INSTITUTE WORKS DEPARTMENT
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

E-TENDER DOCUMENT

For

"Civil Maintenance/ Renovation Work of Hostels, Departments & Residences at Zone 'D' of IIT Roorkee."

Indian Institute of Technology Roorkee
Roorkee-247667, Tel. No. 01332-285747/4858

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Sd-
Institute Engineer,
IWD, IIT Roorkee

INSTITUTE WORKS
DEPARTMENT INDIAN INSTITUTE
OF TECHNOLOGY ROORKEE

No. IWD/IE/E-Tender/2025-26/19 **Dated: April 08 , 2025**

NOTICE INVITING TENDER (NIT)

(e-Tender)

1. General

On behalf of BOG, IIT Roorkee invites open **Percentage Rate e-Tenders** in **Two Bid system** (1. Technical 2. financial) from contractors of appropriate class & category registered with CPWD, State PWD (Buildings), MES, having experience of working in Central/State Government, Public Sector undertaking/ Autonomous Organization of the Central/State Government and Working Contractors of IITR who fulfill the PQ criteria for the following works:

Name of the Work	Estimated Cost	Completion Period (months)
Civil Maintenance/ Renovation Work of Hostels, Departments & Residences at Zone 'D' of IIT Roorkee.	**99.99 Lac**	**12 Months**

2. Critical Data sheet:

Approximately Cost	Rs. **99.99 Lac**
Tender Type (Open / Limited / EOI / Auction / Single)	Open
Tender Category (Services/Goods/Works)	Works
Type/Form of Contract (Work/Supply/ Auction/Service/ Buy/ Empanelment/ Sell)	Work Contract
Product Category (Civil Works/Electrical Works / Fleet Management/ Computer Systems)	Civil Works
Tender document publish date	08.04.2025 (18:00 Hrs)
Tender Document available for sale on website	08.04.2025 (18:00 Hrs) on e-tendering website https://eprocure.gov.in/eprocure/app. Tender document can only be obtained after registration of tenderer on the website https://eprocure.gov.in/eprocure/app.
Start Date of Seeking Clarification	Nil
Last Date of Seeking Clarification	Nil
Pre Bid Meeting Date	Nil
Bid Submission Start Date (online)	20.04.2025 (15:00 Hrs)
Bid Submission End Date (online)	29.04.2025(15:00 Hrs)
Date & time of opening of Tender (Technical Bid) (online)	30.04.2025 (15:30 Hrs)
Date & Time of opening of Financial Bid (online)	**Will be informed later on after the evaluation of Technical Bids (Only to the bidders who successfully qualify the Technical Evaluation)**
Tender Fee	Tender fee of **Rs.1180.00** (Non-refundable) to be submitted in shape of DD in favour of Registrar, IIT Roorkee payable at Roorkee. Scanned copy of DD to be uploaded in Cover-1 and original Copy of the same should reach the following address in a proper sealed envelope on and before the last date and time of bid submission. **Contract Cell** **Institute Works Department** **James Thomsan Building (Main Building)** **IIT Roorkee, Roorkee** **Haridwar Uttarakhand:-247667** **(for further information refer to point no. 07 of page no. 09 of Tender doc)**

EMD	**Rs. 2,00,000.00** (Rs. Two Lac Only) Payment of EMD can be submitted in the form of Bankers Cheque / DD / FDR in the name of Institute Engineer, IIT Roorkee. Scanned copy of Bankers Cheque / DD / FDR to be uploaded in Cover-1 and original Copy of the same should reach the following address in a proper sealed envelope on and before the last date and time of bid submission. :- **Contract Cell** **Institute Works Department** **James Thomason Building (Main Building)** **IIT Roorkee, Roorkee** **Haridwar Uttarakhand-247667**. **(for further information refer to point no. 07 of page no. 09 of Tender doc)**
Performance Guarantee (5%)	5% of awarded value shall be submitted in the form of Bankers Cheque /DD / FDR / Bank Guarantee in the name of Institute Engineer, IIT Roorkee after issue of Letter of Acceptance (LOA).
Security Deposit (5%)	5% of awarded value shall be submitted in the form of Bankers Cheque /DD / FDR / Bank Guarantee in the name of Institute Engineer, IIT Roorkee after issue of Letter of Acceptance (LOA).
No. of Covers	02 (Cover-1 for Technical + Cover-2 for Financial)
Bid Validity Days	90 days (from last date of opening of Financial Bid)
Price Bid	To be uploaded only on CPP Portal (http://eprocure.gov.in/eprocure/app) in excel sheet
Address for submission of documents or other communication.	**Institute Engineer, Institute Works Department, James Thomson Building, IIT Roorkee, Roorkee-247667 (India), Tel. No. 01332-285266/ 5275/ 5747 / 4955**
Email Address	deepak.ie@iitr.ac.in / arestateworks@iitr.ac.in/

