STATE BANK OF INDIA
Local Head Office, Bhopal

Name of work:-Construction of proposed sewerage network system by Re-routing / re-aligning of all existing sewerage / water supply lines, through the ground floor ceiling level with the help of hanging trays / hanging ducts, duly camouflaged by providing a suitable decorative cladding with painted Multipurpose 8 mm thick cement fiber board as per IS: 14862 with suitable fiber cement screw, in the existing A.O Building, Jabalpur, Madhya Pradesh.

State bank of India LHO, Bhopal invites Percentage Rate Tenders from pre-qualified & eligible contractors who have been empaneled with State Bank of India in **"Appropriate Category"** for **Construction of proposed sewerage network system by Re-routing / re-aligning of all existing sewerage / water supply lines, through the ground floor ceiling level with the help of hanging trays / hanging ducts, duly camouflaged by providing a suitable decorative cladding with painted Multipurpose 8 mm thick cement fiber board as per IS : 14862 with suitable fiber cement screw, in the existing A.O Building, Jabalpur, Madhya Pradesh.** The Technical Bids and scope of services to be offered for the above specific project along with General & Special Conditions etc. can be obtained/downloaded from our website www.sbi.co.in and www.statebankofindia.com under procurement news.

Certified that this NIT contains Part-A (Technical Bid containing General Conditions, Additional Conditions, Special Conditions & Particular Specification etc.) and Part-B (Price Bid).

Assistant General Manager-P&E
State Bank of India,
Local Head Office – Bhupal.

NOTICE INVITING E-TENDER

State bank of India LHO, Bhopal, invites Percentage Rate Tenders from Pre-qualified & Eligible contractors empaneled with State Bank of India in **"Appropriate Category"** for the work mentioned below:-

NIT NO.- SBILHOBHUPAL2025-001

Name of work:- Construction of proposed sewerage network system by Re-routing / re-aligning of all existing sewerage / water supply lines, through the ground floor ceiling level with the help of hanging trays / hanging ducts, duly camouflaged by providing a suitable decorative cladding with painted Multipurpose 8 mm thick cement fiber board as per IS : 14862 with suitable fiber cement screw, in the existing A.O Building, Jabalpur, Madhya Pradesh.

Estimated Cost	Rs. 1191600 + GST (GST will be Paid extra as Applicable)
Earnest Money (@ 1% of Estimated Cost)	Rs.11916.00
Time for Completion	02 (Two) months.
Last Date and Time for Submission of Bids	**24.05.2025 at 3.00 PM**

For detailed NIT/ Tender Documents/ Details/ Downloads and for any other correction/ amendments/ modification/ extension till the last date of submission of bids, please visit Bank's web site: www.sbi.co.in and www.statebankofindia.com under procurement news.

Tender submissions can only be made through online mode at http://www.sbi.co.in

For and behalf of State Bank of India

PART “A” TECHNICAL BID

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STATE BANK OF INDIA
Local Head Office, Bhopal

Notice Inviting Tender

Project- Construction of proposed sewerage network system by Re-routing / re-aligning of all existing sewerage / water supply lines, through the ground floor ceiling level with the help of hanging trays / hanging ducts, duly camouflaged by providing a suitable decorative cladding with painted Multipurpose 8 mm thick cement fibre board as per IS : 14862 with suitable fibre cement screw, in the existing A.O Building, Jabalpur, Madhya Pradesh.

State bank of India LHO, Bhopal invites Tenders from empaneled contractors with State Bank of India for the following work: Details of tenders are as under :		
1	Name of Work	**Construction of proposed sewerage network system by Re-routing / re-aligning of all existing sewerage / water supply lines, through the ground floor ceiling level with the help of hanging trays / hanging ducts, duly camouflaged by providing a suitable decorative cladding with painted Multipurpose 8 mm thick cement fibre board as per IS : 14862 with suitable fibre cement screw, in the existing A.O Building, Jabalpur, Madhya Pradesh.**
2	Estimated Cost	Rs. 11,91,600.00 + GST (GST will be Paid extra as Applicable)
3	Time allowed for completion.	02 (Two) months
4	Earnest Money Deposit	Rs.11,916.00 in the form of Demand draft or banker's cheque in favour of **State Bank of India,** Payable at Bhopal.
5	Security Deposit	For the successful contractor, total security deposit shall be 5% of the contract value. Out of this, 2% of the contract value will be in the form of initial security deposit, (in the form of Demand draft or banker's cheque in favour of AGM(P&E) SBI, LHO, Bhopal Payable at Bhopal). Balance 3% shall be deducted from the running account bill/s of the work @ 10% of respective running account bill i.e. deduction from each running bill account will be 10%, till the 3% of the contract value is reached 5%. including the EMD.
6	Last date and time of receipt of tender	**Up to 3.00 PM on 24.05.2025**
7	Address at which the tenders are to be submitted.	State Bank of India, P & E Department – LHO, Bhopal
8	Date and time of opening of Technical Bid & Financial bid	**At 4.00 PM on 24.05.2025.**
9	Place of opening tenders	State Bank of India, P & E Department – L.H.O. – BHOPAL
10	Defects Liability Period	**12 months** from the completion of the works.
11	Validity of offer	**90 days** from the date of opening of price bid.
12	Liquidated Damages	0.5% per week of delay, subject to maximum 5% of the contract value.
13	Value of Interim Certificate	**Rs. 5.00 lacs (excluding GST).**

14	Date of Issue of Tender	Tender documents can be downloaded from SBI e-tender portal www.tenderwizard.com/SBITENDER ,

In case the date of opening of tenders is declared as a holiday, the tenders will be opened on the next working day at the same time. SBI has the right to accept/reject any/all tenders without assigning any reasons. Bank reserve the right to cancel the tender without assigning any reason, if any.

Assistant General Manager – P&E
on behalf of State bank of India LHO, Bhopal.

E-TENDERING INSTRUCTIONS TO CONTRACTOR

E-TENDERING INSTRUCTIONS TO CONTRACTOR

General

State bank of India LHO, Bhopal, hereby publish the TENDER on e-tendering Portal in Electronic mode hereinafter referred as "e Tendering" and TENDER will be hereunder called as "e-Tender". The e-tender published online through portal (website) consisting of standard tender conditions, specifications, schedule of quantities, drawings (if any) for above referred work. Please note that copy of the above e-tender can be downloaded from portal (website) and should be mandatorily submitted in Online Electronic Mode hereinafter referred as "Online Offer". The submission of Online offer duly Encrypted& Digitally signed on above portal should be in prescribed Electronic Forms (Online) available on portal for respective tender in Online Envelope(s) on or before as per the key Dates mentioned in the Tender Notice in this document and online portal for above tender.

Instructions

1. Tender Bidding Methodology:
Electronically Sealed Bid System – Two Stage

2. Broad outline of activities from Contractor perspective:
1. Procure a Digital Signing Certificate (DSC)

2. Register on the e-Procurement portal

3. Create Users and assign roles on the above portal

4. View Notice Inviting Tender (NIT) on the above portal

5. Download Official Copy of Tender Documents from the above portal

6. The contractor must agree to the terms & conditions mentioned in the tender document online before proceeding further with filling in the data in the bidding schedules.

7. The contractor can fill in the data online & the same will be automatically redirected to the Technical or the Price Bid envelope.

8. The contractor can also upload any supporting document which he wants to or has been asked by the Bank official against any bidding schedule.

9. All the bidding schedules which have been identified as mandatory by the Bank official have to be filled in compulsorily. The system will not allow a contractor to make his final submission till all the mandatory bidding schedules are filled-in by the contractor.

10. The final submission of the response to the tender by the contractor will have to be done on or before the last date & time of the submission. Once the final submission is made by the contractor, it is equivalent to dropping the response in the electronic tender box. The contractor cannot make any change once the same is completed, unless with the permission of the Bank official, on which he can withdraw his bid. The withdrawal of the bid can only be done before the last date & submission of the tender.

11 The contractor gets an online receipt (Date, Time & IP Address) on which he has made the final submission. This receipt will always be available on his respective login-id against the tender.
submission of the tender.

12. Attend Public Online Tender Opening Event (TOE) on the above portal– Opening of Technical-Part

13 Post-TOE Clarification on the above portal (Optional)– Respond to ’s post-TOE queries.

14. Attend Public Online Tender Opening Event (TOE) on the above portal– Opening of Financial-Part Only for Technical Responsive Contractor)

For participating in this tender online, the following instructions are to be read carefully. These instructions are supplemented with more detailed guidelines on the relevant screens of the above portal.

3. Digital Certificates

For integrity of data and authenticity/ non-repudiation of electronic records, and to be complaint with IT Act 2000, it is necessary for each user to have a Digital Certificate (DC). also referred to as Digital Signature Certificate (DSC), of Class III.

4. Registration

To use the Electronic Tender portal, vendors need to register on the portal. Registration of each organization is to be done by one of its senior persons vis-a-vis Authorized Signatory who will be the main person coordinating for the e-tendering activities.

5. Bidding related Information for this Tender (Sealed Bid)

The entire bid-submission would be online on the portal. Broad outline of submissions are as follows:

· Submission of Bid Security/ Earnest Money Deposit (EMD) & Cost of Bid Document

· Submission of digitally signed copy of Tender Documents/ Addendum

· Power of Attorney

· Two Envelopes

- Technical-Part

- Financial-Part

NOTE: Please note that above e-Tendering system is an automatically time locked system which will be locked immediately as soon as due date and time is over and will not accept any offer after that. So, the tenderers are strictly advised to do their process well before the due date and time to avoid any such instances.

6. Tender Opening Event (TOE)

The e-Procurement portal offers facility for ‘Public Online Tender Opening Event (TOE)’. Tender Opening Officers as well as authorized representatives of contractor can attend the Public Online Tender Opening Event (TOE) from their offices. For this purpose, representatives of contractor duly authorized are to carry a Laptop and Wireless Connectivity to Internet. Legal requirements for a transparent and secure ‘Public Online Tender Opening Event (TOE)’ have been implemented on the portal. As soon as a Bid is decrypted with the corresponding ‘Passphrase’ as submitted online by the contractor himself (during the TOE itself), salient points of the Bids are simultaneously made available for downloading by all participating contractor. The portal has a facility of ‘Online Comparison Chart’ which is dynamically updated as each online bid is opened. The format of the chart is based on inputs provided by the SBI for each Tender. The information in

the Comparison Chart is based on the data submitted by the Contractor. A detailed Technical and/ or Financial Comparison Chart is provided. The tender details and comparison statement / chart shall be downloaded by the tender opening authority and signed by /SBI representative and contractor's representative if present and the hard copy in duplicate shall be supplied to the tender evaluating authority. The portal has facility of a detailed report titled 'Minutes of Online Tender opening Event (TOE)' covering all important activities of 'Online Tender Opening Event (TOE)'. This is available to all participating contractor for 'Viewing/ Downloading'.

IMPORTANT NOTE: In case of internet related problem at a contractor's end, especially during 'critical events' such as – a short period before bid-submission deadline, during online public tender opening event, during e-auction, it is the contractor's responsibility to have backup internet connections. In case there is a problem at the e-procurement/auction service-provider's end (in the server, leased line, etc.) due to which all the contractors face a problem during critical events, and this is brought to the notice of /SBI by the contractor in time, then /SBI will promptly reschedule the affected event(s).

7. Minimum Requirements at Contractor end

To operate on the electronic tender management system, the user's machine is required to be set up. The machine must have run XP service Pack3 or higher version of Windows like Vista or Window10 Also need to install Mozilla Fire fox web browser and latest Version of Java.

Assistant General Manager – P&E
on behalf of State Bank of India LHO, Bhopal.

INSTRUCTIONS TO THE TENDERERS

1.0 Scope of Work: -

Percentage rate E-Tenders are invited by State Bank of India, LHO-Bhopal, from Pre-qualified & Eligible contractors empaneled with State Bank of India for the work of: " Construction of proposed sewerage network system by Re-routing / re-aligning of all existing sewerage / water supply lines, through the ground floor ceiling level with the help of hanging trays / hanging ducts, duly camouflaged by providing a suitable decorative cladding with painted Multipurpose 8 mm thick cement fiber board as per IS : 14862 with suitable fiber cement screw, in the existing A.O Building, Jabalpur, Madhya Pradesh."

1.1. Site and Its Location: -

The proposed work is to be carried out at SBI- A.O. Building, Jabalpur, Madhya Pradesh.

2.0. Tender Documents

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

- Instructions to tenderers
- General Conditions of Contract
- Special Conditions of Contract
- Technical Specifications
- Drawings
- Priced Bid

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

- Price Bid
- Technical Specifications
- Additional Conditions
- Special Conditions of Contract
- General Conditions of Contract
- Instructions to Tenderers

2.3 Complete set of tender documents including drawings shall be uploaded on the e-tendering website and tenderer shall put in their bids thereon. A Certified sealed copy of all the scanned and uploaded documents as specified in the bid document except Price Bid shall also be submitted physically in the office of State Bank of India, P & E Department – A.O. Building, Jabalpur. OR at the office of State Bank of India, P & E Department – L.H.O. – BHOPAL by the bidding deadline. This shall include the Original EMD, Price Bid document and Conditions. All pages shall be signed and stamped.

2.4 The tender documents are not transferable.

3.0. Site Visit

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

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

4.0 Earnest Money

4.1 The tenderers are requested to submit the Earnest Money of Rs. 11916.00 in the form of Demand Draft in favour of **AGM(P&E) State Bank of India,** Payable at Bhopal, drawn on any Bank in India.

4.2 EMD in any other form other than as specified above will not be accepted. Tender not accompanied by the EMD and Cost of Tender Document in accordance with clause 4.1 above shall be rejected.

4.3 No interest will be paid on the EMD.

4.4 EMD of unsuccessful tenderers will be refunded within 30 days of award of Contract.

4.5 EMD of successful tenderer will be retained as a part of security deposit.

5.0 Initial Security Deposit

The successful tenderer will have to submit a sum equivalent to 2% of contract value less EMD by means of D/D drawn in favour of State Bank of India within a period of 15 days of acceptance of tender.

6.0 Security Deposit

Total security deposit shall be 5% of contract value. Out of this 2% of contract value is in the form of initial security deposit which includes the EMD. Balance 3% shall be deducted from the running account bill of the work at the rate of 10% of the respective running account bill i.e. deduction from each running bill account will be 10% till total 3% of contract value is reached.

6.1 No interest shall be paid to the amount retained by SBI as Security Deposit.

7.0 Signing of Contract Documents

The successful tenderer shall be bound to implement the contract by signing an agreement and conditions of contract attached herewith within 15 days from the receipt of intimation of acceptance of his tender by the Bank. However, the written acceptance of the tender by the Bank will constitute a binding agreement between the Bank and successful tenderer whether such formal agreement is subsequently entered into or not.

8.0 Completion Period

02 (Two) months and 15 (Fifteen) days mobilization period from the issue of work order by the bank or intimation for the commencement of work whichever is earlier.

9.0 Validity of Tender

Tenders shall remain valid and open for acceptance for a period of 90 (Ninety) days from the date of opening price bid. If the tenderer withdraws his/her offer during the validity period or makes modifications in his/her original offer which are not acceptance to the Bank without prejudice to any other right or remedy the Bank shall be at liberty to forfeit the EMD.

10.0 Liquidated Damages

The liquidated damages shall be 0.5% per week subject to a maximum of 5% of contract value.

11. The rate quoted shall be firm and shall include all costs, allowances, and taxes except GST.

12. **General Instructions**

12.1 The intending contractor must read the terms and conditions of tender document carefully. He should only submit his bid if he considers himself eligible and he is in possession of all the documents required.

12.2 The bid document consisting of plans, specifications, the schedule of quantities of various types of items to be executed and the set of terms and conditions of the contract to be complied with and other necessary documents can be seen and downloaded from website http://www.sbi.co.in.
Contractor is advised to keep visiting the above mentioned websites from time to time (till the deadline for bid submission) for any Corrigendum/ updates in respect of the tender documents, if any. Failure to do so shall not absolve the applicant of his liabilities to submit the applications complete in all respect including updates thereof, if any. An incomplete application may be liable for rejection.

The bid can only be submitted after deposition of original EMD in the office of State Bank of India, P & E Department – L.H.O. – BHOPAL, inviting bids within the period of bid submission and uploading the mandatory scanned documents such as Demand Draft in favour of AGM(P&E) **State Bank of India,** Payable at Bhopal, drawn on any Bank in India as mentioned in NIT and other documents as specified.

12.3 Contractor can upload documents in the form of **PDF** format.

12.4 The Technical bid shall be opened first on due date and time as mentioned above. The financial bid of contractors qualifying the technical bid shall be opened thereafter by SBI.

12.5 Any clarification/ modifications, if any, may be uploaded on the website, if felt necessary by the Bank.

12.6 SBI reserves the right to reject any or all prospective application without assigning any reason and to restrict the list of qualified contractors to any number deemed suitable by it, if too many bids are received satisfying the laid down criterion.

12.7 If any information furnished by the applicant is found incorrect at a later stage, he shall be liable to be debarred from tendering/taking up of works in SBI. SBI reserves the right to verify the particulars furnished by the applicant independently.

12.8 The bid submitted shall become invalid and e-Tender processing fee shall not be refunded if:

(i) The contractor is found ineligible.

(ii) The contractor does not deposit original EMD.

(iii) If any discrepancy is noticed between the documents as uploaded at the time of submission of bid and hard copies as submitted physically by the lowest contractor in the office of tender opening authority.

(iv) If a tenderer does not quote any percentage above/below on the total amount of the tender or any section head in percentage rate tender, the tender shall be treated as invalid and will not be considered as lowest tenderer.

(v) Scanned copies of documents including EMD are illegible (not readable).

12.9 The competent authority on behalf of the SBI does not bind itself to accept the lowest or any other bid and reserves to itself the authority to reject any or all the bids received without the assignment of any reason. All bids in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the contractor shall be summarily rejected.

12.10 The conditions mentioned in the NIT shall be understood to be a part of the agreement.

FORM OF TENDER

To
The Assistant General Manager – P & E,
State Bank of India,
Local Head Office, Bhopal.

Name of work : **Construction of proposed sewerage network system by Re-routing / re-aligning of all existing sewerage / water supply lines, through the ground floor ceiling level with the help of hanging trays / hanging ducts, duly camouflaged by providing a suitable decorative cladding with painted Multipurpose 8 mm thick cement fibre board as per IS : 14862 with suitable fibre cement screw, in the existing A.O Building, Jabalpur, Madhya Pradesh.**

Dear Sir,

1. Having visited the site and examined the drawings, conditions of contract, Special Conditions or Contract, General Specifications and Detailed Specification Schedule and bill of Quantities for the construction of the above-named works. We offer to construct complete and maintain in the whole of the said works in conformity with the said the Drawings, Conditions, of Contract, Specification Schedules and Bill of Quantities for the sum stated in Bill of Quantities of this Tender document or such other sum as may be ascertained in accordance with the said conditions of Contract.
2. We undertake to complete and deliver the whole of the works comprised in the contract within the time stated in the Appendix hereto.
3. We have independently considered the amount of Liquidated Damages shown in the Appendix hereto and agree that it represents a fair estimate of the loss likely to be suffered by you in the event of the works not being completed in time.
4. We agree to abide by this Tender for the period of 90 days from the opening of price bid of extensions-thereof as required by the employer from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiry of that period.
5. We confirm that the period and rates as referred in the agreement or in General Conditions of Contract are given or summarized in the appendix here to, to which we give our consent and agree to abide by the same.
6. If this tender is accepted, we undertake to enter and execute at our cost, when called upon by the employer to do so, a contract agreement in the prescribed form. Unless and until a formal Agreement is prepared and executed this tender together with your written acceptance thereof, shall constitute a binding Contract between us.
7. We understand that if our Tender is accepted, we are to be jointly and severely responsible for the due performance of the Contract.
8. We understand that you are not bound to accept the lowest or any tender you may receive and may reject all or any tender, accept or entrust the entire work to one Contractor or divide the work to more than one contractor without assigning any reason or giving any explanation whatsoever.

Dated this _____ day of _____ 2025

Signature _____ in the capacity duly authorized to sign tenders for and on behalf of

_____
Signature &seal of the Tenderer

ARTICLES OF AGREEMENT

ARTICLES OF AGREEMENT made this day of _____Two Thousand twenty-five, BETWEEN STATE BANK OF INDIA, a Corporation incorporated under the State Bank of India Act 1955 and having its LOCAL HEAD OFFICE at BHOPAL (hereinafter referred to as the "owner", which expression shall include its successor and assigns, of the one part.

AND

(**Contractor's name & Address**) of the other part

AND

WHEREAS the Owner is desirous of to have executed certain works more specifically mentioned and described in the contract documents i.e, **Construction of proposed sewerage network system by Re-routing / re-aligning of all existing sewerage / water supply lines, through the ground floor ceiling level with the help of hanging trays / hanging ducts, duly camouflaged by providing a suitable decorative cladding with painted Multipurpose 8 mm thick cement fibre board as per IS : 14862 with suitable fibre cement screw, in the existing A.O Building, Jabalpur, Madhya Pradesh.** (hereinafter called the 'Works'), which expression shall include all amendments herein and/or modifications thereof and has accepted the tender of the contractor for the said work:

AND WHEREAS the Owner in order to effectively carry out the said works (**Construction of proposed sewerage network system by Re-routing / re-aligning of all existing sewerage / water supply lines, through the ground floor ceiling level with the help of hanging trays / hanging ducts, duly camouflaged by providing a suitable decorative cladding with painted Multipurpose 8 mm thick cement fibre board as per IS : 14862 with suitable fibre cement screw, in the existing A.O Building, Jabalpur, Madhya Pradesh.**) engaged M/s. ACME Consultants Pvt. Ltd. located at 10C, Middleton Row, Kolkata hereinafter referred to as **CONSULTANTS** to prepare plans, drawings and specifications, description of work, to supervise the construction and to assist in concerned technical matters.

AND WHEREAS the Owner has caused the plans, drawings and specifications, priced schedule of quantities of the work to be executed for **Construction of proposed sewerage network system by Re-routing / re-aligning of all existing sewerage / water supply lines, through the ground floor ceiling level with the help of hanging trays / hanging ducts, duly camouflaged by providing a suitable decorative cladding with painted Multipurpose 8 mm thick cement fibre board as per IS : 14862 with suitable fibre cement screw, in the existing A.O Building, Jabalpur, Madhya Pradesh.** as per conditions of the contract and special conditions prepared with the assistance of the said Consultant subject to which the offer of the Contractor shall be accepted.

AND WHEREAS the tender of the Contractor amounting to `._____ (Rupees Only) for **Construction of proposed sewerage network system by Re-routing / re-aligning of all existing sewerage / water supply lines, through the ground floor ceiling level with the help of hanging trays / hanging ducts, duly camouflaged by providing a suitable decorative cladding with painted Multipurpose 8 mm thick cement fibre board as per IS : 14862 with suitable fibre cement screw, in the existing A.O Building, Jabalpur, Madhya Pradesh.** has been accepted by owner.

AND WHEREAS the Owner has issued through Consultant Work Order No. _____- dated _____ therefore to the Contractor to perform the work.

AND WHEREAS the Contractor has deposited with the Owner `. _____ (Rupees _____) only as security deposit for the due performance of the agreement.

AND WHEREAS said drawings No. (Details of Drawings) for **Construction of proposed sewerage network system by Re-routing / re-aligning of all existing sewerage / water supply lines, through the ground floor ceiling level with the help of hanging trays / hanging ducts, duly camouflaged by providing a suitable decorative cladding with painted Multipurpose 8 mm thick cement fibre board as per IS : 14862 with suitable fibre cement screw, in the existing A.O Building, Jabalpur, Madhya Pradesh.** inclusive of the specifications, priced schedule of quantities, conditions of contract and special conditions (hereinafter collectively referred to as the said condition) have been signed by the parties hereto and the Contractor has agreed to execute the works upon and subject to the said conditions.

NOW, THEREOF THIS CONTRACT WITNESSTH AS FOLLOWS:

ARTICLE – I

CONTRACT DOCUMENTS

1.1 The following documents shall constitute the Contract Documents, namely.

a) This contract,

b) Tender documents as defined in the General Instructions to tenderer / contractor.

c) Schedule of Quantities & Rates accepted by the Owner and the Contractor.

d) Letter of Acceptance of Tender, by the Consultant on behalf of the Owner (letter no. _____dated_____addressed to the Contractor by the Consultant, and dully signed by the Contractor as token of acceptance of the work order.

ARTICLE : 2

2.1 WORK TO BE PERFORMED :

The Contractor shall perform the said work upon the terms and conditions and within the time specified in the Contract Documents.

ARTICLE : 3

3.1 Subject to and upon the terms and conditions contained in the Contract Documents, the Owner shall pay the Contractor remuneration as specified in the Contract Documents upon the satisfactory performance of the said work and / or otherwise as may be specified in the Contract Documents.

ARTICLE : 4

JURISDICTION :

4.1 Notwithstanding any other Court or Courts having jurisdiction to decide the question (s) forming the subject matter of a reference if the same had been the subject matter of a suit , any and all actions and proceedings arising out of or relative to the Contract (including any Arbitration in terms thereof) shall lie only in the court of competent civil jurisdiction in this behalf at BHOPAL, MADHYAPRADESH, and only the said Court (s) shall have jurisdiction to entertain and to try any such action(s) and /or proceeding (s) to the exclusion of all other Courts .

ARTICLE : 5

ENTIRE CONTRACT :

5.1 The Contract Documents mentioned in Article – 1 hereof embody the entire contract between the parties thereto , and the parties declare that in entering into this contract they do not rely upon any previous representation , whether expressed or implied and whether written or oral , or any inducement , understanding or agreement of any kind not included within the contract documents , and all prior negotiations , representations , contracts and / or agreements and understandings are hereby cancelled .

ARTICLE : 6

NOTICES :

6.1 Subject to any provision in the Contract Documents to the contrary, any notice, or communication sought to be served by the Contractor on the Owner with reference to the contract shall be deemed to have been sufficiently served on the Owner (notwithstanding any enabling provisions under any law to the contrary) ONLY if delivered by hand or registered acknowledgement due post to the Owner's Office at **SBI-LHO, BHOPAL, MADHYAPRADESH.**

6.2 Without prejudice to any other mode of service provided for in the Contract Documents or otherwise available to the Owner, any notice order or other communication sought to be served by the Owner on the Contractor with reference to the Contract, shall be deemed to have been sufficiently served if delivered by hand or through registered acknowledgement due post to the office of the Contractor at **(Address of the Contractor)**

ARTICLE :7

WAIVER :

7.1 No failure or delay by the Owner in enforcing any right or remedy of the Owner in terms of the Contract or any obligation or liability of the Contractor in terms thereof shall be deemed to be a waiver of such right, remedy or obligation or liability, as the case may be, by the Owner and notwithstanding such failure or delay, the Owner shall be entitled at any time to enforce such right, remedy, obligation or liability, as the case may be.

ARTICLE : 8

NON ASSIGNABILITY :

8.1 The Contract and benefits and obligations thereof shall be strictly personal to the Contractor and shall not on any account be assignable or transferable by the Contractor.

IN WITNESS WHEREOF the parties hereto have duly executed this contract at BHOPAL, MADHYAPRADESH, on this day of …….. Two Thousand Twenty five.

ARTICLE : 9

9.1 Vendor/Contractor shall promptly notify any changes in their constitution to SBI. It shall be open for SBI to terminate the agreement on the death, retirement, insanity, or insolvency of any person/s, being director/s or partner/s, in the said company/firm or on the addition or introduction of a new partner without the previous approval in writing of SBI. But in the absence of and until its termination by SBI as aforesaid, this agreement shall continue to be of full force and effect notwithstanding any changes in the constitution of the firm by death, retirement, insanity, or insolvency of any of its partners or the addition or introduction of any new partners. In case of retirement/death, the surviving or remaining partners of the firm shall be jointly and severally liable for the due and satisfactory performance of the terms and conditions of the agreement.

SIGNED AND DELIVERED
For and on behalf of
(Owner)

By:

In the presence of : 1. _____

2. _____

SIGNED AND DELIVERED
For and on behalf of

(Contractor)
By:

In the presence of : 1. _____

2. _____

PART – "B"

GENERAL CONDITIONS OF CONTRACT

1.0 Definitions

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

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

1.1.1 'SBI' shall mean State Bank of India (client) a body Corporate created under State Bank of India Act 1955, having its Corporate Centre at State Bank Bhavan, Madame Cama Road, Mumbai 400 021 and a LHO at Kolkata and includes the client's representatives, successors, and assigns.

'Consultant' shall mean M/s ACME Consultants Pvt. Ltd., 10C, Middleton Row, Kolkata- 700071

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

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

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

1.1.4 'Engineer' shall mean the representative of the SBI/Consultant.

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

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

1.1.7 "Week" means seven consecutive days.

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

2.0 Total Security Deposit

Total Security deposit comprise of :

Earnest Money Deposit
Initial Security Deposit
Retention Money

2.1 Earnest Money Deposit :

The tenderer shall furnish EMD of Rs. 11916.00 in the form of Demand draft or bankers cheque drawn in favour of AGM(P&E) Payable at Bhopal, on any Scheduled Bank. No tender shall be considered unless the EMD is so deposited in the required form. No interest shall be paid on this EMD. The EMD of the unsuccessful tenderer shall be refunded soon after the decision to award the contract is taken without interest. The EMD shall stand absolutely forfeited if the tenderer revokes his tender at any time during the period when he is required to keep his tender open acceptance by the SBI or after it is accepted by the SBI the contractor falls to enter into a formal agreement or fails to pay the initial security deposit as stipulated or fails to commence the work within the stipulated time.

2.2 Initial Security Deposit (ISD)

The amount of ISD shall be 2% of accepted value of tender including the EMD. Balance of ISD (i.e. excluding EMD) is to be submitted in the form of D/D drawn on any scheduled Bank or in the form of Bank Guarantee and shall be deposited within 15 days from the date of letter of acceptance of tender.

2.3 Retention Money

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

3.0 Language Errors, Omissions and Discrepancies

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

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

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

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

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

4.0 Scope of Work

The contractor shall carry out, complete, and maintain the said work in every respect strictly in accordance with this contract and with the directions of and to the satisfaction of the Bank to be communicated through the SBI/Consultant. The SBI/Consultant at the directions of the Bank from time to time issue further drawings and/or written instructions, details directions and explanations which are hereafter collectively referred to as Consultant's instructions in regard to : the variation or modification of the design, quality or quantity of work or the addition or omission or substitution of any work, any discrepancy in the drawings or between the BOQ and/or drawings and/or specifications, the removal from the site of any material brought thereon by the contractor and the substitution of any other materials thereof, the demolition, removal and/or re-execution of any work executed by him, the dismissal from the work of any person employed/engaged thereupon.

5 (i) Letter of Acceptance

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

5 (ii) Contract Agreement

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

6.0 Ownership of drawings

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

7.0 Detailed drawings and instructions

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

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

7.1 Copies of Agreement

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

8.0 Liquidated Damages

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

9.0 Materials, Appliances and Employees

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

10.0 Permits, Laws and Regulations

Permits and licenses required for the execution of the work shall be obtained by the contractor at his own expenses.

The contractor shall give notices and comply with the regulations, laws, and ordinances rules, applicable to the contractor. If the contractor observes any discrepancy between the drawings and specifications, he shall promptly notify the SBI in writing under intimation of the SBI/Consultant. If the contractor performs any act which is against the law, rules and regulations he shall meet all the costs arising there from and shall indemnify the SBI any legal actions arising there from.

11.0 Setting out Work

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

12.0 Protection of works and property

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

He shall take adequate care and steps for protection of the adjacent properties. The contractor shall take all precautions for safety and protection of his employees on the works and shall comply with all applicable provisions of Government and local bodies' safety laws and building codes to prevent accidents, or injuries to persons or property of about or adjacent to his place of work. The contractor shall take insurance covers as per clause 24.0 at his own cost. The policy may be taken in joint names of the contractors and the SBI and the original policy may be lodged with the SBI.

13.0 Inspection of Work

The SBI/SBI/Consultant or their representatives shall at all reasonable times have free access to the work site and/or to the workshop, factories or other places where materials are lying or from where they are obtained, and the contractor shall give every facility to the SBI/Consultant and their representatives necessary for inspection and examination and test of the materials and workmanship. No person unless authorized by the SBISBI/Consultant except the representative of public authorities shall be allowed on the work at any time. The proposed work either during its construction stage or its completion can also be inspected by the Chief Technical Examiner's organization a wing of Central Vigilance Commission.

14.0 Assignment and subletting

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

15.0 Quality of Materials, Workmanship & Test

(i) All materials and workmanship shall be best of the respective kinds described in the contract and in accordance with SBI / Consultant instructions and shall be subject from time to time to such tests as the SBI / /Consultant may direct at the place of manufacture or fabrication or on the site or an approved testing laboratory. The contractor shall provide such assistance, instruments, machinery, labour and materials.

(ii) Samples

All samples of adequate numbers, size, shades & pattern as per specifications shall be supplied by the contractor without any extra charges. If certain items proposed to be used are of such nature that samples cannot be presented or prepared at the site detailed literature/test certificate of the same shall be provided to the satisfaction of the SBI/Consultant. Before submitting the sample/literature the contractor shall satisfy himself that the material/equipment for which he is submitting the samples/literature meet with the requirement of tender specification. Only when the samples are approved in writing by the SBI/Consultant the contractor shall proceed with the procurement and installation of the material/equipment. The approved samples shall be signed by the SBI/Consultant for identification and shall be kept on record at site office until the completion of the work for inspection/comparison at any time. The SBI/Consultant shall take reasonable time to approve the sample. Any delay that might occur in approving the samples for reasons of its not meeting the specifications or other discrepancies inadequacy in furnishing samples of best

qualities from various manufacturers and such other aspects causing delay on the approval of the materials/equipment's etc. shall be to the account of the contractor.

(iii) Cost of tests

a) The cost of making any test shall be borne by the contractor if such test is intended by or provided for in the specifications or BOQ.

(iv) Cost of test not provided for

If any test is ordered by the SBI/Consultant which is either:

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

16.0 Obtaining Information related to execution of work.

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

17.0 Contractor's superintendence

The contractor shall give necessary personal superintendence during the execution of the works and as long, thereafter, as the SBI/Consultant may consider necessary until the expiry of the defect's liability period, stated hereto.

18.0 Quantities

i) The bill of quantities (BOQ) unless or otherwise stated shall be deemed to have been prepared in accordance with the Indian Standard Method of Measurements

The rate quoted shall remain valid for variation of quantity against individual item to any extent. The entire amount paid under Clause 20 hereof as well as amounts of prime cost and provisional sums, if any, shall be excluded.

19.0 Works to be measured.

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

20.0 Variations:

No alteration, omission or variation ordered in writing by the SBI/Consultant shall vitiate the contract.

In case the SBI/Consultant thinks proper at any time during the progress of works to make any alteration in, or additions to or omission from the works or any alteration in the kind or quality of the materials to be used therein, the SBI/Consultant shall give notice thereof in writing to the contractor or shall confirm in writing within seven days of giving such oral instructions the contractor shall alter to, add to, or omit from as the case may be in accordance with such notice but the contractor shall not do any work extra to or make any alteration or additions to or omissions from the works or any deviation from any of the provisions of the contract, stipulations, specifications or contract drawings without previous consent in writing of the SBI/Consultant and the value of such extras, alterations, additions or

omissions shall in all cases be determined by the SBI/Consultant and the same shall be added to or deducted from the contract value, as the case may be.

21.0 Valuation of Variations

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

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

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

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

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

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

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

22.0 Final Measurement

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

23.0 Virtual Completion Certificate (VCC)

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

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

b) Demolish, dismantle, and remove the contractor's site office, temporary works, structures including labour sheds/camps and constructions and other items and things whatsoever brought upon or erected at the site or any land allotted to the contractor by the SBI and not incorporated in the permanent works.

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

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

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

f) All defects/imperfections have been attended and rectified as pointed out by the SBI to the full satisfaction of SBI. Upon the satisfactory fulfillment by the contractor as stated above, the contractor shall be entitled to apply to the SBI/Consultant for the certificate. If the SBI/Consultant is satisfied of the completion of the work, relative to which the

completion certificate has been sought, the SBI/Consultant shall within fourteen (14) days of the receipt of the application for virtual completion certificate, issue a VCC in respect of the work for which the VCC has been applied.

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

24.0 Work by other agencies

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

25.0 Insurance of Works

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

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

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

c) Such insurance shall be affected with an insurer and in terms approved by the SBI which approval shall not be unreasonably withheld and the contractor shall whenever required produce to the SBI/Consultant the policy of insurance and the receipts for payment of the current premiums.

25.2 Damage to persons and property

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

a) The permanent use or occupation of land by or any part thereof.
b) The right of SBI to execute the works or any part thereof, on, over, under, in or through any lands.
c) Injuries or damages to persons or properties which are unavoidable result of the execution or maintenance of the works in accordance with the contract.
d) Injuries or damage to persons or property resulting from any act or neglect of the SBI, their agents, employees or other contractors not being employed by the contractor or in respect of any claims, proceedings, damages, costs, charges and expenses in respect thereof or in relation thereto or where the injury or damage was contributed to by the contractor, his servants or agents such part of the compensation as may be just and equitable having regard to the extent of the responsibility of the SBI, their employees, or agents or other employees, or agents or other contractors for the damage or injury.

25.3 Contractor to indemnify SBI

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

25.4 Contractor's superintendence

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

25.5 Third Party Insurance

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

25.5.2 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 SBI/Consultant the policy or policies of insurance cover and receipts for payment of the current premiums.

25.6 The minimum insurance cover for physical property, injury, and death is Rs.5.0 lacs per occurrence with the number of occurrences limited to four. After each occurrence contractor will pay additional premium necessary to make insurance valid for four occurrences always.

25.7 Accident or Injury to Workmen

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

25.7.2 Insurance against accidents etc to workmen

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

25.7.3 Remedy on Contractor's failure to insure.

If the contractor fails to effect and keep in force the insurance referred to above or any other insurance which he may be required to effect under the terms of contract, then and in any such case the SBI may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by the SBI as aforesaid and also deduct 15% of contract value from any amount due or which may become due to the contractor, or recover the same as debt from the contractor.

25.7.4 Without prejudice to the other rights of the SBI against contractors, in respect of such default, the Bank shall be entitled to deduct from any sums payable to the contractor the amount of any damage's costs, charges, and other expenses paid by the SBI and which are payable by the contractors under this clause. The contractor shall upon settlement by the insurer of any claim made against the insurer pursuant to a policy taken under this clause, proceed with due diligence to rebuild or repair the works destroyed or damaged. In this event all the monies received from the

insurer in respect of such damage shall be paid to the contractor and the contractor shall not be entitled to any further payment in respect of the expenditure incurred for rebuilding or repairing of the materials or goods destroyed or damaged.

26.0 Commencement of Works

The date of commencement of the work will be reckoned as the recorded date of handing over site by the SBI or 15 days from the date of issue of Letter of Acceptance of Bank, whichever is later.

27.0 Time for completion

Time is the essence of the contract and shall be strictly observed by the contractor. The entire work shall be completed within a period of **02 (Two) months and 15 days mobilization period** from the date of issuing work order. If required in the contract or as directed by the SBI/Consultant, the contractor shall complete certain portions of work before completion of the entire work. However, the completion date shall be reckoned as the date by which the whole work is completed as per the terms of the contract.

28.0 Extension of Time

If, in the opinion of the SBI/Consultant, the work be delayed for reasons beyond the control of the contractor, the SBI/Consultant may submit a recommendation to the SBI to grant a fair and reasonable extension of time for completion of work as per the terms of contract. If the contractor needs an extension of time for the completion of work or if the completion of work is likely to be delayed for any reasons beyond the due date of completion as stipulated in the contract, the contractor shall apply to the SBI through the SBI/Consultant in writing at least 30 days before the expiry of the scheduled time and while applying for extension of time he shall furnish the reasons in detail and his justification if any, for the delays. The SBI/Consultant shall submit their recommendations to the SBI in the prescribed format for granting extension of time. While granting extension of time the contractor shall be informed the period extended time which will qualify for levy of liquidated damages. For the balance period in excess of original stipulated period and duly sanctioned extension of time by the SBI the provision of liquidated damages as stated under clause 9 of GCC shall become applicable. Further contract shall remain in force even for the period beyond the due date of completion irrespective whether the extension is granted or not.

29.0 Rate of progress

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

30.0 Work during nights and holidays

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

31.0 No compensation for restrictions of work

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

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

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

32.0 Suspension of work

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

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

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

c) For safety of the works or part thereof.

