the SBI a policy of insurance in the joint names and deposit such policy or policies with the employer from time to time during the currency of this contract. The contractor shall also indemnify SBI against all claims which may be made upon the employer under the workman's compensation act or any other statute in force during the currency of this contract or at common law in respect of any employee of the contractor or any sub contractor and shall at his own expenses effect and maintain upto one month after virtual completion of the contract, from an office approved by SBI a policy or policies of insurance in the joint names of the employer and the contractor as aforesaid .The contractor shall be responsible for any other thing which may be excluded from the insurance policies above referred to and also for any other damage to any property arising out of and incidental to the negligent or defective carrying out of this contract.

He shall also indemnify SBI in respect of any costs,. charges or expenses arising out of any claim or proceedings and also in respect of any award of compensation or damage arising therefrom. SBI shall be at liberty and is hereby empowered to deduct the amount of any damages, compensation caused, charges and expenses arising or occurring from or in respect of any such claims for damages from any sum or sums due or to become due to the contractor.

24. WORKMAN AT SITE:

The contractor's workpeople shall not be allowed to live on the site at any time throughout the contract or to trespass beyond the limits of the site. The contractor will be held responsible for any acts of trespass by his workpeople.

25. DIMENSIONS:

Figures dimensions are to be taken in preference to scaled dimensions in all cases. Before commencing any work the contractor shall verify all measurements. If any discrepancies are found they shall immediately be brought to the notice of the Architects.

26. DISCREPANCIES

All the items shown on the drawings or specifications are taken to be included in both. Any discrepancies, which occur in either the drawings or specifications, shall immediately be brought to the attention of the Architects.

27. CUTTING AND MAKING GOOD

Where it is found necessary to interfere with finished work in order to execute this contract, the contractor will be required to do all necessary work at his expenses. Only approved hangers and bolts or other metal fixing devices shall be used to secure frames panels and other units in position .Wooden plugs will not be permitted .Holes shall be formed with electric drills whenever possible .Structural members shall not be cut or drilled without prior consent of the client .

28. MAINTENANCE AND GUARANTEE

The whole of the work to be performed under this contract shall be completed to the satisfaction of the Architects / Bank.

The contractor without additional charge to the employer renew or replaces any works which prove faulty from workmanship or materials and fully maintain the whole installations for a period of 6 months after the commencement of defects liability period of the main contract and a sum of 5% of the contract amount shall be retained by the employer for his period.

29. PREVENTION OF SPOIL DUMPING

The contractor shall take all reasonable steps to prevent spoil, rubbish, debris surplus materials etc.. arising from a work being dumped on an area other than a recognized or approved tipping area and the Contractor will be held responsible for and shall indemnify the employer against any claim or loss arising there from.

30. LEAVE PERFECT:

The Contractor shall remove all rubbish and superfluous material from the site of the works with all reasonable speed from time to time and at completion. On no account shall W.C' S or the employer's receptacles to be used for this purpose.

The client reserves its right to clear contractors uncleared debris at contractors own cost without any reasons & not more than one notice will be given for this.

31. SETTLEMENT OF DISPUTES AND ARBITRATION:

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

(a) If the contractor considers that he is entitled to any extra payment or compensation in respect of the works over and above the amounts admitted as payable by the Architect or in case the contractor wants to dispute the validity of any deductions or recoveries made or proposed to be made from the contract or raise any dispute, the contractor shall forthwith give notice in writing of his claim, or dispute The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.inand endorse a copy of the same to the Architect, within 60 DAYS from the date of disallowance thereof or the date of deduction or recovery. The said notice shall give full particulars of the claim, grounds on which it is based and detailed calculations of the amount claimed and the contractor shall not be entitled to raise any claim nor shall the bank be in any way liable in respect of any claim by the contractor unless notice of such claim have been given by the Contractor The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in**the manner and within the time as aforesaid. The contractor shall be deemed to have waived and extinguished all his rights in respect of any claim not notified to** The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in**writing in the manner and within the time aforesaid.**

b) The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in **shall give his decision in writing on the claims notified by the contractor. The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in submit his claims to the conciliating authority namely the Circle Development Officer, State Bank of India, Local Head Office, Hyderabad for conciliation along with all details and copies of correspondence exchanged between him and** The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in

(c) If the conciliation proceedings are terminated without settlement of the disputes, the contractor shall, within a period of 60 DAYS of termination thereof shall give a notice to

the SBI for appointment of an arbitrator to adjudicate the notified claims failing which the claims of the contractor shall be deemed to have been considered absolutely barred and waived.

(d) Except where the decision has become final, binding and conclusive in terms of the contract, all disputes of differences arising out of the notified claims of the contractor as aforesaid and all claims of the Bank shall be referred for adjudication through arbitration by the Sole Arbitrator appointed by SBI. It will also be no objection to any such appointment that the Arbitrator so appointed is a Officer and that he had to deal with the matters to which the Contract relates in the course of his duties as Officer. If the arbitrator so appointed is unable or unwilling to act or resigns his appointment or vacates his office due to any reason whatsoever another sole arbitrator shall be appointed in the manner aforesaid by the said SBI. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor.

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

It is also a term of this contract that no person other than a person appointed by such SBI as aforesaid should act arbitrator.

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

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

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

32. TERMINATION OF CONTRACT BY EMPLOYER:

If the contractor (being an individual or a firm) commit any " Act of Insolvency ", or shall be adjudged as insolvent, or shall make an assignment or composition of the greater part in number of amount of his creditors, or shall enter into a Deed of Assignment with his creditors, or (being an incorporated Company) shall have an order made against him or pass an effective Resolution for winding up either compulsorily, or Subject to the supervision of the court or voluntarily, or if the official Assignee of the contractor shall repudiate the Contract, or if the Official Assignee or the Liquidator in any such winding

up shall be unable, within seven days after notice to them requiring him to do so, to show to the reasonable satisfaction of the Architect that he is able to carry out and fulfill the Contract and if required by the Architect to give a security there for, or if the contractor shall suffer any payment under this contract to be attached by or on behalf of any of creditors of the Contractor, if the Contractor shall assign or sublet the contract without the consent in writing of the Architect first obtained, or if the contractor shall charge or encumber this Contract for any payments due or which may become due to the Contractor thereunder, or if the Architect shall certify in writing to the Employer that in his opinion the Contractor:

(a) Has abandoned the Contract, or

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

(c) Has failed to proceed with the work with such due diligence and failed to make such due progress as would enable the works to completed within time agreed upon or

(d) Has failed to remove materials from site or to pull down and replace works within seven days after receiving from Architect written notice that the said materials or work where condemned and rejected by the Architect under these conditions or

(e) Has neglected or failed persistently to observe and perform all or any of the acts, matters or things required by this Contract to be observed and performed by the Contractor for seven days after written notice shall have been given to the Contractor requiring the contractor to observe or perform the same, or

(f) Has to the detriment of good workmanship or in defiance of the Architects instructions to the Contrary, submit any part of the contract or has used in the permanent works important materials which are substandard and not as per specification fraudulently making the Architect / Employer to believe that it is the specified material.

Then and in any of the said caused the Employer with the written consent of the Architect may, notwithstanding any previous waiver, after giving seven days notice in writing to the Contractor, determine the contract, but without thereby affecting the powers of the Architect or the obligations and liabilities of the Contractor, the whole of which shall continue to be in force as fully as if the contract has not been so determined and as if the works subsequently executed and being executed by or on behalf of the contractor. And further, the Employer with the consent of the Architect by his agents or servants may enter upon and take possession of the works and all plant, tools, scaffoldings, shed, machines, steam and other power utensils and materials lying upon premises or the adjoining lands or roads, and use the same as his own property or may employ the same by means of his own servants and workman in carrying on and completing of the works or by employing any other Contractor or any other person or persons to complete the works and the Contractor shall not in any way interrupt or do any act, matter or thing to prevent or hinder such other Contractor or other person or persons employed for completing and finishing or using the materials and plant for the works, when the work shall be completed, or as soon thereafter as convenient, the Architect shall give a notice in writing to the Contractor, to remove his surplus material and plant and should the Contractor fail to do so within a period of fourteen days after receipt thereof by him, the Employer may sell the same by public auction and shall give credit to the Contractor for the amount so realized. The Architects shall thereafter shall assertion and certify in writing under his hand what (if

anything) shall be due or payable to or by the Employer, for the value of the said plant and materials so taken possession of by the Employer, and the expense or loss which the Employer shall have been put to in getting the works to be so completed, and the amount, if any owing to the Contractor and the amount which shall be so certified shall, thereupon, be paid by the Employer to the Contractor or by the Contractor to the Employer as the case may be, and the certificate of the Architect shall be final and conclusive between the parties.

33. The mode of measurements shall be as per IS: 1200.

34. The contractor should co-ordinate with other agencies viz., INTERIOR, HVAC (Air-Conditioning), Civil, LAN cabling etc.,

35. CONTRACTOR SHOULD WORK AT ODD HOURS, ON HOLIDAYS TO KEEP UP TIME SCHEDULE. CONTRACTOR TO CO-ORDINATE WITH OTHER CONTRACTORS FOR SMOOTH EXECUTION OF WORK.

36. Partitions shall be measured from finished floor level to bottom level of false ceiling.

38. The Contractor shall not be eligible for any material advance.

Abstract Terms and Conditions:

1.	Defects Liability Period.	12 calendar months.
2.	Period for final measurement and valuation.	2 weeks.
3.	Date of commencement.	Within ONE week after confirmation.
4.	Date of completion.	(60) DAYS from date of commencement.
5.	Minimum value of Interim Certificate.	Only First and final bill
6.	Agreed liquidated damages.	½ % of the total contract amount per week beyond the date of completion subject to maximum of 5%.
7.	Initial Security Deposit.	1% to be paid along with the Tender, balance 1% to be paid within seven days from the date of receipt of work order.
8.	Retention Money.	10% of interim certificate amount of running account bill.
9.	Total retention money in final bill including EMD & ISD Amount.	5% of the contract value.
10.	Installment after virtual completion.	Initial Security Deposit – after the contractor removes all the left over materials, machinery etc.,
11.	Period of honoring certificate.	7 days.
12.	Income Tax Deduction and S. T. under works contract act.	As per Central / State Government rules.
13.	Insurance, Custom duties and taxes.	To be provided and paid by contractor.
14.	Price Escalation.	Will not be considered.
15.	Rate of BOQ's items.	To include item complete in all respects.
16.	**GST TAX:**	**The rate quoted by contractor must be exclusive of GST. GST will be paid as per prevailing government norms.**

ARTICLES OF AGREEMENT

NAME OF WORK: PROPOSED INTERIOR, ELECTRICAL & HVAC (AIR-CONDITIONING) WORKS FOR STATE BANK AO CYBERABADMAIN ENTRANCE LOBBY, SBSC CAMPUS, HYDERABAD. (TELANGANA.)

Articles of agreement made at Hyderabad, this _____day of_____2024 between the **The Chief Manager (Ops), State Bank of India, AO Cyberabad Gachibowli, Hyderabad. Email: cmops.aocyb@sbi.co.in. *(herein after called the employer which expression shall include its successors and assignees)* of the one part and_____(*herein after called the contractors which expression shall include its successors and assignees)* of the other part.**

Whereas the employer desires to get the above mentioned work namely INTERIOR, ELECTRICAL & HVAC (AIR-CONDITIONING) WORKS FOR STATE BANK AO CYBERABADMAIN ENTRANCE LOBBY, SBSC CAMPUS, HYDERABAD (TELANGANA.) as envisaged in tender documents dated _____, schedule of quantities, specifications and the drawings.

And whereas the Contractor agreed to execute upon and subject to conditions set forth herein and to the conditions set forth in special conditions and in schedule of quantities, specifications, conditions of contract, drawings etc., *(all of which are collectively hereinafter referred to as the said conditions)* at the respective rates therein set forth amounting to the sum as herein arrived at or such sum as shall become payable there under *(herein after referred as the said contract sum)*

Now it is hereby agreed as follows:

1. **In consideration of the said contract amount to be paid at the times and manner set forth in the said conditions the contractor shall upon and subjected to the said conditions and complete the work shown upon the said drawings and described in the specifications and schedule of quantities.**

2. **The employer will be pay the contractor a sum of RS._____ (Rupees _____) herein after referred to as the contract sum or such other sum as shall become payable at the times and in the manner specified in the said conditions.**

3. **The term 'THE ARCHITECTS ' in the said conditions shall mean the said " NOT APPLICABAL which expression shall include successors and assignees or in the event their ceasing to be the Architects for the purpose of this contract for whatever reason such other person or persons as shall be nominated for that purpose by the employer, provided always that no person or persons subsequently appointed to be the architects under this contract shall be entitled to disregard or overrule any previous decisions or approval or directions given or expressed in writing by the Architects for time being.**

4. **The said conditions and appendix thereto shall be read and construed as forming part of this agreement and parties hereto shall respectively abide by, subject to themselves to the said conditions and perform agreements on their part respectively in the said conditions contained.**

5. The following documents shall be deemed to form and read and construed as part of this agreement:

a) Notice Inviting Tenders. (NIT)
b) Tender Form.
c) Special Conditions of Contract.
d) General Specifications.
e) Drawings.
f) Employers letter of intent no._____.
g) Contractors letter of acceptance.

6. This contract is neither a fixed lumpsum contract nor a piece work contract but a contract to carry out the work in respect of the entire building to be paid for according to actual measured quantities at the rates contained in schedule of quantities in the said conditions.

7. The Employer reserves to himself the right of altering the drawings and nature of work by adding or omitting any items of work having portions of the same carried out through the other agencies without prejudice to this contract.

8. The time shall be considered as essence of this contract and the contractor hereby agrees to commence the work from the _____(which shall be considered as the date of commencement of the work) and to complete the entire work within 30 DAYS from the date of commencement. The work shall throughout the stipulated period of contract, be proceeded with all due diligence and if the contractor fails to complete the work within the specified period, he shall be liable to pay compensation as provided in clause 7 of the special conditions of contract.

9. That the several conditions of this contract have been read to & fully understood by us.

As witness our hands, this _____day of _____2024 in the presence of:

Witness:

1. EMPLOYER:

2. CONTRACTOR.

GENERAL SPECIFICATIONS – INTERIOR WORKS

TIMBER:

All timbers used are to be of top quality, free from knots, shakes, wormholes, and with a moisture content of not more than 8% to 10% depending on the climatic conditions prevailing at the site.

JOINTS:

All Joints will be standard mortise and tenon, dovetails, dowel, cross-halved, mitred, tongued and grooved and invited. Nailed or glued butt joints will not be permitted. Except in exceptional cases nailed butt joints will not be accepted.

FASTENINGS:

Screws, nails, bolts, will generally be of M.S. G. I wire, except in following examples: "Outdoor Furniture" fastenings will be of brass or other non-Corrosive metal. In hardware, they will match the finish of the hardware item.

Brass Nails in a finished surface shall be neatly punched and the hole filled with wood filler matching the finish. Screws in a finished surface will be round head, raised head or sunk (beneath the surface and the hole plugged with matching colour and grain of the wood surface) unless specially detailed.

PLYWOOD:

Used mainly for the bodywork of this furniture, shall be Luaan or similar close-grained plywood suitable for veneering painting or bounding plastic laminate. It will be a resin bonded (PFB) weatherproof brand, and for "outdoor" furniture, standard specifications, ' marine' 'Mysore ply ', 'Anchor ply ' or Indian plywood brand or equivalent. Exposed edges will be finished with a piece of soiled wood, tongued and grooved and glued or as detailed.

HARDWARE:

Hinges, lock, latches, door tracks etc., shall be as specified and as far as it possible, by the manufacturer specified. In any variation of this the quality of the substitute shall be equal to or better than the original specified, and sampled should be submitted to the Designer for prior approval.

METAL:

Where metal logs frames etc., are used these shall be welded, brazed, bolted or riveted as required and on finished surfaces. Welding, brazing riveting shall be neatly smoothed so that no evidence of this is apparent on the final finish of the metal, which will be as specified on drawing. On all legs, wood or metal, nylon glides or castor as indicated are to be installed.

SPECIAL CONDITIONS AND SAFETY CONDITIONS

The contractor is hereby advised to read the following conditions carefully before quoting rates and to be strictly adhered during execution of work.

SPECIAL INSTRUCTIONS

a) Contractor shall submit copies of all statutory compliance certificates such as ESIC, PF, Contract labour registration, shop & establishment and or any other local authority registration as applicable.

b) All workmen, engineers, supervisors shall be converted as per ESIC, PF & minimum wages act.

c) All workmen, engineers, supervisors shall under gopre employment medical checkup through company recognized medical officer and submit copies of test report.

Contractor to provide proof of monthly remittances with regard to the workmen deployed at the site.

Contractor is responsible to ensure that his workmen are confined to their work area and comply with all safety, security and administrative instructions given by the site engineer.

Contractor shall provide identification badges to all his people.
On completion of day's work, the entire area shall be kept clean and neat. All debris, surplus material etc., shall be removed immediately from the site.

Any such standard material used during execution will be rejected and fully deducted from the bills.

The contractor has to carry out the work in coordination with the other appointed agencies. The contractor should study the situation at site and organize the work accordingly. Whenever work needs to be done in coordination with other agencies, the contractor shall work out the actual time required to complete his part of the job in respects and inform the company.

Revision of rates is not allowed and will be not paid for any reason due to unexpected increase in the cost of the materials or delay in completing the works etc.,
No labour hutment is allowed inside the premises.

The area is in "No smoking Zone" therefore smoking is strictly prohibited.
All workmen, Mastri, supervisor and Engineers wearing shoes and safety helmets are only allowed to enter the gate.

Every day contractor / his supervisor should take necessary "Work permit" from the company engineer before starting the job.
Workers are not allowed to sleep during night and cook good inside the premises.

Work to be carried out only under supervision of the qualified engineer.

Contractor should strictly following safety guidelines.
Contractor should use only angle/pipe scaffolding. Wooden scaffolding is not allowed.

All contractor's people need to undergo induction/safety training and formal interview by company selection committee.

Contractor shall submit a copy of competency certificates like wiremen license, supervisor's license, IBR welder license etc., issued by competent authority before starting the work.

Contractor shall maintain daily master roll book for his people at site. Based on that, ESIC & PF contribution to be made.

COMPANY SAFETY GUIDE LINES

WORKING BELOW GROUND LEVEL:

Check that there are no underground cables/ water/sewage lines prior to start of work area. If found inform site in-charge. Disconnect power supply to any cables found in work areas with permission.

For pits deeper than 3 feet workmen should be provided with lifelines. Ladders should be provided for quick escape from the pit. Provide firmly supported side shuttering or shoring to prevent accidental collapse of earth into pits; cordon off the area around the pit to prevent accidental falls. (Cordon must be at least 3 feet beyond the pit edge) excavated earth from the pit must be stacked only beyond the cordon.

Refill the pit promptly on completion.

Incase pits need to be left open for any reason, ensure proper covers over the pits.

WORKING AT HEIGHTS:

All personnel working at heights beyond 1.8M should wear safety belts.

Ensure that safety belts are tied security to anchors while working at heights.

Ensure that rigging is well anchored to solid supports prior to erecting items like trusses at a height.

Ensure that debris is cleared on a daily basis from work spots.

Ensure that a nylon safety net is securely fitted under the trusses to provide safety against accidental falls to personnel (who will need to have safety belts securely fastened) working on the t6russes and roofing. Alternatively well-supported platforms with protected railings should be used a height suitable for personnel to work while standing.

Ensure that roof top ladders are used while laying and working on the roof.

Ensure that ladders used for climbing to heights are firmly secured against slippage.

All scaffolding should be in steel frames.

Scaffolding should be provided with 3 feet wide working platforms. The platforms should be provided with protective railings.

WORKING WITH ELECTRICITY

Ensure proper earthing of all electrical machines used.

Ensure that all connection s are taken throughout earth leakage's circuit breakers. Providing ELCB on the main distribution board prevents accidental shocks.

Ensure that welders always used suitable welding goggles and gloves while welding.

Ensure availability of 2 CO2 type fire extinguishers at any easily accessible location at site for fire fighting

Provide a pair of fire buckets filled with dry sand for firefighting at site.

As far as possible DC generators sets shall be used instead of AC transformer sets.

Contractor shall get his welding sets certified by inspector of electrical department.

The welding transformer shall be fed through an armored cable.

All connections from main to individual M/C (such as cutter, planer, compressor etc) to be taken through shielded cable and 3-pin plug only
The potable machines should be of fully insulated or plastic body. No metal body is allowed.

During welding the earthling to be provided directly to the member to be welded throughout cable only not using any reinforcement rod/angles.

PERSONAL PROTECTIVE GEAR

Following is a list of items to be provided to workmen by the contractor as and when required the items must be ISI certified.

Safety shoes
Hard hats
Safety belts
Goggles
Gloves
Safety nets
Roof top ladders
GENERAL

BREAKING WORKS:

Workmen engaged in breaking stones/chipping of concrete should wear safety goggles.

INDEX FOR SPECIFICATION FOR CIVIL WORK

10. SPECIFICATIONS FOR CIVIL WORK

MATERIALS – GENERAL

a. All the materials required in the construction shall conform to the relevant latest Indian Standards specifications unless otherwise indicated. For patented products, the specifications and instructions of the manufacturers will be followed. In case where there are no specifications, then Architects/Employers instructions will be followed. In Case of any discrepancy/dispute regarding specifications, Architect and Employer's decision will be final and binding.

b. Materials shall be transported, landed and stored at the site or elsewhere in such a manner as to prevent any damage, deterioration or contamination.

c. The samples of all materials shall be got approved by the Architect and Employer prior to ordering and shall be kept at site office of the Architect & Employer. The materials brought to site shall conform in all respects to the approved samples. Any work executed, without approval for the materials, is liable to be rejected. Accordingly, it will be paid either at tender rates or reduced rates or not to be paid at all, at the discretion of Architect & Employer, whose decision will be final and binding.

d. The Architect & Employer shall have an option to have any materials tested at the contractor's cost to find out whether they are in accordance with the specifications. All Bills, vouchers, test certificates shall be produced for inspection on demand by the Architect & Employer to ascertain the quality/ suitability of materials.

e. The materials shall be stacked at site as directed by the Architect & Employer.

f. Any materials rejected by the Architect & Employer, shall be removed by the contractor from the site within 24 hours at his own cost.

g. The contractor shall include the elements of wastage of materials in his rates for various items.

h. The Architect & Employer shall have the power to cause the contractors to purchase and use such material from any particular source at his opinion be necessary for proper execution of work.

A. **PLAIN AND REINFORCED PRECAST CONCRETE WORK:**

B.1. **APPLICATION OF SPECIFICATIONS:**

B.1.1 Not withstanding what is stated in the specification herein, detailed architectural and structural drawings and notes appended there on shall be deemed to form part of the specifications and to supersede these, in case of any discrepancy.

B.2. **GENERAL:**

B.2.1 The structural and architectural drawings shall be studied thoroughly and any discrepancy in the dimensions on the drawings or any other point not clear to the contractor shall be brought to the notice of Architect & Employer well in advance, and got decided from them before further proceeding with the work.

B.2.2. No concrete works shall be carried out in the absence of authorised and qualified supervisor of the client/Architect.

B.3. **MATERIALS:**

B.3.1. **General:**

B.3.1.1. All the materials constituting the concrete shall conform to the relevant latest Indian Standard Specifications, unless otherwise indicated.

B.3.1.2. Materials shall be transported, handled and stored on the site or elsewhere in such a manner as to prevent damage, deterioration or contamination.

B.3.1.3. All the materials such as sand, coarse aggregates, cement and water shall be got tested in any approved laboratory, as directed by the Employer & Architect, before starting the concrete work. During construction also all these materials will have to be tested, as often as deemed necessary by the Employer & Architect.

B.3.2. **Cement:**

Cement shall be ordinary Portland cement 43 grade and of approved brand confirming to IS 1812 – 1989 unless otherwise specified. The contractor shall procure cement of makes – ULTRATECH, BIRLA, ACC, or any other manufacturer as approved by Architect. The contractor may use ordinary Portland Cement of 53 grade of the makes specified above by obtaining written permission from the Architects/Bank. It shall be stored by the contractor in a dry, watertight and properly ventilated structure as per specified conditions. The cement shall be stacked on a dry raised platform, 1'-0" above the floor level and shall be stacked in the sequence of receipt of consignments. Not more than 10 bags should be kept in one stack. Any cement which has deteriorated caked or which has been damaged due to any reason whatsoever shall not be used. Cement, concerning which there is any doubt, shall be got tested by the contractor at his cost and used, only if found satisfactory. Condemned/damaged cement shall be removed immediately from the site by the contractor at his cost.

Daily account of receipt and use of cement bags shall be maintained by the contractor in the proforma approved by the Architects/Employer and got checked by the Employer's Engineer at site. Cement should be used in the order in which it is received at site. Cement stored for more than three months shall be got tested, before using it in the work.

B.3.3. **Sand:**

Sand shall be well graded, coarse in texture, clean, hard and free from salt, earth, clay or any other harmful material. Before starting the work, the contractor shall get samples of sand, locally available from different sources, if required, and the same shall be got tested as per latest relevant B.I.S. codes for concrete work and to get the final approval of Employer & Architect. During the course of the construction or for any reasons it is observed that the sand, procured by the Contractor from previously approved source, is not upto the approved standard or it is not available in sufficient quantity required for the entire project, then the contractor will have to make such alternative arrangements to procure the sand of approved quality from any other source, even with longer lead at no extra cost. Sand shall be screened and washed, if required, as directed by the Employer & Architect/at no extra cost. Field tests shall be carried out regularly and as directed, to ensure the suitability/quality of the same. Silt content should not exceed 8% by volume or 5% by weight, and should be free from other deleterious materials. When sand is mixed by volume, necessary allowance shall be made for bulkage, as required and directed to give correct mixture.

B.3.4. **Coarse Aggregate:**

Coarse aggregates shall consist of hard, dense, durable uncoated crushed Granite rock. It shall be free from soft, friable, thin or long laminated pieces. All aggregates should generally confirm to IS 383 – 1970. For reinforced cement concrete, the maximum size shall be not more than 20mm and minimum shall not be less than 5mm and shall be uniformly graded to the approval of Employer & Architect. If locally available coarse aggregate is not suitable or is not sufficient in quantity, the contractor shall have to procure it from any other source, even with longer leads at no extra cost. As and when directed by Employer & Architect, aggregates shall be washed by approved methods at contractor's cost. Necessary tests shall be carried out, as and when required to ascertain about the suitability and grading of the aggregated, by the contractor at his cost.

B.3.5. **Water:**

Water shall be clean, fresh and free from organic or inorganic matters in solution or suspension in such amounts, that may impair the strength or durability of the concrete. Water fit for drinking will generally be found suitable for use in concrete and plastering work. However water shall be tested periodically for its use in construction work.

B.3.6. **Reinforcement:**

B.3.6.1. **Mild steel bars:**

Mild steel reinforcement bars shall conform to I.S.432 – 1982 "Part I" Fe 410 – S, other qualities of steel shall not be acceptable.

B.3.6.2. **High strength deformed bars:**

Where deformed high strength reinforcement bars are specified, the contractor shall use tor steel, accompanied by a test certificate from the manufacturer, conforming to IS – 1786 – 1986 and shall be Fe 500 grade. Contractor shall bet steel reinforcement tested at his cost as and when required and directed by Employer & Architect.

Steel shall be from the main manufacturers i.e., TATA / SAIL/VSP or any other manufacturer as approved by Architect & Employer.

B.3.6.3. **Cleaning of reinforcement:**

Before steel reinforcement is placed in position, the surface of the reinforcement shall be cleaned of loose rust or scaling, dust, grease and any other objectionable substances as required and directed.

B.3.6.4. **Bar bending schedule of reinforcement:**

On receipt of structural drawings, contractor shall prepare bar bending schedules of reinforcement and shall get it approved by the Employer & Architect, in advance before starting the work.

B.3.6.5. **Cutting and Reinforcement:**

Before steel reinforcement bars are cut, the contractor shall study the lengths of bars required as per drawings and shall carry out cutting, only to suit the sizes required as per drawings so that the wastage is minimum.

B.3.6.6. **Placing and Security:**

Reinforcement bars shall be accurately placed and secured in position and firmly supported or wedged by precast cement mortar concrete blocks of suitable mix, thickness and size, at sufficiently close intervals, so that the bars will not sag between the supports or get displaced during the placing of concrete or any other operation of the work. 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 position.

B.3.6.7. **Binding wire:**

The reinforcement shall be securely bound wherever bars cross/lap or whenever required with 2 strands of suitable length of 18 gauge soft annealed steel wire.

B.3.6.8. **Welding:**

Welding of bars, in place of splicing, shall not be carried out, unless specifically authorised in writing by architect & employer, and the welding shall be as per relevant I.S. code of practice. However, no extra payment shall be allowed for the same.

B.3.6.9. **Bends etc:**

Bends, cranks, curves, etc., in steel reinforcement shall be carefully formed and shall strictly confirm to the drawings/requirements, care being taken to keep bends out of winding. Otherwise, all rods shall be truly straight. If any bend/crank shows signs of cracking, such rods/bars shall be removed immediately from the site. For bending of bars to any curvature, minimum radius of 9 times diameter of the bar shall be used, unless otherwise specified in the drawings. However, in respect of standard hooks, the radius of bends shall be two times the diameter of bar. Heating of reinforcement of bars to facilitate bending will not be permitted. The bars shall always be bend cold. In case of mild steel reinforcement bars of larger sizes, where cold bending is not possible, they may be bent by heating, but only with written permission of the Architect & employer. Bars when bent shall not be heated beyond cherry red colour, 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 or cranking.

B.3.6.10 **Inspection of Reinforcement:**

No concreting shall be commenced until the Architect & Employer have inspected the reinforcement in position and their approval obtained. A notice of atleast 72 hours shall be given to the Architect & Employer by the Contractor for inspection of reinforcement. If in the opinion of the Architect & Employer any material is not in accordance with the specification or the reinforcement is incorrectly spaced/bend or otherwise defective, the contractor shall immediately remove such materials from the site and replace with new ones and rectify any other defects in accordance with the instruction of the Architect and Employer and to their entire satisfaction.

B.3.6.11 **Net Measurement:**

Reinforcements shall be placed as shown on the structural drawings and payment will be made based on and limited to the net measurements, as per drawings. Only such laps, dowels, spacers, chairs etc., in reinforcement specifically shown on drawings shall be paid for. The contractor shall allow in his quoted rates for all wastages and rolling margins, which will not be paid for. The measured length of all the bars shall be converted into weight, as per standard weights given in latest I. S. Schedule. In case the weights of any bar/bars are less than the required weight (beyond rolling margins specified by B.I.S.) the same shall not be used on work. If used, the same shall be replaced with proper ones, at no extra cost.

B.3.6.12 **Cover for Reinforcement:**

Unless otherwise specified in drawings, cover shall be measured from outer surface of the main reinforcement and shall be as follows:

a. For beams and lintels – 25mm or dia of the bar, whichever is higher.

b. For slabs, chajjas, canopies, pardas –20 mm or dia of the bar, whichever is higher.

c. Columns above GL – 40mm, or dia of bar, whichever is higher.

d. Columns below GL – 80mm,

e. Footings – 50mm.

f. Cover blocks shall be of (1:1½:3) P.C.C. and of thickness, not less than the cover specified. Cover blocks of 1:2 cement mortar may be allowed, if specifically permitted by the Architect. PVC cover blocks of required cover is also allowed.

B.3.6.13. Rates quoted for reinforcement, in addition to any factors mentioned elsewhere, shall also include for:

a. Stock piling of reinforcement as described.
b. Decoiling, straightening (coiled bars, bent bars).
c. Removal of rust and every other undesirable substance, using wire brushes etc., as required/directed.
d. Cutting to required lengths, labour for bending and cranking, forming hooked ends (if required), handling, hoisting, placing in position, tying binding with binding wire and everything necessary to fix reinforcement in work as per drawings/requirements.

e. Cost of binding wire required as described.

f. Fabricating and fitting reinforcement, in any structural member, irrespective of its location, shape, dimension and level.

g. Cost of precast concrete/mortar cover blocks of proper size or nylon spacers to maintain cover and holding reinforcement in position.

h. Work at all levels.

B – 4 **FORM WORK:**

B.4.1. **Materials and design:**

Contractor shall get the materials, sizes/arrangements and method of supports, details of joinery, and design of formwork for beams, slabs, columns etc., approved by Architect, before starting the formwork.

B.4.2. **Design of Form work:**

i) Form work shall be adequately designed to support the full weight of workers, reinforcement, freshly placed concrete, effects of tamping/vibrating, etc., without yielding/settlement or deflection, and to ensure good and truly aligned concrete finish in accordance with the construction drawings.
ii) The formwork shall be so designed that the sides of the beams can be first struck, leaving the soffit of beams and supporting props in positions. Props shall be designed to allow accurate adjustment and to permit of their being struck without jarring the concrete.
iii) The design of form work shall be got approved from the Architect & Employer before starting this item of work.

B.4.2.1 The form work shall be of approved plywood (Marine or boiling waterproof) and not less than 12mm thick and with proper supports as may be approved by Architect & Employer. As an alternative sufficiently rigid steel shuttering with appropriate supports may be used, as may be approved by Architect & Employer at no extra cost. In every case, joints in the shuttering are to be such as to prevent loss of liquid from concrete. In case of steel shuttering, the joints must be perfectly close and sealed with craft paper or any other types of approved sealing materials. If any particular material or materials are specified in the Schedule of Quantities for form work, only such particular/ specified material or materials shall be used in the work. The form work shall be constructed so as to remain sufficiently rigid during placing and vibrating/tamping of the concrete. All shuttering and framing must be adequately stayed and properly supporting the concrete during period of hardening. The forms shall have sufficient strength and rigidity to hold concrete and withstand the forces/pressure of people and machinery working ramming and vibration, and more so when the concrete is tamped/vibrated. The surface of all forms in contract with concrete shall be clean, rigid, watertight, and smooth. Suitable devices shall be used to hold corners, adjacent ends and edges of panels of other forms together in accurate alignment.

B.4.2.2. The form work shall conform to the shape, lines and dimensions to suit the RCC members, as shown in the drawings and be so constructed. A camber of 6mm in all directions, for every 5 meter span, in shuttering for all slabs and beams shall be given to allow for unavoidable sagging, due to self weight (including concrete, workers, machinery etc)/compaction of other causes.

B.4.2.3. Temporary openings or windows shall be provided at the base of column forms, and at other points, where necessary to facilitate cleaning and observation, immediately before concrete is deposited. These shall be properly closed, before placing concrete in position.

B.4.2.4. **Vertical centering/staging:**

The vertical shuttering shall be carried down to such solid surface as is sufficiently strong to afford adequate support and shall remain in position until the newly constructed work is able to support itself. Props shall be steel tubes with extension pieces and securely braced against lateral displacement. The spacing of steel tubes shall be designed to carry loads imposed on it without undue deflection of the members, supported by the props. The spacing and sizes of props shall be approved by the Architect & Employer and any alterations suggested by them shall be carried out at contractor's expense. Pipe bracing shall be provided, as required/directed, without extra cost. The contractor shall allow in his rates for providing props and struts upto any height as shown in the working drawings issued to the contractor from time to time. Wooden props and bracing can only be allowed under special sanction of the Architect & Employer.

B.4.2. **Design of form work:**

i) Form work shall be adequately designed to support the full weight of workers, reinforcement, freshly placed concrete, effects of tamping/vibrating, etc., without yielding/settlement or deflection, and to ensure good and truly aligned concrete finish in accordance with the construction drawings.

ii) The form work shall be so designed that the sides of the beams can be first struck, leaving the soffit of beams and the support props in position. Props shall be designed to allow accurate adjustment and to permit of their being struck without jarring the concrete.

iii) The design of form work shall be got approved from the Architect & Employer before starting this item of work.

B.4.3. **Water tightness:**

It is the contractor's responsibility to ensure that the forms are checked for water tightness during progress of shuttering work and also just before concreting operation starts and to make good deficiencies, if any. If instructed by the Architect & Employer, building paper will have to be used, without any extra charge for the same, viz., to have adequate water tightness.

B.4.4. **Cleaning and treatment of forms:**

All rubbish, particularly chippings, shavings and sew dust, etc., shall be removed from the interior of the forms, before the reinforcement is placed in position and as well before the concrete is placed. The form work to be in contact with the concrete shall be cleaned and thoroughly wetted or treated with an approved composition before placing concrete. Care shall be taken that such approved composition is kept out of contact with reinforcements. Interior of all moulds and boxes must be thoroughly washed (water) with hose pipe or otherwise so as to be perfectly clean and free from all extraneous matter before depositing of concrete. Prior approval of the form work should be obtained from Architect/Employer, before placing reinforcement on the form work.

B.4.5. **Stripping:**

Form shall be left in place until their removal is authorised by the Architect & Employer and shall then be removed with due care, so as to avoid injury to concrete and or workmen. In no circumstances the forms shall be struck, until the concrete develops strength of at least twice the stress, to which the concrete may be subjected to at the time of striking. The strength referred to shall be that of concrete, using the same cement and aggregates with the same proportions, and cured under conditions of temperature and moisture similar to these existing on the work. Where possible, the form work should be left longer, as it would assist in more effective curing.

B.4.6. **Stripping time:**

In normal circumstances (general where temperatures are above 20 degrees C and where ordinary Portland cement is used) forms shall be struck after expiry of the following periods, unless otherwise specifically directed at site by the Architect & Employer.

	LOCATION	STRIKING TIME IN CLEAR DAYS (OPC) (AFTER THE DAY OF CASTING)
a.	Vertical sides of walls slabs, beams and columns	1
b.	Bottoms of slabs up to 4.5m span.	7
c.	Bottom of slabs above 4.5m span/ bottoms of beams & arch rib bottoms up to 6m span.	14
d.	Bottom of beams over 6m span and arch rib bottoms above 6m span.	21

B.4.7. **Form work in lifts for continuous surfaces:**

Where forms for continuous surface are placed in successive units, (as for example in columns or walls) the forms shall fit tightly over the completed surface so as to prevent any leakage of water/mortar from the concrete and to maintain accurate alignment of the surface.

B.4.8. **Procedure while removing the form work:**

All formwork shall be removed without shock or vibration, as otherwise it would damage the reinforced concrete. Before the soffit and struts are removed, the concrete surface shall be first exposed partly, where necessary, in order to ascertain that the concrete has sufficiently hardened. Proper precautions shall be taken to allow for the decrease in the rate of hardening that occur with cement, in cold weather. Wetting the surface before stripping is preferable, to avoid spalling of corners.

B.4.9. In case of structures with two or more floors, the weight of concrete, centering and shuttering of any upper floor being cast shall be suitably supported on one floor below the top most floor already cast. The rate quoted for reinforced concrete items is deemed to have included for these arrangements/supports.

B.4.10. **Tolerance:**

a. All RCC work shall be executed to true lines and levels and plumb and to the final approval of Architect & Employer's representative.

b. If work is not carried out within the reasonable tolerance the cost of all rectification measures of dismantling and reconstructing or as decided by the architect and Employer shall be borne by the Contractor. In case of work dismantled, the same will not be measured and paid for.

B.5.1. **Concrete mix proportioning:**

Concrete mix proportioning for all grades of concrete shall be as per IS 456 – 2000 clauses 8 & 9 and as per SP 23 – 1982 Section 6. The constituent materials to be used for concrete making namely cement, aggregates & water shall be as per clause 4 of IS 456 – 2000. The mix proportions shall be so selected as to ensure that the workability of the fresh concrete is appropriate/suitable for the conditions of handling and placing, so that after compaction its surrounds all reinforcements and completely fills the form work. When concrete is hardened, it shall have the required strength, durability and surface finish. The determination of the proportions of Cement, Aggregates and water to attain the required strengths shall be made as follows:

a. By adopting nominal concrete mix, which is called 'nominal mix concrete'.

Batching:

In proportioning concrete the quantity of both cement and aggregate should be determined by mass. The mass of cement can be determined on the basis of mass of cement per bag. Water shall be measured by volume in calibrated containers/tanks or weighed.

In case of design mix of concrete, uniformity of the materials used for the concrete making has been established over a period of time, the proportioning may be done subsequently by volume batching, provided prior approval of Architect & Employer is obtained for same and ensured that periodic checks are made on mass/volume relationships of materials. Where weigh batching is adopted, allowance shall be made for bulking in accordance with IS 2386 (part III) 1963.

The concrete shall be mixed in a Mechanical Mixer as per IS 4791 – 1968. Workability of the concrete should be controlled by direct measurement of water content. Workability should be checked at frequent intervals as per IS 1199 – 1959. The contractor is entirely responsible for the proportioning of concrete mixes of required strengths and must submit the procedure for such proportioning of concrete mixes for the prior approval of Employer & Architect, whose decision shall be final in the matter.

b. Alternatively, contractor may use suitable ready mix concrete at no extra cost and after obtaining written permission from Architects/Bank.

B.5.2. **Transporting and placing concrete:**

B.5.2.1. Immediately prior to placing the concrete, the shuttering shall be well watered and any water and rubbish lying removed.

B.5.2.2. The concrete shall be transported from mixer to the position of placing as rapidly as possible and in a manner that would prevent separation or bleeding or impair the quality of concrete. Equipment for transportation, pumping or pneumatically conveying concrete shall be of such size and design as to ensure a practically continuous flow of concrete at the delivery end, and without any separation of the materials. The chute shall be of metal or metal-lined wood with slopes neither less than 1 vertical to 3 horizontal nor more than 1:2. The discharge end of the chute shall be provided with baffle plates to prevent segregation.

B.5.2.3. Concrete shall not be dropped from a height in a manner, which will cause segregation. It shall be placed directly in its permanent position to avoid segregation due to rehandling. Rate of placing concrete shall be such as to avoid formation of planes of weakness in concrete being placed. No partly set or retempered concrete shall be used on the job.

B.5.2.4. Each layer of concrete being placed shall be consolidated by mechanical vibration supplemented by hand spreading, rodding and tamping as directed, to form dense concrete with all surfaces free from honeycombing and tolerably free
from water and air holes or other blemishes. Vibrators shall in no case be used to work along the forms. Duration of vibration shall be so limited to reduce time necessary for satisfactory consolidation, without causing objectionable segregation. The vibrator shall not be inserted into a lower course, that has already been vibrated/compacted and begun to set.

B.5.2.5. The contractor shall be responsible for the co-ordination with sub-contractors or other contractors for incorporating necessary inserts, electrical conduit pipes, fixing boxes, blocks, chase holes, etc., as required. The contractor shall obtain approval from the Architect/Client as regards the above, before casting of the concrete. No holes or chases shall be made in the concrete, without prior approval of the Architect & Employer.

B.5.2.6. Concrete shall be placed continuously until completion of the work.

B.5.2.7. Accumulation of set concrete on the reinforcement shall be avoided. Before fresh concrete is deposited upon or against any concrete which has already hardened, the surface of the hardened concrete shall be well roughened, if necessary by chipping, and all lattance removed. The surface shall then be swept clean with wire brushes, thoroughly wetted and covered with a thin layer of rich cement mortar and or chemical additives, as may be directed by Architects.

B.5.2.8. In foundation trenches or in like positions, concrete shall be carefully laid and poured from less than over 1 meter height. If the height exceeds 1 meter, the concrete must be deposited through inclined spouts. The trenches shall be maintained free of water during concreting by proper diversion of water flow with dewatering as required and directed, at no cost and without washing over freshly deposited concrete.

B.5.2.9. Concrete footing shall be placed upon undisturbed clean and hard surfaces of specified bearing capacity.

B.5.2.10. Contractor's authorised Engineers/Supervisors/Foremen shall always be present for all concreting work carried out at site.

B.5.3. **Protection of Concrete:**

Newly placed concrete shall be protected by approved means from rain, sun and drying winds. Exposed vertical/inclined/curved faces of concrete shall be kept wet continuously for not less than a fortnight by covering with a layer of sack curing, invariably horizontal surfaces shall be kept covered with water pounded by means of bunds. Concrete placed below the ground shall be protected from falling earth during and after placing. Approved means shall be taken to protect immature concrete from damage due to debris, excessive loading, vibration, abrasion, ground-water, mixing with earth or other materials, flotation and other influences that may impair the strength and durability of the concrete.

B.5.4. **Consistency:**

Only minimum and sufficient water shall be added to the cement and aggregate during the mixing to produce a concrete having sufficient workability to enable it to be well consolidated and to be worked into the corners of the shuttering and around reinforcement, to give the specified surface finish, and to have the specified strength. When suitable and appropriate amount of water has been determined, the resultant consistency shall be maintained through the corresponding parts of the work and approved tests shall be conducted from time to time to ensure the maintenance of this consistency.

The exact determination of the slump for various members and water cement ratio shall be as directed by the Architect & Employer.

Slumps tests shall be made in accordance with the details given in IS 456 – 1978.

B.5.5. **Finishing:**

B.5.5.1. As soon as possible after the form work has been struck holes left by clamping bolts, air and water holes and other rough patches shall be filled in with cement and sand mortar 1:1 mix (sand passing 1/8" sieve) by working into the surface with a wooden float. Excess water shall be avoided. This should be done within 72 hours after removal of form work.

B.5.5.2. Unless instructed to the contrary the face of exposed concrete placed against shuttering shall be rubbed down immediately upon removal of the shuttering to remove fine or other irregularities. All surfaces which are required to be plastered shall be hacked properly.

B.5.5.3. All exposed faces of concrete members for which shuttering is not provided, shall be smoothened with a wooden float, when the concrete is green and setting has not started, to give a finish equal to that of rubbed down face where shuttering is provided. The top face of a slab, which is not intended to be covered with other materials, shall be levelled and floated while unset to a smooth finish to the levels of falls/slopes shown on the drawings or as instructed. The floating shall be done so as not to bring an excess of mortar to the surface of

the concrete. Dentations in the surface of the concrete shall be formed, if specified/ordered, by approved implements to the depths and patterns described. The top face of a slab intended to be surfaces with mortar, granolithic or any other materials shall be finished rough (to receive final finish) and to the approval of the Architect & Employer.

B.5.5.4 **Honey Combing:**

i) Where honey combed surfaces are noticed in the concrete, the contractor shall not patch up the same, until examined by the Architect & Employer and decision given regarding accepting the work with rectifications or rejections of the same. If the contractor patches up such defects without the knowledge of the Architect & Employer, the Architect & Employer will be at liberty to order demolition of the concerned concrete members to the extent they consider necessary. In such cases, the contractor shall reconstruct the demolished work. The cost of demolition and demolished work and disposal of debris shall not be measured and paid for.

ii) If in the opinion of the Architect & Employer the honey combing is harmful to the structure and where so directed by the Architect & Employer, the full structural members affected by honey combing, as decided by Architect & Employer, shall be dismantled and reconstructed to Architect & Employer's approval. The cost of demolished concrete and as well cost of demolishing and disposing the debris will not be measured and paid for.

iii) Where in the opinion of the Architect & Employer the structural members containing honey combing can be allowed to be retained with rectification, the rectification shall be carried out as directed by the Architect & Employer by gunitting (with cement mortar 1:3 proportion) or epoxy bonding and plastering the areas concerned at the contractor's expense.

iv) If such honey combed areas are not severe in the opinion of the Architect & Employer and where so directed shall be patched up with dry-pack cement mortar consisting of 1 part of cement and 3 parts of sand after removing defective concrete down to sound concrete to the satisfaction of Architect & Employer all at the expense of the contractor. Such works should be completed within 72 hours from deshuttering.

v) Concrete faces to be finally concealed shall be left as from the shuttering, except that honey combed surface shall treated as above (i), (ii), (iii) & (iv). Faces of concrete that are to have finished other than specified shall be prepared in an approved manner and as instructed.

vi) The patched up areas shall be kept moist for 7 days and prevented from drying out too soon. Wherever required or instructed by the Architect & Employer, patching work shall be done using part white cement upto 30% of the total quantity of cement specified.