2. Eligibility Criteria for submission of bid documents:

a. Intending bidder should not be a joint venture (Copy of relevant documents clearly establishing the status of bidder to be uploaded in Cover-1).

b. Experience of having successfully completed similar work individually costing not less than as stated below during the last 7 years ending previous day of last date of submission of bids.

(i) Three similar works, each of value not less than 40% of the estimated cost,

OR

(ii) Two similar works, each of value not less than 60% of the estimated cost,

OR

(iii) One similar works of value not less than 80% of the estimated cost,

Completion certificate issued by Competent Authority will only be considered. Competent Authority means officer of not below the Rank of Executive Engineer/ Equivalent would be acceptable.

The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum, calculated from the date of completion to last date of receipt of applications for this tender. (Copy of work completion certificate to be uploaded as proof of eligibility criteria in Cover-1).

c. Similar work means: - Construction/ maintenance/ renovation work of Buildings.

Turnover: The Average Annual Turnover CA Certificate preferably with UDIN should be at least **50%** of estimated cost during the immediate last 3 consecutive Financial Years (2021-22, 2022-23, 2023-24) –balance sheet duly audited by Charted Accountant. (Scanned copy of Certificate from CA preferably with UDIN Number to be uploaded). The year in which no turnover is shown would also be considered for working out the average.

3. Institute reserves the right to cancel any or all tenders without assigning any reason.

4. **No exemption in tender fee and EMD shall be applicable for firms registered under MSE/NSIC/Udyog Adhaar. Therefore, all the bidders are required to submit the EMD and Tender fee as mentioned in Tender documents.**

List of Documents to be scanned and uploaded under Cover-1 on e-tendering website to the last date and time mentioned in Critical data sheet:

Note: Physical submission of their documents is not required at the time of uploading of tender by bidders, however these documents should be submitted by bidder if asked by the institute subsequently for verification of documents

1) Documents regarding legal status of the firm and written power of attorney of the signatory.
2) Tender Fee & EMD.
3) Copy of Registration Certificate with CPWD, State PWD (Buildings), MES, or as mentioned in NIT
4) Copy of work completion certificate/ similar work experience Certificate to be uploaded as proof of eligibility criteria.
5) Notarized Undertaking as per the tender document.
6) The Average Annual Turnover CA Certificate preferably with UDIN should be at least 50% of estimated cost during the immediate last 3 consecutive Financial Years (2021-22, 2022-23, 2023-24).
7) GST registration certificate.
8) PAN card.
9) Copy of valid ESIC registration certificate
10) Copy of valid EPFO Registration certificate
11) Bank Solvency certificate: Bidder should have to submit valid solvency certificate of the amount at least 40% of the estimated cost of the work issued by a scheduled bank which is not more than one year old from the last date of tender submission (including extension time). Certified copy of original solvency certificate to be uploaded in cover-1.

List of Documents to be uploaded up to the last date and time mentioned above in Cover-2 (Financial Bid):

a. Duly filled in priced BOQ.

Kindly note that no physical submission of duly filled in BOQ is required and it is to be uploaded only on e-tendering website.