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

ii) If the suspension is ordered for reasons (b) and (c) in sub-Para (i) above :

The contractor shall be entitled to an extension of time equal to the period of every such suspension. No compensation whatsoever shall be paid on this account.

33.0 Action when the whole security deposit is forfeited.

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

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

b)To employ labour paid by the SBI and to supply materials to carry out the work, or any part of the work, debiting the contractor with the cost of the labour and materials (the cost of such labour and materials as worked out by the SBI/Consultant shall be final and conclusive against the contractor) and crediting him with the value of the work done, in all respects in the same manner and at the same manner and at the same rates as if it had been carried out by the contractor under the terms of this contract the certificate of SBI/Consultant as to the value of work done shall be final and conclusive against the contractor.

c) To measure up the work of the contractor, and to take such part thereof as shall be unexecuted, out of his hands, and to give it to another contractor to complete in which case any expenses which may be incurred in excess of the sum which would have been paid to the original contractor, if the whole work had been executed by him (of the amount of which excess the certificates in writing of the SBI/Consultant shall be final and conclusive) shall be borne by original contractor and may be deducted from any money due to him by SBI under the contract or otherwise, or from his security deposit or the proceeds of sale thereof, or sufficient part thereof.

In the event of any of above courses being adopted by the SBI the contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased or procured any material or entered into any engagements or make any advances on account of, or with a view to the execution of the work or the performance of the contract and in case the contract shall be rescinded under the provision aforesaid, the contractor shall not be entitled to recover or to be paid any sum or any work thereto for actually performed under this contract, unless, and until the SBI/Consultant will have certified in writing the performance of such work and the value payable in respect thereof, and he shall only be entitled to be paid the value so certified.

34.0 Owner's Right to Terminate the Contract

If the contractor being an individual or a firm commit any 'Act of Insolvency' or shall be adjusted an insolvent or being an incorporated company shall have an order for compulsory winding up voluntarily or subject to the supervision of Government and of the Official Assignee of the liquidator in such acts of insolvency or winding up shall be unable within seven days after notice to him to do so, to show to the

reasonable satisfaction of the SBI/Consultant that he can carry out and fulfill the contract, and to give security therefore if so, required by the SBI/Consultant.

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

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

a) Has abandoned the contract; or

b) Has failed to commence the works, or has without any lawful excuse under these conditions suspended the progress of the works for 14 days after receiving from the SBI through the SBI/Consultant written notice to proceed, or

c) Has failed to proceed with the works with such diligence and failed to make such due progress as would enable the works to be completed within the time agreed upon, or has failed to remove the materials from the site or to pull down and replace work within seven days after written notice from the SBI through the SBI/Consultant that the said materials were condemned and rejected by the SBI/Consultant under these conditions; or has neglected or failed persistently to observe and perform all or any of the acts, matters or things by this contract to be observed and performed by the contractor for seven days after written notice shall have been given to the contractor to observe or perform the same or has to the detriment of good workmanship or in defiance of the SBI's/'s or Consultant's/Consultant's instructions to the contrary subject any part of the contract. Then and in any of said cases the SBI and or the SBI/Consultant , may not withstanding any previous waiver, after giving seven days' notice in writing to the contractor, determine the contract, but without thereby affecting the powers of the SBI or the SBI/Consultant or the obligation and liabilities of the contractor the whole of which shall continue in force as fully as if the contract had not been so determined and as if the works subsequently had been executed by or on behalf of the contractor. And, further the SBI through the SBI/Consultant , their agents or employees may enter upon and take possession of the work and all plants, tools, scaffoldings, materials, sheds, machineries lying upon the premises or on the adjoining lands or roads, use the same by means of their own employees or workmen in carrying on and completing the work or by engaging any other contractors or persons to complete the work and the contractor shall not in any was interrupt or do any act, matter or thing to prevent or hinder such other contractor or other persons employed for completing and finishing or using the materials and plant for the works.

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

35.0 Certificate of Payment

The contractor shall be entitled under the certificates to be issued by the SBI/Consultant to the contractor within 10 working days from the date of certificate to the payment from SBI from time to time. The SBI shall recover the statutory recoveries and other dues including the retention amount from the certificate of payment provided always that the issue of any certificate by the SBI/Consultant during the progress of works or completion shall not have effect as certificate of satisfaction or relieve the contractor from his liability under clause.
The SBI/Consultant shall have power to withhold the certificate if the work or any part thereof is not carried out to their satisfaction.

The SBI/Consultant may by any certificate make any corrections required in previous certificate.

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

The contractor shall submit interim bills only after taking actual measurements and properly recorded in the Measurement book (M.B).

The contractor shall not submit interim bills when the approximate value of work done by him is less than **Rs. 5.0 lacs** and the minimum interval between two such bills shall be one month.

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

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

36.0 Settlement of Disputes and Arbitration

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

i) If the contractor considers that he is entitled to any extra payment or compensation in respect of the works over and above the amounts admitted as payable by the SBI/Consultant or in case the contractor wants to dispute the validity of any deductions or recoveries made or proposed to be made from the contract or raise any dispute, the Contractor shall forthwith give notice in writing of his claim, or dispute to the Assistant General Manager (Premises & Estate)/ Dy. General Manager (Premises) and endorse a copy of the same to the SBI/Consultant, within 30 days from the date of disallowance thereof or the date of deduction or recovery. The said notice shall give full particulars of the claim, grounds on which it is based and detailed calculations of the amount claimed and the contractor shall not be entitled to raise any claim nor shall the Bank be in any way liable in respect of any claim by the contractor unless notice of such claim shall have been given by the contractor to the Assistant General Manager (Premises & Estate)/Dy. General Manager (premises) 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 Assistant General Manager (Premises & Estate)/Dy. General Manager (premises) in writing in the manner and within the time aforesaid.

ii) The Assistant General Manager (Premises & Estate)/Dy. General Manager (premises) shall give his decision in writing on the claims notified by the contractor. The contractor may within 30 days of the receipt of the decision of the Assistant General Manager (Premises & Estate)/Dy. General Manager (premises) submit his claims to the conciliating authority namely the Circle Development Officer/General Manager (Corporate Services) for conciliation along with all details and copies of correspondence exchanged between him and the Assistant General Manager (Premises & Estate)/Dy. General Manager (premises)

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

iv) Except where the decision has become final, binding, and conclusive in terms of the contract, all disputes or differences arising out of the notified claims of the contractor as aforesaid, and all claims of the Bank shall be referred for adjudication through arbitration by the Sole Arbitrator appointed by the Chief General Manager/ Dy. Managing Director &Corporate Development Officer. It will also be no objection to any such appointment that the Arbitrator so appointed is a Bank Officer and that he had to deal with the matters to which the Contract relates in the course of his duties as Bank Officer. If the arbitrator so appointed is unable or unwilling to act or resigns his appointment or vacates his office due to any reason whatsoever another sole arbitrator shall be appointed in the manner aforesaid by the said Chief General Manager/ Dy. Managing Director &Corporate Development Officer. 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 Chief General Manager aforesaid should act as arbitrator.

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

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

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

37.0 Power Supply

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

38.0 Water supply

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

i) That the water used by the Contractor shall be fit for construction purpose to the satisfaction of the SBI/Consultant.

ii) The Contractor shall make alternative arrangements for the supply of water if the arrangements made by the Contractor for procurement of water in the opinion of the SBI/Consultant is unsatisfactory.

38.1 The Contractor shall construct temporary well/tube well in SBI land for taking water for construction purposes only after obtaining permission in writing from the SBI. The contractor has to make his own arrangements for drawing

and distributing the water at his own cost. He must make necessary arrangements. To avoid any accidents or damages caused due to construction and subsequent maintenance of the wells. He must obtain necessary approvals from the local authorities, if required at his own cost. He shall restore the ground to its original condition after wells are dismantled on completion of work or hand over the well to the SBI without any compensation as directed by the SBI/Consultant.

39.0 Treasure Trove etc.

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

40.0 Method of Measurement

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

41.0 Maintenance of Registers

The contractor shall maintain the following registers as per the enclosed format at site of work and should produce the same for inspection of SBI/Consultant whenever desired by them. The contractor shall also maintain the records/registers as required by the local authorities/Government from time to time. Refer to Clause 47.0

43. Force Majeure

43.1 Neither contractor not SBI shall be considered in default in performance of their obligations if such performance is prevented or delayed by events such as war, hostilities revolution, riots, civil commotion, strikes, lockout, conflagrations, epidemics, accidents, fire, storms, floods, droughts, earthquakes or ordinances or any act of god or for any other cause beyond the reasonable control of the party affected or prevented or delayed. However a notice is required to be given within 30 days from the happening of the event with complete details, to the other party to the contract, if it is not possible to serve a notice, within the shortest possible period without delay.

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

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

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

44.0 Local Laws, Acts, Regulations

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

i) Minimum Wages Act, 1948 (Amended)
ii) Payment of Wages Act 1936 (Amended)
iii) Workmen's Compensation Act 1923 (Amended)
iv) Contract Labour Regulation and Abolition Act 1970 and Central Rules 1971 (Amended)
v) Apprentice Act 1961 (Amended)
vi) Industrial Employment (Standing Order) Act 1946 (Amended)

vii) Personal Injuries (Compensation Insurance) Act 1963 and any other modifications
viii) Employees' Provident Fund and Miscellaneous Provisions Act 1952 and amendment thereof
ix) Shop and Establishment Act
x) Any other Act or enactment relating thereto and rules framed there under from time to time.

45.0 SAFETY CODE:

SAFETY MEASURES AT SITE:

1. All personnel at site should be provided with Helmets and Safety Boots with some Identification Mark. Visitors also should be provided with Helmets. It should be ensured that these are used properly.

2. First Aid Box should be kept at site with all requisite materials.

3. No one should be allowed to inspect / work at a height without Safety Belt.

4. Suitable scaffolds should be provided for workmen for all Works that cannot safely be done from the ground, or from solid construction except such short period Work as 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 as suitable footholds and handholds shall be provided on the ladder and the ladder shall be given an inclination not steeper than ¼ to 1 (¼ horizontal and 1 vertical).

5. Scaffolding or staging more than 3.5 meters above the ground or floors, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly attached, bolted, braced and otherwise secured at least 1 Meter high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

6. Working platforms, Gangways, and Stairways should be so constructed that they do not sag unduly or unequally, and if the height of the platform or the Gangway or the Stairway is more than 3-5 Meters above ground level or floor level they should be closely boarded, should have adequate width and should be suitably fenced, as described.

7. 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 1 Meter.

8. 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 Meters in length while the width between side rails in rung ladder shall in no case be less than 30cms for ladder upto and including Meters in length. For longer ladders this width should be increased at least 6mm for each additional 30 cms. Uniform step spacing shall not exceed 30 cms.

9. Adequate precautions shall be taken to prevent danger from electrical equipments. For electrical on line works gloves, rubber mats, and rubber shoes shall be used.
10. All trenches 1.2 Meters or more in depth shall at all times be supplied with at least one ladder for each 30 Meters length or fraction thereof. Ladder shall be extended from bottom of the trench to at least 1 Meter above the surface of the ground. The sides of the trenches, which are 1.5 Meters or more in depth shall be stepped back to give suitable slope, or securely held by timber bracing, so as to avoid the danger of sides collapsing. The excavated materials shall not be placed within 1.5 Meters of the edge of the trench or half of the depth of the trench whichever is more cuttings shall be done from top to bottom. Under no circumstances undermining or under cutting shall be done.

11. Before any demolition work is commenced and also during the process of the work :-

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

b) No electrical 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 risk or fire or explosion or flooding. No floor, roof or other part of the building shall be so over-loaded with debris or materials as to render it unsafe.

d) All necessary personal safety equipment as considered adequate by the Site Engineer 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 those concerned.

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

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

g) Those engaged in welding works shall be provided with Welder's protective eye-shields.

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

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

12. Use of hoisting machines and tackle including their attachments, anchorage and support shall conform to the following standard or conditions:-

a) These shall be of good mechanical construction, sound material and adequate strength and free from patent defect and shall be kept in good repairs and 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.

c) 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 scaffold, winch or give signals to the operator.

d) 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.

e) Every hoisting machine and all gear referred to above shall be plainly marked with the safe working load. In case of hoisting machine having a variable safe working load, each safe working load of the conditions under which it is applicable shall be clearly indicated. No part of any machine or of any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing.

f) Motor, 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 to the minimum the risk of accidental descent of the load, adequate precautions should be taken to reduce to the minimum the risk of any part of a suspended load becoming accidentally displaced.

g) When workers are employed on electrical installation, which are already energized, insulating mats, wearing apparel such as gloves, sleeves, and boots as may be necessary should be provided. The workers should not wear any rings, watches and carry keys or other materials, which are good conductors of electricity.

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

46.0 Accidents

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

47.0 BANK'S BUILDING PROJECTS – MAINTENANCE OF RECORDS

A	**Registers to be maintained at the site office:**
1	Measurement Books.
2	Cement Register (Daily Record).
3	Steel Register.
4	Steel Consumption Register – Bill wise.
5	Drawings register
6	Materials at site register.
7	Hindrance Register.
8	Concrete cube Test Register.
9	File and Register for extra / variation items.
10	Materials test Register and File.
11	Site Order Book (in triplicate).
12	Lead caulking Register.
13	Labour Reports and progress Reports Register.
14	Site Visit & Instruction Register
15	Certified true copies of the contracts

ADDITIONAL CONDITIONS (Scope of Works)

1. The contractors are advised to get acquainted with the proposed work and its site, approach roads, working space, restrictions and also study the Soil Report, the Preliminary Architectural / Structural Drawings, Specifications and Special Conditions etc. carefully before tendering. No claim of any sort shall be entertained on account of any site conditions and ignorance of specifications and special conditions.

2. The tenderer shall see the approaches to the site. In case any approach from main road is required at site or existing approach is to be improved and maintained for cartage of materials by the contractor, the same shall be provided, improved and maintained by the contractor at his own cost. No payment shall be made on this account.

3. The rates quoted by the contractor shall be taken as net and nothing extra shall be paid on any account i.e. royalty, cartage any other's taxes for stacking of materials at required places etc

4. The rates for different items of work shall apply for all heights and depths, leads and lifts unless otherwise specified in the agreement or specifications applicable to the agreement.

5. Any damage done by the contractor to any existing work during the course of execution of the work shall be made good by him at his own cost.

6. Articles manufactured by the reputed firms and approved by SBI/Consultant shall only be used. Only articles classified, as 'first quality' by the manufacturer shall be used unless otherwise specified. In case articles bearing ISI certification are not available in the market, quality of samples brought by the contractor shall be judged by standards laid down in the relevant Standards & Specifications. The sample of materials to be brought to site for use in work shall be got approved from the SBI/Consultant before actual execution of work.

7. Samples of materials required for testing shall be provided free of cost by the contractor at the Bank's office and the Consultant's Office. Testing charges, if any, shall be borne by the contractor in case the test results are satisfactory except where-ever specifically mentioned otherwise in the NIT. All other expenditure to be incurred for taking samples, conveyance, packing etc. shall be borne by the contractor. If material fails in testing, the testing charges will be borne by the contractor.
   The contractor shall get the water tested with regard to its suitability and conforming to the relevant IS Code. The contractor shall obtain written approval from the SBI/Consultant before he proceeds by using the same for execution of work. The water testing charges shall be borne by the contractor.

8. The contractor shall submit a detailed work schedule (Bar/Part chart) within 15 days of the date of issue of award letter. Detailed program should include all the mile stone, cash flow, material procurement, manpower deployment. Program must show clearly the critical path to complete the project in time. The SBI/Consultant can modify the program and the contractor shall have to work accordingly.

9. The quantities of each item shall not be exceeded beyond the agreement quantities without prior permission of the Bank/Consultant/.

10. Statutory deductions as applicable shall be made from the gross amount of the bill as per Additional Condition 49.

11. The contractor shall make his own arrangements for obtaining electric connection and water connection, if required and make necessary payments directly to the department concerned.

12. All types of mortars to be used in the work shall be mixed in the mechanical mixer and hand mixing shall not be permitted.

13. The contractor shall make his own arrangement for getting the permission to ply the trucks, machinery etc. from the traffic police.

14. No payment shall be made to the contractor for any damage caused by rain, snow fall, floods or any other natural causes whatsoever during the execution of work. The damage caused to work shall have to be made good by the contractor at his own cost and no claim on this account shall be entertained.

15. Other agencies may also simultaneously be executing the work of electrification, substation, firefighting, HVAC, Horticulture or external services and other building works for the same building along with this work. The contractor shall afford necessary facilities for the same and no claim in the matter shall be entertained. The contractor shall especially co-ordinate with the other agencies carrying out their work.

16. Some restrictions may be imposed by the security staff etc. on the working and or movement of labour and materials, etc., the contractor shall be bound to follow all such restrictions / instructions and nothing shall be payable on this account.

17. The contractor shall take all precautions to avoid accidents by exhibiting necessary caution boards, red lights and all other such measures. He shall be responsible for all damages and accidents caused due to negligence on his part. No hindrance shall be caused to traffic during the execution of the work by storing materials on the road.

18. The contractor shall be fully responsible for the safe custody of the material issued or brought by him to site for doing the work

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19. The contractor shall make his own arrangement of water for construction and drinking purpose as well for electricity and its distribution at his own cost. The department will render only assistance to the contractor for making application to DJB/ authorized Electric supply agency, if required. All the fees and charges including consumption charges shall be borne by the contractor. The water should be as per relevant codes.

20. The contractor shall adhere to the instructions being issued by the SIDCUL, Fire Authorities, Government, SBI and agencies such as Chief Technical Examiner of Central Vigilance Commission and any other Authorities connected with the various works involved in the project during their inspection and assist the Bank and the Consultants/SBI/Consultant to reply their queries/objections and ensure removal of the deficiency pointed out by the agency during the inspection and the help SBIConsultant in replying to their observations from time to time till the matters are finally cleared by the C.T.E.'s Organization and settled.

20. The contractor shall assist the day to day supervision/inspection of the SBI/Consultant and ensure that the said works are being executed as per the plans and designs and specification of the contract agreements.

21. The contractor shall assist the SBI/Consultant in checking the materials/works, getting various tests for materials and works done, correct measurements of the works, and initial scrutiny of his bills at site.

22. The contractor shall ensure that no extra-items/quantities of items are executed until and unless the same have been approved by SBI and maintain necessary site records for the same as soon as the same is envisaged.

23. The contractor shall use the material/product only after approval of the SBI/Consultant in case of finishing items/special Architectural features such as marble granite, ceramic tiles, stone finishes, decorative plaster, mouldings, shades of paints, interior furnishing items, flooring, mural work, any Architectural pattern in finishing items, sanitary ware.

24. He shall maintain records of site meetings and minutes of meetings, quotations/bills of material/product for rates for extra items, prepare quantity variations statement, ensure quality control of materials and workmanship and prepare the statement of theoretical estimated and actual consumption of cement, steel and other identical materials as per specification and schedules laid down in the contracts.

25. He shall ensure proper establishment of field laboratories to conduct laboratory tests on materials for construction such as cement, steel, bricks etc. and other test mentioned in the tender for the construction work accepted by SBI.

28. The contractor shall assist the SBI for obtaining final building completion certificate and securing permission of Municipal Corporation or other authority for occupation of the building. He shall also assist for obtaining all other NOCs like those of Aviation, Environment/pollution board and another departments/offices of Govt./Semi Govt./Public Bodies etc.

29 The contractor will not have any claim in case of any delay. in removal of trees or shifting, removing of telegraph, telephone or electric lines (overhead or underground), water and sewer lines and other structure etc., if any which may come in the way of the work. However, suitable extension of time can be granted to cover such delay.

30 The malba /garbage (construction waste material) generated at site due to construction activities shall be removed from the site immediately & shall be disposed of by the contractor to the approved dumping site at his own cost as per the prevailed Local Govt. Authority norms.

31. The contractor shall clean the site thoroughly of scaffolding materials, rubbish, equipment left out of his work and dress the site around the building to the complete satisfaction of the SBI/Consultant before the work is treated as completed.

32. The **Labour Welfare Cess** @ 1% of gross work done shall be deducted.

33 **Barricading**

i. The proper temporary barricading by fencing with G.I. sheets, shall be carried out by the Contractor at the start of work to physically define the boundaries of the plot for restricted entry to only those involved in the work and also to prevent any accidents, at the same time without causing any inconvenience to the traffic and the users of the buildings in the adjacent plots. It shall be done by providing, erecting, maintaining temporary protective barricading of minimum 3.0 meters in height, made in panels, with each panel having MS frames / MS scaffolding pipes of suitable size and stiffness, with 24 gauge thick GI corrugated sheet or suitably stiffened plain GI sheet fixed on frames. Such panels shall be suitably connected to each other for stability with nuts and bolts, hooks, clamps etc. and fixed firmly to the ground at about 2 meters spacing, for the entire duration till completion of the work. He shall also provide and erect temporary protective barricades within the plot, if required, to prevent any accident. Temporary protective roofing near the Entrance to the building, under construction, shall be made to protect the visiting officials from getting hurt by falling debris etc. Also, one or more coat of enamel paint of shade as approved and directed. shall be applied on the panels and "PWD" shall be painted over that in suitable sizes, shapes and numbers as directed. It shall be dismantled and taken away by the Contractor after the completion of work at his own cost with the approval of the Engineer-in-Charge. Nothing extra shall be payable on this account.

ii. Access gate of adequate sized opening in barricading should be provided to allow smooth flow of construction machinery, trucks, trailers etc.

iii. The contractor shall maintain the site barricading during the complete period of execution and realign it if required, for execution of works. Nothing extra shall be payable on this account.

34. The work shall be carried out in accordance with the Architectural drawings and structural drawings, to be issued from time to time.

Before commencement of any item of work, the contractor shall correlate all the relevant Architectural and structural drawings issued for the work and satisfy himself that the information available there from is complete and unambiguous. The discrepancy, if any, shall be brought to notice of SBI/Consultant before execution of the work. The contractor alone shall be responsible for any loss or damage occurring by the commencement of work on the basis of any erroneous and or incomplete information.

35. The contractor shall give due notices / request letter to Municipality, Police, Labour Department and /or other authorities that may be required under the law/ rules under force in the area and obtain all requisite licenses for temporary obstructions/ enclosures and pay all fee, taxes and charges which may be leviable on account of these operations in executing the work under the agreement. Nothing extra shall be payable on this account. The contractor shall ensure that there is no damage to adjoining property. If any such untoward happens he shall be entirely responsible for any consequences besides making good any damages to the adjoining property whether public or private. He shall supply and maintain lights either for illumination or for cautioning the public at night.

36. The contractor shall leave such recesses, holes, openings etc. as may be required for the electric, air-conditioning and other related works at the time of casting of concrete, stone work & brick work, if required, and nothing extra shall be payable on this account.

37. Before start of work, the Contractor keeping in view that the space available is limited shall furnish a construction yard layout, specifying areas for constructions, positioning of machinery, material yard, cement and other storage, steel fabrication yard, site laboratory, water tank, conveyer belt etc. and seek formal approval of the SBI/Consultant. The contractor shall not stack building material/ malba on the NDMC land or road or on the land owned by any other authority. In case, the Contractor is found stacking the building material/ malba as stated above, he shall be liable to pay the stacking charges as may be levied by NDMC or any other local body or authority and also to face penal action as per the rules, regulations and byelaws of the said body or authority. The SBI/Consultant shall be at liberty to recover the sums due but not paid to the concerned authorities on the above counts from any sums due to the contractor including amount of the Security Deposit or Retention Money in respect of this contract or any other contract.

38. The contractor shall arrange carrying out of all tests required under the agreement through the laboratory as approved. and shall bear all charges in connection therewith including fee for testing. However, no testing charges will be payable by the contractor for the tests conducted in laboratories at site of work. In all cases, cost of samples and to and from carriage shall be borne by the contractor. Contractor shall establish a laboratory at site of work at his own cost.

Allowing establishing the laboratory at site shall not absolve the contractor from fulfilling the criteria of getting the test done in independent Lab. /CPWD Lab. The decision of the SBI/Consultant of allowing any test in the site laboratory or any other laboratory shall be final.

39. SETTING OUT:

39.1 The contractor shall establish, maintain, and assume responsibility for grades, lines, levels and benchmarks. He shall report any errors or inconsistencies regarding grades, lines, levels, dimensions to the SBI/Consultant before commencing work. Commencement of work shall be regarded as the contractor's acceptance of such grades, lines, levels and dimensions and no claim shall be entertained later for any errors found.
If at any time, any error in this respect shall appear during the progress of the work, the contractor shall, at his own expense rectify such error if so, required to the satisfaction of the SBI/Consultant. Nothing extra shall be payable on this account for any errors found later.
The Contractor shall protect and maintain temporary/ permanent benchmarks at the site of work throughout the execution of work. These benchmarks shall be got checked or his authorized representatives. The work at

different stages shall be checked with reference to benchmarks maintained for the said purpose. Nothing extra shall be payable on this account.

39.2 The approval of the setting out by the contractor shall not relieve the contractor of any of his responsibilities.

39.3 The contractor shall be entirely and exclusively responsible for the horizontal, vertical and other alignment, the level and correctness of every part of the work and shall rectify effectively and errors or imperfections therein. Such rectifications shall be carried out by the contractor at his own cost to the instructions and satisfaction of the SBI/Consultant.

39.4 The rates quoted by the Contractor are deemed to be inclusive of site clearance, setting out work, profile, establishment of reference benchmark, spot levels, construction of all safety and protection devices, barriers, earth embankments, preparatory works, all testing of materials, working during monsoon, working at all depths, heights and locations etc.

40.0 INTEGRATED PROGRAMME CHART:

The Contractor shall prepare an integrated program chart within fifteen days of issue of award letter including civil as well as PHE activities for the execution of work, showing clearly all activities from the start of work to completion, with details of manpower, equipment and machinery required for the fulfillment of the program within the stipulated period and submit the same for approval of the SBI/Consultant within fifteen days of the award of the work. The integrated program chart so submitted should not have any discrepancy with the physical milestones attached in the contract agreement. The program chart should include the following: -

(i) Descriptive note explaining sequence of various activities.
(ii) Program for procurement of materials by the contractor.
(iii) Program for arranging and deployment of manpower both skilled and unskilled so as to achieve targeted progress.
(iv) Program of procurement of machinery/equipment having adequate capacity, commensurate with the quantum of work to be done within the stipulated period, by the contractor.
(v) Program for achieving fortnightly micro milestones and periodic milestones.
(vi) In case of non-compliance/delay in compliance in this, a penalty @ Rs. 2000/- per day will be imposed which will be recovered from the immediate next R/A Bill of the Contractor.
(vii) If at any time, it appears to the SBI/Consultant that the actual progress of work does not conform to the approved program referred above, the contractor shall produce a revised program showing the modifications to the approved program by additional inputs to ensure completion of the work within 7(seven) days.
(ix) The submission for approval. of such program or the furnishing of such particulars shall not relieve the contractor of any of his duties or responsibilities under the contract. This is without prejudice to the right of SBI/Consultant to act against the contractor as per terms and conditions of the agreement.
(x) Apart from the above integrated program chart, the contractor shall be required to submit monthly progress report of the work in computerized form on 1st of every month. These Monthly progress reports shall be accompanied with photographs (at least ten nos.) of the work done at all the parts of construction site in a computerized form besides forwarding hard copies of the same before to Engineer in Charge. The contractor shall submit the 5-minute compiled video in soft copy of execution of different items of work along with the monthly progress report. Nothing extra shall be payable on this account.
    (a) Construction schedule of the various components of the work through a bar chart for the next two fortnights (or as may be specified), showing the micro- milestone/milestones, targeted tasks (including material and labour requirement) and up to date progress. At least 10 digital photographs

showing all the parts of construction site along with at least 5 minutes video of executions of different items in soft copy must be submitted in every fortnightly progress report.

(b) Progress chart of the various components of the work that are planned and achieved, for the fortnight as well as cumulative up to the fortnight under reckoning, with reason for deviations, if in the scheduled tabular format.

(c) Plant and machinery statement, indicating those deployed in the work.

(d) Man-power statement indicating:

- Individually the names of all the staff deployed on the work, along with their designations.
- No. of skilled workers (trade wise) and total no. of unskilled workers deployed on the work and their location of deployment i.e., blocks.

(e) Financial statement, indicating the broad details of all the running account payment received up to date, such as gross value of work done, advances taken, recoveries effected, amount withheld, net payments details of cheque payment received, extra/substituted/deviation items if any, etc.

(i) In case of non-compliance / delay in compliance in submission of fortnightly, a penalty @ Rs. 5000/- per fortnightly report will be imposed which will be recovered from the immediate next R/A Bill of the Contractor.

(ii) For completing the work in time, the Contractor might be required to work in two or more shifts (including night shifts). No claim whatsoever shall be entertained on this account, not with-standing the fact that the Contractor may have to pay extra amounts for any reason, to the labour and other staff engaged directly or indirectly on the work according to the provisions of the labour and other statutory bodies regulations and the agreement entered upon by the Contractor with them.

(xi) The work should be planned in a systematic manner to ensure proper co-ordination of various disciplines viz. sanitary & water supply, electrical, firefighting and any other services.

(xii) Other agencies will also simultaneously execute and install the works of sub-station / generating sets, air-conditioning, lifts, etc. for the work and the contractor shall afford necessary facilities for the same.

(xiii) The Contractor shall do proper sequencing of the various activities by suitably staggering the activities within various pockets in the plot to achieve early completion. The agency may deploy adequate equipment, machinery and labour as required for the completion of the entire work within the stipulated period specified. Also, ancillary facilities shall be provided commensurate with requirement to complete the entire work within the stipulated period. Nothing extra shall be payable on this account. Adequate number/sets of equipment in working condition, along with adequate stand-by arrangements, shall be deployed during entire construction period. It shall be ensured by the Contractor that all the equipment, Tools & Plants, machineries etc. provided by him are always maintained in proper working conditions during the progress of the work and till the completion of the work. Further, all the constructional tools, plants, equipment and machineries provided by the Contractor, on site of work or his work shop for this work, shall be exclusively intended for use in the construction of this work and they shall not be shifted / removed from site without the permission of the SBI/Consultant. Delay caused due to repairing or maintenance of Equipment, tools and other machineries shall be entirely attributed to the contractor. Extension of time shall not be given on this account to the contractor.

(xiv) To avoid delay, contractor should submit samples well in advance so as to give timely orders for procurement.

(xv) All material shall only be brought at site as per program finalized with the SBI/Consultant. Any pre-delivery of the material not required for immediate consumption shall not be accepted and thus not paid for (in terms of secured advance or advance payment etc.).

41.0 EXISTING SERVICES:

41.1 Existing drains, pipes, cables, overhead wires, sewer lines, water lines and similar services encountered in the course of the execution of the work shall be protected against the damage by the contractor at his own expense. The contractor shall not store materials or otherwise occupy any part of the site in a manner likely to hinder the operation of such services. If for the purposes for the work, any changes, modifications in

alignment, relocations and permissions for the same are required, the contractor shall carry out the same at his own cost and effort. For this purpose, before tendering he shall examine site and surroundings at his own cost.

41.2 The contractor shall be responsible for the watch and ward of the building, safety of all fittings and fixtures including sanitary and water supply fittings and fixtures provided by him against pilferage and breakage during the period of installation and thereafter till the work is physically handed over to the department.

42.0 **STORAGE AND ISSUE OF MATERIALS:**

42.1 Materials required for the work whether procured by the contractor or supplied by the department shall be stored by the contractor only at approved places, in standard profiles and in the manner as approved. Storage and safe custody of all materials shall be the sole responsibility of the contractor.

42.2 Special care shall be taken by the contractor at his expense to store H.T. steel wires/strands/bars under suitable sheds as approved. The SBI/Consultant or his authorized representatives shall always have an easy access to the store for inspection the H.T. steel and satisfy themselves regarding the condition thereof. Any modifications in storage arrangement suggested by them shall be strictly followed by the contractor. Suitable and effective protection of the H.T. steel against corrosion shall be fully ensured. The H.T. steel shall also be invariably wrapped in gunny clothes, tar papers or with other suitable materials as approved at the cost of contractor.

42.3 Stock piling of the H.T. steel on the work site will not be allowed any time and specially before and during the monsoon. During monsoon days the H.T. steel shall necessarily be kept in air tight stores. Nothing extra shall be paid to the contractor on these accounts.

42.4 Steel reinforcement shall be stored in such a way as to avoid distortions and to prevent deterioration by corrosion.

42.5 The contractor shall construct suitable godowns as per specifications of work for storing the materials safe against damage due to sun, rain dampness, fire, theft etc. He shall also employ necessary watch and ward establishment for the purpose.

42.6 The days to day receipt and issue accounts of different grade/brand of cement shall be maintained separately in the Standard Performa by the Engineer in charge of work and which shall be duly signed by the contractor or his authorized representative.

43.0 PREVENTION OF NUISANCE:

43.1 The contractor shall take all necessary precautions to prevent any nuisance or inconvenience to the owners, tenants or occupiers of adjacent properties and to the public in general and to prevent any damage to such building and any pollution of smoke, streams and water-ways. He shall make good at his cost and to the satisfaction of the SBI/Consultant, any damage to roads, paths, cross drainage works or public or private property whatsoever caused by the execution of the work or by traffic brought thereon by the contractor. All waste or superfluous materials shall be carried away by the contractor without any reservation entirely to the satisfaction of the SBI/Consultant.

44.0 SECURITY & TRAFFIC ARRANGEMENTS:

44.1 Wherever the construction is taken up, the contractor shall provide at his own cost an all-weather motorable track/parking place if considered necessary. entirely to his satisfaction to facilitate the movement and parking of inspection vehicles.

44.2 No inflammable materials including P.O.L. shall generally be allowed to be stored at site. However, reasonable quantity may be permitted for storage subject to the compliance of all rules / instructions issued by the competent authorities and as per the direction of SBI/Consultant.

43.3 In the event of any restrictions (including temporary suspension of work) being imposed by the Security agency, PWD, Traffic or any other authority having jurisdiction in the area on the working or movement of labour /material, the contractor shall strictly follow such restrictions and nothing extra shall be payable to the contractor on this account. The loss of time on this account, if any, shall have to be made up by generating additional resources etc. General Security restrictions are given as under:

(i) The movement of trucks and vehicles shall be regulated in accordance with rules and regulations as approved by competent authority.

(ii) The contractor shall inform, in advance, the truck registration numbers, ownerships of the trucks, names and addresses of the drivers for necessary action by the Security agency.

(iii) Due to the site restrictions, there is no possibility for labour huts to be erected at site. However, a few huts may be allowed as per the discretion of the SBI/Consultant.

(iv) Names and addresses of labourers/ staff etc. working at site shall be furnished for security verification.

(v) The labourers / staff should not be changed too frequently once the verification of the character and antecedents is done.

(vi) After verification of antecedents of workers, identification badges will be issued to them by the contractor under the seal of the SBI/Consultant or his representative. The cost of badges would be borne by the contractor.

(vii) As and when there will be security requirements, certain additional restriction (s) can be imposed as per the requirement of the situation.

(viii) No claim whatsoever will be entertained by the department on account of any restriction (including temporary suspension of work) imposed by the security agencies in execution of work.

44.4 The contractor shall place a private security agency on the site of work to regulate movement of materials, personnel, vehicles, and machinery. This agency shall follow the guidelines given by the SBI if any. Nothing extra shall be paid on this account.

45.0 **Submission and Documentation:**

The Contractor shall render all help and assistance in documenting the total sequences of this project by way of photography, slides, audio / video recording etc. Nothing extra shall be payable to Contractor on this account. The original films shall be the property of the Department. No copy shall be prepared without the prior approval of the SBI/Consultant.

(i) The Contractor shall display all permissions, licenses, registration certificates, bar charts, other statements etc under various labour laws and other regulations applicable to the works, at his site office. He should also keep at site at least one set of BIS Codes and other relevant codes at site and produce the same if asked for by SBI/Consultant. In case of noncompliance, these codes will be purchased from the Market and actual cost of purchase will be recovered from the next RA Bill of the Contractor.

(ii) The Contractor shall make available four (04) portfolios (300 mm x 450 mm) sets each containing completed Building Drawings, "As Built Drawings" along with literatures, manuals, warranty certificates etc. of various installed fittings, fixtures and equipment for the completed projects. **This shall be the prerequisite for payment of final bill**.

These drawings shall be prepared on CAD using Auto-CAD and shall be recorded on CDs and one set of these CDs shall also be submitted.

(iii) The Contractor shall make available three (04) sets of all drawings of internal and external services i.e.

Water Supply, Sanitary line and Drainage lines. This shall be the prerequisite for payment of final bill. These drawings shall have the following information:

(a) Run off for all piping and their diameters including soil, waste pipes and vertical stacks.

(b) Ground and invert level of all drainage pipes together with locations of all manholes and connections, up to outfall.

(c) Run off for all water supply lines with diameters location of control valves, access panels etc.

(iv) The contractor shall make available four (04) sets of computerized Standard Measurement Books (SMBs) having measurement of all the permanent standing in a building.

(v) The Performance Guarantee shall not be released to the contractor until the aforesaid drawings/documents are submitted to the SBI/Consultant.

(v) The contractor will submit computerized measurement sheet (in Excel) for the work carried out by him for making payment as specified in General Conditions of Contract. For casting of RCC members and other hidden items the corrected and duly test checked measurement sheets of reinforcement or that of other hidden items shall be deposited with Engineer in charge or his authorized representative, before casting of RCC or other hidden items. The delay in submission of corrected and duly checked measurement sheet may, therefore, delay casting of RCC or execution of hidden item for which no hindrance shall be recorded.

46 Facilities to be provided by the contractor.

(a) The contractor shall make arrangement for Helmets and leather shoes (meant for construction work at sites) for all field staff of the department during the entire period of construction for safety reasons. Nothing extra shall be payable on this account.

47. RATES:-

i) The rates quoted by the Contractor are deemed to be inclusive of site clearance, setting out work, profile, setting lay out on ground, establishment of reference bench mark(s), installing various signage, taking spot levels, survey with total station, construction of all safety and protection devices, compulsory use of helmet and safety shoes, and other appropriate safety gadgets by workers, imparting continuous training for all the workers, barriers, preparatory works, construction of clean, hygienic and well-ventilated workers housings in sufficient numbers as per drawing supplied by Engineer in charge, working during monsoon or odd season, working beyond normal hours, working at all depths, height, lead, lift, levels and location etc. and any other unforeseen but essential incidental works required to complete this work. Nothing extra shall be payable on this account and no extension of time for completion of work shall be granted on these accounts.

ii) The rates quoted by the tenderer, shall be firm and inclusive of all taxes, levies, contribution towards EPF & ESIC. Nothing extra beyond quoted rate shall be paid on any account. Contractor shall ensure that all GST rates on all products and services shall be found out by them and to quote accordingly.

iii) No foreign exchange shall be made available by the Department for importing (purchase) of equipment, plants, machinery, materials of any kind or any other items required to be carried out during execution of the work. No delay and no claim of any kind shall be entertained from the Contractor, on account of variation in the foreign exchange rate.

iv) Ancillary and incidental facilities required for execution of work like labour accommodations, stores, fabrication yard, offices for Contractor, watch and ward, temporary ramp required to be made for working at the basement level, temporary structure for plants and machineries, water storage tanks, installation and consumption charges of temporary electricity, telephone, water etc. required for execution of the work, liaison and pursuing for obtaining various No Objection Certificates, completion certificates from local bodies etc., protection works, testing facilities / laboratory at site of work, facilities for all field tests and for

taking samples etc. during execution or any other activity which is necessary (for execution of work and as directed by SBI/Consultant), shall be deemed to be included in rates quoted by the Contractor, for various items in the schedule of quantities. Nothing extra shall be payable on these accounts. Before start of the work, the Contractor shall submit to the SBI/Consultant, a site / construction yard layout, specifying areas for construction, site office, positioning of machinery, material yard, cement and other storage, steel fabrication yard, site laboratory, water tank, etc.

v) For completing the work in time, the Contractor might be required to work in two or more shifts (including night shifts). No claim whatsoever shall be entertained on this account, not with-standing the fact that the Contractor may have to pay extra amounts for any reason, to the labourers and other staff engaged directly or indirectly on the work according to the provisions of the labour and other statutory bodies regulations and the agreement entered upon by the Contractor with them.

48 MODE OF MEASUREMENTS

1. The measurements shall be recorded and entered in computerized format in the first instance by the contractor, and a hard copy shall be submitted to the Department. All entries shall be made exactly as per the required procedure.
2. These measurements shall then be checked. or his representative. The contractor shall incorporate all such changes or corrections, as may be done during these checks, to his draft computerized measurement, and submit to the department the corrected computerized measurement Books now in use, and with its pages machine numbered.
3. This book shall be treated as a Computerized Measurement Book.
4. The SBI/Consultant shall record the necessary certificates for their checks and test checks as per the required procedure in this Computerized Measurement Book.
5. The Computerized Measurement Book shall be allotted a serial number as per the Register of Computerized Measurement Books.