B.5.6. **Construction joints:**

Concreting shall be carried out continuously up to construction joints, if any, the position and details of which shall be predetermined by the Architects/Employers. Construction joints shall be provided as directed by the Architect. They shall be rebated and or of an approved shape for slabs, beams etc., and shall be provided in the positions described on the drawings or as directed by the Architects/Employer. Inclined "Feather" joints shall not be permitted. Shear keys not less than 2" deep and equal to 50% of the cross sectional area shall be provided

to all construction joints. Reinforcing bars shall extend by not less than 60 time dia of respective bars for M:150, 50 times dia, for M:200, beyond construction joints, unless otherwise indicated.

The joints shall be kept only at places, where the shear force is minimum and these shall be at right angles to the direction of main reinforcement. In case of columns, the joints shall be horizontal and about 3" below the bottom of the deepest beam framing into the columns.

B.5.7. **Structural joints:**

Expansion joints, construction joints, hinges or other permanent structural joints shall be provided in the position and of the form described in the drawings or as directed by the Architects/Employers and shall be got approved before casting.

In no case shall the reinforcement corner protecting angles or other fixed metal items, embedded in or bonded into concrete, run continuously through the expansion joints. The placing of concrete or either side of the expansion joint shall be separated by suitable filler materials during continuous construction or alternately adequate space left during construction and filler materials placed in position later after an interval of at least seven days.

B.5.8. **Cutting into concrete:**

No concrete shall be neither cut into, nor shall it be interfered with in any way, without the prior approval in writing by the Architect & Employer.

B.5.9. No portion of the structure shall be subjected to any loading in excess of design loads, except with prior written permission of Architect.

B.6.0. **Strength of Concrete:**

B.6.1. The concrete mix shall be so made to produce the desired grade concrete having the required workability and characteristic strength not less than values given below:

Grade Definition	**Specified Minimum Characteristic compressive strength at 28 days**
M – 15	150 Kg/Sq.cm
M – 20	200 Kg/Sq.cm
M – 25	250 Kg/Sq.cm
M – 30	300 Kg/Sq.cm

M – 35	350 Kg/Sq.cm

Strength of concrete required for various situations have been clearly stipulated in the relevant item of the schedule of quantities and/or in the drawings. As required by the Architect, the water content and the water/cement ratio shall be determined from the results of tests of the materials proposed for use, in advance of construction. It is important to maintain constant water cement ratio at its correct value.

If the concrete produced at site does not satisfy the above strength requirements, the Architect & Employer will reserve the right to require the contractor to improve the method of batching, the quality of the ingredients and the mix with increased cement contents, if necessary. The contractor shall not be entitled to claim any extra cost for the extra cement used or for the modifications, for fulfilling the strength requirements as specified. The able guide for the quality and for durability of concrete. It must also have an adequate cement content and as well a low water – cement ration, as given below, which is applicable for moderate weather conditions, as specified in I.S. 456 – 2000.

MINIMUM CEMENT CONTENT	**MAXIMUM WATER – CEMENT RATIO**
Moderate conditions 290 Kg/Cum	0.55

The minimum cement content is based on 20mm aggregates. For 40mm aggregate it should be reduced by about 10% and for 12.5mm aggregate it should be increased by about 10%.

B.6.2. **Strength tests during the work:**

Samples should be taken from each 20 cum of concrete made during the progress of the work, or when a day's concrete work does not amount to 20 cum, then from each day's quota, and as required by Architects/Employers. Six samples of cubes of size 150 x 150 x 150mm shall be taken jointly each time in steel moulds, 3 of which shall be tested for 7 days strength and the remaining 3 shall be tested for 28 days strength on 7^{th} and 28^{th} day respectively, after the day of casting. Proper curing arrangements, as directed by Employers/Architects, shall be made at site by the contractor. Each cube shall be marked and numbered, and dated by the contractor.

The contractor shall maintain a register at site as directed by the Architect Employer, showing all particulars (date of casting, mix of concrete, location of concreting, water cement ratios, approximate concrete quantity represented by samples, no of cubes cast, date and results of testing, and remarks) and all the entries should be signed jointly by the contractor with Architect & Employer. 7 days strength shall not be less than 2/3rds of the 28 days strength. The results of the tests in any of the recognised laboratories and/or contractor's laboratory at site shall be taken as final and binding on the contractor. The average strength shall be higher than the prescribed strength. The average strength of the specimens taken at a time, may be

assumed as the compressive strength of concrete, provided the difference between the maximum and minimum strength of the three specimens does not exceed 15% of the average strength. Concrete test cubes shall be taken out and got tested as per time schedule for knowing 7 days and 28 days crushing strength, at no extra cost, either at site or at an approved laboratory. Whenever for any set of cubes, if the 7 days crushing strength is found satisfactory, 28 days tests are not necessary. In cases, where 7 days strength is not satisfactory, tests for 28 days strength must be gone done WITHOUT ANY EXCEPTION.

In case the compressive strength obtained from the test samples of concrete at 28 days is less than the minimum specified characteristic compressive strength, the work is liable to be rejected at the sole discretion of Architect & Employer.

Employer's & Architect's decision regarding dismantling of such works or suitable rectifications or any alternative assessment by load test for allowing the corresponding work to be retained, shall be final and binding on the contractor. These shall be carried out at contractor's cost only. The condition of any test does not guarantee acceptance of concrete covered by the test final decision regarding finally accepting/rejecting such works even after conducting those tests shall be made by the Architect & Employer only.

In case of concrete showing test results lower than the specified strength and in the opinion of the Architect & Employer such works could be allowed to remain, after due and satisfactory rectifications, if any, ordered and or load tests or even otherwise, then the rates quoted by the contractor, corresponding to those items, shall be reduced suitably for paying for that part of work. The Employer/Architect shall have full power in their absolute discretion to fix the actual rate payable after deduction, and it shall be binding on the contractor. If the strength is so low that in the opinion of Architect & Employer, the work has to be dismantled, then the contractor shall do so as directed at his own cost irrespective of the amount of loss, inconvenience and difficulties involved. Rejected/dismantled work shall not be paid for.

If in the opinion of the Architect & Employer/Engineer any load test or hammer test or any other test is necessary, the same shall be carried out by the contractor as directed and he shall bear the cost of the same. Based on the results of the tests, the Architect shall reduce rates/accept after rectification or modification/reject and order dismantling of concrete, and the decision shall be final and binding on the contractor.

The contractor shall pay all costs incurred in supplying the material for and in making, maturing, delivering and testing the cubes.

B.7. **RECORD OF CONCRETING:**

B.7.1 The contractor shall keep a daily record showing the date when each portion of concrete is poured in slab, beam, column footing etc., curing period, removal of formwork and test cubes results at 7 days and 28 days period and observations on the same.

B.8. The rates for concrete shall also include, apart from any other factors specified elsewhere in the tender, as follows:

B.8.1. All materials required for design/ nominal mix concrete, getting the designs for the design mix from an approved agency, labour, use of tools and plants, scaffolding, mixing, conveying, placing, ramming, vibrating, formwork, finishing, curing, hacking etc., complete as required and directed.

B.8.2. Rates for concrete items shall cover

a. Any shape and size, and for doing at any height and depth (all lifts) as per drawings, providing cover blocks or nylon spacers etc.

b. Fixing all inserts such as pipes, plugs, forming holes/pockets etc.

c. Providing dowel bars, etc., through shuttering and forming drip moulds to chajjas, sills etc., or at any other places as directed.

B.9.0 **MODE OF MEASUREMENT:**

B.9.1. Length of columns will be measured upto top of the slab.

B.9.2. Length of main beams will be measured between columns and depth below the top of the slab. For secondary beams length will be between main beams.

B.9.3. Slabs to be measured in Cum between beam to beam.

B.9.4. Chajjas will be measured in Sqm. Width to be measured beyond lintel width.

B.9.5. For staircase, RCC steps, waist slab, beams will be measured in Cum.

B.10. **PRECAST CONCRETE:**

B.10.1. All provisions in the specifications for concrete shall apply to precast concrete except for the specific variations given herein below:

B.10.2. **Aggregate:**

For maximum size of aggregate shall not be larger than one third of the minimum dimension of the member.

B.10.3. **Concrete Cover:**

For all surfaces not exposed to weather, all reinforcement shall be protected by concrete equal to the nominal diameter of bars but not less than 15mm.

B.10.3. **Concrete Cover:**

For all surfaces not exposed to weather, all reinforcement shall be protected by concrete equal to the nominal diameter of bars but not less than 15mm.

B.10.4. **Care:**

The concrete in one precast piece shall be placed in one operation. No piece shall be removed from the mould or erected until sufficiently natured to ensure that no damage may occur to the piece.

B.10.5. **Details:**

All details of jointing, inserts, anchors and bearing widths etc., shall be as shown in the drawings.

B.10.6. **Identification and Marking:**

All precast concrete members shall be properly marked to indicate the top of the member and its location.

B.10.7 **Transportation, Storage and Erection:**

While handling, including loading/unloading, the members shall be supported/hung at such suitable points, so that the member may safely withstand all the loads/stresses etc., that may occur/develop. For this, suitable hooks/markings etc., shall be provided, while casting itself, as may be necessary and or as directed.

B.10.7.1. Units shall be stored, transported and placed so that they will not be over stressed/pressed or damaged.

B.10.7.2. Precast concrete units shall be adequately braced and supported during erection to ensure proper alignment and safety and such bracing and supports shall be maintained until there are adequate permanent connections.

B. **MASONRY:**

C.1. **AAC BLOCKS MASONRY:**

C.1.1. **AUTOCLAVE AEREATED BLOCKS:**

The Blocks shall be from approved Manufacturer and shall confirm to BIS: 2185 (Part 3) – 1964 and shall be of quality approved by the Employer and Architect before placing orders for the same. All the tests shall confirm to BIS: 6441 – 1972.

a. The maximum variation in length shall not be more than +/- 5mm and that in height / width shall not be more than +/- 3mm.

b. The Block density shall be between 5.51 to 6.50 KN/Cu.M.

c. The Blocks shall have a minimum crushing strength of 4N/Sq.mm.

d. The thermal conductivity shall not exceed 0.24 W/m.k

e. The drying shrinkage shall not be more than 0.05%.

f. If the contractor executes the work, without approved quality of blocks, the same shall be liable for rejection or paid at reduced rates, at the sole discretion of the Employer and Architect, which shall be final and binding.

C.1.A. **BRICK MASONRY:**

C.1.A.1. **BRICKS:**

a. The bricks shall be of best locally available quality, and having the specified crushing strength, and shall be of quality approved by the Employer & Architect before placing orders for the same.

b. They shall be sound, hard and well burnt. They must give a ringing sound when struck with a metal piece and shall have frog.

c. They shall be free from cracks, flaws and nodules and also free from lime or stone pieces.

d. All bricks when dry, shall have an average compressive strength not less than 35 Kg/Sqmm, unless otherwise specified.

e. The bricks wherever specified as wire cut and or machine made, shall have compressive strength not less than 75 Kg/sq.cm, unless otherwise specified. The crushing strength bricks of bricks which vary by more than 15% of average strength of that group of sample must be omitted and average strength of balance bricks only shall be considered as representative of that lot of bricks.

f. The contractor shall produce different brands of locally available bricks for approval by the Employer & Architect. If during the execution of the work, it is observed that the bricks of approved brand/quality are not sufficient in quantity or Manufacturer's have not maintained the same approved quality, then the contractor shall make alternate arrangements to procure bricks from any other source even with longer leads without any extra cost, after getting same approved in advance by the Architect & Employer, as done earlier.

g. If the contractor executes the work, without approved quality of bricks, the same shall be liable for rejection or paid at reduced rates, at the sole discretion of the Employer & Architect, which shall be final and binding.

C.1.2. **Mortar:**

The sand should be only of approved quality and 'Coarse' unless otherwise specified. It will be screened and/or washed, if required and directed, without extra cost. Unless otherwise stated, cement mortar for brick work shall be of 1:6 (1 cement: 6 sand) proportion for walls of one brick thick and above. While for half brick walls or brick on edge work cement mortar shall be of 1:4 (1 cement :4 sand) proportion.

C.2. **WORKMANSHIP:**

C.2.1. **Proportion and mixing of cement mortar:**

Cement and sand shall be mixed in the specified proportion by volume by emptying cement bags on measured quantity of sand and thoroughly turning over the mixture in a dry state, till uniform colour is obtained. The mixture is made into the form of a frustrum of a cone with a hollow at top centre, and then water added to it. The whole material is then thoroughly turned and mixed till mortar is homogeneous; and shall be mixed only for such quantities, which can be readily used. Not more than 30 minutes should pass between adding of water to the dry mixture and the actual placings of mortar in position.

C.2.2. **Construction:**

C.2.2.1. All brick work shall be set out and built to lines, levels, batters, curves and to any shape or position to dimensions, thickness and heights shown upon the drawings, and a good bond shall be preserved throughout the work both laterally and transversly. English bond shall be used throughout.

C.2.2.2. All bricks shall be thoroughly wetted before use in the manner that water penetrates to the full depth of brick stock, and every brick is fully soaked.

C.2.2.3. Single or double scaffolding of adequate strength shall be provided for all types of loads likely to come on them during construction. In case of single scaffoldings all the scaffolding holes shall finally be filled with cement concrete 1:3:6 (1 cement :3 coarse sand : 6 graded stone aggregate, 20mm nominal size) at contractor's cost.

C.2.2.4. All courses shall be laid truly horizontal and all vertical joints made truly vertical.

C.2.2.5. Where water is met within foundations, work space shall be kept free of water by the contractor while the brick work is in progress and until the mortar, pointing, plastering has properly set.

C.2.2.6. No half or quarter brick shall be used except as closures. The closures shall be horizontal and the walls shall be raised plumb. Not more than ten courses shall be raised in a day and no part of the work shall be raised more than one meter above another at any time.

C.2.2.7. Joints shall be uniform in thickness. All joints shall be adjusted to its final position in the wall while the mortar is steel soft and plastic. All vertical joints shall be full of mortar and well compacted with trowel and just sufficient water (so that cement/mortar does not flow out of the joints). No looseness/hollows in the mortar (in the joints) shall be permitted. Any unit, which is disturbed after mortar has stiffened or the mortar in the joints is loose or has hollows, shall be removed and re laid with fresh mortar.

C.2.2.8. All joint shall be raked out, while the mortar is still green, to a depth of 10mm (minimum) to ensure a good key for plastering.

C.2.2.9. Half brick walls shall be reinforced at every 4^{th} bedded course with 25 x 1.5mm hoop iron reinforcement well in mortar, properly lagged etc., and as directed by the Architect. Alternatively two 6mm dia bars be embedded in cement mortar in same locations.

C.2.2.10. In brick arches or other circular work, the bricks shall be shaped to slope, joints radiating outward and correctly from the center, front to back of walls and joints shall be not more than 12mm thick.

C.2.2.11. All brick work shall be adequately watered atleast for three times as day, for ten days continuously.

C.2.2.12. During the rains and frosty weather, the work shall be carefully covered, without extra charge, so as to prevent any mortar being washed away etc. Should any brick work be damaged, the same shall be removed and rebuilt at the contractor's expense.

C.2.2.13. Chases and raked out joints shall be kept free from mortar or other debris. Spaces around door frames and other built-in items shall be solidly filled with cement mortar 1:3 (1 cement: 3 coarse sand) or cement concrete 1:3:6 (1 cement: 3 coarse sand: 6 hard stone aggregate of suitable size). Anchors, wall plugs, accessories, flashings and other items required to be built in with masonry shall be built in as masonry work progresses. Unfinished work shall be stepped back for jointing with new work. Toothing may be resorted to, only when specifically approved by the Architect. Before new work is started, all loose mortar shall be removed and the exposed joints shall be thoroughly cleaned before laying new work.

C.3. **RATES TO INCLUDE:**

Apart from other factors mentioned elsewhere in this contract, the rates for brick masonry shall also include following:

C.3.1. All materials, labour, tools/equipment used and other items intended for the satisfactory completion of brick masonry at all heights and depths.

C.3.2. Erecting and removing of all single or double scaffolding, (as may be directed/specified), ladders required for the execution of the work at any height and depth and shape as shown in drawings or as directed by the Architect & Employer, and as well cleaning every day the surface of masonry executed on that day.

C.3.3. Cutting of brick work, raking out joints to received plaster, removing stains and mortar lumps, making required chases and openings and filling the chases with cement mortar not leaner than 1:4 (1 cement :4 coarse sand), all as specified/directed.

C.3.4. Reinforcement embedded in cement mortar, including cost of reinforcement, in half brick walls and brick on edge work.

C.3.5. Dewatering, wherever required.

C.4 **MODE OF MEASUREMENT:**

All brick work, except half brick work and brick on edge, shall be measured in cubic meters. Half brick and brick on edge will be measured in Sq.meters. Deductions shall be made for all openings, lintels, beams, chajjas/shelves bearings, and the like and columns etc., occupying full thickness of the walls. No deductions will be made for ends only of

i. Dissimilar materials like girders, beams, lintels, rafters etc., upto 500 Sq.cm. cross section, and for

ii. Openings upto 0.1 Sq.m. in face area.

D.O. **RUBBLE MASONRY:**

D.1. **MATERIALS:**

D.1.1. **Stones:**

D.1.1.1. They shall be blue granite stones from an approved quarry.

D.1.1.2. They shall be tough, hard, dense, durable, sound, uniform in colour and texture and free from flaws, cracks, unjuries, veins, crystals, minerals, salt, cavities, skins (weathered surfaces) and other defects.

D.1.1.3. The stone shall not absorb water more than 5% of its dry weight, when immersed in water and tested as per I.S. 1224.

D.1.1.4. The contractor shall furnish a sample of stones which he intends to use on the works and get the same approved by the Architects, well before start of masonry.

D.1.1.5. All Royalties, Compensations, Taxes, Octroi, duties, etc., payable for securing stones shall be paid by the contractor and included in the rates quoted for respective items.

The mortar shall be as specified in the item or as shown on drawing. The sand shall be coarse and of approved quality and may be screened or washed, if required, without extra cost.

D.2.0. **WORKMANSHIP:**

D.2.1. **Masonry:**

D.2.1.1. The stones shall be hammer dressed, unless otherwise specified in the item, before they are laid in position. For masonry to be plastered, bushes on surfaces shall not exceed 12mm in thickness and for other (exposed) faces not more than 25mm.

D.2.1.2. The masonry shall consist of large stones flat bedded, properly selected for their places and carefully laid, with a suitable proportion of smaller stones and chips to fill up the interstices (but not on faces). No face joint shall exceed 20mm and shall also be not less than 10mm in width. The stones shall be wetted before laying in mortar. The work shall be hand set and solidly bedded in and surrounded with mortar fully and properly on every side except the face.

D.2.1.3. Flat stones shall not be less in breadth than in height and its length shall not be less than 1½ times its height.

D.2.1.4. Through stones or headers shall be laid in every course at a distance not exceeding 1.0 meter apart and shall be staggered. They shall be in one piece for walls upto 600mm width and shall be lap jointed (laps not less than 150mm) in case of greater thickness, if laps are desired by the contractor. In no case length of these stones shall be less than 400mm. Alternately headers may be of precast cement concrete blocks of cement concrete 1:3:6 (1 cement: 3

coarse sand: 6 hard stone aggregate 20mm nominal size) and in cross section, height shall be equal to the height of that course in the masonry. The face area of each header shall not be less than 0.05 sq.m. They shall be distinctly marked on their face.

D.2.1.5. Quoins shall have the same height as that of the course. They shall be laid header and stretcher alternatively. Faces of quoins shall be fair dressed. No quoin stone shall be less than 0.03 cum in content. Jambs or doors, windows and openings be formed with quoins only. They shall have uniform chisel draft of 40mm at the corner edges.

D.2.1.6. The masonry shall be laid to lines, levels, curves, and shapes as shown in the plans. The face of all masonry work shall be strictly in plumb. In the case of battered walls, the courses on the battered surface side shall be at right angles to the batter. All joints shall be raked out to a depth not less than 20mm, and unless otherwise stated shall be flush pointed for all exposed surfaces with cement mortar of proportion (1 cement :3 fine sand). The width of pointing shall be uniform and constant.

D.2.1.7. The fixtures, plugs, frames etc., if any, shall be built in places as shown on plans, while laying the masonry, and not afterwards, by removing the stones already laid.

D.2.1.8. Bad work shall be pulled down, as directed by the Architect, and shall be rebuilt at the contractor's cost.

D.2.1.9. All masonry shall be washed down on completion and all stains and mortar removed from the faces as scaffolding is removed, on each day.

D.2.1.10. Holes of the required size and shape shall be preferably left during construction alone for fixing pipes, service lines etc. After the pipes are fixed in position the hollows if any, shall be filled in with 1:3 (1 cement : 3 coarse sand) cement mortar or 1:3:6 cement concrete (1 cement: 3 coarse sand: 6 graded stone aggregate 20/12.5mm nominal size as required). The face shall be neatly finished with matching stones. Iron and steel fixtures shall be embedded in cement mortar 1:5 91 cement :5 coarse sand).

D.2.1.11. In wet foundations, work space shall be kept free from water, while the masonry is in progress and until the mortar has sufficiently set.

D.2.1.12. Adequate single/double scaffolding as required and or directed for constructing masonry shall be provided and scaffolding holes filled with cement concrete (1 cement : 3 coarse sand : 6 graded stone aggregate 20mm nominal size) and finished to have surfaces matching with adjacent stones by the contractor at his expenses.

D.2.2. **Coursed Rubble – Stone Masonry – Second Sort:**

D.2.2.1. Exposed face stones shall be khandki dressed to have the vertical and horizontal sides perfectly straight, parallel at right angles to the adjacent sides. Where the interior face is to be plastered, the backing stones and hearting shall be as specified for uncoursed rubble masonry, chisel drafts of 37mm dia shall be provided at the external corners, when stone face is not chisel dressed.

D.2.2.2. Height of each course shall not be less than 150mm and all the stones in any course shall be of the same height. Unless otherwise stated, height of all courses shall be uniform. In no

case the height of any course shall be more than any of the courses below it. The bed and joints shall be hammer or chisel dressed back from the face for 3" and 1½" width respectively. The faces of the stones shall be hammer dressed and bushings shall not be more than 10mm. Thickness of the joints shall not exceed 10mm. Stones shall break joints atleast half of the height of the course.

D.2.2.3. Quoins shall be atleast 0.5m long (limited to thickness of wall when single piece placed across the jamb), laid square on their levels and beds shall be fair dressed to a depth of atleast 10mm.

D.2.2.4. Face joints shall not exceed 15mm.

D.2.3. **Uncoursed Rubble Masonry:**

Rubble stones shall be uncoursed blue granite stones from an approved quarry. They shall be tough, hard, dense, durable, sound, uniform in colour and texture and free from flaws, cracks, injuries, veins, crystals, minerals, salts, cavities, skins and other defects.

If ordered by the Architect & Employer, 75 x 75mm or of specified size weep holes shall be provided in the masonry without any extra cost, at spacings as directed by the Architect.

During the progress of the work, if necessary, diversion of the nalla shall be provided and maintained by the Contractor at his own cost.

In wet foundations, work space shall be kept free from water while the masonry is in progress and until the mortar has sufficiently set in. Dewatering shall be done bailing out water or pumping out water by the contractor at his own cost.

Adequate scaffolding required for constructing masonry walls shall be provided by the contractor at his expenses.

Flush cement pointing shall be done in cement mortar 1:3 (1 cement: 3 fine sand) unless otherwise specified. The width of pointing shall be constant and not varying.

Stones shall be hammer dressed. Nearly half the stones shall not be less than 0.01 cum each in content and 25% of stones shall tail back into the masonry by 40mm or more. The stones shall be so arranged to break horizontal joints atleast by 50mm and long vertical joints being carefully avoided.

Cement mortar shall be of (1:6) proportion, unless otherwise specified.

For masonry to be plastered, bushes shall not exceed 12mm, in thickness.

Flat stones shall not be less in breadth than in height and its length shall not be less than 1½ times its height.

The masonry shall consist of large stones flat bedded, properly selected for their places and carefully laid with a suitable proportion of smaller stones and chips to fill up interstices (hearting). The stones shall be wetted before laying in mortar. The whole work shall be hand set and solidly bedded and surrounded well with compacted mortar on all sides, except the face.

Through stones or headers shall be laid in every course at a distance not exceeding 1m. apart and shall be staggered. They shall be in one piece for walls, upto 600mm width and shall lap atleast 150mm for thicker walls. Face area shall not be less than 0.05 Sqm. They shall be distinctly marked less than 400mm. Alternately headers may be of precast cement concrete blocks of cement concrete 1:3:6 (1cement : 3 coarse sand : 6 hard stone aggregate 20mm nominal size) and in cross section, height shall be equal to the height of that course in the masonry.

Quoins shall have same height as courses and shall be laid alternatively header and stretcher. They shall be fair dressed and shall be less than 0.03 cum in content. Jambs of doors, windows and openings shall be formed with quoins. They shall have uniform chisel draft of 40mm at the corner edges.

The masonry shall be laid to lines, curves, levels and shapes as shown in drawings. The face of masonry shall be in plumb. In case of battered walls the courses on the battered side shall be at right angles to the batter.

All face joints shall be raked out for a depth not less than 20mm, and unless otherwise stated, shall be pointed sunk/raised/flush (as may be decided by the Architect) with cement mortar 1:3 (1 cement : 3 fine sand) in case of all exposed surfaces. The pointing shall be of uniform and constant width. The masonry shall be shaded from the sun and watered well for 10 days.

For the day's work, all masonry shall be washed down, on completion of days work, of all stains; and mortar splashes removed from the face for the day's work and before the scaffolding is removed.

The joints shall be uniform on the face and be not more than 20mm in width.

D.2.4. **Random Rubble – First Sort:**

D.2.4.1. Stones shall be roughly chisel dressed. They shall be so arranged as to break joints as much as possible, avoiding continuous lines of joints horizontal and vertical. Quoins shall be same as for coursed rubble second sort.

D.2.4.2. All stones shall be carefully fitted with uniform thickness of joints not exceeding 20mm. Face joints shall be chisel dressed for a depth not less than 25mm for fitting in position properly.

D.2.4.3. All other details shall be same as for coursed rubble stone masonry 2nd sort.

D.3.0 **MODE OF MEASUREMENT:**

Masonry work will be paid in Cu.m. All deductions shall be made specified for brick masonry work.

D.4.0. **STORM WATER DRAINAGE:**

Storm water drains shall be constructed as per drawings/directions, and on either one or both sides of the road, (unless the land beyond both the shoulders slopes away adequately), to serve as catch water drains and or for continuing upstream drain. The dimensions and slopes shall be as detailed in the drawings and as required and directed. Bed concrete shall be of P.C.C. 1:3:6 (1 cement: 3 coarse sand: 6 hard graded stone aggregate 40mm size) of 150mm thickness. Drains shall be constructed either in rubble masonry or brick masonry as required and shall be plastered in CM 1:6 (1 cement: 6 fine sand) or as specified/directed. The sides

of drains may also be of cast-in-situ or precast with cement concrete 1:2:4 (1 cement: 2 sand: 4 hard graded stone aggregate 20mm nominal size), if so specified. When the drain is provided by the side of road, adjoining the shoulder necessary stone masonry parapets shall be provided over the drain wall on the road side.

D.5.0. **DRY RUBBLE PITCHING:**

The rubble stones for pitching shall be sound, hard and durable and fairly regular in shape. The average depth of the stones shall be not less than the specified thickness of pitching (and depth of any individual stone shall generally be less by more than 25mm) and each stone shall generally be not less than 0.01 cum or as ordered by the Architect & employer. The smaller size stones shall be brought to site only for the purpose of packing and wedging.

The slopes of the bank shall be made up with morrum and trimmed to the required slope and properly compacted in layers (each not more than 200mm) after adequately watering profile shall be put up with pegs and strings at required intervals for the pitching, to ensure that it is done true to line, curves, levels, thickness and slopes.

Toe wall as shown and directed shall be provided at the toe to support the pitching and shall be measured along with the slope of pitching. The pitching shall be commenced at the toe and laid course by course up the slope. The stones shall be laid closely in position on the prepared bed, and firmly set. The pitching shall be laid to line, levels, curves and slope as indicated in the plans or as ordered by the Architect & Employer. Each stone shall cover the full depth of pitching and shall be perpendicular to the sloping bed. The stones shall be laid with breaking joints as far as possible.
Additional morrum, bedding, if required, for proper slope shall be laid out simultaneously, watered and well rammed. The joints between stones shall be filled in with spalls of proper size and wedged in with hammers to ensure tight packing or filled with CM 1:5 (1 cement :5 coarse sand) for depths not less than 75mm or as specified and directed. The item includes repairing disturbed pitching, if any, as and when required and directed.

Flush pointing shall be done in cement mortar 1:3 (1 cement :3 fine sand), if so specified/directed.

E. **CEMENT PLASTERING/CEMENT POINTING:**

E.1.0. **MATERIALS:**

E.1.1. Cement, sand and water constituting the materials for the work shall conform to the specifications laid down for the concrete work. Fine sand shall be used as per IS Code.

E.1.2. Lime required for neeru finish shall be of approved variety fat lime.

E.1.3. Mortar shall be in proportion s specified in the bills of quantities.

E.2.0. **WORKMASHIP:**
E.2.1. **General:**
E.2.1.1. Adequate single scaffolding (if specifically permitted) shall be provided by the contractor at his expense and the scaffolding holes shall be filled in with cement concrete 1:3:6 (1 cement

: 3 coarse sand: 6 hard graded stone aggregate 20mm size) compacted well and plastered over before lowering the scaffolding just below, if any, without any extra cost. In case double scaffolding is done, nothing extra shall be paid.

E.2.1.1. Dewatering the foundation if required, shall be done by the contractor at his own cost.

E.2.1.2. The surfaces to be plastered shall be first cleaned and watered well in advance and thoroughly wetted before plastering.

E.2.1.3. Smooth surfaces of concrete, old plaster etc., shall be suitably roughened or removed to provide necessary bend for the plaster. All dirt, sports, oil paint etc., which prevents proper bond with plaster, shall be removed.

E.2.1.4. Patches of plaster 150 x 150mm shall be put on about 3 meter apart as gauges, to ensure even plastering in one plane.

E.2.1.5. All plaster work will be done to lines levels and plumb and to the satisfaction of Architect & Employer.

E.2.1.6. For walls, columns and beams, thickness will be minimum 20mm for external faces and 15mm thick for internal faces, while for ceiling it shall be average 10mm, unless otherwise specified in bill of quantities.

E.2.1.7. The thickness specified shall be average and measured from the proudest part of the surface.

E.2.1.8. Unless otherwise stated in Bill of Quantities, cement mortar shall be in 1:4 (1 cement :4 fine sand) proportion.

E.2.2. **Plaster with Neeru Finish:**

E.2.2.1. The surface thus rendered shall then be finished with good quality of lime neeru. Neeru may be prepared at site out of the best quality of fat lime slaked at site with fresh water and sifted as specified. The slaked and sifted lime shall be reduced to a fine paste by grinding in a mortar mill (150 turns). Only sufficient quantity which can be used within 10 days only, shall be prepared at a time. Chopped hessain or jute fibre in the required quantity may also be added to neeru, if directed by the Architect & Employer. Otherwise readymade neeru of approved quality can be used.
If required, plastered surfaces should be finished smooth with junction of skirting and plaster, if any, shall be finished as directed at no extra cost. All door/window jambs shall be finished as directed.

E.2.2.2. Plaster work shall proceed from top to bottom. An entire unobstructed surface shall be plastered in one operation. All exposed angles and junctions of walls and doors etc., shall be carefully flushed so as to furnish a neat and even surface. Before the base coat sets the neeru finish shall be applied and finished smooth. The entire plaster shall be surfaced truly vertical and horizontal. In case thickness item, no extra will be paid to the contractor.

E.2.2.3. All mouldings as shown on drawings or as directed shall be worked true to the template and drawn neat, clean and level, at no extra cost.

E.2.2.4. Bad work shall be pulled down as directed by the Architects/clients and shall be rebuilt by the contractor at his cost.

E.2.2.5. All plaster work shall be cured at least for 7 days and to the entire satisfaction of the Architect & Employer. The curing shall be so done that damage to plaster with the impact of splashing water is avoided.

E.2.2.6. The contractor shall be responsible for making good any portion of plaster, which requires redoing, at his cost.

E.2.3. **Rough cast Cement plaster:**

E.2.3.1. The surface shall be cleaned as specified under cement plaster with neeru finish.

E.2.3.2. First coat comprising of cement and sand mortar 1:4 (1 cement :4 fine sand) with approved water proofing compound as per manufacturer's instruction, shall be applied uniformly with a trowel and flat board to exact plumb with thickness not less than 15mm and allow it to set for not less than half an hour.

E.2.3.3. While this is still green, the surface shall be roughened with wire brush. The surface shall be cured for 4 days.

E.2.3.4. All loose particles shall be dusted and a second coat of average 6mm thick cement mortar 1:3 (1 cement :3 fine sand) shall then be applied. Sand used shall be screened through a mesh not less than 1/16" and not more than 1/8" size and thoroughly washed, if required. The finished surfaces shall be lightly pressed with close pricked wooden board or a wet sponge to bring the sand particles into prominence.

E.2.3.5. General workmanship, curing etc., shall be all as specified for cement plaster with neeru finish.

E.2.4. **Water proof cement plaster:**

This shall be all as specified herein before for cement plaster work except for the following:

a) No neeru finish shall be applied over the rendered surface, but the rendered surface itself shall be finished smooth by steel trowelling.

b) In the preparation of cement sand mortar, cement shall be mixed with an approved waterproofing compound such as pudlo, CICO No.1 water lock, impermo, composeal or of any other standard manufacturer as per the manufacturer's instructions and as directed by the Architects.

E.2.5. **Rate to include:**

Apart from other factors mentioned elsewhere in the contract, rates for plastering shall also include following:

E.2.5.1. All materials, labour, use of tanks/implements for satisfactory completion of the work.

E.2.5.2. Erection, dismantling and removing single/double scaffolding.

E.2.5.3. Preparing all the surfaces to secure plaster.

E.2.5.4. Providing cement plaster of specified average thickness (measured from the proudest part of BB/stone work) and proportion at all heights and depths and to any shape as directed.

E.2.5.5. Curing for 7 days.

E.2.5.6. Chicken mesh of approved gauge shall be provided at all the junctions of concrete, masonry, timber and grouting of chases made for electrical/plumbing or other purpose as directed at no extra cost. Prover V-grooves must be made at all junctions of walls and slabs/beams/columns etc., at no extra cost.

E.2.5.7. Any moulding, bends, arisers, grooves/drip mould, rounding/Vatas, chamfering, soffits of arches, and also making good damaged plaster after their (Contractor's) all the sub contractor or nominated sub contractors have done their work.

E.2.6. **Mode of Measurement:**

All plastering will be measured in square meter, unless otherwise described, as per relevant I.S. code.

Walls:

The measurement of walls plastering shall be taken between the walls or partitions for the length and from top of floor or skirting up to the ceiling bottom for the height. The dimensions before plastering shall be taken.

Ceiling:

Ceiling shall be measured between walls or partitions and the dimensions before plastering shall be taken. Ceilings with projected beams shall be measured over beam and the plastered side of the beam shall be measured and added to plastering on ceiling.

For jambs, soffits, sills, etc., for openings not exceeding 0.5 sq.m. each in area, ends of joists, beams, posts, girders, steps etc., not exceeding 0.5 sq.m each in area and openings not exceeding 3 sq.m each., deductions and additions shall be made in the following manner.

E.2.6.1. No deduction shall be made for ends of joists, beams posts etc., and openings, not exceeding 0.5 sq.m. each, and no addition shall be made for reveals, jambs, soffits, sills, etc., of these openings no for finishing the plaster around ends of joists, beams, posts, etc.

E.2.6.2. Deductions for openings exceeding 0.50 sqm but not exceeding 3 sqm each shall be made as follows and no addition shall be made for reveals, jambs, soffits, sills, etc., of these openings.

E.2.6.3. Deductions for openings exceeding 0.50 sqm but not exceeding 3 sqm each shall be made as follows and no additions shall be made for reveals, jambs, soffits, sills, etc., of these openings.

When both faces of wall are plastered with the same plaster, deduction shall be made for one face only.

When two faces of wall are plastered with different plasters or if one face is plastered and the other pointed, deduction shall be made from the plaster or pointing, on the side of frames for doors, windows, etc., on which the width of reveals is less than that on the other side, but not deduction shall be made on other side.

E.2.6.4. In case of openings of area above 3 sq.m each, deductions shall be made for the openings, but jambs, soffits and sills shall be measured.

E.3.0. **CEMENT POINTING:**

E.3.1. **Materials:**

E.3.1.1. Cement, sand and water shall conform to the specifications laid down for the concrete work, fine sand to be used as per ISI code.

E.3.2. **Workmanship:**

E.3.2.1. Dust and mortar powder shall be brushed out of all joints. The surface shall then be washed with water and kept wet before pointing is commenced.

E.3.2.2. In case of dry rubble pitching, the cement mortar 1:4 (1 cement: 4 sand) proportion shall be well pressed into the joints with a pointed trowel and rubbed smooth. It shall not be spread over the corners, edges and face of the masonry. All superfluous mortar, if any, shall be removed, with a trowel. All joints shall be generally uniform in size.

E.3.2.3. The pointing shall be kept wet for at least ten days. It shall be suitably protected from sun, rain and other factors during the period of curing.

E.4. **Mode of Measurement:**

Pointing work shall be measured in Sq.meters. Deductions for openings exceeding 0.5 sq.m. will be made, same as for plaster.

F. FLOORING:

F.5. **GRANITE FLOORING SKIRTING AND FACING:**

F.5.1. **Materials:**

F.5.1.1. Granite stone slabs shall of the thickness and type mentioned in the item and of the colour and quality approved by the Architects. Slabs shall be hard, dense, uniform and homogeneous in texture. They shall have even crystallized grain and be free from defects and cracks. The surface shall be mirror polished to an even and perfectly plain surface and edge machine cut, true and square.

F.5.1.2. No slab shall be thinner than the specified thickness, at its thinnest part. The dimensions of the slab shall be as specified in the item. A few specimens of approved finished slabs shall be deposited by the Contractor in the Architect's office for reference.

F.5.1.3. All the Granite slabs brought to site shall be got approved by the Architect & Employer, before using them in the work. Sizes of Granite slabs for floorings, steps/raisers and dado etc., shall be got approved by Architect & Employer, before ordering for the same.

F.5.2. **Workmanship:**

F.5.2.1 They shall be laid to the pattern shown in the drawings or as directed by the Architects.

F.5.2.2. The surface on which the Granite slabs are to be laid shall be cleaned of all dust and saturated with water.

F.5.2.3. The Granite slabs shall be set in cement slurry over cement mortar bedding as specified and tamped with wooden mallet. The joints shall not exceed 1mm. In thickness and shall be grouted/flushed with white cement mixed with pigment of suitable colour, if required, to match the shade/colour of slabs, and cured for 10 days.

F.6. **GLAZED TILE IN FLOORS, DADOS & SKIRTING:**

F.6.1. **Materials:**

F.6.1.1. glazed tiles shall be of first quality and of approved make and 5.5 mm in thickness. They shall be sound, hard and well and evenly glazed with fine and sharp edges, and free from twists. The rear face shall be grooved and recessed or suitably moulded, in parts, to provide necessary cessed or suitably moulded, in parts, to provide necessary key for mortar. They shall generally confirm to I.S.777:1988 (Second revision). The tiles shall be of sizes 150mm x 150mm or 100mm x 100mm or as specified/directed.

F.6.2. **Workmanship:**

F.6.2.1. The tiles to be used for floor and dado shall be of the same manufacture and of first quality, as per approved sample.

F.6.2.2. Tiles shall be immersed in water for atleast 6 hours prior to their end use.

F.6.2.3. Cement sand mortar 1:4 (1 cement :4 coarse sand) bed (average 20mm thick for flooring and 12mm thick for skirting finished to proper levels and falls. After the surface has hardened sufficiently, it shall be roughened, cleaned and well set to receive a thin cement slurry of honey like consistancy. Tiles with theirunder side also smeared with cement slurry of honey like consistancy shall then be laid over the bedding and tamped into position properly to have the top surfaces in a true plane and level or to falls as directed.

F.6.2.4. For skirting/dado, the surfaces shall be plastered with cement mortar 1:4 (1 cement: 4 coarse sand) to make the surface even and in plumb. The surface of the plaster shall be scarified with brush for getting a good bond between the back of the tiles shall be battered with cement paste and pressed on the plastered surface as per flooring and tapped in position.

F.6.2.5. Joints shall be thin, uniform, even and straight. The joints shall be cleaned off gray cement and pointed with white cement paste with pigment, if required, to match the shade of the tiles. The work shall be cured for 7 days. After curing, the surface shall be washed clean with water and oxalic acid. The finished floor skirting/dadoo shall not sound hollow, when tapped with a wooden mallet.

F.6.3. **MODE OF MEASUREMENT:**

All flooring work will be measured in Sq.metre basis and shall be measured between unplastered wall surfaces. Skirting and dado will be measured in Sq.meters and the height above flooring will be measured, length between the finishes of adjoining walls, if any.

F.7. The ceramic flooring shall be of first quality and of approved make and 7.5mm in thickness. They shall be sound, hard and tough as per manufacturers specification. The rear face shall be groove and recessed or) suitably manholed in part to provide necessary key for mortar. The tiles shall be of sizes 12" x 12", 8" x 8" (or) as specified/directed.

G. WOOD WORK:

G.1. MATERIALS:

G.1.1. Unless otherwise stated the timber used in this project will be second class teakwood and shall be got approved from the Employer & Architect before using it in work. The timber shall be well seasoned and free from shakes, fissures, cracks, large/loose knots or other major defects. It shall also be free from spongy, brittle, flaky wood, sapwood and all such defects, which will affect its strength, durability, appearance or usefulness for the purpose for which it is required. Any effort such as plugging, painting or using any adhesives, to hide any defects, shall render the timber liable to rejection by the Employer & Architect. No individual hard and sound knot shall be more than 40mm dia and the aggregate area of all the knots shall not exceed 1.5% of area of the piece for purposes of acceptance. It should confirm to relevant I.S.I003.

G.1.2. Any timber rejected for any reason whatsoever, shall at once be removed from the site of work.

G.1.3. Glue: Organic type shall comply with specification I.S. 852 –1957 and synthetic type shall comply with I.S.851 – 1957 in all respects.

G.1.4. Nails, screws, ties, straps, bolts, etc., shall be of the material, make and pattern as approved by the Architect. Unless otherwise specified, they must be of mild steel and be of such sections and design, such that they serve the purpose adequately.

G.1.5. The Contractor shall get all the wood approved by Architect & Employer, before taking permission of the Architect to apply paints, oils or otherwise treats wood work in anyway whatsoever.

G.1.6. All embedded parts of wood work shall be well painted with two coats of hot boiled tar or creoseted, as approved by the Architects/Employers.

G.2. WORKMANSHIP:

G.2.1. All the wood work shall be neatly and truly finished as per tender item dimensions with not more than 3mm, planning margin. Unless otherwise specified, the exposed wood work shall be accurately planned to the required dimensions, within planning tolerance, smooth and to lines, planes, curves or shapes as required.

G.2.2. All the necessary joinery work shall be carefully done as per normal standard practice and Architects instructions. All framed joinery for external work shall be put together with white lead and joints pinned with hardwood or Fevicol. For internal work, unaffected by moisture, the joints may be glued and pinned or joined with fevicol as directed.

G.2.3. Framed/Fabricated wood work includes all sawing, cutting, planing, jointing, framing, supply and use of all straps, bolts, holdfasts, nauls, trensils, spikes, screws, etc., as may be necessary to complete the work and for fabricating/framing and or fixing. Fabricating/framing and trussing shall be done in the best possible manner and as shown on the drawings or as directed by the Architects/Employers.

G.2.4. The contractor shall provide labour, scaffolding, ladders and tackle necessary for hoisting and fixing wood work in position and afford facilities for its inspection during construction. The contractor shall be responsible for the safety of the work, workmen and for any action or compensation that may arise in this connection.

G.2.5. All iron work connected with wood work and going to be embedded in masonry shall, before erection, receive 2 coats of solignum/creosote. If it is to be painted, it shall be given one coat of red oxide primer and one coat of finishing paind on the ground, before being fixed in position and afterwards second coat of finishing paint.

G.2.6. All wood shall be got inspected and passed by the Architect & Employer before being put into work. The architect defective quality, despite his having previously passed the same before it was worked upon. In no case the wood work shall be painted or otherwise, before it is inspected and approved by the Architect.

G.2.7. After fixing the wood work in position, if any defects, including damaged edges of the frames, are notices by the Architect & Employer during the execution of work or in the defects liability period, the contractor shall have to rectify the same or remove and replace the defective work, as directed and to the satisfaction of Architect & Employer, at no extra cost.

G.2.8. Any cutting and waste of timber, that may be incidental in carrying out an item, shall not be paid for extra, but shall be included in the rate for the item.

G.3. T.W.DOORS AND WINDOWS:

G.3.1. Timber used for this work, shall be locally available second class teakwood, unless otherwise specified, and of approved quality and as per the sample approved by the Employer and Architect. As specified in the item, all the doors shall have teakwood door frames or pressed steel frames of approved make, quality and size, with three numbers holdfasts on each leg. Teakwood beading/cover moulding will be provided wherever necessary and at no extra cost. Hold fasts shall be embedded in concrete blocks, as shown in drawings or as directed.

G.3.2. For flush doors, shutters to be used shall be solid core of best approved make (BWP quality) with ISI mark, 30mm thick (unless otherwise specified) inclusive of either commercial ply, veneer or formica of approved shade and design/pattern on one or both sides as specified and shown in the drawings and shall be bonded with phenol Formaldehyde synthetic resin. If so specified, all flush shutters shall have teak wood lipping on all four sides, as directed, which

shall be fixed at site. All solid core shutters shall generally confirm to IS 2202 (Part I) & (Part 2) :1983.

G.3.3. For full panelled doors, the shutters shall be of best quality factory made with ISI marking and to be approved by the Employer and Architect and having panels of 19mm thick best approved make and quality marine ply, unless otherwise specified, and as shown in drawings or as directed.

G.3.4. The fixtures and fittings required for all the doors and windows shall be got approved from the Employer and Architect before placing the order. Any fixture found damaged or missing at the time of handing over shall be replaced by the contractor and surface of joinery made good as directed at no extra cost.

G.3.5. All the timber work including pressed steel frames shall be painted with 3 coats of synthetic enamel paint (including primer coat) of best approved make and shade as directed. In case of teak ply or decorative ply veneered shutters, they shall be French polished/wax polished, as per specifications and as directed.

G.4. **GLASS:**

G.4.1. All glass used in the doors, windows and ventilators etc., shall be of the best quality, free from specks, bubbles, smoke, veins, airholes, blisters and other defects. The kind of glass and its thickness shall be as mentioned in the item or a shown in detailed drawings or as ordered by the Architect. The glass shall generally confirm to I.S.1765.

G.4.2. Sheet glass shall be best quality of approved make plain/ground/frosted, and either 4mm or 5.0mm thick, as specified. For Bath/W.C. windows 3.8 to 4mm thick frosted glass shall have to be used as directed.

G.4.3. Plate glass shall be polished patent plate glass of best quality. It shall have both surfaces flat and parallel and polished to give clean undistorted vision. All mirrors shall be of plate glass and give clear undistorted reflection. The thickness of the glass shall be as mentioned in the item or shown in the detailed drawings or as directed by the Architect. Minimum thickness of float glass shall be 6mm.

G.4.4. Float glass, wherever specified shall be “Bronze tinted” manufactured by FLOAT GLASS INDIA LIMITED to thickness as specified.