Institute Engineer,
IWD, IIT Roorkee

Information and instructions for bidders

1. Agreement shall be drawn with the successful bidder on prescribed format.
2. The time allowed for carrying out the work will be as per the NIT from the date of start as defined in Award of Work or from the first date of handing over of the site, whichever is later, in accordance with the phasing, if any, indicated in tender documents.
3. The site for the work is available / shall be made available for start of the work.
4. The Tender 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 / downloaded from IIT Roorkee website: www.iitr.ac.in (https://www.iitr.ac.in/administration/pages/Tenders_EOI.html) or from Central Public Procurement Portal (CPPP) http://eprocure.gov.in/app.
5. While submitting the bids, bidder can revise the rate before last date and time of submission of bids as notified. In this case, the last submitted bid before the last date and time will only be considered.
6. **Physical submission of their documents is not required at the time of uploading of tender by bidders, However these documents should be submitted by bidder if asked by the institute subsequently for verification of documents.**
    1) Documents regarding legal status of the firm and written power of attorney of the signatory.
    2) Tender Fee & EMD.
    3) Copy of Registration Certificate with CPWD, State PWD (Buildings), MES, or as mentioned in NIT
    4) Copy of work completion certificate/ similar work experience Certificate to be uploaded as proof of eligibility criteria.
    5) Notarized Undertaking as per the tender document.
    6) The Average Annual Turnover CA Certificate preferably with UDIN should be at least **50%** of estimated cost during the immediate last 3 consecutive Financial Years (2021-22, 2022-23, 2023-24).
    7) GST registration certificate.
    8) PAN.
    9) Copy of valid ESIC registration certificate
    10) Copy of valid EPFO Registration certificate
    11) Bank Solvency certificate: Bidder should have to submit valid solvency certificate of the amount at least 40% of the estimated cost of the work issued by a scheduled bank which is not more than one year old from the last date of tender submission (including extension time). Certified copy of original solvency certificate to be uploaded in cover-1.
7. Intending bidders are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their bids as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their Tender. A bidder shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charge consequent upon any misunderstanding or otherwise shall be allowed. The bidder shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a tender by a bidder implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which stores, tools and plant, etc. will be issued to him by the Institute and local conditions and other factors having a bearing on the execution of the work. Cost of site visit shall be borne by the bidder.
8. All tenders in which any of the prescribed condition is not fulfilled or any condition including that of conditional rebate is put forth by the bidder shall be summarily rejected.
9. Canvassing whether directly or indirectly, in connection with bidders is strictly prohibited and the Tenders submitted by the bidders who resort to canvassing will be liable to rejection.
10. Institute reserve all rights to execute fully or partially or any additional items and quantities as mentioned in BOQ. The contractor has to execute all additional items as directed by the Engineer in charge at the quoted price only.
11. The contractor shall not be permitted to bid for works in the Institute Works Department responsible for award and execution of contracts, in which his near relative is posted in Administrative Institute Supervision Staff or as an officer in any capacity between the grades of Dean, Infrastructure and Junior Engineer (both inclusive). He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any officer/employee in the Institute. Any breach of this condition by the contractor would render his bid liable to be rejected and EMD will be forfeited.
12. No Engineer of gazetted rank or other Gazetted Officer employed in Engineering or Administrative duties in an Engineering Department of the Government of India is allowed to act as a bidder within a period of one year after his retirement from Government service, without the previous permission of the Government of India in writing. This contract is liable to be cancelled if either the bidder or any of his employees is found any time to be such a person who had not

obtained the permission of the Government of India as aforesaid before submission of the tender or engagement in the bidder's service.

13. The bid for the works shall remain open for acceptance for a period of 90 days from the date of opening of financial bids. If any bidder withdraws his bid before the said period or issue of letter of acceptance, whichever is earlier, or makes any modifications in the terms and conditions of the bid which are not acceptable to the Indian Institute of Technology Roorkee, then Indian Institute of Technology Roorkee, without prejudice to any other right or remedy, be at liberty to forfeit of the said earnest money as aforesaid. Further the bidders shall not be allowed to participate in the re-bidding process of the work.

14. The notice inviting bid shall form part of the contract document. The successful bidder, on acceptance of his bid by the Accepting Authority, have to sign the contract consisting of "The Notice Inviting bid, all the documents including Special Conditions, General Specifications/ Particular Specifications and drawings, if any, forming part of the bid as submitted at the time of invitation of bid and the rates quoted online at the time of submission of bid and acceptance thereof together with any correspondence leading thereto within 15 days from the stipulated date of start of the work.

15. **Composite Tender(if applicable)**

15.1 The competent authority is calling this bid for the composite work. The Earnest money is fixed with respect to the combined estimated cost put to tender for the composite tender.

15.2 The eligible bidders have to quote rates for all items given in the schedule of quantity.

15.3 After acceptance of the bid by competent authority, **Institute Engineer, IWD, IIT Roorkee** shall issue letter of acceptance (LOA) on behalf of the Institute. After issue of LOA, the bidder will have to enter into one agreement with **Institute Engineer**.