49.

i. During construction activity no construction waste is allowed to be disposed in the adjacent service manhole/ gully pit of sewerage and drainage. The site surrounding (including the public access) shall have to be cleaned and finished in all way. A photograph of the building showing its status as well as the site condition is to be filed for office record.

ii. No construction material shall be stacked/ stored on the carriageway of any road/street in New town Kolkata.

iii. The construction and demolition waste, slurries shall not be dumped in common public places or in any vacant plot.

iv. The provision of rule 12A regarding construction material management and proper disposal of construction and demolition waste is to be followed. Otherwise, a fine of Rs 50,000/- shall be imposed for each incident of violation and additional fine of Rs. 10,000/- per day of delay shall be imposed in case of non-payment of due fine within the stipulated period.

v. The construction site should be properly maintained so that no nuisance is created by the construction activity as well as by the construction workers, proper facilities for labour hutment, toilets, kitchen etc. should be made from the starting of the construction in a hygienic manner. Failing which penal action will be taken as for existing rules.

vi. During construction proper toilet facilities (temporary in nature) for working labour should be provided and will be checked by NKDA officials time to time during construction period.

vii. The construction area/building should be wrapped in terms of law for the time being in force installing dust barriers or other actions as appropriate for the location.

viii. On completion of work, Contractor shall submit "as built" drawings in Auto CAD to the Bank/Consultant.

50. Testing of material

MANDATORY TEST					
Sl. No.	**Material**	**Test**	**Test Procedure**	**Minimum**	**Frequency**
	1	**2**	**3**	**4**	**5**
1	sand	a. Silt Content	Field	25 Cum.	25 cum. Of part thereof.
		b. Bulking	Field	25 Cum.	25 cum. Of part thereof.
		c. Particle size distribution	Field	50 Cum.	Every 50 cum. Of part of required for RCC work.
		d. Percentage of deterious materials	Laboratory	100 Cum.	Every 300 cum. Of part thereof.
2	Stone/Coarse Aggregate	a. Soft & deterious materials	Laboratory		2 Nos.
		b. Particle size distribution	Field	50 cum.	Every 50 cum. Of part thereof for RCC work. For rest of work as desired by the Consultant
		c. Impact/Crushing strength			2 Nos.
3	Brick	a. Dimensions			Every 50000 or part thereof.
		b. Water absorption	IS-1077-1970	1,00,000	Every 1,00,000 or part thereof.
		c. Efflorescence			One test for source of manufacture
		d. Compressive Strength		1,00,000	Two test for 1st lot of 1,00,000 and one test for every 2,00,000 or part thereof
4	water	a. PH Value			Once before undertaking the construction work of whenever the source is changed
		b. Percentage of solids			
5	Cement Concrete or RCC	a. Slump	Field		Once a day or as desired by consultant.

		b. Cube Strength		i. 25 cum. Or part thereof for slabs, beam, and connected column.	i. Every 25 cum. Of a day's concrete or part thereof subject to max. of 3 set /day.
				ii. 10 cum. For column, lintels, Chajjas etc.	ii. Every 10 cum. Of a day's concrete or part thereof subject to max. of 2 set /day.
6	Steel	a. Temsile Strength	IS-1529		Every 20.00 MT or part thereof for each individual dia.
		b. Bending strength			
7	Cement	a. Compressive Strength			Every 50.00 MT or part thereof .
		b. Fineness soundness			
		c. setting Time (initial & final)			
8	Granite	a. Moisture absorption			One set for every 25 sq.m or part thereof
		b. Hardness			
9	Aluminium door/window	Thickness of anodic coating			One in every 25 sq.m or part thereof

SPECIAL CONDITIONS FOR PROCUREMENT OF CEMENT

1. The contractor shall procure the Cement as required in work from reputed manufacturers of cement mentioned in approved make list. The tenderers may also submit a list of names of cement manufacturers which they propose to use in the work. The tender accepting authority reserves rights to accept or reject name (s) of cement manufacturer(s) which the tenderer proposes to use in the work. No change in the tendered rates will be accepted if the tender accepting authority does not accept the list of cement manufacturers, given by the tenderer fully or partially.
The supply of cement shall be taken in 50 kg. Bags bearing manufacturer's name and ISI marking. Samples of cement arrange by the contractors shall be taken. and got tested in accordance with provisions of relevant BIS codes. In case of test results indicate that the cement arrange by the contractor does not conform to the relevant BIS Codes, the same shall stand rejected, and it shall be removed from the site by the contractor at his own cost within a week's time of written order from the SBI/Consultant to do so.

2. The cement shall be brought at site in bulk supply of approximately 25 tones or as decided. The cement godown of the capacity to store a minimum of 500 bags of cement shall be constructed by the contractor at site of work for which no extra payment shall be made.

3. Double lock provision shall be made to the door of cement godown. The keys of one lock shall remain with CPWD SBI/Consultant or his authorized representative and the keys of the other lock shall remain with the contractor. The contractors shall be responsible for the watch and ward and safety of the cement godown. The contractor shall facilitate the inspection of the cement godown. at any time.

4. The cement shall be got tested. and shall be used on the work only after satisfactory test results have been received. The contractor shall supply free of charge the cement required for testing including its transportation cost to testing laborites. The cost of tests shall be borne by the contractor / department in the manner indicated below:

(a) By the contractor, if the result shows that the cement does not conform to relevant BIS code.
(b) By the department if the result shows that the cement conforms to relevant BIS codes.

5. The actual issue and consumption of cement on work shall be regulated and proper accounts maintained as provided in clause 10 of the contract. The theoretical consumption of cement shall be worked out as per procedure prescribed in clause 42 of the contract and shall be governed by conditions laid therein. In case of cement consumption is less than theoretical consumption including permissible variation; the work will not be accepted.

6. Cement brought to site and cement remaining unused after completion of work shall not be removed form site without written permission of SBI/Consultant.

7.The damaged cement shall be removed from the site immediately by the contactor on receipt of a notice in writing form the SBI/Consultant. If he does not do so within three days of receipt of such notice, the SBI/Consultant shall get it removed at the cost of the contractor.

SPECIAL CONDITION FOR PROCUREMENT OF STEEL

1. The contractor shall procure TMT bars from primary producers mentioned in approved make list.

2. The contractor shall have to obtain and furnish test certificates from the manufacturer to the SBI/Consultant in respect of all supplies of steel brought by him to the site of work.

3. Sample shall also be taken and got tested. as per the provisions in this regard in relevant BIS codes. In case the test results indicate that the steel arranged by the contractor does not conform to the specifications as defined under para (1) (d) & (1) (e) above, the same shall stand rejected, and it shall be removed from the site of work by the contractor at his cost within a week time or written orders from the SBI/Consultant to do so.

4. The steel reinforcement bars shall be brought to the site in bulk supply of 10.0 tons or more, or as decided.

5. The steel reinforcement bars shall be stored by the contractor at site of work in such a way as to prevent their distortion and corrosion, and nothing extra shall be paid on this account. Bars of different sizes and lengths shall be stored separately to facilitate easy counting and checking.

6. For checking nominal mass tensile strength bend test, re-bend test etc. specimen of sufficient length shall be cut from each size of the bar at random, and at frequency not less than that specified below.

Size of bar	For consignment below 100 Tones	For consignment over 100 Tones
Under 10mm dia bars.	One sample for each 25 Tones or part thereof.	One sample for each 40 Tones or part thereof.
10mm to 16mm dia bars.	One sample for each 35 Tones or part thereof.	One sample for each 45 Tones or part thereof.
Over 16mm dia bars.	One sample for each 45 Tones or part thereof.	One sample for each 50 Tones or part thereof.

7. The contractor shall supply free of charge the steel required for testing including its transportation to testing laboratories. The cost of test shall be borne by the contractor/ department in the manner indicated below.
(a) By the contractor, if the result shows that the steel does not conform to relevant BIS code.
(b) By the department, if the result shows that the steel conforms to relevant BIS codes.

8. The actual issue and consumption of steel on work shall be regulated and proper accounts maintained as provided in clause 10 of the contract. The theoretical consumption of steel shall be worked out as per procedure prescribed in clause 42 of the contract and shall be governed by conditions laid therein. In case the consumption is less than theoretical consumption including permissible variations, the work will not be accepted.

9. The steel brought to site and steel remaining unused shall not be removed form site without the written permission of the SBI/Consultant.

SPECIAL CONDITIONS AS PER NGT GUIDELINES

The guidelines regarding preventive measures for Air Pollution from demolition & construction activities issued by West Bengal Pollution Control Committee vide no. DPCC/EIA/Res-001 to 172 /NGT-21/2015/225-408 dated 17.04.2015 in compliance of Hon'ble National Green Tribunal directions enclosed herewith are applicable to the contractor. All appropriate protection measures as per NGT, MoeFCC & SPCB guidelines shall be taken by the contactor at his own cost. Nothing extra shall be payable to the contractor on this account.

1.0 OTHER ENVIRONMENTAL FRIENDLY CONSTRUCTION MEASURES

All materials and systems used in the project are intended to maximize energy efficiency for operation of Project throughout service life (substantial completion to ultimate disposition – reuse, recycling, or demolition) with an emphasis on top quality. Materials and systems are to maximize Environmentally-benign construction techniques, including construction waste recycle, reusable delivery packaging, and reusability of selected materials. All vendors / contractors must adhere to best practices related to Environmental Friendly Construction and the NBC Part 11, Approach to Sustainability, together with conditions placed in Section 11, dealing with construction practices shall be obligatory on the contractors. It shall be put on digital photo- documentation by them together with a site management plan. Other than the general guidelines outlined here, all vendors/contractors will be furnished with a supplementary set of guidelines more specific to their nature of service/product**.**

1.01 BUILDING PRACTICES:

- Ensure healthy indoor air quality in final Project.
- Maximize use of products with low embodied energy (harvesting, mining, manufacturing, transport, installation, use, operations, recycling and disposal). Exceptions might include materials that result in net energy conservation during their useful life in building and building's life cycle.
    1. Maximize use of products easy to maintain, repair, and that can be cleaned using non-toxic substances.
    2. Maximize use of reusable and recyclable packaging.
- Use construction practices such as material waste reduction and dimensional planning that maximize efficient use of resources and materials.
- Provide or contribute to O&M Manuals wherever applicable.
- Be conversant with the Site Waste Management Program Manual and actively contribute to its compilation. Assist the author of the Manual by estimating the nature and volume of waste generated by the process/installation in question.
- Minimize pollution: Select materials that generate least amount of pollution during mining, manufacturing, transport, installation, use, and disposal.
    1. Avoid materials that emit greenhouse gases
    2. Avoid materials that require energy intensive extraction, manufacturing, processing, transport, installation, maintenance, or removal.
    3. Employ construction practices that minimize dust production and combustible by-products.
    4. Avoid materials that can leach harmful chemicals into ground water; do not allow potentially harmful chemicals to enter sewers or storm drains.

    Minimize noise generation during construction; screen mechanical equipment to block noise.

2.00 CONDITIONS OF CONTRACT SPECIFIC TO ENVIRONMENTAL FRIENDLY BUILDING PRACTICES

The contractor shall strictly adhere to the following conditions as part of his contractual obligations:

2.01 SITE

2.01.01 The contractor shall ensure that adequate measures are taken for the prevention of erosion of the top soil during the construction phase. The contractor shall implement the Erosion and Sedimentation Control Plan (ESCP) provided to him . as part of the larger Construction Management Plan (CMP). The contractor shall obtain the Erosion and Sedimentation Control Plan (ESCP) Guidelines from the Landscape Consultant and then prepare "working plan" for the following month's activities as a CAD drawing showing the construction management, staging & ESCP. At no time soil should be allowed to erode away from the site and sediments should be trapped where necessary**.**

2.01.02 The Contractor should follow the construction plan as proposed by the Consultant / landscape consultant to minimize the site disturbance such as soil pollution due to spilling. Use staging and spill prevention and control plan to restrict the spilling of the contaminating material on site. Protect top soil from erosion by collection storage and reapplication of top soil, constructing sediment basin, contour trenching, mulching etc.

2.01.03 Overloading of trucks is unlawful and creates and erosion and sedimentation problems, especially when loose materials like stone dust, excavated earth, sand etc. are moved. Proper covering must take place. No overloading shall be permitted.

2.02 CONSTRUCTION PHASE AND WORKER FACILITIES

2.02.01 The contractor shall specify and limit construction activity in pre-planned/designated areas and shall start construction work after securing the approval for the same from the SBI/Consultant. This shall include areas of construction, storage of materials, and material and personnel movement.

2.02.02 Contractor shall be required to develop and implement a waste management plan, quantifying material diversion goals. He shall establish goals for diversion from disposal in landfills and incinerators and adopt a construction waste management plan to achieve these goals. A project-vide policy of "Nothing leaves the Site" should be followed. In such a case when strictly followed, care would automatically be taken in ordering and timing of materials such that excess doesn't become "waste" Consider recycling cardboard, metal, brick, acoustical tile, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. Designate a specific area(s) on the construction site for segregated or commingled collection of recyclable material, and track recycling efforts throughout the construction process. Identify construction haulers and recyclers to handle the designated materials.

2.02.03 Contractor shall collect all construction waste generated on site. Segregate these wastes based on their utility and examine means of sending such waste to manufacturing units which use them as raw material or other site which require it for specific purpose. Typical construction debris could be broken bricks, steel bars, broken tiles, spilled concrete and mortar etc.

2.02.04 The contractor shall provide clean drinking water for all workers

2.02.05 The contractor shall provide the minimum level of sanitation and safety facilities for the workers at site. The contractor shall ensure cleanliness of workplace with regard to the disposal of waste and effluent; provide clean drinking water and latrines and urinals as per applicable standard. Adequate toilet facilities shall be provided for the workman within easy access of their place of work. The total no. to be provided shall not be less than 1 per 30 employs in any one shift. Toilet facilities shall be provided from the start of building operations, connection to a sewer shall be made as soon as practicable. Every toilet shall be so constructed that the occupant is sheltered from view and protected from the weather and falling objects. Toilet facilities shall be maintained in a sanitary condition. A sufficient quantity of disinfectant shall be provided. Natural or artificial illumination shall be provided.

2.02.06 The contractor shall ensure that air pollution due to dust/generators is kept to a minimum, preventing any adverse effects on the workers and other people in and around the site. The contractor shall ensure proper screening, covering stockpiles, covering brick and loads of dusty materials, wheel-washing facility, gravel pit, and water spraying. Contractor shall ensure the following activities to prevent air pollution during construction:

- Clear vegetation only from areas where work will start right away
- Vegetate / mulch areas where vehicles do not ply.
- Apply gravel / landscaping rock to the areas where mulching / paving is impractical
- Identify roads on-site that would be used for vehicular traffic. Upgrade vehicular roads (if these are unpaved) by increasing the surface strength by improving particle size, shape and mineral types that make up the surface & base. Add surface gravel to reduce source of dust emission. Limit amount of fine particles (smaller than 0.075mm) to 10 – 20%
- Water spray, through a simple hose for small projects, to keep dust under control. Fine mists should be used to control fine particulate. However, this should be done with care so as not to waste water. Heavy watering can also create mud, which when tracked onto paved public roadways, must be promptly removed. Also, there must be an adequate supply of clean water nearby to ensure that spray nozzles don't get plugged. Water spraying can be done on:
  a. Any dusty materials before transferring, loading and unloading
  b. Area where demolition work is being carried out
  c. Any un-paved main haul road
  d. Areas where excavation or earth moving activities are to be carried out
- The contractor shall ensure that the speed of vehicles within the site is limited to 10 km/hr.
- All material storages should be adequately covered and contained so that they are not exposed to situations where winds on site could lead to dust / particulate emissions.
- Spills of dirt or dusty materials will be cleaned up promptly so the spilled material does not become a source of fugitive dust and also to prevent of seepage of pollutant laden water into the ground aquifers. When cleaning up the spill, ensure that the clean-up process does not generate additional dust. Similarly, spilled concrete slurries or liquid wastes should be contained / cleaned up immediately before they can infiltrate into the soil / ground or runoff in nearby areas
- Provide hoardings of not less than 3m high along the site boundary, next to a road or other public area
- Provide dust screens, sheeting or netting to scaffold along the perimeter of the building
- Cover stockpiles of dusty material with impervious sheeting
- Cover dusty load on vehicles by impervious sheeting before they leave the site

2.02.07 Contractor shall be required to provide an easily accessible area that serves the entire building and is dedicated to the separation, collection and storage of materials for recycling including (at a minimum) paper, corrugated cardboard, glass, plastics, and metals. He shall coordinate the size and functionality of the recycling areas with the anticipated collections services for glass, plastic, office paper, newspaper, cardboard, and organic wastes to maximize the effectiveness of the dedicated areas. Consider employing cardboard balers, aluminium can crushers, recycling chutes, and collection bins at individual workstations to further enhance the recycling program

2.02.08 The contractor shall ensure that no construction leach ate (Ex: cement slurry), is allowed to percolate into the ground. Adequate precautions are to be taken to safeguard against this including, reduction of wasteful curing processes, collection, basic filtering and reuse. The contractor shall follow requisite measures for collecting drainage water run-off from construction areas and material storage sites and diverting water flow away from such polluted areas. Temporary drainage channels, perimeter dike/swale, etc. shall be constructed to carry the pollutant-laden water directly to the treatment device or facility (municipal sewer line).

2.02.09 Staging (dividing a construction area into two or more areas to minimize the area of soil that will be exposed at any given time) should be done to separate undisturbed land from land disturbed by construction activity and material storage.

2.02.10 The contractor shall Comply with the safety procedures, norms and guidelines (as applicable) as outlined in the document Part 7 _Constructional practices and safety, 2005, National Building code of India, Bureau of Indian Standards. A copy of all pertinent regulations and notices concerning accidents, injury and first-aid shall be prominently exhibited at the work site. Depending upon the scope & nature of work, a person qualified in first-aid shall be available at work site to render and direct first-aid to causalities. A telephone may be provided to first-aid assistant with telephone numbers of the hospitals displayed. Complete reports of all accidents and action taken thereon shall be forwarded to the competent authorities.

2.02.11 The contractor shall ensure the following activities for construction workers safety, among other measures:

- Guarding all parts of dangerous machinery.
- Precautionary signs for working on machinery
- Maintaining hoists and lifts, lifting machines, chains, ropes, and other lifting tackles in good condition.
- Durable and reusable formwork systems to replace timber formwork and ensure that formwork where used is properly maintained.
- Ensuring that walking surfaces or boards at height are of sound construction and are provided with safety rails or belts.
- Provide protective equipment; helmets etc.
- Provide measures to prevent fires. Fire extinguishers and buckets of sand to be provided in the fire-prone area and elsewhere.
- Provide sufficient and suitable light for working during night time.

2.02.12 Adopt additional best practices, prescribed norms as in Doc No. CED 46(6086), July 2003: Draft National Building Code of India: Part 7 Constructional practices and safety, issued by Bureau of Indian Standards

2.02.13 The storage of material shall be as per standard good practices as specified in Part 7, Section 2 – Storage, Stacking and Handling practices, latest NBC code and shall be to the satisfaction of the SBI/Consultant to ensure minimum wastage and to prevent any misuse, damage, inconvenience or accident. Watch and ward of the Contractor's materials shall be his own responsibility. There should be a proper planning of the layout for stacking and storage of different materials, components and equipment with proper access and proper maneuverability of the vehicles carrying the materials. While planning the layout, the requirements of various materials, components and equipment's at different stages of construction shall be considered. The Owner shall not take any responsibility on any account.

2.02.14 The contractor shall provide for adequate number of garbage bins around the construction site and the workers facilities and will be responsible for the proper utilisation of these bins for any solid waste generated during the construction. The contractor shall ensure that the site and the workers facilities are kept litter free. Separate bins should be provided for plastic, glass, metal, biological and paper waste and labelled in both Hindi and English.

2.02.15 Contractor shall adopt an IAQ (Indoor Air Quality) management plan to protect the HVAC system during construction, control pollutant sources, and interrupt pathways for contamination. He shall sequence installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile, and gypsum wallboard. He shall also protect stored on-site or installed absorptive materials from moisture damage.

2.02.16 The contractor shall ensure that a flush out of all internal spaces is conducted prior to handover. This shall comprise an opening of all doors and windows for 14 days to vent out any toxic fumes due to paints, varnishes, polishes, etc.

2.02.17 Contractor shall make efforts to reduce the quantity of indoor air contaminants that are odorous or potentially irritating harmful to the comfort and well-being of installer and building occupants. Contractor shall ensure that the VOC (Volatile Organic Compounds) content of paints, coatings and primers used must not exceed the VOC content limits mentioned below:

Paints
Non-flat - 150 g/L
Flat (Mat) - 50 g/L
Anti corrosive/ anti rust - 250 g/L
Coatings
Clear wood finishes
Varnish - 350 g/L
Lacquer - 550 g/L
Floor coatings - 100 g/L
Stains - 250 g/L
Sealers
Waterproofing sealer - 250 g/L
Sanding sealer - 275 g/L
Other sealers - 200 g/L

The VOC (Volatile Organic Compounds) content of adhesives and sealants used must be less than VOC content limits mentioned:

Architectural Applications VOC Limit(g/l less water)
Indoor Carpet adhesives -50
Carpet Pad Adhesives - 50
Wood Flooring Adhesive - 100
Rubber Floor Adhesives - 60
Sub Floor Adhesives - 50
Ceramic Tile Adhesives - 65
VCT and Asphalt Tile adhesives - 50
Dry Wall and Panel Adhesives - 50
Structural Glazing Adhesives - 100
Multipurpose Construction Adhesives – 70
Substrate Specific Application VOC Limit (g/l less water)
Metal to Metal - 30
Plastic Foams - 50
Porous material (except wood) - 50
Wood - 30
Fiber Glass – 80

2.02.18 Water Use during Construction Contractor should spray curing water on concrete structure and shall not allow free flow of water. After liberal curing on the first day, all the concrete structures should be painted with curing chemical to save water. Concrete structures should be kept covered with thick cloth/gunny bags and water should be sprayed on them. Contractor shall do water ponding on all sunken slabs using cement and sand mortar.

2.02.19 The Contractor shall remove from site all rubbish and debris generated by the Works and keep Works clean and tidy throughout the Contract Period. All the serviceable and non-serviceable (malba) material shall be segregated and stored separately. The malba obtained during construction shall be collected in well formed heaps at properly selected places, keeping in a view safe condition for workmen in the area. Materials which are likely to cause dust nuisance or undue Environmental pollution in any other way, shall be removed from the site at the earliest and till then they shall be suitable covered. Glass & steel should be dumped or buried separately to prevent injury. The work of removal of debris should be carried out during day. In case of poor visibility artificial light may be provided.

2.02.20 MATERIALS & FIXTURES FOR THE PROJECT

a) The contractor shall ensure that non toxic anti-termite and other pest control is strictly used.

b) The contractor shall employ 100% zero ODP (ozone depletion potential) insulation; HCFC (hydro-chlorofluorocarbon)/ and CFC (chlorofluorocarbon) free HVAC and refrigeration equipments and/halon-free fire suppression and fire extinguishing systems.

2.02.21 RESOURCES CONSUMED DURING CONSTRUCTION

a. The contractor shall ensure that the least amount of water and electricity is wasted during construction. The SBI/Consultant can bring to the attention any such wastage and the contractor will have to ensure that such bad practices are corrected.

b. The contractor shall use treated recycled water of appropriate quality standards for construction, if available.

c. The contractor is encouraged to use bio-diesel in place of petroleum diesel for the running of generators during construction.

2.02.22 CONSTRUCTION WASTE

a) All construction debris generated during construction shall be carefully segregated and stored in a demarcated waste yard. Clear, identifiable areas shall be provided for each waste type. Employ measures to segregate the waste on site into inert, chemical, or hazardous wastes.

b) No construction debris shall be taken away from the site, without the prior approval of the Engineer-in charge

c) The contractor shall recycle the unused chemical/hazardous wastes such as oil, paint, batteries, and asbestos.

d) If and when construction debris is taken out of the site, after prior permissions from the SBI/Consultant, then the contractor shall ensure the safe disposal of all wastes and will only dispose of any such construction waste in approved dumping sites.

Inert waste to be disposed off by Municipal Corporation/ local bodies at landfill sites

PARTICULAR SPECIFICATIONS (CIVIL WORK)

1.0 EXCAVATION IN ALL KINDS OF SOILS

1.1 All excavation operations manually or by mechanical means shall include excavation and 'getting out' the excavated materials. In case of excavation for trenches, basements, water tanks etc. 'getting out' shall include throwing the excavated materials at a distance of at least one metre or half the depth of excavation, whichever is more, clear off the edge of excavation. In all other cases 'getting out' shall include depositing the excavated materials as specified. The subsequent disposal of the excavated material shall be either stated as a separate item or included with the items of excavation stating lead.

1.2 During the excavation the natural drainage of the area shall be maintained. Excavation shall be done from top to bottom. Undermining or undercutting shall not be done.

1.3 In firm soils, the sides of the trenches shall be kept vertical upto a depth of 2 metres from the bottom. For greater depths, the excavation profiles shall be widened by allowing steps of 50 cms on either side after every 2 metres from the bottom. Alternatively, the excavation can be done so as to give slope of 1:4 (1 horizontal: 4 vertical). Where the soil is soft, loose or slushy, the width of steps shall be suitably increased or sides sloped or the soil shored up as directed by the Engineer-in Charge. It shall be the responsibility of the contractor to take complete instructions in writing from the SBI/Consultant regarding the stepping, sloping or shoring to be done for excavation deeper than 2 metres.

1.4 The excavation shall be done true to levels, slope, shape and pattern indicated by the Engineer-in- Charge. Only the excavation shown on the drawings with additional allowances for centering and shuttering or as required. shall be measured and recorded for payment.

1.5 In case of excavation for foundation in trenches or over areas, the bed of excavation shall be to the correct level or slope and consolidated by watering and ramming. If the excavation for foundation is done to a depth greater than that shown in the drawings or as required., the excess depth shall be made good by the contractor at his own cost with the concrete of the mix used for levelling/ bed concrete for foundations. Soft/defective spots at the bed of the foundations shall be dug out and filled with concrete (to be paid separately) as directed.

1.6 While carrying out the excavation for drain work care shall be taken to cut the side and bottom to the required shape, slope and gradient. The surface shall then be properly dressed. If the excavation is done to a depth greater than that shown on the drawing or as required, the excess depth shall be made good by the contractor at his own cost with stiff clay puddle at places where the drains are required to be pitched and with ordinary earth, properly watered and rammed, where the drains are not required to be pitched. In case the drain is required is to be pitched, the back filling with clay puddle, if required, shall be done simultaneously as the pitching work proceeds. The brick pitched storm water drains should be avoided as far as possible in filled-up areas and loose soils.

1.7 In all other cases where the excavation is taken deeper by the contractor, it shall be brought to the required level by the contractor at his own cost by filling in with earth duly watered, consolidated and rammed.

1.8 In case the excavation is done wider than that shown on the drawings or as required by the SBI/Consultant, additional filling wherever required on the account shall be done by the contractor at his own cost.

1.9 The excavation shall be done manually or by mechanical means as directed by SBI/Consultant considering feasibility, urgency of work, availability of labour /mechanical equipments and other factors involved. Contractor shall ensure every safety measures for the workers. Neither any deduction will be made nor any extra payment will be made on this account.

2.1 FILLING

2.1.1 The earth used for filling shall be free from all roots, grass, shrubs, rank vegetation, brushwood, tress, sapling and rubbish.

2.1.2 Filling with excavated earth shall be done in regular horizontal layers each not exceeding 20 cm in depth. All lumps and clods exceeding 8 cm in any direction shall be broken. Each layer shall be watered and consolidated with steel rammer or ½ tonne roller. Where specified, every third and top must layer shall also be consolidated with power

roller of minimum 8 tonnes. Wherever depth of filling exceeds 1.5 metre vibratory power roller shall be used to consolidate the filing unless otherwise directed by SBI/Consultant. The top and sides of filling shall be neatly dressed. The contractor shall make good all subsidence and shrinkage in earth fillings, embankments, traverses etc. during execution and till the completion of work unless otherwise specified.

2.2. ANTI-TERMITE TREATMENT

2.2.1 Sub-terranean termites are responsible for most of the termite damage in buildings. Typically, they form nests or colonies underground. In the soil near ground level in a stump or other suitable piece of timber in a conical or dome shaped mound. The termites find access to the super-structure of the building either through the timber buried in the ground or by means of mud shelter tubes constructed over unprotected foundations.

Termite control in existing as well as new building structures is very important as the damage likely to be caused by the termites to wooden members of building and other household article like furniture, clothing, stationery etc. is considerable. Anti-termite treatment can be either during the time of construction i.e. pre-constructional chemical treatment or after the building has been constructed i.e. treatment for existing building.

Prevention of the termite from reaching the super-structure of the building and its contents can be achieved by creating a chemical barrier between the ground, from where the termites come and other contents of the building which may form food for the termites. This is achieved by treating the soil beneath the building and around the foundation with a suitable insecticide.

2.2.2 Materials

2.2.3 ***Chemicals:*** Any one of the following chemicals in water emulsion to achieve the percentage concentration specified against each chemical shall be used:

(i) Chlorphriphos emulsifiable concentrate of 20%

(ii) Lindane emulsifiable concentrate of 20%

Anti-termite treatment chemical is available in concentrated form in the market and concentration is indicated on the sealed containers. To achieve the specified percentage of concentration, Chemical should be diluted with water in required quantity before it is used. Graduated containers shall be used for dilution of chemical with water in the required proportion to achieve the desired percentage of concentration. For example, to dilute chemical of 20% concentration. 19 parts of water shall be added to one part of chemical for achieving 1% concentration. SBI/Consultant shall procure the chemical of required concentration in sealed original containers directly from the reputed and authorized dealers, chemical shall be kept in the custody of the Engineer-in- Charge or his authorized representatives and issued for use to meet the day's requirements. Empty containers after washing and concentrated chemical left unused at the end of the day's work shall be returned to the SBI/Consultant or his authorized representative.

2.2.4 Safety Precautions

Chemical used for anti-termite treatment are insecticides with a persistent action and are highly poisonous. This chemical can have an adverse effect upon health when absorbed through the skin, inhaled as vapours or spray mists or swallowed.

(i)The containers having emulsifiable concentrates shall be clearly labelled and kept securely closed in stores so that children or pet cannot get at them. Storage and mixing of concentrates shall not be done near any fire source or flame. Persons using these chemical shall be warned that absorption though skin is the most likely source of accidental poisoning. Particular care shall be taken to prevent skin contact with concentrates and prolonged exposure to dilute emulsion shall also be avoided. After handling the concentrates or dilute emulsion. Workers shall wash themselves with soap and water and wear clean clothing, especially before eating. In the event of severe contamination, clothing shall be removed at once and the skin washed with soap and water. If chemical has splashed into the eyes, they shall be flushed with plenty of soap and water and immediate medical attention shall be sought. Care should be taken in the application of chemicals to see that they are not allowed to contaminate wells or springs which serve as source of drinking water.

(ii) Treatment along outside of foundations: The soil in contact with the external wall of the building shall be treated with chemical emulsion at the rate of 7.5 litres per square metre of vertical surface of the sub-structure to a depth of 300 mm. To facilitate this treatment, a shallow channel shall be excavated along and close to the wall face. The chemical emulsion shall be directed towards the wall at 1.75 litres per running metre of the channel. Rodding with 12 mm diameter mild steel rods at 150 mm apart shall be done in the channel. If necessary, for uniform dispersal of the chemical to 300 mm depth from the ground level. The balance chemical of 0.5 litre per running metre shall then be used to treat the backfill earth as it is returned to the channel directing the spray towards the wall surface. If there is a concrete or masonry apron around the building, approximately 12 mm diameter holes shall be drilled as close as possible to the plinth wall about 300 mm apart, deep enough to reach the soil below and the chemical emulsion pumped

into these holes to soak the soil below at the rate of 2.25 litres per linear metre. In soils which do not allow percolation of chemicals to desired depth, the uniform disposal of the chemical to a depth of 300 mm shall be obtained by suitably modifying the mode of treatment depending on site condition. In case of RCC foundations the soil (backfill) in contact with the column sides and plinth beams along with external perimeter of the building shall be treated with chemical emulsion at the rate of 7.5 litres/sqm. of the vertical surface of the structure. To facilitate this treatment, trenches shall be excavated equal to the width of the shovel exposing the sides of the column and plinth beams upto a depth of 300 mm or upto the bottom of the plinth beams, if this level is less than 300 mm. The chemical emulsion shall be sprayed on the backfill earth as it is returned into the trench directing the spray against the concrete surface of the beam or column as the case may be.

(iii) ***Treatment of Soil under Floors:*** The points where the termites are likely to seek entry through the floor are the cracks at the following locations:
(a) At the junction of the floor and walls as result of shrinkage of the concrete.
(b) On the floor surface owing to construction defects.
(c) At construction joints in a concrete floor, cracks in sections; and
(d) Expansion joints in the floor.

Chemical treatment shall be provided in the plinth area of ground floor of the structure, wherever such cracks are noticed by drilling 12 mm holes at the junction of floor and walls along the cracks on the floor and along the construction and expansion joints at the interval of 300 mm to reach the soil below. Chemical emulsion shall be squirted into these holes using a hand operated pressure pump to soak the soil below until refusal or upto a maximum of one litre per hole. The holes shall then be sealed properly with cement mortar 1:2 (1 cement: 2 coarse sand) finished to match the existing floors. The cement mortar applied shall be cured for at least 10 days as per instruction of SBI/Consultant.

3.0 CONCRETE WORK
3.1. MATERIAL
Grade of Concrete: - The compressive strength of various grades of concrete shall be given as below: -

GRADE DESIGNATION	**COMPRESSIVE STRENGTH ON 15 cm CUBES min. 7 DAYS (N/ mm^2)**	**SPECIFIED CHARACTERISTIC COMPRESSIVE STRENGTH AT 28 DAYS AT (N/ mm^2)**
(i) M-20	As Per Design	20
(ii) M-25	As Per Design	25
(iii) M-30	As Per Design	30
(iv) M-35	As Per Design	35
(iv) M-40	As Per Design	40

3.1.1 Coarse Aggregate
3.1.1.1 ***General:*** Aggregate most of which is retained on 4.75 mm IS Sieve and contains only as much fine material as is permitted in IS 383 for various sizes and grading is known as coarse aggregate. Coarse aggregate shall be specified as stone aggregate, gravel or brick aggregate and it shall be obtained from approved/ authorized sources.

(a) Stone Aggregate: It shall consist of naturally occurring (uncrushed, crushed or broken) stones. It shall be hard, strong, dense, durable and clean. It shall be free from veins, adherent coating, injurious amounts of disintegrated pieces, alkali, vegetable matter and other deleterious substances. It shall be roughly cubical in shape. Flaky and elongated pieces shall be avoided.

(b) Gravel: It shall consist of naturally occurring (uncrushed, crushed or broken) river bed shingle or pit gravel. It shall be sound, hard and clean. It shall be free from flat particles of shale or similar laminated material, powdered clay, silt, loam, adherent coating, alkali, vegetable matter and other deleterious substances. Pit gravel shall be washed if it contains soil materials adhering to it. These shall conform to IS 383 unless otherwise specified.

3.1.1.3 ***Size and Grading***
(i) *Stone aggregate and gravel:* It shall be either graded or single sized as specified. Nominal size and grading shall be as under:-
(a) Nominal sizes of graded stone aggregate or gravel shall be 40, 20, 16, or 12.5 mm as specified.

3.2 ***Machine Mixing:*** The mixer drum shall be flushed clean with water. Measured quantity of coarse aggregate shall be placed first in the hopper. This shall be followed with measured quantity of fine aggregate and then cement. In case fine aggregate is damp, half the required quantity of coarse aggregate shall be placed in the hopper, followed by fine aggregate and cement. Finally the balance quantity of coarse aggregate shall be fed in the hopper, & then the dry materials are slipped into the drum by raising the hopper. The dry material shall be mixed for atleast four turns of the drum. While the drum is rotating, water shall be added gradually to achieve the water cement ratio as specified or as required .. After adding water, the mixing shall be continued until concrete of uniform colour, uniformly distributed material and consistency is obtained. Mixing shall be done for atleast two minutes after adding water. If there is segregation after unloading from the mixer, the concrete should be remixed.
The drum shall be emptied before recharging. When the mixer is closed down for the day or at any time exceeding 20 minutes, the drum shall be flushed cleaned with water.

3.3 ***Hand Mixing:*** When hand mixing has been specifically permitted in exceptional circumstances
. in writing, subject to adding 10% extra cement, it shall be carried out on a smooth, clean and water tight platform of suitable size. Measured quantity of sand shall be spread
evenly on the platform and the cement shall be dumped on the sand and distributed evenly. Sand and cement shall be mixed intimately with spade until mixture is of even colour throughout. Measured quantity of coarse aggregate shall be spread on top of cement sand mixture and mixing done by showlling and turning till the coarse aggregate gets evenly distributed the cement sand mixture. Three quarters of the total quantity of water required shall be added in a hollow made in the middle of the mixed pile and the material is turned towards the middle of pile with spade. The whole mixture is turned slowly over and again and the remaining quantity of water is added gradually. The mixing shall be continued until concrete of uniform colour and consistency is obtained. The mixing platform shall be washed and cleaned at the end of the day.

3.4 ***Transportation and Handling :*** Concrete shall be transported from the mixer to the place of laying as rapidly as possible by methods which will prevent the segregation or loss of any of the ingredients and maintaining the required workability.
During hot or cold weather, concrete shall be transported in deep containers, other suitable methods to reduce the loss of water by evaporation in hot weather and heat loss in cold weather may also be adopted.

3.5 Placing
The concrete shall be deposited as nearly as practicable in its final position to avoid rehandling. It shall be laid gently (not thrown) and shall be thoroughly vibrated and compacted before setting commences and should not be subsequently disturbed. Method of placing shall be such as to preclude segregation. Care shall be taken to avoid displacement of reinforcement or movement of form work and damage due to rains. As a general guidance, the maximum free fall of concrete may be taken as 1.5 metre.

3.6 Compaction
Concrete shall be thoroughly compacted and fully worked around embedded fixtures and into corners of the form work. Compaction shall be done by mechanical vibrator of appropriate type till a dense concrete is obtained. To prevent segregation, over vibration shall be avoided. Compaction shall be completed before the initial setting starts. For the items where mechanical vibrators are not to be used, the contractor shall take permission of the SBI/Consultant in writing before the start of the work. After compaction the top surface shall be finished even and smooth with wooden trowel before the concrete begins to set.

3.7 Construction Joints
Concreting shall be carried out continuously upto construction joints. The position and arrangement of construction joints shall be as shown in the structural drawings or as directed by the Engineer-in- Charge. Number of such joints shall be kept minimum. Joints shall be kept as straight as possible.

3.8 When the work has to be resumed on a surface which has hardened, such surface shall be roughened. It shall then be swept clean and thoroughly wetted. For vertical joints, neat cement slurry, of workable consistency by using 2 kgs of cement per sqm shall be applied on the surface before it is dry. For horizontal joints, the surface shall be covered with a

layer of mortar about 10-15 mm thick composed of cement and sand in the same ratio as the cement and sand in concrete mix. This layer of cement slurry of mortar shall be freshly mixed and applied immediately before placing of the concrete.

3.9 Where the concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes, care being taken to avoid dislodgement of particles of coarse aggregate. The surface shall be thoroughly wetted and all free water removed. The surface shall then be coated with neat cement slurry @ 2 kgs of cement per sqm. On this surface, a layer of concrete not exceeding 150 mm in thickness shall first be placed and shall be well rammed against old work particular attention being paid to corners and close spots; work, thereafter, shall proceed in the normal way.

3.10 Curing
Curing is the process of preventing loss of moisture from the concrete. The following methods shall be employed for effecting curing.

3.10.1 ***Moist Curing :*** Exposed surfaces of concrete shall be kept continuously in a damp or wet condition by ponding or by covering with a layer of sacking, canvas, Hessian or similar materials and kept constantly wet for at least 7 days from the date of placing concrete in case of ordinary Portland cement and at least 10 days where mineral admixtures or blended cements are used. The period of curing shall not be less than 10 days for concrete exposed to dry and hot weather conditions. In the case of concrete where mineral admixtures or blended cements are used, it is recommended that above minimum periods may be extended to 14 days.