G.4.5. **Obscured or ground glass:**

This glass transmits lights, but the vision is partially or almost completely obscured. Principal types are plain, rolled, double rolled, figured, ribbed, fluted, frosted (on one or both sides) and rough cast. The thickness shall be as specified in the item or as mentioned in the drawings or as directed by the Architect.

G.5. **MODE OF MEASUREMENT FOR DOORS AND WINDOWS:**

Payment will be made for the area of opening in the masonry as per relevant ISI. The height of the door shall be measured from finished floor level to the bottom of lintel on the top.

H.0. UPVC LUMINIUM DOORS, WINDOWS & VENTILATORS:(Windows & Doors Manufactured from Multi-chambered un-plasticized Poly Vinyl Chloride Profiles.)

H.1. All UPVC doors, windows & ventilators shall be procured from approved manufacturer and shall be approved by the Architect & Employer before placing the order.

Openable windows shall be double weather-stripped. One weather-strip shall be provided in the outer frame and the other weather-strip in the shutter frame. The weather-strip shall be of extruded neoprene and of a size to make the windows completely weather tight. The weather strip shall be dovetailed into the window section. The hinges of openable windows shall be strong. Pin of the hinges shall be of stainless steel with nylon/PVC washers. In case the windows are projected type, the hinges 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 handle for two-point locking or single point 6mm thick or 8mm thick float glass of first quality and approved make, free from scratches, waviness, bubbles etc., all as shown in drawing or as specified and directed.

SLIDING WINDOWS: As per latest specification of CPWD.

All sections of UPVC doors, windows & ventilators shall be as per standard sections as approved by the Employer/Consultant.

H.2. Functional Need of uPVC WINDOW

1. UPVC Windows should be fabricated with “Fusion welded corners”. The Mullion / Transom can be either Fusion welded or mechanically joined with desired sealing.

2. Windows / doors must conform to the strength requirements based on wind load as per IS 875-3.

3. Appropriate thickness of steel reinforcement should be selected to meet the desired strength. The reinforcement must be installed within 6 to 50mm distance from the face of the weld.

4. For window size ≤ 1500mm tolerance is ± 3.0mm and sizes above ≥1500 mm tolerance is ± 5.0mm on both height and width.

5. The window diagonal should be less than equal to 5mm for window upto 1500mm, above 1500mm, the diagonal difference should not be more than 10mm

6. The minimum overlap of sashes on Frame/ mullion should be 5mm, higher overlap is desirable.

7. Water drainage / ventilation slot should be provided in sash / frames.

8. Min Gap of 3mm should be maintained per face between aperture and window to allow expansion / contraction of uPVC windows.

9. The gap between window and its aperture should be filled with weatherable & elastic material to allow expansion / contraction of PVC and performance over period of years.

H.3 Glazing Gaskets & Weather strip

The gaskets / weather strip shall be of EPDM/ TPE or any equivalent material which meets the following properties

a) Shore A Hardness of the material should be 60±10° A; (ref ISO 7619)

b) Ozone resistance: No visible cracks; (ref ISO 1431)

c) Compression set: should not exceed 50% ; (ref ISO 815)

d) Aging test: The properties after aging should be (ISO 188)

i. Hardness +10 / -5

ii. Tensile Strength not to exceed drop beyond 25%

iii. Elongation not to exceed drop beyond 25%

H.4 Window Hardware’s

The window hardware including the fastenings shall be tested in accordance with ISO 9227: 2006 for corrosion resistance when subjected to neutral salt spray test.

The performance parameters like load bearing, MOC, endurance should be specified by the supplier or mutually agreed between the two parties.

Note1: It should be noted that there is no direct correlation between a given no. of hours salt spray testing and real time natural environment exposure.

Note2: In coastal or industrial environment, the hardware performance should be specified.

H.5 TESTING OF WINDOWS

The window subjected to the testing should adopt the following Sequence of Test.

a) Air Permeability

b) Water tightness

c) Resistance to wind – deflection measurement at Pressure P1 (=P3/1.5)

d) Resistance to wind – pulsating test to P2 pressure (=0.5P1)

e) Resistance to wind – Safety test to pressure P3 (the max wind load as per IS 875)

I.0. **WATER PROOFING TREATMENT:**

I.1. Water proofing treatment to toilet blocks:

I.1.1. Providing and laying water proofing treatment to vertical and horizontal surfaces of depressed portions of W.C., kitchen, and the like shall consist of:

i) 1st course of applying cement slurry @ 4.4 Kg/Sqm, mixed with water proofing compound conforming to IS 2645 in proportions recommended by the manufacturer of the compound.

ii) IInd course of 20mm cement plaster 1:3 (1 cement: 3 sand) mixed with water proofing compound in proportion by the manufacturer of the compound.

iii) The sunken portion will be filled with brick bat aggregate 25mm to 100mm size with 50% of cement mortar 1:5 (1 cement : 5 fine sand) admixed with proprietory water proofing compound conforming to IS 2645 as per manufacturer's specification/directions and finished to receive flooring.

I.1.2. **Mode of Measurement:**

I.1.2.1. For water proof treatment in baths and WCs described at (i) to (iv) above carried out in the sunken floors, both the vertical faces and horizontal surfaces shall be measured in Sqm and paid for the entire treated areas.

I.1.2.2. Brick bat coba treated with waterproofing compound described at (v) above will be measured separately in Cum and paid for.

I.2 **WATER PROOFING TREATMENT:**

I.2.1. Providing and laying integral cement based water proofing treatment including preparation of surface as required for treatment of roofs, balconies, terraces etc., consists of following operations:- (which are as per the specification of specialist company).

i) Applying and grouting a coat of neat cement slurry using cement at 2.75 Kg/sqm and admixed with proprietary water proofing compound, conforming to IS 2645 and in proportions recommended/specified by the manufacturer, RCC slab including cleaning the surface before treatment.

ii) Laying cement concrete using broken bricks/brick bats 25mm to 100mm size with 50% cement mortar 1:5 (1 cement : 5 coarse sand) admixed with proprietary water proofing compound, conforming to IS:2645 and in proportions recommend/specified by the manufacturer, over 20mm thick layer of cement mortar of mix 1:5 (1 cement : 5 coarse sand) admixed with proprietary water proofing compound, conforming to IS: 2645 and in proportions recommended/specified by the manufacturer, to required slopes and treating similarly the adjoining walls up to 300mm height including rounding of junctions of walls and slabs.

iii) After two days of proper curing, applying a second coat of cement slurry admixed with proprietary water proofing compound, conforming to IS:2645 and in proportions recommended/specified by the manufacturer.

iv) Finishing the surface with 20mm thick jointless cement mortar of mix 1:4 (1 cement, 4 coarse sand) admixed with proprietary water proofing compound, conforming to IS: 2645 and in proportions recommended/ specified by the manufacturers, and finally finishing the surface with trowel with neat cement slurry and making grooves to form 300 x 300mm size square panels (grooves for part depth of top plastering only).

v) The whole terrace so finished shall be flooded with water for a minimum period of two weeks for curing and for final test. All above operations shall be done in above order, and as directed and specified by the Engineer – in – charge.

vii) The average thickness shall be 120mm and minimum thickness at khurra as 60. The controlling/deciding factor is provision of minimum slopes of 1:100.

I.2.2. **Rate:**

For purposes of payment, treatment described above shall be measured over flat areas of floors etc. Vertical areas treated shall not be measured for purposes of payments. Cost of same is included in the rate quoted for flat area.

I.3. Main Building contractor shall get all water proofing work (including and sunkel areas) shall be done from any of the approved agencies for this water proofing. The contractors shall obtain a guarantee for a period of 10 years for all the water proofing treatments from that approved water proofing contractor, and shall be jointly responsible for any defects noticed in the work during the above period of execution and defect liquidation liability period. Rate quoted shall include the same.

I.4. All waterproofing work shall be guaranteed for ten years in approved proforma acceptable to the Employer, on a stamp paper of required denomination. This guarantee will be given by approved waterproofing contractor directly to STATE BANK OF INDIA as soon as the work is virtually completed and before the final bill is settled.

I.5. Although the waterproofing work is guaranteed by the approved waterproofing contractor for ten years, the main building contractor shall be responsible, if at any time during the defects liquidation liability period, the other surfaces of areas treated for waterproofing (ceiling etc) show leaks, wet patches, dampness or the waterproofing deteriorates/shows signs of distress/ give way either due to the inadequacy of the work carried out or materials/ workmanship etc., used or for any other reason whatsoever, and shall be liable without any extra cost and inconvenience to the Employer or the occupants, to carry out the necessary rectifications/remedial measures, including redoing of work, as and when required, during defects liquidation liability period, to make good the deficiencies.

J. PAINTING/POLISHING WORK:

J.1 LIME WASHING AND COLOUR WASHING:

J.1.1. The materials for preparing the lime wash shall be freshly burnt fat lime of good quality free from unburnt stone and other foreign matter.

This shall be dissolved in sufficient quantity of water (about 4-5 litres/Kg of lime), stirred thoroughly and strained through a clean coarse cloth. Alternately, readymade whiting, complying with I.S.63-1950, may also be used. Clean gum dissolved in hot water shall then be added in suitable proportion of 2 gm. of gum-arabic to a litre of lime, to prevent lime wash coming off easily when rubbed.

J.1.2. Colour wash shall be lime wash prepared as above, to which a solution of water, lime and fast pigment, boiled if directed, shall be gradually added and stirred until the required shade/tinge is obtained.

J.1.3. As required, single or double scaffolding or ladder shall be used, without damaging or scratching the wall/plastered surfaces/floors.

J.1.4. The surfaces to be painted shall be prepared by removing all mortar droppings and foreign matter and thoroughly cleaned with wire or fibre brush. All holes or depressions shall be stopped with mortar and cured and surfaces made even and smooth before painting.

J.1.5. Colour/lime wash shall be applied with a brush. The first stroke of brush shall be from top downwards, next from bottom upwards over the first stroke and further a stroke over the earlier brushing before it dries. This will form one coat. Each coat must be allowed to dry and shall be subject to inspection before the next coat is applied. When dry, the surface shall not show signs of cracking and shall present a smooth and uniform finish, free from brush marks, and it shall not come off easily, when rubbed with a finger. Patchy or streaky work will be rejected and shall have to be re-executed at the contractor's own expense. Unless otherwise specified, 3 coats of lime wash or colour wash shall be applied.

J.1.6. Doors, windows, floors and other articles of furniture etc., shall be protected from being splashed upon. Splashing and droppings, if any, shall be removed and surfaces cleaned.

J.2. **CEMENT WASH:**

J.3.1. **Dry Distempering:**

J.3.1.1. **Material:**

Powedered dry distemper shall be of approved make, colour and shade and manufactured by approved manufacturers. It shall generally confirm to IS:427 – 1965.

J.3.1.2. **Scaffolding:**

This shall be double or single as required and directed.

J.3.1.3. **Preparing the surface:**

The surface to be distempered shall be cleaned well and all cracks, holes and surface defects shall be repaired with gypsum and allowed to set hard. All irregularities shall be sand papered smooth and wiped clean. The surface so prepared must be completely dry and free from dust before distempering is commenced. In the case of newly plastered walls, special care shall be taken to see that it is completely dry before any treatment is at tempted. For old surfaces, which has earlier been distempered, the surface shall be cleaned well of grease, dust etc. The flaking of previous coating, if any, shall be removed/ taken off. All cracks, holes and surface defects shall be repaired with gypsum and allowed to set hard and then sand papered and wiped clean. But in case the surfaces were colour or white washed, the wash must be removed thoroughly first.

J.3.1.4. **Priming Coat:**

The priming coat shall be applied over complete dry surface in the manner recommended by the manufacturer in cast of patent distemper. When no priming coat is specified by the manufacturer, finely powdered chalk mixed with a thin solution of glue shall be applied to prepare a good hard background. This coating, when dry, shall be sand papered as close and smooth as possible.

J.3.1.5. **Application of Distemper:**

The instructions of the manufacturer shall be followed, regarding the preparation of the surface and application of priming and finishing coats. Distemper shall not be mixed in

quantities larger than is actually required for a day's work. Hot water may be used to prepare the mixture. Distempers shall be applied in dry weather with broad stiff brushes in long parallel strokes. The treated surface shall be allowed to dry and harden. Second or succeeding coats shall not be applied until the preceding coat has passed by the Employer & Architects. Two more coats of distemper shall be given in exactly the same manner as the first one but only after the earlier coat laid has thoroughly dried. All the operations (strokes of brush) for one coat of white/colour wash will give two coats in case of distempering.

J.3.1.6. **Rates to be inclusive of:**

The rates shall include all labour, materials, equipment and tools for carrying out the following operations:

i) Providing and mixing the primer and distemper separately.
ii) Scaffolding.
iii) Preparing the surface to receive the priming and finishing coats.
iv) Applying the priming coats.
v) Each coat to be completed in all parts of one building and got approved, before starting next coat in that building, and shall not be done room wise or floor wise.
vi) Applying the distemper in 3 coats minimum, including primer coat. If a proper even surface is not obtained to the satisfaction of the Employer & Architects in 3 coats contractor shall carryout additional coats of distemper to approval, at contractor's own expense.

J.4. **ACRYLIC WASHABLE DISTEMPER:**

J.4.1. Washable acrylic distemper shall be conforming to IS 2395 – 1 – 1966 and shall be of approved make and shade.

J.4.2. As required, single or double scaffolding shall be used. Ladders, if used, shall be tied with old gunny bags at top to prevent damage or scratches to the walls/floors etc.

J.4.3. The instructions of the manufacturer shall be followed regarding preparation of the manufacturer shall be followed regarding preparation of the surface and application of priming and finishing coats.

J.4.4. Where the specifications of the manufacturer are not available, the following instructions shall be carried out:

J.4.5. The surface shall be cleaned and all clears, holes and surface defects shall be repaired with gypsum and allowed to set hard. All irregularities shall be sand papered smooth and wiped clean. The surface so prepared shall be completely dry and free from dust before distempering is commenced. In case of newly plastered surfaces/walls, special care shall be taken to see that it is completely dry before treatment is attempted.

The old surfaces which had earlier been distempered, shall be cleaned of grease and dust etc. All cracks, holes and surface defects shall be repaired with plaster of Paris and allowed to set hard and then sand papered smooth and wiped clean. The flakings of previous coatings, if

any, shall be taken off. But in case the surfaces are colour or white washed, the wash must be removed thoroughly first.

J.4.6. The priming coat shall be applied over complete dry surfaces as recommended by the manufacturers or patent distemper.

J.4.7. Distemper shall be applied in dry weather with a broad stiff brush in long parallel strokes. This shall be allowed to dry thoroughly before the next coat is applied. All the operations (strokes of brush) for one coat of white colour wash will give tow coats in case of distempering.

Rates to be inclusive of: The rates shall include all labour, materials, equipment and tools for carrying out the following operations:

i) Providing and mixing the primer and distemper separately.

ii) Scaffolding.

iii) Preparing the surface to receive the priming and finishing coats.

iv) Applying the priming coats.

v) Each coat to be completed in all parts of one building and got approved, before starting next coat in that building, and shall not be done room wise or floor wise.

vi) Applying the distemper in 3 coats minimum, including priming coat. If a proper even surface is not obtained to the satisfaction of the Employer and Architects in 3 coats contractor shall carryout additional coats of distemper to approval, at contractor's own expense.

J.5. **WATERPROOF CEMENT PAINT:**

The waterproof cement paint shall be of Super Snowcem or of any approved manufacture and it shall be of approved colour and shade. It shall be brought to site in original air tight containers with seals intact.

Double scaffolding and ladders shall be provided, if necessary, without damaging the wall surfaces to be painted.

The preparation of surface, mixing of paint and application shall be done as specified by the manufacturer. In the absence of manufacturer's specifications, the following shall be followed:

The surfaces shall be thoroughly cleaned free from dirt, dust, etc., by brushing and washing down with clean water. Any grease, oil paint or other foreign material shall be removed by approved method.

Colour/Lime wash and or distemper shall be thoroughly removed by washing, brushing and if necessary the accumulated coats of oil paint shall be removed by thoroughly brushing or scraping and washing and a clean even surface obtained.

Rough cast plaster and pebble dash surfaces shall be thoroughly brushed and washed to remove dust and dirt.

Dry cement paint shall be thoroughly mixed with clean fresh water to produce paint of required consistency. It shall be strained through a paint strainer. The paint shall be kept stirred thoroughly and applied within the specified time. Hardened or damaged paint shall not be used.

The paint shall be applied by brush. Each paint coat shall be properly cured and got inspected and approved by the Architects/Employer before the next coat is applied. Minimum 2 coats will be applied but if the work is not satisfactory, more coat/coats shall be applied as directed at no extra cost.

Absorbent surfaces shall be evenly damped so as to give even suction in dry weather, freshly painted surfaces shall be kept damp for at least two days.

For smooth surfaces one coat of primer shall be applied as per manufacturer's specifications and three more coats of cement paint of approved shade shall be applied. All operations (strokes of brush) for one coat of white (colour wash will give two coats of cement painting).

Rates to be inclusive of: The rates shall include all labour, materials, equipment and tools for carrying out the following operations:

i) Providing and mixing the primer and waterproof cement paint distemper separately.

ii) Scaffolding.

iii) Preparing the surface to receive the priming and finishing coats.

iv) Applying the priming coats.

v) Each coat to be completed in all parts of one building and got approved, before starting next coat in that building, and shall not be done room wise or floor wise.

vi) Applying the waterproof cement paint in 3 coats minimum, including primer coat. If a proper even surface is not obtained to the satisfaction of the Employer & Architect in 3 coats, contractor shall carryout additional coats of work to approval, at contractor's own expense.

vii) **Water repellant silicon liquid paint:**

Multipurpose protective coating.

PIDICOTEW – 100 is a protective coating system designed for vertical walls, and acts as a one-way membrane, allowing moisture to escape to the surface but prevents moisture ingress into the treated structure.

Application Areas:

- External wall surface for durable insulation effect.
- For wall surfaces, can be used as protective coating in the desired colour.
- For protecting industrial as well as residential structures from weathering effect.

Coverage:

- 10 to 12 Sq-m/lit of PIDEBIND P – 100 on smooth surface once the area is covered properly with primer coat then, apply one coat of PIDICOTEW – 100 with a coverage rate of 5 sqm/lit.
- After 1 hour of drying of first coat, second coat of PIDICOTEW – 100 shall be applied with the coverage rate of 5 sqm/lit.

J.6. **MODE OF MEASUREMENT (FOR J1 TO J5):**

For all the above painting items, Mode of measurement shall be same as that of plastering and shall be in Sq.meters. No extra payment shall be made for painting rough cast surfaces or sandfaced surfaces.

J.7. **ENAMELLED PAINTING:**

J.7.1. **Materials:**

J.7.1.1. The paint shall be of the specified colour and shade and of an approved make by the Architect & Employer. The paint shall comply in all respects with relevant Indian Standard Codes.

J.7.1.2. The make and brand of the paint to be used on the work shall first be got approved by the Architects/Employer. The material shall be obtained directly from the approved manufacturers or authorised dealers and brought to the site in the manufacturers drums etc., with seals unbroken.

J.7.1.3. Paint for undercoating and finishing coat shall be ready mixed. Mixing by contractor is not permissible except with prior written approved of the Architects/Employer, in which case the preparations of ingredients and their quality shall be strictly maintained as per manufacturer's instructions and relevant I.S. codes.

J.7.1.4. All the materials shall be kept properly protected when not actually in use. Lids of containers shall be kept closed and surfaces of paint in open shall be covered with thin layers of turpentine to prevent formation of a skin.

In case of doubt regarding the quality, the paint supplied by the contractor shall be got tested in an approved laboratory as described in I.S. 101 – 1964, if considered necessary by the Architect. The cost shall be borne by the client, if the results are satisfactory, and by the contractor if otherwise. The rejected paint shall be removed from the site of work forthwith.

J.7.2. **PREPARATION OF SURFACE:**

J.7.2.1. **Plastered Surfaces:**

New plaster shall not be primed or painted till it is completely dry and hard. The surface shall be carefully rubbed smooth and thoroughly cleaned. The surface shall be dry, smooth, clean and free from dirt.

J.7.2.2. **Steel work (NEW):**
Degreasing shall be done by either proprietary brands of approved solvent cleaner or by mineral turpentine or petroleum and other petroleum solvents, like trichloroethylene alkali solutions or detergents as directed by the architects.

The de-rusting shall be done by manual scraping (by wire brushes, fine steel wool scraper, sand paper etc.) and/or mechanically by sand blasting, shot blasting or flame cleaning or chemical methods as approved by the Architects.

J.7.2.3. **Steel work (Old):**
For repainting necessitated due to any specified reason the relevant instructions given in I.S. 1447:1966 shall be followed. If necessary and ordered by the Architect, the surface shall be cleaned completely as for new steel.

J.7.2.4. **Wood Work:**
The surface to be painted shall be thoroughly dry, clean and smooth. It shall be sand papered with coarse medium grade sand papers and the finished surface shall be free from scratches.

J.7.2.5. Before applying primer, knots, if any, shall be covered with preparation of red lead made by grinding red lead in water and mixing with glue sized and used hot. The surface prepared for painting shall be dry before paint is applied. The holes and indentation on the surface shall be stopped with putty. Stopping shall not be done before the priming coat is applied.

J.7.3. **Application:**

J.7.3.1. All brushes, tools, etc., used shall be cleaned of all foreign matter at the beginning of different operations being undertaken.

J.7.3.2. Paint may be applied by spraying or brushing. Unless otherwise specified, paint shall be applied with brushes. Brushes of appropriate size shall be either round or oval shaped and they shall be maintained carefully throughout the work so as to be pliable and free from bristles.

J.7.3.3. The contents of the drum and tins shall be well stirred with a small clean and smooth stick before using and ocassionally during use to prevent sedimentation at the bottom of the container.

J.7.3.4. Painting shall be carried out as far as possible in dry and warm weather.

J.7.3.5. Single or double scaffolding shall be used as necessary, by the contractor at his cost. Ladders, if used, shall be tied with old gunny bags at top to prevent damage or scratches to the walls, floors etc.

J.7.3.6. The primer coat shall be applied as soon as the surface has been cleaned and before deterioration of surface by rust and contamination of the surfaces by dust, dirt or any other foreign material.

J.7.3.7. Sufficient time shall be allowed for each coat of paint to dry before the next is applied.

J.7.3.8. Painted surface, shall be protected from sun, rain, condensation, contamination or surface damage, till it is completely dry. 'Wet paint' shall be put, when necessary.

J.7.3.9. Preparation of surfaces, priming coat, undercoat and finishing coats shall be applied as specified or recommended by the manufacturer. Where no specifications are available, the following specifications will be followed.

J.7.3.10. **Primer Coat: Plastered surface:**

Priming coat shall consist of equal parts of white and red lead mixed in boiled linseed oil to the required consistency applied uniformly over the surface. When this coat is dry, all cracks, holes and other such defects shall be filled with a mixture of one part of white lead and 3 parts of ordinary putty. After drying, the surface shall be rubbed with sand paper and dusted clean. An undercoat shall be applied thinly so that plaster may be thoroughly saturated. One or more undercoats with putty shall be applied as required and directed to obtain thoroughly saturated surface to the satisfaction of Architect & Employer.

Steel Work:

The primer coat be of red lead conforming to I.S.102 – 1962. Undercoating and puttying shall be done, if necessary. For old painted surfaces and new surfaces already primer with red lead/red oxide, the surface shall be cleaned thoroughly and primed with red lead/ red oxide, at some places, where necessary or over the whole surface as directed by the Architects.

Wood Work:

The primer coat shall consist of red lead, white lead, raw and boiled linseed oil and patent driers.

After priming coat, all small holes, cracks, open joints and other minor defects shall be stopped with putty made from whitening mixed to proper consistency with raw linseed oil and little white lead to help hardening of putty. The surface shall then be lightly rubbed down smooth with sand paper. One or more undercoats, with putty shall be applied as required and directed to obtain thoroughly saturated surface to the satisfaction of Architect & Employer.

J.7.3.11. **Finishing coats:**

Unless otherwise specified in the item, the finishing shall be done with atleast two coats of paint of approved made and shade confirming to the latest I.S. codes. The last coat of paint

shall give a matt/flat, semi-glossy or glossy finish as specified for each item of painting or as directed by the Architect & Employer. Striple finish shall be given at no extra cost, if required, by the Architect & Employer. The finished surface shall be of the required shade and present an even appearance. It shall not show any brush marks. If required, final coat will be applied with rollers at no extra cost.

J.8. **ENAMEL PAINT:**

General specifications, preparation of surface and priming coat shall be same as specified for oil painting. Finishing shall be done in two coats or more as required with synthetic enamel paint of approved make and shade and shall generally conform to relevant I.S.codes.

J.9. **RATE FOR ALL PAINTING WORKS TO INCLUDE:**

Apart from other factors mentioned elsewhere in this contract, the rate for painting shall also include.

J.9.1. Providing all the materials/labour and equipment that is required to execute the work as specified.

J.9.2. Scaffolding (single/double) erection and removal.

J.9.3. Preparing the surfaces before painting.

J.9.4. Applying three cots of approved paint including priming coat. If proper & even surface or shade is not acquired, then extra cost/coats shall be applied as directed and to the final approval of the Architect & Employer, at no extra cost.

J.9.5. Applying additional priming coat/coats to obtain thoroughly saturated surface and filling the putty as required and directed.

J.9.6. No extra coat shall be paid for painting smooth/rough surfaces such as precast concrete pardis, rough cast plaster, sand faced plaster etc.

J.9.7. Curing the cement paint as directed for minimum 7 days.

J.9.8. Doors, windows, floors and other materials of furniture etc., shall be protects from being splashed upon. Splashing and droppings, if any, shall be removed and the surfaces cleaned as directed.

J.9.9. If any cracks develop in the plaster, before or after final painting, the same will have to be filled in by suitable putty and the surface painted again as directed to give an even surface to the approval of Architect & Employer at no extra cost. If neeru surface is damaged due to any reason before painting, then the surface shall be redone by using plaster of paris as directed, at no extra cost.

J.10. **MODE OF MEASUREMENT FOR OIL, ENAMEL PAINT, POLISHING ETC:**

J.10.1. Measurement of painted/polished surfaces shall be in Sq.m and as per plaster work.

J.10.2. For measurement of polishing/painting to joinery and steel work etc., multiplying coefficients, as in standard table shall, be as follows:

S.NO.	DESCRIPTION OF WORK	HOW MEASURED	COEFFICIENT
I.	**Wood Work – doors and windows etc:**		
1.	Panelled doors/windows.	Measured flat including frame.	1.30 (for each side).
2.	Flush doors.	- do -	1.20 (for each side).
3.	Partly panelled and partly glazed or glazed doors/windows (for glazed portions only – for panelled portions as per 1 above).	- do -	1.00 (for each side).
4.	Fully venetioned or louvered doors/windows.	- do -	1.80 (for each side).
II.	**Steel Work – Doors and Windows:**		
1.	Fully glazed doors & windows.	Measured flat including frame.	0.50 (for each side).
2.	Plain sheeted steel door, windows.	- do -	1.10 (for each side)
3.	Collapsible gate.	Measured flat.	1.50 (for painting all over)
4.	Rolling shutters of interlocked laths.	-do- jamb guides bottom rails, locking arrangement included (top cover shall be measured separately)	1.10 for each side.
III.	**General work:**		
1.	Expanded metal, M.S. grill work, grating in guard bars, ballustrades, railing and partitions.	Measured flat.	1(for painting all over).
2.	R.C.C. grill.	- do -	1(for each side).

The table given above is as per C.P.W.D. specification.

J.11. **FRENCH SPIRIT POLISHING:**

J.11.1. **Materials:**

French spirit polish shall be of an approved make conforming to I.S.348:1968 and shall be approved by the Architects. If it is to be prepared, the polish shall be made by dissolving 0.7 Kgs of best shellac in 4.5 litres of spirit or wine without heating. To obtain required shade, approved pigment shall be added and mixed in required proportions.

J.11.2. **Workmanship:**

J.11.2.1. **Preparation of Surface:**

The surface shall be cleaned. All unevenness shall be rubbed down smooth with sand paper and well dusted. Holes and indentations of the surface shall be filled with putty made of whiting and linseed oil. The surface shall be given a coat of filler made of 2.25 Kg of whiting

and 1.5 litre of methylated spirit. When it dries, the surface shall again be rubbed down perfectly smooth with sand paper and wiped clean.

J.11.2.2. **Application:**
A piece of clean fine cotton cloth or cotton wool made into the shape of a pad shall be used to apply polish. The pad shall be moistened with polish and applied sparingly but uniformly and completely over the entire surface. It shall be allowed to dry and then only another coat is applied in the same way. To finish off, the pad shall be covered with a fresh piece of clean fine cotton cloth, slightly damped with methylated spirit and rubbed lightly and quickly with a circular motion. The finished surface shall have a uniform texture and high gloss. Irrespective of number of coats, this will be carried out to the entire satisfaction of Architect & Employer.

J.12. **POLISHING:**

J.12.1. **Materials:**

This shall be of approved quality and make and brought to site in sealed containers as marketed by the manufacturers.

J.12.2. **Workmanship:**

J.12.2.1 **Preparation of Surface:**
Woodwork to be treated, shall be finished smooth. It shall then be stopped and rubbed down perfectly smooth with different grades of sand paper. (The final rubbing shall be done with sand paper which has been slightly moistened with linseed oil and rubbed one over the other for a few seconds).

J.12.2.2. **Application:**
The mixture of the polishing shall be applied evenly, with a clean cloth pad in such a way that no blank patches are left, and rubbed continuously for half an hour. When the surface is quite dry, a second coat shall then be applied and rubbed for two hours or more if necessary, until the surface has assumed a uniform glass and is quite dry, showing no signs of stickiness when touched. Irrespective of number of coats, this will be carried out to the entire satisfaction of Architect & Employer.

J.13. **MEASUREMENT:**
Measurement for French/wax polishing and or polishing with readymade polish will be as per schedule stated herein before and the explanatory note on coefficient shall be as per C.P.W.D. specifications.

J.14. For all painting and polishing works (J.1. to J.12):

(i) Detailed register shall be maintained, by the contractor, showing daily account of receipts, consumption and balance of different materials showing materials received and their consumption with location, and shall be checked by Employer & Architect as their discretion.

(ii) Each coat of work shall be done in one building at a time and got approved before starting next coat in that building; and shall not be done room wise or floor wise.

11. INDEX FOR SPECIFICATIONS FOR WATER SUPPLY AND SANITARY WORKS

WATER SUPPLY:

1. G.I. pipe and Socket etc.
2. C.I. and spun iron pipes & fittings

DRAINAGE:

1. Stoneware pipes etc.
2. Cement Concrete pipes
3. Manholes, Inspection chambers etc.
4. Soil, Waste, Rainwater, Vent, etc.
5. Lead Pipes

"A" Cutting, Patching and Making good

"B" Equipment, Material & Workmanship, Tests

"C" Cleaning, Operation and Tests

6. Sanitary Fixtures and Fittings
7. Mode of Measurement

"C" Tools and materials and storage

"D" Safety codes

} General & Applicable for all types of work costs of these shall be included in the rates quoted.

12. SPECIFICATIONS FOR WATER SUPPLY & SANITARY WORKS

1. WATER SUPPLY:

1.1 G.I.PIPES AND SOCKETS:

1.1.1. Materials:

The pipes shall be galvanised mild steel welded pipes and seamless, screwed and socketed tubes and conforming to the requirements of I.S.1239 – 1982. They shall be of the diameter (nominal bore) and grade specified in the description of the item. The sockets shall be designated by the representative nominal bores of the pipes, for which they are intended.

The pipes and sockets shall be cleanly finished, well galvanized inside and outside and free from cracks, surface flaws, laminations and other defects. All screw threads shall be clean and well cut. The ends shall be cut clean and square to the axis of the tube. Unless otherwise specified, the pipes below ground level or concealed in walls or floors and those supported on walls shall be of "B" class only.

The weights of GI pipes for various glasses and diameter are reproduced below:

Weight in Kg.per meter of common G.I. pipes of various dia (plain ends).

DIA	**(LIGHT) "A" CLASS**	**(MEDIUM) "B" CLASS**	**(HEAVY) "C" CLASS**
15	0.952	1.22	1.45
20	1.41	1.58	1.90
25	2.01	2.44	2.97
32	2.58	3.14	3.84
40	3.25	3.61	4.43
50	4.11	5.10	6.17
65	5.80	6.51	7.90

1.1.2 Pipe fittings:

The fittings shall be of malleable cast iron or mild steel tubes complying with all the appropriate requirements given in para 1.1.1. or as specified. The fittings shall be designated by the respective nominal bores of the pipes for which they are intended.

1.1.3. **Cutting, Laying and Jointing:**

The pipes and fittings shall be inspected at site before use, to ascertain that they conform to the specifications given in para 1.1.1. above. The defective pipes shall be rejected. Where the pipes have to be cut or rethreaded, the ends shall be carefully filled out so that no obstruction to bore is offered. The end of the pipes shall then be threaded with pipe dies and taps carefully in such a manner as will not result in slackness of joints when screwed/jointed. The taps and dies shall be used only for straightening screw threads, which have become bent or damaged and shall not be used turning the threads become slack, as the later procedure may result in a joint, which may not be water tight. The screw threads of pipes and fittings shall be protected from damage until they are fitted.

The pipes shall be cleaned and cleared of all foreign matter before being laid. In jointing the pipes, the inside of the socket and the screwed end of the pipes shall be oiled and rubbed over with white lead and a few turns of spun yarn wrapped round the screwed end of the pipe. The end shall then be screwed in the socket, tee, etc., with the pipe wrench. Care should be taken that all pipes and fittings are properly jointed so as to make the joints completely water tight and pipes are kept at all times free from dust removed after screwing. After laying, the open ends of the pipes shall be temporarily plugged to prevent access of water, soil or any other foreign matter.

Any threads exposed after jointing shall be painted or in the case of underground piping thickly coated with approved anti-corrosive paint to prevent corrosion.

1.1.4. **Internal work:**

For all internal work the galvanized iron pipes and fittings shall run outside the surface of the walls or ceiling (not in chase), unless otherwise specified. The fixing shall be done by means of standard battern holder butt clamps, keeping the pipes about 1.5 cm clear of the wall. When it is found necessary to conceal the pipes, chasing may be adopted or pipes fixed in the ducts or recesses etc., provided there is sufficient space to work on the pipes with usual tools.

The pipes shall not ordinarily be burring in walls or solid floors. Where unavoidable, pipes may be burried for short distances, provided adequate protection is given against the damage and where so required joints of M.S. tubes be not buried. Where directed by the Architect & Employer, M.S. tube sleeves shall be fixed at places a where pipes passed through walls or floors for reception of the pipe and to allow freedom for expansion and contraction and other movements. In case the pipe is embedded in walls or floors, it should be painted with anti-corrosive bitumastic paint or approved quality and the pipe shall be wrapped in burlap of hesain cloth impregnated with bitumen. The wrapping shall be made to fit tightly over the pipe and where wrapping with new piece, it shall overlap the old one and the joint shall be tied with M.S. wire or nylon thread. Where pipes are encased within chases made in the wall, they shall be fixed to the wall and M.S. clamps so as to prevent movement before filling in and making good the chase. The pipe should not come in contract with lime mortar or lime concrete, as the pipe is affected by lime under the floors, the pipes shall be laid in a layer of sand filling done under concrete floors.

1.1.4.1. **Insulation for hot water pipes:**

Pipes carrying hot water from storage heater or from central heating system shall be insulated for preventing loss of heat. The materials used for insulation shall be hair felt, asbestosfibre, mineral wool, glass wool or glass wool felt on sufficient thickness as directed and shall be wrapped around the pipe tightly and tied in position by wire loops at certain intervals.

This shall be covered by hesain cloth wrapping as detailed above for cold water pipes. All pipes and fittings shall be fixed truly vertical and horizontal, unless unavoidable. The pipes shall be fixed to walls with standard batten holder – bat clamps of required shape and size, so as to fit tightly on the pipes, when tightened with screwed bolts. The bats shall be of teakwood, painted with coal tar.

These clamps shall be embedded in brick work in cement mortar 1:4 (1 cement : 4 coarse sand) and shall be spaced at regular intervals in straight lengths.

The clamps shall be fixed at shorter lengths near the fittings or as directed by the Architect & Employer.

For G. I. pipes 15mm to 25mm diameter, the holes in the walls and floors shall be made by drilling or with chisel or jumper and not by dismantling the birck work or concrete. However, for bigger dimension pipes, the holes shall be carefully made of the smallest but of adequate size, as directed by the Architect & Employer. After fixing the pipes the holes shall be made good with cement mortar 1:4 (1 cement: 4 coarse sand) and properly finished to match the adjacent surface.

1.1.5. **External work:**

The galvanised iron pipes and fittings shall be laid in trenches. The widths and depths of the trenches for different diameters of the pipes shall be given as in the table below, and shall be deep enough to have a clear cover of at least 400mm above the top of pipes.

Dia of Pipe	**Width of trench**	**Depth of trench**
15mm to 50mm	30 Cms.	60 Cms.
65mm to 100mm	45 Cms.	75 Cms.

At joints the trench width shall be widened where necessary. The work of excavation and refilling be done true to line and gradient.

The pipes shall be painted with two coats of anticorrosive bitumastic paint of approved quality. The pipes shall be surrounded with sand (The pipes shall be laid on a layer of 7.5 cm sand and filled with sand up to 15 cm above the pipes. Remaining portion of the trench shall then be filled with excavated earth) before the trenches are back filled with excavated earth.

When excavation is done in rock the bottom shall be cut deep enough to permit the pipes to be laid on a cushion of sand, minimum 7.5 cm thick. In case of bigger diameter pipes, where the pressure is very high, thrust blocks of cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate of 20mm nominal size) and of suitable size shall be constructed at all bends, tees etc., to transmit the hydraulic thrust by and spreading it over a sufficient area, without impairing the ground, as directed by the Architect & Employer.

1.1.6. **Testing the joints:**

After laying and jointing, the pipes and fittings shall be inspected under working conditions of pressure and flow. Any joint found leaking shall be redone and all leaking pipes removed and replaced without extra cost.

The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 Kg/cm². (60 metre head or double the designed working pressure whichever is more). The pipes shall be slowly and carefully charged with water allowing all air to escape and avoiding all shock or water hammer.

The draw off takes and stop cocks shall then be closed and specified hydraulic pressure shall be applied gradually. Pressure gauge must be accurate and preferably should have been recalibrated before the test. The test pump having been stopped the test pressure should maintain without loss for at least half an hour. The pipes and fittings shall be tested in sections as the work of laying proceeds, keeping the joints exposed for inspection during the testing.

1.1.7. **Measurements:**

The lengths shall be measured in running meter correct to a cm., for the finished work, which shall include G. I. pipe and G.I. fittings such as bends, tees, elbows, reducers, crosses, plugs, sockets, nipples and nuts etc., unless otherwise specified, but exclude brass and gun metal taps(cocks), valves, lead connection pipes and shower roses. The measurements shall be taken separately for internal and external work. For this, the internal and external work shall have meaning given in 1.1.4 and 1.1.5. The length shall be taken along the central line of the pipe fittings. All pipes and fittings shall be classified according to their diameters, method of joining and fixing substance, quality and finish. The diameter shall be the nominal diameter of the internal bore of the pipes. The rates shall include all cuttings and wastages. In case of fittings of unequal bore, the largest bore shall be measured.

Digging and refilling of trenches is clubbed with main item if so specified. If digging and refilling is clubbed with the item, the maximum depth of trench shall be as specified.

Internal work:

The rate for internal work shall include the cost of labour and material involved in all the operations described above except in para 1.1.5. The rate shall include the cost of cutting holes in walls and floors and making good the same. Insulation of pipes for hot water supply will be paid separately as extra over. The rates shall include cutting chases, drilling/making holes etc., and making good the same, after testing/painting etc.

External work:

The rate for external work shall include the cost of labour and materials involved in all the operations described above except in para 1.1.4. The rate shall include excavation trenches, testing painting of pies etc., and re-filling all round the pipes etc., complete.

1.2. **MAKING CONNECTION OF G.I. DISTRIBUTION BRANCH WITH GI MAIN:**

1.2.1. **Materials:**

Pipes and fittings – Para 1.1.1. and 1.1.2. shall apply.

1.2.2. **Preliminary work:**

A pit of suitable dimensions shall be dug at the point, where the connection is to be made with the main, and earth removed up to 15 cm below the main. The flow of water in the water main shall be disconnected by closing the sluice or wheel valves on the mains.

1.2.3. **Making connection:**

For cutting and jointing para 1.1.3 shall apply. The G.I main shall first be cut. Water, if any collected in the pit shall be bailed out and ends of the G. I. pipe threaded. The connection of distribution pipe shall then be made by fixing malleable G.I. tee of the required size and fittings such as jam nut, G. I. socket, connecting piece etc.

1.2.4. **Testing of joints:**

Para 1.1.6 shall apply.

1.2.5. The portion of the pipe in the pit shall be painted with bitumastic paint and encased with sand 15 cm. all-round. The pit shall be filled with earth in level with the original ground surface, watered, rammed and the area dressed.

1.2.6. **Measurements:**

The work of making connections should be counted in numbers, if paid separately.

1.2.7. **Rate:**

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

1.3 **FIXING WATER METER AND STOP COCK IN G.I. PIPE LINE:**

1.3.1 **Materials:**

Pipe and fittings para 1.1.2. shall apply.

1.3.2. **Cutting G.I. pipe line:**

The G.I. line shall be cut to the required length at the position where the metre and stop cock required to be fixed. The ends of the pipe shall then be threaded. For cutting and threading the pipe, para 1.1.3 shall apply.

Fixing meter and stop cock:

For cutting and jointing para 1.1.3 shall apply. The G.I. main shall first be cut. Water, if any, collected in the pit shall be bailed out and ends of the G.I. pipe threaded.

The meter and stop cock shall be fixed in position by means of connecting pipes, G.I jam nut and socket etc. The stop cock shall be fixed near the inlet of the water meter. The paper disc inserted in the nipples of the meter shall be removed and the meter installed exactly horizontal or vertical in the flow line in the direction shown by the arrow cat on the body of the meter. Care shall be taken that the factory seal of the meter is not disturbed. Wherever the meter shall be fixed to a newly fitted pipe line, the pipe line shall have to be completely washed before fitting the meter. For this purpose a piece of pipe equal to the length of the meter shall be fitted in the proposed position of the meter in the new pipe line. The water shall be allowed to flow completely to wash the pipe line and then the meter installed as described above by replacing the connecting piece.

Testing of joints:

Testing of joints shall be done as described in para 1.1.6.

The portion of the pipe in the pit shall be painted with bitumastic paint and encased with sand15 cm all-round. The pit shall be filled with earth in level with the original ground surface watered, rammed and the area dressed.

Measurements:

The work of fixing meters and stop cocks shall be counted in numbers according to the diameters.

Rate:

The rate shall include the cost of labour and materials involved in all the operations described above excluding the cost of stop cock and water meter.

1.4. **FITTINGS:**

General:

The brass or gun metal fittings shall be of heavy quality and of approved manufacture and pattern, with screwed or flanged ends, as specified. The fittings shall in all respects comply with Indian Standard specifications No. I.S. 778 – 1957 and I.S. 781 – 1959. The standard size of brass or gun metal fittings shall be designated by the nominal bore of the pipe outlet to which the fittings are attached. A sample of each kind of fittings shall be got approved from the Architect & Employer and all supplies made according to the approved samples.

1.4.1. All cast fittings shall be sound and free from pits, blow holes and projections. Both internal and external surfaces shall be clean, smooth and free from sand etc. Burning, plugging, stopping or patching of the casting shall not be permissible. The bodies, bonnets, spindles and other parts shall be truly machined so that when assembled the parts shall be axial, parallel and cylindrical, with surfaces smoothly finished. The area of the water way of the fittings shall not be less than the area of the nominal bore.

The fittings shall be fully examined and cleaned of all foreign matter before being fixed. The fittings shall be fitted in the line in a workman like manner. The joints between fittings and

pipes shall be made leak-proof, when tested to a pressure of 6 Kg/sq.cm as described in para 1.1.6, and the defective fittings and joints shall be replaced or redone without any extra cost.

1.4.2. **Brass bib cock and stop cock:**

A bib cock (bib tap) is a draw off tap with a horizontal inlet and free outlet and a stop cock (stop tap) is a valve with a suitable means of connections for insertion in a pipe line for controlling or stopping the flow. They shall be of specified size and shall be of screw down type. The closing device should work by means of a disc carrying renewable non-metallic washer which shuts against water pressure on a seating at right angles to the axis of the threaded spindle which operates it. The handle shall be either crutch or butterfly type, securely fixed to the spindle. Valve shall be of the loose leather seated pattern. The cocks (taps) shall open in anti-clock wise direction.

The bib cock and stop cock shall be polished bright. The minimum finished weights of bob tap (cock) and stop tap (cock) as given in the I.S. specifications are reproduced below:

Size in mm.	**Minimum finished Weight.**	
	Bib Tap in Kgs.	**Stop Tap in Kgs.**
8	0.25	0.25
10	0.30	0.35
15	0.40	0.40
20	0.75	0.75

When the bib cocks or stop cocks are required to be chromium plated, the chromium plating shall be of grade B type conforming to I.S. 1068 – 1958. The chormiumn shall never be deposited on brass unless a heavy coating of nickel is interposed. In case these are required to be nickel plated, the plating shall be of the first quality with a good thick deposit of silvery whiteness capable of taking high polish, which will not easily tarnish or scale.
In finish and appearance, the plated articles, when inspected shall be free from plating defect such as blisters, pits, roughness and unplanted areas and shall not be stained or discoloured. Before a cock is plated, the washer plate shall be removed from the fittings. The gland packing shall be protected from the plating solution.
Gun metal bib cock and stop cock:
These shall be of gun metal screw down pattern of the size as specified. So far as the general requirements of material are concerned, these shall be similar to those as described in para 1.4.2. The weight of these shall be the same as for brass bib cocks and stop cocks as described in para 1.4.2.

1.5.1. **Brass full way valve:**
Full way valve is a valve with suitable means of connection for insertion in a pipeline for controlling or stopping the flow. The valve shall be of brass, fitting with a cast iron wheel and shall be of gate valve type, opening full way of the size as specified.

The valve shall be of best quality as approved by the Architect & Employer.

1.5.2. **Gun metal full way valve with wheel:**

These shall be of the gun metal fitted with wheel and shall be of gate valve type opening full way and of the size as specified. These shall generally conform to I.S. 778 – 1978.

1.6. **Ball valve:**

The ball valve shall be of high pressure or low pressure class and shall be of sizes as specified and directed.

The nominal size of a ball valve shall be that corresponding to the size of the pipe to which it is fixed. The ball valve shall be of gun metal as specified with standard valve shall be of gun metal as specified with standard polyurethane float. The float shall be spherical in shape, the jointing of the float shall be made by efficiently finished, lapped and soldered seam or by brazing. Polyurethane floats shall be used as specified.

The ball valve shall generally conform to I.S. specification No.1703: 1977. The weight of ball cock and the size of ball be as per table given below:

Both low pressure and high pressure ball valves are designed for use on mains having pressures upto 17.5 Kg/cm^2.

Ball valve size in mm			**Total Wt. H.P.**	**Total Wt. L.P.**
Dia	15	-	524 gms	481 gms
	20	-	986 gms	867 gms
	25	-	1549 gms	1411 gms
	32	-	2120 gms	1873 gms
	40	-	2646 gms	2303 gms
	50	-	4454 gms	3959 gms

1.7 CPVC PIPES: (CHLORINATED POLYVINYL CHLORIDE PIPES FOR POTABLE HOT AND COLD WATER)

1.7.1 The pipes shall be conforming to the requirements of I.S.15778: 2007. They shall be of the diameter (nominal bore) and grade specified in the description of the item. The sockets shall be designated by the representative nominal bores of the pipes, for which they are intended.