3.10.2 ***Membrane Curing*** *:* Approved curing compounds may be used in lieu of moist curing with the permission of the SBI/Consultant. Such compound shall be applied to all exposed surfaces of the concrete as soon as possible after the concrete has set. Impermeable membrane such as polythene sheet covering the concrete surface may also be used to provide effective barrier against the evaporation.

3.10.3 Freshly laid concrete shall be protected from rain by suitable covering.

3.10.4 Over the foundation concrete, the masonry work may be started after 48 hours of its compaction but the curing of exposed surfaces of cement concrete shall be continued along with the masonry work for at east 7 days. And where cement concrete is used as base concrete for flooring, the flooring may be commenced before the curing period of base concrete is over but the curing of base concrete shall be continued along with top layer of flooring for a minimum period of 7 days.

3.11 Measurements
3.11.1 Dimensions of length, breadth and thickness shall be measured correct to nearest cm. except for the thickness of slab and partition which shall be measured to nearest 5 mm. Areas shall be worked out to nearest 0.01 sq.m and the cubic contents of consolidated concrete shall be worked out to nearest 0.01 cum.

4 DAMP PROOF COURSE
4.1 Cement Concrete Layer
This shall consist of cement concrete of specified proportions and thickness. The surface of brick or stone masonry work shall be levelled and prepared before laying the cement concrete. Edge of damp proof course shall be straight, even and vertical. Side shuttering shall consist of steel forms and shall be strong and properly fixed so that it does not get disturbed during compaction and the mortar does not leak through. The concrete mix shall be of workable consistency and shall be tamped thoroughly to make a dense mass. When the sides are removed, the surface should come out smooth without honeycombing. Continuity shall be maintained while laying the cement concrete layer and laying shall be terminated only at the predetermined location where damp proof course is to be discontinued. There shall be no construction joints in the Damp Proof Course.

4.2 Curing
Damp proof course shall be cured for at least seven days, after which it shall be allowed to dry.

4.3 Application of Hot Bitumen
Where so directed, hot bitumen in specified quantity shall be applied over the dried up surface of cement concrete, properly cleaned with brushes and finally with a piece of cloth soaked in kerosene oil. Bitumen of penetration A 90 or

equivalent where used shall be heated to a temperature of 160º ± 5ºC. The hot bitumen shall be applied uniformly all over, so that no blank spaces are left anywhere. It will be paid for separately.

4.4 Water Proofing Materials
Where so specified, water proofing material of approved quality shall be added to the concrete mixture in accordance with the manufacturer's specification stating the quantity of water proofing material in litres or kg per 50 kg or cement and will be paid for separately.

4.5 Measurements
The length and breadth shall be measured correct to a cm and its area shall be calculated in square metres correct to two places of decimal. The depth shall not be less than the specified thickness at any section.

5.0 REINFORCED CEMENT CONCRETE WORK
5.0 GENERAL
Reinforced cement concrete work may be cast-in-situ or Precast as may be directed by Engineer-in- Charge according to the nature of work. Reinforced cement concrete work shall comprise of the following which may be paid separately or collectively as per the description of the item of work.
(a) Form work (Centering and Shuttering)
(b) Reinforcement
(c) Concreting: (1– Cast-in-situ), (2 – Precast)

5.1 MATERIALS
5.1.1 Water, cement, fine and coarse aggregate shall be as specified under respective clauses of chapter 03 mortars and chapter 04 concrete work as applicable.

5.1.2 Fly Ash admixed cement concrete (FACC) and fly ash Blended cements in Cement Concrete (PPCC) in RCC structures.

5.1.2.0 Fly ash Blended Cements conforming to IS 1489 (Part I) may be used in RCC structures as per guidelines given below :

5.1.2.1 ***General***
(i) IS 456- 2000 Code of Practice for Plain and Reinforced Concrete (as amended up to date) shall

be followed in regard to Concrete Mix Proportion and its production as under :

(a) The concrete mix design shall be done as "Design Mix Concrete"

(b) Concrete shall be manufactured in accordance with clause 10 of above mentioned covering quality assurance measures both technical and organizational, which shall also necessarily require a qualified Concrete Technologist to be available during manufacture of concrete for certification of quality of concrete.

(ii) Minimum M -25 grade of concrete shall be used in all structural elements made with RCC both in load bearing and framed structure.

(iii) The mechanical properties such as modulus of elasticity, tensile strength, creep and shrinkage of fly ash mixed concrete or concrete using fly ash blended cements (PPCs) are not likely to be significantly different and their values are to be taken same as those used for concrete made with OPC.

(iv) To control higher rate of carbonation in early ages of concrete both in fly ash admixed as well as PPC based concrete, water/binder ratio shall be kept as low as possible, which shall be closely monitored during concrete manufacture. If necessitated due to low water/binder ratio, required workability shall be achieved by use of chloride free chemical admixtures conforming to IS 9103. The compatibility of chemical admixtures and super plasticizers with each set OPC, fly ash and /or PPC received from different sources shall be ensured by trials.

(v) In environment subjected to aggressive chloride or sulphate attach in particular, use of fly ash admixed or PPC based concrete is recommended. In cases, where structural concrete is exposed to excessive magnesium sulphate, flyash substitution/content shall be limited to 18% by weight. Special type of cement with low C3A content may also be alternatively used. Durability criteria like minimum binder content and maximum water /binder ratio also need to be given due consideration in such environment.

(vi) Wet curing period shall be enhanced to a minimum of 10 days or its equivalent. In hot & arid regions, the minimum curing period shall be 14 days or its equivalent.

5.2 Thermo Mechanically treated reinforcement bars:
(a) There is no BIS code for TMT bars. The available code BIS 1786 pertains to HSD Bars. Therefore there should be no stipulation that TMT bars should conform to relevant BIS code.

(b) The TMT bars are being produced under valid licence from either of the firms namely Tempcore, Thermex Evcon Turbo & Turbo Quench. These firms have acquired patents and are giving licences to various producers to produce TMT Bars.

(c) The TMT bars shall conform to IS 1786 pertaining to Fe 415 D or Fe 500 D or Fe grade of steel as specified.

(d) In design and construction of reinforced concrete building in seismic zone III and above, steel reinforcement of Grade Fe 415 D shall be used. However, high strength deformed steel bars, produced by thermomechanical treatment process of grade Fe 415, Fe 500 and Fe 550 having elongation more than 14.5. % and conform to other requirements of Fe 415 D, Fe 500 D and Fe 550 D respectively of IS 1786 may also be used for reinforcement. In future, latest provision of IS 456 and IS 13920 or any other relevant code as modified from time to time shall be applicable.

5.2.1 General Requirement
It shall be strong enough to withstand the dead and live loads and forces caused by ramming and vibrations of concrete and other incidental loads, imposed upon it during and after casting of concrete. It shall be made sufficiently rigid by using adequate number of ties and braces, screw jacks or hard board wedges where required shall be provided to make up any settlement in the form work either before or during the placing of concrete. Form shall be so constructed as to be removable in sections in the desired sequence, without damaging the surface of concrete or disturbing other sections, care shall be taken to see that no piece is keyed into the concrete.

5.2.2 ***Material for Form Work***
(a) *Propping and Centering* : All propping and centering should be either of steel tubes with extension pieces or built up sections of rolled steel.

5.2.3 (a) ***Centering/Staging :*** Staging should be as designed with required extension pieces as approved by SBI/Consultant to ensure proper slopes, as per design for slabs/ beams etc. and as per levels as shown in drawing. All the staging to be either of Tubular steel structure with adequate bracings as approved or made of built up structural sections made form rolled structural steel sections.
(b) 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.
(c) Form work and concreting of upper floor shall not be done until concrete of lower floor has set
at least for 14 days.

5.2.4 ***Shuttering:*** Shuttering used shall be of sufficient stiffness to avoid excessive deflection and joints shall be tightly butted to avoid leakage of slurry. If required, rubberized lining of material as approved . shall be provided in the joints. Steel shuttering used or concreting should be sufficiently stiffened. The steel shuttering should also be properly repaired before use and properly cleaned to avoid stains, honey combing, seepage of slurry through joints etc.

(a) *Runner Joists:* RSJ, MS Channel or any other suitable section of the required size shall be used as runners.

(b) Assembly of beam head over props. Beam head is an adopter that fits snugly on the head plates of props to provide wider support under beam bottoms.
(c) Only steel shuttering shall be used, except for unavoidable portions and very small works for which 12 mm thick water proofing ply of approved quality may be used.

5.2.5 Form work shall be properly designed for self-weight, weight of reinforcement, weight of fresh concrete, and in addition, the various live loads likely to be imposed during the construction process (such as workmen, materials and equipment). In case the height of centering exceeds 3.50 metres, the prop may be provided in multi-stages.

5.2.6 ***Camber:*** Suitable camber shall be provided in horizontal members of structure, especially in cantilever spans to counteract the effect of deflection. The form work shall be so assembled as to

provide for camber. The camber for beams and slabs shall be 4 mm per metre (1 to 250) or as directed., so as to offset the subsequent deflection, For cantilevers the camber at free end shall be 1/50th of the projected length or as directed.

5.2.6.1 Typical arrangement of form work for 'beams,columns and walls' are shown working drawing.
5.3 ***Walls :*** The form faces have to be kept at fixed distance apart and an arrangement of wall ties with spacer tubes or bolts is considered best. The two shutters of the wall are to be kept in place by appropriate ties, braces and studs, some of the accessories used for wall form

5.4 ***Erection of Form Work (Centering and shuttering):*** Following points shall be borne in mind while checking during erection.
(a) Any member which is to remain in position after the general dismantling is done, should be clearly marked.

(b) Material used should be checked to ensure that, wrong items/ rejects are not used.

(c) If there are any excavations nearby which may influence the safety of form works, corrective and strengthening action must be taken.

(d)

(i) The bearing soil must be sound and well prepared, and the sole plates shall bear well on the ground.

(ii) Sole plates shall be properly seated on their bearing pads or sleepers.

(iii) The bearing plates of steel props shall not be distorted.

(iv) The steel parts on the bearing members shall have adequate bearing areas.

(e) Safety measures to prevent impact of traffic, scour due to water etc. should be taken. Adequate precautionary measures shall be taken to prevent accidental impacts etc.

(f) Bracing, struts and ties shall be installed along with the progress of form work to ensure strength and stability of form work at intermediate stage. Steel sections (especially deep sections) shall be adequately restrained against tilting, overturning and form work should be restrained against horizontal loads. All the securing devices and bracing shall be tightened.

(g) The stacked materials shall be placed as catered for, in the design.

(h) When adjustable steel props are used. They should:

1. be undamaged and not visibly bent.

2. have the steel pins provided by the manufacturers for use.

3. be restrained laterally near each end.

4. have means for centralizing beams placed in the forkheads.

(i) Screw adjustment of adjustable props shall not be over extended.

(j) Double wedges shall be provided for adjustment of the form to the required position wherever any settlement/ elastic shorting of props occurs. Wedges should be used only at the bottom end of single prop. Wedges should not be too steep and one of the pair should be tightened/ clamped down after adjustment to prevent shifting.

(k) No member shall be eccentric upon vertical member.

(l) The number of nuts and bolts shall be adequate.

(m) All provisions of the design and/or drawings shall be complied with.

(n) Cantilever supports shall be adequate.

(o) Props shall be directly under one another in multistage constructions as far as possible.

(p) Guy ropes or stays shall be tensioned properly.

(q) There shall be adequate provision for the movements and operation of vibrators and other construction plant and equipment.

(r) Required camber shall be provided over long spans.

(s) Supports shall be adequate, and in plumb within the specified tolerances.

5.5 Measurements

5.5.1 ***General*** **:** The form work shall include the following:

(a) Splayed edges, notching, allowance for overlaps and passing at angles, sheathing battens, strutting, bolting, nailing, wedging, easing, striking and removal.

(b) All supports, struts, braces, wedges as well as mud sills, piles or other suitable arrangements to support the form work.

(c) Bolts, wire, ties, clamps, spreaders, nails or any other items to hold the sheathing together.

(d) Working scaffolds, ladders, gangways, and similar items.

(e) Filleting to form stop chamfered edges of splayed external angles not exceeding 20mm wide to beams, columns and the like.

(f) Where required, the temporary openings provided in the forms for pouring concrete, inserting vibrators, and cleaning holes for removing rubbish from the interior of the sheathing before pouring concrete.

(g) Dressing with oil to prevent adhesion and

(h) Raking or circular cutting

5.6 REINFORCEMENTS

5.6.1 General Requirements

Steel conforming to para 5.1.3 for reinforcement shall be clear and free from loose mill scales, dust, loose rust, coats of paints, oil or other coating which may destroy or reduce bond. It shall be stored in such a way as to avoid distortion and to prevent deterioration and corrosion. Prior to assembly of reinforcement on no account any oily substance shall be used for removing the rust.

5.6.1.1 ***Assembly of Reinforcement:*** Bars shall be bent correctly and accurately to the size and shape as shown in the detailed drawing or as directed by SBI/Consultant. Preferably bars of full length shall be used. Necessary cutting and straightening is also included. Overlapping of bars, where necessary shall be done as directed. The overlapping bars shall not touch each other, and these shall be kept apart with concrete between them by 25mm or 11/4 times the maximum size of the coarse aggregate whichever is greater. But where this is not possible, the overlapping bars shall be bound together at intervals not exceedingly twice the dia. of such bars with two strands annealed steel wire of 0.90 mm to 1.6 mm twisted tight. The overlaps/ splices shall be staggered as per directions of the SBI/Consultant. But in no case the overlapping shall be provided in more than 50% of cross-sectional area at one section.

5.6.1.2 ***Bonds and Hooks Forming End Anchorages:*** Reinforcement shall be bent and fixed in accordance with procedure specified in IS 2502, code of practice of bending and fixing of bars for concrete reinforcement. The details of bends and hooks are shown below for guidance.

(a) *U-Type Hook*

In case of mild steel plain bars standard U type hook shall be provided by bending ends of rod into semicircular hooks having clear diameter equal to four times the diameter of the bar.

Note: In case of work in seismic zone, the size of hooks at the end of the rod shall be eight times the diameter of bar or as given in the structural drawings.

(b) *Bends*

Bend forming anchorage to a M.S. plain bar shall be bent with and internal radius equal to two times the diameter of the bar with a minimum length beyond the bend equal to four times the diameter of the bar.

5.6.1.3 ***Anchoring Bars in Tension :*** Deformed bars may be used without end anchorages provided, development length equipment is satisfied. Hooks should normally be provided for plain bars in tension. Development length of bars as per drawing.

5.6.1.4 ***Anchoring Bars in Compression :*** The anchorage length of straight bar in compression shall be equal to the 'Development length' of bars in compression as specified in IS: 456. The projected length of hooks, bend and straight lengths beyond bend, if provided for a bar in compression, shall be considered for development length.

5.6.1.5 ***Binders, stirrups, links etc. :*** In case of binders, stirrups, links etc. the straight portion beyond the curve at the end shall be not less than eight times and nominal size of bar.

5.6.2 Welding of Bars

Wherever facility for electric **arc** welding **or gas pressure welding** is available, welding of bars shall be done in lieu of overlap. The location and type of welding shall be got approved by the Engineer-in- Charge

5.6.3 Placing in Position

5.3.3.1 Fabricated reinforcement bars shall be placed in position as shown in the drawings or as directed.. The bars crossing one another shall be tied together at every intersection with two strands of annealed steel wire 0.9 to 1.6 mm thickness twisted tight to make the skeleton of the steel work rigid so that the reinforcement does not get displaced during deposition of concrete. Tack welding in crossing bars shall also be permitted in lieu of binding with steel wire if approved by SBI/Consultant.

5.6.3.2 The bars shall be kept in correct position by the following methods:

(a) In case of beam and slab construction pre-cast cover blocks in cement mortar 1:2 (1 cement : 2 coarse sand) about 4x4 cm section and of thickness equal to the specified cover shall be placed

between the bars and shuttering, so as to secure and maintain the requisite cover of concrete over reinforcements.

(b) In case of cantilevered and doubly reinforced beams of slabs, the vertical distance between the

horizontal bars shall be maintained by introducing chairs, spacers or support bars of steel at 1.0 mere or at shorter spacing to avoid sagging.

(c) In case of columns and walls, the vertical bars shall be kept in position by means of timber templates with slots accurately cut in them: or with clock of cement mortar 1:2 (1 cement: 2 coarse sand) of required size suitable tied to the reinforcement to ensure that they are in correct position during concreting.

(d) In case of other R.C.C. structure such as arches, domes, shells, storage tanks etc. a combination

of cover blocks, spacers and templates shall be used as directed by SBI/Consultant.

5.6.3.3 ***Tolerance on Placing of Reinforcement*** **:** Unless otherwise specified ., reinforcement shall be placed within the following tolerances: *Tolerance in spacing*

(a) For effective depth, 200 mm or less +10 mm

(b) For effective depth, more than 200 mm + 15 mm

5.6.3.4 ***Bending at Construction Joints*** **:** Where reinforcement bars are bent aside at construction joints and afterwards bent back into their original position care should be taken to ensure that at no time the radius of the bend is less than 4 bar diameters for plain mild steel or 6 bar diameter for deformed bars. Care shall also be taken when bending back bars to ensure that the concrete around the bar is not damaged.

5.6.3.5 ***Cover :*** The minimum nominal cover to meet durability requirements shall be as under:-

Exposure Nominal Concrete cover in mm not less than

Mild 20

Moderate 30

Severe 45

Very severe 50

Extreme 75

Notes : 1. For main reinforcement upto 12 mm diameter bar for mild exposure the nominal cover may be reduced by 5 mm.

2. Unless specified otherwise, actual concrete cover should not deviate from the required nominal cover by + 10 mm.

3. For exposure condition ‘severe’ and ‘very severe’ reduction of 5 mm may be made, where concrete grade is M35 and above.

4. Nominal cover to meet specified period of fire resistance shall not be less than as specified.

5.6.4 Measurement

Reinforcement including authorized spacer bars and lappages shall be measured in length of different diametre, as actually (not more than as specified in the drgs.) used in the work nearest to a centimetre and their weight calculated on the basis of standard weight given in Table 5.4 below. In case actual unit weight of the bars is less than standard unit

weight, but within variation, in such cases weight of reinforcement shall be calculated on the basis of actual unit weight. Wastage and unauthorized overlaps shall not be paid for. Annealed steel wire required for binding or tack welding shall not be measured, its cost being included in the rate of reinforcement.

5.7 Compaction
It shall be as specified in sub-head of Concrete Work of this specification.

5.7.1 Concrete shall be compacted into dense mass immediately after placing by means of mechanical vibrators designed for continuous operations complying with specification. The SBI/Consultant may however relax this condition at his discretion for certain items depending on the thickness of the members and feasibility of vibrating the same and permit hand compaction instead. Hand compaction shall be done with the help of tamping rods so that concrete is thoroughly compacted and completely worked around the reinforcement, embedded fixtures, and into corners of the form. The layers of concrete shall be so placed that the bottom layer does not finally set before the top layer is placed. The vibrators shall maintain the whole of concrete under treatment in an adequate state of agitation; such that de-aeration and effective compaction is attained at a rate commensurate with the supply of concrete from the mixers. The vibration shall continue during the whole period occupied by placing of concrete, the vibrators being adjusted so that the centre of vibrations approximates to the centre of the mass being compacted at the time of placing.

5.8 Concrete shall be judged to be properly compacted, when the mortar fills the spaces between
the coarse aggregate and begins to cream up to form an even surface. When this condition has been attained, the vibrator shall be stopped in case of vibrating tables and external vibrators. Needle vibrators shall be withdrawn slowly so as to prevent formation of loose pockets in case of internal vibration. In case both internal and external vibrators are being used, the internal vibrator shall be first withdrawn slowly after which the external vibrators shall be stopped so that no loose pocket is left in the body of the concrete. The specific instructions of the makers of the particular type of vibrator used shall be strictly complied with. Shaking of reinforcement for the purpose of compaction should be avoided. Compaction shall be completed before the initial setting starts, i.e. with 30 minutes of addition of water to the dry mixture.

5.9 READY MIXED CONCRETE
5.9.1 Materials
5.9.1.1 ***Selection and Approval of Materials*** **:** Materials used should satisfy the requirements for the safety, structural performance durability and appearance of the finished structure, taking full account of the environment to which it will be subjected. The selection and use of materials shall be in accordance with IS 456. Materials used shall conform to the relevant Indian Standards applicable. Where materials are used which are not covered by the provisions of the relevant Indian Standard, there should be satisfactory data on their suitability and assurance of quality control. Records and details of performance of such materials should be maintained. Account should be taken of possible interactions and compatibility between IS 4926 and materials used. Also, prior permission of the purchaser shall be obtained before use of such materials.

5.9.1.2 ***Cement*** : Cement used for concrete shall be in accordance with the requirements.

5.9.1.3 ***Mineral Admixtures :*** Use of mineral admixtures shall be permitted in accordance with the
provisions of IS 456.

5.9.1.4 ***Aggregates :*** Aggregates used for concrete shall be in accordance with the requirement of engineer. Unless otherwise agreed testing frequencies for aggregates in plant shall be as given IS 4926.

5.9.1.5 ***Chemical Admixtures***
(i) Use of chemical admixtures shall be permitted in accordance, with EIC.

(ii) It shall be the responsibility of the producer to establish compatibility and suitability of any admixture with the other ingredients of the mix and the determine the dosage required to give the desired effect.

(iii) Admixtures should be stored in a manner that prevents degradation of the product and consumed within the time period indicated by the admixture supplier. Any vessel containing an admixture in the plant or taken to site by the producer shall be clearly marked as to its content.

(iv) When offering or delivering a mix to a purchaser it should be indicated if such a mix contains an admixture or combination of admixtures or not. The admixtures may be identified generically and should be declared on the delivery ticket.

(v) The amount of admixture added to mix shall be recorded in the production record. In special circumstances, if necessary, additional dose of admixture may be added at project site to regain the workability of concrete with the mutual agreement between the producer and the purchaser.

5.9.1.6 ***Water :*** Unless otherwise agreed, the testing frequencies for water shall be as given Testing of material Table.
The use of re-cycled water is encouraged as long as concrete of satisfactory performance can be
produced and steps are taken to monitor the build up of chlorides in any recirculated water and that any subsequent adjustments to the mix design are made to ensure that any overall limit on chloride contents is satisfied. The addition of any recycled water shall be monitored and controlled to meet these requirements. The total amount of water added to the mix shall be recorded in the production record. The water content of concrete shall be regulated by controlling its workability or by measuring and adjusting the moisture contents of its constituent materials. The producer's production staff and truck-mixer, drivers shall be made aware of the appropriate responses to variations in concrete consistency of a particular mix caused by normal variations in aggregate moisture content or grading.

5.9.2 General Requirements

5.9.2.1 ***Basis of Supply :*** Ready-mixed concrete shall be supplied having the quality and the quantity in accordance with the requirement agreed with the purchaser or his agent. Notwithstanding this, the concrete supplied shall generally comply with requirements of IS 456. All concrete will be supplied and invoiced in terms of cubic metres (full or part) of compacted fresh concrete. All proportioning is to be carried out by mass except water and admixture, which may be measured by volume.

5.9.2.2 ***Transport of Concrete :*** Ready-mixed concrete shall be transported from the mixer to the point of placing as rapidly as practicable by methods that will maintain the required workability and will prevent segregation, loss of any constituents or ingress of foreign matter or water. The concrete shall be placed as soon as possible after delivery, as close as is practicable to its final position to avoid re-handling or moving the concrete horizontally by vibration. If required by the purchaser the producer can utilize admixtures to slow down the rate of workability loss, however this does not remove the need for the purchaser to place the concrete as rapidly as possible. The purchaser should plan his arrangements so as to enable a full load of concrete to be discharged within 30 minutes of arrival on site. Concrete shall be transported in a truck-mixer unless the purchaser agrees to the use of nonagitating vehicles. When non-agitating vehicles are used, the mixed concrete shall be protected from gain or loss of water.

5.9.2.3 ***Time in Transport :*** The general requirement is that concrete shall be discharged from the
truck-mixer within 2 h of the time of loading. However, a longer period may be permitted if retarding
admixtures are used or in cool humid weather or when chilled concrete is produced. The time of loading shall start from adding the mixing water to the dry mix of cement and aggregate or of adding the cement to the wet aggregate whichever is applicable. Ready-mixed concrete plant shall have test facilities at its premises to carry out routine tests as per the requirement of the standard.

5.9.3 Sampling and Testing of Ready-Mixed Concrete

5.9.3.1 ***Point and Time of Sampling*** **:** For the assessment of compliance of ready-mixed concrete, the point and time of sampling shall be at discharge from the producer's delivery vehicle or from the mixer to the site or when delivered into the purchaser's vehicle. It is critical that the sampling procedure and equipment used enables as representative a sample as possible to be taken of the quantity of concrete delivered (see Annex A).
The sampling may be carried out jointly by the purchaser and the supplier with its frequency mutually
agreed upon. However, it will not absolve the supplier of his responsibility from supplying in concrete as per the requirement given in this standard or otherwise agreed to where so permitted in the standard.

5.9.3.2 ***Workability :*** The test for acceptance is to be performed upon the producer's delivery vehicle discharge on site or upon discharge into the purchaser's vehicle. lf discharge from the producers' vehicle is delayed on site due to lack of preparedness on behalf of the purchaser then the responsibility passes to the purchaser after a delay of more than 30 min.
The workability shall be within the following limits on the specified value as appropriate:
Slump ± 25 mm or 1/3 of the specified value, whichever is less.
Compacting factor : ± 0.03, where the specified value is 0.90 or greater,

± 0.04, where the specified value is less than 0.90 but more than 0.80,
± 0.05, where the specified value is 0.80 or less.
Flow table test may be specified for concrete, for very high workability (see IS 9103) Acceptance criteria for spread (flow) are to be established between the supplier and the purchaser.

5.9.3.3 ***Specified Strength***
(i) Compliance shall be assessed against the requirements of IS 456 or other agreed Indian Standard. The purchaser may perform his sampling and testing or may enter into an arrangement with the producer to provide his testing requirements.

(ii) Unless otherwise agreed between the parties involved, the minimum testing frequency to be applied by the producer in the absence of a recognized ready- mixed concrete industry method of production control should be one sample for every 50 m3 of production or every 50 batches, whichever is the greater frequency. Three test specimens shall be made up for each sample for testing at 28 day In order to get a relatively quicker idea of the quality of concrete, optional test on beams for modulus of rupture at 72 ± 2 h or at 7 days or compressive strength test at 7 days may be carried out in addition to 28 days compressive strength test. For this purpose the value should be arrived at based on actual testing. In all cases 28 days compressive strength shall alone be the criteria for acceptance or rejection of the concrete.

(iii) The purchaser shall inform the producer if his requirements for sampling and testing are higher than one sample every 50 m3 or 50 batches, whichever is the greater frequency.

5.9.3.4 ***Additional Compliance Criteria*** *:* Any additional compliance criteria shall be declared to the producer by the purchaser prior to supply and shall be mutually agreed upon in terms of definition, tolerance frequency of assessment, method of test and significance result.

5.9.3.5 ***Non-Compliance :*** The action to be taken in case of non-compliance shall be declared and mutually agreed upon.

5.9.4 Information to be Supplied by the Purchaser
5.9.4.1 The purchaser shall provide to the producer the details of the concrete mix or mixes required by him and all pertinent information on the use of the concrete and the specified requirements. Prior to supply taking place, it is recommended that a meeting is held between the purchaser and the producer. Its objective to clarify operational matters such as notice to be given prior to delivery, delivery rate, the name of the purchasers authorized representative who will coordinate deliveries, any requirements for additional services such as pumping, on site testing or training, etc.

5.9.4.2 ***Designed Mixes :*** Where the purchaser specifies a designed mix to be supplied it is essential that all relevant information is conveyed to the producer. In order to assist in this, the format given in Annex B may be completed and forwarded to the producer at the time of enquiry.

5.9.4.3 ***Prescribed Mixes :*** The concrete mix shall be specified by its constituent materials and the properties or quantities of those constituents to produce a concrete with the required performance. The assessment of the mix proportions shall form an essential part of the compliance requirements. The purchaser shall provide the producer with all pertinent information on the use of the concrete and the specified requirements. In order to assist in this, the format given in Annex B may be followed with suitable modifications as applicable to prescribed mixes.

5.9.5 Information to be Supplied by the Producer
When requested, the producer shall provide the purchaser with the following information before any concretes is supplied:
(a) Nature and source of each constituent material,
(b) Source of supply of cement,
(c) Proposed proportions or quantity of each constituent/ m3 of fresh concrete.
(d) Generic type(s) of the main active constituent(s) in the admixture;
(e) Whether or not the admixture contains chlorides and if so, the chloride content of the admixture expressed as a percentage of chloride ion by mass of admixture;
(f) Where more than one admixture is used, confirmation of their compatibility and
(g) Initial and final setting time of concrete when admixture is used at adopted dosage (tested as per IS 8142).

6.1 Brick Work
The brick work shall be classified according to the class designation of bricks used.

6.2 Mortar
The mortar for the brick work shall be as specified, and conform to accepted standards. Lime shall not be used where reinforcement is provided in brick work.

6.3 Soaking of Bricks
Bricks shall be soaked in water before use for a period for the water to just penetrate the whole depth of the bricks. Alternatively bricks may be adequately soaked in stacks by profusely spraying with clean water at regular intervals for a period not less than six hours. The bricks required for masonry work using mud mortar shall not be soaked. When the bricks are soaked they shall be removed from the tank sufficiently early so that at the time of laying they are skin-dry. Such soaked bricks shall be stacked on a clean place where they are not again spoiled by dirt earth etc.
Note I: The period of soaking may be easily found at site by a field test in which the bricks are soaked in water for different periods and then broken to find the extent of water penetration. The least period that corresponds to complete soaking will be the one to be allowed for in construction work.
Note II : If the bricks are soaked for the required time in water that is frequently changed the soluble salt in the bricks will be leached out, and subsequently efflorescence will be reduced.

6.4 Laying
6.4.1 Bricks shall be laid in English Bond unless otherwise specified. For brick work in half brick wall, bricks shall be laid in stretcher bond. Half or cut bricks shall not be used except as closer where necessary to complete the bond. Closers in such cases, shall be cut to the required size and used near the ends of the wall. Header bond shall be used preferably in all courses in curved plan for ensuring better alignment.
Note: Header bond shall also be used in foundation footings unless thickness of walls (width of footing) makes the use of headers impracticable. Where thickness of footing is uniform for a number of courses, the top course of footing shall be headers.

6.4.2 All loose materials, dirt and set lumps of mortar which may be lying over the surface on which brick work is to be freshly started, shall be removed with a wire brush and surface wetted. Bricks shall be laid on a full bed of mortar, when laying, each brick shall, be properly bedded and set in position by gently pressing with the handle of a trowel. Its inside face shall be buttered with mortar before the next brick is laid and pressed against it. Joints shall be fully filled and packed with mortar such that no hollow space are left inside the joints.

6.4.3 The walls shall be taken up truly in plumb or true to the required batter where specified. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical. Vertical joints in the alternate course shall come directly one over the other. Quoin, Jambs and other angles shall be properly plumbed as the work proceeds. Care shall be taken to keep the perpends properly aligned within following maximum permissible tolerances :
(a) Deviation from vertical within a storey shall not exceed 6 mm per 3 m height.
(b) Deviation in verticality in total height of any wall of building more than one storey in height shall not exceed 12.5 mm.
(c) Deviation from position shown on plan of any brick work shall not exceed 12.5 mm.
(d) Relative displacement between load bearing wall in adjacent storeys intended to be vertical alignments shall not exceed 6 mm.
(e) A set of tools comprising of wooden straight edge, masonic spirit levels, square, 1 metre rule line and plumb shall be kept on the site of work for every 3 masons for proper check during the progress of work.

6.4.4 All quoins shall be accurately constructed and the height of brick courses shall be kept uniform.
This will be checked using graduated wooden straight edge or storey rod indicating height of each course including thickness of joints. The position of damp proof course, window sills, bottom of lintels, top of the wall etc. along the height of the wall shall be marked on the graduated straight edge or storey rod. Acute and obtuse quoins shall be bonded, where practicable in the same way as square quoins. Obtuse quoins shall be formed with squint showing three quarters brick on one face and quarter brick on the other.

6.4.5 The brick work shall be built in uniform layers.
No part of the wall during its construction shall rise more than one metre above the general construction level. Parts of wall left at different levels shall be raked back at an angle of 45 degrees or less with the horizontal. Toothing shall not

be permitted as an alternative to raking back. For half brick partition to be keyed into main walls, indents shall be left in the main walls.

6.4.6 All pipe fittings and specials, spouts, hold fasts and other fixtures which are required to be built into the walls shall be embedded, as specified, in their correct position as the work proceeds unless otherwise directed..

6.4.7 Top courses of all plinths, parapets, steps and top of walls below floor and roof slabs shall be laid with brick on edge, unless specified otherwise. Brick on edge laid in the top courses at corner of walls shall be properly radiated and keyed into position to form cut (maru) corners as shown in Fig 6.4. Where bricks cannot be cut to the required shape to form cut (maru) corners, cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) equal to thickness of course shall be provided in lieu of cut bricks.

6.4.8 Bricks shall be laid with frog (where provided) up. However, when top course is exposed, bricks shall be laid with frog down. For the bricks to be laid with frog down, the frog shall be filled with mortar before placing the brick in position.

6.4.9 In case of walls one brick thick and under, one face shall be kept even and in proper plane, while the other face may be slightly rough. In case of walls more than one brick thick, both the faces shall be kept even and in proper plane.

6.4.10 To facilitate taking service lines later without excessive cutting of completed work, sleeves (to be paid separately) shall be provided, where specified, while raising the brick work. Such sleeves in external walls shall be sloped down outward so as to avoid passage of water inside.

6.4.11 Top of the brickwork in coping and sills in external walls shall be slightly tilted. Where brick coping and sills are projecting beyond the face of the wall, drip course/throating (to be paid separately) shall be provided where indicated.

6.4.12 Care shall be taken during construction that edges of jambs, sills and projections are not damaged in case of rain. New built work shall be covered with gunny bags or tarpoulin so as to prevent the mortar from being washed away. Damage, if any, shall be made good to the satisfaction of the SBI/Consultant.

6.4.13 Vertical reinforcement in the form of bars (MS or high strength deformed bars or thermomechanically treated bars as per direction of SBI/Consultant)), considered necessary at the corners and junction of walls and jamb opening doors, windows etc. shall be encased with cement mortar not leaner than 1:4 (1 cement : 4 coarse sand), or cement concrete mix as specified. The reinforcement shall be suitably tied, properly embedded in the foundation and at roof level. The dia. of bars shall not be less than 8 mm and concrete grade shall be minimum 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size).

6.4.14 In retaining walls and the like, where water is likely to accumulate, weep holes, 50 to 75 mm square shall be provided at 2 m vertically and horizontally unless otherwise specified. The lowest weep hole shall be at about 30 cm above the ground level. All weep holes shall be surrounded by loose stones and shall have sufficient fall to drain out the water quickly.
Note : Work of providing loose stone will be payable extra.

6.4.15 Work of cutting chases, wherever required to be made in the walls for housing G.I. pipe, CI pipe or any other fixtures shall be carried out in various locations as per guidelines given below :
(a) Cutting of chases in one brick thick and above load bearing walls.

(i) As far as possible services should be planned with the help of vertical chases. Horizontal chases should be avoided.

(ii) The depths of vertical chases and horizontal chases shall not exceed one-third and one-sixth of the thickness of the masonry respectively.

(iii) When narrow stretches of masonry (or short length of walls) such as between doors and windows, cannot be avoided they should not be pierced with openings for soil pipes or waste pipes or timber joints, etc. Where there is a possibility of load concentration such narrow lengths of walls shall be checked for stresses and high strength bricks in mortar or concrete walls provided, if required.

(iv) Horizontal chases when unavoidable should be located in the upper or lower one-third of height of storey and not more than three chases should be permitted in any stretch of a wall. No continuous horizontal chase shall exceed one metre in length. Where unavoidable, stresses in the affected area should be checked and kept within the permissible limits.

(v) Vertical chases should not be closer than 2 m in any stretch of a wall. These shall be kept

away from bearings of beams and lintels. If unavoidable, stresses in the affected area should

be checked and kept within permissible limits.

(vi) Masonry directly above a recess, if wider than 30 cm horizontal dimension) should be supported on lintel. Holes in masonry may be provided upto 30 cm width and 30 cm height without any lintel. In the case of circular holes in the masonry, no lintel need be provided for holes upto 40 cm in diameter.

(b) Cutting of chases in half brick load bearing walls. No chase shall be permitted in half brick load bearing walls and as such no reccessed conduits and concealed pipes shall be provided with half brick thick load bearing walls.

(c) Cutting of chases in half brick non-load bearing wall : Services should be planned with the help of vertical chases. Horizontal chase should be provided only when unavoidable.

6.5 Joints

The thickness of all types of joints including brick wall joints and cross joints shall be such that four course and three joints taken consecutively shall measure as follows:

(i) In case of modular bricks conforming to IS 1077 specification for common burnt clay buildings bricks, equal to 39 cm.

(ii) In case of non-modular bricks, it shall be equal to 31 cm.

Note : Specified thickness of joints shall be of 1 cm. Deviation from the specified thickness of all joints shall not exceed one-fifth of specified thickness.

6.5.1 ***Finishing of Joints:*** The face of brick work may be finished flush or by pointing. In flush finishing either the face joints of the mortar shall be worked out while still green to give a finished surface flush with the face of the brick work or the joints shall be squarely raked out to a depth of 1 cm while the mortar is still green for subsequently plastering. The faces of brick work shall be cleaned with wire brush so as to remove any splashes of mortar during the course of raising the brick work. In pointing, the joints shall be squarely raked out to a depth of 1.5 cm while the mortar is still green and raked joints shall be brushed to remove dust and loose particles and well wetted, and shall be later refilled with mortar to give ruled finish. Some such finishes are 'flush', 'weathered', ruled, etc.

6.6 Curing

The brick work shall be constantly kept moist on all faces for a minimum period of seven days. Brick work done during the day shall be suitably marked indicating the date on which the work is done so as to keep a watch on the curing period.

6.7 Scaffolding

Scaffolding shall be strong to withstand all dead, live and impact loads which are likely to come on them. Scaffolding shall be provided to allow easy approach to every part of the work.

6.7.1 ***Single Scaffolding:*** Where plastering, pointing or any other finishing has been indicated for brick work, single scaffolding may be provided, unless otherwise specified. In single scaffolding, one end of the put-logs/pole shall rest in the hole provided in the header course of brick masonry. Not more than one header for each put-log/pole shall be left out. Such holes shall not be allowed in the case of pillars, brick work less than one metre in length between the openings or near the skew backs of arches or immediately under or near the structural member supported by the walls. The holes for putlogs/poles shall be made good with brick work and wall finishing as specified.

6.7.2 ***Double Scaffolding:*** Where the brick work or tile work is to be exposed and not to be finished with plastering etc. double scaffolding having two independent supports, clear of the work, shall be provided.

6.8 Measurements

6.8.1 Brick work shall be measured in cubic metres unless otherwise specified. Any extra work over

the specified dimensions shall be ignored. Dimensions shall be measured correct to the nearest 0.01 m i.e. 1 cm. Areas shall be calculated to the nearest 0.01 sq mtrs and the cubic contents shall be worked out to the nearest 0.01 cubic metres.

6.8.2 Brick work shall be measured separately in the following stages:
(a) From foundation to floor one level (Plinth level)
(b) Plinth (floor one) level to floor two level
(c) Between two specified floor levels above floor two level
Note : (i) Brick work in parapet walls, mumty, lift machine room and water tanks constructed on the roof upto 1.2 m height above roof shall be measured together with the corresponding work of the floor next below.

6.8.3 No deductions or additions shall be done and no extra payment made for the following :
Note : Where minimum area is defined for deduction of an opening, void or both, such areas shall refer only to opening or void within the space measured.
(a) Ends of dissimilar materials (that is, joists, beams, lintels, posts, girders, rafters, purlins, trusses, corbels, steps, etc.); up to 0.1 m2 in section;
(b) Opening up to 0.1 m2 in area (see Note);
(c) Wall plates, bed plates, and bearing of slabs, chajjas and the like, where thickness does not exceed 10 cm and bearing does not extend over the full thickness of wall;
(d) Cement concrete blocks as for hold fasts and holding down bolts;
(e) Iron fixtures, such as wall ties, pipes upto 300 mm diameter and hold fasts for doors and windows; and
(f) Chases of section not exceeding 50 cm in girth.
(g) Bearing portion of drip course, bearing of moulding and cornice.
Note : In calculating area of an opening, any separate lintel or sills shall be included with the size of the opening but end portions of lintel shall be excluded. Extra width of rebated reveals, if any, shall also be excluded.