1.7.2 Material:

1.7.2.1 Virgin Material – Material in such form as granules or powder that has not been subjected to use or processing other than that required for its manufacture and to which no re-processible or recyclable material(s) have been added.

1.7.2.2 Own Rework Material – Material prepared from rejected unused pipes, including the trimmings from the production of pipes, which will be reprocessed in a manufacturer's plant by a process such as extrusion and for which the complete formulation is known.

1.7.2.3 Standard Thermoplastic Pipe Dimension Ratio (SDR) – The standard thermoplastic pipe dimension ratio (SDR) is the ratio of pipe diameter to wall thickness.

1.7.3 Classification of Pipes:

The pipes shall be classified by pressure rating (working pressure) at 270C and 820C – see table given below.

Working Pressure for Pipes: (All values are in Mpa.)

S. No.	Pressure Class.	Working Pressure at		
		SDR.	270C.	820C.
1.	1	11	2.76	0.68
2.	2	13.5	2.18	0.55
3.	3	17	1.73	0.42

Note: The above pipes are recommended for water temperatures ranging from +1 to +900C. The recommended maximum safe working stress for these pipes is 8.6 MPa at 270C. At higher temperature upto 900C, the strength of the pipe reduces and the working pressure shall be modified in accordance.

1.7.4 Composition – The material from which the pipe is produced shall consist substantially of chlorinated polyvinyl chloride to which may be added only those additives that are needed to facilitate the manufacture of the pipe and the production of sound and durable pipe of good surface finish, mechanical strength and opacity under conditions of use. None of these additives shall be used separately or together in quantities sufficient to constitute a toxic, organoleptic or microbial growth hazard or materially to impair the fabrication or welding properties of the pipe, or to impair the chemical, physical or mechanical properties (in particular long-term mechanical strength and impact strength) as defined in the standard.

1.7.5 Dimension of Pipes:

The outside diameter and outside diameter at any given point and wall thickness shall be as given in table below.

1.7.5.1 Diameter – The outside diameter and outside diameter at any given point and wall thickness shall be as given in table below shall be measured according to the method given in IS 12235 (Part I).

1.7.5.2 Diameter at any Point – The difference between the measured maximum outside diameter and measured minimum outside diameter in the same cross-section (also called tolerance on ovality) shall not exceed the greater of the following two values: 0.5mm and 0.012 rounded off to the next higher 0.1mm.

1.7.5.3 The wall thickness of the pipes shall be as given in the table below.

Dimensions of Chlorinated Polyvinyl Chloride Pipes:

S. No.	Nominal Size.	Nominal Outside Diameter.	Mean Outside Diameter.		Outside Diameter at Any Point.		Wall Thickness.					
							Class 1, SDR 11.			Class 2, SDR 13.5.		
			Min.	Max.	Min.	Max.	Avg. Max.	Min.	Max.	Avg. Max.	Min.	Max.
1.	15	15.9	15.8	16.0	15.8	16.0	2.2*	1.7*	2.2*	1.9*	1.4*	1.9*
2.	20	22.2	22.1	22.3	22.0	22.4	2.5	2.0	2.5	2.2	1.7	2.2
3.	25	28.6	28.5	28.7	28.4	28.8	3.1	2.6	3.1	2.6	2.1	2.6
4.	32	34.9	34.8	35.0	34.7	35.1	3.7	3.2	3.7	3.1	2.6	3.1
5.	40	41.3	41.2	41.4	41.1	41.5	4.3	3.8	4.3	3.6	3.1	3.6
6.	50	54.0	53.9	54.1	53.7	54.3	5.5	4.9	5.5	4.6	4.0	4.6
7.	65	73.0	72.8	73.2	72.2	73.8	-	-	-	-	-	4.0
8.	80	88.9	88.7	89.1	88.1	89.7	-	-	-	-	-	5.0
9.	100	114.3	114.1	114.5	113.5	115.1	-	-	-	-	-	7.0
10.	150	168.3	168.0	168.6	166.5	170.1	-	-	-	-	-	11.0

Notes: 1) All dimensions with " * " are not a function of SDR.

2) For CPVC pipes SDR is calculated by dividing the average outer diameter of the pipe in mm by the minimum wall thickness in mm. If the wall thickness 1.52mm, it shall be increased to 1.52mm. The SDR values shall be rounded to the nearest 0.5.

1.7.6 Guidelines for Storage and Installation:

1.7.6.1 Storage – CPVC pipes of all sizes are packed in polyethylene packing rolls and both the ends of the packed roll are sealed with air bubble film cap in order to provide protection during handling and transportation. After packing, the whole bunch of pipes is tightened with polypropylene / HDPE strapping. Each role is then marked with size / type of the pipe, lot number and quantity. The packed pipe rolls are stored in their respective racks in properly covered storage area. Apart from providing protection during handling and transportation, the packing rolls also protect the pipe from ultra violet rays.

1.7.7 Installation Guidelines:

1.7.7.1 Visually inspect pipe ends before making the joint. Use of a chamfering tool will help identify any cracks, as it will catch on to any crack.

1.7.7.2 Pipe may be cut quickly and efficiently by several methods. Wheel type plastic tubing cutters are preferred. Ratchet type cutter or fine tooth saw are another options. However, when using the ratchet cutter be certain to score the exterior wall be rotating the cutter blade in circular motion around the pipe. Do this before applying significant downward pressure to finalize the cut. This step leads to a square cut. In addition, make sure ratchet cutter blades are sharp. Cutting tubing as squarely as possible provides optimal bonding area within a joint.

1.7.7.3 Burrs and filing can prevent proper contact between the tube and fittings during the assembly, and should be removed from the outside and inside of the tube. A chamfering tool is preferred, but a pocket knife or file is also suitable for this purpose.

1.7.7.4 Use only CPVC cement jointing. Use CPVC cement, which is dully recommended by the manufacturer.

1.7.7.5 When using adhesive solution / solvent cement be certain for proper ventilation.

1.7.7.6 When making a joint, apply a heavy, even coat of cement to the pipe end. Use the same applicator without additional cement to apply a thin coat inside the fitting socket. Too much cement can cause clogged waterways. Do not allow excess cement to puddle in the fitting and pipe assembly. This could result in a weakening of the pipe wall and possible pipe failure when the system is pressurized.

1.7.7.7 Rotate pipe one-quarter to one-half turn while inserting it into the fitting socket and remove the excess adhesive solution / solvent cement from the joint with clean rag. Once the pipe end is seated, hold it in place for 5 s to 10 s to allow the joint to set.

1.7.7.8 When making a transition connection to metal threads, use special transition fitting or CPVC male threaded adapter whenever possible. Do not over-torque plastic threaded connections. Hand tight plus one-half turn should be adequate.

1.7.7.9 Hang or strap CPVC systems loosely to allow for thermal expansion. Do not use metal straps with sharp edges that might damage the rubbing.

1.7.7.10 CPVC stub outs for lavatories, closets and sinks are appropriate. However, on areas where there is a likelihood that movement or impact abuse will occur, metal pipe nipples may be a more appropriate stub-out material. Showerheads, tub spouts and outside sill cocks are examples.

1.7.7.11 When connected to a gas water heater, CPVC tubing should not be located within 50cm of the flue. For water heaters lacking reliable temperature control, this distance may be increased upto 1 m a metal nipple or flexible appliance connector should be utilized. This measure eliminates the potential for damage to plastic piping that might result from excessive radiant heat from the flue.

2.0 CAST IRON AND SPUN IRON PIPES AND FITTINGS:

2.1 MATERIALS:

Pipes and Specials:

The cast iron pipes shall conform to I.S. 1537 – 1967, while spun iron pipes shall conform to I.S. 1537 – 1967, while spun iron pipes shall conform to I.S. 1536 – 1976. The pipes shall be either with spigot and socket ends or flanged ends. The cast iron pipes shall be vertically cast, either class A or class B, as specified. The spun iron pipes, shall be of cast iron casted centrifugally and shall be of class LA, class A and class B, as specified in the item.

Specials:

The specials shall conform to I.S. 1538 (Parts 1 to 23): 1976 and shall be of medium or heavy class, as specified, depending on their thickness.

All cast iron pipes shall be capable of easily worked with a drill or file. Pipes and specials should be sound with smooth inner and out surfaces, neatly dressed and carefully selected, free from laps, pinhole, and other imperfections, and shall ring clearly when struck with a light hammer. The ends of the pipes and specials shall be reasonably square to their axis.

All pipes and specials, before they are affected by rust, shall have been coated with an approved anti-corrosive treatment or by heating and dipping in Dr. Angus Smith's solution at the factory.

Stacking:

The pipes and specials shall be handled with sufficient care to avoid damage to them. These shall be lined up on one side of the alignment of the trench, socket facing uphill or in the direction of flow of water.

2.2 TRENCHES FOR C.I. PIPES AND SPECIALS:

The trenches for the pipes shall be excavated to lines and levels as directed. The bed of the trench shall have to be truly and evenly dressed throughout from one change of grade to next.

The gradient is to be set out by means of boning rods and the required depth be excavated at any point. The trench shall be excavated as directed by the Engineer/ Architect. The depth of the trench shall not be less than 1 meter, measured from the top of the pipe to the surface of the ground under roads crossing, and not less than 0.75m. elsewhere.

The width of the trench shall be the nominal diameter of the pipe plus 40 cm but it shall not be less than 80 cm. in case of all kinds of soils excluding rock and not less than 0.55 metres in case of rock.

The bed of the trench, if in soft or made up earth, shall be well watered and rammed before laying the pipes and the depressions, if any, shall be properly filled with earth and consolidated in 20 cm layers.

If the rock is met with, it shall be removed to 15 cm, below the level of the pipe and the trench shall be refilled with excavated materials (soil) and consolidated.

The excavated materials shall not be placed within 1 meter or half of the depth of the trench, whichever is greater, from the edge of the trench.

The materials excavated shall be separated and stacked so that in refilling they may be relaid and compacted in the same order to the satisfaction of the Architect & Employer. The trench shall be kept free of water. Shoring and timbering shall be provided wherever required. Excavation below water table shall be done after dewatering the trenches.

After the excavation of the trench is completed, hollows shall be cut at the required positions to receive the sockets of the pipes and these hollows shall be of sufficient depth to ensure that the barrels of the pipes shall rest throughout their entire length on the solid ground and that sufficient space is left for jointing to underside of the pipe joint. These socket holes shall be refilled with sand after jointing the pipe.

Where the pipe line or drain crosses an existing road, the road crossing shall be excavated half at a time, the second half being commenced after the pipes have been laid in the first half and the trench refilled. Necessary safety measures for traffic, as directed, shall be adopted. All types of pipes, water mains, cables etc., met within the course of excavation shall be carefully protected and supported. Care shall be taken, not disturb the electrical and communication cables.

2.3 **Laying of pipes and specials:**

Before being laid, the pipes shall be examined to see that there are no cracks or defects, as described in para 1.7.1. above. Subject to the approval of the Architect & Employer, the damaged portion of the cracked pipe may be cut at a point not less than 15 cm beyond the visible extremity of the crack.

The pipe shall be thoroughly cleaned of all dust and dirt and special care shall be taken to clean the inside of the socket and outside of the spigots.

The pipes shall be lowered into the trench by means of suitable pulley blocks, shear legs, chains, ropes etc. In no case the pipes shall be rolled and dropped into the trench. After lowering, the pipes shall be so arranged that the spigot of one pipe shall be carefully laid central to the socket of the next pipe, and pushed to the full distance that it can go. The pipe line shall be laid to the levels required. Specials shall also be laid in their proper position as stated above.

Where so directed, the pipes and specials may be laid on masonry or concrete pillars. The pipe laid on the level ground, shall be laid with socket facing the direction of the flow of water. In all other cases, the sockets shall be laid facing up hill.
Any deviation either in plan or elevation less than 11¼ degree shall be effected by laying the straight pipes round a flat curve, of such radius that minimum thickness of lead at the face of the socket shall not be reduced below 6mm or the opening between spigot and socket increased beyond 12mm at any point. A deviation of about 2¼ degree can be affected at each joint in this way. At the end of each day's work, the last pipe laid shall have its open ends securely closed with a wooden plug o prevent entry of water, soil, rats and any other foreign matter into the pipe.

Cement concrete thrust blocks of suitable design as approved by the Architect & Employer shall be provided at 45 degrees and 90 degrees bends of the pipes and also at places where there is likelihood of thrust so as to withstand the dynamic and static forces developed due to water in the pipe line. The thrust blocks shall be made after the joints have been caulked with lead.

4.4 **Lead caulked joints:**

2.4.1. **Lead caulked joints with molten lead:**

This type of lead chalking is generally done in providing joints in water but not in case of wet conditions.

a. Materials: Pig lead and spun yard.

Pig lead shall be of uniform quality, clean and free from foreign materials. It shall be of uniform softness and capable of being easily caulked or driven. It shall conform to I.S. 782 – 1978 for caulking lead.

Spun yarn shall be of clean hemp and of good quality. It shall be soaked in hot coal tar or bitumen and cooled before use.

The approximate depth of pig lead for various diameters of C.I. pipes and specials shall be given below with a tolerance of plus or minus 5 percent.

Nominal size of pipe mm (1)	**Lead per jointKg (2)**	**Depth of lead jointmm (3)**
80	1.8	45
100	2.2	45
125	2.6	45
150	3.4	50
200	5.0	50
250	6.1	50
300	7.2	55
350	8.4	55
400	9.5	55
450	14.0	55
500	15.0	60
600	19.0	60
700	22.0	60
750	25.0	60

Note:

1. The quantity of lead given in the table are on average basis and a variation of 10 percent is permissible.

2. Before pipes are jointed on large scale, three or four sample joints shall be made and the average consumption of lead per joint shall be got approved by the Engineer-in-charge.

Just sufficient quantity of spun yarn shall be put so as to give the specified depth of lead.

b. Jointing:

Preparing the joint: The interior of the socket and exterior of the spigots shall be thoroughly cleaned and dried. The spigot end shall be inserted into the socket right up to the back of the socket and carefully entered by two or three laps of treated spun yarn,

twisted into ropes of uniform thickness, well caulked into the back of the socket. No piece of yarn shall be shorted than the circumference of the pipe. The jointed pipe line shall be at required levels and directions.

Leading: The leading of pipes shall be made by means of ropes covered with clay or by using special leading rings. The lead shall be melted so as to be thoroughly fluid and each joint shall be filled in one pouring.

The following precautions shall be taken for melting lead:

b. The pot and the ladle in which lead shall be put shall be clean and dry.

c. Sufficient quantity of lead shall be melted.

d. Any scum which may appear on the surface of the lead during melting shall be skimmed off.

e. Lead shall not be overheated, as it is not desirable to overheat it.

Caulking: After the lead has been run into the joint, the lead shall be thoroughly caulked. Caulking of joints shall be done after a convenient length of the pipes has been laid and leaded. The leading ring shall first be removed and any lead outside the socket shall be removed with a flat chisel and then the joint chalked round three times with caulking tools of increasing thickness and hammer 2 to 3 kg weight. The joints shall not be covered till the pipe line has been tested under pressure though the rest of the pipe line should be covered up to prevent expansion and contraction due to variation in temperature.

2.4.2. Lead caulked joints with lead wool yarn: This type of lead caulking is generally done when it is inconvenient or dangerous to use molted lead for joints, for example in cases such as inverted joints or in wet trenches or in exceptional cases. In such cases, the joints shall be made with lead wool or yarn. Caulking with lead, wool or yarn shall however be carried out, only after detaining the prior permission of Architect & Employer in writing.

Materials:

Lead wool or yarn and spun yarn:

Sub para (a) materials of para 1.7.4.1. shall apply except that the approximate weights and depths of lead wool or lead yarn required for each joint of various dia of C.I. pipes and specials shall be as given in the following table. Just sufficient quantity of spun yarn shall be put so as to give specified depth of lead wool.

Diameter of pipe in m.	Wt. of lead wool or lead yarn in Kgs.	Depth of lead wool or lead yarn in mm.
80	0.80	19
100	0.90	19
125	1.25	20
150	1.60	23

200	2.05	23
250	2.95	25
300	3.50	25
350	4.65	29
400	5.70	31
450	6.70	32
500	8.30	33
600	10.00	35
700	11.80	36
750	13.60	38
800	15.40	40
900	16.80	40

An allowance of five percent variation in the specified weight and depths shall be permissible.

Jointing:

The spun yarn shall be first inserted and caulked into the socket as described under jointing with pig lead. Lead wool or yarn shall then be introduced in the joint in strings not less than 6mm thick and the caulking shall be repeated with each turn of lead wool or yarn. The whole of the lead wool or yarn shall be compressed into a dense mass. The joint shall then be finally finished flus with face of the socket.

2.4.2. **Testing of joints:**

Para 1.1.6 shall apply.

2.5 **REFILLING OF EXCAVATED EARTH IN TRENCHES:**

The excavated earth shall be spread in layers of 200mm thickness and shall be compacted after proper watering. Initially, only thin filling shall be done, such that the joints remain completely open for working. Rest of the filling shall be done in the same manner, after the line is satisfactorily tested. The excavated material such as brick bats, asphalts cakes etc., shall be properly arranged in the top most layer of 23 cm only and shall be consolidated thoroughly. The excess materials shall be spread over the surrounding ground within a radius of 1.5 kilometers from the point of excavation at his own cost. If extra earth, for complete filling, will be necessary, the same shall be brought from other places by the contractor at his own cost, and the same shall be filled up into the trench as per the manner shown above.

4.5 **MEASUREMENTS:**

The lengths of pipes shall be measured complete as laid or fixed in running meter correct to a cm, excluding specials which shall be enumerated separately. The lengths of pipes shall however not include the portion of spigots within the sockets of specials and pipes at the joints.

Excavation, refilling, shoring and timbering in trenches, masonry or concrete pillars and thrust blocks, wherever required, shall not be measured separately by included in the item if so specified and provided for in bill of quantities, excavation in hard rock shall be measured and paid separately (on stack measurement basis after deducting 40% for voids).

Lead caulked joints shall be enumerated separately or may be clubbed with the item laying of pipes.

2.7. **RATE:**

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

2.8. **MASONRY CHAMBERS:**

2.8.1. **General:**

All masonry chambers for stop cocks, shall be built as per supplied drawings.

2.8.2. **Excavation:**

The excavation for chambers shall be done true to dimension and levels as indicated on plans or as directed by the Architect & Employer.

2.8.3. **Bed Concrete:**

This shall be of cement concrete 1:3:6 (1 cement: 3 fine sand: 6 graded stone aggregate 40mm nominal size) and 100mm thick. In case of chambers for stop cocks, thickness can be 75mm.

2.8.4. **Brick work:**

This shall be with 2nd class bricks (average crushing strength not less than 35 Kg/sq cm) with cement mortar 1:6 (2 cement :6 fine sand) and one brick thick.

2.8.5. **Plastering:**

Plastering not less than 12mm thick shall be done in cement mortar 1:4 (1 cement: 4 coarse sand). It shall be finished with a floating coat of neat cement for inner surfaces only.

2.8.6. **Surface Box:**

This shall be of cast iron, well made and free from casting and other defects. All sharp edges shall be removed and finished smooth. The shape and dimensions for surface boxes for stopcocks, water meters etc., shall be as given in drawings.

Drawing for this shall be supplied as a typical drawing and the item 1.8.1. to 1.8.5 to be checked to tally with drawings.

The C.I. Surface box shall be fixed on the top of masonry chamber in plain or reinforce cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 grades stone aggregate 20mm, normal size).

The C.I. surface box shall be fixed on the top of masonry chamber in plain or reinforce cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20mm, normal size).

2.8.7. **Measurements:**

Masonry chambers shall be enumerated under the relevant items as per sizes.

2.8.8. **Rate:**

The rate shall include the costs of all materials and labour involved in all the operations described above, including excavation in all soils, morrum, soft rock, boulders or decomposed rock, hard rock and disposal as directed. If so specified and provided for in bill of quantities the excavation in hard rock will be measured and paid for separately on stack basis after 40% deduction for voids.

B. **DRAINAGE:**

B.1 **STONE WARE PIPES:**

B.1.1. All pipes with spigot and socket ends shall conform to IS 651 – 1980 and shall be of grade "A". These shall be sound, free from visible defects such as fire cracks or hair cracks etc. The glaze of the pipes shall be free from crazing. The pipes shall give a sharp clear not when struck with a light hammer. There shall be no broken blisters or chipping. The approximate thickness of pipes shall be as given in the table below: (for pipes of 60 cm length only).

Internal diameter mm	**Minimum thickness of the barrel and of socket in mm**	**Weight of each pipe per M in Kgs (minimum)**
100	12	14
150	16	22
200	17	33
230	19	44
250	20	52
300	25	79
350	30	112
400	35	148
450	38	180

The length of pipes shall be about 65 or 75 or 90 cm, exclusive of the internal depth of the socket.

The pipes shall be handled with sufficient care, to avoid damage to them.

B.1.2. **Laying of Stoneware pipes:**

Para 2.2 "Trenches for C.I. pipes & specials" shall apply. All pipes shall be laid on a bed of 15 cm cement concrete 1:5:10 as specified, projecting on each side of the pipe to a width of 15 cm. The pipes shall be covered with 15 cm thick concrete 1:5:10 around the crown of the pipe and sloped off to meet the outer edges of the bed concrete to give a minimum thickness of 15cm. all round the pipe.

The pipes shall be carefully laid to the alignments, levels and gradients shown on the plans and sections. Great care shall be taken to prevent earth stones, sand etc., from entering the pipes. The pipes between two manholes shall be laid truly in a straight line without vertical or horizontal undulations. The pipes shall be laid with socket up the gradient. The body of the pipe shall, for its entire length rest on an even bed of concrete, and pockets shall be excavated in the concrete to receive the socket of the pipe.

Where pipes are not bedded on concrete, the trench floor shall be left slightly high and carefully bottomed up as pipe laying proceeds, so that the pipe barrels rest on firm and undisturbed ground. If the excavation has been carried too low, the desired levels shall be made up with concrete 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate 40mm nominal size), for which no extra payment shall be made.

If the floor of the trench consists of rock or very hard ground that cannot easily be excavated to a smooth surface, the pipe shall be laid on a levelling course of concrete as desired.

B.1.3. **Jointing:**

Tarred gasket of hemp yarn soaked in thick cement slurry shall first be placed round the spigot of each pipe and spigot shall then be slipped home well into the socket of the pipe previously laid. The pipe shall then be adjusted and fixed in the correct position and the gasket caulked tightly home so as to fill not more than $1/4^{th}$ of the total depth of the socket.

The remainder of the socket shall then be filled with stiff mixture of cement mortar in the proportion of 1: 1 (1 cement: 1 fine sand). When the socket is filled, a fillet shall be formed round the joint with a trowel forming an angle of 45 degrees with the barrel of the pipe. The joints shall be tested hydraulically as per para 1.9.4 and no concreting for encasement shall be done unless pipes are satisfactorily tested and at least 24 hours elapse after the pipe joints are rectified to the extent necessary. After a day's work, all extraneous materials shall be removed from the inside of the pipes. The newly made joints shall be cured well.

B.1.4. **Testing of joints: Hydraulic tests:**

Stoneware pipes used for sewers shall be subjected to a test pressure of 1.5m or required head of water at the highest point of the section under test. The test shall be carried out by suitably plugging the lower end of the drain and the ends of the connection, if any, and filling the system with water. A knuckle bend shall be temporarily jointed at the top and a sufficient length of vertical pipe jointed to it, so as to joint with a connection to a hose ending in a tunnel, which could be raised or lowered till the required head is obtained, and fixed suitably for observation.

During the test the required head is maintained for 30 minutes by adding water from a measuring vessel at 10 minutes interval and the average quantity added shall not exceed 1 litre per hour per 100m length per 10mm dia of pipe.

Where leakage is visible the defective part of the work shall be removed and made good, at no extra cost.

B.1.5. **Refilling of trenches:**

Para 2.5 under water supply shall apply.

In case where pipes are not bedded on concrete, special care shall be taken in refilling trenches, to prevent the displacement and subsequent settlement at the surface, resulting in uneven surfaces and dangers to foundations etc. Initially, the back filling materials shall be packed by hand under and around the pipe and rammed with a shovel and light tamper. This method of filling will be continued up to the top of pipe. The refilling shall then rise evenly on both sides of the pipes and continued up to 60 cm above the top of pipes, so as not to disturb the pipes. No tamping should be done within 15 cm of the top of pipe. The remainder of backfill shall not be done until 7 days have elapsed for brick sewers and 14 days for concrete sewers, unless local conditions or materials are suitable for earlier placing of loads on the pipes. The tamping shall become progressively heavier, as the depth of the backfill increases.

B.1.6. **Measurements:**

The lengths of pipes shall be measured in running meters nearest to a cm, as laid or fixed from inside of one manhole to the inside of the other manhole. The length shall be taken along the center line of the pipes, over all fittings such as bends, junctions etc., which shall not be measured separately.

Excavation, shoring, timbering, backfilling in trenches and cement concreting, wherever required, is clubbed with the item only if so specified and provided for in bill of quantities, excavation in hard rock will be paid for separately, based on stack measurement basis, after deducting 40% towards voids.

B.1.7. **Rate:**

The rate shall include the cost of all materials and labour involved in all the operations described above, including excavation in all soils, morrum, soft rock, boulders or decomposed rock, hard rock and disposal as directed. If so specified and provided for in bill of quantities the excavation in hard rock will be measured and paid for separately on stack basis after 40% deduction for voids.

B.1.8. **S. W. Gully Trap:**

B.1.8.1. Gully traps shall conform to IS:651-1980. These shall be sound, free from visible defects, such as fire cracks or hair cracks. The glaze of the traps shall be free from crazing. They shall give a sharp clear note when struck with light hammer. There shall be no broken blisters.

The size of the gully trap shall be as specified and all dimensions will be as per drawing.

Each gully trap shall have one C.I. grating of square shape corresponding to the dimensions of inlet of gully trap. It will also have a water tight C.I. cover with frame, inside dimensions 300 x 200mm and the cover weighing not less than 2.72 Kg. The cover and frame shall be of sound and good casting and shall have truly square machined seating faces.

B.1.8.2. **Excavation:**

The excavation for gully traps shall be done true to dimensions and levels as indicated on plans or as directed by the Architect & Employer.

B.1.8.3. **Fixing:**

The gully trap shall be fixed on cement concrete foundation 600 x 600 cm square and not less than 10 cm thick. The mix for the concrete will be 1:5:10 (1 cement : 5 fine sand: 10 graded stone aggregate 40mm nominal size). The jointing of gully outlet to the branch drain shall be done similar to jointing of S.W. pipe as directed in 2.1.3.

B.1.8.4. **Brick masonry chamber:**

After fixing and testing gully and branch drains, a brick masonry chamber 300 x 200 (inside) in best quality locally available bricks of strength not less than 35 Kg/Sqcm in cement mortar 1:5 (1 cement: 5 fine sand) shall be built with a 10 cm. thick brick work round the gully trap from the top of the bed concrete upto ground level. The space between the chamber walls and the trap shall be filled in with cement concrete 1:5:10 (1 cement: 5 fine sand : 10 graded stones aggregate 400mm nominal size). The upper portion of the chamber i.e., above the top level of the trap shall be plastered inside with cement mortar 1:4 91 cement: 4 coarse sand), finished with a floating coat of neat cement. The corners and bottom of the chamber shall be rounded off as to slope towards the grating and or a hopper.

C.I. cover with frame 300 x 200mm (inside) shall then be fixed on the top of the brick masonry with cement concrete 1:2:4 (1 cement : 2 coarse sand: 4 graded stone aggregate 20mm nominal size and rendered smooth. The finished top of cover shall be left about 4 cm above the adjoining ground level so as to exclude the surface water from entering the gully trap.

B.1.8.5. **Measurements:**

The work shall be enumerated including excavation.

B.1.8.6. **Rate:**

The rate shall include the costs of all materials and labour involved in all operations described above, including excavation in all soils, morrum, soft rock, boulders or decomposed rock, hard rock and disposal as directed. If so specified and provided for in bill of quantities the excavation in hard rock shall be measured and paid for separately on stack basis after 40% deduction for voids.

B.1A.0 **DROP CONNECTION:**

B.1A.1. In cases where branch pipe sewer enters the manhole of main piper sewer at a level higher than the main sewer by more than 600mm, a drop connection should be provided. A typical drawing for drop connection shall be supplied to the contractor.
For 150 and 250mm main lines, if the difference in levels between the main – sewer water line (peak-flow-level) and the invert level of branch line is less than 60 cm, a drop connection may be provided within the manhole by giving a ramp. If the difference in level is more than 60 cm., the drop should be provided externally.

B.1A.1.1. **The Excavation:**

The excavation shall be done for the drop connection at the place where the branch line meets the manhole. The excavation shall be carried upto the bed concrete of the manhole and to the full width of the branch.

B.1A.1.2. **Laying:**

At the end of branch sewer line stoneware "T" shall be fixed to the line, which shall be extended through the wall of the manhole by a horizontal piece of C.I.pipe to form an inspection or cleaning eye. The open end shall be provided with a chain and lid. The stone ware drop pipe shall be connected to the tee at the top and to the S.W.bend at the bottom. The bend shall be extended through the wall of the manhole by a piece of C.I. pipe, which shall discharge into the channel. Necessary channel shall be made with cement concrete 1:2:4 (1 cement: 2 fine sand: 4 graded stone aggregate 20mm nominal size) finished smooth (with a floating coat of neat cement), to connect the main channel. The joints between S.W. pipes and C.I./S.W. fittings shall be cement jointed.

The joint between S.W. tee and S.W. branch line shall be made with cement mortar 1:1 (1 cement: 1 fine sand) as per para B.1.3. for S.W.pipes. The exposed portion of the drop connection shall be encased all round with a single brick work in C.M. 1:4 and pointed. The holes made in the walls of the manholes shall be made good with brick work in cement mortar 1:6 (1 cement: 6 coarse sand) and plastered with cement mortar 1:4 (1 cement: 4 coarse sand) on the inside of the manhole wall. The excavated earth shall be backfilled in the trench in level with the original ground level.

B.1A.2. **Measurements:**

Prop connections shall be enumerated. The "depth" beyond 60 cm shall be measured in running meters correct to a cm under relevant items.

B.1A.3. **Rates:**

The rates shall include the cost of labour and materials involved in all the operations described above but excluding the cost of excavation and refilling.

B.2.0 **CEMENT CONCRETE PIPES:**

B.2.1. The pipes shall be with or without reinforcement as required and of the class as specified. These shall conform to IS: 458 – 1961. The reinforced cement concrete pipes shall be manufactured by centrifugal (or spun) process. All pipes shall be true to shape, straight, perfectly sound and free from cracks and flaws. The external and internal surfaces of the pipes shall be smooth and hard. The pipes shall be free from defects resulting from imperfect grading of the aggregate, mixing or moulding. The pipes shall be of R.C.C. light duty, NP2 type, unless otherwise specified.

B.2.2. **Trenches for concrete pipe:**

Para 2.2 "Trenches for C.I. pipes and specials" shall apply. Where the pipe shall be bedded directly on soil, the bed shall be suitably rounded to fit the lower part of the pipe; the cost of this operation shall be included in the rate for laying the pipe itself.

B.2.3. **Laying of pipes:**

Loading, transporting and unloading of concrete pipes shall be done with due care. Handling shall be such as to avoid impact. Gradual unloading by inclined plane or by chain pully block is recommended. All pipe sections and connections shall be inspected carefully before being laid. Broken or defective pipes or connections shall not be used. Pipes shall be lowered into the trenches carefully. Mechanical appliances may be used. Pipes shall be laid true to lines and grades as specified. Laying of pipes shall proceed upgrade of a slope.

If the pipes have spigot and socket joints, the socket end shall face upstream. In case of pipes with joints to be made with loose collars, the collars shall be slipped on, before the next pipe is laid. Adequate and proper expansion joints shall be provided where directed.

In cases, where the foundation conditions are unusual such as in the proximity of trees or holes, under existing or proposed manholes etc., the pipes shall be encased alround in 15 cm thick cement concrete 1:5:10 (1 cement : 5 fine sand:10 graded stone aggregate 40mm nominal size) or compacted sand as per directions of the Architect.

In cases, where the natural foundation is inadequate, the pipes shall be laid either in concrete cradles supported on proper foundations or on any other suitably designed structures as specified. If a concrete cradle bedding is used, the depth of concrete below and the bottom of the pipes shall be at least ¼ of the internal dia and not least than 100mm thick, and shall

extend on the sides of the pipe at least to a distance of ¼th of the outside diameter for pipes 300mm and over in dia and 75mm in case of lesser diameter pipes. The pipes shall be laid on this concrete bedding, before the concrete has set. Pipes laid in trenches in earth shall be bedded evenly and firmly and initially filled up as far the haunches of the pipes, as to safely transmit the load expected from back-fill through the pipe to the bed. This shall be done either by excavating the bottom of the trench to fit the curve of the pipe or by compacting the earth under around the curve of the pipe to form an even bed. Necessary provision shall be made for joints, wherever required.

When the pipes is laid in trench in rock, hard clay, shale or other hard material, the space below the pipe shall be excavated and replaced with an equalizing bed of concrete of sand. In no place, shall pipes be laid directly on such hard material.

When the pipes are laid completely above the ground, the foundations shall be made even and sufficiently strong to support the pipes lines without any material settlement. Alternatively, the pipelines shall be supported on P.C.C. or similar saddles blocks. Similar arrangement shall be made to retain the pipe line in proper alignment, such as by shaping the top of the supports to fit the lower part of the pipe. The distance between the supports shall in no case exceed the length of a pipe. The pipes shall be supported as far as possible, close to the joints. In no case, shall the joints come in centre of the span. Care shall be taken to see that superimposed loads, greater than the total load equivalent to the weight of the pipe when running full shall not be permitted.

B.2.4. **Jointing of pipes:**

Joints are generally of rigid type.

B.2.4.1. **Spigot and socket joints (rigid):**

The spigot of each pipe shall be slipped home well into the socket of the pipe previously laid and adjusted in the correct position. The opening of the joint shall be filled with stiff mixture of cement mortar in the proportion of 1:1 (1 cement: 1 fine sand), which shall be rammed with a caulking tool.

After a day's work, all extraneous materials shall be removed from the inside of the pipes and the newly made joints shall be cured thoroughly for 7 days.

B.2.4.2. **Collar joint (Rigid):**

The two adjoining pipes be butted against each other and adjusted in correct position. The collar shall then be slipped over the joint, covering equally both the pipes. The annular space shall be filled with stiff mixture of cement mortar 1:1 (1 cement: 1 fine sand), which shall be rammed with a caulking tool.

After a day's work all extraneous material shall be removed from the inside of the pipe and the newly made joints shall be cured thoroughly for 7 days.

B.2.5. **Testing of joints, refilling of trenches, measurements and rate:**

Para B.1.4. to B.1.7 shall apply for stoneware and concrete sewers.

B.3. MANHOLES, INSPECTION CHAMBERS, STORM WATER GULLIES ETC.

B.3.1. Inspection Chambers:

B.3.1.1. Where depth of sewer is less than 1.5m rectangular chambers shall be used having size as specified. Usual sizes are 450 x 900 or 600 x 900. These shall be constructed in the sewer line at such places and levels and dimensions as indicated on the drawing. Sizes specified shall be clear internal dimensions of the chamber.

B.3.2. Manholes:

B.3.2.1. Where depth of sewer exceeds 1.5m circular conical manholes shall be provided. Various types and sizes of manholes are specified for different depths. Typical drawing of various types of manholes shall be supplied to the contractors. In the absence of such drawings the standard drawings of the MCH sewerage department of local body if available shall be followed.

B.3.2.2. Manholes and inspection chambers are provided on roads or where heavy vehicular traffic is expected are provided with "heavy duty" C.I. airtight frame and cover.

For those built on foot paths carriage drives and cycle tracks "medium duty" covers are provided. For locations within domestic premises or areas not subjected to wheel traffic loads they shall be provided with "light duty" covers.

B.3.3. Construction of manholes, Inspection chambers and gullies:

B.3.3.1. **Excavation:**
This shall be done to dimensions and levels on the drawing.

B.3.3.2. **Bed concrete:**
Base of the manhole shall be constructed in P.C.C. 1:4:6 may fulfil this as specified, and of thickness as specified and shown on drawings or as directed.

B.3.3.3. **Brick work:**
Brick work shall be in CM 1:6 constructed with second class bricks of crushing strength not less than 35 Kg per sqcm. Brick masonry in arches and arching over the pipes shall be in CM 1:3. Walls shall be generally built in 230mm thickness for inspection chambers and manholes up to a depth of 2.1m and 350mm thick for depths over 2.1m. However the exact thickness shall be based on structural design and shall be specified by the Architect & Employer.

B.3.3.4 **Plastering:**

Walls of manholes shall be plastered inside with 12mm thick cement plaster 1:4 and finished smooth with a floating coat of neat cement. Where ground water table is high external surfaces of manholes shall also be plastered in CM 1:4.

B.3.3.5. **Vatas:**

75mm fillet shall be made with CM 1:3 all round the external joints between the bed concrete and brick masonry walls for manholes.

B.3.3.6. **Benching:**

Channels and benching inside he manhole or inspection chamber shall be done in CC 1:2:4 and rendered smooth with neat cement. Depth of channels and benching shall be as per the table given below:

Size of drain in mm	**Top of channel at center in cm. above bed concrete**	**Depth of benching at side walls in C.M. above bed concrete.**
100	15	29
150	20	30
200	25	35
250	30	40
300	35	45

B.3.3.7. **P.C.C. Cap:**

PCC M 150 cap of 150mm thickness shall be provided on top of manholes for fixing the manhole frame.

B.3.3.8. **Footrests:**

Footrests shall be of C.I. rings, weighing 5.41 Kg each and made up of 20mm dia M.S. square of round bars, as specified. These shall be embedded in 1:3:6 cement concrete and properly secured. Footrests shall be placed 300mm apart vertically and 375mm horizontally in staggered fashion. First footrest shall be 450mm below top. Foot rests shall be painted with coal tar or bituminous paint and the portion embedded shall be painted with thick cement slurry before fixing.

B.3.3.9. **Manhole frames and covers:**

Approximate weights for various dimensions of frames and covers of various duties shall be as specified in the respective items.

Covers shall have raised chequered design on the top surface to provide adequate non slip grip. The cover shall be capable of easy opening and closing, and it shall be fitted in the frame in a workmanlike manner. Covers shall be gas and water tight. Size of the cover shall be the clear internal dimensions of frame. 2½% variation in weights shall be permissible. Covers and frames shall be coated with a black anticorrosive paint of bituminous composition. The coating shall be smooth and tenacious. The covers shall be so fixed as to be flush with ground surface. After completion, the manhole covers shall be sealed by means of grease.

B.3.3.10. **Testing:**

Manhole after it is raised above highest expected sub soil water level in the monsoon, shall be tested for water tightness. The mouths of all pipes entering the manhole shall be suitably plugged with brick masonry or wooden or any other type of plug. Manhole under test shall then be filled with water up to general sub-soil water level and the level observed for one hour. If the level does not drop by more than 50mm in one hour, it shall be deemed as water tight. During testing the pit around shall be kept free of water, and contractor shall observe the places where leakages takes place and take steps to correct the same.

B.3.4. **Measurements:**

Manholes, Inspection Chambers, gullies etc., shall be enumerated under relevant items in the schedule of quantities. Depth shall be measured from top of C.I. cover to the invert level of channel. Depth shall be measured to correct centimeter. The extra depths shall be measure as an extra, over the depth specified under enumerated item, and paid for running meter, under a separate item, following the main item.

B.3.5. **Rate:**

The rate shall include the cost of materials and labour involved in all operations from (2) to (9) under B.3.3. above, up to specified depth in the item. Payment for extra depths shall be paid separately under relevant item. Excavation and refilling is clubbed with the item of manhole Para 2.8.8 of "Water Supply" shall apply. If the duty of the cover in the item is changed during execution by the Architect & Employer, amount due to difference in weight of the cover shall be paid extra or deducted, as the case may be.

B.4.0. **SOIL, WASTE, RAIN WATER, VENT AND ANTI-SIPHONAGE PIPES AND FITTINGS:**

B.4.1. All soil, waste, rain water, vent and anti-siphonage pipes and fittings used within sunken floor areas or within plumbing shafts vertical run, shall be send cast iron socket and spigot type pipes conforming to IS 1729 – 1964 or its subsequent revision. All cast iron pipes and fittings shall be of the best approved Indian make of soil variety and free from flaws, air bubbles, cracks, sand-holes and other defects and truly cylindrical and uniform in thickness. They shall not be brittle, but shall allow for heavy cutting, chipping and drilling and shall not be less than the diameter, mentioned in the schedule of quantities, and shall be of the largest length available, and shall be fixed against the wall with special "U" clamps – 25mm wide, 3mm thick and hot dip galvanized, by means or round headed flat nails on brick walls.

B.4.2. Jointing shall be carried out with molten lead. The spigot of the pipe or fitting must be forced well home into socket of next pipe or fitting (as may be the case) and must be centered, so that the joint may be of even thickness all-round. At least, one complete lap of clean white hemp spun yarn without being forced through the joint. As many laps as may be needed, to leave a space of not less than 25mm for the lead shall then be placed in the joint and caulked tight. The joints shall then be run with molten lead in sufficient quantity so that after being caulked, the lead may project about 1/8" beyond the face of the socket, against the outside of the spigot, but must be flush with the outside edge of the socket.

B.4.3.A. The joints, if so specified in the respective items, shall be done in cement mortar in place of lead. In case of cement jointing, the joints shall be done as specified in b.5.2, but after the

hemp soaked in thick cement slurry is forced in the socket for one complete lap, a stiff mixture of cement mortar in proportion 1:1 (1 part of cement to 1 part of clean fine sand) is filled in the remainder of the socket. When the socket is filled, a fillet shall be formed round the joint, with a trowel and finished smooth cured well.

B.4.3.B. Clean outs at the head of C.I. S/S horizontal pipes running under the floor shall be of cast brass screwed in type. Floor and wall cleanouts shall be of cast brass screwed type. The connecting pipes shall be G.I. threaded coupling to suit the cleanout with lead caulked joint.

B.4.4. Inspection chambers, gully traps, etc., within the building shall be of approved make cast iron chambers with bolts, nuts to close the cover, all to be fabricated as per actual requirement.

B.4.5. Supports, pedestals and base for inspection chambers, gully traps and pipes shall be in 1:2:4 cement concrete mix.

B.4.6. Pipe sleeves and inserts, etc., through RCC walls either external or internal shall be of C.I. or M.S. provided with water bar flange.

B.4.7. During installation, open ends of pipes shall be plugged with wood cut into required shape and gunny bags and to be maintained to be free from dirt.

B.4.8. G.I. waste pipes and fittings shall be of "C" class I.T.C. or equivalent with G.I.a unions, tall pieces reducers and connections to be provided between joints with either lead or C.I. pipes.

B.4.9. The sizes of branch waste pipe for different fittings shall be as follows:

Lavatory Basin	-	32 dia
Urinal	-	40 dia
Sink	-	40 dia
Nahani trap	-	75 dia

B.4.10. W.C. pan connectors shall be to suit the requirements as per drawing, with 40mm dia vent horn for connection to the antisiphonage pipe and with pan connector of C.I. or lead.

B.4.11. Connection to the sewage or storm water collection sumps to be perfectly water tight.

B.4.12. Rain water flashing shall be with C.I.dome shape grating and extension piece as specified in the item.

B.4.13. All rainwater pipes and fittings shall be soil type variety conforming to I.S. 1729 – 1964 or equivalent. This shall apply to pipes outside buildings or within the buildings or for separate shafts.

B.4.14. The floor traps for toilet blocks shall be of cast iron with C.I./brass grating, bolted down design. The traps shall be 'P' type and of dimensions as given in table 26 of IS 1729 – 1979 (clause 7.1).

B.4.15. Where toilet slabs are sunk, the floor trap shall be of 100 x 75mm heavy duty type with C.I. "P" trap and C.P. brass grating of bolted down design.

B.4.16. Bathroom C.P.gratingshal be of bolted down design out of heavy cast brass, with chromium plating of best approved standard.

B.4.17. Cast iron grating shall be flat with perfect edges and of best quality procurable and of the specified width and thickness and in the available lengths.

B.4.18. Spigotted and socketed 75mm, 100mm and 150mm C.I. pipes shall be of heavy pattern for the portions below the floor and embedded and laid over 150mm cement concrete 1:2:4 with width of concrete being

For 75mm dia pipes	-	320mm wide
For 100mm dia pipes	-	400mm wide
For 150mm dia pipes	-	450mm wide
For 200mm dia pipes	-	600mm wide.

The pipes shall be laid to a slope of minimum 1 in 100 and preferably to 1 in 50, and connected to the drain. On no account should lime or lime concrete come in direct contact.

B.4.19 **Measurements:**

All pipes shall be measured along their lengths, including length over the fittings and be paid under relevant items. Alternatively, straight pipes shall be laid measured along their lengths along centre line, excluding length, over fittings and fittings shall be enumerated and paid per number. Whatever method of measurements is to be followed for the to item in the schedule, the description of respective items in the schedule shall be worded accordingly. Traps, clean outs etc., shall be enumerated separately and paid separately per number.

B.4.20. **Rate:**

The rate shall include the costs of all materials and labour involved in all the operations described above, including excavation in all soils, morrum, soft rock, boulders or decomposed rock, hard rock and disposal as directed. If so specified and provided for in bill of quantities the excavation in hard rock will be measured and paid for separately on stack basis after 40% deduction for voids.

B.5. **LEAD PIPES:**

B.5.1. Lead pipes shall be of solid drawn lead, the size mentioned being their internal diameter and shall conform to the requirements of relevant Indian Standard Specifications.

B.5.2. The weights for lead pipes of various bores shall be as follows:

BORE OF PIPE	WEIGHT OF PIPE	REMARKS
100 dia	11.4 Kg per m.	For soil, waste, anti siphonge and vent.
75 dia	8.5 Kg per m.	
65 dia	7.2 Kg per m.	
50 dia	6.0 Kg per m.	
40 dia	4.47 Kg per m.	
40 dia	6.00 Kg per m.	For flushing and washing pipes.
32 dia	4.47 Kg per m.	

15 dia	1.50 Kg per m.	
25 dia 10 dia 15 dia	6.20 Kg per m. 4.47 Kg per m. 3.00 Kg per m.	Supply and distribution pipes.

B.5.3. The joints between the lead pipes and other fittings shall be made with brass thimbles and tail pipes and jointing shall be with wiped solder joints.

B.5.4. **Rates:**

The rate shall include the costs of all material and labour involved in all the operations described above. The following paras B "A" to B "C" and B.6 to B.7 are applicable for all works under "A" Water Supply and "B" drainage.

B. "A" **CUTTING, PATCHING, REPAIRING AND MAKING GOOD:**

B.A.1 Cutting, patching and repairing required for the proper installation and completion of the work, specified in each division, including chasing, plastering, masonry work, concrete work, etc., and making good shall be carried out by the contractor wherever required. Holes which are cut over size shall be refilled, so that a tight fit is obtained around the pipe or other passing throughout.

B.A.2. Any damages to water proofed locations should not be patched up, without rectification by the water proofing agency (specialist contractor) to ensure his guarantee.

B.A.3. **Equipment Protection:**

B.A.3.1. Keep all pipe and conduit openings closed by means of plugs or caps to prevent the entrance of foreign matter. Protect all piping, conduit, fixtures, equipment or apparatus. Any such items damaged prior to final completion of work shall be restored to its original conditions or replaced at no expense to the owner.

B.A.3.2. **Accessibility:**

The installation of valves, thermometers, cleanout fittings and other indicating equipment or specialities requiring frequent reading, adjustment, inspection, repairs, removal or replacement, shall be conveniently and accessibly located with reference to the finished buildings. Thermometers and gauges shall be installed so as to be easily read from the floor. For floor cleanout, minimum distance of 600mm shall be available from any wall.