6.8.4 Walls half brick thick and less shall each be measured separately in square metres stating thickness.

6.8.5 Walls beyond half brick thickness shall be measured in multiples of half brick which shall be deemed to be inclusive of mortar joints. For the sizes of bricks specified in 6.1.1, half brick thickness shall mean 100 mm for modular and 115 mm for non-modular bricks.
Where fractions of half brick occur due to architectural or other reasons, measurement shall be as follows :
(a) upto 1/4th brick-actual measurements and
(b) exceeding 1/4 brick-full half bricks.

6.8.6 String courses, projecting pilasters, aprons, sills and other projections shall be fully described and measured separately in running metres stating dimensions of each projection.

6.8.7 Square or rectangular pillars shall be measured separately in cubic metres in multiple of half brick.

6.8.8 Circular pillars shall be measured separately in cubic metres as per actual dimensions.

6.8.9 Brick work curved on plan shall be measured like the brick work in straight walls and shall include all cutting and wastage of bricks, tapered vertical joints and use of extra mortar, if any. Brick work curved on plan to a mean radius not exceeding six metres shall be measured separately and extra shall be payable over the rates for brick work in straight walls. Nothing extra shall be payable if the mean radius of the brick work curved in plan exceeds six metres.

6.8.10 Tapered walls shall be measured net as walls and extra payment shall be allowed for making tapered surface for brick work in walls.

6.8.11 Brick work with brick tiles shall be measured and paid for separately.

6.9 Rate

The rate shall include the cost of materials and labour required for all the operations described above except the vertical reinforcement and its encasement in cement mortar or cement concrete. The rate shall also include the following :
(a) Raking out joints or finishing joints flush as the work proceeds;
(b) Preparing tops of existing walls and the like for raising further new brick work.
(c) Rough cutting and waste for forming gables, splays at eaves and the like.
(d) Leaving holes for pipes upto 150 mm dia. and encasing hold fasts etc.

(e) Rough cutting and waste for brick work curved in plan and for backing to stone or other types of facing.
(f) Embedding in ends of beams, joists, slabs, lintels, sills, trusses etc.
(g) Bedding wall plates, lintels, sills, roof tiles, corrugated sheets, etc. in or on walls if not covered in respective items and
(h) Leaving chases of section not exceeding 50 cm in girth or 350 sq cm in cross-section.
(i) Brick on edge courses, cut brick corners, splays reveals, cavity walls, brick works curved on plan to a mean radius exceeding six metres.

6.10 HALF BRICK WORK

Brick work in half brick walls shall be done in the same manner as described above in 6.2.4 except that the bricks shall be laid in stretcher bond. When the half brick work is to be reinforced, 2 Nos. M.S. bars of 6 mm dia., shall be embedded in every third course as given in the item (the dia of bars shall not exceed 8 mm). These shall be securely anchored at their end where the partitions end. The free ends of the reinforcement shall be keyed into the mortar of the main brick work to which the half brick work is joined. The mortar used for reinforced brick work shall be rich dense cement mortar of mix 1:4 (1 cement: 4 coarse sand). Lime mortar shall not be used. Over laps in reinforcement, if any shall not be less than 30 cm. The mortar interposed between the reinforcement bars and the brick shall not be less than 5 mm. The mortar covering in the direction of joints shall not be less than 15 mm.

6.10.1 Measurements

The length and height of the wall shall be measured correct to a cm. The area shall be calculated in sq.m. where half brick wall is joined to the main walls of one brick or greater thickness and measurements for half brick wall shall be taken for its clear length from the face of the thicker wall.

7 DOOR, WINDOW AND VENTILATOR FRAMES

7.1 Timber for door, window and ventilators frames shall be as specified. Timber shall be sawn in the direction of the grains. All members of a frame shall be of the same species of timber and shall be straight without any warp or bow. Frames shall have smooth, well-planed (wrought) surfaces except the surfaces touching the walls, lintels, sill etc., which may be left clean sawn. Rebates, rounding or moulding shall be done before the members are jointed into frames. The depth of the rebate for housing the shutters shall be 15 mm, and the width of the rebates shall be equal to the thickness of the shutters. A tolerance of ± 2 mm shall be permitted in the specified finished dimensions of timber sections in frames.

7.2 Joints

The Jamb posts shall be through tenoned in to the mortise of the transoms to the full thickness of the transoms and the thickness of the tenon shall be not less than 2.5 cm. The tenons shall closely fit into the mortise without any wedging or filling. The contact surface of tenon and mortise before putting together shall be glued with polyvinyl acetate dispersion based adhesive conforming to IS 4835 or adhesive conforming IS 851 and pinned with 10 mm dia hard wood dowels, or bamboo pins or star shaped metal pins. The joints shall be at right angles when checked from the inside surfaces of the respective members. The joints shall be pressed in position. Each assembled door frame shall be fitted with a temporary stretcher and a temporary diagonal brace on the rebated faces.

7.3 Fixing of Frames

The frames shall be got approved. before being painted, oiled or otherwise treated and before fixing in position. The surface of the frames abutting masonry or concrete and the portions of the frames embedded in floors shall be given a coating of coal tar. Frames shall be fixed to the abutting masonry or concrete with holdfasts or metallic fasteners as specified. After fixing, the jamb posts of the frames shall be plugged suitably and finished neat. Vertical members of the door frames shall be embedded in the floor for the full thickness of the floor finish and shall be suitably strutted and wedged in order to prevent warping during construction. A minimum of three hold fasts shall be fixed on each side of door and window frames one at centre point and other two at 30 cm from the top and bottom of the frames. In case of window and ventilator frames of less than 1 m in height two hold fasts shall be fixed on each side at quarter point of the frames. Hold fasts and metallic fasteners shall be measured and paid for separately.

7.4 Measurements

Wood work wrought, framed and fixed shall be measured for finished dimension without any allowance for the wastage or for dimensions beyond specified dimension. However, in case of members having mouldings, roundings or rebates and members of circular or varying sections, finished dimensions shall be taken as the sides of the smallest square or rectangle from which such a section can be cut. Length of each member shall be

measured over all to the nearest cm so as to include projection for tenons. Width and thickness shall be measured to the nearest mm and the quantity shall be worked out in unit of upto three places of decimal.

7.5 FLUSH DOOR SHUTTERS

7.5.0 Flush door shutters shall have a solid core and may be of the decorative or non-decorative. Nominal thickness of shutters may be 25, 30 or 35 mm. Thickness and type of shutters shall be as specified.

7.5.1 Width and height of the shutters shall be as shown in the drawings. All four edges of the shutters shall be square. The shutter shall be free from twist or warp in its plane. The moisture content in timbers used in the manufacture of flush door shutters shall be not more than 12 per cent when tested.

7.5.2 Core

The core of the flush door shutters shall be a block board having wooden strips held in a frame constructed of stiles and rails. Each stile and rail shall be a single piece without any joint. The width of the stiles and rails including lipping, where provided shall not be less than 45 mm and not more than 75 mm. The width of each wooden strip shall not exceed 30 mm. Stiles, rails and wooden strips forming the core of a shutter shall be of equal and uniform thickness. Wooden strips shall be parallel to the stiles. End joints of the pieces of wooden strips of small lengths shall be staggered. In a shutter, stiles and rails shall be of one species of timber. Wooden strips shall also be of one species only but it may or may not be of the same species as that of the stiles and rails. Any species of timber may be used for core of flush door. However, any non-coniferous (Hard wood) timber shall be used for stiles, rails and lipping.

7.5.3 Face Panel

The face panel shall be formed by gluing, by the hot-press process on both faces of the core, either
plywood or cross-bands and face veneers. The thickness of the cross bands as such or in the plywood shall be between 1.0 mm and 3.0 mm. The thickness of the face veneers as such or in the plywood shall be between 0.5 mm and 1.5 mm for commercial veneers and between 0.4 mm and 1.0 mm for decorative veneers, provided that the combined thickness of both is not less than 2.2 mm. The direction of the veneers adjacent to the core shall be at right angles to the direction of the wooden strips. Finished faces shall be sanded to smooth even texture. Commercial face veneers shall conform to marine grade plywood and decorative face veneers shall conform to type I decorative plywood in IS 1328.

7.5.4 Lipping

Lipping, where specified, shall be provided internally on all edges of the shutters. Lipping shall be done with battens of first class hardwood or as specified of depth not less than 25 mm. For double leaved shutters, depth of the lipping at meeting of stiles shall be not less than 35 mm. Joints shall not be permitted in the lipping.

7.5.5 Rebating

In the case of double leaves shutters the meeting of stiles shall be rebated by 8 mm to 10 mm. The rebating shall be either splayed or square type as shown in drawing where lipping is provided. The depth of lipping at the meeting of stiles shall not be less than 30 mm.

7.5.6 Opening for Glazing

When required by the purchaser opening for glazing shall be provided and unless otherwise specified the opening for glazing shall be 250 mm in height and 150 mm or 200 mm in width unless directed otherwise. The bottom of the opening shall be at a height of 1.4 m from the bottom of the shutter. Opening for glazing shall be lipped internally with wooden batten of width not less than 25 mm. Opening for glazing shall be provided where specified or shown in the drawing.

7.5.7 Venetian Opening

Where specified the height of the venetian opening shall be 350 mm from the bottom of the shutter. The width of the opening shall be as directed but shall provide for a clear space of 75 mm between the edge of the door and venetian opening but in no case the opening shall extend beyond the stiles of the shutter. The top edge of the opening shall be lipped internally with wooden battens of width not less than 25 mm. Venetian opening shall be provided where specified or shown in the drawing.

7.5.8 Tolerance

Tolerance on width and height shall be + 3 mm and tolerance on nominal thickness shall be ± 1.2 mm. The thickness of the door shutter shall be uniform throughout with a permissible variation of not more than 0.8 mm when measured at any two points.

7.5.9 Adhesive
Adhesive used for bonding various components of flush door shutters namely, core, core frame, lipping, cross-bands, face veneers, plywood etc. and for bonding plywood shall conform to BWP type, phenol formaldehyde synthetic resin adhesive conforming to IS 848.

7.5.10 Tests
Samples of flush door shutters shall be subjected to the following tests:
(a) End Immersion Test
(b) Knife Test
(c) Glue Adhesion Test
One end of each sample shutter shall be tested for End Immersion Test. Two specimens of 150 x 150 mm size shall be cut from the two corners at the other end of each sample shutter for carrying out Glue Adhesion Test. Knife Test shall be done on the remaining portion of each sample shutter. Test shall be done as laid down in Appendix F of Chapter 9.

7.6 Floor Door Stopper
7.6.1 The floor door stopper shall conform to IS 1823. This shall be made of cast brass of overall size as specified and shall have rubber cushion. The shape and pattern of stopper shall be approved .. It shall be of brass finished bright, chromium plated or oxidised or as specified. The size of floor stopper shall be determined by the length of its plate. It shall be well made and shall have four counter sunk holes for fixing the door stoppers to the floor by means of wood screws. The body for housing of the door stopper shall be cast in one piece and it shall be fixed to the cover plate by means of brass or mild steel screws and cover plate shall be of casting or of sheet metal. The spring shall be fixed firmly to the pin. Tongue which would be pressed while closing or opening of the door shall be connected to the lower part by means of copper pin. On the extreme end a rubber piece shall be attached to absorb shock. All parts of the door stopper shall be of good workmanship and finish, burrs and sharp edges removed. It shall be free from surface and casting defects. Aluminium stopper shall be anodised and anodic film shall not be less than grade AC-10 of IS 1868.

7.7 Universal Hydraulic Door Closer (Exposed Type)
7.7.1 These shall be made of cast iron/aluminium alloy/zinc alloy and of shape and pattern as approved ..
7.7.2 These shall generally conform to IS Specifications for door closers Hydraulically regulated
7.7.3 The door closers may be polished or painted and finished with lacquer to desired colour.
Aluminium alloy door closer shall be anodized and the anodic coating shall not be less than grade AC 15 of IS 1868. All dents, burrs and sharp edges shall be removed from various components and they shall be pickled, scrubbed and rinsed to remove greese, rust, scale or any other foreign elements. After pickling, all the M.S. parts shall be given phosphating treatment

7.8 ROLLING SHUTTERS
7.8.1 Rolling shutters shall conform to IS 6248. These shall include necessary locking arrangement and handles etc. These shall be suitable for fixing in the position as specified i.e. outside or inside on or below lintel or between jambs of the opening. The door shall be either push and pull type or operated with mechanical device supplied by the firm. Shutters upto 10 sq. metre shall be of push and pull type and shutters with an area of over 10 sq. metre shall generally be provided with reduction gear operated by mechanical device with chain or handle, if bearings are specified for each of operation, these shall be paid for separately.

7.8.1.1 ***Shutter :*** The shutter be built up of inter locking lath section formed from cold rolled steel strips. The thickness of the sheets from which the lath sections have been rolled shall be not less than 0.90 mm for the shutters upto 3.5 m width. Shutters above 9 metres width should be divided in 2 parts with provision of one middle fixed or movable guide channel or supported from the back side to resist wind pressure. The lath section shall be rolled so as to have interlocking curls at both edges and a deep corrugation at the centre with a bridge depth of not less than 12 mm to provide sufficient curtain of stiffness for resisting manual pressures and normal wind pressure. Each lath section shall be continuous single piece without any welded joint. When interlocked, the lath sections shall have a distance of 75 mm rolling centers. Each alternate lath section shall be fitted with malleable cast iron or mild steel clips securely riveted at either ends, thus locking in the lath section at both ends preventing lateral movement of the individual lath sections. The clips shall be so designed as to fit the contour of the lath sections.

7.8.1.2 ***Spring :*** The spring shall be of coiled type. The spring shall be manufactured from high tensile spring steel wire or strips of adequate strength conforming to IS 4454- Part I .

7.8.1.3 ***Roller and Brackets :*** The suspension shaft of the roller shall be made of steel pipe conforming to heavy duty as per IS 1161. For shutter upto 6 metre width and height not exceeding 5 metre, steel pipes of 50 mm nominal bore shall be used. The shaft shall be supported on mild steel brackets of size 375 x 375 x 3.15 mm for shutters upto a clear height of 3.5 metre. The size of mild steel brackets shall be 500 x 500 x 10 mm for shutters of clear height above 3.5 m and upto 6.5 m. The suspension shaft clamped to the brackets shall be fitted with rotatable cast iron pulleys to which the shutter is attached. The pulleys and pipe shaft shall connected by means of pretensioned helical springs to counter balance the weight of the shutter and to keep the shutter in equilibrium in any partly open position.

7.8.1.4 When the width of the opening is greater than 3.5 mtr. The cast iron pulleys shall be interconnected with a cage formed out of mild steel flats of at least 32 x 6 mm and mild steel dummy rings made of similar flats to distribute the torque uniformly. Self aligning two row ball bearing with special cast iron casings shall be provided at the extreme pulley and caging rings shall have a minimum spacing of 15mm and at least 4 number flats running throughout length of roller shall be provided.

7.8.1.5 In case of shutters of large opening with mechanical device for opening the shutter the roller shall be fitted with a purion wheel at one end which in contact with a worm fitted to the bracket plate,caging and pulley with two ball bearing shall be provided.

7.8.1.6 ***Guide Channel :*** The width of guide channel shall be 25 mm the minimum depth of guide channels shall be as follows:

Clear width of shutters Depth of guide channel
Upto 3.5 m 65 mm
3.5 m upto 8 m 75 mm
8 m and above 100 mm

7.8.1.7 The gap between the two legs of the guide channels shall be sufficient to allow the free movement of the shutter and at the same time close enough to prevent rattling of the shutter due to wind.

7.8.1.8 Each guide channel shall be provided with a minimum of three fixing cleats or supports for attachment to the wall or column by means of bolts or screws. The spacing of cleats shall not exceed 0.75 m. Alternatively, the guide channels may also be provided with suitable dowels, hooks or pins for embedding in the walls.

7.8.1.9 The guide channels shall be attached to the jambs, plumb and true either in the overlapping fashion or embedded in grooves, depending on the method of fixing.

7.8.1.10 ***Cover :*** Top cover shall be of mild steel sheets not less than 0.90 mm thick and stiffened with angle or flat stiffeners at top and bottom edges to retain shape.

7.8.1.11 Lock plates with sliding bolts, handles and anchoring rods shall be as per IS 6248.

7.8.2 Fixing

The arrangement for fixing in different situations in the opening shall be as per IS 6248.

7.8.2.1 Brackets shall be fixed on the lintel or under the lintel as specified with rawl. Plugs and screws bolts etc. The shaft along with the spring shall then be fixed on the brackets.

7.8.2.2 The lath portion (shutter) shall be laid on ground and the side guide channels shall be bound with ropes etc. The shutter shall then be placed in position and top fixed with pipe shaft with bolts and nuts. The side guide channels and cover frames shall then be fixed to the walls through the plate welded to the guides. These plates and bracket shall be fixed by means of steel screws bolts, and rawl plugs concealed in plaster to make their location invisible. Fixing shall be done accurately in a workmen like manner that the operation of the shutter is easy and smooth.

7.8.3 Measurements

Clear width and clear height of the opening for rolling shutter shall be measured correct to a mm.

The clear distance between the two jambs of the opening shall be clear width and the clear distance between the sill and the soffit (bottom of lintel) of the opening shall be the clear height. The area shall be calculated in square metres correct to two places of decimal.

7.9 T-IRON DOORS, WINDOWS AND VENTILATORS FRAMES.

7.9.0 T-iron doors, windows and ventilators frames shall be manufactured from uniform mild steel Tee section. The steel shall be of the grade as per specified. The frames shall be got fabricated in approved workshop as approved by the SBI.

7.9.1 The sizes of doors, windows and ventilator frames shall be as per drawing or as decided by the SBI/Consultant. MS tie bar of 10 mm dia shall be welded at bottom of the frame. The size of doors, window and ventilators shall be calculated so as to allow 12.5 mm clearance on all sides to allow an easy fittings in opening. The actual size of doors, windows and ventilator shall not vary by more than + 2 mm than those shown in the drawings.
The size of T section used for manufacture of doors, windows and ventilators shall not be less than as specified unless otherwise directed..

7.9.2 Fabrications

The frame shall be constructed in section which has been cut to length and mitred. The corners of the frames shall be butt welded to form a true and right angle.
The T Sections shall be mitre joined and continuously butt welded all along

7.9.3 Fittings

Requisite number of holes shall be made in the frame for fixing of fitting. All fitting shall be fillet welded to T iron frame all along the periphery of contact. Butt hinges shall be fixed to the frame as below:
(i) MS flat of size 100 mm x 25 mm x 6 mm will be welded with fillet weld all along the periphery of contact on the rear side of the web of T iron to receive the hinges. Requisite number of holes shall be made in T iron frame and MS flat for fixing of hinges with counter sunk steel
(ii) An alternate method of fixing butt hinges can be adopted by fillet welding the hinge to the T iron frame on three sided. No welding shall be done along the hinge pin to allow free movement of butt hinges

7.9.4 Fixing Procedure

Fixing procedure for T iron doors, windows and ventilator frames in masonry opening

7.9.5 Measurements

T- iron door windows and ventilator frames shall be measured in running metre, along the centre line of the frame correct to a 1mm and weight calculated on the basis of standard tables. No deduction or extra payment shall be made for making holes and making arrangement for fixing fittings including packing wherever necessary. No deduction will be made for not providing tie bars in case of windows and ventilators.

7.9.6 Rate

The rate includes cost of materials and labour involved in all the operation described above. It shall include the necessary butt hinges and screws for fixing the same with frame or as specified. But it does not include the cost of other door, window and ventilator fittings.

7.1. PRESSED STEEL DOOR FRAMES

7.10.1 Materials

Steel door frames shall be manufactured from commercial mild steel sheet of specified thickness, Steel door frames with or without fan light shall be made in the profiles indicated in Fig. 10.8 which may be manufactured to suit doors of either type opening inwards or outwards as directed

7.10.2 Construction

Each door frame shall consist of hinge jamb, lock jamb, head and if required angle threshold. These shall be welded or rigidly fixed together by mechanical means. Where no angle threshold is required, temporary base tie shall be screwed to the feet of frames in order to form a rigid unit. Where so specified base ties shall be of pressed mild steel 1.25 mm thick adjustable to suit floor thickness of 35 or 40 mm and removable , or alternatively, threshold of mild steel angle of section 50 x 25 mm, minimum shall be provided for external doors frames.

7.10.3 Fabrication

The pressed steel door frames shall be got fabricated in an approved workshop as approved by the Chief Engineer.

7.10.3.1 ***Fixing Lugs :*** There shall be three adjustable lugs with split end tail to each jamb without fan light, and four for jamb with fan light. The head of the fixing lug shall be of one of the following lengths:
(a) 98 mm long for use with profile A
(b) 120 mm long for use with profile B
(c) 160 mm long for use with profile C
The head shall be made from flat steel strip 25 mm wide and not less than 1.60 mm thick
The tail of the lugs shall be 200mm long and shall be made of steel strip not less than 40 mm wide and not less than 1 mm thick.

7.10.3.2 ***Hinges*** : 100 mm mild steel butt hinges shall be used. For door frames 80 cm wide and under, three hinges shall be rigidly fixed to one jamb and for door frames above 80 cm wide, four hinges shall rigidly fixed to one jamb, if it is single shutter, where the height of door shutter exceeds 2.15 metres, one additional hinge shall be provided for every 0.5 m or part thereof the additional height. In all cases the hinges shall be so fixed that the distance from the inside of the head rebate to the top of the upper hinge is 20 cm and the distance from the bottom of the door frame to the bottom of the bottom hinge is also kept about 200 mm. The middle hinges shall be at equal distances from lower and upper hinges or as agreed to between the purchaser and the supplier. Hinges shall be made of steel 2.5 mm thick with zinc coated removable pin of 6 mm diameter. The space between the two leaves of the hinge when closed shall be 3 mm and the leaf that is not welded to the frame shall have four counter sunk holes to take No. 10 cross recessed head wood screws.

7.10.3.3 ***Mortar Guards:*** Mortar guards of thickness of main frame sheet shall be provided in accordance to provisions of IS 4351 and as instructed by SBI/Consultant shall be provided. These shall be welded to the frame at the head of the frame for double shutter doors to make provision for bolts. These shall also be provided to the frame behind the hinges, mortice locks and latches, slots, aldrop and sliding /tower bolts.

7.10.3.4 ***Lock – Strike Plate:*** There shall be an adjustable lock- strike plate of steel complete with mortar guard to make provision for locks or latches complying with the relevant Indian Standards. (IS 4351) Lock-strike plates shall be of galvanized mild steel and fixed at 95 cm from the head of the frame.

7.10.3.5 ***Shock Absorbers:*** For side hung door there shall not be less than three buffers or rubber or other suitable material inserted in holes in the rebate. one shall be located at the centre of the lock jamb and the other two shall be at 30 cm. from top and bottom of the frame. For double leaf shutter door, two buffers shall be provided.

7.10.4 Finishing
The surface of door frame shall be thoroughly cleaned, free of rust, mill-scale dirt oil etc. either by mechanical means, for example sand or shot blasting or by chemical means such as picking. After pretreatment of the surface one coat of approved primer i.e. red oxide zinc chrome primer. Two coats of paints as directed. shall be applied to the exposed surface.

7.10.5 Fixing
Frames shall be fixed up right in plumb and plane. To avoid sag or bow in width during fixing or during construction phase, temporary struts across the width preventing sides bulging inwards may be provided. Wall shall be built solid on each side and grouted at each course to ensure solid contact with frame leaving no voids behind the frame. Three lugs shall be provided on each jamb with spacing not more than 75 cm. The temporary strut should not be removed till the masonry behind the frame is set. In case screwed base tie is provided, this should be left in position till the flooring is laid when it can be removed. After pretreatment of the surface, one coat of steel primer and two coats, of paint, as directed by SBI/Consultant shall be applied to the exposed surface.

7.10.6 Measurements
The length shall be measured in running metre correct to a cm along the centre line of the frames.

7.10.7 Rate
The rate shall include the cost of labour and material involved in all the operation described above including one coat of approved steel primer but excluding two coats of paint.

8 CEMENT CONCRETE FLOORING

8.1 Cement Concrete

Cement concrete of specified mix grade shall be used as directed

8.2 Base Concrete

8.2.1 Flooring shall be laid on base concrete where so provided. The base concrete shall be provided with the slopes required for the flooring. Flooring in verandah, Courtyard, kitchens & baths shall have slope ranging from 1 : 48 to 1 : 60 depending upon location and as decided .. Floors in water closet portion shall have slope of 1:30 or as decided . to drain off washing water. Further, necessary drop in flooring in bath, WC, kitchen near floor traps ranging from 6 mm to 10 mm will also be provided to avoid spread of water. Necessary margin to accommodate this drop shall be made in base concrete. Plinth masonry off set shall be depressed so as to allow the base concrete to rest on it.

8.2.2 The flooring shall be commenced preferably within 48 hours of the laying of base concrete. The surface of the base shall be roughened with steel wire brushes without disturbing the concrete.
Immediately before laying the flooring, the base shall be wetted and a coat of cement slurry @ 2 kg of cement spread over an area of one sqm so as to get a good bond between the base and concrete floor.

8.2.3 If the cement concrete flooring is to be laid directly on the RCC slab, the top surface of RCC
slab shall be cleaned and the laitance shall be removed and a coat of cement slurry @ 2 kg of cement spread over an area of one sqm so as to get a good bond between the base and concrete floor.

8.4 Thickness

The thickness of floor shall be as specified in the description of the item.

8.5 Laying

8.5.1 ***Panels :*** Flooring of specified thickness shall be laid in the pattern including the border as given in the drawings or as directed.. The border panels shall not exceed 450 mm in width and the joints in the border shall be in line with panel joints. The panels shall be of uniform size and no dimension of a panel shall exceed 2 m and the area of a panel shall not be more than 2 sqm. The joints of borders at corners shall be mitred for provision of strips.

8.5.2 ***Laying of Flooring with Strips :*** Normally cement concrete flooring shall be laid in one
operation using glass/aluminium/PVC/brass strips/stainless steel strips or any other strips as required as per drawing or instructions of the SBI/Consultant, at the junction of two panels. This methodensures uniformity in colour of all the panels and straightness at the junction of the panels. 4 mm thick glass strips or 2 mm PVC strips or 2 mm aluminium or brass strips shall be fixed with their tops at proper level, giving required slopes. Use of glass and metallic strips shall be avoided in areas exposed to sun. Cost of providing and fixing strips shall be paid for separately.

Concreting : Cement concrete shall be placed in the panels and be levelled with the help of straight edge and trowel and beaten with thapy or mason's trowel. The blows shall be fairly heavy in the beginning but as consolidation takes place, light rapid strokes shall be given. Beating shall cease as soon as the surface is found covered with a thin layer of cream of mortar. The evenness of the surfaceshall be tested with straight edge. Surface of flooring be true to required slopes. While laying concrete, care shall be taken to see that the strips are not damaged/disturbed by the labourers. The tops of strips shall be visible clearly after finishing with cement slurry.

8.5.3 ***Laying of Flooring without Strips :*** Laying of cement concrete flooring in alternate panels may be allowed . in case strips are not to be provided.
Shuttering : The panels shall be bounded by angle iron or flats. The angle iron/flat shall have the same depth as the concrete flooring. These shall be fixed in position, with their top at proper level giving required slopes. The surface of the angle iron or flats, to come in contact with concrete shall be smeared with soap solution or non-sticking oil (Form oil or raw linseed oil) before concreting. The flooring shall butt against the unplastered masonry wall.
Concreting : The angle iron/ flats used for shuttering, shall be removed on the next day of the laying of cement concrete. The ends thus exposed shall be repaired, if damaged with cement mortar 1 : 2 (1 cement : 2 coarse sand) and allowed to set for minimum period of 24 hours. The alternate panels shall then be cleaned of dust, mortar, droppings etc. and concrete laid. While laying concrete, care shall be taken to see that the edges of the previously laid panels are not damaged and fresh mortar is not splashed over them. The joints between the panels should come out as fine straight lines.

8.6 Finishing

8.6.1 The finishing of the surface shall follow immediately after the cessation of beating. The surface shall be left for some time, till moisture disappears from it or surplus water can be mopped up. Use of dry cement or cement and sand mixture stiffening the concrete to absorb excessive moisture shall not be permitted. Excessive trowelling shall be avoided.

8.6.2 Fresh cement shall be mixed with water to form a thick slurry and spreaded @ 2 kg of cement over an area of one sqm of flooring while the flooring concrete is still green. The cement slurry shall then be properly processed and finished smooth.

8.6.3 The edges of sunk floors shall be finished and rounded with cement mortar 1:2 (1 cement : 2 coarse sand) and finished with a floating coat of neat cement.

8.6.4 The junctions of floor with wall plaster, dado or skirting shall be rounded off where so specified.

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

8.6.6 Curing

The curing shall be done for a minimum period of ten days. Curing shall not be commenced until the top layer has hardened. Covering with empty gunnies bag shall be avoided as the colour of the flooring is likely to be bleached due to the remanents of cement dust from the bags.

8.6.7 Precautions

Flooring in lavatories and bath room shall be laid only after fixing of water closet and squatting pans and floor traps. Traps shall be plugged while laying the floors and opened after the floors are cured and cleaned. Any damage done to W.C.'s squatting pans and floor traps during the execution of work shall be made good. During cold weather, concreting shall not be done when the temperature falls below 4°C. The concrete placed shall be protected against frost by suitable covering. Concrete damaged by frost shall be removed and work redone. During hot weather, precautions shall be taken to see that the temperature of wet concrete does not exceed 38° C. No concreting shall be laid within half an hour of the closing time of the day, unless permitted .. To facilitate rounding of junction of skirting, dado and floor, the skirting/dado shall be laid along with the border or adjacent panels of floor.

8.6.8 Measurement

Length and breadth shall be measured before laying skirting, dado or wall plaster. No deduction shall be made nor extra paid for voids not exceeding 0.20 sqm. Deductions for ends of dissimilar materials or other articles embedded shall not be made for areas not exceeding 0.10 sqm. The flooring done either with strips (in one operation) or without strips (in alternate panels) shall be treated as same and measured together.

8.6.9 Rate

The rate shall include the cost of all materials and labour involved in all the operations describedabove including application of cement slurry on RCC slab or on base concrete including roughening and cleaning the surface but excluding the cost of strips which shall be paid separately under relevant item. Nosing of steps where provided shall be paid for separately in running metre. Nothing extra shall be paid for laying the floor at different levels in the same room or courtyard and rounding off edges of sunk floors. In case the flooring is laid in alternate panels, nothing extra shall be paid towards the cost of shuttering used for this purpose.

8.7 CEMENT CONCRETE FLOORING WITH METALLIC HARDENER TOPPING

8.7.0 Wherever floors are required to withstand heavy wear and tear, use of floor hardener shall be avoided as far as possible by using richer mixes of concrete, unless the use of a metallic hardner is justified on the basis of cost. Where metallic hardener topping is used, it shall be 12 mm thick.

8.7.1 Metallic Hardening Compound

The compound shall be of approved quality consisting of uniformally graded iron particles, free from non-ferrous metal particles, oil, grease sand, soluble alkaline compounds. Where so directed by the SBI/Consultant it shall be tested as directed.

8.7.2 Base Concrete
It shall be as specified in estimate

8.7.3 Under Layer
Cement concrete flooring of specified thickness and mix (mentioned in item for under layer) shall be laid as under layer. The top surface shall be roughened with brushes while the concrete is still green and the forms/strips shall be kept projecting up 12 mm over the concrete surface, to receive the metallic hardening compound topping.

8.7.4 Topping
This shall consist of 12 mm thick layer of mix 1:2 (1 cement : 2 stone aggregate 6 mm nominal size)
by volume or as otherwise specified with which metallic hardening compound is mixed in the ratio of 1 : 4 (1 metallic concrete hardener : 4 cement) by weight. Metallic hardener shall be dry mixed thoroughly with cement on a clean dry pacca platform. This dry mixture shall be mixed with stone aggregate 6 mm nominal size or as otherwise specified in the ratio of 1 : 2 (1 cement : 2 stone aggregate) and well turnedover. Just enough water shall then be added to this dry mix as required for floor concrete. The mixture so obtained shall be laid in 12 mm thickness, on cement concrete floor within 2 to 4 hours of its laying. The topping shall be laid true to provide a uniform and eve surface. It shall be firmly pressed into the bottom concrete so as to have good bond with it. After the initial set has started, the surface shall be finished smooth and true to slope with steel floats.
The junction of floor with wall plaster, dado or skirting and finishing operations shall be dealt with as
described in 11.2.5. The men engaged on finishing operations shall be provided with raised wooden platform to sit on, so as to prevent damage to new work.

9.1 CEMENT PLASTER
The cement plaster shall be 12 mm, 15 mm or 20 mm thick as specified in the item.
9.1.1 Scaffolding
For all exposed brick work or tile work double scaffolding independent of the work having two sets of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed. For all other work in buildings, single scaffolding shall be permitted. In such cases the inner end of the horizontal scaffolding pole shall rest in a hole provided only in the header course for the purpose. Only one header for each pole shall be left out. Such holes for scaffolding shall, however, not be allowed in pillars/columns less than one metre in width or immediately near the skew backs of arches. The holes left in masonry works for scaffolding purposes shall be filled and made good before plastering.
Note : In case of special type of brick work, scaffolding shall be got approved from SBI/Consultant in advance.

9.1.2 Preparation of Surface
The joints shall be raked out properly. Dust and loose mortar shall be brushed out. Efflorescence if any shall be removed by brushing and scrapping. The surface shall then be thoroughly washed with water, cleaned and kept wet before plastering is commenced. In case of concrete surface if a chemical retarder has been applied to the form work, the surface shall be roughened by wire brushing and all the resulting dust and loose particles cleaned off and care shall be taken that none of the retarders is left on the surface.

9.1.3 Mortar
The mortar of the specified mix using the type of sand described in the item shall be used. It shall be as specified in Subhead 3.0. For external work and under coat work, the fine aggregate shall conform to grading IV. For finishing coat work the fine aggregate conforming to grading zone V shall be used.

9.1.4 Application of Plaster
9.1.4.1 Ceiling plaster shall be completed before commencement of wall plaster.

9.1.4.2 Plastering shall be started from the top and worked down towards the floor. All putlog holes shall be properly filled in advance of the plastering as the scaffolding is being taken down. To ensure even thickness and a true surface, plaster about 15 × 15 cm shall be first applied, horizontally and vertically, at not more than 2 metres intervals over the entire surface to serve as gauges. The surfaces of these gauged areas shall be truly in the plane of the finished plaster surface. The mortar shall then be laid on the wall, between the gauges with trowel. The mortar shall be applied in a uniform surface slightly more than the specified thickness. This shall be brought to a true surface, by working a wooden straight edge reaching across the gauges, with small upward and sideways movements at a time. Finally the surface shall be finished off true with trowel or wooden float according as a smooth or a sandy granular texture is required. Excessive troweling or over working the float shall be avoided.

9.1.4.3 All corners, arrises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Rounding or chamfering corners, arrises, provision of grooves at junctions etc. where required shall be done without any extra payment. Such rounding, chamfering or grooving shall be carried out with proper templates or battens to the sizes required.

9.1.4.4 When suspending work at the end of the day, the plaster shall be left, cut clean to line both horizontally and vertically. When recommencing the plastering, the edge of the old work shall be scrapped cleaned and wetted with cement slurry before plaster is applied to the adjacent areas, to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of wall and not nearer than 15 cm to any corners or arrises. It shall not be closed on the body of the features such as plasters, bands and cornices, nor at the corners of arrises. Horizontal joints in plaster work shall not also occur on parapet tops and copings as these invariably lead to leakages. The plastering and finishing shall be completed within half an hour of adding water to the dry mortar. No portion of the surface shall be left out initially to be patched up later on. The plastering and finishing shall be completed within half an hour of adding water to the dry mortar.

9.1.5 Thickness

Where the thickness required as per description of the item is 20 mm the average thickness of the plaster shall not be less than 20 mm whether the wall treated is of brick or stone. In the case of brick work, the minimum thickness over any portion of the surface shall be not less than 15 mm while in case of stone work the minimum thickness over the bushings shall be not less than 12 mm.

9.1.6 Curing

Curing shall be started as soon as the plaster has hardened sufficiently not to be damaged when watered. The plaster shall be kept wet for a period of at least 7 days. During this period, it shall be suitably protected from all damages at the contractor's expense by such means as the SBI/Consultant may approve. The dates on which the plastering is done shall be legibly marked on the various sections plastered so that curing for the specified period thereafter can be watched.

9.1.7 Finish

The plaster shall be finished to a true and plumb surface and to the proper degree of smoothness as required. The work shall be tested frequently as the work proceeds with a true straight edge not less than 2.5 m long and with plumb bobs. All horizontal lines and surfaces shall be tested with a level and all jambs and corners with a plumb bob as the work proceeds.

9.1.8 Precaution

Any cracks which appear in the surface and all portions which sound hollow when tapped, or are found to be soft or otherwise defective, shall be cut out in rectangular shape and redone as directed..

(i) When ceiling plaster is done, it shall be finished to chamfered edge at an angle at its junction with a suitable tool when plaster is being done. Similarly when the wall plaster is being done, it shall be kept separate from the ceiling plaster by a thin straight groove not deeper than 6 mm drawn with any suitable method with the wall while the plaster is green.

(ii) To prevent surface cracks appearing between junctions of column/beam and walls, 150 mm wide chicken wire mesh should be fixed with U nails 150 mm centre to centre before plastering the junction. The plastering of walls and beam/column in one vertical plane should be carried out in one go. For providing and fixing chicken wire mesh with U nails payment shall be made separately.

9.1.9 Measurements

9.1.9.1 Length and breadth shall be measured correct to a cm and its area shall be calculated in square metres correct to two places of decimal.

9.1.9.2 Thickness of the plaster shall be exclusive of the thickness of the key i.e. grooves, or open joints in brick work.

9.1.9.3 The measurement of wall plaster shall be taken between the walls or partitions (the dimensions before the plaster shall be taken) for the length and from the top of the floor or skirting to the ceiling for the height. Depth of coves or cornices if any shall be deducted.

9.1.9.4 The following shall be measured separately from wall plaster.
(a) Plaster bands 30 cm wide and under
(b) Cornice beadings and architraves or architraves moulded wholly in plaster.
(c) Circular work not exceeding 6 m in radius.

9.1.9.5 Plaster over masonry pilasters will be measured and paid for as plaster only.

9.1.9.6 A coefficient of 1.63 shall be adopted for the measurement of one side plastering on honey comb work having 6 x 10 cm. opening.

9.1.9.7 Moulded cornices and coves.
(a) Length shall be measured at the centre of the girth.
(b) Moulded cornices and coves shall be given in square metres the area being arrived at by multiplying length by the girth.
(c) Flat or weathered top to cornices when exceeding 15 cm in width shall not be included in the girth but measured with the general plaster work.
(d) Cornices which are curved in their length shall be measured separately.

9.1.9.8 Exterior plastering at a height greater than 10 m from average ground level shall be measured separately in each storey height. Patch plastering (in repairs) shall be measured as plastering new work, where the patch exceed 2.5 sqm. extra payment being made for preparing old wall, such as dismantling old plaster, raking out the joints and cleaning the surface. Where the patch does not exceed 2.5 sqm in area it shall be measured under the appropriate item under sub head 'Repairs to Buildings.'

9.1.9.9 Deductions in measurements, for opening etc. will be regulated as follows:
(a) No deduction will be made for openings or ends of joists, beams, posts, girders, steps etc. upto 0.5 sqm in area and no additions shall be made either, for the jambs, soffits and sills of such openings. The above procedure will apply to both faces of wall.

(b) Deduction for opening exceeding 0.5 sqm but not exceeding 3 sqm each shall be made for reveals, jambs, soffits sills, sills, etc. of these openings.

(i) When both faces of walls are plastered with same plaster, deductions shall be made for one face only.

(ii) When two faces of walls are plastered with different types of plaster or if one face is plastered and other is pointed or one face is plastered and other is unplastered, deduction shall be made from the plaster or pointing on the side of the frame for the doors, windows etc. on which width of reveals is less than that on the other side but no deduction shall be made on the other side. Where width of reveals on both faces of wall are equal, deduction of 50% of area of opening

on each face shall be made from area of plaster and/or pointing as the case may be.

(iii) For opening having door frame equal to or projecting beyond thickness of wall, full deduction for opening shall be made from each plastered face of wall.

(c) For opening exceeding 3 sqm in area, deduction will be made in the measurements for the full opening of the wall treatment on both faces, while at the same time, jambs, sills and soffits will be measured for payment. In measuring jambs, sills and soffits, deduction shall not be made for the area in contact with the frame of doors, windows etc.