B.A.3.3. **Insets & Sleeves:**

General:

In advance of placing of concrete slabs or construction of walls, required inserts and sleeves necessary to complete the work. Cost of cutting or patching made necessary as a result of this operation shall be at no expense to the owner. Openings shall be as per structural consultants' approval.

B.B.0 **EQUIPMENT, MATERIAL AND WORKMANSHIP, TESTS:**

B.B.1 Determine that each piece of equipment meets the detailed requirements of the contract documents and that it is suitable for the installation shown. Notify the Architect of any short comings found during the tendering period. Each piece of equipment furnished shall meet at all detailed requirements of the contract documents. Equipments not meeting all requirements will not be acceptable, even though specified by name along with other manufacturers.

B.B.2. Where two or more units of the same class of equipment are furnished, use product of the same manufacture, component parts of entire system need not be product of the same manufacturer but conform to ISI standard. Provide all materials and equipment, new and free from defects and of size, make, type, and quality specified or approved by the Architect & Employer. All shall be installed in a neat and workman like manner.

B.C. **CLEANING, OPERATION AND TESTS:**

B.C.1. Plumbing equipment, fixtures, piping etc., shall be free of stampings, marking (except those required by codes) iron cuttings and other foreign materials.

B.C.2 Hot, cold and drinking water systems shall be cleaned thoroughly and flushed with water.

B.C.3. The entire mechanical apparatus shall operate at full capacity without any objectionable noise or vibrations, at specified efficiency.

B.C.4. Test all plumbing systems in the presence of the Employer's/ Architect. Provide all equipment, materials and labour necessary for inspection and tests, and replace/ rectify/ repair all work, not passing the tests. After repairs are made, repeat the tests until the systems are found satisfactory and to the approval of above authorities. Carry out tests prior to concealing, insulating or back filling over any piping. No exceptions shall be made.

B.C.5. Test entire system of soil, waste and vent piping with water after the general inspection and test are completed and before the fixtures are set. After setting the fixtures, conduct smoke test, after sealing all traps.

B.C.6. **Water Test:**

Test entire system or sections of system by closing all opening in piping except the highest opening and filling the section/system with water to the point of overflow. If the system is tested in sections, plug each opening except the water in system or in portion under test for atleast 45 minutes before inspection starts at test pressure/head, lasting for two hours. The system must be water tight at all joints.

B.C.7. **Final Test:**

After all fixtures are set, test the system with smoke test as follows:

B.C.8. Test all drawings/rain water pipes and their branches within the building by water as described for the soil, waste and vent system.

B.C.9. **All Water piping:**

Hydro-static tests shall be conducted at 10 Kg/cm² or twice the working pressure (whichever is higher). The lest pressure shall be maintained for 0.5 hours, without any drop in pressure.

B.C.10. All tests on below grade lines shall be continued until backfill on such lines is completed, to disclose any damages caused by back-filling.

B.C.11. All systems be tested in sections as required to expedite the work or other trades and meet construction schedules and final tests on completion.

B.C.12. On completion of the works, the following tests shall be performed to the satisfaction of the Architects/ Employer before issue of virtual complete certificate, if so required.

a. Smoke test.

b. Hydraulic test.

c. Self inducted test for fixtures.

d. Test for anti-syphonage system

e. Pump rating and output.

f. Inspection of all units and fixtures.

B.C.13. The contractor shall arrange on his own initiative for similar tests during the progress of works to ensure that there are no defects in material/workmanship in portions of work to be concealed or embedded under the floor or walls or in ceiling.

Any pipe, fittings or fixtures found damaged or stolen during the progress of the work and before handing over of the building, the same shall be replaced by the contractor including patching up of the surfaces etc., as directed, at no extra cost.

6. SANITARY FIXTURES AND FITTINGS:

6.1 Unless otherwise specified, the sanitary fixtures shall conform to following specifications:

6.1.1. Water closets (European type) shall be of vitreous china of approved pattern, quality and colour. The closet shall be fixed with C.P.brass screws in floor for floor mounted type, and

mounted on C.I. chair brackets with bolts for wall mounted type and shall be provided with solid plastic seat and cover with chrome-plated pillar brass hangers as specified.

6.1.2. Indian pattern shall be of similar quality of specified above. The pan shall be 675/575mm in length with "S" or "P" trap of materials same as that of the pan. The W.C. with the trap shall be fitted and fixed in position and built round solid with brick and cement, to required level after all connections are made. The finished floor of the water closet shall be of 25mm below the level of the room or passage in front of it.

6.1.3. Both types of closets should conform to the requirements of IS 771 (Part I): 1979 for glazed vitreous china sanitary appliances.

6.1.4. The flushing cisterns shall conform to the requirements of I.S.774 – 1984. High level cisterns shall be of cast iron, unless other specified. Low level cisterns shall be of the same material as the water closet. The cisterns shall be mosquito proof and shall fulfil the requirements of the local authority.

6.1.5. The flush pipes shall be 32mm dia and of lead if concealed, and if exposed brass/C.I.

6.1.6. Where flush valves are specified, there shall be of the best approved quality procurable with C.P. control valve and C.P. flush pipe. Prior approval of Architect shall be obtained before placing orders.

7. MODE OF MEASUREMENT:

7.1 All drain pipes shall be measured in linear lengths along the centre line of the drainage line laid. Deductions shall be made for chambers and fittings lengths etc. The rate shall include all work as specified in the respective items.

7.2. Stoneware or cast iron, bends, junctions, sewer traps etc., shall be measured in numbers and paid separately, only if item for pipe works does not specifically include "Fittings/Fixtures".

7.3. All cast iron spigots and sockets or flanged pipes for water supply, shall be measured in linear lengths along the centre line of completed work. Deductions shall be made for fittings lengths if fittings/ specials etc., are provided for separately in the schedules/bill of quantities. The rate shall include lead caulking or jointing with nut and bolts, rubber gaskets, etc., complete as specified in the respective items.

7.15. Same rate shall be applicable for pipes of same size and material laid in any building at any level or floor.

7.4. Cast iron fittings such as spigot and socket fittings, flanged fittings like tees, bends, tapers, cross etc., shall not be measured in numbers and paid for separately unless otherwise provided for in the bill of quantities/schedules.

7.5 The rock cutting shall be measured in cum of the stacks of excavated rock. Deduction for voids will be 40% of the gross stack volume. Only the rock which is removed by chiselling or blasting etc., shall be measured for this item of work, boulders shall not be considered as a rock. The excavated rock will become the owner's property.

7.6 All cast iron pipes, such as soil, waste, vent and rain water shall be measured in linear lengths along the centre line, to nearest cm as completed including length over fittings. The rates shall include all joints and clamps, etc., as specified in the respective items.

7.7 Length over cast iron fittings, for soil, waste, vent or rain water pipes like single or double waves of various degrees, bends, cowls etc., shall be measured in meters, as extra over the item for 7.6 above, if so provided for in the schedule/bill of quantities. Otherwise, the rate for these shall be same as for respective pipe work.

7.8 Plan cement concrete for supports and for encasement or bedding etc., shall be measured as specified in the respective items in the schedule of quantities.

7.9 Lead pipes shall be measured in linear length and shall be of weights as per specifications of the respective item in installation work. The rate shall include making of necessary offsets, bends etc.

7.10 All sanitary fittings and fixtures shall be measured in numbers, only if so provided in the Schedule/bill of quantities, and the rate shall include all the work specified and described under item in the schedule of quantities.

7.11 All G.I. pipes shall be measured in linear lengths along the centre line of the pipe, including G.I. fittings. The rate for pipe line up to and including 50mm die shall be inclusive of all G.I. fittings. In the case of pipe line of dia above 50mm dia G.I. fittings will be measured in nos., pipe lengths will be measured after deducting the lengths over fittings from linear measurements only if provided in the schedule/bill of quantities. The rates, in all cases, will be inclusive of all work as specified in the respective items. Lengths over valves shall be excluded.

7.12 All peet valves, ball valves, non-return valves, sluice valves, pressure reducing valves etc., shall be measured in numbers after excluding them from linear measurement, and paid for separately.

7.13 The diameters of pipes and fittings mentioned in the specification are the inside nominal diameters in all cases, unless otherwise stated. H.D P.E. pipes shall be specified as outside diameter and class.

7.14 In case fittings of C.I., G.I or stoneware of unequal bore, the largest bore shall be measured if paid separately.

7.15 Same rate shall be applicable for pipes of same size and material laid in any building at any level or floor.

C. **TOOLS AND MATERIALS AND STORAGE:**

a. The contractor at his own cost and charge shall provide all materials, tools, tackles, scaffolding, labour and water, necessary for execution and completion of the whole work in all respects.
b. The contractor shall pay the fees for testing the materials and bear the costs of the samples, and as well of packing and dispatching/delivering in the respective laboratories/test

houses, if tests are directed by the Architects, local authorities or any other statutory authorities.

c. The contractor at his cost shall obtain from time to time various permissions and the completion certificates as per rules of all local and statutory authorities.

d. The contractor shall arrange proper and adequate storage facilities at site for all materials.

e. Any materials, brought at site, shall not be removed without the written authority of the architects/employer. Materials either damaged or rejected shall be immediately removed from the site. Materials, paid in the interim bills as on site but not used, shall be the property of the Employer and the contractor only shall be liable for any loss or damage thereto.

f. All the brackets and hangers for pipes shall be fixed to the walls or RCC, using “Dash” fasteners, wherever necessary.

g. Surplus material from the site shall be carted away by the contractor without any cost to the employer. On complete of work, storage “space” provided to the contractor shall be handed over to the Employer, clear and fit for occupation.

13. LIST OF MANDATORY TESTS

MATERIALS	TEST	TEST PROCEDURE	MIN.QTY.	FREQUENCY
SAND	a. Stilt Content	Field	20 Cum	20 cum or par thereof.
	b. Bulking	Field	20 Cum	50 Cum or par thereof
	c. Particle size distribution.	Field	40 Cum	Every 40 Cum or part, required in RCC work.
COARSE AGGREGATE	a. Particle size distribution b. Crushing value	Field	45 Cum	Every 45 cum or par thereof for RCC work. For rest of work as desired. b. Every 300 Cum
R.C.C.	1. Slump	Field		Once a day as desired.
	2. Cube strength		20 cum in slabs, beams and connected columns	Every 20 cum of a days concrete.
BRICKS	1. Water absorption and Efflorescence		Designation 35	One test for each source of manufacture.
	2. Compressive Strength.		Designation 35	1,00,000 or par thereof. For larger quantities two tests for 1 lot of 1 lakh. One test for every additional 2 lakhs or par thereof.
TIMBER	Moisture Content		1 Cum	Every three cum or part.
STEEL	a. Tensile strength	IS – 1529	20 Tonne	Every 20 tonne or part.
	b. Bending strength	IS – 1529	20 Tonne	Every 20 tonne or part.

Note: Minimum quantity give above is the quantity of work which warrants conduction of respective tests.

1. Cost of samples, testing and transport will be borne by the contractors only.

2. Any other materials shall also be got tested by contractors at his own cost as per the instructions of Architects/Employer from time to time.

5. Frequency stated above is minimum and the contractor may have to test materials with any other frequency, as instructed by Architect/Client, without any costs.

14. **SAFETY CODE**

Suitable scaffolds should be provided for workman for all the works that cannot safely be done from the ground or from solid construction, except in cases of short duration works, which can be done safely from ladders. When a ladder is used, an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, it shall be of rigid construction made either of good quality wood or steel. The steps shall have a minimum width of 450mm and a maximum rise of 300mm. Suitable foot and hand holds of good quality wood or steel shall be provided and the ladder shall be given an inclination not steeper than 1 in 4 (1 horizontal to 4 vertical).

Scaffolding or staging more than 300mm above the ground or floor, swung or suspended from an overhead support, shall be erected with stationery supports and shall have guard rails properly attached, bolted, braced and otherwise secured and atleast 900mm high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends there of with only such openings as may necessary for the access of persons and delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

Working platform, gangways and stairways should be so constructed that they should not sag unduly or unequally and if the height of the platform or the gangway or the stairway is more than 3-6m above ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened, as described in (ii) above.

Every opening in the floor of a building or in a working platform be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing or railing, whose minimum height shall be 900mm.

Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 M in length while the width between side rails in ring ladder shall be in no case be less than 300mm. For longer ladders, this width should be increased atleast 6mm for each additional foot of length. Spacing of steps shall be uniform and shall not exceed 300mm.

Adequate precautions shall be taken to prevent danger from electrical equipment. At the work site, no materials shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall also provide all necessary fencing and lights to protect the public from accident, and shall be bound to bear the expenses of defence of every suit, action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay damages and costs, which may be awarded in such suit, action or proceedings to any such persons or which may with the consent of the contractor be paid to compromise any claim by any such person.

I. **Excavation and Trenching:**

All trenches, 1.2m or more in depth, shall at all times be supplied with atleast one ladder for each 30m in length or fraction thereof. Ladder shall be extended from bottom of the trench to atleast 900mm above the surface of the ground. The side of the trenches which are 1.5m or more in depth shall be stepped back to give suitable slope or securely held by timber shoring, so as to avoid any danger to sides collapse. The excavated material shall not be placed within 1.5m of the edge of the trench or half of the depth of the trench, whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or under cutting shall be done.

II. **Demolition:**

Before any demolition work is commenced and also during the progress of the work.

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

b. No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by the operator shall remain electrically charged.

c. All practical steps shall be taken to prevent danger to persons employed, from the risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so over- loaded with debris or materials, so as to render it unsafe.

III. All necessary personal safety equipments as considered adequate by the Architects should be kept available for the use of the persons employed on the site and maintained in a condition suitable for immediate use and the contractor should take adequate steps to ensure proper use of equipment by the concerned.

a. Workers employed in mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective gloves.

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

c. Those engaged in welding works shall be provided with welder's protective (eye) shields.

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

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

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

i) No paint containing lead or lead products shall be used except in the form of paste or readymade paint.

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

iii) Overalls shall be supplied by the contractors to the workers and adequate facilities for washing shall be provided to the working painters during and on cessation of work.

XVI. When the work is done near any place, where there is risk of drowning, all necessary equipment should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provisions should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

XVII. Use of hoisting machine and shackle including their attachments, in charge and supports shall conform to the following standards or conditions.

1.a. These shall be of good mechanical construction, sound material and adequate strength and free from any patent defects and shall be kept in good working order.

b. Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength and free from patent defects.

2. Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years should be in charge of any hoisting machine including any scaffolding or give signals to the operator.

6. In case of every hoisting machine and of every chain, ring hook, shackle swivel and pulley block used in hoisting or lowering or as means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. In case of a hoisting machine having a variable safe working load, each safe working load and the condition under which it is applicable shall be clearly indicated. No part of any machine or any gear referred above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

7. In case of departmental machines, the safe working load shall be notified by the clients. As regards contractor's machines the contractor shall notify the safe working load of the machines to the consultants, whenever he brings any machinery to site of work and get it verified by the consultants.

XVIII. Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Hoisting appliances should be provided with such means as will reduce and minimise the risk of accidental descent of loads. Adequate precautions should be taken to reduce to the minimum risks of any part of a suspended load becoming accidentally displaced. Sleeves and boots as may be necessary should be provided, whenever workers are employed on electrical installations. The workers should not wear any rings, watches and carry keys or other materials, which are good conductors of electricity.

XIX. All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition. No scaffold, ladder, or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near place of work.

XX. To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangements made by the contractor shall be open to inspection by the clients or the Architect.

XXI. These safety provisions should be brought to the notice of all concerned by display of a notice board at a prominent place of the workspot. The person, responsible for compliance of the safety code, shall be named therein by the contractor.

XXII. Notwithstanding the above clauses for (i) to (xiv), there is nothing in these to exempt the contractor from the operation of any other Act or Rules in force in the Republic of India.

XXIII. <u>OTHER CONDITIONS:</u>

<u>CONTENTS:</u>

SPECIAL CONDITIONS

1. **<u>General:</u>**

1.1 These special conditions shall be read in conjunction with the description of the item of work in the Bill(s) of Quantities, the particular Specifications, Local Statutory Regulations, Indian Standards Specifications/Codes and the drawings. All the above quoted documents shall be considered supplementary to each other. However, in the case of conflict amongst the various provisions the owner's and the consultants opinion will be final and shall be adopted.

1.2 The tenderer is advised to inspect the site to ascertain the nature of site, access thereto, local facilities for procurement of materials and working labour rates prevalent in the area, in fact all matters affecting his prices and execution of the work. The tenderer shall be deemed to have full knowledge of the site and drawings whether or not he actually inspects them.

2. **Rates**

2.1 The rates quoted shall be deemed to allow for all minor extras and constructional details which are not specifically shown on drawings or given on the specifications but are essential in the opinion of the Engineer-in-charge to the execution of works to confirm to good workmanship and sound engineering practice. The Consultant/SBI reserves the right to make any minor changes during the execution without any extra payment.

2.2 The Consultants/SBI decision to clarify any item under minor changes, minor extras and constructional details shall be final, conclusive and binding on the Contractor.

2.3 The rates quoted by the Contractor shall be net so as to include all requirements described in the contract agreement and no claim whatsoever due to fluctuations in the price of material and labour will be entertained.

2.4 The rates quoted by the Contractor shall include for supplying materials and labour necessary for completing the work in the best and most workmanship like manner to the satisfaction of the Consultant/SBI and which in the opinion of the Consultant cannot be made better, and for maintaining the same. The rates shall be complete in all respects also including cost of materials, erection, fabrication, labour, supervision, tools and plant, transport, sales and other taxes, royalties, duties and materials, contingencies, breakage, wastage, sundries, scaffoldings, etc., on the basis of works contract. The rates quoted shall include all transport, insurance, octroi, or any other levies applicable under the statute.

3.0 Materials**:**

3.1 The Contractor shall ensure to the satisfaction of the Consultant/SBI that the materials are packed in original sealed containers/packing bearing manufacturer's markings and brands etc., except where the gross quantity required is a fraction of the smallest packings. Materials not complying with this requirement shall be rejected.

3.2 Testing of Materials:

a) When required by the Consultant / SBI, the Contractor shall provide all facilities at site or at manufacturer's works or in an approved laboratory for testing the materials and/or workmanship. All the expenditure in respect of this shall be borne by the Contractor unless specified otherwise in the Contract. The Contractor shall, when required to do so by the Consultant shall submit at his own cost, manufacturer's certificate of tests, proof sheets, mill sheets etc., showing that the materials have been tested in accordance with requirements of these specifications. The samples for Tests shall be selected by SBI / Consultant.

4.0 Rectification **of Defects**:

4.1 Any defect in the work done or materials used in the works pointed out by the Consultant / SBI shall be rectified within a week or such extended time as may be allowed in this failing which the said defect shall be got rectified by the Consultant at the risk and cost of the Contractors.

5.0 Conduit **and Cables Layout:**

5.1 Prior to the pulling of wires, the Contractor shall verify the conduits laid at site by Civil Contractors and satisfy themselves about the adequacy of the same. The contractors shall prepare Wiring layout along

with Conduit layout and submit for approval. Prior to laying of the cables, the Contractor shall submit to the Consultant /SBI detailed layout plans of the cable net work and get the same approved. The layout plans shall contain particulars regarding size and routes of the cables. The Cables shall be procured only after approval of Layout Drawings.

6.0 **Regulations & Standards:**

6.1 The installation shall conform in all respects to Indian Standard Code of Practice for Electrical Wiring Installation IS: 732 and IS: 2274. It shall also be in conformity with the current Indian Electricity Rules and Regulations and requirements of the local Electric Supply Authority in so far as these become applicable to the installation. Wherever this specification calls for higher standard of material and/or workmanship than those required by any of the above regulations then this specification shall take precedence over the said regulations and standards.

7.0 **Shop Drawings**:

7.1 The Contractor shall prepare and submit to the Consultant / SBI for the approval of detailed fabrication drawings for Main LT Panels/Switch Gears/Rising Mains special boxes and Distribution Board, switch board, special any other equipment to be fabricated by Contractor within 7 days of signing of the contract.

8.0 **Completion Drawings**:

8.1 At the completion of the work and before issuance of certificate of virtual completion the contractor shall submit to the consultant / SBI layout drawings drawn at approved scale indicating the complete wiring system "As Installed". These drawings shall in particular, give the following information.

(a) Run and size of conduits, inspection, junction and pull boxes.

(b) Location and rating of sockets and switches, controlling the light and power outlets.

(c) Number and size of conductors in each circuit.

(d) Location and details of distribution boards, mains, switches, switchgear and other particulars.

(e) A complete wiring diagram, as installed and schematic drawings showing all connections in the complete electrical system.

(f) Location of telephone outlets, T.V. Music & Fire Alarm outlet boxes, junctions boxes, sizes of various conduits.

(g) Locations of all earthing stations, routs and size of all earthing conductors, manholes etc.

(h) Layout and particulars of all cables.

9.0 **Manufacturer's Instructions**:

9.1 Where manufacturers have furnished specific instructions, rating to the materials used in this job, covering points not specifically mentioned in the documents, these instructions shall be followed in all cases.

10.0 **Completion Certificate**:

10.1 On completion of the Electrical Installation a certificate shall be furnished by the Contractor counter signed by a licensed supervisor, under whose direct supervision the installation was carried out.

This certificate shall be in the prescribed form as required by the local supply authority. The Contractor shall be responsible for getting the drawings and Electrical Installation inspected
and approved by the local Authority concerned.

11.0 **Qualified Competent Supervision**:

11.1 The Contractor shall employ competent fully licensed, qualified full time Engineer to direct the work of Electrical installation in accordance with drawings and specifications. The Engineer shall be available at all times on the site to receive instructions from Consultant in the day to day activities, throughout the duration of the contract. The foremen shall co-relate the progress of the work in conjunction with all relevant requirements of the supply authorities.

12**. Approval from SEB/ Electrical Inspectorate**:
The Contractor shall prepare and submit all the relevant drawings as per the Requirement of AP TRANSCO/ Electrical Inspectorate and obtain the Approvals from CEIG, CEA, and Hyderabad. No incidental expenses will be paid towards the same. Only statutory fees if any will be paid by SBI.

TECHNICAL SPECIFICATIONS
CHAPTER 1
INTERNAL ELECTRIFICATION

1.0 Scope :

This specification is intended to cover the requirements of supply, installation, testing and commissioning of electrical wiring installation and other accessories required for its satisfactory operation. This covers the essential requirements or precautions regarding wiring installations for ensuring satisfactory and reliable service.

2.0 Standards:

The Electrical wiring installations and other accessories shall comply with latest IS: 732 - 1989 and National Electrical code - 1985.

3. Construction

Wall mounted switch boards shall be installed such that the bottom is at a minimum height of 1.35 m above finished floor level wherever applicable, as indicated in the drawing.

Equipment which is on the front of a switch board shall be so arranged that inadvertent personnel contact with live parts is unlikely during the manipulation of switches, changing of fuses or similar operation.

In every case in which switches and fuses are fitted on the same pole, these fuses, shall be so arranged that the fuses are not live when their respective switches are in 'OFF' position.

No fuses other than fuses in instrument circuit shall be fixed on the back or behind a switch board panel or frame.

4. Capacity of circuit:

Lighting Circuits shall not have more than a total of ten points of fans, 5A socket outlets and light points and its total load shall not exceed 800 watts. Lights, fans, and 5A socket outlets can be wired on a single common circuit. If fan circuit is drawn separately, circuit shall not be used more than eight points and load shall not exceed more than 800 watts. In the circuit, the neutral and earth wires can be looped up to 10points. From distribution boards Neutral & Earth wires shall be run for every circuit.

The power circuits shall not have more than two outlets per circuit if load to be fed by each outlet is less than 1KW, and if load is more than 2KW, each outlet shall be connected to a separate circuit.

Switches: All switches shall be placed in the live conductor of the circuit and no single pole switch or fuse shall be inserted in the earth or earthed neutral conductor of the circuits. Single pole switches (other than for multiple control) carrying not more than 15amperes may be of the piano flush type and the switch shall be 'ON' When the knob is down.

Lamp holders : Lamp holders for use on brackets and the like shall have not less than 1.3 cm nipple and all those for use with flexible pendant shall be provided with cord grips. All lamp holders shall be provided with shade carriers. Where centre contact Edison screw lamp holders are used, the outer or screw contact shall be connected to the 'middle wire' or the neutral or to the earthed conductor of the circuit.

Lamps: All incandescent lamps, unless otherwise specified shall be hung at a height of not less than 2.5 m above the finished floor level.

Ceiling rose: a) A ceiling rose or any other similar attachment shall not be used on circuit, the voltage of which normally exceeds 250 volts.

A ceiling rose shall not embody fuse terminals as an integral part of it.

Every socket outlet shall be controlled by a switch. The switch controlling the socket shall be on the 'live' side of side line.5 Amps and 15 Amps socket-outlet shall normally be fixed at any convenient place 60 cm above the floor level or near such level as indicated in drawing. 15 Amps socket outlets in kitchen shall be fixed at convenient place 23cm above the working platform. In a room containing a fixed bath or shower, there shall be no socket outlet and there shall be no provision for connecting a portable appliance.

5 Recessed MS conduit wiring system

a) Making of chase : The chase in the wall shall neatly be made and shall be of suitable dimension to permit the conduit to be fixed in the manner desired by the Engineer-in-charge. In the case of buildings under construction, chases shall be provided in the wall, ceiling, etc. at the time of their construction and shall be filled up neatly after erection of conduit and brought to the original finish of the wall.

b) Fixing of conduit in chase: The conduit shall be fixed by means of staples or by means of saddles not more than 600 mm apart. Fixing of standard bends or elbows shall be avoided as far as practicable and all curves maintained by bending the conduit pipe itself with a long radius which will permit easy drawing-in of conductors. All the threaded joints of rigid steel conduits shall be treated with approved preservative compound to ensure protection against rust.

c) Inspection boxes : To permit periodical inspection and to facilitate replacement of wires, suitable inspection boxes shall be provided at convenient locations. They shall be mounted in flush with the wall. The minimum size of inspection boxes shall be 75 x 75 mm. Suitable ventilating holes shall be provided in the inspection box covers.

d) Types of accessories to be used: All outlets, such as switches and sockets, may be either of flush mounting type or of surface mounting type.

The switches and other outlets shall be mounted on such boxes. The metal box shall be efficiently earthed with the earth continuity wire run along the conduit.

When crossing through expansion joints in buildings, the conduit sections across the joint may be through flexible copper bellows of the same size as PVC conduit. The Number of wires that can be drawn through a conduit shall be strictly as per IS 732 and as mentioned in Drawings.

6. MS Conduits:

MS conduit shall be black enameled and of thickness not less than 16SWG and of size minimum 19 mm dia. The Conduit shall conform to IS 9537/ Part II

Bunching of cables: Separate conduits shall be used for bunching of conductors of AC supply and DC supply for lighting and small power outlet circuits.

All outlets of conduit systems shall be properly drained and ventilated, but in such a manner so as to prevent the entry of insects etc. as far as possible.

Bends in conduit: Wherever necessary, bends or diversions may be achieved by bending the conduits or by employing normal bends, inspection bends, inspection boxes, elbows or similar fittings.

In case of plain conduit, heat may be used to soften the conduit for bending and forming joints. Positioning of conduit in close proximity to hot surfaces should be avoided.

7. TESTING OF WIRING:

The following tests shall be carried out on all types of wiring on completion of the work and before energizing the installation:

i) Insulation resistance test,

ii) Electrical continuity test,

iii) Earth continuity test,

iv) Earth electrode resistance test,

v) Switch polarity test.

i) Insulation Resistance test:
The insulation resistance shall be measured by using 500 v megger between the following points.

Phase and neutral conductor with all fuses in position and all switches in closed condition and main switch in OFF position with lamps and other devices removed.

Between earth and whole system of conductors with all fuses in place, all switches closed and all lamps in position.

Between all conductors connected to one phase of the supply of the above tests shall not be less than 50 divided by the number of points on the circuit. Where a whole installation is being tested, a lower value than that given by the above formula is acceptable subject to a minimum of one megaohm.

The insulation resistance in megaohm as obtained by each of the above tests shall not be less than 50 divided by the number of points on the circuit. Where a whole installation is being tested, a lower value than that given by the above formula is acceptable subject to a minimum of one megaohm.

(ii) Electrical continuity test:

Each and every circuit shall be tested for electrical continuity by using a multimeter.

(iii) Earth continuity test:

The earth continuity conductor including metal conduit shall be tested for electrical continuity and the resistance of the same along with the earthing lead measured from the connection with the earth electrode to any point in the earth continuity conductor in the complete installation shall not exceed one ohm.

(iv) Earth electrode resistance test:

The earth electrode resistance shall be tested as specified in section

(v).Switch polarity test:

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 marked for connection to the phase conductor.

8 Distribution Boards:

All the distribution boards shall be with MCBs as described in the respective schedule.

The distribution boards shall be controlled by a switch fuse, miniature circuit breaker or an isolator as described in the respective schedule. Each outgoing circuit shall be provided either with MCB or a fuse on the phase. The neutral shall be connected to a common link and be capable of being disconnected individually for testing purposes.

The distribution boards shall be located as indicated in the respective electrical working drawings and as directed by Engineer - in - charge. The distribution boards shall be fixed on wall in the niche provided and marked with the details of circuits, source of supply, size of incoming wires Etc.,

All marking shall be clear and legible.

The total load of the consuming devices shall be evenly distributed between the number of ways of distribution board.

The consuming devices circuit shall be connected to distribution board in proper sequence, so as to avoid unnecessary crossing of wires.

Cables shall be connected to a terminal only by crimped lugs.

Cables shall be rigidly fixed in such a manner that a clearance of at least 2.5cm is maintained between conductors of opposite polarity or phase and between the conductors and any material other than insulating material.

The incoming and outgoing cables shall be neatly bunched.

9. MOUNTING HEIGHTS:

The Mounting heights of various fixtures shall be as specified in the Drawings.

CHAPER 2

POWER CONTROL CENTRES

1.0 Scope :
This specification is to cover the requirement of design, supply, installation, testing and commissioning of LT power control centres / main switch boards with all components, Instruments, fittings and accessories for efficient operation without any trouble.

2.0 Standards:
The PCC specified herein, unless otherwise stated shall conform to the relevant and latest revisions of Indian standards and Indian Electricity Rules.

3.0 Design and construction:
3.1 Design requirements : The power control centres shall be suitable for operation on 440volt, 3 phase,4wire 50HZ system to withstand a short circuit level of 50 KA RMS symmetrical.

The PCC shall be designed for operation in high ambient temperature upto 45 degrees centigrade and high humidity upto 95% and tropical atmospheric conditions. Means shall be provided to facilitate ease of inspection, Maintenance and Servicing.

3.2 Constructional requirements:

The power control centre shall be of

i) Metal clad, cubicle, indoor, free standing type suitable for Mounting on Built up Trenches with U Channels of adequate size.

ii) Made up of the requisite vertical sections, which when coupled together shall form continuous dead front switch board.

iii) Dust and damp protected, the degree of protection shall be better than IP - 54 as specified in IS-2147.

iv) Readily extendable on both sides by the addition of vertical sections after removal of the end covers.

v) Single front construction with the circuit beaker feeder and switch fuse feeders suitable for operation from the front of the panel.

The PCC shall have the feeder ratings as per the schematic diagrams enclosed with the schedule and constructed only of materials capable of withstanding the mechanical, electrical and thermal stresses as well as the effects of humidity, which are likely to be encountered in normal service.

3.3 Vertical Sections: Each vertical section shall comprise a front framed structure rolled folded sheet steel channel section of minimum 2 mm thickness rigidly bolted together. This structure shall house the components contributing the major weight of the equipment such as circuit breaker, switch fuse units, main horizontal busbars, vertical risers and other front mounted accessories. The structure shall be mounted on a rigid base frame of folded sheet steel of minimum of 2.5 mm thickness and 100mm height. The design shall ensure Structural stability during Transit and also during Operation after

Commissioning Suitable cable chamber housing the cable end connections and power / control cable terminations shall be provided. The design shall ensure generous availability of space for ease of installation and maintenance of cabling and adequate safety for working in one vertical section without coming into accidental contact with live parts in the adjacent section.

A cover plate at the top of the vertical section shall be provided with necessary ventilating arrangements. Any aperture for ventilation shall be covered with a perforated sheet having less than 1 mm diameter perforations to prevent entry of vermin.

3.4 Sheet Steel Cubicle:

3.4.1 The sheet steel cubicle shall be designed in fully segregated multitier formation. Each cubicle shall have hinged front access door with easy operating fasteners. All the doors and covers shall be heavily gasketed to make the compartment dust tight. Each cubicle shall have a covering at the bottom to make a dust and vermin proof construction. Door hinges shall be of concealed type.

The cubicle shall be of minimum 2 mm thick sheet steel. Sheet steel shrouds and partitions shall be of minimum 1.6 mm thickness. All sheet steel work forming the exterior of switch boards shall be smoothly finished, leveled and free from flaws. The corners shall be rounded. The minimum Thickness of Gland plates shall be 3mm.

3.4.2 The apparatus and circuits in the power control centers shall be so arranged as to facilitate their operation and maintenance at the same time to ensure the necessary degree of safety.

Apparatus forming part of the control centers shall have the following minimum clearance.

i) between phases - 25 mm,

ii) between phase and neutral - 25 mm,

iii) between phases and earth - 25 mm,

iv) Between neutral and earth - 19 mm,

When, for any reason, the above clearances are not available suitable insulation shall be provided. Clearance shall be maintained during normal service conditions. Creepage distances shall comply with those specified in relevant standards.

3.4.3 All insulating materials used in the construction of the equipment shall be non hygroscopic duly treated to withstand the effect of high humidity, high temperature and tropical ambient service conditions.

3.4.4 Functional units such as circuit beakers and fuse switches shall be arranged in multitier formation, except that not more than one air circuit braker housed in a single vertical section.

3.4.5 Metallic/insulated barriers shall be provided within vertical sections and between adjacent sections to ensure prevention of accidental contact with :

i) Main busbars and vertical risers during operation, inspection or maintenance of functional units and front connected accessories.

ii) Cable terminations of one functional unit, when working on those of adjacent unit/units.

3.4.6. All doors / covers providing access to live power equipment / circuits shall be provided with tool operated fastners to prevent unauthorized access.

3.4.7 Provisions shall be made for permanently earthing the frames and other metal parts of the switchgear by two independent connections.

3.5 Metal treatment and finish:

All steel works used in the construction of the switch boards shall have undergone a suitable rigorous metal treatment process so as to remove oxide scales and rust formation and to facilitate a durable coating of the paint on the metal surfaces and also to prevent the spreading of rust, in the event of the paint film being mechanically damaged.

Two coats of Anti Corrosive primer followed by a finishing coat of Epoxy spray power coating of the shade 631 of IS: 5 (i.e. Siemens grey) shall be given. The total thickness of paint shall not be less than 25 micron.

3.6 Bus Bars:

3.6.1 The busbars shall be housed in non-segregated sheet steel compartments in the cubicle at convenient locations with provision for access to the buses from the front of the panel. The busbar shall be suitably braced with DMC/SMC supports to provide a through fault withstand capacity of 50 KA RMS symmetrical for one second and a peak short circuit withstand capacity 150 KA minimum. The neutral as well as the earth bus shall be capable of withstanding the above fault level.

3.6.3 Large clearance and creeping distance shall be provided on the busbar system to minimize the possibility of a fault.

3.6.4 High tension bolts, nuts and spring washers shall be provided at all busbar joints.

3.6.5 The continuous rating of the busbar shall be 125% of the rated current. Maximum temperature of the bus and the connections shall not exceed 85 degrees centigrade. The busbars shall be of liberal design for the required current rating i.e. 0.8Amp/sq.mm.

The main phase busbars shall have continuous current rating throughout the length of each power control centre and the neutral busbars shall have continuous rating of at least 50% of phase busbars.

3.6.6 Connections from the main busbars to functional circuits shall be arranged and supported so as to withstand without any damage or deformation, the thermal and dynamic stresses due to short circuit currents.

All busbars and tapings shall be provided with color coded sleeves for phase identification.

All joints/tapping points of the buses shall be suitably shrouded to prevent accidental contact.

4.0 Circuit Breakers:

4.1 General:

4.1.1 Circuit breakers shall be of triple pole / four pole, air break, horizontal draw out /Fixed type, as given in the schedule of work and comply with the requirements of relevant IS with latest amendments and shall have the following :

i) A short circuit breaking capacity of not less than 50 KA RMS at 415 volts, 50 Hz AC.

ii) A short circuit making capacity of 105 KA.

iii) A short time withstand capacity of 150 KA for one second.

iv) Electrical overload performance at 6 times the rated current, 100% of the rated voltage as recovery voltage at 0.5 power factor.

v) Dielectric test of 2.5 KV applied for one minute on main circuits.

4.1.2 The circuit breakers shall be fitted with detachable arc chutes on each pole designed to permit rapid dispersion, cooling and extinction of the arc. Interphase barriers shall be provided to prevent flash over between phases.

4.1.3 Arcing contacts shall be of hard wearing material copper tungsten or silver tungsten and shall be easily replaceable. Main contacts shall be of silver plated copper of high pressure type and generous cross section.

4.2 Operating Mechanism:

The operating mechanism shall be of robust design, with minimum number of linkages to ensure maximum reliability. Manually operated circuit breakers shall be provided with spring operated closing mechanism which are independent of speed of manual operation. Electrically shall be independent of the motor which shall be used slowly for charging the closing spring.

The operating mechanism shall be such that the breaker is at all times free to open immediately when the trip coil is energized.

Mechanical operation indicators shall be provided to show open and close positions of the breaker. Electrically operated breakers shall be additionally provided with mechanical indications to show charged and discharged conditions of the charging spring.

Means shall be provided for slow closing and opening of the breaker for maintenance purposes, and for manual changing and closing of electrically operated breakers during emergencies,

4.3 Protection:

Provisions shall be available for fitting a minimum of five trip devices - three over current, as shunt trip and an under voltage release or two over current and earth fault release, a shunt trip and one under voltage release. The breakers shall be of the shunt or series trip type as specified in the schedule.

4.4 Housing of Circuit Breaker:

Circuit breakers shall be individually housed in sheet metal castle provided with hinged doors. The breaker along with its operating mechanism shall be mounted on a robust carriage moving on guide rollers with in the castle. Isolating contacts for both power and control circuits shall be of robust design and fully self aligning. The assembly shall be designed to allow smooth and easy movement of the breakers within its castle.

The breaker shall have three distinct positions within the castle as follows:
i) ` Service' position: With main and auxiliary contacts connected.

ii) `Test' position: with power contacts fully disconnected and control circuit contacts connected.

iii) `Isolated' position: with both power and control circuit contacts fully disconnected.

It shall be possible to achieve any of the above positions with the castle doors closed. Mechanical position indicators shall be provided for the three positions of the breakers.

4.5 Interlocking:

4.5.1. The moving portion of the circuit breaker shall be interlocked so that:

i) It shall not be possible either to isolate it from the connected position, or to plug it in from the isolated position with the breaker closed.

ii) The circuit breaker can be closed only when it is in one of the three positions or when it is fully out of the castle.

iii) It shall not be possible to open the hinged door of the castle unless the breaker is drawn to the isolated position.

iv) Inadvertent with drawl of the circuit breaker too far beyond the supporters is prevented by the suitable stops.

4.5.2 Provisions shall be available for the padlocking of the circuit breaker access flame in any of the three positions.

4.5.3 Automatically operated safety shutters shall be provided to screen the fixed isolating contacts when the breaker is drawn out from the castle.

4.5.4 The moving portion of the circuit breaker shall be provided with a heavy duty, self aligning earth contact, which shall make before and break after the main isolating contacts during insertion into with drawl from the service position of the breaker. Even in the isolated position positive earthing contact should exist.

4.5.5 Auxiliary switches directly operated by the breaker operating mechanism and having 4 `NO' and 4 `NC' contacts shall be provided on each breaker. The auxiliary switch contacts shall have a minimum rated thermal current of 10 amps.

5.0 **Switch Fuse Units:**

5.1 General:

The switch fuse units shall be of the load break, heavy duty, cubicle type conforming to the requirements IS and of AC 23 duty.

The switch fuse units shall be capable of withstanding the thermal and electromagnetic stresses caused by short circuits for the time of operation of the associated fuse links.

The switch fuse units shall be double break and have quick make break mechanism, designed to ensure positive operation.

All switch fuse contacts shall be silver plated at the current transfer surfaces.

The unit shall be provided with a front operating handle. The ON and OFF positions of the switch handle shall be clearly marked.

5.2 Interlocks and Safety:

Interlocks shall be provided so as to prevent opening of the unit door when the switch is in the ON position and also to prevent closing of the switch with the door not properly secured. It should however be possible for a competent person to operate the switch shall be suitable for locking with switch in the OFF position by means of a padlock.

The interior arrangement of the switch fuse unit shall be such that all 'Live' parts are shrouded.

5.3 HRC Fuses:

The switch fuse units shall be fitted with High rupturing capacity cartridge fuse links with ISI marking for a rupturing capacity of not less than 80 KA at 415 volts. The fuse links shall be mounted in a draw out carriage, thus ensuring positive isolation of contacts during fuse replacements.

6.0 Current Transformers.

Current transformers shall comply with the requirements of relevant latest amendment IS. They shall have ratios, outputs and accuracy as specified in the schedule.

7.0 Indicating / Integrating Meters:

All indicating instruments shall be of flush mounted industrial pattern conforming to the relevant latest amended IS. The instrument shall have non reflecting bazels, clearly, divided and indelibly marked scales, and shall be provided with zero adjusting devices in the front. Integrating instruments shall be of flush mounted switch board pattern complying with the requirements of relevant latest IS.

8.0 Relays: Circuit breakers shall be provided with integrally mounted relays as specified in the schedule.

The relay shall have a set of three phase characteristics, which shall be adjustable over a wide range, to provide discrimination between a multiplicity of devices. The relay shall be able to provide over current and earth fault protection. Also UV and Shunt trip Relays are to be provided.

9.0 Control switches/Selector switches: Control switches/Selector switches shall be of the heavy duty rotary type, with plates clearly marked to show the operating position. They shall be of semi-flush mounted type with only the front plate and the operating handle projected.

Circuit breakers control switches shall be of the spring return to neutral type.

10.0 Indicating lamps and push buttons:

Indicating lamps shall be of the LED type of low watt consumption, provided with series resistors where necessary and with translucent lamp covers. Bulbs and lenses shall be easily replaceable from the front.

Push buttons shall be of the momentary contact, push to actuate type fitted with self-reset contacts and provided with plates marked with its junctions.

11.0 Cable terminations:

Cable entries and terminals shall be provided in the switch board to suit the number, type and size of aluminum conductor power cables and copper conductor control cables as indicated in the schematic diagram.

Provision shall be made for top or bottom entry of cables as required. Generous size of cabling chambers shall be provided, with the position of cable glands and terminals such that cables can be easily and safely terminated.

Barriers or shrouds shall be provided to permit safe working at the terminals of one circuit without accidentally touching that of another live circuit.

Cable riser shall be adequately supported to withstand the effects of rated short circuit currents without damage and without causing secondary faults.

Cable sockets shall be of copper and of the crimping type/soldering as required.

12.0 Control wiring: All control wiring shall be carried out with 1100/650 V grade single core Copper cable conforming to relevant IS having stranded copper conductors of minimum 2.5 sq.mm. section for CT Wiring and 1.5sq.mm for Control/indicating Instruments.

Wiring shall be neatly bunched, adequately supported and properly routed to allow easy access and maintenance.

Wires shall be identified by numbered ferrules at each end. The ferrules shall be of the ring type of non-deteriorating material. They shall be firmly located on each wire so as to prevent free movement.

All control circuit fuses shall be mounted in front of the panel and shall be easily accessible.

13.0 Terminal blocks and lables:

Terminal block shall be of 500 volts grade of the stud type. Insulating barriers shall be provided between adjacent terminals.

Terminal block shall have minimum current rating of 10 amps and shall be shrouded.

Provisions shall be made for lable inscriptions.

Lables shall be made of anodized aluminum, with white engraving on black background. They shall be properly secured with fasteners. Danger plate of size and descriptions as recommended in the relevant IS shall be provided on the PCC.

14.0 Tests:

i) The power control centre shall be completely assembled, wired, adjusted and tested for operation under simulated conditions to ensure correctness of wiring and interlocking and proper functioning of all components.

ii) Each power control centre and components shall be subjected to standard routine tests as per applicable clauses of relevant standards.

iii) All current carrying parts and wiring of power control centre shall be subjected to power frequency voltage withstand test.

15.0 Drawings: After the award of the contract the contractors shall submit three copies of the following drawings for approval of the Department.

i) Outline dimensional drawing of the PCC showing the general arrangement indicating the following:

a) Busbar clearances;
b) power and control cable entry points;
c) Configuration of busbars;
d) Details of support insulations and spacings;
e) Outgoing power cable termination arrangements.

ii) Single line diagram of power control centreshowing Protection, Metering etc.

iii) Cubicle wiring diagram.
iv) List of Firements with Ratings & makes / Models

16.0 Installation Testing and commissioning:

The power control centre shall be installed over the cable trench/cable pit using suitable size of MS channel including grouting of the channel with necessary bolts and nuts. Proper earthing of PCC shall be done using two independent copper/GI strip of sizes as indicated in the schedule. The channel shall be painted with one coat of red oxide primer and two coats of anticorrosive enamel paint of proper shade as directed by the Engineer-i-charge.

The pre-commissioning tests as required shall be done and the PCC shall be commissioned.

CHAPTER 3
LAYING OF CABLES

1.0 **Scope**:

This specification is intended to cover the requirements of installation and energizing of PVC/XLPE/PILCDSTA power cables including jointing of cables.

2.0 **Standards** :

The power cable and its fixing accessories shall comply with the latest relevant Indian Standards and National Electrical Code.

3.0 **Laying of Cables** :

3.1 **General** :

3.1.1 Before the commencement of cable laying, it shall be ensured by the Engineer-in-Charge that only ISI marked cables are used. It shall be the responsibility of the contractor to check the soundness and correctness of the size of the cable while taking delivery of the cable from stores. Any defect noticed shall be brought to the notice of the issuing authorities immediately. If any defects is noticed after the cable is laid or during the process of laying, it shall be brought to the notice of the Engineer-in-Charge and upon his satisfaction, that the cable is not damaged due to bad handling, it will be the entire responsibility of the contractor to retrieve the cable already laid and return the defective cable to store and take fresh length of the cable from the store and relay the same.

3.1.2 The material such as bricks, sand, cable route markers, RCC slab of best quality as approved by the Engineer-in-Charge only shall be used for cable laying works.

3.1.3 The contractor shall provide all the necessary labour, tools, plants and other requisites at his own cost for carrying out pumping of water and removing of water from trenches, if any, where required.

3.1.4 Installation shall be carried out in a neat, workman like manner by skilled, experienced and competent workman in accordance with standard practices.

3.1.5 While laying the cable care shall be taken to avoid formation of kinks and also damage to the cable. In the case of cable bends, it shall not have bent radius lesser than 20 times the overall diameter of the cable.

3.1.6 A cable loop of about five meters length and as directed by the Engineer-in-Charge / SBI shall be provided at the following locations.

a) Near the termination points
b) Near to the straight through joint

3.1.7 The method of cable laying and routing of cables, shall in every case be as directed by the Engineer-in-Charge / consultant / SBI.

3.1.8 Whenever cable passes through hume pipes/GI pipes embedded across the wall in a building, both the ends of the pipe shall be suitably sealed.

3.1.9 Identification tags indicating the size of the cable and feeder designation shall be securely attached at both ends of the cable. Such tags shall also be attached to the cable at intervals of 50 Mtrs. The materials of the tag shall be of either 12 SWG GI sheet. In case of plastic, the details have to be engraved and incase of GI sheet, the details should be punched. Cable route markers shall be provided at the intervals of 200 M with a minimum of one number route marker. The details of the route makers shall be as per the drawing. At the locations of straight through joints, necessary joint-markers shall be provided.

3.1.10 When cable runs vertically, it shall be clamped on mild steel flats or angle iron fixed on walls and are spaced at such intervals as to prevent buckling of the cables. All steel work shall be painted with a coat of red oxide and thereafter finished with suitable anticorrosive paints.

3.2 **Cable laid in ground** :

3.2.1. All MV cables (up to 1.1 KV) shall be laid at a minimum depth of 0.75 M & HT cables (1.1 KV to 11 KV) shall be laid at a depth of 1.0 M when laid in ground. When cable pass through roads, nallahs etc. they must be protected by either hume pipe or GI pipe of suitable dimensions.

3.2.2. Excavations of trenches shall be carried out as indicated in the drawing. The width of the trench at the bottom shall be 0.4 M for one cable. In case the total number of cables laid in trenches is more than one, then the width shall be such that the spacing between the cables is maintained as shown in the drawing. Before the cable is laid in the trench the bottom of the trench shall be cleared from stones and other sharp materials and filled with sand layers of 75 mm, as shown in the drawing.

3.2.3. While removing the cable from the drum, it shall be ensured that the cable drum is supported on suitable jacks and the drum is rotated to unwind the cable from the drum. The cable should never be pulled while unwinding from the drum. It shall be ensured that the cables are run over the wooden rollers placed in the trench at intervals not exceeding 2 M.

3.2.4. After placing the cables in the trench shall be filled in layers ensuring that each layer is well rammed by spraying water and consolidated. The extra earth shall be removed from the place of trench and deposited at a place as directed by the Engineer-in-Charge/consultant / SBI.

3.2.5. The HT cables shall be provided with RCC slabs (marked HT cable) on top as protection.

3.3 **Cables laid in built up trench** :

3.3.1. Before the commencement of cable laying the cable trench shall be drained properly. Cable shall be laid as explained in item 3.2. Cable shall be properly clamped to the cable supports , which are provided in the cable trench. The method of clamping shall suit the size of the cable and the cable supports, which are provided in the cable trench. The method of clamping shall suit the size of the cable and the cable supports, as directed by the Engineer-in-Charge / SBI.

Care shall be taken while removing and replacing the trench cover slab. It is the responsibility of the contractor to make good any damaged trench covers.

3.4. **Cable terminations and straight through joints** :

3.4.1. All cable jointing materials such as straight through joint boxes, cable compound, cable lugs, insulation tapes etc. shall be of best quality and as approved by the Engineer-in-Charge / SBI.

3.4.2. Cable glands for strip / armoured cables shall include a suitable armour clamp for receiving and securely attaching the armouring of the cable in a manner such that no movement of the armour occurs when the assembly is subjected to tension forces.

The cable gland shall not impose on the armouring, a bending radius not less than the diameter of the cable. The clamping ring shall be solid and of adequate strength.

Provision shall be made for attachment of an external earthing bond between the metallic covering of the cable and the metallic structure of the apparatus to which the cable box is attached.

3.5 **Sealing boxes** :

3.5.1 A sealing box, irrespective of the class of insulation of the cable for which it is intended, shall be so designed that it may be filled with compound after connecting the cable specially in flame proof/hazardous areas.

3.5.2 All parts and connection for attaching the armouring, wiping or clamping the metallic sheath in a sealing box, shall be easily accessible. This may be achieved by splitting the box or by providing a suitable cover or other such means.

3.5.3 The joints in the box shall prevent leakage of the compound.

3.5.4 Provision shall be made to ensure that the cores of the cable are efficiently sealed to prevent moisture penetrating along the strands or the cable conductors.

3.5.5 The sealing box shall be provided with compound filling orifices with suitable covers or plugs of size that will permit easy pouring of the compound.

In all cases where screwed plugs are used, one or more air vents shall be provided to ensure complete expulsion of air and total filling of the box with compound.3.5.6 The box shall be of sufficient length to allow for manipulation of the insulated cover without damage to them or to the insulation.

3.5.7 A sealing box intended to be attached directly to the apparatus shall be designed such that the box together with the connected cable may be detached from the apparatus without disturbing the sealing compound.

3.5.8 Cable sealing and dividing boxes intended for use in the flame proof areas shall comply additionally with the relevant requirements of IS:2148-1968.

4.0 **Testing**

Once cable is laid, following tests shall be conducted in the presence of Engineer-in-Charge, before energizing the cable:

i) Insulation resistance test (Sectional and Overall).
ii) Sheathing continuity test.
iii) Continuity and conductor resistance test.
iv) Earth test.
v) High voltage test.

Tests conducted shall be as per Indian Standards and National Electrical Code.

CHAPTER 4
EARTHING

1.0 SCOPE:

This specification is intended to cover the requirements of supply, installation, testing and commissioning of

a) Pipe earthing
b) Plate earthing
c) Strip earthing

2.0 STANDARDS:

Earthing installations shall conform to the Indian Electricity Rules - 1956, as amended from time to time and IS 3043-1989 "code of practice for earthing", with latest amendments.

3.0 Earth electrode arrangement :

3.1 Pipe electrode :

3.1.1 Electrode shall be made of CI pipe having a clean surface and not covered with paint, enamel or poorly conducting material. Galvanized pipe shall not be smaller than 100 mm ID. Earthing with pipe electrode shall be done as per the details indicated in IS : 3043/87 .

3.1.2 Electrodes shall be embedded below permanent moisture level.

3.1.3 The length of pipe electrodes shall not be less than 2.5 m. if rock is encountered, pipes shall be driven to a depth of not less than 2.5 m with suitable inclination. Pipe shall be in one piece and deeply driven.

3.1.4 To reduce the depth of burial of an electrode without increasing the resistance, a number of rods or pipes may have to be connected together in parallel. The distance between two electrodes in such a case shall not be less than twice the length of the electrode. The earthing lead shall be connected by means of a through bolt, nuts and washers and cable socket.

3.2 Plate electrode :

For plate electrodes, minimum dimensions of the electrode shall be as under.

3.2.1 GI plate electrode : 600 x 600 x 6 mm thick.
3.2.2 Copper plate electrode : 600 x 600 x 3.15 mm thick
3.2.3 The electrode shall be buried in ground, with its faces vertical and top not less than 2.5 M from the surface of the ground.

3.2.4 Earthing using plate electrode shall be done as per details, indicated in drawing.

3.2.5 Plate electrodes shall have a galvanized iron water pipe, buried vertically and adjacent to the electrode. One end of pipe shall be atleast 5 cm above the surface of the ground and need not be more than 10 cm. The internal diameter of the pipe shall be atleast 19 mm. The length of pipe under the

earth's surface shall be such that it shall be able to reach the center of the plate. The earthing lead shall be securely bolted the plate with two bolts, nuts, check nuts and washers.

3.3. **Strip or conductor electrodes** :

3.3.1. Strip electrode shall not be smaller than 25 x 1.6 mm, if of copper and 25 x 3 mm, if of galvanized iron and steel. If round conductors are used as earth electrodes, their cross sectional area shall not be smaller than 3 sq.mm , if of copper and 6 sq.mm. if galvanized iron and steel.

3.3.2. Conductor shall be buried in trenches not less than 0.5 m deep.

4.0 **General** :

i) All materials used for connecting the earth lead with electrode shall be of GI in case of GI pipe and GI plate electrodes, and of tinned brass in case of copper plate electrode. The earthing lead shall be securely connected at the other end to the main board.

ii) The earthing lead from electrode onwards shall be suitably protected against mechanical injury by routing the earth wire / strip through a suitable size of GI pipe.

iii) All medium voltage equipments shall be earthed by two separate and distinct connections with the earth. In the case of high and extra high voltages, the neutral points shall be earthed by not less than two separate and distinct connections with the earth, each having its own electrode at the generating station or substation.

iv) All materials, fittings etc. used in earthing shall conform to Indian standard specifications wherever they exist. In the case of materials for which Indian standard specifications do not exist, such materials shall be approved by the Engineer-in-Charge.

v) The earth electrode shall be kept free from paint, enamel and grease.

vi) It shall be ensured that similar materials for respective earth electrodes and earth conductors are used.

vii)Earth electrode shall not be installed in proximity to a metal fence.

viii)Copper/GI strip shall be connected to the respective earth electrodes, either by brazing or welding respectively. The Copper/GI strip shall be jointed only either by brazing or by riveting at the end of over lapping portions. The over lap shall
not be less than 50 mm.

ix) Earthing clamps used for supporting earth strips shall be made of such materials so as to avoid bimetallic action between strip and clamps.

5.0 **Testing** :

The earth resistance of each electrode shall be measured by using a reliable and calibrated earth megger and the value shall be as per IS/IE rules .

LIST OF I.S.CODES FOR INTERNAL ELECTRIFICATION INSTALLATIONS

B.

1.	EXTERNAL ELECTRIFICATION wiring installation (system voltage not exceeding 650V)	IS 732 – 1989
2.	Graphical symbols used in Electro-technology art-XI-Electrical Installation buildings	IS 2032-1969
3.	Fire safety of buildings (General) Electrical Installation	IS 1646-1961
4.	3 pin plugs and sockets	IS 1293
5.	Earthing.	IS 3043-1966
6.	Rigid steel conduits for electrical wiring	IS 9537-PII-1989
7.	Fittings for electrical wiring	IS 2667-1964
8.	Flexible steel conduits electrical wiring	IS 3430-1966
9.	Accessories for rigid steel conduit insulated cables	IS 3837-1966
10.	General and safety requirements for electric lighting fittings	IS 1913-1969
11.	Protecting of buildings and allied structures against lightning	IS 2309-1967
12.	Busbar ratings	IS 8084-1976
13.	On load change over switches	IS 4064-1978

SPECIAL CONDITIONS OF CONTRACT

GENERAL

1.1 These conditions are meant to amplify the specifications. If any discrepancy is noticed between these conditions, Specifications, Bill of Quantities and Drawings the most stringent of the above shall apply for execution of the work.

1.2 The materials, design and workmanship shall satisfy the specifications contained herein and Codes referred to. Where the technical specifications stipulate the requirement in addition to those contained in the Standard Codes and specifications those additional requirements shall also be satisfied. In the absence of any Standard/Specifications covering any part of the work covered in this tender document, the instruction/directions of Consultant will be binding on the contractor. The contractor shall quote as per specification and shall not be accepted to deviate from the same. No alternative offer shall be accepted for the works.

1.3 The scope of this section is to describe materials and systems for Heating, Ventilation & Air Conditioning (HVAC) which form together with the project documents, a complete volume of work and quality description.

1.4 All HVAC works shall be of high quality, complete and fully operational including all necessary items and accessories whether or not specified herein. All HVAC works shall be completed in accordance with the regulations and standards to the satisfaction of the Consultants. The general provisions, special provisions and general requirements apply to the entire installation.

1.5 During the progress of work completed portion of the building may be occupied and be put to use by the owner but the contractor shall remain fully responsible for the maintenance of Heating, Ventilation & Air-conditioning works till the entire work covered by this contract is satisfactorily completed by him and handed over to the owner.

1.6 Contractor shall calculate the capacities for areas and confirm the inside conditions specified in the basis of design. Contractor shall be liable to make do any changes/modifications to the system for achieving the inside conditions without any extra expenditure to the client.

2.0 RATES

2.1 The rates quoted shall be deemed to allow for all minor extras and constructional details which are not specifically shown on or given in the specifications but are essential in the opinion of SBIIM / Owner / Consultants to the execution of works to conform to good workmanship and sound engineering practice. The SBIIM / Owner/Consultants reserve the right to make any minor changes during the execution without any extra payment.

2.2 The Consultants decision to clarify any item under minor changes, minor extras and constructional details shall be final, conclusive and binding on the Contractor.

2.3 The rates quoted by the Contractor shall be net so as to include all the requirements described in the contract agreement and no claim whatsoever due to fluctuations in the price of material and labour will be entertained.

2.4 The rates quoted by the Contractor shall include for supplying materials and labour necessary for completing the work in the best and most workmanship like manner to the satisfaction of the SBIIM / Owner/Consultants and which in the opinion of the Consultants cannot be made better. The rates shall be complete in all respects including cost of materials, erection, fabrication, labour, supervision, tools and plant, transport, sales and other taxes, royalties, duties and materials, contingencies, breakage, wastage, sundries, scaffoldings etc on the basis of works contract. The rates quoted shall include all taxes, duties, transport, Insurance's, octroi, or any other levies applicable under the statute except GST which shall be paid separately.

2.5 In case the rates of identical items under different sub-heads/parts are different, the lowest of these will be taken for the purpose of making the payments.

2.6 The rates for different items are for all heights, depths, widths and positions, unless otherwise specified against the item. No claim in respect of any leads/lifts for any item specified in the Schedule of Quantities, for which separate items for lead/lift do not exist in that schedule, will be entertained.

3.0 AWARENESS OF SITE CONDITIONS AND CARRYING OUT OF SITE INSPECTION PRIOR TO TENDER SUBMISSION

3.1 Prior to the preparation and submission of his Tender, the Contractor shall make visits to the site and carry out all the necessary inspections and investigations in order to obtain all information and to make his own assessment of the conditions and constraints at site, including the means of access to it. The Contractor shall make himself aware of all the features of the site and the working conditions and space and shall, in general, be responsible for obtaining all the necessary and requisite information needed for him to prepare and submit his Tender.

3.2 Should the Contractor require any clarifications he shall seek these in writing from the Owner before submitting his Tender. At no stage will any extra claims be entertained or allowed on any matter or for any reason arising from or as a consequence of the Contractor's failure to comply with all the requirements stipulated in this Clause.

4.0 WORK AND WORKMANSHIP

To determine the acceptable standard of workmanship, SBIIM / Owner/Consultant may order the Contractor to execute certain portions of works and services under the close supervision of the SBI / Owner/Consultant. On approval, they shall be labeled as guiding samples so that further works are executed to conform to these samples.

5.0 ASSOCIATED CIVIL WORKS

5.1 Major Civil works associated with Heating, Ventilation & Air conditioning installation are excluded from the scope of this tender. These shall be executed by other agencies to suit the requirements of Heating, Ventilation & Air conditioning contractor. Minor Civil & finishing works have to be carried by the Air conditioning Contractor.

5.2 RCC/PCC Foundation for units shall be carried out by other agencies.

5.3 False ceiling to cover the ducts and piping in corridor shall be carried out by other agencies.

6.0 ASSOCIATED ELECTRICAL WORKS

6.1 The electrical works included in the scope of this proposal are the main panel in the plant room controlling the Equipment, power and control cabling of various equipment and sub panels for Air handling units and FCU's. Supply, Installation, Testing and commissioning of control cables from field components viz., Thermostats, Pressure cut out, Level Sensing devices, Flow Switches and other control/protection components required for proper sequencing and control of major of equipment shall be carried out by the HVAC contractor.

7.0 PROTECTION OF OTHER CONTRACTOR'S WORKS AND SAFETY OFPERSONNEL AT SITE

7.1 In view of other contractors and agencies being engaged on site and shall be working simultaneously, the Contractor shall ensure at all times that during the execution of his work or

during the operations and movements of equipment and supply vehicles and machinery no damage or injury is caused to the work or property or personnel of other contractors and agencies.

7.2 In case of any such loss or damage the Contractor shall take full responsibility for the same and shall bear all cost and expenses thereof. The Contractor shall be responsible and liable for all delays caused due to such damage and or injury and for the consequences which the other Contractors and Agencies may have to face or to which they may be subjected to or be accountable for as a result of such delays.

8.0 SAFETY OF MATERIALS AND MEN

The contractor shall provide proper and adequate storage facilities to protect all the materials and equipment including those issued by the owner against damage/theft from any cause whatsoever. The contractor should also protect the personnel/ inmates from any mishap, which could occur due to negligence of Air conditioning contractor.

9.0 TOOLS, TACKLES, EQUIPMENT & SCAFFOLDING

Tools, Tackles & Equipment, necessary for the electrical installation and testing, shall be provided by the contractor. The quoted rates shall take into account for providing any such equipment, which may not form part of the installation, but are necessary for the execution of the job Contractor shall be responsible to make his own arrangement to provide scaffolding/supports etc., necessary for his work.

10.0 ACTUAL ROUTE OF PIPE LINES

10.1 The location of the HVAC duct and pipe lines, indicated in the drawing is only indicative. The actual route of HVAC pipelines may differ from the plans according to the details of the building construction and the conditions of executions of the installations.

10.2 The contractor shall supply and install at his own expense all secondary materials and special fittings found necessary to overcome the interference and to supply the modifications on the route of HVAC duct and pipe lines that are found necessary during the work to the complete satisfaction of SBI / Owner/Consultants.

11.0 RATING

Rating of all items shall be appropriate for the conditions on the particular site on which the item will be used. All the equipment shall be fit for continuous work under the most severe conditions of site and shall berated for the following ambient condition.

- Outdoor temperature 44º C

- Temperature under shade 42º C

12.0 INSPECTION AND TESTING

12.1 The SBI / Owner/Consultant reserves the right to request inspection and testing at manufacturer's works at all reasonable times during manufacture of items for this contract.
Tests on site of completed works shall demonstrate among other things.

12.2 That the equipment installed complies with specification in all particulars and is of the correct rating for the duty and site conditions.

12.3 That all items operate efficiently and quietly to meet the specified requirements.

12.4 The contractor shall provide all necessary instruments and labour for testing shall make adequate records of test procedures and readings, shall repeat any tests requested by SBI / Owner/Consultants and shall provide test certificates signed by a properly authorized person. Such test shall be conducted on all materials and equipment's and on completed work as called for by SBI / Owner/ Consultants.

12.5 If it is proved that the installation or part thereof is not satisfactorily carried out then the contractor shall be liable for the rectification and re-testing of the same as called for by SBI / Owner/Consultants at the cost of the contractor. The SBI / Owner/Consultants decision as to what constitutes a satisfactory test shall be final.

12.6 The above general requirements as to testing shall be read in conjunction with any particular requirements specified elsewhere. A test house approved by SBI / Owner/Consultants shall carry out all tests.

13.0 TESTING

13.1 All types of routine and other/tests shall be carried out at the works of the Contractor or the manufacturers of the components. The SBI / Consultants shall be free to witness any or all tests, if they so desire.

13.2 On completion of the installation, the Contractor shall arrange to carry out various initial tests as detailed below, in the presence of and to the complete satisfaction of the Consultants or his representative. Any defects or short comings found during the tests shall be speedily rectified or made good by the Contractor at his own expense. The initial tests shall include but not be limited to the following:

13.3 To operate and check the proper functioning of all electrically operated components viz. Compressor motor, fan, Air handling unit etc as well as other electrical motors.

13.4 To test and check the proper functioning of electrical switch gear, safety and other controls to ensure proper functioning.

13.5 To check the air distribution system and to provide design airflow in all areas by adjusting the grills, diffusers and dampers for air conditioning.

13.6 To check & balance/adjust the water flow in the water circuits for smooth and noiseless flow.

13.7 To check the systems against leaks in different circuits, alignment of motor, 'V' belt adjustments, control setting and all such other tests which are essential for smooth functioning of the plant.

13.8 On the satisfactory completion of all 'Initial' tests the plant should be considered to the 'Virtually Complete" for the purpose of taking over by the employer.

13.9 In addition to the 'Initial' test the Contractor shall also give two or three continuous running tests of the plant, each of (3) three days duration, and each one during the full specified outside

conditions (when the ambient 13.8 On the satisfactory completion of all 'Initial' tests the plant should be considered to the 'Virtually Complete" for the purpose of taking over by the employer.

13.9 In addition to the 'Initial' test the Contractor shall also give two or three continuous running tests of the plant, each of (3) three days duration, and each one during the full specified outside conditions (when the ambient conditions are close to the specified ambient conditions). The first running test may be taken on the completion of the initial test, provided the ambient temperature and Humidity are near their peak.

13.10 The Contractor shall provide all necessary tools, instruments, gauges, flow meter, Anemometer, etc. as may be required for conducting the various tests. He shall also provide necessary lubricant etc and required personnel for the tests.

14.0 SAMPLES AND CATALOGUES

14.1 Before ordering the necessary material for these installations, the contractor shall submit Technical data sheets for Compressors, Condensers, Fan Coil Units, Air handling units, Ductable units, Motors, Insulation material, Piping, Valves & all other instruments &controls to the SBI / Owner/Consultants for approval. A sample of every kind of material such as pipe, fittings, insulation of ducts etc., shall be supplied.

14.2 Also the contractor shall ensure that the dimensional details of the equipment fit into the allotted space provided in the building.

15.0 VENDOR AND SHOP DRAWINGS

15.1 The contractor shall prepare and submit to SBI / Owner/Consultants for his approval six (6) sets of detailed layout of all HVAC equipment and piping layouts/ducting layouts.

15.2 He shall prepare shop drawings incorporating the details given by manufacturers for the items included in his contract and also owner supplied items and any other items which need to be coordinated with other contractors for interfacing.

15.3 Before starting the work, the contractor shall submit to SBI / Owner/Consultants for his approval in the prescribed manner, the shop/execution drawing for the entire installation.

15.4 The SBIIM / Owner/Consultants, reserves the right to alter or modify these, if they are found to be insufficient or not complying with the established technical standards or if they do not offer the most satisfactory performance or accessibility for maintenance. Contractor shall supply in eight (8) sets of all approved shop drawings for execution.

16.0 “AS BUILT”

At the completion of work and before issuance of certificate of virtual completion the contractor shall submit eight (8) sets to SBI / Owner/Consultants, layout drawing drawn at appropriate scale indicating the complete system “as installed”.

17.0 INSTRUCTION / MAINTENANCE MANUAL

The Contractor shall prepare and produce instruction, operation and maintenance manuals in English for the use, operation and the maintenance of the supplied equipment and installations and submit to SBI / Owner/Consultants in (8) copies at the time of handing over.

The manual shall generally consist of the following:

a) Description of the project.

b) Operating instructions.

c) Maintenance instructions including procedures for preventive maintenance.

d) Manufacturers catalogues.

e) Spare parts list with prices.

f) Trouble shooting charts.

g) Schematic & control wiring diagrams.

h) Type and routine test certificates of major items.

I) One (1) set of reproducible ‘As Built’ tracings on cloth.

18.0 COMPLETION CERTIFICATE

On completion of the HVAC installation a certificate shall be furnished by the contractor countersigned by the licensed supervisor, under whose direct supervision the installation was carried out.

19.0 GUARANTEE:

At the close of the work and before issuance of final certificate of virtual completion by SBI / Owner/Consultants, the contractor shall furnish written guarantee indemnifying the owner against defective materials and workmanship for a period of one year after completion. The contractor shall hold himself fully responsible for reinstallation or replacement free of cost to owner, the following:

1. Any defective work or material supplied by the Contractor.

2. Any material or equipment supplied by the owner, which is damaged or destroyed as a result of defective workmanship by the contractor.

3. Any material or equipment damaged or destroyed as a result of defective workmanship by the contractor.

20.0 RATE ANALYSIS

At any time and at the request of SBI / Owner/Consultants the contractor shall provide details or break-up costs and prices of any part or parts of the works.

21.0 WATER AND POWER

The contractor will make his own arrangement for water and electricity. If arranged by the Owner the same shall be supplied at one point only and the contractor shall be required to make his own arrangement for distribution lines required for the work. Recovery for the same shall be made at the prevailing rates based on the meter readings to be installed by the contractor at the source point. In case the Owner does not provide power/water they should make arrangements for themselves for carrying out the works.

22.0 MAINTENANCE OF PLANT AND TRAINING OF PERSONNEL

22.1 The Contractor shall arrange to provide, at no extra cost, necessary personnel and material to carry out all routine and special maintenance of the plant as required regularly for a period of twelve (12) months from date of handing over including monthly inspection by contractor or his technical representative during the guarantee period.

22.2 The contractor shall train the employer's personnel to operate the plant and carry out routine checks. During the period of installation and testing, if found necessary, the employer shall train such personnel at his works at no extra cost to the Owners.

23.0 PERIOD AND TIME LIMIT FOR VIRTUAL COMPLETION OF WORKS

The period and time limit for Virtual Completion of the Works shall be 8(Eight) calendar months from the date of issue of Work Order to commence works or handing over of site in respect of the award of Contract.

24.0 PROFESSIONAL INTEGRITY AND TEAM SPIRIT

It is the intent of SBI / Owner / Architect that this project will be executed in a spirit of team and full professional integrity. Contractor is expected to cooperate with all the agencies involved in the project to fulfill this objective.

25.0 LIST OF APPROVED MAKES

The Contractor shall quote for one of the makes of materials from the list of approved makes. The contractor shall clearly indicate the list of materials proposed to be used by him & enclose the same with the tender.

26.0 WORK PROGRESS REPORT

The Contractor shall provide the following while carrying out the execution/planning of works:

1. Detailed schedule of events with completion date

2. Fortnightly report showing progress of work

3. Program of works for upcoming weeks every fortnightly

4. Updated PERT charts with monthly progress

5. Material flow as well as cash flow scheduling at the beginning of the job. The SBIIM / Owner/Consultant for work scheduling shall approve the same. On completion of detailed engineering the contract shall submit the bill of quantities which will be within a variation of upto5% of approved drawings from the customer/consultant.

27.0 NOISE CRITERION

27.1 All air conditioning equipment and materials (like pumps, chillers, motors, ducts, grilles, acoustic lining etc.,) will be selected, designed and installed in such a manner that the inside noise criterion for all conditioned spaces will be in the range NC-30 to NC-35. The noise levels in conditioned occupied spaces due to all air conditioning equipment will not exceed 50 dB at 125Hz when measured at any point in the occupied spaces less than 1.5 meter above floor level and not closer than 1.5 meter from any supply air register or 1 meter from any return air grill.

27.2 When taking noise level measurements, the background noise level without the equipment operating shall be at least 7 dB below the actual background noise level when the equipment is in operation.

28.0 DESIGN PARAMETERS

Performance rating of the units shall be based as per the requirement.

Temperature of condensing Refrigerant = 135º F

Compressor speed not exceeding = 2950

Refrigerant = R134A / R407 / R410 - Ozone Friendly and Non CFC Refrigerant

Piping shall be sized for the following design Parameters

Maximum flow velocity = 8 Ft/Sec.

Maximum friction = 5 Ft W C/100 Ft.

Design Parameters for duct design shall be:

Maximum flow velocity for A/c ducts = 1500 Ft/Min

Maximum velocity at supply air outlet = 500 Ft/Min

29.0 MODE OF MEASUREMENTS:

Mode of Measurement for payment of items of ducting and piping & their insulation shall be as follows:

29.1 PIPING:

Shall be measured in units of length along the centre line of installed pipes including all pipe fittings, flanges (with gaskets and nuts and bolts for jointing), unions, bends, elbows, tees, concentric and/or eccentric reducers, inspection pieces, expansion loops etc. The above accessories shall be measured as part of piping length along the centreline of installed pipes and no special rates for these accessories shall be permitted. The quoted unit rates for centre line linear measurement of piping shall include all wastage, allowances, pipe supports includes hangers, MS channel, wooden bunches, nuts and check nuts, vibration isolator suspension where specified or required, and cost of excavation, bedding back filling and finishing as required to complete the piping installation as per the specification. None of these items will be separately measured and paid for. However, all valves (gate/globe /butterfly /check -balancing/purge/drain etc.), strainers, orifice plates, temperature gauge, pressure gauges shall be separately measured and paid as per their individual unit rates, which shall also include their insulation as per specifications, piping measurements shall be taken before application of the insulation. The cost shall also include any excavations and making masonry valve chamber with steel cover etc.

29.2 PIPING INSULATION:

Shall be measured in units of length along the centreline of the installed pipe, strictly on the same basis as the piping measurements described above. The linear measurements shall be taken before the application of the insulation, it may be noted that for piping measurements, all valves, orifice plates and strainers are separately measurable and their quoted unit rates shall include the insulation cost in the valve required and as specified.

HVAC
TECHNICAL SPECIFICATIONS

1. SCOPE :

The scope of this section comprises the supply, installation, testing and commissioning of Double skin Ceiling Suspended Type air handling units of the size and capacity set forth in the Schedule of Equipment.

2.0 CABINET TYPE:

2.1 The unit shall be of sectionalized construction consisting of Fan section, coil section, Filter section and drain pan.

2.2 Metallic casing shall be fabricated from 16 Gauge galvanized sheet steel ribbed and reinforced for structural strength and rigidity. 16 Gauge hot section channels shall be used for reinforcing .It shall be sectionalized construction with proper sealing at the joints to make the joints air tight. Fan section and panels with bearing supports shall be reinforced with heavy gauge channels. For CSU/AHU supported on floor, leg packages shall be provided for attachment to the Fan and Filter sections, All edges shall be formed inter locking to stiffen and support the weight and shall be secured with galvanized nuts and bolts.

2.3 Fan impeller shall be of forward curved blade centrifugal type. Impeller shall be of double width double inlet type. Two or three wheels shall be provided for each CSU/AHU. Blower section (includes Scroll, impeller blades, etc.) shall be fabricated from 16/18 gauge galvanized sheet steel. Fan housing shall be made of die formed side sheets with stream lined inlet and guide vanes to ensure smooth air flow into the fans. Fan shaft shall be of solid cold rolled carbon steel, ground and polished. The whole assembly shall be statically and dynamically balanced for smooth operation.
Fan shaft bearing shall be of heavy-duty type selected for an average operating life of 100,000 hours. Bearing shall be self-aligning type. They
shall be permanently lubricated. Bearing housing shall be fabricated from malleable iron and suitably supported from outside.

Fan motor shall be mounted on an adjustable sound isolating base located on the top surface above the CSU/AHU.

2.4 Cooling Coils shall be of the fin and tube having Aluminum fins firmly bonded to Copper tube (Seamless solid drain). Capacity of the coil shall be as required under the Schedule of Equipment. Velocity of air across coil face shall not exceed 500 CFM. Tube shall be of 5/8" O.D. and with 10-12 fins per inch. Coils shall be tested at 300 psig Nitrogen pressure in presence of our engineers. Shut off valve (Butterfly type) at the inlet and outlet of coil to be provided. Proper purging and drain arrangement to be made on header of coil. Copper tube gauge **thickness shall not be less than 20 SWG. Aluminum fins gauge shall not be less than 32 G.** Fin punching profile must follow full length air of contact with tube and must be turned at edges to increase rigidity and contact.

Drain pan shall be constructed of 18 G stainless steel with sandwich type insulation in-between bottom plates. Necessary support shall be provided to slide the coil in the drain pan. Outlet shall be provided on both the side of drain pan. An extension drip pan shall be provided at proper location outside the casing to catch all drip from external coil connections and valves.

End panel of the coil section casing shall be removable for withdraw of the coil and shall be provided with opening for coil connections.

2.5 Filters shall be cleanable viscous metal AL box type and shall be 50 mm thick. The filter shall be hold with stiffeners in-between made out of hollow SS material.

2.6 **Suitable, easily open able service door (for Internal Maintenance) between coil section and fan section to be provided to enable a person to enter inside**

2.7 Unit shall be thermally and sound insulated as in section "Insulation"

2.8 Spring type Anti Vibration Mounting of approved make shall be provided as vibration isolators.

2.9 Sheet metal fresh air louvers with frame, damper, etc. shall be provided in the clear opening in masonry made by the owner.

2.10 The Unit cost shall be complete with all accessories, including the following:
1] Manual air vents at high point and drain at low point. 2] Water Thermometers at Inlet & Outlet.3] Pressure gauges with siphon cocks at Inlet & Outlet. 4) Canvass Connection

3.0 INSTALLATION:
The installation of the machine shall be carried out with proper foundation, ant vibration mounts (as recommended by manufacturer), and proper supporting. The contractor shall prepare all the necessary drawings with norms, design, specification given by consultants and shall be approved by the consultant before carrying out the installation work.

4.0 PERFORMANCE DATA & TESTING:
Air handling units shall be selected for the lowest operating noise level of the equipment for performance rating and power consumption data with operating points(On Fan Curve) clearly indicated shall be submitted with the tenders and verified at the time of testing and commissioning . The following test result shall be furnished during commissioning in the presence of department's Engineer;

a) Air Side
- Air Flow Rate in CFM or Cub.M per hour
- Static pressure in mm wg
- Entering Dry bulb & Wet bulb temperature
- Leaving Dry bulb & Wet bulb temperature

b) Water Side
- Inlet temperature in degree C
- Outlet temperature in degree C
- Pressure drop in psig

5.0 PAINTING:

Unit shall be painted with approved type of Epoxy paint (minimum two coats)

6.0 CODES & STANDARDS FOR AIR HANDLING UNIT:

The design, manufacture and performance of AHU shall comply all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. The equipment shall also conform to the requirements of the latest editions of applicable Indian/U.S.A. standards. Nothing in this specification shall be construed to relieve the vendor of this responsibility. In particular the equipment shall conform to the latest editions of the following standards:

a)	ANSI 89.1	Safety code for mechanical refrigeration.
b)	IS:659	Safety code for air-conditioning.
c)	IS:660	Safety code for mechanical refrigeration.
d)	AHRAE	Standard-33 methods of testing for rating forced Circulation air-cooling and air heating coils.
e)	ARI-410	Standard for forced circulation air cooling and air Heating coils.

G.I. insulated condensate drain piping with drain valve, upto sump or floor drain within the air handling unit room. The drain shall be provided with proper 'U' loop. Only piping and valve shall be measured and paid at unit rate.

7.0 PERFORMANCE DATA:

Air handling units shall be selected for the lowest operating noise level of the equipment. Fan performance rating and power consumption data with operating points clearly indicated shall be submitted with the tenders and verified at the time of testing and commissioning of CSU/AHU.

8.0 DUCTING: AS PER SMACNA (FACTORY FABRICATED)

Ducting shall be fabricated from Galvanised Sheet Class VIII. 24 gauge sheets shall be used for fabrication of duct from 0mm to 750mm, 22 gauge sheets shall be used for 750mm to 1500mm,20 gauge sheets shall be used for 1500mm to 2250mm, and 18 gauge shall be used for 2251 mm and above. Where ever site made pieces of higher sizes is required IS655 shall be followed up to 90" duct size, and above that 18 gauge shall be used. All ducts should be supported using 8mm,10mm, 12mm GI Threaded Rods and GI Slotted Channels duly fixed to the slab using anchor fastener. The plenum shall be provided with MS angle bracing duly painted with red oxide paint and black enamel paint. All duct connections shall have neoprene gasket properly stuck with resin-based adhesive. The joining of two ducts shall be carried out using GI nut bolts only. The ducting joints shall be sealed using silicon sealant, wherever specified in the drawings for clean
rooms.

9.0 LAG COATING WITH ALUMINIUM CLADDING FOR EXPOSED DUCT-

Lag coating a Synthetic Rubber based, Low VOC product specially developed for various applications. It is an excellent adhesive to bond Nitrile Rubber to Galvanized Iron or Aluminium duct surface.

The advantages are listed below,

1. Fungal Resistance.
2. Non-flammable in wet state.
3. Fire resistance after drying.
4. Contain no solvents to attack insulating material.
5. High bond strength & low permeability.
6. UV Protection.

10.0 DUCT TYPE DAMPERS:

Duct damper shall be of GI in construction, with opposed blade construction, and with flanged ends. The damper shall be painted properly with proper on – off indication. The dampers shall have phosphor bronze bearing and geared mechanism. The Dampers shall be LOW LEAKAGE TYPE with Neoprene Gaskets

11.0 GRILLES / DIFFUSERS / SUPPLY AIR DAMPERS:

All linear continuous Grilles, Diffusers, Box Type Dampers etc., shall be fabricated out of Extrude Aluminium sections and shall be powder coated with approved colour by client / consultant an necessary fixing arrangement shall be carried out using GI Screws and GI Fixing strips. The diffusers shall be of removable core type. All supply air diffusers shall have dampers and return air diffusers without dampers. The damper shall be opposed blade and aluminum in construction.

12.0 FRESH AIR COWL WITH DAMPER, BIRD SCREEN & FILTER:

Fresh air cowl shall be constructed of either GI Sheet or FRP as specified in the Bill of Quantity, complete with GI Volume Control Damper as mentioned above, G I Bird screen and a washable 20 micron filter shall be provided as per the requirements specified on drawing/BOQ.

13.0 HANGERS FOR DUCT:

Duct Size [mm]	Spacing [M]	Size of MS equal angle [mm x mm]	Size of rod dia [mm]
Upto 750	2.5	40 x 3	10
751 to 1500	2.0	40 x 3	12
1501 to 2250	2.0	50 x 3	15
2251 to above	2.0	50 x 3	15

All the MS angle, use for duct support & brazing etc, shall be hot dip galvanized

14.0 COLD INSULATION:

14.1 All pipes, ducts &equipments operating at temperature lower than the ambient shall be insulated in the manner specified hereinafter.

14.2 The insulating material shall be as follows:

a) Pipes:
Rigid preformed sections of expanded polystyrene of uniform density of 24 Kgs./m^3 with a `K' value of not more than 0.23 B.T.U/ Hr./In/Sq.ft./^{0}F at 50^{0}F mean temperature.

14.3No insulation shall be applied on pipes until the pipes are satisfactorily tested.

Thickness of pipe insulation shall be 50mm.

14.4Pipe insulation shall be applied as follows:

a) Pipes shall be thoroughly cleaned with wire brush and rendered free from all rust and grease.

b) Two coats of bitumen shall be applied on the cleaned pipe surface.

c) Rigid pipe sections of insulation shall be fixed tightly to the surface taking care to seal all joints and covered with Polythene sheet.

d) 24 G x 20 mm mesh wire netting shall be applied, butting all joints and shall be laced down with G.I. wire.

e) Insulated surface shall be finished with two layers of sand cement plaster. Each layer shall be not less than 7 mm thick.

14.5 All valves, fittings, strainers etc. in chilled water piping shall be insulated to the same thickness as specified for the main run of piping. Valve bonnets, yokes and spindles shall be insulated in such a manner as not to cause damage to insulation when the valve is used or serviced.

14.6 Cabinet air handling units shall be insulated as follows.
Fans & coil section panels shall be internally lined with fire retardant quality 25 mm thick, 24 Kgs./m^3 density thermocole slab (with black pigmented neoprene coating).

The insulation should be stuck to the body of AHU without making any hole in the body.

14.7 Ducts shall be insulated as follows:

	Type	Location	Insulation
a)	Supply duct	unconditioned space	50 mm, 24 kg/m^3 density TF quality, thermocole slab.
b)	Supply duct	conditioned space	25 mm, 24 kg/m^3 density TF quality, thermocole Slab.
c)	Return duct or plenum	unconditioned space	25 mm, 24 kg/m^3 density TF quality, thermocole slab.

Contractor shall submit the Insulation material test certificate clearly showing density, K value, lot ,etc of material.

14.8Duct insulation shall be applied as follows:

a) Black bitumen paint shall be applied over the surface after cleaning the ducts.
b) 24 kg/m^3 density thermocole slab insulation of specified thickness shall be put by using Bitumen uniformly over Insulation surface.
c) The Thermocol Insulation shall be covered with 40 G AL foil. Al foil should be wrapped on Thermocole uniformly, using Bitumen.
d) The Joints of AL foil shall be overlapped at least 75mm covered with AL tape. Stripping should be done at distance of 1 meter to hold the insulation, wherever required.
e) Wherever necessary and particularly in larger duct, strapping with PVC material should be done after thermocol insulation and before putting AL foil

15.0 ACOUSTIC INSULATION OF DUCT:-

The acoustic Insulation shall be done with 48 Kg/cu.m.Density,25mm thick Resin bonded Fibre Glass.

The duct surface shall be cleaned and hot bitumen applied in patches and resin bonded glass wool cut to appropriate sizes and stuck to the duct wall. The insulated face shall be covered with RP tissue papers & perforated AL sheet of 28 Gage thickness having 3mm perforations at 5mm staggered centre and held in position with rivets or galvanized steel bolt with counter sunk heads & 50 x 50 x 2 mm plate washers at not more than 600mm centers.

16.0 PIPING

1. SCOPE:
The scope of this section comprises the supply & laying of all pipes required for this project. On the award of the contract, the tenderer shall prepare his own detailed working drawings.

2.0 CHILLED WATER PIPING:

2.1 All chilled water piping and fittings shall be of M.S. Class `C' (heavy class) of **TATA/Jindal make only**. The pipe confirming to BIS 1239 for pipe size upto 150 mm dia. and for pipe size 200 mm dia. and above shall be as per BIS 3589 having minimum 6 mm thickness. All joining in piping shall generally be by welding unless otherwise mentioned or as directed at site. All welding shall be done by qualified welders and shall strictly confirm to Indian Standard code of procedure for manual metallic welding of mild steel as per BIS 823.

2.2 The piping shall be so designed that the water velocity through the piping shall not exceeds maximum 8 fps and also the piping friction drop shall be limited to 4 m per hundred meter of pipe length.
Pipe threads shall be of I.S. 554/1955 and flanges of I.S. 1536/1960.. Pipes shall be sloping towards drain points.

2.3 Fittings shall be new and from standard manufacturers. Fittings shall be malleable casting of pressure ratings suitable for the piping system. Fittings used on welded piping shall be of the

weld able type. Flanges shall be new and from standard manufacturers. Supply of flanges shall include bolts, washers etc. as required.

2.4 Tee-off connections shall be through reducing tees, wherever possible. Otherwise ferrules welded to the main pipe shall be used.

2.5 All equipment and valve connections or connections to any other mating pipes, shall be through unions/screwed flanges up to 50 mm dia. And flanges (welded or screwed for G.S.) for larger diameters or as required for the mating connection.

2.6 All welded piping is subject to the approval of the Engineer and sufficient number of flanges and unions shall be provided as required under.

2.7 All the drain piping shall be insulated GI medium class condensate drain water piping with bends reducers tees, supports etc. The insulation shall be with pipe sections of nitrile rubber as per specifications and drawings.(Make Suprem / Astral)

2.8 Gate valves shall be provided conforming to the following specifications.

Size		Construction	Ends
12 to 65 mm		Gun metal	Screwed female
65 mm & over	a)	Body - Cast Iron	Flanged
	b)	Spindle, valves seat, Wedge, nut etc. –	Bronze or Gun Metal

Valves shall conform to I.S. 780/1963 & flanges to I.S. 1536/1960 or as required. Valves shall have non rising spindles unless otherwise specified and shall be suitable for 300 psig test pressure. The valve shall be of Leader make. Tail pieces shall be used wherever required.

2.9 Butterfly valves shall perform the function of isolating valves. Butterfly valves shall have cast iron body with Nitrile rubber bonded bakelite hard back seat. Disc shall be of high duty iron with epoxy coating on nickel plating. All butterfly valves shall be provided with locking devices. The shaft shall be stainless steel AISI 410. The valve shall be **Audco/Advance / Donfoce**.

17.0 PIPING INSTALLATION:

17.1 Pipe runs and sizes should to meet the site conditions. The contractor on the award of the work shall prepare detailed working drawings, showing the cross section, longitudinal sections, details of fittings, locations of isolating, drain and air valves etc. They must keep in view the specific openings in buildings and other structures through which the pipes are designed to pass.

17.2 Piping shall be properly supported on or suspended from strands, clamps, hangers etc. as specified and as required. The tenderer shall adequately design all the brackets, saddles, clamps, hangers etc. and be responsible for their structural integrity.

17.3 Pipe supports shall be of steel, adjustable for height and prime coated with rust preventive paint and finish coated black. Where pipe and clamp are of dissimilar material, a gasket shall be provided in between.

Spacing of pipe supports shall not exceed the following:

Pipe (mm)	Spacing (Meters)
3 to 12	1.22
19 to 25	1.83
32 to 150	2.44
150 and above	3.05

Pipe hangers shall be fixed on walls and ceilings by means of metallic rawl plugs or approved shear fasteners.

17.4 Vertical risers shall be parallel to wall and column lines and shall be straight and plump. Risers passing from floor to floor shall be supported at each floor by clamps or collars attached to pipe and with a 12 mm thick rubber pad or any resilient material. Where pipes pass through the terrace floor, suitable flashing shall be provided to prevent water leakage. Risers shall also have a suitable elbow or concrete pipe support at the lowest point.

17.5 Pipe sleeves of 50 mm diameter shall be provided wherever pipes pass through walls and the annular space filled with felt and finished with retaining rings.

17.6 Insulated piping shall be supported in such a manner as not to put undue pressure on the insulation.

17.7Cut-outs required in the floor slabs for taking the various pipes are provided. Tenderers shall carefully examine the cutouts provided and clearly point out wherever the cutouts do not meet with the requirements.

17.8 Piping work shall be carried out with minimum disturbance to the other work on the site. A program of work shall be chalked out in consultation with the Engineer.

17.9 All pipes using screwed fittings shall be accurately cut to the required sizes and threaded in accordance with I.S. 554/1955 and burrs removed before laying. Open ends of the piping shall be blocked as the pipe is installed to avoid entrance of foreign matter. Wherever reducers are to be made in horizontal runs, eccentric reducers shall be used if the piping is to drain freely; in other locations, concentric reducers may be used.

17.10 Drains shall be provided at all low points in the piping system and shall be of the following sizes:

Mains	Drain
Upto 300 mm	25 mm

Over 300 mm 40 mm

Drains shall be provided with gate valves of equal size with rising spindle. Drains shall be piped through equal size G.I. pipe to the nearest drain or floor waste. Piping shall be pitched towards drain points.

18.0 PRESSURE GAUGES:

18.1 The pressure gauges shall be Bourbon tube type confirming to IS : 3624 and shall be with siphon cock and angle valve. Pressure gauges shall be not less than 150 mm dia. and of appropriate range etc. duly calibrated before installation. The Pressure gauges shall be of **H.GURU/equ. make.**

18.2 Care shall be taken to protect pressure gauges during pressure testing.

19.0 THERMOMETERS:

19.1 Thermometers shall be either 150 mm dia. dial or direct reading industrial type, of appropriate range, duly calibrated before installation. Thermometers shall be installed in separable wells.

20.0 INSULATION:

20.1 Pipes shall be insulated in accordance with specifications in section `INSULATION'.

21.0 VIBRATION ELIMINATION:

21.1 Piping installation shall be carried out with vibration elimination fittings wherever required.

22.0 TESTING:

22.1 All piping shall be tested to hydrostatic test pressure of at least 1½ times the maximum operating pressure, but not less that 7 Kgs/Sq.Cm. for a period of not less than 24 hours. All leaks and defects in joints revealed during the testing shall be rectified to the satisfaction of the Engineer.

22.2 Piping repaired subsequent to the above pressure test shall be retested in the same manner.

22.3 System may be tested in sections and such sections shall be securely capped.

22.4 The owner shall be notified well in advance by the Contractor of his intention to test a section or sections of piping and all testing shall be witnessed by the Engineer or his authorized representative.

22.5 The contractor shall provide all materials, tools, equipment, instruments, services and labour required to perform the test and to remove water resulting from cleaning and/after testing.

22.6 The contractor shall make sure that proper noiseless circulation of fluid is achieved through all coils and other heat exchanger in the system concerned. If proper circulation is not achieved due to air bound connections, the Contractor shall rectify the defective connections. He shall bear all the expenses for carrying out the above rectifications, including the tearing up and re-finishing of floors, walls, etc. as required.

22.6 No insulation shall be applied to piping until after the completion of the pressure testing to the satisfaction of the Engineer.

23.0 PAINTING:

23.1 After all the piping has been installed, tested and run for at least 10 days of eight hours each, the piping shall be given two finish coats, as follows:

Service	Flow	Colour
Chilled water	supply return	as approved by the Engineer

23.2 The direction of flow of fluid in the pipe shall be visibly marked in White arrows.

24.0 RATINGS & STANDARDS:

21.1 Rating of the motors shall be as indicated by you in the data sheets and as per the requirements of the airflow and static pressure. Ratings shall be on the basis of the specified ambient temperature and without exceeding the maximum temperature limits set by IS 325/1961.