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

10.1 DRIVEN CAST-IN-SITU REINFORCED CEMENT CONCRETE PILES

10.1.1 General

Cast-in-situ piles shall be installed by driving a metal casing with a shoe at the tip and displacing the material laterally. Driven cast-in-situ pile is formed by driving a casing, permanent or temporary and subsequently filling the hole with plain or reinforced concrete.

10.1.2 Equipment

The equipment and accessories used for driven cast-in-situ piles shall depend on type of sub-soil strata, ground water conditions, type of founding material and penetration etc. Commonly used plants are as per Appendix 'F' and few more are given below:

Dolly: A cushion of hardwood or some suitable material placed on the top of the casing to receive the blows of the hammer

Kent Ledge: Dead weight used for applying a test load to a pile.

Shoe: Pile Shoe should be of material as specified in the item. The pile shoes may be either cast iron or mild steel. Cast iron pile shoes shall be made from chill hardened iron as used for making grey iron casting confirming to IS 210. The chilled iron point shall be free from blow holes and other surface defects. Cast steel piles shoe shall be of steel conforming to IS 2644. Straps or other fastenings to cast pile shoes shall be of steel conforming to IS 1079 and shall be cast into the point to form an integral part
of shoe. Square Pile Shoe Round Pile Shoe Pile Shoe with Wedge Shape

Drop Hammer (or Monkey): Hammer, ram or monkey raised by a winch and allowed to fall under gravity.

Single or Double Acting Hammer: A hammer operated by steam compressed air or internal
combustion, the energy of its blows being derived mainly from source of motive power and not from gravity along.

Pile Frame (or Pile Rig): A movable steel structure for driving piles in the correct position and
alignment by means of a hammer operating in the guides or (leaders) of the frame.

10.1.3 Pile Driving

10.1.3.1 ***Installation of Piles:*** Installation of piles shall be as accurate as possible and as per design and drawings. The vertically or the required batter should be correctly maintained. Particular care shall be taken in respect of installing either single pile or piles in two pile groups.

10.1.3.2 ***Deviation /Tolerance***

(i) The deviation/tolerance should be as per IS 2911 (Part 1/Sec.1). The piles should not deviate more than 75 mm or D/4 whichever is less (75 mm or D/10 whichever is more in case of piles having diameter more than 600 mm) from their designed position at the working level.

(ii) In case of a single pile under a column, the positional deviation should not be more than 50 mm or D/4 whichever is less (100 mm in case of piles having diameter more than 600 mm. Greater tolerance may be prescribed for piles driven over water and for raking piles.

10.1.3.3 ***Sequence of Installation:*** Normal sequence of installation of pile group is from the centre to the periphery of the group or from one side to the other. Particular care shall be taken to avoid damaging the already cast pile while driving a fresh tube nearby before the concrete has sufficiently set. The possibility of the pile getting damaged is more in compact soils than in loose soils.

10.1.3.4 ***Driving a Group of Friction Piles***

(i) The skin friction increases considerably when the pile bore is driven in the loose sand as the pile tends to compact the sand. Therefore in such cases the order of installation shall be altered so that a compact block is not created where driving further pile bore will not be possible. Similar precaution will have to be taken where stiff clay or compact sand layers will have to be penetrated.

(ii) However driving the pile bore from centre outwards or commencing at a particular selected edge or even working across the group the problem pointed out in Para (I) above can be avoided.

PILE WORK

(iii) In case of very soft soil it is advisable to start driving the bore hole from outside to inside so that the soil gets restrained from flowing out during operation.

10.1.3.5 ***Procedure of Pile Driving***
(i) Driven cast-in-situ concrete piles are installed by driving a metal casing with a shoe at the tip/toe and displacing the material laterally.
(ii) These piles may be cast in metal shells which may remain permanently in place or the casing may be withdrawn which may be termed as uncased driven cast-in-situ cement concrete piles.
(iii) The metal casing shall be of sufficient thickness and strength to hold in original form and show no harmful distortion when the adjacent casing is driven and the driving core if any is withdrawn.
(iv) Driven cast-in-situ concrete piles shall be installed using a properly designed detachable shoe at the bottom of the casing.
(v) Any liner or bore hole; which is temporarily located and shows partial collapse that would affect the load carrying capacity of the pile, shall be rejected or repaired as directed by the Engineer-in-Charge.
10.1.3.6 A proper record of pile driving and other details such as depth driven, sequence of installation in a group, cut off level/working level shall be mentioned in sequence of occurrence worksheet for the inspection of SBI/Consultant.

10.1.4 Jetting
(i) Driving of pile may be assisted by preboring holes or by the use of jets or both subject to the approval of the SBI/Consultant. These may be used essentially to achieve the minimum penetration shown on the drawings where such penetration is not reached under normal conditions of driving. The diameter of the hole shall; not be greater than the diagonal dimension of the pile less 100 mm.
(ii) The maximum depth of the preboring shall be such that the specified set (or less) is obtained when the toe of the pile is at founding level. Preboring shall be as approved and shall not extend beyond one metre above the founding level and the pile shall be driven to at least one metre below the prebored hole. To ensure that the pile is properly supported laterally in the hole, any space remaining around the pile at the ground level after driving is finished shall be backfilled with approved granular material.
(iii) When the water jetting is used at least two jets shall be attached to the pile symmetrically. The volume and pressure of water at the outlet nozzles shall be sufficient to freely erode material adjacent to the toe of the pile. The maximum depth of jetting shall be such that the specified set is obtained when the toe of the pile is at founding level. Jetting shall cease as directed and shall not proceed beyond one metre above the founding level and the
pile shall be driven at least one metre below the prebored hole.
(iv) To avoid very hard driving and vibration in materials such as sand, jetting of piles by means of water may be carried out in such a manner as not to impair the bearing capacity of piles already in place, the stability of the soil or the safety of any adjoining buildings. Details of arrangement for jetting shall be got approved from the SBI/Consultant in advance.
(v) If large quantities of water are used for jetting it may be necessary to make provision for collection of water when it comes to the ground surface so that the stability of the piling plant is not endangered by the softening of the ground. Jetting shall be stopped before completing the driving which shall always be finished by ordinary methods. Jetting shall be stopped if there is any tendency for the pile tips to be drawn towards the pile already driven owing to the disturbance to the ground.

10.1.5 Reinforcement
(i) The design of reinforcing cage varies depending upon the driving and installation conditions, the nature of the sub-soil and the nature of load to be transmitted by the shaft, axial or otherwise. The minimum area of longitudinal reinforcement of any type or grade within the pile shaft shall be 0.4 per cent of the sectional area calculated on the basis of the outside area of the casings of the shaft.
(ii) The curtailment of reinforcement along the depth of the pile, in general, depends on the type of loading and sub-soil strata. In case of piles subjected to compressive load only, the designed quantity of reinforcement may be curtailed at appropriate level according to design requirements. For piles subjected to uplift load, lateral load & moments, separately or with compressive loads, it may be necessary to provide reinforcement to the full depth of the pile. In soft clays or loose sands, or where there is likelihood of danger to green concrete due to driving of adjacent piles, the reinforcement should be provided up to full pile depth, regardless of whether or not it is required from uplift & lateral load considerations. However, in all cases, the minimum reinforcement specified in Para (i) above should be provided in full length of the pile.
(iii) Piles shall always be reinforced with a minimum amount of reinforcement as dowels keeping the minimum bond length into the pile shaft below its cut-off level, and with adequate projection into the pile cap, irrespective of design requirements.
Note: In some cases the cage may lift at bottom or at the laps during withdrawal of casing. This can be minimized by making the reinforcement “U” shaped at the bottom and up to well secured joints. Also the lifting 5 percent of the length should be considered not to affect the quality of pile.

(iv) Clear cover to all main reinforcement in pile shaft shall be not less than 50 mm and shall be maintained by suitable spacers. The laterals of reinforcing cage may be in the form of links or spirals. The diameter and spacing of the same is chosen to impart adequate rigidity of the reinforcing cage during the handing and installation. The minimum diameter of links or spirals shall be 6 mm and the spacing of the links or spirals shall be not less than 150 mm. The minimum clear distance between two adjacent main reinforcement should normally be 100 mm for full depth of the cage.
(v) The reinforcing cage should be left with adequate protruding length above the cut off level for proper embedment in the pile cap. Prior to the lowering of reinforcement cage into the pile shaft, the shaft shall be cleaned of all loose materials.
(vi) Reinforcement in the form of cage shall be assembled with additional support, such as spreader forks and lacings; necessary to form a rigid cage hoops, links, or helical reinforcement has to fit closely around the main longitudinal bars and shall be tied by binding wire of approved quality. The ends of the binding wire shall be turned into the interior of the pile. Reinforcement shall be placed and maintained in correct position. The reinforcements shall be joined wherever necessary by welding and the procedure of welding be followed as described in IS 2751.

10.1.6 Concrete
10.1.6.1 ***Cement*** : Cement shall be as specified in agreement item or as specified. However, high alumina cement shall not be used.

10.1.6.2 ***Water:*** Water to be used for concreting shall be as specified

10.1.6.3 ***Fine Aggregate:*** Fine aggregate to be used for concreting shall be as specified

10.1.6.4 ***Coarse Aggregate:*** For tremie concreting, coarse aggregate having nominal size more than 20 mm should not be used. Natural rounded shingle of appropriate size may also be used as coarse aggregate. It helps to give high slump with less water cement ratio.

10.1.6.5 ***Chemical Admixtures:*** Admixtures to be used in the concrete shall be as per IS 9103.

10.1.6.6 ***Concrete Grades to be adopted***
(i) Concreting of piles shall be done only with design mix of appropriate grade with weigh batching of constituents. The grade of concrete to be kept as per nomenclature of the item.
(ii) Only concrete Grade M-25 and/or higher grades shall be used for concreting the piles. The exact grade of concrete to be used shall mainly depend upon the nature of work and the general design consideration. However, Concrete Grade M-15 and Grade M-20 shall not be used for concreting piles under any circumstances, even with weigh batching. The minimum cement content shall be 400 kg/m3 in all conditions.
(iii) When concreting under water or drilling mud 10 per cent additional cement over the minimum cement content for the particular grade shall be used subject to a minimum cement content of 370 kg/cum.

10.1.6.7 ***Workability of Concrete:*** The minimum slump shall be 100 mm when the concrete for the piles is being vibrated and when the concrete is not vibrated the maximum permitted slump is 150 mm. The degree of workability in both the cases is considered as very high.

10.1.6.8 ***Placing of Concrete***
(i) Before commencement of pouring of concrete, it shall be ensured that there is no ingress of water in the casing tubes from bottom. Further, adequate control during withdrawal of the casing tube is essential so as to maintain sufficient head of concrete inside the casing tube at all stages of withdrawal.

(ii) Wherever practicable concrete should be placed in a clean dry hole where concrete is placed in dry hole and when casing is present, the top 3 m pile shall be compacted using internal vibrators. The concrete should invariably be poured through a tremie, with a funnel so that the flow is directed and concrete can be deposited in the hole without segregation. Care shall be taken during concreting to prevent as far as possible the segregation of the ingredients. The displacement or distortion of reinforcement during concreting and also while extracting the tube shall be avoided.

(iii) Where the casing is withdrawn from cohesive soils for the formation of cast-in-situ pile, the concreting should be done with necessary precautions to minimize the softening of the soil by excess water. Where mud flow conditions exist, the casing of cast-in-situ piles shall not be allowed to be withdrawn.

(iv) The concrete shall be self compacting and shall not get mixed with soil, excess water, or other extraneous matter. Special care shall be taken in silt clays and other soils with tendency to squeeze into newly deposited concrete and

cause necking. Sufficient head of green concrete shall be maintained to prevent inflow of soil or wager into concrete. The placing of concrete shall be continuous process from the toe level to the top of pile to prevent segregation, a tube of tremie pipe ass appropriate shall be used to place concrete in all piles. To ensure compaction by hydraulic static heads, rate of placing concrete in the pile shaft shall not be less than 6 m (length of pile) per hour.

(v) The diameter of the finished pile shall not be less than specified and a continuous record shall be kept by the Engineer as to the volume of concrete placed in relation to the length of pile cast. After each pile has been cast and any empty pile hole remaining shall be protected and back filled as soon as possible with approved material.

(vi) The minimum embedment of cast-in-situ concrete piles into pile cap shall be 150 mm. Any defective concrete at the head of the completed pile shall be cut away and made good with new concrete. The clear cover between the bottom reinforcement in pile cap from top of pile shall not be less than 30 mm. The reinforcement in the pile shall be exposed for full anchorage length to permit it to be adequately bonded into the pile cap. Exposing such length shall be done carefully to avoid damaging the rest of the pile. In cases where the pile cap is to be laid on ground a leveling course with cement concrete of Grade M-15 and of 100 mm thickness shall be provided.

(vii) Normally concreting of piles should be uninterrupted. In exceptional case of interruption of concreting, but which can be resumed within 1 or 2 hours, the tremie shall not be taken out of the concrete. Instead it shall be raised and lowered slowly from time to time to prevent the concrete around the pipe from setting. Concreting should be resumed by introducing a little richer concrete with a slump of about 200 mm for each displacement of the partly set concrete. If the concreting cannot be resumed before final set of concrete already laid, the pile so cast may be rejected.

(viii) In case of withdrawal of tremie out of concrete, either accidentally or to removed a choke in the tremie, the tremie may be re-introduced to prevent impregnation of laitance scum lying on the top of the concrete already deposited in the bore. The tremie shall be gently lowered on to the old concrete with very little penetration initially. A vermiculite plug should be introduced in the tremie. Fresh concrete of slump between 150 mm and 175 mm should be filled in the tremie which will push the plug forward and swill emerges out of the tremie displacing the laitance/scum. The tremie will be pushed further in steps masking fresh concrete sweep away laitance scum in its way. When the tremie is buried by about 60 to 100 cms, concreting may be resumed.

(ix) The top of concrete in a pile shall be brought above the cut-off level to permit removal of all laitance and weak concrete before capping and to ensure good concrete at the cut-off level for proper embedment into the pile cap.

(x) Where cut-off level is less than 1.5 metres below the working level concrete shall be cast to a minimum of 300 mm above cut-off level. For each additional 0.3 m increase in cut-off level below the working level additional coverage of 50 mm minimum shall be allowed. Higher allowance may be necessary depending on the length of the pile. When concrete is placed by tremie method concrete shall be cast to the piling platform level to permit overflow of concrete for visual inspection or to a minimum of one metre above cut off level. In the circumstances where cut-off level is below ground water level the need to maintain pressure on the unset concrete equal to or greater than water pressure should be observed and accordingly length of extra concrete above cut-off level shall be determined.

10.1.6.9 ***Placing Concrete under Water***

(i) Before concreting under water, the bottom of the hole shall be cleared of drilling mud and all soft loose materials very carefully. In case a hole is bored with use of drilling mud, concreting should not be taken up when the specific gravity of bottom slurry is more than 1.2. The drilling mud should be maintained at 1.5 m above the ground water level. Concreting under water for cast-insitu concrete piles may be done either with the use of tremie method or by the use of approved method specialty designed to permit under water placement of concrete. General requirements and precautions for concreting under water are as follows:

(a) The concreting of pile must be completed in one continuous operation. Also for bored holes, the finishing of the bore, cleaning of the bore, lowering of reinforcement cage and concreting of pile for full length must be accomplished in one continuous operation without any stoppage.

(b) The concrete should be coherent, rich in cement with high slump & restricted water cement ratio.

(c) The tremie pipe will have to be large enough with due regard to the size of the aggregate. For 30 mm aggregate the tremie pipe should be of diameter not less than 150 mm and for larger aggregate, larger diameter of tremie pipe may be necessary.

(d) The first charge of concrete should be placed with a sliding plug pushed down the tube ahead of it to prevent mixing of water and concrete.

(e) The tremie pipe should always penetrate well into the concrete with an adequate margin of safety against accidental withdrawal if the pipe is surged to discharge the concrete.

(f) The pile should be concentrated wholly by tremie and the method of deposition should not be changed part way up the pile to prevent the laitance from being entrapped within the pile.

(g) All tremie tubes should be scrupulously cleaned after use. When concreting is carried out under water a temporary casing should be installed to the full depth of the bore hole or 2 m into non collapsible stratum, so that fragments of ground cannot drop from the sides of the hole into the concrete as it is placed. The temporary casing may not be required except near the top when concreting under drilling mud.

10.1.7 Testing of Concrete as per Material Testing Table

10.1.7.2 ***Test Specimen:*** Three test specimens shall be made for each sample for testing at 28 days. Additional samples may be required for various purposes such as to determine the strength of concrete at 7 days or to determine the duration of curing, or check the testing error, additional sample may also be required for testing samples cured by accelerated methods as described in IS 9103. The specimen shall be tested as described in IS 516.

10.1.7.3 ***Test Results of Samples:*** The test results of the samples shall be the average of the strength

of three specimens. The individual variation should not be more than ±15% percent of the average strength. If the variation is more, the test result of the sample is invalid.

10.1.8 Curing

As per IS 456 – 2000, exposed surfaces of concrete shall be kept continuously in a damp or wet condition by ponding or by covering with a layer of sacking, canvas, Hessian or similar materials and kept constantly wet for at least 10 days from the date of placing concrete. The period of curing shall not be less than 14 days for concrete exposed to dry and hot weather conditions.

10.1.9 Defective Pile

(i) In case defective piles are formed they shall be removed or left in place whichever is convenient without affecting performance of the adjacent piles or cap as a whole. Additional piles shall be provided to replace them as directed.

(ii) Any deviation from the designed location alignment or load capacity of any pile shall be noted and adequate measures taken well before concreting of the pile cap and plinth beam, if the deviations are beyond permissible limit.

(iii) During chipping of the pile, top manual chipping may be permitted after three days of pile casting pneumatic tools for chipping shall not be used before seven days after pile casting.

(iv) After concreting the actual quantity of concrete shall be compared with average obtained from observations actually made in the case of a few piles initially cast. If the actual quantity is found to be considerably less, special investigations shall be conducted and appropriate measures taken.

10.1.10 Ready Mix Concrete (RMC)

Alternatively, the contractor can be allowed to use Ready Mix Concrete (RMC) with the permission of SBI/Consultant, provided that the manufacturer assures that for RMC supplied for the particular work contains the minimum cement content and it is in conformity of approved design mix. The manufacturer of RMC has also to agree to the sampling and testing procedure as specified under clause 10.1.7 or alternatively he can propose his own sampling and testing procedure which should in turn be approved .. Normally, RMC supplied to site are mixed with certain admixtures which enables the concrete to be used within 3 hours of supply at site. In case RMC supplied is not consumed within 3 hours of supply the quantity of RMC remaining unused beyond 3 hours shall be rejected and removed from site.

10.1.11 Measurement

Dimension shall be measured nearest to a cm. Measurement of length on completion shall be along the axis of pile and shall be measured from top of shoe to the bottom of pile cap. No allowance shall be made for bulking, shrinkage, cut off tolerance, wastage and hiring of tools and equipment for excavating driving etc.

10.1.12 Rate

The rate includes the cost of materials and labour involved in all the operations described above including pile embedded in pile cap, except soil investigation, reinforcement, pile cap and grade beam.

10.2 BORED CAST-IN-SITU REINFORCED CONCRETE PILES

10.2.1 General

The piles are formed within the ground by excavating or boring a pile within it with or without the use of temporary casing and subsequently filling it with plain or reinforced concrete. When the casing is left permanently it is termed as cased pile and when the casing is taken out it is termed as uncased pile.

20.2.2 Equipment

The equipment and accessories used for bored cast-in-situ piles shall depend on subsoil strata, ground water conditions, type of founding material and penetration etc. General requirements of boring equipment are as per Appendix 'D'. The equipment is applicable for bored piles without the use of bentonite.

10.2.2.1 Boring operation shall be done by rotary percussion type drilling rigs using direct mud circulation or reverse mud circulation methods to bail out the cuttings or as specified. In soft clays and loose sand, bailer and chisel method should be used with caution to avoid the effect of suction. Rope operated grabbing tool Kelly mounted hydraulically operated grab are also used. This method of advancing the hole avoids suction. The size of cutting tool shall be not less than the diameter of pile by more than 75 mm.

10.2.2.2 Use of drilling mud is stabilizing sides of bore hole where specified shall have properties as defined in Appendix A. Permanent casing where specified shall be used to avoid aggressive action of water.

10.2.3 Boring for installing Pile

10.2.3.1 ***Installation of Piles :*** As described under clause 10.1.3.1

10.2.3.2 ***Deviation and Tolerance :*** As described under clause 10.1.3.2.

10.2.3.3 ***Procedure of Driving Pile Bore***

(i) Bored cast-in-situ concrete piles are installed by making a bore into the ground and removing out the material.

(ii) The ground shall be roughly leveled and position of pile marked. The boring shall be done with or without the use of temporary casing. The sides of bore hole; shall be stabilized with the aid of temporary casing or with the aid of drilling mud of suitable consistency.

(iii) The equipment and accessories shall depend upon the type of bored pile chosen for the job, consideration of sub-soil strata, ground water condition, type of founding material. Boring operation normally are done by rotary or percussion type drilling rigs using direct mud circulation on reverse mud tool shall be as detailed

(iv) In case permanent/temporary casing is not used then bored pile is stablised with drilling fluid. Bentonite supplied to site shall conform to IS 2720 (Part V). A certificate shall be obtained by the contractor from the manufacturer showing properties of each consignment and should be submitted to the SBI/Consultant. Bentonite shall be mixed thoroughly with fresh clean water to make a suspension which will maintain the stability of the pile excavation for the period necessary to place concrete and complete construction. The temperature of the water used in mixing the bentonite suspension and when supplied to bore hole shall not be lower than 5ºC. Consistency of the drilling fluid suspension and when controlled throughout the boring as well as in concreting operations in order to keep the hole stabilized as well as to avoid concrete getting mixed up with thick suspension of mud. Frequency and methods of testing drilling fluid shall be as specified and the test results shall be as specified

(v) Bored cast-in-situ piles in soils which are stable may often be installed with a small casing length at the top. A minimum of 2.0 m length of top of bore shall; invariably be provided with casing to ensure against loose soil falling in to drilling mud, or a suitable steel casing. The casing may be left in place permanently especially in cases where the aggressive action of the ground water is to be avoided, or in the cases of piles built in water or in cases where significant length of piles could be exposed due to scour.

(vi) For bored cast-in-situ piles, casing/liner shall be driven open ended with a pile driving hammer capable of achieving penetration of the liner to the length shown on the drawing or as directed by the SBI/Consultant. Materials inside the casing shall be removed progressively by air lift, grap or percussion equipment or other approved means.

(vii) Where bored cast-in-situ piles are used in soils liable to inflow, the bottom of the casing shall be kept low enough in advance of the boring tool; to prevent the entry of soil into the casing, thus presenting the formation of settlements in the adjoining ground. The water level in the casing should generally be maintained at the natural ground water level for the same reasons. The joints of the casing shall be made as tight as possible to minimize inflow of water or leakage of slurry during concreting.

(viii) Boring shall be carried out using rotary or percussion type equipment. Unless otherwise directed. the diameter of the bore holes shall be not more than the inside diameter of the liner.

(ix) After the boring has reached the required depth, the steel reinforcement shall be lowered in position maintaining the specified size of cover on all sides. The bore shall then be flushed with bentonite slurry and concreting shall be taken up exactly as described under clause 20.1.6.8.

10.2.3.4 A proper record of pile driving and other details such as sequence of installation of piles, dimension of piles, depth bored, time taken for concreting etc. shall be maintained in sequence of occurrence at site as per clause 20.1.3.6.

While drilling mud is used, the specific gravity of fresh supply and contaminated mud in the hole before concreting is taken up shall be recorded for first ten piles and subsequently at interval of 10 piles or as specified..

10.2.4 Measurement

Dimensions shall be measured nearest to a cm. Measurement of length on completion shall be along the axis of pile and shall be measured up to the bottom of pile cap. No allowance shall be made for bulking, shrinkage, cut off tolerance, wastage and hiring of tools, equipment for excavating, driving etc.

10.2.5 Rate

The rate includes the cost of material and labour involved in all the operations described above including pile embedded in pile cap except reinforcement, pile cap and grade beam.

10.3 LOAD TEST ON PILES

10.3.1 General

The bearing capacity of a single or group of piles shall be determined from test loading. It is most direct method for determining safe load on pile and it is more reliable on account of its being in-situ test. The load test on a concrete pile shall not be carried out earlier than 28 days of its casting. Initial test shall be carried on test pile which is not used as working pile and Routine tests shall be carried out as a check on working pile. Routine test shall be one-half percent to two percent of total number of piles or as specified, applicable to vertical and lateral load. Load Test shall generally conform to provision made in IS 2911 (Part IV) which provides guidelines for determination of safe loads and conducting of different types of tests.

10.3.2 Types of loadings/tests

(i) Vertical Load Test (Compression)

(ii) Cyclic Vertical Load Test

(iii) Lateral Load Test

10.3.3 Vertical Load Test

10.3.3.1 ***General:*** Compression load shall be applied to the pile top by means of a hydraulic jack against suitable load frame which is capable of providing reaction and settlement is recorded by suitable dial gauges. The contractor shall apprise of Engineer-in-Charge before test is conducted.

10.3.3.2 ***Preparation of Pile Head:*** Pile head shall be chipped off to horizontal plane, projecting steel shall be cut or bent and top finished smooth and leveled with plaster of Paris or similar synthetic material as specified to give a plane surface which is normal to the axis of the pile. A bearing plate with a hole at the centers shall be placed on the head of pile for the jacks to rest.

10.3.3.3 ***Loading Platform:*** A proper loading platform is installed as specified. Contractor shall ensure that when the hydraulic jack and load measuring devices are mounted on pile head the whole system will be stable on the maximum specified load. For single pile two dial gauges shall be fixed to the pile and bear on surfaces on reference frame. The dial gauges shall be placed in diametrically opposite positions and be equidistant from the pile axis. Four dial gauges are used for groups, having 0.01 mm sensitivity. The arrangement shall be approved by the Engineer-in-charge.

10.3.3.4 ***Application of Load:*** The test is carried out by applying a series of downward incremental load (20 per cent of safe loads on pile). In this method application of increment of test load and taking of measurement or displacement in each stage is maintained till the rate of displacement is either 0.1 mm in first 30 minutes or 0.2 mm in first one hour or 2 hours, whichever occurs first. The test load shall be maintained for 24 hours. This method is applicable for both

initial and routine test. For testing of raker piles the loading shall be along its axis. Safe load on single pile for initial test is least of following:

(i) Two-thirds of the final load at which the total displacement attains a value of 12 mm unless otherwise stated, in such case the safe load should be corresponding to total displacement permissible.

(ii) 50 per cent of the final load at which the total displacement equal 10 per cent of pile diameter and 7.5 per cent of bulb diameter in case of under-reamed piles. Routine test shall be carried for a test load of one and half times the working load, maximum settlement not to exceed 12 mm or as stated. Safe load on group of piles for initial test shall be least of the two

(i) Final load at which total displacement is 25 mm or as stated.

(ii) Two-thirds of final load at which the total displacement is 40 mm.

Routine test shall be carried for a test load equal to not less than working load, the maximum settlement not to exceed 25 mm.

10.3.3.5 ***Maintained Load Method:*** This is applicable for both initial and routine test. In this method application of increment of test load and taking of measurement or displacement in each stage of loading is maintained till rate of displacement of the pile top is either 0.1 mm in first 30 minutes or 0.2 mm in first one hour or till 2 hours, whichever occurs first. If the limit of permissible displacement as given in 10.3.3.4 is not exceeded, testing of pile is not required to be continued further. The test load shall be maintained for 24 hours. Pile test data such as load, displacement and time shall be recorded in suitable prescribed tabular form. Results can be presented by suitable curves.

Test shall be carried out in proper manner and to the entire satisfaction of the Engineer-in-charge.

After the test is completed the test cap shall be dismantled and pile surface shall be resorted to original shape.

10.3.3.6 ***Measurement:*** Each completed test shall be enumerated for initial test, routine test separately.

10.3.3.7 ***Rate:*** The rate includes the cost of labour, material and all the operations described above such as preparatory work including installation of loading platform, applying load, preparing pile head for load test, trimming of pile head etc. complete.

10.3.4 Cyclic Vertical Load Testing

10.3.4.1 ***General:*** This process shall be used in case of initial test to find out separately skin friction and point bearing load on single piles of uniform diameter in conformity of provisions of IS Code 2911 (Part 4) for conducting of the test.

10.3.4.2 ***Preparatory Pile Head:*** As per clause 10.3.3.2.

10.3.4.3 ***Loading Platform:*** As per clause 10.3.3.3

10.3.4.4 ***Application of Load:*** Relevant provision as per clause 10.3.3.4 shall be applicable. The test may be continued up to 50 per cent over the safe load.

10.3.4.5 Test procedure given in Appendix E shall be followed. Test shall be carried out in proper manner and to the entire satisfaction of the Engineer-in-charge. After the test is completed, the test cap shall be dismantled and pile surface shall be restored to original shape.

10.3.4.6 ***Measurement:*** Each completed test shall be enumerated for different load ranges.

10.3.4.7 ***Rate:*** The rate includes the cost of labour, materials and all the operations described above such as preparatory work, trimming of pile head etc. complete.

10.3.5 Lateral Load Testing

10.3.5.1 ***Load Platform:*** A proper loading platform shall be installed as specified. Hydraulic jack is mounted with gauge between two piles or pile groups under test. Dial gauge tips shall rest on central portion of glass plate fixed on the side of pile.

10.3.5.2 ***Application of Load:*** Full load imposed by the jack shall be taken as lateral resistance on each pile or group. Load should be applied in increments of about 20 per cent of the estimated safe load. The next increment shall be applied after the rate of displacement is approximately equal to 0.1 mm per 30 minutes.

10.3.5.3 The safe lateral load on pile; is least of the following:

(i) Fifty per cent of the final load at which total displacement increases to 12 mm.

(ii) Final load when total displacement is 5 mm.

(iii) Load corresponding to any other specified displacement as per requirement.

Pile group shall be tested as per actual conditions as far as possible.

10.3.5.4 ***Displacements:*** Displacement is read by at least two dial gauges of 0.1 mm sensitivity spaced at 30 cm and kept horizontally one above the other and displacement is interpolated at cut off level. One dia gauge placed diametrically opposite to jack shall directly measure displacement. Where, it is not possible to locate one of the dial gauges in the line of the jack axes, then two dial gauge may be kept at a distance of 30 cm at a suitable height and the displacement interpolated at load point from similar triangles.

Note*:* One of the methods of keeping dial gauge on pile surface is to chip off uneven concrete on the side of the pile and to fix a piece of glass 20 to 30 mm square. The dial gauge tips shall rest on the central portion of the glass plate.

Arrangement and test procedure shall be duly approved by the Engineer-in-Charge.

10.3.5.5 ***Measurement:*** Each completed test shall be enumerated for different load ranges.

10.3.5.6 ***Rate:*** The rate includes the costs of labour, materials and all the operations described above.

ANNEXURE-I

GUARANTEE TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF WATER-PROOFING WORKS.

The agreement made this..... day of ..... Two Thousand ..... between .....S/o .....(hereinafter called the GUARANTOR on the one part) and the SBI (hereinafter called the EMPLOYER on the other part)

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated ..... and made between the GUARANTOR ON THE ONE PART AND the EMPLOYER on the other part whereby the contractor inter alia undertook to render the building and structures in the said contract completely water and leak-proof.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the affect that the said work will remain water and leak proof, for Ten years from the date of giving water proofing treatment.

NOW THE GUARANTOR hereby guarantees that work executed by him will render the structures completely leak proof and the minimum life of such water proofing treatment shall be **Ten years** to be reckoned from the date after the expiry of defects liability period prescribed in the contract.

The decision of the SBI/Consultant with regard to nature and cause of defect shall be final.

During this period of guarantee, the guarantor shall make good all defects and in case of any defect being found render the building water proof to the satisfaction of the SBI/Consultant calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the Guarantor's cost and risk. The decision of the SBI/Consultant as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to execute the water proofing or commits breach thereunder, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and or cost incurred by the EMPLOYER, the decision of the SBI/Consultant will be final and binding on both the parties.

IN WITNESS WHEREOF these presents have been executed by the obligator .....and ..... by ..... for and on behalf of SBI on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of:-

1. ..... 2. .....

SIGNED FOR AND BEHALF OF SBI BY .....in the presence of:-

1. .....
2. .....

ANNEXURE-II

GUARANTEE TO BE EXECUTED BY THE CONTRACTOR
FOR REMOVAL OF DEFECTS AFTER COMPLETION
IN RESPECT OF SANITARY INSTALLATIONS / WATER SUPPLY / DRAINAGE WORK

The agreement made this..... day of ..... Two Thousand ..... between .....S/o .....(hereinafter called the GUARANTOR on the one part) and the SBI (hereinafter called the EMPLOYER on the other part)

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated ..... and made between the GUARANTOR ON THE ONE PART AND the Government on the other part, whereby the contractor inter alia, undertook to render the work in the said contract structurally stable, leak proof and sound material, workmanship, anodizing, coloring, sealing etc.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the affect that the said work will remain structurally stable, leak proof and guaranteed against faulty material and workmanship, defective anodizing / Powder coat coloring and finishing for **five** years from the date of completion of work.

NOW THE GUARANTOR hereby guarantee that work executed by him will be free from any leakage, seepage, cracks in pipes and guaranteed against faulty material and workmanship, defective galvanizing for five years to be reckoned from the date after the expiry of defects liability period prescribed in the contract.

The decision of the SBI/Consultant with regard to nature and cause of defect shall be final.

During this period of guarantee, the guarantor shall make good all defects and in case of any defect to satisfaction of SBI/Consultant at his cost and shall commence the work for such rectification within seven days from the date of issue of the notice from the SBI/Consultant calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the guarantor's cost and risk. The decision of the SBI/Consultant as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to make good all defects or commits breach there under, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and or cost incurred by the Government, the decision of the SBI/Consultant will be final and binding on both the parties.

IN WITNESS WHEREOF these presents have been executed by the obligator ....and ..... by ..... for and on behalf of SBI on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of :-

1. ..... 2. .....

SIGNED FOR AND ON BEHALF OF SBI BY..... in the presence of:-

1. ..... 2. .....

ANNEXURE-III

GUARANTEE TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF ALUMINIUM WORK

The agreement made this..... day of ..... Two Thousand ..... between .....S/o .....(hereinafter called the GUARANTOR on the one part) and the SBI (hereinafter called the EMPLOYER on the other part)

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated ..... and made between the GUARANTOR ON THE ONE PART AND the EMPLOYER on the other part, whereby the contractor inter alia, undertook to render the work in the said contract structurally stable, leak proof and sound material, workmanship, anodizing, coloring, sealing etc.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the effect that the said work will remain structurally stable, leak proof and guaranteed against faulty material and workmanship, defective anodizing / Powder coat coloring and finishing for **Two** years from the date of completion of work.

NOW THE GUARANTOR hereby guarantees that work executed by him will be free from any leakage, seepage, cracks in pipes and guaranteed against faulty material and workmanship, defective galvanizing for two years to be reckoned from the date after the expiry of defects liability period prescribed in the contract.

The decision of the SBI/Consultant with regard to nature and cause of defect shall be final.

During this period of guarantee, the guarantor shall make good all defects and in case of any defect to satisfaction of SBI/Consultant at his cost and shall commence the work for such rectification within seven days from the date of issue of the notice from the SBI/Consultant calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the guarantor's cost and risk. The decision of the SBI/Consultant as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to make good all defects or commits breach there under, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and or cost incurred by the EMPLOYER, the decision of the SBI/Consultant will be final and binding on both the parties.

IN WITNESS WHEREOF these presents have been executed by the obligator ....and ..... by ..... for and on behalf of the SBI on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of :-

1. ..... 2. .....

SIGNED FOR AND ON BEHALF OF SBI BY..... in the presence of:-

1. ..... 2. .....

SPECIAL CONDITIONS AND TECHNICAL SPECIFICATIONS FOR PHE WORKS

SPECIAL CONDITIONS

1. GENERAL

These special conditions are intended to amplify the General Conditions of Contract, and shall be read in conjunction with the same. For any discrepancies between the General Conditions and these Special Conditions, the more stringent shall apply.

2. DRAWINGS

The Plumbing / Sanitary Drawings issued with tenders are diagrammatic only and indicate arrangement of various systems and the extent of work covered in the contract. These Drawings indicate the points of supply and of termination of services and broadly suggest the routes to be followed. Under no circumstances shall dimensions be scaled from these Drawings. The working /interiors drawings and details shall be examined for exact location of equipments and water supply / drainage piping etc.

The tenderer shall follow the tender drawings in preparation of his shop drawings, and for subsequent installation work. He shall check the drawings of other trades to verify spaces in which his work will be installed.

Maximum headroom and space shall be maintained at all points. Where headroom appears inadequate, the tenderer shall notify the Consultant/Consultant/BANK's site representative before proceeding with the installation. In case installation is carried out without notifying, the work shall be rejected and tenderer shall rectify the same at his own cost.

The tenderer shall examine all Working structural, plumbing, electrical and other services drawings and check the as-built works before starting the work, report to the BANK's site representative any discrepancies and obtain clarification. Any changes found essential to coordinate installation of his work with other services and trades, shall be made with prior approval of the Consultant/Consultant/ BANK's site representative without additional cost to the BANK. The data given in the Drawings and Specifications is as exact as could be procured, but its accuracy is not guaranteed.

3. SHOP DRAWINGS

All the shop drawings shall be prepared on computer through Autocad System based on Working Drawings, site measurements and Interior Designer's Drawings. Within four weeks of the award of the contract, tenderer shall furnish, for the approval of the Consultant/Consultant, two sets of detailed shop drawings of all equipment and materials including layouts for Plant room, Pump room, Typical toilets drawings showing exact location of supports, flanges, bends, tee connections, reducers, detailed piping drawings showing exact location and type of supports, valves, fittings etc; external insulation details for pipe insulation etc; electrical panels inside/outside views, power and control wiring schematics, cable trays, supports and terminations.

These shop drawings shall contain all information required to complete the Project as per specifications and as required by the Consultant/Consultant/BANK's site representative. These Drawings shall contain details of construction, size, arrangement, operating clearances, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other tenderers. Each shop drawing shall contain tabulation of all measurable items of equipment/materials/works and progressive cumulative totals from other related drawings to arrive at a variation-in-quantity statement at the completion of all shop drawings. Minimum 5 sets of drawings shall be submitted after final approval along with CD.

Each item of equipment/material proposed shall be a standard catalogue product of an established manufacturer strictly from the manufacturers.

When the Consultant makes any amendments in the above drawings, the tenderer shall supply two fresh sets of drawings with the amendments duly incorporated alongwith check prints, for approval. The tenderer shall submit further twelve sets of shop drawings to the BANK's site representative for the exclusive use by the BANK's site representative and all other agencies. No material or equipment may be delivered or installed at

the job site until the tenderer has in his possession, the approved shop drawing for the particular material/equipment/installation.

Shop drawings shall be submitted for approval four weeks in advance of planned delivery and installation of any material to allow Consultant/Consultant ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved programme.
Manufacturers' drawings, catalogues, pamphlets and other documents submitted for approval shall be in four sets. Each item in each set shall be properly labelled, indicating the specific services for which material or equipment is to be used, giving reference to the governing section and clause number and clearly identifying in ink the items and the operating characteristics. Data of general nature shall not be accepted.

Samples of all materials like valves, pipes etc. shall be submitted to the BANK's site representative prior to procurement. These will be submitted in two sets for approval and retention by BANK's site representative and shall be kept in their site office for reference and verification till the completion of the Project. Wherever directed a mockup or sample installation shall be carried out for approval before proceeding for further installation.

Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimensions. Where drawings are approved, said approval does not mean that the drawings supercede the contract requirements, nor does it in any way relieve the tenderer of the responsibility or requirement to furnish material and perform work as required by the contract.

Where the tenderer proposes to use an item of equipment, other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundation, piping, wiring or any other part of the mechanical, electrical or Working layouts; all such re-design, and all new drawings and detailing required therefore, shall be prepared by the tenderer at his own expense and gotten approved by the Consultant/Consultant/ BANK's site representative. Any delay on such account shall be at the cost of and consequence of the Tenderer.

Plumbing / Sanitary Tenderer shall prepare coordinated services **shop drawings** based on the drawings prepared by Electrical, HVAC & Low Voltage Tenderers to ensure adequate clearances are available for installation of services for each trade.

Where the work of the tenderer has to be installed in close proximity to, or will interfere with work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the BANK's site representative, the tenderer shall prepare composite working drawings and sections at a suitable scale, not less than 1:50, clearly showing how his work is to be installed in relation to the work of other trades. If the Tenderer installs his work before coordinating with other trades, or so as to cause any interference with work of other trades, he shall make all the necessary changes without extra cost to the BANK.

Within two week of approval of all the relevant shop drawings, the tenderer shall submit four copies of a comprehensive variation in quantity statement, and itemized price list of recommended (by manufacturers') imported and local spare parts and tools, covering all equipment and materials in this contract. The Project Manager shall make recommendation to BANK for acceptance of anticipated variation in contract amounts and also advise BANK to initiate action for procurement of spare parts and tools at the completion of project.

4. QUIET OPERATION AND VIBRATION ISOLATION

All equipment shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the BANK's site representative. In case of rotating machinery sound or vibration noticeable outside the room in which it is installed, or annoyingly noticeable inside its own room, shall be considered objectionable. Such conditions shall be corrected by the Tenderer at his own expense. The tenderer shall guarantee that the equipment installed shall maintain the desired NC levels.

5. ACCESSIBILITY

The Tenderer shall verify the sufficiency of the size of the shaft openings, clearances in cavity walls and suspended ceilings for proper installation of his piping and other ancillaries. His failure to communicate insufficiency of any of the above, shall constitute his acceptance of sufficiency of the same**.** The Tenderer

shall locate all equipment which must be serviced, operated or maintained in fully accessible positions. The exact location and size of all access panels, required for each concealed valve or other devices requiring attendance, shall be finalized and communicated in sufficient time, to be provided in the normal course of work. Failing this, the Tenderer shall make all the necessary repairs and changes at his own expense. Access panel shall be standardised for each piece of equipment / device / accessory and shall be clearly nomenclature / marked.

6. MATERIALS AND EQUIPMENT

All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design. Makes shall be strictly in conformity with list of approved manufacturers.

7. MANUFACTURERS INSTRUCTIONS

Where manufacturer has furnished specific instructions, relating to the material and equipment used in this project, covering points not specifically mentioned in these documents, such instructions shall be followed in all cases.

8. ELECTRICAL INSTALLATION

The electrical work related to Plumbing / Sanitary services is excluded from the scope of the tenderer. The termination of the cable to the various motors shall be carried out by the contractor.

9. BALANCING, TESTING AND COMMISSIONING

Balancing of all water systems and all tests as called for the Specifications shall be carried out by the tenderer through a specialist group, in accordance with the Specifications and ASPE / ASHRAE Guide lines and Standards. Performance test shall consist of three days of 10 hour each operation of system for each season. Cost of performance witness test of major equipment such as pumps, boilers, WTP etc. at factory with two personnel from BANKs / Consultant shall be included.

The installation shall be tested again after removal of defects and shall be commissioned only after approval by the BANK's site representative. All tests shall be carried out in the presence of the representatives of the Consultant/Consultant and BANK's site representative.

10. COMPLETION DRAWINGS

Tenderer shall periodically submit completion drawings as and when work in all respects is completed in a particular area. These drawings shall be prepared in Autocad submitted in the form of two sets of PENDRIVEs and four portfolios (300 x 450 mm) each containing complete set of drawings on approved scale indicating the work as - installed. These drawings shall clearly indicate complete plant room layouts, piping layouts, location of wiring and sequencing of automatic controls, location of all concealed piping, valves, controls, wiring and other services. Each portfolio shall also contain consolidated control diagrams and technical literature on all controls. The tenderer shall frame under glass, in the plant room, one set of these consolidated control diagrams.

11. OPERATING INSTRUCTION & MAINTENANCE MANUAL

Upon completion and commissioning of part Plumbing / Sanitary system the tenderer shall submit a draft copy of comprehensive operating instructions, maintenance schedule and log sheets for all systems and equipment included in this contract. This shall be supplementary to manufacturer's operating and maintenance manuals. Upon approval of the draft, the tenderer shall submit four (4) complete bound sets of typewritten operating instructions and maintenance manuals; one each for retention by Consultant and BANK's site representative and two for BANKs Operating Personnel. These manuals shall also include basis of design, detailed technical data for each piece of equipment as installed, spare parts manual and recommended spares for 4 year period of maintenance of each equipment.

"*Preventive Maintenance Schedule for each equipment / panel shall be submitted along with Operation and Maintenance Manual".*

12. ON SITE TRAINING

Upon completion of all work and all tests, the Tenderer shall provide necessary operators, labour and helpers for operating the entire installation for a period of fifteen (15) working days of ten (10) hours each, to enable the BANK's staff to get acquainted with the operation of the system. During this period, the tenderer shall train the BANK's personnel in the operation, adjustment and maintenance of all equipment installed**.**

13. MAINTENANCE DURING DEFECTS LIABILITY PERIOD

A: Complaints

The Tenderer shall receive calls for any and all problems experienced in the operation of the system under this contract, attend to these within 10 hours of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist.

B: Repairs

All equipment that requires repairing shall be immediately serviced and repaired. Since the period of Mechanical Maintenance runs for one year concurrently with the defects liability period, all replacement parts and labour shall be supplied promptly free-of-charge to the BANK.

16. PARTIAL ORDERING

BANK reserves the right to order equipment and material from any and all alternates, and /or to order high side and /or low side equipment and materials or parts thereof from one or more tenderers**.**

TECHNICAL SPECIFICATIONS

. WORKMANSHIP

The workmanship shall be best of its kind and shall conform to the specifications, as below or Indian Standard Specifications in every respect or latest trade practices and shall be subject to approval of the Bank's Site Representative. All materials and/or Workmanship which in the opinion of the Bank's Site Representative / Consultant / Consultant is defective or unsuitable shall be removed immediately from the site and shall be substituted with proper materials and/or workmanship forthwith.

. MATERIALS

All materials shall be best of their kind and shall conform to the latest Indian Standards.

All materials shall be of approved quality as per samples and approved by the Bank's Site Representative / Consultant / Consultants.

As and when required by the Bank's Site Representative / Consultant, the contractor shall arrange to test the materials and/or portions of works at his own cost to prove their soundness and efficiency. If after tests any materials, work or portions or work are found defective or unsound by the Bank's Site Representative / Consultant, the contractor shall remove the defective material from the site, pull down and re-execute the works at his own cost to the satisfaction of the Bank's Site Representative / Consultant. To prove that the materials used are as specified the contractor shall furnish the Bank's Site Representative with original vouchers on demand.

WATER SUPPLY (COLD & HOT)

1. SCOPE

The scope of this section comprises the supply, installation, testing and commissioning of piping network for water supply for internal & external services as follows:

a. Existing Water supply mains.
b. Drinking Water Supply.
c. Washing
d. Connection to various mechanical equipments to be supplied and installed by the other specialist contractors.

The Contractor shall make all necessary application and arrangements for his work to be inspected by the Local Authorities.

The Contractor shall be solely responsible for obtaining the Authorities approval of his works prior to the handing over of the complete water supply / distribution installation to the Bank.

2. PIPING MATERIALS

The piping system shall consist of heavy class galvanized iron pipes and fittings conforming to IS:1239. The sizes and makes is specified in the Schedule of Quantities.

For any internal works, the galvanized iron or CPVC (SDR-11) pipes and fittings shall be embedded in the wall chase or run on the floor/ceiling unless otherwise specified. No unsightly exposed runs shall be permitted. Outside the building the piping shall be installed at least 1.0 m below the finished grade level.

2.1 Galvanised Iron Pipes & Fittings

The pipes shall be galvanised mild steel welded (ERW) or (HFW) screwed and socketed conforming to the requirements of IS:1239. The Galvanising shall conform to IS:4736, the zinc coating shall be uniform, adherent reasonably smooth and free from such imperfections as flux, ash and drop inclusions, bare patches, black spots, pimples, lumpiness, runs, rust strains, bulky white deposits and blisters. The pipes and sockets shall be cleanly finished, well galvanised in and out and free from cracks, surface flaws laminations and other

defects. All screw threads shall be clean and well cut. The ends shall be cut cleanly and square with the axis of the pipe.

The fittings shall be malleable iron and comply with all the requirements of the pipes. The sizes of pipes and fitting are specified in the schedule of quantities.

2.2 Laying And Jointing of GI Pipes

The galvanised pipes and fittings shall run in wall chase or ceiling or as specified. The fixing shall be done by means of standard pattern holder bat clamps keeping the pipes about 1.5 cm clear of the wall where to be laid on surface. Where it is specified to conceal the pipes, chasing may be adopted for pipes fixed in the shafts, ducts etc. there should be sufficient space to work on the pipes with the usual tools. As far as possible, pipes may be buried for short distances provided adequate protection is given against damage and where so required special care to be taken at joints. Where directed by the Bank's Site Representative, pipe sleeves shall be fixed at a place the pipe is passing through a wall or floor for reception of the pipe and allow freedom for expansion and contraction and other movements. In case of pipe is embedded in walls or floors it shall be painted with anticorrosive bitumastic paints of approved quality. Under the floors the pipes shall be laid in layer of sand filling.

Galvanised iron pipes shall be jointed with threaded and socket joints, using threaded fittings. Care shall be taken to remove any burr from the end of the pipes after threading.Teflon tape, White lead or an equivalent jointing compound of proprietary make shall be used, according to the manufacturer's instructions, with a grommet of a few strands of fine yarn while tightening. Compounds containing red lead shall not be used because of the danger of contamination of water. Any threads exposed after jointing shall be painted with bituminous paint to prevent corrosion.

CPVC Pipes & Fittings

The pipes shall be CPVC (Chlorinated Poly Vinyl Chloride) material for hot & cold water supply piping system wth pipes as per CTs SDR -11at a working pressure of 320 PSI at 23 deg C and 80 PSI at 82 deg.C, using solvent welded CPVC fittings i.e. Tees, Elbows, Couplees, Unions, Reducers, Brushing etc. including transition fittings (connection between CPVC & Metal pipes / GI) i.e. Brass adapters (both Male & Female threaded and all conforming to ASTM D-2846 with only CPVC solvent cement conforming to ASTM F-493, with clamps / structural metal supports as required /directed at site including cutting chases & fitting the same with cement concrete / cement mortar as required, including painting of the exposed pipes with one coat of desired shade of enamel paint. All termination points for installation of faucets shall have brass termination fittings. Installation shall be to the satisfaction of manufacturer & Project Manager. The material shall have to be gotten approved from Chief Fire Officer.

i. **Joining Pipes & Fittings**

a. Cutting:

Pipes shall be cut either with a wheel type plastic pipe cutting or hacksaw blade and care shall be taken to make a square cut which provides optimal bonding area within a joint.

b. Deburring / Beveling:

Burrs and fittings should be removed from the outside and inside of pipe with a pocket knife or file otherwise burrs and fittings may prevent proper contact between pipe and fittings during assembly.

c. Fitting preparation:

A clean dry rag/cloth should be used to wipe dirt and moisture from the fitting sockets and tubing end. The tubing should make contact with the socket wall 1/3 or 2/3 of the way into the fitting socket.

d. Solvent Cement Application:

Only CPVC solvent cement confirming to ASTM-F493 should be used for joining pipe with fittings. An even coat of solvent cement should be applied on the pipe end and a thin coat inside the fitting socket, otherwise too much of cement solvent can cause clogged water ways.

e. Assembly

After applying the solvent cement on both pipe and fitting socket, pipe should be inserted into the fitting socket within 30 seconds, and rotating the pipe ¼ to ½ turn while inserting so as to ensure even distribution of solvent cement with the joint. The assemnbled system should be held for 10 seconds (approximately) in order to allow the joint to set up.

An even bead of cement should be evident around the joint and if this bead is not continuos remake the joint to avoid potential leaks.

Set & Cure times:

Solvent cement set and cure times shall be strictly adhered to as per the below mentioned table.

Minimum Core prior to pressure testing at 150 PSI

Ambient Temperature during Core period	Pipe Size	
	½ " - 1"	1.¼" - 2"
Above 15 deg. C	1 Hr	2 Hrs
4-15 deg.C	2 Hrs	4 Hrs
Below 4 deg C	4 Hrs	8 Hrs

Special care shall be exercised when assembling flow guard systems in extremely low temperature (below 4°C) or extremely high temperature (above 45°C) In extremely hot temperatures, make sure that both surfaces to be joined are till wet with cement solvent when putting them together.

f. Testing

Once an installation is completed and cored as per above mentioned recommendations, the system should be hydrostatically pressure tested at 150 psi(10 Bar) for one hour. During pressure testing, the system should be fitted with water and if a leak is found, the joint should be cut out and replacing the same with new one by using couplers.

ii. **Transition of Flowguard CPVC to Metals**

When making a transition connection to metal threads, special Brass / plastic transition fitting (Male and female adapters) should be used. Plastic threaded connections should not be over torqued Hard tight pluts one half turn should be adequate.

iii. **Threaded Sealents**

Teflon tape shall be used to make threaded connections leak proof.

iv. **Solvent Cement**

Only CPVC solvent cement conforming to ASTMF 493 should be used for joining pipe with fittings and valves. Flowguard CPVC cement solventhave a minimum shelf life of 1 year. Aged cement solvent will often change colour or being to thicken and become gelatinous or jelly like and when this happens, the cement should not be used. The cement solvent should be used within 30 days after opening the company's seal and tightly close the seal after using inorder to avoid its freezing. The freezed cement solvent should be discarded immediately and fresh one should be used. The CPVC solvent cement usage should be adhered to as given in table below

Diameter of pipe in inch (flowguard)	**½"**	**¾"**	**1"**	**¼"**	**1½"**	**2"**
Approx. nos. of joints which can be mode per litre of solvent cement.	200 Nos	180 Nos	150 Nos	130 Nos	100 Nos	70 Nos

3. PIPING INSTALLATION SUPPORT

Tender drawings indicate schematically the size and location of pipes. The Contractor, on the award of the work, shall prepare detailed working drawings, showing the cross-sections, longitudinal sections, details of fittings,

locations of isolating and control valves, drain and air valves, and all pipe supports. He must keep in view the specific openings in buildings and other structure through which pipes are designed to pass.

Piping shall be properly supported on, or suspended from, on stands, clamps, hangers as specified and as required. The Contractor shall adequately design all the brackets, saddles, anchor, clamps and hangers, and be responsible for their structural stability.

Pipe work and fittings shall be supported by hangers or brackets so as to permit free expansion and contraction. All accessories and ancillaries of support system such as brackets, saddles, clamps, hangers etc. shall be hot dip galvanized after fabrication. Further to permit free movement of common piping, support shall be from a common hanger bar, fabricated from galvanised steel sections.

Pipe hangers shall be provided at the following maximum spacings:

Pipe Dia (mm)	**Hanger Rod Dia (mm)**	**Spacing between Supports (m)**
Up to 25	6	2
32 to 50	10	2.7
80 to 100	12	2.7
125 to 150	16	3.6
200 to 300	19	5.3

Insulated piping shall be supported in such a manner as not to put undue pressure on the insulation. 14 gauge metal sheet shall be provided between the insulation and the clamp, saddle or roller, extending atleast 15 cm. on both sides of the clamps, saddles or roller.

All pipe work shall be carried out in a proper workman like manner, causing minimum disturbance to the existing services, buildings, roads and structure. The entire piping work shall be organized in consultation with other agencies work, so that area can be carried out in one stretch.

Cut-outs in the floor slab for installing the various pipes area are indicated in the drawings. Contractor shall carefully examine the cut-outs provided and clearly point out wherever the cut-outs shown in the drawings, do not meet with the requirements.

Pipe sleeves, larger diameter than pipes, shall be provided wherever pipes pass through walls and slab and annular space filled with fibreglass and finished with retainer rings.

The contractor shall make sure that the clamps, brackets, saddles and hangers provided for pipe supports are adequate or as specified / approved by Consultants. Piping layout shall take due care for expansion and contraction in pipes and include expansion joints where required.

All pipes shall be accurately cut to the required sizes in accordance with relevant BIS codes and burrs removed before laying. Open ends of the piping shall be closed as the pipe is installed to avoid entrance of foreign matter. Where reducers are to be made in horizontal runs, eccentric reduces shall be used for the piping to drain freely. In other locations, concentric reduces may be used.

All buried pipes for CWS shall be cleaned and coated with two coats of bitumen and then wrapped with two layers of 400 microne polythene sheet coating.

Automatic air valves shall be provided at all high points in the piping system for venting. All valves shall be of 15mm pipe size and shall be associated with an equal size isolation ball valve. Automatic air valves shall also be provided on hot water risers.

Discharge from the air valves shall be piped through a galvanized steel pipe to the nearest drain or sump. All pipes shall be pitched towards drain points.

Pressure gauges shall be provided as shown on the approved drawings and include in Bill of Quantities. Care shall be taken to protect pressure gauges during pressure testing.

Temperature gauge as specified shall be provided at the hot water supply and return and as shown on drawings and included in Bill of Quantities.

4. TESTING

The Contractor shall notify the Consultant three days in advance of any test so that the Consultant can witness the tests if he so wishes.

All water supply system shall be tested to hydrostatic pressure test of atleast one and a half (1.5) times the maximum pressure but not less than 10Kg/Sq.cm for a period of not less than 4 hours. All leaks and defects in joints revealed during the testing shall be rectified and got approved at site by retest. Piping required subsequent to the above pressure test shall be retested in the same manner.

System may be tested in sections and such sections shall be entirely retested on completion.

The Contractor shall make sure that proper noiseless circulation of fluid is achieved through the entire piping network of the system concerned. In case of improper circulation, the contractor shall rectify the defective connections. He shall bear all expenses for carrying out the above rectifications including the tearing up and refinishing of floors and walls as required.

In addition to the sectional testing carried out during the construction, contractor shall test the entire installation after connections to the overhead tanks or pumping system or mains. He shall rectify all leakages and shall replace all defective materials in the system. Any damage done due to carelessness, open or burst pipes or failure of fittings, to the building, furniture and fixtures shall be made good by the contractor during the defects liability period without any cost.

After commissioning of the water supply system, contractor shall test each valve by closing and opening it a number of times to observe if it is working efficiently. Valves which do not effectively operate shall be replaced by new ones at no extra cost and the same shall be tested as above.

A test register shall be maintained and all entries shall be signed and dated by Contractor(s) and Bank's site representative.

5. DISINFECTION OF PIPING SYSTEM AND STORAGE TANKS

Before commissioning the water supply system, the contractor shall arrange to disinfect the entire system as described in the succeeding paragraph.

The water pipes shall first be filled with water and thoroughly flushed out. The storage tanks shall then be filled with water again and disinfecting chemical containing chlorine added gradually while tanks are being filled to ensure thorough mixing. Sufficient chemical shall be used to give water a dose of 50 parts of chlorine to one million parts of water.

If ordinary bleaching powder is used, the proportions will be 150 gm of power to 1000 liters of water. The power shall be mixed with water in the storage tank. If a proprietary brand of chemical is used, the proportions shall be specified by the manufacturer. When the storage tanks is full, the supply shall be stopped and all the taps on the distributing pipes are opened successively working progressively away from the storage tank. Each tap shall be closed when the water discharged begins to smell of chlorine. The storage tank shall then be filled up with water from supply pipe and added with more disinfecting chemical in the recommended proportions. The storage tank and pipe shall then remain charged at least for three hours. Finally the tank and pipes shall be thoroughly flushed out before any water is used for domestic purpose.

The pipework shall be thoroughly flushed before supply is restored.

6. STERILIZATION OF MAIN

After the pipework has been tested and approved, but before it is coupled, it shall be sterilized with a solution of chloride of lime.

7. CUTTING CHASES IN MASONARY WALLS

Cold water distribution pipes to fixtures and equipment exposed to view in the bathrooms, kitchens, and sanitary compartments shall be chased into walls or floors or placed in wall cavities. The Contractor shall be responsible for cutting all notches, chases, and recesses in walls and floors and only a diamond cutter shall be

used. The maximum size of conduit or pipe permitted to be concealed in floor slabs shall be 32 mm diameter unless otherwise approved by the Consultant.

The chases upto 7.5 x 7.5 cm shall be made in the walls for housing GI pipes etc. These shall be provided in correct positions as shown in the drawings or directed by the Consultants. Chases shall be made by chiseling out the masonry to proper line and depth. After the pipes etc are fixed in chases, the chases shall be filled with cement mortar 1:2:4 or as may be specified, and made flush with the masonry surface. The concrete surface shall be roughened with wire brush to provide a key for plastering.

Where pipes pass through beams or structural walls, subject to the approval of the Structural Consulting Engineer, the Contractor shall ensure that sizes and locations of openings required are formed in when the relevant beams or walls are cast.

8. VALVES

All valves (ball, gate, globe, check, safety) shall be of gun metal suitable for the particular service as specified. All valves shall be of the particular duty and design as specified. Valves shall either be of screwed type or flanged type, as specified, with suitable flanges and non-corrosive bolts and gaskets. Tail pieces as required shall be supplied along with valves. Gate, globe and check valves shall conform to Indian Standard IS:776 and non-return valves and swing check type reflux to IS:5312.

Sluice valves, where specified shall be flanged sluice valves of cast iron body. The spindle, valve seat and wedge nuts shall be gunmetal. They shall generally have non-rising spindle and shall be of the particular duty and design as specified. The valves shall be supplied with suitable flanges, non-corrosive bolts and asbestos fibre gaskets. Sluice valves shall conform to Indian standard IS:780 and IS:2906.

Ball valves with floats to be fixed in storage tanks shall consist of cast brass lever arm having copper balls (26 SWG) screwed to the arm integrally. The copper ball shall have bronze welded seams. The closing/opening mechanism incorporating the piston and cylinder shall be non-corrosive metal and include washers. The size and construction of ball valves and float shall be suitable for desired working pressure operating the supply system. Where called for brass valves shall be supplied with brass hexagonal back nuts to secure them to the tanks and a socket to connect to supply pipe.

Globe valves on Hot-water line shall be union bonnet with stem/disc and body seat ring of SS. Suitable for temperature upto 80° C.

S.No	Type of Valve	Size	Construction	Ends
a.	Isolating Valve	15 mm to 50 mm 65 mm and above	Gun Metal Gun Metal	Screwed Flanged
b.	Ball Valve	15 mm to 50 mm	Gun Metal	Screwed
c.	Sluice Valve & Butterfly Valve	65 mm and above	Cast Iron	Flanged
d.	G.M. non return valve	15 mm to 50 mm 65 mm above	Gun Metal Gun Metal	Screwed Flanged
e.	Flap Type – Non return valve	65 mm and above	Cast Iron	Flanged

All valves shall be suitable for the working pressure involved.

9. WATER FITTINGS

Unless otherwise specified all Gunmetal fittings such as gate, globe, check & safety valves shall be fitted in pipe line in workman like manner. Necessary unions shall be provided on both ends of the valves for easy replacement. The joints between fittings and pipes shall be leak-proof when tested to desired pressure rating. The defective fittings and joints shall be replaced or redone.

10. CONNECTIONS TO VARIOUS MECHANICAL EQUIPMENT SUPPLIED BY OTHER AGENCIES

All inlets, outlets, valves, piping and other incidental work connected with installation of mechanical equipment supplied by other agencies all be carried out by the contractor in accordance with the drawings, requirements for proper performance of equipment, manufacturers instructions and the directions of the Bank's site representative / Consultant. The equipments to be supplied by the other agencies consist mainly for Kitchen, Back-of-the- Block area and other similar areas. The work of connections to the various equipments shall be effected through proper unions and isolating valves. The work of effecting connections shall be executed in consultation with and according to the requirement of equipment suppliers, under the directions of the Bank's site representative / Consultant. The various aspects of connection work shall be executed in a similar way to the work of respective trade mentioned elsewhere in these specifications.

11. MEASUREMENTS

The length above ground shall be measured in running meter correct to a cm for the finished work, which shall include pipe and fittings such as coupling, bends, tees, elbows, reducers, crosses, plugs, sockets, nipples and nuts, unions. Deductions for length of valves shall be made. Rate quoted shall be inclusive of all fittings, clamps, cutting holes chased and making good the same and all items mentioned in the specifications and Bill of Quantities.

All pipes below ground shall be measured per linear meters (to the nearest cm) and shall be inclusive of all fittings e.g. coupling, tees, bends, elbows, unions, deduction for valves shall be made rate quoted shall be inclusive of all fittings, excavation, back filling and disposal of surplus earth, cutting holes and chase and making good all item mentioned in Bill of Quantities.

13. PIPE PROTECTION (FOR COLD WATER PIPES BURIED IN TRENCHES / GROUND / EARTH)

All buried pipes shall be cleaned with zinc chromate primer and bitumen paint, wrapped with three layers of fibre glass tissue, each layer laid in bitumen and placed on concrete blocks with PUF saddles dipped in bitumen at every 2 meters. The pipes where laid under floor shall be encased with 100 mm thick jamuna sand all around in addition to protective coating as described above.

14. MASONRY CHAMBER

i. All masonry chambers for stop cocks, sluice valves and meter etc. shall be built as per supplied drawings.

ii. The excavation for chambers shall be done true to dimension and level indicated on plans or as directed by the Bank's site representative.

iii. Concrete shall be of cement concrete 1:3:6 (1 cement: 3 coarse sand: 6 graded stone aggregate 40 mm nominal size.

iv. Brick shall be of class designation 75 in cement mortar 1:4 (1 cement: 4 fine sand)

v. Inside Plastering not less than 12 mm thick shall be done in cement mortar 1:3 (1 cement : 3 fine sand) finished with a floating coat of neat cement.

15. SHIFTING OF EXCAVATED SURPLUS MATERIAL

Contractor shall make his own arrangement to shift the surplus excavated material within the site limits as directed by Bank's site representative at free of cost within time limit.

INTERNAL DRAINAGE (SOIL, WASTE, VENT & RAIN WATER PIPES)

1. SCOPE

The scope of this section comprises the supply, installation, testing and commissioning of internal drainage services.

Work under this section shall consist of furnishing all labour, materials, equipments and appliances necessary and required to completely install all soil, waste, vent and rainwater pipes and fittings as required by the drawings, and given in the schedule of quantities.

2. BASIC PIPING SYSTEM

Every waste pipe shall discharge above the grating of properly trapped gully. The contractor will ensure that this requirement is adequately met with. Wherever floor traps are provided, it shall be ensured that atleast one wash is connected to such floor traps to avoid drying of water seal in the trap. Ventilating pipes shall be of cast iron or galvanised mild steel pipes, conforming to the requirements laid down earlier. Anti-syphon vent pipes/relief vent pipes where called for on the drawings shall be of cast iron or galvanised mild steel pipes as specified. The pipes shall be of the diameter shown on the drawings.

All traps on branch soil and waste pipes shall also be ventilated at a point not less than 75mm or more than 300mm from their highest part and on the side nearest to the soil pipe or waste pipes.

Access doors for fittings and clean outs shall be so located that they are easily accessible for repair and maintenance. Any access panel required in the civil structure, false ceiling or marble cladding etc. shall be clearly reported to the Bank in the form of shop drawings so that other agencies are instructed to provide the same.

All the fittings used for connections between soil, waste and ventilation pipes and branch pipes shall be made by using pipe fittings with inspection doors for cleaning. The doors shall be provided with 3mm thick rubber insertion packing and when closed and bolted shall be air and water tight.

Head (starting point) of drains and sewage / waste water sumps (as and where applicable) having a length of greater than 4 m upto it connection to the main drain or manhole shall be provided with a 80 / 100 mm vent pipe.

3. PIPING MATERIALS

3.1 Cast Iron Pipes

Cast iron pipes and fittings shall be of good and tough quality and dark grey on fracture. The pipes and fittings shall be true to shape, smooth and cylindrical, their inner and outer surface being as nearly as practicable concentric. They shall be sound and nicely cast, shall be free from cracks, taps, pinholes and other manufacturing defects.

The pipes and fittings shall conform to IS:3989 / IS:1729 as called for. Fittings shall be of required degree with or without access door. All access doors shall be made up with 3mm thick insertion rubber gasket of white lead and tightly bolted to make the fittings air and water tight. The fittings shall be of the same manufacture as the pipes used for soil and waste.

All CI pipes and fittings shall bear the manufacturer's name and ISI specification to which it conforms.

All pipes and fittings shall be coated internally and externally with the same material at the factory, the fittings being preheated prior to total immersion in a bath containing a uniformly heated composition having a tar/other suitable base. The coating material shall have good adherence and shall not scale off. The coating shall be smooth and tenacious and hard enough not to flow when exposed to a temperature of 77 degree C but not so brittle at a temperature of '0' degree C as to chip off when scratched lightly with a pen knife.

All pipes and fittings before installation at site shall be tested hydrostatically to a pressure of 0.45 Kg/sq. cm without showing any sign of leakage, sweating or other defects of any kind. The pressure shall be applied internally and shall be maintained for not less than 15 minutes. All these tests shall be carried out in the presence of the representative of the Project Manager. Alternatively a test certificate from manufacturers be obtained before dispatch of material to site.

Cast Iron Specialities

If required, Cast iron specialty items such as deep seal floor traps, urinal traps, trap integral pieces with integral inlet/outlet connections, manhole cover with frame, chamber cover etc. shall be fabricated to suit individual location requirements. The contractor shall arrange the fabrication of these items from an approved source.

Drip Seal Joints :

Drip seal PJS-43 (pipe joint sealant) shall be used for joining various diameters of C.I. pipes and specials. This sealant replaces the standard Drip seal caulked joints. The application is by Homogenously mixing the two pack system in cold condition. Drip seal PJS - 43 is the proprietary item of M/s. Vinod Cement Co., Chandigarh.

Application Procedure:

Clean the pipe joints thoroughly to ensure it is free from any traces of oil, dirt or any other foreign body. Mix two parts of Drip Seal thoroughly with an iron flat to get a homogenous compound. * Place Spun yarn in the pipe joint as a filler and then take the required quantity of the compound and push it in the joint with a caulking tool, MS flat / damp finger uniformly all over to obtain a smooth and uniform joint. Dip the fingers in water every often to ensure the compound does not stick to the hands of the workmen, but this will ensure perfect sealing and the smooth surface for the joint cement. (* The compound prepared from the two mixtures is to be used within 30 minutes) Precaution to be taken to wash hands thoroughly with soap before and after use. Preferably use disposable gloves for hand application.

3.2 **Galvanised Iron Pipes**

Waste pipes of 50mm dia and below and where called for shall be galvanised iron pipes screwed and socketed conforming to the requirements of IS:1239 of heavy grade. The pipes and sockets shall be cleanly finished, well galvanised in and out and free from cracks, surface flaws, laminations and other defects. All screw thread shall be clean and well cut. All pipes and fittings shall bear manufacturer's trade mark and conform to the IS as specified.

3.3 **UPVC Pipes and Fittings**

The pipes shall be round and shall be supplied in straight lengths with socketed ends. The internal and external surfaces of pipes shall be smooth, clean, free from groovings and other defects. The ends shall be cleanly cut and square with the axis of the pipe. The pipes shall be designed by external diameter and shall conform to IS:4985-1981. The pipes shall be of Class-II; 6 Kg/sqm pressure rating.

Fittings

Fittings shall be of the same make as that of pipes, injection moulded and shall conform to Indian Standard.

Laying and Jointing

The pipes shall be laid and clamped to wooden plugs fixed above the surface of the wall. Alternatively plastic clamps of suitable designs shall be preferred. Provision shall be made for the effect of thermal movement by not gripping or disturbing the pipe at supports between the anchors for suspended pipes. The supports shall allow the repeated movements to take place without abrasion.

Jointing for UPVC pipes shall be made by means of solvent cement for horizontal lines and ‘O’ rubber ring for vertical line. The type of joint shall be used as per site conditions / direction of the Bank’s site representative. Where UPVC pipes are to be used for rain water pipes, the pipe shall be finished with GI adopter for insertion in the RCC slab for a water proof joint complete as directed by Bank’s site representative.

Supports

UPVC pipes require supports at close intervals. Recommended support spacing for unplasticized PVC pipes is 1400 mm for pipes 50 mm dia and above. Pipes shall be aligned properly before fixing them on the wooden plugs with clamps. Even if the wooden plugs are fixed using a plumb line, pipe shall also be checked for its alignment before clamping, piping shall be properly supported on, or suspended from clamps, hangers as specified and as required. The Contractor shall adequately design all the brackets, saddles, anchors, clamps and hangers and be responsible for their structural sufficiency. Pipe supports shall be primer coated with rust preventive paint.

Repairs

While temporary or emergency repairs may be made to the damaged pipes, permanent repairs shall be made by replacement of the damaged section. If any split or chip out occur in the wall of the pipe, a short piece of pipe of sufficient length to cover the damaged portion of the pipe is cut. The sleeve is cut longitudinally and heated sufficiently to soften it so that it may be slipped over the damaged hard pipe.

All cast iron pipes and fittings shall be jointed with drip seal / Best Quality pig lead free from impurities confirming to IS 27.

Before jointing, 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 centered by two or three laps of threaded spun yarn, twisted into ropes of uniform thickness, well caulked into the back of the socket. No piece of yarn shall be shorter than the circumference of the pipe. The jointed pipe line shall be at required levels and alignment. The reminder of the socket is left for the dripseal caulking. Where the gasket has been tightly held, a jointing ring shall be placed round the barrel against the face of the socket..

The depth of the lead joints for the cast iron pipes shall be 45mm for the pipes upto 100mm dia and 50mm for the pipes beyond 100mm dia respectively.

The joint shall not be covered till the pipe line has been tested under pressure. Rest of pipe line shall be covered so as to prevent the expansion and contraction due to variation in temperature.

Rainwater Pipes

All open terraces shall be drained by rain water down takes.

Rainwater down takes are separate and independent of the soil and waste system and will discharge into the underground storm water drainage system of the complex.

Rainwater in open courtyards shall be collected in catch basins and connected to the Storm Water Drains.

Any dry weather flow from waste appliances, e.g. AHU's pump rooms, waste water sumps shall connected to sewers after traps and not in the storm water drainage systems.

Balcony / Planter drainage

Wherever required, all balconies, terraces, planters and other frontal landscape areas will be drained by vertical down takes or other type of drainage system shown on the drawings and directed by the Project Manager.

4. TRAPS

4.1 Floor Traps

Floor traps where specified shall be siphon type full before P or S type cast iron having a minimum 50 mm deep seal. The trap and waste pipes when buried below ground shall be set and encased in cement concrete blocks firmly supported on firm ground or when installed on a sunken RCC structural slab. The blocks shall be in 1:2:4 mix (1 cement : 2 coarse sand : 4 stone aggregate 20 mm nominal size).

Contractor shall provide all necessary shuttering and centering for the blocks. Size of the block shall be 30 x 30 cms of the required depth.

4.2 Floor Trap Inlet /Hopper

Bath room traps and connection shall ensure free and silent flow of discharging water. Where specified, contractor shall provide a special type of floor inlet fitting fabricated from GI pipe, with one, two or three inlet sockets welded on side to connect the waste pipe. All joint between waste hopper and CI inlet socket shall be drip seal/Lead Caulked. Inlet shall be connected to a CI "P" trap. Floor trap inlet and the traps shall be set in cement concrete blocks where burried in floors without extra charge. Floor trap for the shower cubicle shall suit site and as per the approval of Bank's site representative. All fabricated hopper shall be hot dip galvanized.

4.3 Floor Trap Grating

Floor and urinal traps shall be provided with 100 – 150 mm square or round stainless steel gratings, with frame and rim of approved design and shape or as specified in the schedule of quantities approved by the Bank's site representative.

5. PIPE SLEEVES

Pipe sleeves, next larger diameter than pipes shall be provided wherever pipes pass through walls & slabs and annular space filled with fiberglass & finished with retainer rings. All pipes shall be accurately cut to the required sizes in accordance with relevant BIS codes and burrs removed before laying. Open ends of the pipe shall be closed as the pipe is installed to avoid entrance of foreign matter.

6. PIPE PROTECTION

Cast iron soil and waste pipes under floor in sunken slabs and in wall chases (when cut specially for the pipe) shall be encased in cement concrete 1:2:4 mix (1 cement : 2 coarse sand : 4 stone aggregate of 12 mm size) 10 cm bed and around. When pipes are running well above the structural slabs, the encased pipes shall be supported with suitable cement concrete pillars of required height and size at intervals directed by the Project Manager.

7. CUTTING AND MAKING GOOD

Pipes shall be fixed and tested as building proceeds. The contractor shall provide all necessary holes, cutouts and chases in structural members as building work proceeds. Wherever holes are cut or left originally they shall be made good with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 stone aggregate 20 mm nominal size) or cement mortar 1:2 (1 cement : 2 coarse sand). Cured and the surface restored to original condition.

8. PAINTING

Soil, waste, vent and rain water pipes in exposed location, in shafts and pipe space shall be painted with two or more coats of ready mix oil paint to give an even shade. Before painting all dust and extraneous matter shall be removed.

Paint shall be of approved quality and shade. Where directed by the Bank's site representative pipes shall be painted in accordance with approved pipe colour code.

Pipe in chase shall be painted with two coats of bitumen paint, covered with polythene tape and a final coat of bitumen paint. Exposed pipes shall be painted with synthetic enamel paint after removing dust and extraneous matter.

C.I. Soil and waste pipes below ground and covered in cement concrete shall not be painted.

9. TESTING

Testing shall be done in accordance with IS:1172 and IS:5329 except as may be modified herein under.

Entire drainage system shall be tested for water tightness and smoke tightness during and after completion of the installation. No portion of the system shall remain untested. Contractor must have adequate number of expandable rubber bellow plugs, manometers, smoke testing machines, pipe and fitting work tests,

All materials obtained and used on site must have manufacturer's hydraulic test certificate for each batch of materials used on the site.

Before use at site all CI pipes shall be tested by filling up with water for at least 30 minutes. After filling, pipes shall be struck with a hammer and inspected for blow holes and cracks. All defective pipes shall be rejected and removed from the site within 48 hours. Pipes with minor sweating may be accepted at the discretion of the Project Manager.

Soil and waste pipes shall be tested in sections after installation, by filling up the stack with water. All openings and connections shall be suitably plugged as approved by the Project Manager. The total head in the stack shall be 4.5 m at the highest point of the section under test. The period of test shall be minimum for 30 minutes or as directed by the Project Manager. If any leakage is visible, the defective part of the work shall be cut out and made good.

On completion of the work the entire installation shall be tested by smoke testing machine. The test shall be conducted after the plumbing fixtures are installed and all traps have water seal or by plugging the outlets with bellow plugs. Apply dense smoke keeping the top of stack open and observe for leakages. Rectify or replace defective sections.

After the installation is fully complete, it should be tested by flushing the toilets, running atleast 20% of all taps simultaneously and ensuring that the entire system is self draining, has no leakages, blockages etc. rectify and replace where required.

A test register shall be maintained and all entries shall be signed and dated by the Contractor and the Project Manager or his representative.

All pipes in wall chase or meant to be encased or burried shall be hydro tested before the chase in plastered or the pipe encased or burried.

10. GREASE TRAP

10.1 **Size of Grease Trap**

The size given in Bill of Quantities and drawings shall be internal size of chamber. The work shall be done strictly as per standard drawing and following specifications.

10.2 **Bed Concrete**

Shall be in 1:4:8 cement concrete 150 mm thick.

10.3 **Brick work**

Brick work shall be with best quality bricks in 1: 4 CEMENT MORTAR.

Baffle walls shall be of R.C.C and of size as mentioned in Bill of Quantities. Brick partition constructed of best quality table moulded bricks in cement mortar 1:4 shall be provided for the entire height of chamber.

10.4 **Plaster**

The walls of chamber shall be plastered from inside with 12 mm thick cement plaster 1:3 and finished smooth with a floating coat of neat cement & rough plaster on outside in cement mortar 1:3.

10.5 **Chamber Covers**

Covers shall be of size and duty as mentioned in Bill of Quantities. Covers shall be of cast iron as per the details given in the drawing and shall be fixed on frame embedded in concrete.

C. I steps shall be provided at two corners of the chamber.

All Cast Iron and MS items shall be painted with two coats of bitumastic paint.

10.6 **Cast iron Manhole covers and Frame**

The Cast Iron Manhole Cover and Frame shall conform to IS: 1726 and the grade and types have been specified in the Bill of Quantities. The cover and frames shall be cleanly cast and they shall be free from air and sand holes and from cold shuts. They shall be neatly dressed and carefully trimmed. All castings shall be free from voids whether due to shrinkage, gas inclusion or other causes. Covers shall have a raised checkered design on the top surface to provide an adequate non-slip grip.

The sizes of covers specified shall be taken as the clear internal dimensions of the frame.

The covers and frames shall be coated with a black bituminous composition. The coating shall be smooth and tenacious. It shall not flow when exposed to a temperature of 63° C and shall not brittle as to chip off at a temperature of 0° C.