22.2 Unless otherwise stated, Indian Standard Specifications shall apply. Where I.S. specifications are not available, the relevant British Standard Specifications shall be followed.

25.0 SQUIRREL CAGE INDUCTION MOTORS:

25.1 All motors shall be screen protected drip proof type TEFC with Class-C insulation, conforming to I.S. 325/1961 unless otherwise specified.

25.2 The motor shall be statically and dynamically balanced.

25.3 Bearings shall be combination ball and roller type with limit lubricators.

25.4 Termination shall be of ample size housed in a termination box . The terminal box shall be suitable for cable entry. Two earth terminals shall be provided.

25.5 The starting torque shall match with the load torque and the starting current shall not exceed 6 times the full load current.

26.0 INSTALLATION:

26.1 All motors shall be mounted on a common foundation with the driven equipment coupled through flexible couplings or through belt drive. Installation shall be in accordance with I.S. 900/1956.

26.2 Flexible connections shall be provided to all motors terminals wherever the motor is mounted on guide rails and belt drive is adopted. Even in the case of direct drive motors, the connections shall be flexible enough to prevent transmission of vibration.

26.3 All drive arrangements and couplings shall be provided with a safety guard.

27.0 TESTING:

27.1 Motors shall be tested in accordance with the relevant Indian Standard Specifications and test certificates furnished for routine type and high voltage tests.

28.0 CHILLED WATER CASSETTE UNITS.

The chilled Water Cassette Unit installed between the bottom of finished slab & top of false ceiling. The maximum allowable height for the cassette type units shall be 350 mm. The unit must have in built drain pump, suitable for vertical lift of 1000 mm. it should be auto air side modulating by reduce a fan speed proportionally save energy both air and water ,The unit casing shall be Galvanized Steel Plate. Unit must be insulated with sound absorbing thermal insulation material, Polyurethane foam. The noise level of unit at the highest operating level shall not exceed 50 dB(A), at a vertical distance of 1.5 m from the grille of the unit. Unit shall have provision of connecting fresh air without any special chamber & without increasing the total height of the unit (350 mm maximum). The unit shall be supplied with Resin Net filter with Mold Resistance. The filter shall be easy to remove, clean & re install The unit will be further may be connected to Intelligent Building Management System All indoor units shall be of similar make and model to have aesthetic look.

29.0 VFD FOR AHU.

The VRF drive to Suitable for VFD Auto/ Manual feedback on Return and it Should be Potential free contact from CSU MCC panel Potential Free Contact to be provided by HVAC Its to be operate VFD Trip Status, CSU Fan Status, CSU Filter Status, Return Air, CSU Chilled Water, Valve control, Temperature & RH, CSU Chilled water, valve status, VFD control feedback on Return

Schedule of Technical Data for each Air Handling Unit
(To be submitted for each AHU separately)

Technical data shall be furnished as below:

I) General:

1) Make:-
2) Air Discharge Direction:- Horizontal or Vertical
3) Overall Dimensions:-
4) Weight (including water):-
5) Type of Vibration Isolators:-
6) Approx. noise level (db):-
7) Drive belts & size (Flat, Belt, V-Belt):-
8) G.I. CasingGauge:-
9) AHU body insulation material &thickness:-
10) Density of insulation material :-
11) Drain Tray Material :-
12) Drain tray insulating material &thickness:-
13) Whether inspection door provided for AHU body:-

II) Fan Section:

1) Air handling capacity (CFM/CMH):-
2) Total static press (mm WG):-
3) Fan speed (r.p.m.):-
4) Nos. of Fan outlet &area:-
5) Fan diameter:-
6) Balance (Static and/or Dynamic):-
7) Bearings:-
8) Make & Mode of Fan.

III) Filter Section:

1) Type:-
2) Gross filter area:-
3) Velocity through filter (F.P.M.):-
4) Press drop through filter when new (mm, W.G.):-
5) Efficiency:-
6) Filter material:-
7) Filter Casing Material & Gauge

IV) Cooling Coil:

1) Coil fin material &thickness:-
2) Copper tube diameter &thickness:-
3) Water through coil (F.P.M.):-
4) No. of fins per inch:-
5) Water press drop in the coil (psig):-
6) coil Face area :-
7) Nos. of coils:-
8) No. of rows of each coil:-

V) Drive Motor for AHU:

1) Make:-
2) Frame size:-
3) Insulation Class:-
4) HP/KW rating:-
5) Type

VI) VALVES

1. Butterfly Valve

1] Make :-
2] Model :-

2. Gate Valve

1] Make :-
2] Model :-

VII) Gauges

1. Pressure Gauge

    1) Make:-
    2) Type:-

2. Thermometers

    1) Make:-
    2) Type:-

VIII) Miscellaneous

1. Insulation (Duct/Piping)
    1) Make:-
    2) Thickness &Density:-

2. Piping
    1) Make
    2) Class of Pipe

3. Ducting Sheet
    1) Make of Sheet

4. Anti Vibration Mounting
    1) Type
    2) Make

Schedule of Technical Data for each CASETTTE

Technical data shall be furnished as below:

VIII) General:

14) Make:-

15) Way Air Discharge Direction:-

16) Overall Dimensions:-

17) Weight (including water):-

18) Approx. noise level (db):-

19) Motor detail :-

20) G.I. CasingGauge:-

21) Density of insulation material :-

22) Drain Details :-

Note: Any other additional technical details may be included by the tenderer.

LIST OF APPROVED MANUFACTURERS / NATURAL SOURCES OF MATERIALS TO BE USED IN THE INTERIOR WORKS SUBJECT TO THE APPROVAL OF SAMPLES BY SBI / **ARCHITECT.**

(ALL THE MATERIALS USED HAVE TO CONFIRM TO GREEN INTERIOR NORMS OF IGBC)

S. No.	MATERIAL NAME.	BRAND / MANUFACTURER.
1.	PLYWOOD – BWR (Boiling Water Resistant, Termite Resistant & Borer Resistant) – CONFIRMING TO IS: 303.	GOLDENPLY / SARDAPLY / ARCHID / GREENPLY / CENTURY / UNIPLY / RAMA PLY / MAYUR / NATIONAL PLYWOOD.
2.	FLEXI PLYWOOD – BWP (Boiling Water Resistant, Termite Resistant & Borer Resistant) – CONFIRMING TO IS: 303.	GOLDENPLY / SARDAPLY / ARCHID / GREENPLY / CENTURY / UNIPLY / RAMA PLY / NATIONAL PLYWOOD.
3.	BLOCK BOARD – CONFIRMING TO IS :11255 - 2003.	NIKON / GOLDEN / TRUWUD / ARCHID / GREENPLY.
4.	FLUSH DOOR – CONFIRMING TO IS : 2202 (Part – 1) – 1991.	NIKON / GREENPLY / EGG WOOD / RAMA.
5.	LAMINATE – CONFIRMING TO IS : 2046-1995.	GREENLAM / MERINO/ CENTURY / ARCHID / MONARCHLAM / VIR LAMINATE / MIKA.
6.	GLASS.	SAINT GOBAIN / GUJRAT GUARDIAN / TRIVENI / MODIFLOAT / ASAHI FLOAT.
7.	HARDWARE.	EFFICIENT GADGETS / KUBIK / HETTICH/EARL BEHARI (EBCO) / HARDWIN / ETALICA / GODREJ.
8.	NATURAL WOOD.	AS APPROVED BY SBI / ARCHITECT.
9.	SCREWS.	GKW NETTLEFOLD OR AS APPROVED.
10.	ADHESIVES.	MOVICOL / FEVICOL SH / ARALDITE.
11.	PAINT.	ASIAN / NIPPON / BERGER / KANSAI NEROLAC.
12.	FLOOR SPRING / DOOR CLOSER.	HETTICH/DOORSET / STERLING / DORMA / OZONE.
13.	LOCKS.	DOORSET / GODREJ/ HETTICH.
14.	GI SUPPORT SYSTEM FOR PLAIN FALSE CEILING.	GYPSTEEL ULTRA / US BORAL.
15.	GI DRY WALL PARTITION SYSTEM.	GYPSTEEL / US BORAL / FRAME WORK / RONDO / BMS.
16.	GYPSUM / PLASTER BOARDS.	GYPBOARD / LAGYP.
17.	GI SUPPORT SYSTEM FOR GRID CEILING.	ARMSTRONG / GYPSTEEL ULTRA / US BORAL.
18.	CEILING TILES.	ARMSTRONG / GYPROCK / US BORAL.
19.	ACRYLIC SOLID SURFACE.	LG Hausys, HI - MACS / DUPONT - MONTELLI / STARON / LOTTE - STARON.
20.	TEXTURED PAINT.	TERRACO / SPECTRUM.

21.	VINYL FLOORING.	LG / WINNER.
22.	MODULAR FURNITURE, SOFAS AND CHAIRS.	GODREJ / FEATHERLITE / MONARCH / METHODEX / BOSQ / AMARDEEP./ EURO COUSTIC /NEMAN / MANSAROVER
23.	VITRIFIED, CERAMIC AND GLAZED TILES.	JOHNSON / SIMPOLO / KAJARIA / RAK / VARMORA.
24.	SANITARY FAUCETS AND FIXTURES.	JAGUAR / HINDWARE / KOHLER.
25.	ALUMINIUM COMPOSITE PANELS.	ALSTRONG / EUROBOND / ALUDECOR.
26.	CARPET TILES FLOORING.	GODREJ / ELEMENT / UNITEX / FLORTEX/VITOFLOOR/WELSPUN.
27.	CEMENT FIBER / CALCIUM SILICATE / REINFORCED MAGNESIUM SILICATE BOARD.	VISAKA / TRILITE / SHERA / BISON.

S.No	MATERIAL NAME.	BRAND / MANUFACTURER.
1.	CEMENT.	43/53 GRADE – L&T, BIRLA, ACC OR APPROVED EQUIVALENT.
2.	REINFORCEMENT STEEL.	Fe500 – TATA, SAIL, VSP / TMT OR APPROVED EQUIVALENT.
3.	AAC BLOCKS.	AEROCON / BIRLA OR APPROVED BY ARCHITECTS.
4.	METAL.	APPROVED BY ARCHITECTS.
5.	SAND.	MACHINE MANUFACTURED SAND OR APPROVED BY ARCHITECTS.

6.	READY MIX CONCRETE.	BIRLA / L & T / ACC OR EQUIVALENT.
7.	STRUCTURAL STEEL.	TATA OR EQUIVALENT.
8.	ASBESTOS SHEETS.	CHARMINAR OR EQUIVALENT.
9.	PVC PIPES.	SUPREME / PRINCE OR EQUIVALENT.
10.	WATER PROOFING COMPOUNDS.	B-DRY OR EQUIVALENT.
11.	PAINT.	NEROLAC / ASIAN / ICI / BEGER OR APPROVED EQUIVALENT.
12.	UPVC WINDOWS.	FENESTA / NATURE / KOMMERLING / LINGEL OR APPROVED EQUIVALENT.
13.	FLOAT GLASS.	TRIVENI OR APPROVED EQUIVALENT.
14.	FLUSH DOORS.	EGGWOOD / KUTTY OR EQUIVALENT.
15.	VITRIFIED TILES. (DOUBLE CHARGE OR NANO ONLY.)	JOHNSON / SIMPOLO / MARBITO / KAJARIA / NITCO / RAK OR APPROVED EQUIVALENT.
16.	CERAMIC AND GLAZED TILES.	JOHNSON / KAJARIA / NITCO OR EQUIVALENT.
24.	NATURAL WOOD.	APPROVED BY ARCHITECT
18.	GATE MOTOR.	NICE, ITALY MAKE OR APPROVED EQUIVALENT.
19.	CORBELLING STONE	APPROVED BY ARCHITECTS.
20.	ROOFING TILES.	LAFARGE OR APPROVED EQUIVALENT.
21.	GLASS MOSAIC TILES.	BISSAZA OR APPROVED EQUIVALENT.
21.	SANITARY FIXTURES AND FAUCETS:	JAGUAR / HINDWARE OR APPROVED EQUIVALENT.

NOTE: **The Contractor shall use only above mentioned material. All other materials shall confirm to the specifications laid down. The Contractor shall take this into account while tendering rates / prices.All materials and sections used should adhere to the manufacturer's guidelines and the contractor has to submit certificate from the manufacturer on usage of their specified product / sections.**

STATE BANK OF INDIA

LIST OF APPROVED MANUFACTURERS OF MATERIALS TO BE USED IN THE ELECTRICAL WORKS SUBJECT TO THE APPROVAL OF SAMPLES BY THE CONSULTANT/ ENGINEER

S.No	Material Name.
1	**Switches/Sockets** : Legrand –Mosaic / MK-wrap around/ Anchor -Woods / Schneider-Clipsal/ Crabtree-Thames/Athena /Wipro (North west) - Stylus/Convex / GM Four- Five
2	**Copper Conductor wires** :Finolex /RR Cable/Havells/ Poly Cab/ KEI
3	**PVC conduits, Casing , Capping & Accessories** : Precision / Sudhakar/ Avon plast/ FINOLEX
4	**Metal clad Sockets** : Legrand /L&T- Hager /ABB/SIEMENS/ Schneider/ Inodo- Asian
5	**MCBs /MCB Distribution boards(Powder coated Only)** : ABB/Siemens/ Legrand / Schneider /L&T/ Hager /Havells
6	**MCCBs/Switchgear** : GE Power /Hager(Compact) /L&T/ ABB/Schneider/ Legrand/ Siemens
7	**Underground Cables :** CCI /Nicco /Havells/ Universal/ Poly Cab/ Gloster
8	**Cable Glands** : HMI /Comet/ Cosmos/Dowells (Biller India)/ Hax Brass
9	**Capacitor Bank** :Epcos /Neptune/ Tibcon
10	**Cable Lugs :** Dowell's / 3D
11	**MV Panels (PCCs)** : Manufacturers with CPRI Test Certificate.
12	**Measuring Instruments** :Conzerv/ CMS/ El measure/IME/ L&T/ Nippen/ Schneider Electric
13	**Selector Switches**: Vaishno / Salzer / Kaycee
14	**Indication Lamps LED** :Schneider / Vaishno / Binay
15	**Resign cast CTs** : AE / Kappa
16	**Telephone Wires**: Lapp / Delton / Polycab/ Finolex
17	**LAN Cables:** D LINK, Finolex, Ploycab, Legrand
18	**Light Fixtures (LED):** Philips / GE/ Havells/ CG/ Wipro/Bajaj
19	**Ceiling Fans, Wall mounted fans & Exhaust Fans** : Havells/Bajaj/ CG/Orient/ USHA/ Almonard

Note: All Items Materials Used on site shall be ISI Mark only & Materials will be selected by bank only

LIST OF PREFERRED MANUFACTURERS / NATURAL SOURCES OF MATERIALS TO BE USED IN THE HVAC (AIR CONDITIONING) WORKS SUBJECT

TO THE APPROVAL OF SAMPLES BY SBI / CONSULTANT

<table>
<tr><th>S.No.</th><th>Material Name.</th><th>Brand / Manufacturer / Recommended Make.</th></tr>
<tr><td>1.</td><td>Inverter Split/Cassette AC</td><td>AS specified in the NIT</td></tr>
<tr><td>2.</td><td>GI Sheets</td><td>TATA / HSL / SAIL / NIPPON DENRO or approved equivalent.</td></tr>
<tr><td>3.</td><td>Fire Damper</td><td>Caryaire / AirMaster / Air Breeze / Ravistar or approved equivalent.</td></tr>
<tr><td>4.</td><td>Vibration Isolators / FlexibleConnectors</td><td>Resistoflex / Dunlop or approved equivalent.</td></tr>
<tr><td>5.</td><td>INSULATION / Fibre glass</td><td>UP Twiga / Kimmco / Owens corning or approved equivalent.</td></tr>
<tr><td>6.</td><td>Power Cables</td><td>CCI / ICC / Gloster / UCL or approved equivalent.</td></tr>
<tr><td>7.</td><td>Control Cables</td><td>Finolex / Delton or approved equivalent.</td></tr>
<tr><td>8.</td><td>Aluminum Grilles Diffusers /Linear Grilles</td><td>Caryaire / Air Master / Air Breeze/SRIFABS or approved equivalent.</td></tr>
<tr><td>9.</td><td>Filters</td><td>Klenzaids / Airtech / Aerosol / Anfilco or approved equivalent.</td></tr>
<tr><td>10.</td><td>Cooling Coils / Heating Coils</td><td>Bluestar / Rohini / Ethos / Carrier / Jaypee / Coil Company / ZECO or approved equivalent.</td></tr>
<tr><td>11.</td><td>Nitrile rubber</td><td>Armaflex / vedoflex /AERO FLEX/ARMACELL or approved equivalent.</td></tr>
<tr><td>12.</td><td>AC UNTS</td><td><table><tr><td>1. Voltas</td><td>6. Mitsubishi Heavy</td></tr><tr><td>2. Bluestar</td><td>7. Daikin</td></tr><tr><td>3. Carrier</td><td>8. O’General</td></tr><tr><td>4. LG</td><td>9. Toshibha</td></tr><tr><td>5. Panasonic</td><td>10. Hitachi</td></tr></table></td></tr>
</table>

NOTE : **The contractor shall use only above mentioned material or equivalent make to be approved by SBI / Consultant. All other materials shall confirm to the specifications laid down. The tenderer shall take this into account while tendering rates / prices.**

PROPOSED INTERIOR WORKS FOR STATE BANK AO CYBERABAD

RBO RC PURAM, AO CYBERABAD, HYDERABAD.

SCHEDULE OF QUANTITIES AND DETAILED SPECIFICATIONS: INTERIOR

S.No.	Item. / Particulars.	Unit.	Quantity	Rate	Amount
A	**FIXED FURNITURE:**				
1	**FULL HEIGHT PARTITIONS: (75MM THICK) - ONE SIDE VENEER AND ONE SIDE LAMINATE FINISH.**	Sq.M.	68		
	Providing and fixing metal stud dry wall partition with following specifications: The Partition will be fully opaque OR partly opaque and partly glazed as per specific site conditions and drawings.				
	(a) Supporting system comprising of 51mm / 50mm x 35mm / 34mm x 0.5mm metal studs at 600mm c/c and 51mm / 50mm x 32mm x 0.5mm metal tracks at floor, middle, door and ceiling level with joints staggered to avoid through joints. The vertical members should touch the ceiling with horizontal ceiling channel at slab / beam bottom. The rate should also include necessary strengthening with studs / tracks or channels at doors and other openings.				
	(b) 12mm Plywood / 12mm Cement Board fixed on both sides with 25mm dry wall screws for the entire height of the partition.				
	(c) Partition to have 8mm clear float glass with 3M privacy film fixed with 85mm x 15mm alround jamb and 12mm x 12mm button beading on both sides of the glass, to a neat finish as per drawings and directions etc., complete.				

	(d) Partition to have 4mm Veneer (Veneer Base Rate Rs - 1,500/- Sq.M.) from one side and 1mm Laminate from other side, (Laminate Base Rate RS. 500/- per Sq.M.) to a neat finish as per drawings and directions etc., complete.				
	(e) All beech wood members and faces of veneer to have melamine spray polish finish. Melamine Spray Polishing to be done as per specifications.				
2	**FULL HEIGHT PARTITIONS: (75MM THICK) - BOTH SIDE LAMINATE FINISH.Same as above to be cladded with 1mm Laminate (Laminate Base Rate Rs - 500/- Sq.M.) from both sides to a neat finish as per drawings and directions etc., complete.**	Sq.M.	47		

3	**50MM THICK FLUSH DOORS IN PARTITIONS: (ONE SIDE VENEER AND ONE SIDE LAMINATE FINISH.)** **Providing and fixing 50mm thick solid core flush shutter with 100mm x 15mm beech wood jamb alround the opening of the partition and 12mm x 12mm button beading on one side of the partition and 8mm clear float glass with 3M privacy film fixed as per drawing with 65mm x 15mm beech wood jamb around the glass opening and 12mm x 12mm beech wood beading for fixing of glass on both sides. The rate to include necessary hardware viz., door stopper, door buffer, pair of " H " type handles, Mortise Dead Lock and Euro Profile Cylinder - Key and Knob 70mm SS, 4 Nos. SS 2 ball-bearing hinges - (127mm x 76mm x 2.5mm), concealed door closer (all of approved make and quality), ZERO VOC or NO VOC duco paint finish for all exposed surfaces of MDF Exterior Grade members, etc., complete as directed.** **door to be cladded with 4mm Veneer (Veneer Base Rate Rs - 1,500/- Sq.M.) from one side and 1mm Laminate (Laminate Base Rate Rs - 500/- Sq.M.) from other side to a neat finish as per drawings and directions etc., complete.**	Sq.M.	9		
4	**50MM THICK FLUSH DOORS IN PARTITIONS: (BOTH SIDE LAMINATE FINISH.)** **Same as above to be cladded with 1mm Laminate (Laminate Base Rate Rs - 500/- Sq.M.) from both sides to a neat finish as per drawings and directions etc., complete.**	Sq.M.	3		
5	**HALF HEIGHT PARTITIONS: (LAMINATE FINISH)**	Sq.M.	0		
6	**FIXED GLASS WORKS: (10MM TOUGHENED GLASS PARTITIONS)**	Sq.M.	35		

	Providing and Fixing of Kubik/Vedic or Equelent /Vedic or Equelent modular single glazed partition system series, using Dotline 25mm x 40mm natural Silver Anozide aluminum finish for verticals and horizontal top and bottom with KOPS 015N & KOPS 014N using 10MM thick toughened glass, glass to glass joints to be bonded with Aluminum for "butt" / "L" /90° corner joints from FFL to FCL.-2700 mm height. The glass to be butt jointed with 2 to 3 mm edge chamfer & edge polishing all around. Distance between two butt jointed glass panels not to exceed 4mm. Glass between profiles shall be fixed with 3m clear tape. The frame all round shall be fixed with acoustic tape to get proper acoustics.				
	(a) All sections used should adhere to the manufacturers guidelines and the contractor has to submit certificate from the manufacturer on usage of their specified sections.				
	(b) The cost to include all materials and hardware required etc., as per site conditions. The rate is for a finished item of work etc., complete as directed.				
7	**10MM TOUGHENED GLASS SINGLE LEAF SHUTTER WITH DOOR FRAME:**	Sq.M.	8		

	Providing and Fixing of Kubik/Vedic or Equelent modular single glazed partition system series, using Dotline 25mm x 40mm natural Silver Anozide aluminum finish for verticals and horizontal top and bottom with KOPS 015N & KOPS 014N using 10MM thick toughened glass, glass to glass joints to be bonded with Aluminum for "butt" / "L" /90° corner joints from FFL to FCL.-2700 mm height. The glass to be butt jointed with 2 to 3 mm edge chamfer & edge polishing all around. Distance between two butt jointed glass panels not to exceed 4mm. Glass between profiles shall be fixed with 3m clear tape. The frame all round shall be fixed with acoustic tape to get proper acoustics.				
	(a) All sections used should adhere to the manufacturers guidelines and the contractor has to submit certificate from the manufacturer on usage of their specified sections.				
	(b) The cost to include all materials and hardware required etc., as per site conditions. The rate is for a finished item of work etc., complete as directed.				
8	**WALL PANELLING: (VENEER FINISH)**	Sq.M.	36		
	Providing and fixing metal stud Wall Paneling with following specifications:				
	a) Same as full hight partition above, but for Wall Panelling. The basic frame work to comprise all cladding specified only from one side to a neat job as per drawings and directions etc., complete.				
	b) 12mm Plywood fixed with 25mm dry wall screws for the entire height of the paneling.				
	c) Wall Panelling to be cladded with 4mm Veneer (Veneer Base Rate Rs - 1,200/- Sq.M.) from one side to a neat finish as per drawings and directions etc., complete.				

	d) Providing 15mm thick jamb for door and window openings of suitable depth as per site conditions.				
	e) All beech wood members and faces of veneer to have melamine spray polish finish.				
9	**WALL PANELLING: (LAMINATE FINISH)**	Sq.M.	20		
	Same as above to be cladded with 1mm Laminate (Laminate Base Rate Rs - 500/- Sq.M.) from one side to a neat finish as per drawings and directions etc., complete.				
10	**STORAGE UNITS: (VENEER FINISH)**	Sq.M.	4		
	Providing, making and placing in position Storage Units with horizontal partitions of 1100mm abutting wall / abutting partition / 750mm as back credenza height made in 19mm plywood for all other members and 25mm block board for table top. The Storage Unit top of 25mm Block Board and to be cladded with 6mm thick acrylic solid surface and the front facia and sides of the top to have 6mm thick acrylic solid surface double thickness at edges alround OR 1mm Laminate / edge binding tape. All other exposed faces of the unit to have either 4mm Veneer and 0.8mm Laminate finish on all unexposed faces and all necessary hardware viz., 'W' or wing hinges, locks, handles, tower bolts etc., etc., complete.				
	(a) All the edges of 19mm plywood to have 20mm x 6mm beech wood edge lipping.				
	(b) All wooden members and faces of veneer to have melamine spray polish finish. Melamine Spray Polishing to be done as per specifications given in item 2.6 below.				
11	**GRID FALSE CEILING:**	Sq.M.	239		

	Providing & Fixing of Mineral Fibre Acoustical Suspended Ceiling System with 15mm Tiles and Exposed GRID. The tiles should have Humidity Resistance (RH) of 90% - 99%, NRC 0.5, Light Reflectance ≥87%, Thermal Conductivity k = 0.052 - 0.057 w/m K, Colour White, Fire Performance UK Class 0 / Class 1 (BS 476 pt - 6 &7) in module size of 600 x 600 x 16mm , suitable for Green Building application, with Recycled content of 30% - 45% .				
	The tile shall be laid on Microline / Silhouette profile grid system with 15mm - 16mm white flanges incorporating a 6mm central reveal in white/black colour and with a web height of 38mm and a load carrying capacity of minimum 8 Kgs/M2 & minimum pull out strength of 100 Kgs. Microline / Silhouette, Main Runners & Cross Tees to have mitred ends & "birdsmouth" notches to provide mitred cruciform junctions. The T Sections have a Galvanizing of 90 grams per M2 and need to be installed with Suspension system as per manufacturers details.				
	The Instalation to comprise main runner spaced at 1200mm centres securely fixed to the structural soffit using US Boral / Gyproc / Armstrong suspension system (specifications below) at 1200mm maximum centre. The First/Last suspension system at the end of each main runner should not be greater than 450mm from the adjacent wall.				

	Flush fitting 1200mm long cross tees to be interlocked between main runners at 600mm centre to form 1200 x 600 mm module. Cut cross tees longer than 600mm require independent support. 600 x 600mm module to be formed by fitting 600mm long flush fitting cross tees centrally between the 1200 mm cross tees. Perimeter trim to be Wall angles of size 3000mm x 19mm x 19mm, secured to walls at 450 mm maximum centres.				
12	**PLAIN FALSE CEILING:**	Sq.M.	160		
	Providing and fixing Concealed Grid suspended ceiling system of 12.5mm Gypsum Boards / Standard Plaster Boards fixed to ceiling Frame Work as per manufacturers instructions and details for a concealed grid key lock suspended ceiling system consisting of following:				
	(a) 27 x 37 x 1.6mm Soffit Clip, 5mm suspension rod / 25 x 10 x 0.5mm Ceiling Angle, adjustable spring loaded suspension clip / 2.64mm dia Connecting Clip, 20 x 28 x 30 x 0.5mm Perimeter Channel, Top Cross Rail of 3000mm long of 0.55BMT Furring Channel / 15 x 45 x 15 x 0.9mm Intermediate Channel and 4000mm long made of 0.5mm BMT the Top Cross Rail / 80 x 26 x 0.5mm Ceiling Section to be suspended from ceiling at every 1200mm and Furring / Intermediate Channel to be fixed to Top Cross Rail / Ceiling Section at every 600mm to make a grid of 1200 x 600mm.				
	(b) All sections used should adhere to the manufacturers guidelines and the contractor has to submit certificate from the manufacturer on usage of their specified sections.				

	(c) Further the rates to include cutouts for lighting fixtures / AC grilles / Fire Alarm Detectors etc., along with necessary strengthening and supports for fixing of these. The board joints are to be flush finished with jointing compound and paper tape etc., complete as directed.				
13	**VERTICAL FACES IN FALSE CEILING:**	Sq.M.	24		
	Same asabove but for vertical faces in false ceiling as per drawing including cut outs for AC grilles etc., complete as directed.				
14	**PLYWOOD FALSE CEILING:**	Sq.M.	12		
	Providing and making plywood ceiling with Trap Doors in Ceiling of approximate size 1800mm x 750mm made with 50mm x 50mm hard wood frame and shutter with hard wood frame of 35mm x 35mm with 19mm marine quality plywood / block board, the exposed surface of the ceiling to be cladded with 1mm thick laminate of approved shade and painted with enamel paint internally with necessary hardware viz., hinges, safety chain, lock, handle etc., complete as per drawings and directions.				
15	**VENEER FALSE CEILING:**	Sq.M.	9		
	Same as plain falce ceiling but for 12mm Plywood instead of Gypsum Plasterboard cladded with 4mm Veneer (Veneer Base Rate Rs - 1,500/- Sq.M.) with minimum three coats of melamine spray polish to a finished item of work as per drawings and directions etc., complete.				
B	**LOOSE FURNITURE WORKS:**				
1.00	**ASST GENERAL MANGER'S EXECUTIVE TABLE AND SIDE TABLE: size - 2400mm x 900mm x 750mm + 1200mm x 450mm x 750mm**	Each.	1		
	Providing, making and placing in position Executive Table and Side Table with following specifications and per dimensions specified.				

	(a) Tabletop and the front alround facia of the table to be made in 25mm block board with 6mm thick acrylic solid surface and double thickness at edges alround.				
	(b) All other members 19mm plywood and all exposed faces of the table to have 4mm Veneer (Veneer Base Rate Rs - 1,200/- Sq.M.) OR 1mm Laminate (Laminate Base Rate Rs - 500/- Sq.M.) as specified above to be used.				
	(c) All the edges of 19mm plywood to have 20mm x 6mm beech wood edge lipping.				
	(d) One ready made key board tray. (Eco - KTE1 - 35 - Ebco make.)				
	(e) One ready made hanging type pedestal for keeping CPU. (CPUSL, Ebco make.)				
	(f) One Electric Box Board. (EBB - 45, Ebco make.)				
	(g) 2 Nos. Electric Box Board. (EBB - 30, Ebco make.)				
	(h) All the exposed faces to have either 6mm thick acrylic solid surface of approved shade and make as specified above.				
	(i) All the unexposed faces to have 0.8mm thick Laminate				
	(j) A loose Ready Made Modular Foot Rest (FR2 - Ebco make.) to be provided for each table / work station.				
	(k) All wooden members and faces of veneer to have melamine spray polish finish.				
2.00	**MODULAR FURNITURE**				

2.1	**CM's EXECUTIVE TABLE, SIDE TABLE AND BACK CREDENZA: size - 1650mm8/1500mm x 750mm x 750mm + 1050mm x 450mm x 750mm SYSTEM - GABLE ENDTable top: 25mm thick Pre-laminate particle board with 2mm PVC edge lipping on allexposed edges.Gable End – Supported on 25mm thick PLT Gable ends.Modesty Panel - 18mm Thick Prelaminated Modesty Panel of 450mm Height.Wire Management - Anodised Finish Nos Flip up box 300 x 150 with soft closures,without sockets and switches are provided, PVC Cable Dump.Back Storage Unit Top – 25mm thick Pre laminate Particle board with 2mm PVCedge lipping.Back – 9mm thick Pre laminate Particle board with 2mm PVC edge lipping.Sides & Shutters – 18mm thick Pre laminate Particle board.Shelfs - 18mm thick Pre laminate Particle board.Handle - Finger Groove handles.Hardware – Door closing hinges, mini-fix, levellers & locks, etc.**	Each.	8		

2.2	**WORKSTATIONS WITH HALF HEIGHT PARTITIONS: L-SHAPE WORKSTATION- SIZE: 1500 L X 1500 W X 600 D X 1200 HTSYSTEM NEO-70MM**Partition - 50mm thick Slide on based Partition.Main spine - Neo 50mm thick partition system.Return spine - Neo 50mm thick partition system.Finishes / Tiles - Fabric above and Laminate below table top.Special Tiles - One Fabric Magnetic Board and One Glass Marker Tile.Table top - 25mm thick Pre-laminate particle board with 2mm PVC edge lipping on allexposed edges.Supports - 18mm thick PLT gable ends with necessary brackets.Wire Management - One metal Raceway tile to mount switches below the table toplevel for power and skiriting tile for data.65mm dia Grommet cut-out with ABS Cap.	Each.	32		
2.3	**MOBILE PEDESTAL UNIT: SIZE: 400L X 450D X 600HT** **Top & Sides: 18mm thick Pre-laminated particle board.** **Back: 9mm thick Pre-laminated particle board.** **Edges: All exposed area with 2mm thick PVC edge lipping.** **Handle: Finger Groove handles.** **Lock: Regular lock with locable castors.**	Each.	40		
2.4	**Modular FOOT REST & CPUTROLLY & Key board tray**	Each.	40		
2.5	**CONFERENCE ROOM TABLE: with courian top**	Rmt.	22		

2.6	**CUBICAL PARTITION : Size - 3000mm x 1200mm TYPE-60mm Panel Base SystemTABLE TOP -25mm thick E1 grade prelaminated table top with matching edgebanding with PVC flap 120mm(W) x 120mm(D) provision in anodized finish only60mm thick partition Above table top:- Each will have half pinup soft board & one laminate marker inside & rest all will be fabric hard boardUNDERSTRUCTURE- MS Powder coated MEET hookon type legs and MS Powder coated beams cosnsidered for table support.WIRE MANAGEMENT-2 level race ways - one at BTT only at main spine & skirting level race way at main spine & return spine**	Each.	5		
C	**STORAGE UNITS:**				
	Top – 25mm thick Pre laminate Particle board with 2mm PVC edge lipping. Back – 9mm thick Pre laminate Particle board with 2mm PVC edge lipping. Sides & Shutters – 18mm thick Pre laminate Particle board. Shelfs - 18mm thick Pre laminate Particle board. Handle - Finger Groove handles. Hardware – Door closing hinges, mini-fix, levellers & locks, etc.				
1.00	**STORAGE UNITS: Size - 750mm x 1200mm Top – 25mm thick Pre laminate Particle board with 2mm PVC edge lipping. Back – 9mm thick Pre laminate Particle board with 2mm PVC edge lipping. Sides & Shutters – 18mm thick Pre laminate Particle board. Shelfs - 18mm thick Pre laminate Particle board. Handle - Finger Groove handles. Hardware – Door closing hinges, mini-fix, levellers & locks, etc.**	Each.	12		
2.00	**STORAGE UNITS: Size - 900mm x 1200mm**	Each.	28		
3.00	**STORAGE UNITS: Size - 900mm x 750mm**	Each.	8		

4.00	**STORAGE UNITS: Size - 1350mm x 750mm**	Each.	12		
5.00	**LACQURED GLASS - AS A DIVIDER BETWEEN WORK STATIONS: Providing, making and placing in position Lacqured Toughened Glass 12mm thick, Sparkling Snow White shade, fixed over the table top of workstations as a divider of approximate size varyring 550mm x 450mm fixed with Table Partition Clamps (TPCS-8 of Ebco make). The edges of glass to be polished for a smooth surface.**	Each.	48		
D	**OTHER WORKS:**				
1.0	**PLASTIC EMULSION PAINTING: Cleaning the surface of the wall / ceiling and then applying one coat of Wall Care putty followed by one coat of primer & then applying second coat of putty to give smooth finish exactly in line and level & then finally applying a minimum of two coats of NO VOC or LOW VOC Plastic Emulsion Paint of approved shade to give a neat finish including cost of all materials necessary scaffolding etc., complete for walls & ceiling.**	Sq.M.	701		
2.0	**OIL BOUND DISTEMPER PAINTING:LOW VOC OR NO VOC OIL BOUND DISTEMPER PAINTING: Painting to walls with 2 coats of ready mixed oil bound washable distemper of approved brand and shade over a base coat of appropriate primer of approved brand, making 3 coats in all to give an even shade after thourughly brushing the surface to remove all dirt and remains of loose powdered materials, including cost and conveyance of all materials to work site and all operational, incidental, labour charges etc. complete for finished item of work.**	Sq.M.	64		

3.0	**SYNTHETIC ENAMEL PAINTING** **Painting to new MS Grille / steel windows with painting two coats of synthetic enamel paint Grade-I VOC (Volatile Organic Compound) content less than 50 grams/litre of approved shade including cost and conveyance of all materials to site cost of primer coat and all labour charges etc. complete including applying sand paper for neat finish and overheads & contractors profit complete in all floors.**	Sq.M.	29		
4.0	**VITRIFIED TILES FLOORING: Providing & laying flooring with Full Body Vitrified Tiles (Double Charged) of approved make, shade and colour of 800mm x 800mm size of 10 / 12mm thickness laid over laid over a flooring bed of 50mm to 100mm thick or more in CM 1:8 proportion including neat cement slurry of honey like consistency spread at the rate of 3.3 Kgs cement per Sq.M/ (or using laticrate over the existing flooring) . before laying tiles on base coat and filling the joints with white cement or colour cement to match the shade of tiles including cost of base coat, cement slurry, jointing material and cost and conveyance of all materials viz., cement, sand, water, vitrified tiles, white or coloured cement etc., to site, cost of seigniorage charges on materials, labour charges for all operations etc., complete as directed, curing etc., complete for finished item of work. Alternatively approved make Tile adhesive and jointing compound can be used without any extra cost. (Base Rate for body tiles - 750/Sq.M. and Base rate for dark tiles - 850/Sq.M.)**	Sq.M.	460		

5.0	**CARPET TILES FLOORING: CARPET CONFORMING TO GREEN SEAL: Providing and fixing in position carpet tiles of 500mm x 500mm x 6mm to 7mm total height and pile height 2.5mm - 3mm of Interface make, Furrows - Element - Time Warp series / Godrej or approved eqivalent make, for finished item of work etc., complete as directed.**	Sq.M.	89		
6.0	**ROLLER BLINDS:** **Providing and fixing in position of Roller Blinds of approved Fabric (Fabric Cost - RS. 1,000/- per Meter) of Hunter Douglas / Mac / Vista make or approved equivalent of approved shade etc., as directed.**	Sq.M.	50		
E	**CIVIL AND SANITARY WORKS:**				
1.0	**DISMANTLING WORKS BRICK MASONARY Dismantling, clearing away and carefully stacking useful materials for re-use and disposal of unserviceable materials in Brick masonary as directed by Architect/ Bank duly taking actual premeasurements before dismantling including all labour charges , overheads & contractor profit etc., complete.**	Sq.M.	64		
2.0	**200MM AAC BLOCK MASONRY: Providing and constructing Aerated (Cellular) Autoclaved Concrete Blocks conforming to IS:2185 (Part-3) - 1984 and IS:6441-1972 of Compressive strength 3 N/mm2 - 600 x 200 x 200 mm masonry in C.M. 1:5 in line and level including providing & laying cement concrete with proportion 1:2:4 using 12mm to 20 mm gauge down graded machine crushed metal & best quality sand on brick wall at approximatly 900 mm intervels & 75 mm thick including supplying and fabricating of 2 no 8 mm Dia bar placed horizontally in each bed as per drawings and direction. The 8 mm Dia bar is to be properly embeded in to column/wall at each junction etc., complete as per drawings and directions. and as directed by the Architect/ Bank.**	Sq.M.	23		

3.0	**100MM AAC BLOCK MASONRY: Providing and constructing 100 mm thick Aerated (Cellular) Autoclaved Concrete Blocks conforming to IS:2185 (Part-3) - 1984 and IS:6441-1972 of Compressive strength 3 N/mm2 - 600 x 200 x 100 mm masonry in C.M. 1:4 in line and level including providing & laying cement concrete with proportion 1:2:4 using 12mm to 20 mm gauge down graded machine crushed metal & best quality sand on brick wall at approximatly 900 mm intervels & 75 mm thick including supplying and fabricating of 1 no 8 mm Dia bar placed horizontally in each bed as per drawings and direction. The 8mm Dia bar is to be properly embeded in to column/wall at each junction etc., complete as per drawings and directions. and as directed by the Architect/ Bank.**	Sq.M.	12		
4.0	**EXTERNAL PLASTERING - 20MM THICK: Providing, Plastering 20mm thick to all uneven faces of brick masonry walls / aerocon block walls with a base coat of 16mm thick in CM 1:6 and top coat of 4mm thick in CM 1:4 with dubara sponge finishing, including cost and conveyance of all materials to site, seigniorage charges, all labour charges for mixing mortar, scaffolding, curing, etc., complete for finished item of work.**	Sq.M.	167		
5.0	**INTERNAL PLASTERING - 12MM THICK: Providing and applying 12mm thick cement plastering in two coats i.e., a base coat of 12 mm thickness in CM 1:5 and to a sponge finish to ceilings and walls to an exact line and level including curing, scaffolding etc.,providing and fixing of MS jali (Chicken Mesh) at all joints between brick masonry and concrete works etc., complete for finished item of work and as directed by Architect / Bank.**	Sq.M.	20		

6.0	**RCC LINTELS: Supply and placing of the Concrete M 25 grade corresponding to IS 456 with minimum cement content of 380 kgs per 1 cum of concrete using WEIGH BATCHER / MIXER with 20mm size graded machine crushed hard granite metal (coarse aggregate - as per IS 383 - 1970 and IS 2386 Part 1 to Part 8) from approved quarry including cost and conveyance of all materials like cement, fine aggregate (sand) coarse aggregate, water etc., to site and sales & other taxes on all materials, centering using Casurina Ballies, Bamboos, Wooden Reapers, Runners, Wood Posts, Wall Plates etc., including all operational, incidental and labour charges such as weigh batching, machine mixing, lifting of concrete manually, laying concrete, curing , overheads & contractors profit etc., complete including cost of steel and its fabrication charges for finished item of work and as directed by Architect / Bank.**	Cu.M.	3		

7.0	**RCC SUN-SHADES: Reinforced cement concrete with M 25 grade Design mix (by weigh batching) as per using 20mm size (SS 5) machine crushed hard granite graded metal (coarse aggregate) from approved quarry using a minimum quantity of 360 Kg of cement and required quantity of Chemical Admixture per 1 Cum of concrete including cost and conveyance of all materials like cement, fine aggregate (sand) ,coarse aggregate, water etc. to site and cost of seigniorage charges on all materials including centering using Cashewrina Ballies and Wooden runners & staging including all bracings, cross members etc., shuttering, machine mixing, laying concrete, 7.5cm thick at fixed end and 5cm thick at free end with an average thickness of 6.25cm including plastering to all exposed faces 12mm thick in CM (1:4) including providing drip course band of 12mm x 12mm in CM (1:4) proportion including labour charges for mixing, laying, curing etc., complete including cost of steel and its fabrication charges for finished item of work and as directed by Architect / Bank.**	Cu.M.	3		

8.0	**FLUSH DOORS WITH FRAMES: Supply and fixing of doors as per approved drawings with WPC (Wood Polymer Composite) frame of section 125mm x 75 mm and BIS marked solid core flush door shutter of 35mm thick single shutters with bond wood solid block board type Core having cross bands and face veneers, hot pressed bonded with water proof phenol formaldehyde synthetic resin factory made both sides commercial ply with internal lipping on all sides and fixed with 1mm Laminate (dark and light) on both sides including cost and conveyance to site of WPC frame, flush shutter including supply and fixing Bed Blocks and 6 nos MS Z hold fasts of size 300 mm x 40 mm x 5mm. including cost and conveyance of all materials, accessories, labour charges for transportation, erection at site complete for finished item of work.**	Sq.M.	2		
9.0	**UPVC WINDOWS : Supplying and fixing of Unplasticized PolyVinyl Chloride (UPVC) 3 track sliding windows with mesh shutter provision – (only 2-glass shutters) duly manufactured using UPVC reinforced profiles (Composition of profile shall consists a minimum of 5.5 PHR of TiO2 and not more than 12 PHR of CaCo3 for every 100 parts of PVC resin) of (80 mm x 52 mm)/ including cost and conveyance of all materials, accessories, labour charges for transportation, erection at site complete for finished item of work.**	Sq.M.	36		

10.0	**UPVC VENTILATORS :** **Providing, supplying & fixing of Top hung Ventilator with Exhaust Fan Provision made out of multi chambered uPVC sections with TPV Gasket for sash & Glazing bead shall be co-extruded with Grey colour soft PVC and reinforced with Galvanized Iron profiles.** **through out the window. The outer frame having an overall size of 60mm x 55 mm x 2.40 mm with reinforcement of 1 mm thickness, Mullion with overall size of 74 mm x 60 mm x 2.40 mm with reinforcement of 1 mm thickness and Sash with overall size of 75 mm x 60 mm x 2.40 mm with reinforcement of 1.0/1.2 mm thickness. (Composition of profile shall consists a minimum of 5.5 PHR of TiO2 and not more than 12 PHR of CaCo3 for every 100 parts of PVC resin). Glazing bead for fixing of glass shall be of size 34 x 20 mm coextruded with soft PVC gasket. Ventilator shall be provided with 4.5 mm Pin Head glass, standard hardware, single point locking using cockspur handle and friction stays. Wall thickness of frame, mullion and sash shall be 2.4 mm., including cost and conveyance of all materials, accessories, labour charges for transportation, erection at site complete for finished item of work.**	Sq.M.	2		
11.0	**ANTI SKID CERAMIC TILES FLOORING:**	Sq.M.	3		

	Providing & laying flooring with edge cut Ceramic Tiles of JHONSON / VARMORA / CENGRES / MARBITO / SIMPOLO / RAK /KAJARIA / NITCO / SOMANY or approved equivalent make, shade and colour of 300mm x 300mm size of 7.3mm thickness laid over laid over a flooring bed of 50mm to 75mm thick or more in CM 1:8 proportion including neat cement slurry of honey like consistency spread at the rate of 3.3 Kgs cement per Sq.M. before laying tiles on base coat and filling the joints with white cement or colour cement to match the shade of tiles including cost of base coat, cement slurry, jointing material and cost and conveyance of all materials viz., cement, sand, water, ceramic tiles, white or coloured cement etc., to site, cost of seigniorage charges on materials, labour charges for all operations etc., complete as directed, curing etc., complete for finished item of work.				
	Alternatively approved make Tile adhesive and jointing compound can be used without any extra cost. The Rate should also include dismantling, clearing away disposal materials as directed by Architect / Bank. (Base Rate for tiles - 400/Sq.M.)				
12.0	**GLAZED TILES DADO WORK: BODY TILES:**	Sq.M.	11		

	Providing & laying Glazed Tiles Dado work with Johnson - Wall Tiles Collection (300mm x 450mm) or approved equivalent make tiles of specified size and series mentioned to be fixed to the plastered walls using tile adhesive (Laticrete-290 or equivalent) and filling the joints with epoxy grout of approved make and colour to match the shade of tiles including cost of base coat, cement slurry, jointing material and conveyance of all materials viz., cement, sand, water, ceramic tiles, white or coloured cement etc., to site, cost of seigniorage charges on materials, labour charges for all operations etc., complete as directed, curing etc., complete for finished item of work. **The Rate should also include dismantling, clearing away disposal materials as directed by Architect / Bank.**				
13.0	**HIGH LIGHER TILES:**	Sq.M.	7		
	BODY TILES: Same as item no 3.1.10 mentioned above but for the following specified tile work etc., complete and as directed by Architect / Bank.				
14.0	**SCREED CONCRETING**	Sq.M.	5		