EXTERNAL DRAINAGE (SEWAGE & STORM WATER DISPOSAL)

1. SCOPE

The scope of this section comprises the supply, installation, testing and commissioning of external drainage & sewage disposal services.

1.1 **General Scheme**

The contractor shall install a drainage system to effectively collect; drain and dispose all soil and waste water from various parts of the buildings, appurtenances and equipment. The piping system shall finally terminate and discharge into the Municipal Manhole The piping work mainly consists of laying of Salt glazed stoneware pipes, reinforced cement concrete pipes and cast iron soil pipes as called for on the drawings. All piping shall be installed at depth greater than 80 cm below finished ground level. The disposal system shall include construction of gully traps, manholes, intercepting chambers as indicated. The piping system shall be vented suitably at the starting point of all branch drains, main drains, the highest/lowest point of drain and at intervals as shown. All ventilating arrangements shall be unobstructive and concealed. The work shall be executed strictly in accordance with IS: 1742. The sewage system shall be subject to smoke test for its soundness as directed by the Project Manager. Wherever the sewerage pipes run above water supply lines, same shall be completely encased in cement concrete 1:2:4 all round with the prior approval of the Project Manager.

Without restricting to the generality of the foregoing, the drainage system shall inter-alia include:

a. Sewer lines including earth work for excavation, disposal, back filling and compaction, pipe lines, manholes, drop connections and connections to the municipal or existing sewer.

b. Storm water drainage, earth works for excavation, disposal, backfilling and compaction, pipe lines, manholes, catch basins and connections to the existing municipal storm water drain or connected as indicated by the Project Manager.

General Requirements

All materials shall be new and of quality conforming to specifications and subject to the approval of the Bank's site representative. Wherever particular makes are mentioned, the choice of selection shall remain with the Consultant / Consultant / Bank's site representative.

Drainage lines and open drains shall be laid to the required gradients and profies.

All drainage work shall be done in accordance with the local municipal bye-laws.

Contractor shall obtain necessary approval and permission for the drainage system from the municipal or any other competent authority.

Location of all manholes, etc shall be got confirmed by the Project Manager before the actual execution of work at site. As far as possible, no drains or sewers shall be laid in the middle of road unless otherwise specifically shown on the drawings or directed by the Project Manager in writing.

All materials shall be rustproofed; materials in direct or indirect contact shall be compatible to prevent electrolytic or chemical (bimetallic) corrosion.

2. TRENCHING FOR PIPES AND DRAINS

2.1 **General**

All the material shall be new of best quality conforming to specifications and subject to the approval of the Consultants / Consultant / Project In Charge. Drainage lines shall be laid to the required gradients and profiles. All drainage work shall be done in accordance with the local municipal by-laws.

Location of all manholes, catch basins etc. shall be finalized and shown in approved shop drawings before the actual execution of work at site. All work shall be executed as directed by the Project Manager.

2.2 **Alignment & Grade**

The sewer and storm water drainage pipes shall be carefully laid to levels and gradients shown in the plans and sections but subject to modifications as shall be ordered by the Consultants from time to time to meet the

requirements of the works. Great care shall be taken to prevent sand etc. from entering the pipes. The pipes between two manholes shall be laid truly in straight lines without vertical or horizontal undulations. The body of the pipes shall rest on an even bed in the trench for its length and places shall be excavated to receive collar for the purpose of jointing. No deviations from the lines, depths of cuttings or gradients as called for on the drawings shall be permitted without the written approval of the Consultant. All pipes shall be laid at least 60cms below the finished ground level or as called for on the drawings.

2.3 **Setting out Trenches**

The contractor shall set out all trenches, manholes, chambers and such other works to true grades and alignments as called for. He shall provide the necessary instruments for setting out and verification for the same. All trenches shall be laid to true grade and in straight lines and as shown on the drawings. The trenches shall be laid to proper levels by the assistance of boning rods and sight rails which shall be fixed at intervals not exceeding 10 meters or as directed by the Project Manager.

2.4 **Trench Excavation**

The trenches for the pipes shall be excavated with bottoms formed to level and gradients as shown on the drawings or as directed by the Project Manager. In soft and filled in ground, the Project Manager may require the trenches to be excavated to a greater depth than the shown on the drawings and to fill up such additional excavation with concrete (1:4:8) consolidated to bring the excavation to the required levels as shown on the drawings.

All excavations shall be properly protected where necessary by suitable timbering, piling and sheeting as approved by the Project Manager. All timbering and sheeting when withdrawn shall be done gradually to avoid falls. All cavities are adequately filled and consolidated. No blasting shall be allowed without prior approval in writing from the Consultant. It shall be carried out under thorough and competent supervision, with the written permission of the appropriate authorities taking full precautions connected with the blasting operations. All excavated earth shall be kept clear of the trenches to a distance equal to 75 cms.

2.5 **Timbering of Sewer and Trenches**

The Contractor shall at all times support efficiently and effectively the sides of all the trenches and other excavations by suitable timbering, piling and sheeting and they shall be close timbered in loose or sandy starta and below the surface of the sub soil water level.

All timberijg, sheeting and piling with their wallings and supports shall be of adequate dimensions and strength and fully braced and strutted so that no risk of collapse or subsidence of the walls of the trench shall take place.

The Contractor shall be held responsible and shall be accountable for the sufficiency of all timbering, bracings, sheeting and piling used and also for, all damage to persons and property resulting from improper quality strength placing, maintaining or removing of the same.

2.6 **Shoring of Buildings**

The Contractor shall shore up all buildings, walls and other structures, the stability of which is liable to be endangered by the execution of the work and shall be fully responsible for all damages to persons or property resulting from any accident.

2.7 **Obstruction Road**

The contractor shall not occupy or obstruct by his operation more than one half of the width of any road or street and sufficient space shall then be left for public and private transit. He shall remove the materials excavated and bring them back again when the trench is required to be refilled. The contractor shall obtain the consent of the Project Manager in writing before closing any road to vehicular traffic and the foot walks must be clear at all times.

2.8 **Protection of Pipes etc.**

All pipes, water mains, cables etc. met in the course of excavation shall be carefully protected and supported. Care shall be taken not to disturb the cables, the removal of which shall be arranged by the contractor with the written consent from the Project Manager.

2.9 **Trench Back Filling**

Refilling of the trenches shall not be commenced until the length of pipes therein has been tested and approved. All timbering which may be withdrawn safely shall be removed as filling proceeds. Where the pipes are unprotected by concrete haunching, selected fine material shall be carefully hand-packed around the lower half of the pipes so as to buttress them to the sides of the trench.

The refilling shall then be continued to 150mm over the top of the pipe using selected fine hand packed material, watered and rammed on both sides of the pipes with a wooden hammer. The process of filling and tamping shall proceed evenly in layers not exceeding 150mm thickness, each layer being watered and consolidated so as to maintain an equal pressure on both sides of the pipe line. In gardens and fields the top solid and turf if any, shall be carefully replaced.

2.10 **Contractor to restore settlement and Damages**

The contractor shall at his own costs and expenses, make good promptly during the whole period for the works in hand if any settlement occurs in the surfaces of roads, beams, footpaths, gardens, open spaces etc. in the public or private areas caused by his trenches or by his other excavations and he shall be liable for any accident caused thereby. He shall also, at his own expense and charges, repair (and make good) any damage done to building and other property. If in the opinion of the Project Manager he fails to make good such works with all practicable despatch, the Project Manager shall be at his liberty to get the work done by other means and the expenses thereof shall be paid by the contractor or deducted from any money that may be or become due to him or recovered from him by any other manner according to the laws of land.

The contractor shall at his own costs and charges provide places for disposal of all surplus materials not required to be used on the works. As each trench is refilled, surplus soil shall be immediately removed, the surface shall be properly restored and roadways and sides shall be left clear.

2.11 **Removal of Water from Sewer, Trench etc.**

The contractor shall at all times during the progress of work keep the excavations free from water which shall be disposed by him in a manner as will neither cause injury to the public health nor to the public or private property nor to the work completed or in progress nor to the surface of any road or streets, nor cause any interference with the use of the same by the public.

If any excavation is carried out at any point or points to a greater width of the specified cross section of the sewer with its cover, the full width of the trench shall be filled with concrete by the contractor at his own expense and charges to the requirements of the Project Manager.

2.12 **Removal of Filth**

All night soil, filth or any other offensive mater met with during the execution of the works, shall not be deposited on the surface of any street or where it is likely to be a nuisance or passed into any sewer or drain but shall be immediately, after it is taken out of any trench, sewer or cess pool, put into the carts and removed to a suitable place to be provided by the Contractor.

2.13 **Width of Trench**

The Project Manager shall have power by giving an order in writing to the Contractor to increase the maximum width/depth for excavation and backfilling in trenches for various classes of sewer, manholes and other works in certain length to be specifically laid down by him, where on account of bad ground on other unusual conditions, he considers that such increased width/depths are necessary in view of the site conditions.

Measurement:

a. Excavation

Measurement for excavation of pipes trenches shall be made per linear meter.

b. Trenches shall be measurement between outside walls of manholes at top and the depth shall be the average depth between the two ends to the nearest cm. The rate quoted shall be for a depth upto 1.5 metre or as given in the Bill of Quantities.

Payment for trenches more than 1.5 m in depth shall be made for extra depth as given in the Bill of Quantities and above the rate for depth upto 1.5 m.

c. RCC pipes shall be measured for length of the pipe line per linear metre.

i. Length between manholes shall be recorded from inside of one manhole or inside of other manhole.
ii. Length between gully trap and manhole shall be recorded between socket of pipe near gully trap and inside of manhole.

3. CONSTRUCTION OF MANHOLE

Where manholes are to be constructed, the excavation, filling back and ramming, disposal of surplus earth, preparation of bottom and sides etc. shall be carried out as described earlier under trench excavation. Manhole shall be sized and depths as called for in the drawings and Bill of Quantities.

The manhole shall be built on a base concrete 1:3:6 of 150mm thickness for manholes upto 1500mm depth and 250mm thickness for manholes from 1500 to 2500mm depth and 300mm thickness manholes of depth greater than 2500mm. Reinforcement as shown shall be provided in the base slabs.

The walls shall be of brick work of thickness as shown in drawings built in cement mortar 1:5. The joints of brick work shall be raked and plastered internally in cement mortar 1:3 (at least 12 mm thick) and finish with a coat of neat cement, external plaster shall be rough plaster in 1:3, PCC benching & semi circular channels of the same diameter as the pipes shall be provided and finished with neat cement coating.

Above the horizontal diameter, the sides of channel shall be extended vertically to the same level as the crown of the outgoing pipe and the top edge shall be suitably rounded off. The branch channels shall also be similarly constructed with respect to the benching but at their junction with the main channel an appropriate fall suitably rounded off in the direction of flow in the main channel shall be given. All manholes / sumps shall be provided with poly propylene coated steel reinforced foot rest. The polyproplene shall confirm to ASTM D-4101 specification, injection moulded around 12 mm dia IS-1786 grade FE-415 steel reinforcing bar. These rungs shall be set at 30cms interval in two vertical runs at 380mm apart horizontally. The top rung shall be 450mm below the manhole cover. Unless otherwise mentioned, manholes shall be constructed to the requirements of Indian Standard IS: 4111 (Part I). All manholes shall be constructed so as to be water tight under test. All angles shall be rounded to a 75mm radius with cement plaster 20mm thick. The benching at the side shall be carried out in such a manner so as to provide no lodgment for any splashing in case of accidental flooding. Manhole cover with frame shall be of cast iron of an approved make. The covers and frame shall generally be double seal as specified in the Bill of Quantities.

3.1 Measurements

Manhole shall be measured in numbers as indicated in the Bill of Quantity. The depth of manhole shall be measured from invert of channel to the top of manhole cover.
Manhole with depth greater than specified under the main item shall be paid for under `Extra Depth' and shall include all items as given for manholes depth will be measured to the nearest cm. Depth of the manholes shall be measured from top of the manhole cover to bottom of channel. The following are inclusive in the cost of manhole viz;

i. Bed concrete
ii. Brick work.
iii. Plastering (inside & outside)

iv. R C C top slab, benching and channeling including drop connections.
v. Supply and fix foot rests.
vi. Keeping holes and embedding pipes for all the connections.
vii. Excavation, refilling, necessary de-watering and disposing off surplus soil to places as directed by Project Manager.
viii. Curing.
ix Cost of angle frame and embedding the frame in concrete bed.
x Testing.
xi De-watering of chambers.

3.2. **Drop Connection**

Drop connection shall be provided between branch sewer and main sewer in the main sewer itself in steep ground when the difference in invert level of two exceeds 60 cms of the required sizes. Drop connections from gully traps to main sewer in rectangular shall be made inside the manholes and shall have CI special type door bend on to top and heel rest bend at bottom connected by a CI pipe. The pipe shall be supported by holder bat clamps at 180 cms intervals with atleast one clamp for each drop connection. All joints shall be dripseal joints 25mm deep.

Drop connections from branch sewer to main sewer shall be made outside the manhole wall with CI / CI class LA pipe, connection, vertical pipe and bend at the bottoms. The top of the tee shall be finished upto the surface level and provided with a CI hinges type frame and cover 30cms x 30cms. The connection and tee upto the surface chamber of the tee.

Drop connection made from vertical stacks directly into manholes shall not be considered as drop connections.

3.3 **Making Connections**

Contractor shall connect the new sewer line to the existing manhole by cutting the walls benching and restoring them to the original condition. A new channel shall be cut in the benching of the existing manhole for the new connection. Contractor shall remove all sewage and water if encountered in making the connection without additional cost.

4. TESTING

All rights of the sewer and drain shall be carefully tested for water tightness by means of water pressure maintained for not less than 30 minutes. Testing shall be carried out from manhole to manhole. All pipes shall be subject to a test pressure of 1.5 meter head of water. The test pressure will however, not exceed 6 meters head at any point. The pipes shall be plugged preferably with standard design plugs or with rubber plugs on both sides, the upper end shall, however, be connected to a pipe for filling with water and getting the required head poured at one time.

Sewer lines shall be tested for straightness by:

i. Inserting a smooth ball 12 mm less than the internal diameter of the pipe. In the absence of obstructions such as yarn or mortar projecting at the joints the ball shall roll down the invert of the pipe and emerge at the lower end.

ii. Means of a mirror at one end a lamp at the other end. If the pipe is straight the full circle of light will be seen otherwise obstructions or deviations will be apparent.

iii. The contractor shall give a smoke test to the drain and sewer at his own expense, if directed by the Bank's site representative.

iv. A test register shall be maintained which shall be signed and dated by contractor and Bank's site representative.

4.1 Valves

The Contractor shall supply and install all isolating valves and control valves as indicated on the drawings and as required for the proper and efficient operation and maintenance of the entire systems.

All valves supplied shall be suitable for the working pressure and test pressure of the system as specified elsewhere in this specification.

Regulating valves shall be of similar materials as that specified for cast iron gate valves.
All regulating valves shall be lock shield type.

All valves shall be full line size.

Each valve shall have a purpose made reference number plate for label engraved or stamped indicating the manufacturer's catalogue number, pressure and temperature ratings. Valves shall be arranged so that clockwise rotation of the spindle will close the valve.

Furnish all valves and accessory materials necessary in the piping whether or not shown on drawings as flows.

All valves shall be packed with an approved packing and threads shall be coated with oil and graphite. Packing should be replaced when found deteriorated on site.

Where possible locate all valves at convenient positions of operation from the floor with valve stems upright.

Valves that are flanged shall have flanges to the table specified for the pipe work.

Plastic or metal plates (rustless) shall be provided to indicate the open / close status as well as the use of each valve in the pump and tank rooms.

COMMISSIONING & GUARANTEE

1. SCOPE OF WORK

Work under this section shall be executed without any additional cost. The rates quoted in this tender shall be inclusive of the works given in this section.

Contractor shall provide all tools, equipment, metering and testing devices required for the purpose.

On award of work, Contractor shall submit a detailed proposal giving methods of testing and gauging the performance of the equipment to be supplied and installed under this contract.

All tests shall be made in the presence of the Consultant or his representative or any inspecting authority. At least five working days notice in writing shall be given to the inspecting parties before performing any test.

Water flow rates of all equipment and in pipe lines through valves shall be adjusted to design conditions. Complete results of adjustments shall be recorded and submitted.

Contractor shall ensure proper balancing of the hydraulic system and for the pipes / valves installed in his scope of work by regulating the flow rates in the pipe line by valve operation. The contractor shall also provide permanent Tee connection (with plug) in water supply lines for ease of installing pressure gauge, temperature gauge & rota meters. Contractor shall also supply all required pressure gauge, temperature gauge & rotameter for system commissioning and balancing. The balancing shall be to the satisfaction of Consultant / Project Manager.

Three copies of all test results shall be submitted to the Engineer in A4 size sheet paper within two weeks after completion of the tests.

2. PRECOMMISSIONNIG

On completion of the installation of all pumps, piping, valves, pipe connections, insulation etc. the Contractor shall proceed as follows:

a. Prior to start-up and hydraulic testing, the Contractor shall clean the entire installation including all fitments and pipe work and the like after installation and keep them in a new condition. All pumping systems shall be flushed and drained at least once through to get rid of contaminating materials. All pipes shall be rodded to ensure clearance of debris, cleaning and flushing shall be carried out in sections as the installation becomes completed.

- Remove oil, grease and foreign residue from the pipe work and fittings;
- Pre-condition the metal surfaces to resist reaction with water or air.
- Establish an initial protective film;
- Details and procedures of the pre-treatment shall be submitted to the Consultant for approval.

b. Check all clamps, supports and hangers provided for the pipes.

c. Fill up pipes with water and apply hydrostatic pressure to the system as given in the relevant section of the specification. If any leakage is found, rectify the same and retest the pipes.

3. STATUTORY AUTHORITIES' TESTS AND INSPECTIONS

As and when notified in writing or instructed by the Consultant/Consultant, the Contractor shall submit shop drawing and attend all tests and inspections carried out by Local Fire Authorities, Water Authority and other Statutory Authorities, and shall forthwith execute free of charge any rectification work ordered by the Consultant/Consultant as a result of such tests and inspections where these indicate non-compliance with Statutory Regulations. Some of these tests may take place after the issue of Practical Completion of the Main Contract and the Contractor shall make all allowances in this respect.

The Contractor shall be responsible for the submission of all necessary forms and shop drawings to the Statutory Authorities which shall conform in layout to the latest plans submitted to and kept by these Authorities.

The submission shall comply with the requirements set forth in the current Codes of Practice and circular letters of the Statutory Authorities. The shop drawings to be submitted shall be forwarded to the Consultant for checking before submission.

The Contractor shall allow for at least two submissions of complete sets of shop drawings to the Authorities, one to be made within six months after the award of the Contract but not less than six weeks before the inspection. The Consultant may at his discretion instruct the Contractor for additional submissions to the Local Authorities whenever necessary.

The Contractor shall notify the Consultant at least seven days in advance of his application for local Authority tests and inspections. On receipt of a confirmed date for test and inspection the Contractor shall inform the Consultant without delay.

4. FINAL ACCEPTANCE TESTS

Following commissioning and inspection of the entire installation, and prior to issue of the Completion Certificate, the Contractor shall carry out final acceptance tests in accordance with a programme to be agreed with the Consultant.

Should the results of the acceptance tests show that plant, systems and/or equipment fail to perform to the efficiencies or other performance figures as given in this Specification, the Contractor shall adjust, modify and if necessary replace the equipment without further payment in order that the required performance is obtained.

Where acceptance tests are required by the relevant Authorities having jurisdiction, these tests shall be carried out by the Contractor prior to the issue of Completion Certificate to the acceptance of the Authorities.

5. REJECTION OF INSTALLATION

Any item of system or component which fails to comply with the requirements of this Specification in any respect whatsoever at any stage of manufacture, test, erection or on completion at site may be rejected by the Consultant either in whole or in part as he considers necessary/appropriate. Adjustment and/or modification work as required by the Consultant so as to comply with the Authority's requirements and the intent of the Specification shall be carried out by the Contractor at his own expense and to the satisfaction of the Authority/Consultant.

After works have been accepted, the Contractor may be required to carry out assist in carrying out additional performance tests as reasonably required by the Consultant/Bank.

6. WARRANTY AND HANDOVER

The Contractor shall warrant that all plant, materials and equipment supplied and all workmanship performed by him to be free from defects of whatsoever nature before handover to the Bank.

7. HANDING OVER OF DOCUMENTS

All testing and commissioning shall be done by the Contractor to the entire satisfaction of the Bank’s site representative and all testing and commissioning documents shall be handed over to the Bank’s site representative.

The Contractor shall also hand over all maintenance and operation manuals, all certificates and all other documentation as per the terms of the contract to the Bank’s site representative.

8. PIPE COLOUR CODE:

S.No.	Pipe Lines	Ground / Base Colour	First Colour Band	Second Colour Band
1	Drinking Water (All cold water lines after filter)	Sea Green	French Blue	Single Red
2	Treated Water (Soft Water)	Sea Green	Light Orange	
3	Domestic Hot Water	Sea Green	Light Grey	
4	Drainage (Storm Water)	Black		
5	Drainage (Sewage Water)	Brown		
6	Fire System	Post Office Red		

9. CHECK LIST FOR COMMISSIONING

Water Supply System

Common

a) Operate each and every valve on the system to see if the valves are functioning properly.

b) Check all clamps, support and hangers provided for the pipes.

c) Check rotation of each motor and correct the same if required.

d) Check all annunciations by simulating the alarm conditions if any at site.

Water Supply and Drainage

a) Remove grease trap manhole covers. Check for cleanliness, check for partitions, and put back the cover.

b) Remove manhole covers on sewer lines, inspect for cleanliness. After they are found to be clean, pour water into the first manhole and see that all the lines are clear. Make sure that all the covers are put back after the inspection.

c) Check gully traps by opening of covers and check that water seal in the traps are maintained. Check for general cleanliness.

d) Check installation of proper vents and cowls at the roof level for all soil and waste pipes.

Fortnightly Progress Report					
Name of Work: Construction of SBI Branch Building at New Town, Kolkata: Civil and PHE works					
Date :					
Sl. No.	Activity as per BOQ	% Complete	On Schedule (Yes/No)	Scheduled Completion Date as in Bar Chart	Remarks

Signature of Contractor

FORMAT OF RUNNING A/C BILL

i)	Name of Contractor/Agency	:	
ii)	Name of Work	:	
iii)	Sr No. of this bill	:	
iv)	No. and date of previous bill	:	
v)	Reference to Agreement No.	:	
vi)	Date of written order to commence	:	
vii)	Date of completion as per agreement		

Sl. No.	Item Description	Unit	Rate (Rs.)	As per tender	
				Qty	Amount (Rs.)
1	2	3	4	5	

Upto Previous R/A Bill		Upto Date (Gross)		Present Bill		
Qty	Amount (Rs)	Qty	Amount (Rs.)	Qty	Amount (Rs.)	Remarks
6		7		8		9

Note : 1. If adhoc payment is made, it should be mentioned specifically.

Net value since previous bill

LIST OF APPROVED MAKES FOR CIVIL & ARCHITECTURAL WORKS

DESCRIPTION OF ITEM	APPROVED MAKES/ MANUFACTURERS
Ordinary Portland Cement Grade – 43 or PPC with fly ash content	Ultratech, ACC, Dalmia /Konark, JSW
Ready Mix Concrete	Ultratech, ACC, Dalmia / Konark, JSW
White Cement	JK, Birla, ACC
Water Proofing Chemicals	Pidilite, Sika, STP, Fosroc
Admixtures/ Pigments	Pidilite, Structural waterproofing Co., Fosroc, STP, Sika
Interlock Tiles/ Grass Paver Blocks/Kerb Stone	NITCO, Unistone, Hindustan, Modern, Nimco Prefab, KK
Thermo Mechanically Treated Bars	SAIL, TATA, RINL
Wall putty	Birla white putty, JK White, Kamdhenu, SARA Putty (Ferrous Crete)
Cement Primer	Asian Paints, Berger, ICI
Distemper/ Acrylic Paint/ Textured	ICI, Asian Paints, Berger
Enamel Paint	Asian Paints, Berger, ICI
SS Hardware Fittings	Hafele, Hettich, Dorma
Mortice Lock & Latch, Night Latch	D line Denmark, Godrej, Hafele
Hydraulic Door Closer/ Concealed Door closer	Hafele , Hettich, Dorma, Godrej, Dorset
High Performance Glass	Saint Gobain, Asahi, Hindustan Pilkington
Float Glass	Saint Gobain, Asahi, Hindustan Pilkington
Aluminum Structural Members/ Aluminum Extrusions	Hindalco, Jindal
Aluminum Louvers	Hunter Douglas, Alufinns, Metallica
SS Spider Fittings	Dorma , Hafele , Ozone
Frameless Glass Door Patch Fittings	Dorma ,Hafele , Ozone
Silicon Sealants	Dow Corning, Wacker, GE Silicon
Polysulphide Sealants	Pidilite, Fosroc, STP, Sika

DESCRIPTION OF ITEM	APPROVED MAKES/ MANUFACTURERS
Masking Tapes, Polymer	Sun control, Wonder, 3M
S S Screws for Fabrication	Kundan, Puja, Atul
Dash Fasteners, Anchor Bolts	Hilti, Fischer, Bosch, 3M
EPDM Gaskets	Anand, Roopor, RAM, Hennig
Locks	Godrej, Dorset, Ozone, Hettich
Pressed Steel Door Frames	Agew, Raymos, Steel craft, Modern, Shutter India, Jupitor, Shiva, Precision, Prema Doors, Loyal
Float Glass	Asahi, SaintGobain, Hindustan Pilkington
Polymer Sealants, Concrete Additives	Sika, CICO-TL, Fosroc, Dr. Fixit, STP, Pidilite, Choksey
Expanded Poly Sterene	Bread Cell, Lloyd, BASF
Adhesives	Dunlop, Fevicol, Pidilite, Vamicol, Asian Laboratories
Aluminium Fittings	Nulite, Argent, Parsuram, Sunfire, RKCP, Pamini
Crystalline water proofing admixtures	Kryton Buildmat , Vandex , Zydex
UPVC Doors and windows	WINSTA KOMMERLING/ FENESTA/ ENCRAFT/Rheau
Rolling Shutters	Conforming to I.S. 6248
Fire door	Shaktimet, Radiant
Fire door Hardware Fittings	`Yale', SIO, Briton, Hafele

LIST OF APPROVED MAKES FOR PHE WORKS

Vitreous China Sanitaryware	Parryware, Kohler, Duravit, Jaquar
Seat Cover (Heavy Duty)	Commander Parryware, Kohler, Duravit, Hindustan Sanitaryware Cera
WC Connectors	Ashirvad , Supreme, Mutliwik
Floor Drain Fixture, Rain Water Outlets & Channel Gratings	ACO GMGR Neer
C.P. Grating for Floor Trap	GMGR Chilly
Cast Iron Pipes & Fittings Manhole covers and frames	
a. As per IS:3989 (Pipes & Fittings)	NECO, Kapilansh, Hepco
b. As per IS:1729 (Manhole covers and frames)	NECO, Hepco, BIC Raj Iron Foundry Agra
c. As per IS:1536 (CI Class LA Pipes)	Electro Steel Calcutta IISCO Kesoram Calcutta NECO
d. D.I. Manhole Covers & Frames	Kartar valves & fittings NECO
e. CILA fittings	Kartar valves & fittings Neco
f. Suspended Manhole and Gully Trap	Patel Pattern
Drip Seal	Vinod Cement Co. Chandigarh (PJS-43)
GI / M.S Pipes (IS : 1239 and IS : 3589)	Tata, Jindal
GI pipes fittings	Unik, HB, Zoloto M
GI pipe sealant	Henkel - LOCTITE 55
Pipe clamp & supports	Chilly, Euroclamp
UPVC Pipe	Supreme Ashirvad Astral Oriplast
CPVC pipes	Oriplast Supreme Ashirwad Astral
RCC Pipe	K K , Ghosh & Co.,

	Pranali & Approved
Stoneware Pipes, Gully Traps	Perfect Potteries, JABALPUR Rajura Local & Approved
GM / Forged Brass Valves	Tiemme Danfoss Jayhiwa Zoloto Hydint Valves Automation
Sluice Valves	Indian Valve Company Kirloskar
Butterfly Valve	Audco Danfoss Jayhiwa Hydint Valves Automation
Check Valve – Wafer Type	Advance Danfoss Kirloskar Hydint Valves Automation
Check Valve – Dual Plate	Advance Danfoss Kirloskar Hydint Valves Automation
Pressure Reducing Valve	Tiemme Honeywell RB Zoloto Hydint Valves Automation
Solenoid Valve	Avcon Danfoss Hydint Valves Automation
Air Release Valve	Arco OR Zoloto Hydint Valves Automation
Ball Float Valve	Esseti HBD Zoloto
Y Strainer	Tiemme Emerald Zoloto
Storm Water Drainage / Sewage Sump Pumps (Submersible)	Grundfos ITT Willo – Mather & Platt DP – Holland
Transfer Pumps	Grundfos ITT

	Willo - Mather & Platt DP – Holland
Mechanical Seal	Burgmann Sealol
Couplings	Lovejoy & Approved
Anti Vibration Mounting & Flexible Connections	Dunlop Flexionics Kanwal Industrial Corporation Resistoflex
Pressure Gauge	Emerald Fiebig H Guru
Electronic Flow Meter	Krohne (Forbes Marshall) Rockwin
Level Controller & Indicator (Water)	Auto Pump Cirrus Engineering Technika Techtrol
Paints	Asian Paints Berger ICI
MH / Water Tank Plastic Steps	KGM Patel Pranali Industries
Three Way Motorized Valve	Danfoss Honeywell Johnson Control Siemens
Welding Rods	ADOR, Cosmos, Esab
Fastner	Fisher Hilti
Fire Sealant	Birla 3 M Hilti Promat
Ductile Iron Pipes & Fiitings	Electrosteel Kesoram
HDPE Pipes	Jain Irrigation Oriplast Supreme Astral
Non Return Valve for Sewage	Danfoss Normax
SS Exp. Joints	Kanwal Industrial Corporation Dunlop Resistoflex

PART – B (PRICE BID)

Name of work : Construction of proposed sewerage network system by Re-routing / re-aligning of all existing sewerage / water supply lines, through the ground floor ceiling level with the help of hanging trays / hanging ducts, duly camouflaged by providing a suitable decorative cladding with painted Multipurpose 8 mm thick cement fibre board as per IS : 14862 with suitable fibre cement screw, in the existing A.O Building, Jabalpur, Madhya Pradesh.

: SCHEDULE OF WORK :

Srl.no	Breif Description of works	Unit	Qty	Rate	Amount
1	**Dismantling of Brick walls of Existing Duct**. : Demolishing brick work manually/ by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer-in-charge. In cement mortar	Cum	1	2060.20	2060.20
2	**Laying of New PVC soil pipe :** Providing and fixing 160mm dia PVC (Polyvinyl Chloride) pipes, having Specification as per standard Technocore soil pipes, tested to BS 4514; EN 1453-1:2000, including fixing the pipe with Hanging Tray made from MS Hallow sections by using clamps at 1.00 m spacing. New PVC pipes shall be connected with existing CI pipes using the specially designed SP140 connector and jointing between PVC pipes & fittings using Rubber Ring Joints. Cost of SP140 connector, Bend, Socket etc fittings shall be paid seperately. Note : The rubber ring joint is integrally moulded on one end of the pipe. The joint incorporates a factory fitted rubber sealing ring which is retained in position by a polypropylene lock ring. The opposite (spigot) end of the pipe is chamfered and has a “depth of entry’’ mark near the end. Each joint is capable of handling some expansion and contraction as well as angular deflection. The seal ring is designed to provide a watertight joint at high and low pressures.	Rmtr	116	550	63800.00
3	**Connecting New PVC pipe with existing C.I.Soil pipe :** Providing and fixing specially designed SP140 connector or making connections of New PVC soil pipes with existing C.I. soil pipes.	Each	6	2500	15000.00
4	**PVC Fittings.:[All 160mm dia.]**				
4.1	Providing and fixing PVC Bends (90 degree) :				
4.1.1	a) Door Bend	Each	8	750	6000.00
4.1.2	b) Without Door Bend	Each	4	600	2400.00
4.2	Providing and fixing PVC Tees :				
4.2.1	a) T-With Door	Each	4	850	3400.00
4.2.2	b) T- Without Door Bend	Each	4	700	2800.00

Srl.no	Breif Description of works	Unit	Qty	Rate	Amount
5	**Steelworks for Hanging Trays.:** Steel work in built up tubular (round, square or rectangular hollow tubes etc.) trusses etc., including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer, including welding and bolted with special shaped washers etc. complete. Hot finished seamless type tubes.	Kg	3095	206.35	638653.25
6	Encasing Hanging Trays with Multipurpose 8 mm thick cement fibre board cladding :Providing and fixing, in position concealed G.I. section for wall paneling using Multipurpose 8 mm thick cement fibre board as per IS : 14862 with suitable fibre cement screw. fixed on the 'W' profile (0.55 mm thick) having a knurled web of 51.55 mm and two flanges of 26 mm each with lips of 10.55 mm, placed @ 610 mm C/C in perimeter channel having one flange of 20 mm and another flange of 30 mm with thickness of 0.55 mm and web of length 27 mm. Perimeter channel is fixed on the floor and the ceiling with the nylon sleeves @ 610 mm C/C with fully threaded self-tapping dry wall screws. Board is fixed to the 'W' profile with 25 mm countersunk ribbed head screws @ 200 mm C/C., all complete as per the drawing & directions of engineer-in-charge, the joints of the boards are finished with specially formulated jointing compound and 48mm wide jointing tape to provide seamless finish.	Sqm	83	1209.10	100355.30
7	**Construction of Soil Pits.:** Constructing brick masonry manhole in cement mortar 1:4 (1 cement : 4 coarse sand) with R.C.C. top slab with 1:1.5:3 mix (1 cement : 1.5 coarse sand (zone-III) : 3 graded stone aggregate 20 mm nominal size), foundation concrete 1:4:8 mix (1 cement : 4 coarse sand (zone-III) : 8 graded stone aggregate 40 mm nominal size), inside plastering 12 mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) finished with a floating coat of neat cement complete as per standard design : Inside size 90x80 cm and 45 cm deep including C.I. cover with frame (light duty) 455x610 mm internal dimensions, total weight of cover and frame to be not less than 38 kg (weight of cover 23 kg and weight of frame 15 kg) : With common burnt clay F.P.S. (non modular) bricks of class designation 7.5	Each	9	12770.55	114934.95
8	Connection of New Sewer line with Existing Soil Pits.: Making connection of drain or sewer line with existing manhole including breaking into and making good the walls, floors with cement concrete 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) cement plastered on both sides with cement mortar 1:3 (1 cement : 3 coarse sand), finished with a floating coat of neat cement and making necessary channels for the drain etc. complete For pipes 100 to 250 mm diameter.	Each	8	810.45	6484.00

Srl.no	Breif Description of works	Unit	Qty	Rate	Amount
9	**Dismantling of Concrete** : Demolishing Nominal concrete 1:3:6 or richer mix (i/c equivalent design mix) manually/ by mechanical means including disposal of material within 50 metres lead as per direction of Engineer - in - charge.	Cum	18	2434.25	43817.00
10	**Earthwork in excavation :** Excavating trenches of required width for pipes, cables, etc including excavation for sockets, and dressing of sides, ramming of bottoms, depth upto 1.5 m, including getting out the excavated soil, and then returning the soil as required, in layers not exceeding 20 cm in depth, including consolidating each deposited layer by ramming, watering, etc. and disposing of surplus excavated soil as directed, within a lead of 50 m : for Pipes, cables etc. exceeding 80 mm dia. but not exceeding 300 mm dia.	Rmtr	77	352.15	27115.55
11	**Earthwork in Filling** : Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift up to 1.5 m.	Cum	69	196.00	13524.00
12	Providing & laying Single Brick Flat Soling.	Sqm	58	196.00	11368.00
13	**PLAIN CEMENT CONCRETE WORK (CAST-IN-SITU) :**				
13.1	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level : 1:4:8 (1 Cement : 4 coarse sand (zone-III) derived from natural sources : 8 graded stone aggregate 40 mm nominal size derived from natural sources).	Cum	6	6812.00	40872.00
13.2	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level : 1:1½:3 (1 Cement: 1½ coarse sand(zone-III) derived from natural sources : 3 graded stone aggregate 20 mm nominal size derived from natural sources).	Cum	6	8340.85	50045.10
14.0	**BRICK WORK** :				
14.1	Brick work with clay flyash F.P.S. (non modular) brick of class designation 7.5 in superstructure above plinth level up to floor five level in : Cement mortar 1:6 (1 cement : 6 coarse sand)	Cum	2	9095.05	18190.10
15.0	**PLASTERING WORKs** :				
15.1	15 mm cement plaster on the rough side of single or half brick wall of mix : 1:4 (1 cement: 4 fine sand)	Sqm	6	399.45	2396.70

Srl.no	Breif Description of works	Unit	Qty	Rate	Amount
16	**Painting & Putty works :**				
16.1	Providing and applying white cement based putty of average thickness 1 mm, of approved brand and manufacturer, over the plastered wall surface to prepare the surface even and smooth complete.	Sqm	83	156.05	12952.15
16.2	Distempering with 1st quality acrylic distemper (ready mixed) having VOC content less than 50 gram/litre, of approved manufacturer, of required shade and colour all complete : New work (two or more coats) over and including water thinnable priming coat with cement primer having VOC content less than 50 gram/litre	Sqm	83	185.65	15408.95
	Total =			Rs	1191577.25
	%age (percentage) ABOVE or BELOW =	(+ve) / (-ve)		%	
	[Percentage in words : _____ Above / Below.]				
	Net Amount :			Rs	

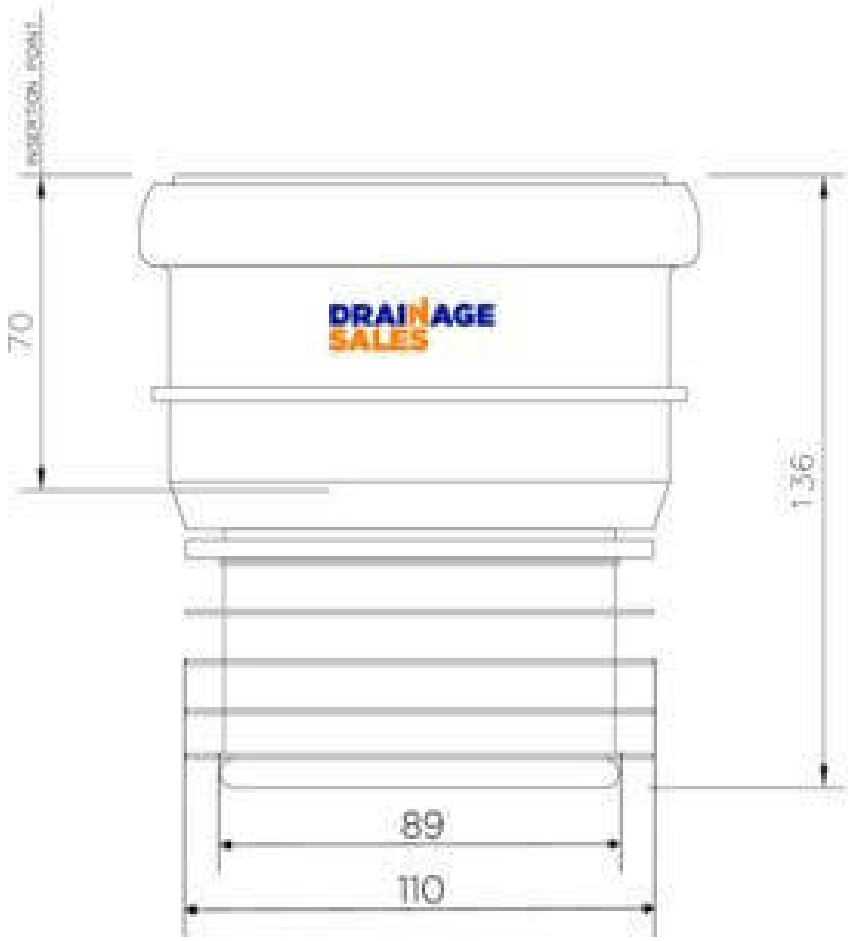
Net Amount (in words) : Rupees ….....
…..... Only .

Note : GST Shall be paid extra as applicable.

Signature of the Contractor with
Seal & Date.

TENDER DRAWINGs

specially designed SP140 connector or making connections of New PVC soil pipes with existing C.I. soil pipes.



Technical Drawing of Specially designed SP140 connector for making connections of New PVC soil pipes with existing C.I. soil pipes.