	Providing and laying of Screed concrete in proportion of 1:1.5:3 (Cement: Sand:Baby Chips of 6mm size) to the required slope towards the drain with finishing on an average of 50mm thick to be placed after chipping of flooring and cure for a few days/as instructed by the architect. Admixed with approved waterproofing compound B DRY Conproof IWC (Integral waterproofing compound confirming to IS 2645) at the dosage of 125ml/bag of cement including cost and conveyance of all materials like cement, sand, water etc., to site, including sales & other taxes on all materials, and all operational, incidental charges on materials and including cost of all labour charges for mixing mortar, finishing, lift charges, curing, etc., and overheads & contractors profit etc., complete for finished item of work and as directed by Architect / Bank.				
15.0	**WATER PROOFING:**	Sq.M.	9		

	Cleaning the wall/floor Mechanically including wire brushing remove all loose particles of cement motor, oils from the flooring. Later with a water jet clean all the flooring 24 hours before the work starts. Providing and applying two coats of BDRY POLYFLEX WP, High performance polymer modified cementations waterproof coating with very high flexibility comprising of a BDRY POLYFLEX WP with 50% polymer component and 1200% elongation at break along with B DRY microfine cement, with application as follows : Prepare a slurry using 1 part by weight of Polymer and 1¼ B Dry Microfine Cement. Use a mix by weight of 1:1¼ for the first coat and 1:1¼ for subsequent coats. The mixing is best done using a low- speed stirrer, but continuous hand-mixing to a lump-free consistency is also adequate. Apply the slurry by brush to the damp surface. Prepare only as much slurry as can be used within 30 minutes. Keep the mix continuously stirred.				
	Apply by brush two more coats of similar slurry at 24 hour intervals and allow to set for 48 hours. Cure the coating for 7 days by sprinkling water thrice a day on the vertical surface (external walls) and by moist gunny bags on the horizontal surface. The total thickness of coating shall be 1.0 mm, etc., complete for finished item of work and as directed by Architect / Bank.				
F	**SANITARY WORKS:**				
1	**150MM DIA SWG (STONE WARE GLAZED) PIPES:**	Rmt.	20		

2	Supplying and laying of following diameter Soil Waste pipe of approved make and quality to the required slopes, alignments, as per drawings, making joints with proper sealent including necessary excavation, refilling, consolidating earth and disposing of excess earth and cradling with PCC 1:4:8 and also including providing and fixing of necessary specials like tees and bends wherever necessary etc., complete as directed.				
2.1	**SOIL WASTE RAIN - (PVC) PIPES: 160MM DIA SWR PIPES:**	Rmt.	20		
2.2	**SOIL WASTE RAIN - (PVC) PIPES: 110MM DIA SWR PIPES:B42**	Rmt.	40		
2.3	**SOIL WASTE RAIN - (PVC) PIPES: 75MM DIA SWR PIPES:**	Rmt.	30		
3	**Supplying and fixing in position of following diameter CPVC pipes of approved make and quality confirming to BIS specifications including all necessary specials like couplings, unions, flanges, tees, elbows, bends, plugs etc., and excavation in all types of soils upto required depth, refilling, concealing pipeline by chasing walls or constructing brick masonry pedestals wherever required, MS clamps, wooden blocks, Bombay nails anti-corrosive painting etc., complete as per drawings and directions.**				
3.1	**CPVC PIPES:50MM DIA CPVC PIPES:**	Rmt.	20		
3.2	**CPVC PIPES: 35MM DIA CPVC PIPES:**	Rmt.	20		
3.3	**CPVC PIPES:25MM DIA CPVC PIPES:**	Rmt.	15		
4	**15MM DIA CPVC PIPES:**	Rmt.	25		
5	**NAHANI TRAP: Supplying & fixing CI Nahany traps 1st quality ISI marked conforming to IS:1729-1979 with C.P. Grating fixing with white cement as per site requirements with standard practice for 100 mm dia Inlet- 75 mm (3") outlet pipe - 4 Kgs**	Each.	1		

6	**GULLY GRAP : Supplying and fixing of SWG Gully traps 150mm x 100mm of ISI make confirming to IS 651 & 4127 with C.I grating & constructing cement brick masonry in CM (1:6) prop., intermediate chamber and fitted with 304.8 mm X 288.6 mm (12"x9") C.I Frame with hinged cover of standard make as approved including cost and conveyance of all materials to site, labour charges, overheads & contractors profit etc., complete for finished item of work.**	Each.	2		
7	**INSPECTION CHAMBERS: Constructing 457.2 mm x 457.2 mm (1'6"x1'6") brick in CM 1:6 prop. Masonry. Inspection chamber upto 914.4 mm (3'0") and fitted with light weight 457.2 mm x 457.2 mm (1'6"x1'6") C.I frame and cover of 20 Kg including cost and conveyance of all materials like cement, sand, bricks, water etc., to site, cost of seigniorage charges on all materials and all incidental and operational, labour charges like mixing cement mortar, constructing masonry, lift charges, curing , overheads & contractors profit etc., complete for finished item of work as per Standard specification.**	Each.	2		
F	**SANITARY FIXTURES:**	-			
1	**EWC - EUROPEAN WATER CLOSET: EWC: (Base Rate: RS. 11,000/- each.) - Wall Hung, with soft close seat and cover of Jaguar or approved equivalent make with all necessary materials for fixing and placing in position viz., long bend, wall support bolts etc., complete as directed.**	Each.	1		
2	**WALL HUNG WASH BASIN: WALL HUNG INTEGRATED BASIN: (Base Rate: RS. 6,500/- each.) Wash Basin with Integrated Half Pedestal with all necessary materials viz., Bottle Trap extension arrangement for fixing and placing in position etc., complete as directed.**	Each.	1		

3	**HAND SHOWER - HEALTH FAUCET: HEALTH FAUCET: (Base Rate: RS. 1,000/- each.) Hand Shower with (Health Faucet) with One meter length extension of Jaguar or approved equivalent make with all necessary materials viz., arrangement for fixing and placing in position etc., complete as directed.**	Each.	1		
4	**PILLAR COCK FOR WASH BASIN: PILLAR COCK: (Base Rate: RS. 1,300/- each.) Pillar Cock of Jaguar or approved equivalent make with all necessary materials viz., arrangement for fixing and placing in position etc., complete as directed.**	Each.	1		
5	**CONCEALED STOP COCK: CONCEALED STOP COCK WITH WALL FLANGE: (Base Rate: RS. 500/- each.) Concealed Stop Cock with Wall Flange of Jaguar or approved equivalent make with all necessary materials viz., arrangement for fixing and placing in position etc., complete as directed.**	Each.	2		
6	**BIB COCK: BIB COCK WITH WALL FLANGE: (Base Rate: RS. 1,250/- each.) Bib Stop Cock with Wall Flange of Jaguar or approved equivalent make with all necessary materials viz., arrangement for fixing and placing in position etc., complete as directed.**	Each.	1		
7	**BOTTLE TRAP: BOTTLE TRAP: (Base Rate: RS. 1,000/- each.) Bottle Trap of Jaguar or approved equivalent make with all necessary materials viz., arrangement for fixing and placing in position etc., complete as directed.**	Each.	1		
8	**WASTE COUPLING: WASTE COUPLING: (Base Rate: RS. 350/- each.) Waste Coupling, 32mm Half Thread of Jaguar or approved equivalent make with all necessary materials viz., arrangement for fixing and placing in position etc., complete as directed.**	Each.	1		

9	**CONCEALED CISTERN WITH FLOOR MOUNTING FRAME: CONCEALED CISTERN WITH FLOOR MOUNTING FRAME - (Base Rate: RS. 6,000/- each.) Providing and fixing of Single Piece Slim Concealed Cistern with Floor Mounting Frame, Installation Kit, " S - Type " Drain Pipe Connection Set for Wall Hung WC of Jaguar or approved equivalent make with wall brackets etc., The cost to include the cistern its allied components, its proper fixing, testing, commissioning etc., for a finished item of work etc., complete as directed.**	Each.	1		
10	**CISTERN CONTROL FLUSH PLATE: CISTERN CONTROL FLUSH PLATE - (Base Rate: RS. 1,050/- each.) Providing and fixing of Control Plate - of Jaguar or approved equivalent make. The cost to include the cistern its allied components, its proper fixing, testing, commissioning etc., for a finished item of work etc., complete as directed.**	Each.	1		
11	**SOAP DISPENSER WITH GLASS BOTTLE: SOAP DISPENSOR WITH GLASS BOTTLE: (Base Rate: RS. 1,200/- each.) Soap Dispensor of Jaguar or approved equivalent make with all necessary materials viz., arrangement for fixing and placing in position etc., complete as directed.**	Each.	1		
12	**TOWEL RING SQUARE: TOWEL RING: (Base Rate: RS. 800/- each.) Towel Ring with Round Flange of Jaguar or approved equivalent make with all necessary materials viz., arrangement for fixing and placing in position etc., complete as directed.**	Each.	1		

13	**MIRRORS: Providing, making and placing in position Toilet Mirrors with Ledge of overall size 600mm x 900mm made in 19mm plywood backing with 1mm laminate as specified above and 100mm ledge made with 19mm plywood with 1mm laminate as specified above including 8mm thick mirror with 19mm plywood 75mm alround with 1mm laminate as specified above and 20mm x 20mm beech wood beading all round the mirror. All exposed faces to have 1mm laminate and all unexposed faces to have two coats of synthetic enamel paint, all edges of plywood / blockboard to have 20mm x 6mm beech wood edge lipping. All beech wooden members to have melamine spray polish finish. The rate should include all necessary hardware, back hole frame fixing etc., as per drawings and directions.**	Each.	1		
	ELECTRICAL WORKS				
1	**DISTRIBUTION BOARDS:-** Supply, installation and concelling/surface of following size MCB/MCCB/RCBO distribution boards with following combination of C curve-MCBs as required. the scope of work includes supply of blanking paltes for Vacant slots.				
a	Supply & Installation of 200A, 4Pole, 25KA MCCB in the existing fabricated panel by dismantling the old MCCB as main incomer to RBO	No	1		
b	Master Control DB: Supply & fabrication of free standing wall mounted M V panel made out of 14SWG MS sheet after seven tank process and painting with epoxy powder coating with vertical cubicles as detailed below. 1. CUBLICLE-1: 200A, 4P, 25KA MCCB with vary deep extendable handle to Main Panel - 1 No. 2. CUBICLE-2: 160A, 4P, 25K MCCB with vary deep extendable handle to AC Outdoor Units Panel - 1 No. Note : install panel at the second entry. if there is no second entry install the same near main entrance.	No	1		
c	MAIN PANEL- "Fabrication, Supply, installation, Testing and Commissioning of 3 phase and neutral 415V, 4 wire, free standing floor mounted M.V panel made out of 14SWG MS sheet after seven tank process and painting with epoxy powder coating. The panel shall consist of suitable rating TPN Aluminium busbar (at the rating of 1.5A/ sq.mm) supported with DMC/ SMC barriers and colour coded with heat shrinkable sleeves. The metering shall be provided as specified. The panel shall have short circuit withstanding capacity of minimum 50KA and consist of switchgear as under. The panel shall be got fabricated with CPRI test certificate only. The size of all panel mounting meters shall be 96 X 96 MM. The panels shall be mounted on U channels including supply and fixing of the same. a) Phase Indicating lamps LED type with MCB control - 1Set b) On, off, trip, indication lamps - 1Set c) Multi function digital meter of 160A/5A, CL-1, 5VA CT's with tape wound - 1 job	No	1		

	d) Digital Energy Meter with RS-485 Communication Port. **Incomer:** (1) 200A, 25KA, 4P MCCB with extendable handle - 1 No.				
	Outgoings: (2) 100A, 25KA, 4P MCCB - 1 No (3) 63A, 16KA, 4P, MCCB to Ductable AC - 1 No. (4) 63A,16KA, 4P, MCB to PDB's - 4 nos (5) 40A,10KA, 4P, MCB TO LDB's - 4 nos (6) 63A, 36KA, FP, MCCB - 1no with TVSS (Surge Supp.) Note: Fabricate the panel as per SLD."				
d	AC DB 3 phase 4 way Ekinox³ TPN DB-VTPN DB's for DX³ MCB, IP 43 - #IK 09 with metal Double door:- (1) 63A, 4P, MCB-1 no (input from PDB) (2) 63A, 4P, 100mA, RCCB-1 No (Input) (3) 32A, 3P, MCB-01 No (cassette Acs) (4) 6-32A SP, MCB-9 No (cassette/ split Acs)"	No	1		
e	**LDB** Ekinox³ TPN DB - 8 way 7 segment DB's for DX³ MCB, Isolator, RCCB and RCBO :With provision for FP MCB/Isolator/RCCB/RCBO as incomer and SP MCB's as (1) 40 A 4 Pole MCB-1no (Input From COS) (2) 40A 2P 30mA / 100mA RCCB-3no (3) 6-10A SP MCB-18no for raw power sockets and light point circuits (4) 16A SP MCB-3 nos of water cooler, Kitchen power point (5) 20A SP MCB-3 no as spare	No	2		
f	**PDB:** **3 phase 4 way Ekinox³ TPN DB-VTPN DB's** **for DX³ MCB, IP 43 - #IK 09 with metal Double door:-** (1) 63A, 4P, MCB-1 no (input from Main DB) (2) 63A,4P, 100mA, RCCB - 1 no (Input) (3) 6-32A SP MCB - 12 Nos. (To work stations)	No	3		
g	MCB WITH ENCLOSURE FOR CASSETTE AC(1 PH) SITC of 20A 2 pole MCB in a suitable weather proof enclosure for cassette Acs	No	2		
h	MCB WITH ENCLOSURE FOR CASSETTE AC(3PH) SITC of 63A 4 pole MCB in a suitable weather proof metal enclosure for cassette Acs	No	2		
	UPS & RELATED DBS				
i	UPS INPUT DB: DP/TP/FP Metal enclosure with 1 no of 63A 4 P MCB for 7.5 to 10 KVA UPS.	No	2		
j	UPS OUTPUT DB DP/TP/FP Metal enclosure with 1 no of 63A DP MCB for 7.5 to 10KVA	No	2		
k	**UPS OUTPUT DISTRIBUTION DB NEAR UPS** SITC of 4 Way, VTPN TPN MCB DB (Metal door) with 63A, TPN, MCB -1 No as incomer and 40A (10KA) TP MCBs -4Nos as outgoings. MAIN UDB	NO	2		
n	**UPS DB IN BANKING HALL** SITC of 4 Way, TPN MCB DB (Metal door) with 40A, 4P, MCB -1 No as incomer and 6-32 A (10KA) SP MCBs -12 Nos. as outgoings. For UPS DB	No	4		
o	**UPS DB IN BANKING HALL** SPN 12 way IP 43 - #IK 09 with metal Double door DB for UPS sockets. The scope of work includes supply & fixing of	No	1		

	following MCBs: (1) 32A DP MCB-1NO, (2)6-10A SP MCB-10NO				
p	**UPS DB** SPN 8 way IP 43 - #IK 09 with metal Double door DB for UPS sockets. The scope of work includes supply & fixing of following MCBs: (1) 32A DP MCB-1NO, (2)6-10A SP MCB-6NO	No	1		
2	**ARMOURED CABLES FOR DB INPUT, CASSETTE ACS & UPS INPUT DB:-** Supply, Laying, Testing and commissioning of 1.1 KV grade XLPE insulated armoured alluminium/copper conductor cable of the following size including laying in trenches, cable trays, on wall including claming and including civil works etc complete as per IS 7098 - Part 1 - 1983. The scope of work includes supply & laying of 2 runs of 8 SWG GI wire along with the cable				
a	3.5C X 120 SQMM ALU CABLE	Rmt	160		
b	3.5C X 95 SQMM ALU CABLE	Rmt	130		
c	3.5C X 50 SQMM ALU CABLE	Rmt	50		
d	3.5C X 25 SQMM ALU CABLE	Rmt	180		
e	4C X 16 SQMM CU CABLE	Rmt	40		
f	4C X 10 SQMM CU CABLE	Rmt	380		
g	4C X 6 SQMM CU CABLE	Rmt	170		
h	4C X 4 SQMM CU CABLE	Rmt	110		
i	3 C X 4 SQMM CU CABLE	Rmt	180		
j	3 C X 2.5 SQMM CU CABLE	Rmt	40		
3	**TERMINATIONS:** Termination of the following cables with **double compression(DC/ Single compression(SC) cable glands** and also with suitable size alluminiumn/copper lugs including supply and fixing of Lugs.				
a	3.5C X 120 SQMM ALU CABLE (SC)	No	6		
b	3.5C X 95 SQMM ALU CABLE (SC)	No	6		
c	3.5C X 50 SQMM ALU CABLE (SC)	No	6		
d	3.5C X 25 SQMM ALU CABLE (SC)	No	10		
e	4C X 16 SQMM CU CABLE (SC)	No	4		
f	4C X 10 SQMM CU CABLE (DC)	No	12		
g	4C X 6 SQMM CU CABLE (DC)	No	6		
h	4C X 4 SQMM CU CABLE (DC)	No	4		
i	3 C X 4 SQMM CU CABLE (DC)	No	10		
j	3 C X 2.5 SQMM CU CABLE (DC)	No	4		
4	**UPS INTERNAL WIRING**				
	Supply, laying and dressing of following 1.1KV XLPE Insulated, PVC tape/PVC Extruded Innersheathed for Multicore **copper flexible Cables**, extruded PVC Type ST2 Sheathed, 650/1100 V grade as per IS 7098 (Part 1) 1988. The scope of work includes laying of cable in a suitable metal hose flexible pipe .complete the work as directed by				

	theSBIIMS. the cable should be laid from UPS I/P to UPS I/P enclosure & UPS O/P to UPS ouput enclosure only.				
a	4 core X 6 sqmm coppe flexible cable	Rmt	80		
5	**AC WIRING**				
a	**SPLIT AC WIRING:-** Supply and Fixing of 20 A DP MCB fixed on a suitable module metal box including all interconnections as required. (for High Wall Spli ACs) along with supply & laying of 3 C* 4 sqmm copper armoured cable concealed on wall/ Ceiling etc as required. The wires should be conforming to IS 694 (with latest amendments).The scope of work includes wiring from AC DB to DP MCB to AC unit .	No	2		
6	**GLOW SIGN BOARD:-** Supply & laying of **3core 1.5sqmm Copper flexible Cable** in a suitable FRLS PVC pipe for Glow Sign Board including all terminations	Rmt	80		
7	**EMERGENCY LIGHTING(UPS SUPPLY)** Supply & laying of 3 core 1.5 sqmm copper flexible cable in a suitable FRLS PVC pipe for emergency lighting. The scope of work includes **supply & fixing of 2A DP MCB** in a suitable enclosure. No of points :One primary point & two secondary points. The scope of work extends to **supply & fixing of 3 no of square type 15 watts recess** mounted LED lights also.	No	2		
8	**LIGHT & FAN POINT WIRING:-** Point Wiring for Light/fan point with 3X1.5 sqmm copper conductor FRLS insulated 1100v grade multi strand wires (P+N+E) in concealed/ surface using 20/25/32 Medium duty FRLS PVC conduit 16swg thick with all bend, tees, saddle mounting box, cover plate, ceiling rose, etc. complete as required etc. The scope of work includes the circuit wiring from DB to point control box /switch box using 3x2.5 sq mm copper conductor FRLS insulated 1100V grade multistrand wire (P+N+E) in FRLS PVC conduit 16 swg thick complete in all respect. Each circuit shall have separate earth wire. All switch socket must be modular type with M.S. Boxes and plate etc. as required.				
a	Primary points	No	130		
b	same as the above secondary point (only one secondary point on the primary point	No	53		
c	one switch controlled by three lights	No	2		
d	Call bell points for the cabins including supply of call bell as required	No	2		
9	**MODULAR SOCKETS:** Supply and fixing of switch(s) & socket(s) fixed on a suitable module metal box(16 guage) and white front plate (Modular type) including all interconnections as required and blank plate has to be provided if necessary. The scope of work extends to Supply and wiring with **2runs of 4.0 sq.mm & one run of 2.5sqmm** 1100 V grade PVC insulated multi strand **FRLS copper conductor wires** conforming to IS 694 (with latest amendments) in suitable size FRLS PVC CONDUIT of 2mm thick concealed in the above ducts in the floor and supply of all fixing materials and accessories, interconnections complete as required for the UPS/ raw power sockets in the single window counters and officer tables.				

a	**PRIMARY POINT: RAW POWER** 1 no of 6/16A socket with 1 no of 16A switch For power point in banking hall cooler, Kitch	No	10		
b	**PRIMARY POINT: RAW POWER** 2 nos of 6/16A socket with 2 no of 16A switch For Kitchen	No	10		
10	Supply and fixing of switch(s) & socket(s) fixed on a suitable module metal box(16 guage) and white front plate (Modular type) including all interconnections as required and blank plate has to be provided if necessary. The scope of work extends to Supply and wiring with **3runs of 2.5 sq.mm** 1100 V grade PVC insulated multi strand **FRLS copper conductor wires** conforming to IS 694 (with latest amendments) in suitable size FRLS PVC CONDUIT of 2mm thick concealed in the above ducts in the floor and supply of all fixing materials and accessories, interconnections complete as required for the UPS/ raw power sockets in the single window counters and officer tables.				
a	PRIMARY POINT- RAW POWER 1nos6/16A Socket and 1nos 16A switch (Rawpower point switch and socket to be installed ina metal box) . The scope of work extends supply of **3 meter length of flexible 3core 2.5sqmm multi core copper cable** one end connected to **plug top 16A** and the other connected to the SB inside and a suitable hook arrangment as required for hanging the cable required for **Record rooms & Safe room**, LOCKER room, Strong room, stationary room(Independent Circuits)	No	2		
b	**PRIMARY POINT:UPS POWER 4nos. 6A sockets** with **1 no 16A switch** for NET WORK RACK, CCTV etc)	No	4		
11	Supply and fixing of switch(s) & socket(s) fixed on a suitable module metal box(16 guage) and white front plate (Modular type) including all interconnections as required and blank plate has to be provided if necessary. The scope of work extends to Supply and wiring with **3runs of 1.5 sq.mm** 1100 V grade PVC insulated multi strand FRLS copper conductor wires conforming to IS 694 (with latest amendments) in suitable size **FRLS PVC CONDUIT** of 2mm thick concealed in the above ducts in the floor and supply of all fixing materials and accessories, interconnections complete as required for the UPS/ raw power sockets in the single window counters and officer tables. **if these sockets are mounted in SB (along with point wiring) we will treat it as on board socket.**				
a	**PRIMARY POINT:UPS POWER 4nos. 6A sockets** with **1 no 16A switch** (Switch shall be fixed above the table and sockets shall be fixed below the counter OF BM, SWO, field officer, Grahakamitra, Cash officers, gold loan, etc)	No	46		
b	**PRIMARY POINT: RAW POWER 2nos 6A SocketS** with **1 No of 6A switch** (Raw Sockets)- for counters(Switch & Socket should be mounted above the table	No	22		
c	**SECONDARY POINT: RAW POWER (2 X6A socket & 1 X6A switch)** same as above but looped from nearest point (Primary point to Secondary point) from counter to counter	No	22		

d	**PRIMARY POINT:UPS/ RAW POWER** **2 nos of 6A socket** with **2 no of 6A switch** for display,coin vending machine, pass book printing	No	10		
e	**PRIMARY POINT: UPS/RAW POWER** **1 nos of 6A socket** with **1 no of 6A switch** for fire panel	No	10		
12	Supply and fixing of switch(s) & socket(s) fixed on a suitable module metal box(16 guage) and white front plate (Modular type) including all interconnections as required and blank plate has to be provided if necessary.				
a	**ON BOARD SWITCH & SOCKET** **1 no of 6A socket** with **1 no of 6A** switch and it should be fixed in the switch board -RAW POWER	No	15		
b	**SOCKET FOR WALL MOUNTING FAN** **1 no of 6A** socket 3" below the false ceiling for wall mounting fan - RAW POWER	No	20		
13	**SUPPLY & FIXING OF EXHAUST FANS WITH TIMER** Supply & fixing of **2 no of bird cage exhaust fans(300mm)** with **timer** control for the exhaust fans in the UPS room. The scope of work includes point wiring & making provision in the wall for installation of exhaust fans and bring back to original finish.	No	1		
14	**NETWORKING**				
a	**POINT WIRING:** Supplying, laying, tesing and commissioning of four pair CAT 6, UTP cable 23 AWG solid bare copper or better;Insulation - Polyethylene;Jacket - Flame Retardant PVC;Pair Separator - Star Quad Separator or equivalent; 250 MHz;UL Subject 444, EIAITIA-568 B.2.1, ISO/IEC 11801 & IEC61156·5for LAN in a suitable FRLS PVC conduit of 2mm thick and making connection on both ends complete as required with all acessories including labour charges. The scope of work includes supply & fixing of RJ-45 LAN socket outlet(I/O) in GI metal box and front cover plate	No	94		
b	SITC of branded UTP Category 6 four pair, 1 meter Patch Cord with factory crimped boots on RJ 45 plugs at both ends. Should conform or exceed ISO/IEC 11801, EIA/TIA 568, EN50173 and UL, ETL	No	94		
c	SITC of branded UTP Category 6 four pair, 2 meter Patch Cord with factory crimped boots on RJ 45 plugs at both ends. Should conform or exceed ISO/IEC 11801, EIA/TIA 568, EN50173 and UL, ETL	No	94		
d	Supply of Cat-6 24 port jack panel make-D-link or equlent (Uplink data cable for connecting the two Jack panels is also included under the scope of work)	No	4		
e	Supply of 9U wall mount rack with all accessories(self, power manager, cable Manager, Fan etc. Pl note that while installing the rack, power supply sockets and switch to be installaed above the rack. To avoid loose hanging power wires.	No	2		
15	**TELI PHONE WIRING**				
	POINT WIRING Supply, installation, testing and commissioing of high Conductivity Solid Annealed Bare Copper industrial 0.5mm dia Telephone (Switchboard) Cables with High Density Polyethylene Insulation, Paired, Polyester and Sheathed with High Oxygen Index, Fire Retardant, PVC Compound, Grey Outer Sheath generally conforming ITD Specification. the scope of work inclusive of all fixing accessories & laying in a suitable ISI medimum PVC conduit. The scope of work				

	extends to Supply and Fixing of modular type RJ11 Telephone outlet with anodized GI box and front plate complete as required.				
a	2 pair	No	46		
16	**KRONE ENCLOSURE**				
	Supply, installation, testing & commissioning of Telephone krone in an MS powder coated enclosure for the following sizes.				
a	50 PAIR KRONE	No	1		
b	SITC of EPABX intercom box suitable for 50 pair crone connector with all necessary connections required	No	1		
17	**PA & MUSIC SYSTEM**				
a	S & I of point wiring for music - cum PA system comprising of 2x 1.0 sqmm stranded , copper conductor , flexible PVC insulated and PVC Sheathed wire pulled through 20 mm dia FRLS PVC heavy gauge conduits and looped from one speaker to other and to the volume control and control switch wherever applicable and finally terminated at Tag Block.	Pts.	13		
b	S & I of Philips / Bosch/Ahuja make music 6W (101.6mm Diameter) speaker flush mounted on the false ceiling with proper clamping arrangement	Nos.	13		
c	S & I of 100 Watts BOSCH/Ahuja make Central Music System Amplifier and MP3/CD/USB Player with FM facility of make Samsung/Onida/LG.	SET	1		
18	**FIXTURES/FANS(All light fixtures and fans to be supplied COMMERCIAL MODELS only)**				
	Supply & Installation of following type direct/ indirect type recess/surface/ wall mounted light fixtures. The fixtures shall be installed including supply and wiring between Ceiling rose to fixture with supply and laying of 3core 1.5Sq.mm copper flexible cable and fixing of Lamp with all required accessories, support chains & interconnections etc. including cost and conveyance of all materials, taxes and all labor charges etc., complete.				
a	Supply & Installation of **15W** Led down light fixture. (Havells:- Integra neo 15W, 857 CROMPTON: LCDRQ-15-CDL/LCDRO-15-CDL or DN296B LED15S 6500K in Philips or equivalent) including cost and conveyance of all materials, taxes and all labor charges etc., complete.	No	58		
b	Supply & Installation of **33-36W** 2X2 LedLight fixtures **(Havells - PLANO2X2PLR36WLED857S / VENUSNEOHE2X2PLR34WLED8XXS or CROMPTON: LCTLRNE-36-FO-CDL or Philips RC 375B30S 6500K or Equl)** including cost and conveyance of all materials, taxes and all labor charges etc., complete. Weight of the light should not be on the grid/ Gypsum ceiling. light has to be fixed with the help of GI/chain wires and to the anchroed to the ceiling.	No	56		
c	Supply & Installation of 610x610 LedLight fixtures Frames including cost and conveyance of all materials, taxes and all labor charges etc., complete.	No	13		
d	Supply & Installation of **9-12W** T5 led Light fixtures and giving connections and all labour charges etc., complete for eraction. **(LUMILINEBS9WLED857SPCWH - Havels or BN021-12S in Philips or Equl)**	No	10		
e	Supply and Installation of **18-20W T5 fixtures** SURFACE type with all interconnections and fixing arrangement as	No	25		

	required. (LUMILINEBS18WLED857SPCWH - Havels or BN021-21S in Philips or CROMPTON: LDL-20-CDL or equivalent)				
f	supply & fixing of 20 watts per meter rope lights	Rmt	100		
g	**WALL MOUNTING FANS** Supply and Fixing of **18 inch metal(body & Blades) wall mounted** fans with 3 pin socket, fan body should be earthed if 3 pin socket not available in the market. (BM, counters, Server RM, Field Officer), Make: Storm model in CG or equivalent	No	20		
h	**EXHAUST FAN:-** Supply & Installation of fresh air exhaust fan 50W of light duty 300mm size (12"), Metallic body & blades, wire mesh, bird louvers etc. including cost and conveyance of all materials, taxes and all labor charges etc., complete for eraction	No	4		
i	**CEILING FAN:-** supply &Fixing of 1200mm sweep 5 star High speed ceiling fan with electronic step regulator in suitable locations as required. And Supplying of double anchor fastener hooks and down rods . complete in all respects as directed by Bank. CG/ Havells	No	8		
19	**Earthing:**				
a	**<u>COPPER EARTHING:</u>** Providing independent earthing for sophisticated electronic equipment with 600 mm x 600 mm x 3.5 mm thick copper plate rigidly fixed to 40 mm dia G.I. pipe of 3 mtr length connected with reducer providing .GI. funnel with wiremesh as per national electric code including C.C. Chamber of size 400 mm x 400 mm x 400 mm covered with RCC slab filling with salt and charcoal giving earth connection from electrode copper strip 2 runs of 50 mm x 6 mm x 3000 mm length with all accessories and labour charges complete, as per IS specifications 732/1982 (Part II)	No	1		
b	**<u>GI EARTHING:</u>** Providing independent earthing for important equipment with 40 mm dia "B" class 2.5m long G.I pipe and 19mm dia "B" class G.I pipe of 0.3 mtr. Long connected with reducer providing G.I. funnel with mesh enclosed in C.C. Chamber of 400mm x 400 mm x 400 mm with RCC slab cover duly providing staggered holes filling with salt and charcoal from the bottom of the pipe giving earth connection from electrode through G.I. strip 2 runs of 50 x 6 mm x 3000 mm length with all accessories and labour charges complete, as per IS specifications 732/1982 (part II)	No	2		
c	Supply and laying of 8SWG Cu bear conductor in 20mm dia rigid pvc conduit For Body	Rmt	140		
d	Supply and laying of 8SWG GI bear conductor in 20mm dia rigid pvc conduit For Body	Rmt	140		
e	Supply and laying of 25*6 mm hot dipped GI flat	Rmt	100		
f	Supply & Laying of 100mmX 25mmX 5mm Copper strip with supporting insulator and holes	no	2		
g	Supply & Laying of 100mmX 25mmX 6mm GI strip with supporting insulator and holes	No	2		
20	**ELECTRICAL SAFETY & INDICATION ITEMS**				
a	"Supply & laying of ISI marked Electrical Insulating dotted floor mat of dimension 2000 x 600mm 12mm thick in Electrical / UPS room -IS 15652:2006"	No	1		

b	"Preparing single line diagram for power & LAN (from sourse to end point), lamination(A3 size) & installation on wall and submit the soft copy of autocad & PDF formats.". The scope of work includes showing of cable size and length in the SLD.	Job	1		
c	"Supply & installation of Laminated Electrical Shock Treatment Chart (50x75cm) in UPS / Electrical Room."	No	1		
d	Danger Boards (English, Telugu & Hindi languages)	Each	2		
e	First Aid kit with complete set of medicines	Each	1		
f	Supply & Installation of 3 no of 3watts(R,Y,B) bulbs in a suitable enclosure For indicating the electricity board supply. The scope of work includes wiring from DB.	No	1		
21	Supply and laying of 20 pair Optical fibre cable in a suitable PVC conduit by clamping on wall / ceiling at regular intervals	rmt	110		
22	**RCCB WITH ENCLOSURE FOR DUCTABLE AC(3PH)** SITC of 63A 4 pole 100mA / 300mA RCCB in a suitable weather proof enclosure for AC outdoor units (To be installed on terrace)	No	3		
23	Arrangements of temporary power, Lighting, UPS wiring etc without effecting the operation of the branch working hour.Liasioning with the supply authorities and other Government bodies for enhancement of power load . If any official fee payable to Telangana Power Distribution company will be reimbersed by the Bank. Meaning of Temporary POwer: vendor has to lay suitable copper flexible cable from UPS/ raw power to counters with a protection of ELCB and laying of LAN cable also	Job	1		
24	Supply and Fixing of 6 module floor mounted Popup box with provision for fixing 6/16A Switch & Socket, HDMI Connector and RJ45 LAN Connector with I/O Port for Laptop or other accessories, sunked in and mounted flush with table top. Make : Legrand / MK / Honeywell	No.	7		
25	Supply and laying of 25/32 mm dia PVC pipe by cutting the floor and restoring as it is, for laying data wiring / Power cables	Rmt	40		
26	Supply & Installation of cable cubby with 1× HDMI connector, 1× 15–pin HD connector, 1× 3.5mm mini jack, 1× RJ–45 connectors with cable extention of length 2 meters. Make: Magnum/Kramer/Extron/Crestron/ Legrand/ MK	No.	2		
27	Supply and laying of HDMI Cable through suitable PVC conduit for the above item	Rmt	30		
28	Supply and laying of 15 Pin HD Cable through suitable PVC conduit for the above item	Rmt	30		
29	Supply and laying of 3.5 mm mini jack Cable through suitable PVC conduit for the above item	Rmt	30		
30	Supply and laying of RJ 45 LAN Cable through suitable PVC conduit for the above item	Rmt	30		
31	Supply and laying of 1.6mm Thick Aluminum Floor Raceways of the following sizes in the floor including cutting/chipping of the existing floor with cutting machines etc wherever required and making the finishing to normal good level as required (Power / Data / Voice). The quote shall include Cutting & chipping of the floor to lay the floor raceways / conduits. The cutting shall be made with the cutting machines and the debris shall be shift outside the premises. The floor shall be made good to normal after laying the raceways /conduits. (as directed by the site engineer).				
a	80x44mm 1.6mm thick Aluminium Box Section as Race way	Rmt	30		

b	100x44mm 1.6mm thick Aluminium Box Section as Race way	Rmt	30		
32	Supply and fixing of Junction boxes made out of 2mm thick MS sheet including powder coating as required fixed in floor. The box shall be provided with removable type 3mm thick powder coated cover.	No			
a	125X125X50mm deep junction boxes	No	4		
b	300X300X50mm deep junction boxes	No	4		
33	Supply and Installation of adjustable holder type LED Light fittings of 15 / 20 W (Warm Color) in Philips or equivalent in Havells / Crompton along with adjustable holder	No	12		
34	Supply, fabrication, erection and commissioning of GI Perforated type Cable trays with 50mm depth made out of 2mm thick GI sheet and supported with 10mm dia rods from ceiling using anchor fasteners and shall be closed properly with the same metal plate, complete as required (for Power / Data & Voice Cables)				
a	300mm wide x 50mm depth	Rmt	60		
b	150mm wide x 50mm depth	Rmt	80		
35	Design, Fabrication, Testing and Commissioning of floor mounted Panel with as per given specification and following switchgears. The panel will be manufactured/ Fabricated in accordence with IS specifications using good quality 14 SWG CRCA sheets with **double door type**, dust and vermine proof Aluminium busbar of suitable size rated to the I/C switch gear heat srinkable colour code sleeves and busbar supports and assembly. Panel should be mounted on a suitable ISMC frame.				
a	**AC OUTDOOR UNITS PANEL- 1ST FLOOR - OUTDOOR TYPE**				
	a) 160A, FP 25KA MCCB as Incomers - 2 No. b) Phase Indicating lamps LED type with MCB control - 2Set c) On, off, trip, indication lamps - 2Set d) Multi function digital meter of 160A/5A, CL-1, 5VA CT's with tape wound - 1 job e) Digital Energy Meter with RS-485 Communication Port. **OUT GOINGS:** f) 80A 4P 16KA MCCB - 4 Nos. g) 63A 4P 16KA, MCCB – 6 No's BUS BAR 50mm X 8mm	No	1		
36	Supply and Fixing of modular type TV. Socket outlet with anodized GI box and front plate complete as required.	No	1		
37	Supply and Laying of RG 11 Coaxial TV cable in PVC Conduits	Rmt	60		
38	Supply and Laying of RG 6 Co.axial TV cable in PVC Conduits	Rmt	70		
39	Supply and Fixing of 4way TV Splitter in a MS powder coated enclosure	No	1		
40	BUY BACK (amount to be paid to the Bank)				
	Removing and taking away on as is where is basis of the following items from the branch with prior approval of the Bank after making payments.				
a	2X2 light fittings	no.	-4		
b	Ceiling / Wall fans	no.	-12		

c	Down Lights / Tube Lights	No	-25		
d	Cables & old DB unused	LS	-1		
	HVAC WORKS				
A	**PART - A : HIGH SIDE WORK**				
1	**Condensing Unit with heating and cooling mode. (Outdoor Unit):**				
	Supply, Transportation, Testing and Commissioning of VRV/VRF/High COP minimum of one/Two/Three Outdoor units comprising of DC scroll/DC Twin Rotary, Inverter driven compressor, Air cooled condenser operation on R-134A/410A Refrigerant gas and on 415V, 50Hz, 3 phase AC supply. The multiple compressors offered shall have independent refrigerant circuit, also shall cut off automatically in part load condition. The unit shall have microprocessor controls. The out door units shall be installed on the space alloted in the drawings and scope shall include all supports for the outdoor units. Units shall be factory assembled and only the refrigerant piping shall be carried out at the site. The noise levels for the outdoor unit shall be less than 65db(A). The price shall include the vibration isolator, all types of outdoor units connection piping (T-Shape and Y-shape) kits in pair excluding refrigerant pipe and refregirent gas for the following capacities				
1.1	16 HP Outdoor Unit with heating and cooling mode.	Nos	2		
2	Supply of VRF Indoor **CASSETTE UNITS** type indoor units comprising with pre-filter, fan section with low noise fan 3/4 multi speed motor, coil section with DX coil, outer cabinet, drain water lift-up mechanism, insulation, pipe connections etc. of various capacities as per specifications and drawings. **WITH CORDLESS REMOTE CONTROL. Panel size should be not more than 950mm Square.**				
2.1	3.0 TR Capacity	Nos	1		
3	SITC of the following capacities of VRF ductable Units (Gas - R 32 / R134A / R407 / R410 - Ozone Friendly and Non CFC Refrigerant) with necessary Gas Top Up complete with copper condenser, evaporator, vibration isolators, structural supports with required hardware, control cable, etc.,				
3.1	8.0TR	Nos	4		

4	Multi kits for Indoor and Outdoor units at various sizes, based on the manufacutures requirement.	Nos	4		
5	Supply and installation of **8.5 / 8.75 TR INVERTER TYPE** Air cooled ductable ceiling suspended split air conditioner. The Indoor unit shall contain blower fan, blower Motor, Micro processor based controller. Outdoor Unit with single /multi scroll compressor, condenser coil, condenser fan motor with fan leaves, service valves for suction and liquid lines, drier, electrical controls like thermostat, overload protector for compressor, single phase preventor, HP/LP cut out, micro processor based on / of switches including cost of refrigerant etc. complete.	Nos	1		
6	Supply and installation of Inverter type Round flow four way cassette type of indoor unit. The unit shall be powder coated galvanised steel andshall include prefilter, fan section, coil section, fan section with low noise fan with Multi speed motor, condensate drain pump, Insulation, pipe connections , including necessary control wiring, all necessary controls, valves and fittings, strainer, drier , Fresh air intake and operating on R410a refrigerant gas/ green gas. The scope includes required Cordless Remotes, supports with necessary Panels, bolts, screws & nuts etc,				
	2 TR Inverter cassette AC	Nos	1		
B	**PART - B : LOW SIDE WORK**				
1	Lifting, Shifting, Positioning & Installation of VRF Outdoor units	Nos	2		
2	Lifting, Shifting, Positioning, Installation, Commissioning and Testing of VRF Indoor units	Nos	5		
3	Vacuuming the system, Gas topping up of R410a, pressure testing and commissioning of above VRF system.	Lot	2		
4	Vacuuming the system, Gas topping up of R410a/R407, pressure testing and commissioning of above system. only for split /Cassette	Nos	1		
5	Vacuuming the system, Gas topping up of R410a/R407, pressure testing and commissioning of above system. only for Ductable	Nos	1		
6	Supply & installation of suction & discharge Hard copper Refrigerant piping with proper supports/hangers from ceiling/wall as required at site & approved by consultant & duly insulated with closed cell elastomeric nitrile insulation of 19mm thick for pipes above 1" and 13 mm thick for pipes below 1"				

6.1	41.6mm	Rmt	40		
6.2	28.6mm	Rmt	50		
6.3	22.2mm	Rmt	35		
6.4	19.1mm	Rmt	40		
6.5	12.7mm	Rmt	45		
6.6	9.5mm	Rmt	40		
6.7	6.4mm	Rmt	30		
7	Supply, installation, testing & commissioning of suitable SWG copper Refrigerant Piping with suitable nitrile rubber(minimum thickness 19 mm) for suction & return upto 2 TR casstte & split AC.(copper pipe should be As per Manufacturer recommendation) and necessary Installation accessories such as supports and clamps. The scope of work includes supply of & laying of suitable power & communication cable from indoor to outdoor	Rmt	15		
8	Supply and laying of hard drawn copper pipe of various dia for refrigerant between Indoor Unit and Outdoor Unit of 8.5 TR AC Unit (Pipe size as per manufacturer's standards) A. Suction Line with 13mm thick closed cell electro metric insulation online.	Rmt	15		
	B. Liquid Line	Rmt	15		
9	supply & installation of Rectangular /circular duct inline fan with all accessories like fan, motor, flanges, non canvass type fire retardant flexible connections, 20 micron wahsable filter, etc., The motor shall be with IP21 protection, quote as per OM make system air /Caryair /ostberg				
9.1	850-CFM @ 15mm wc ESP	Nos	1		
9.2	300-CFM @ 10mm wc ESP	Nos	2		
10	supply & installation CO2 wall/ceiling mountable sensor for automatic ventilation / fresh air control with two switch outputs CO2 controlled for 2 stage control , with manual and automatic mode as well as display of switching status operating voltage 24 VDC SELV output voltage 3 x 0-10V , warning display for CO2 & Sensor with fresh air fan including voltage converter and relay and labour charges concentration	Nos	10		
11	supply & installation CO2 miocro controller with minimum 16 connection port	Nos	1		
12	Supply and installation of flexible FRLS power cable to provide connections between the power supply points and DDC controller / Motorized damper (2 core x 1.0 sqmm)	Rmt	80		

13	Supply , installation , testing and commissioning of GI mixing box 450x450x300 mm with 10 " Ø butterfly damper connected with tye , nuts , bolts , screws linkages etc , as per specifications . The thickness of damper frame shall be 22 Gauge and damper blade shall be 20 Gauge (Make : Airmaster / Systemair / Caryaire / Ruskintitus) if required	Nos	6		
14	Supply, installation , testing & commissioning of thermal insulated flexible duct of following sizes duly supported at regular interval as per site requirement etc. complete as required as per specifications . Flexible ducts of GI to connect into the rectangular ducts each to be 1000mm long - complete with proper edge fasteners , C clips etc etc .	Rmt	30		
15	Supply, installation , testing and commissioning of motorized valume control damper Volume control dampers made outG 200x150 mm GI sheets only on off	Nos	5		
16	Supply, installation , testing and commissioning of Extruded aluminum powder coated continous fresh air disk valve	Nos	5		
17	Supply, installation , testing and commissioning of vfd for suitable capacity of fan	Nos	1		
18	Supply and Erection of hard PVC condenseted drain piping with 9mm thick Nitrile insulated including support and wall opening of the following sizes etc..				
18.1	a) 32mm Dia	Rmt	140		
18.2	b) 25mm Dia	Rmt	80		
19	supply , installation , testing and commissioning of Factory Fabricated Rectangle ducting complete with angel iron flanges, high tech supports (Vanes if reuired) as per IS 655 & Class VIII specifications				
19.1	22 Gauge	Sqm	210		
19.2	24 Gauge	Sqm	80		
20	Fire retardent Canvass connections with 150 mm Zip	Nos	5		
21	Supply, installation , testing and commissioning of Extruded aluminum powder coated continous grills	Sqm	11		

22	Supply, installation , testing and commissioning of GI Volume control dampers made out of 18G GI sheets	Sqm	2		
23	Supply, installation , testing and commissioning of Thermal insulation for ducts with 13mm thick fibre glass of density 24 kg/ cum covered with factory laminated aluminum foil	Sqm	210		
24	Supply, installation, testing and commissioning of Accoustic insulation with 6 mm thick. Resin boned fiber glass of density 48 kg/ cum covered with RP tissue and 28 G AL perforated sheet	Sqm	40		
25	4 Core 1.0 Sq mm. Sheilded cable between Sensors to Control Panel	Rmt	140		
26	Supply, laying and commissioning of following size Power and Communication Copper cable with PVC conduct with clamps, cable ties including connecting and testing :				
a	4core x 2.5sq mm for ductable Units.	Rmt	210		
b	4core x 1.5sq mm for Split /cassette Units.	Rmt	80		
27	Charges for making the duct layout as per site condition in Autocad as advised by Electrical Engineer and the same copy of final layout in A3 sheet laminated colour copy shall be submitted.	LS	1		
28	**MS WORK**				
a	Outdoor Flat form/Stand work for mounting of Outdoor units for all the above VRF Outdoor units painted with Red oxide / enamil paint .	Nos	2		
b	Supply & Fixing of suitable MS Stand for the above Split / Cassette AC units	Nos	1		
c	SITC of Outdoor Platform/Stand for mounting of Outdoor units for all Ductable AC units.	Nos	1		
29	**Associated Civil works**				
	Chipping ,chasing & Plastering the wall openings in cement morter 1:6 of 15 mm thick finishing to line and level with sand facied finishing at all levels, including all leads & lifts, scaffolding, curing etc complete (for Copper & Drain openings in all rooms etc.	Lot	1		
		TOTAL AMOUNT (A):			

	AMC FOR HVAC WORKS		

	Comprehensive ANNUAL MAINTENANCE CONTRACT (AMC) For the above Air conditioning units after warranty period of One Year and also for existing AC units in Branch, which includes all spares, compressor, replenishing the refrigerant, Quarterly servicing, any number visits if any problem occurs.				
1	CAMC for 2nd Year	per TR	45.5		
2	CAMC for 3rd Year	per TR	45.5		
3	CAMC for 4th Year	per TR	45.5		
4	CAMC for 5th Year	per TR	45.5		
5	CAMC for 6th Year	per TR	45.5		
TOTAL COST OF CAMC FOR 5 YEARS (EXCLUDING GST) (B)					
GRAND TOTAL : (A+B)					