15.4 Entire work under the scope of composite tender including major and all minor components shall be executed under one agreement.

15.5 Security Deposit will be worked out separately for each component corresponding to the quoted/accepted cost of the respective component of works. The Earnest Money will become part of the security deposit of the respective projects under the head Mega projects in ratio of the corresponding estimated value of these projects.

15.6 The bidder may associate agency(s) for minor component(s) conforming to eligibility criteria as defined in the tender document and has to submit detail of such agency(s) to Dean Infrastructure. Name of the agency(s) to be associated shall be approved by Dean Infrastructure. Before engaging such associate agencies bidder has to inform to Dean Infrastructure along with his past experience and all credential's and got the approval of the same from him.

15.7 In case the bidder intends to change any of the above agency/ agencies during the operation of the contract, he shall obtain prior approval of respective Dean Infrastructure. The new agency/ agencies shall also have to satisfy the laid down eligibility criteria. In case Dean Infrastructure is not satisfied with the performance of any agency, he can direct the bidder to change the agency and this shall be binding on the bidder.

15.8 The main bidder has to enter into agreement with bidder(s) associated by him for execution of minor component(s). Copy of such agreement shall be submitted to Engineer-in-charge In case of change of associate bidder, the main bidder has to enter into agreement with the new bidder associated by him.

15.9 The composite work shall be treated as complete when all the components of the work are complete. The completion certificate of the composite work shall be recorded by Engineer-incharge of major component after record of completion certificate of all other components. Final bill of whole work shall be finalized by IWD, IIT Roorkee.

15.10 It will be obligatory on the part of the bidder to sign the tender documents for all components before the first payment is released.

15.11 **No exemption** in tender fee and EMD shall be applicable for firms registered under MSE/NSIC/Udyog Adhaar. Therefore, all the bidders are required to submit the EMD and Tender fee as mentioned in Tender documents.

-Sd-
Institute Engineer,
IWD, IIT Roorkee

INSTRUCTIONS FOR ONLINE BID SUBMISSION

As per the directives of Department of Expenditure, this tender document has been published on the Central Public Procurement Portal (URL:http://eprocure.gov.in/eprocure/app). The bidders are required to submit soft copies of their bids electronically on the CPP Portal, using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal. More information useful for submitting online bids on the CPP Portal may be obtained at: http://eprocure.gov.in/eprocure/app.

1.0 Registration

1.1 Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal (URL:http://eprocure.gov.in/eprocure/app) by clicking on the link "Click here to Enroll". Enrolment on the CPP Portal is free of charge.

1.2 As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.

1.3 Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal.

1.4 Upon enrolment, **the bidders will be required to register their valid Digital Signature Certificate (Class II or Class III Certificates with signing key usage) issued by any Certifying Authority recognized by CCA India (e.g. Sify/TCS/nCode/eMudhra etc.) with their profile.**

1.5 Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSCs to others which may lead to misuse.

1.6 Bidder then logs in to the site through the secured log-in by entering their user ID/password and the password of the DSC/eToken.

2.0 Searching for Tender Documents

2.1 There are various search options built in the CPP Portal, to facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, organization name, location, date, value, etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as organization name, form of contract, location, date, other keywords etc. to search for a tender published on the CPP Portal.

2.2 Once the bidders have selected the tenders they are interested in, they may download the required documents / tender schedules. These tenders can be moved to the respective 'My Tenders' folder. This would enable the CPP Portal to intimate the bidders through SMS / e-mail in case there is any corrigendum issued to the tender document.

2.3 The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification / help from the Helpdesk.

3.0 Preparation of Bids

3.1 Bidder should take into account any corrigendum published on the tender document before submitting their bids.

3.2 Please go through the tender advertisement and the tender document carefully to understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents - including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.

3.3 Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document / schedule and generally, they can be in PDF / XLS / RAR / DWF formats. Bid documents may be scanned with 100 dpi with black and white option.

3.4 To avoid the time and effort required in uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents (e.g. PAN card copy, annual reports, auditor certificates etc.) has been provided to the bidders. Bidders can use "My Space" area available to them to upload such documents. These documents may be directly submitted from the "My Space" area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.

4.0 Submission of Bids

4.1 Bidder should log into the site well in advance for bid submission so that he/she upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other issues.

4.2 The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.

4.3 Bidder has to select the payment option as "on-line" to pay the tender fee / EMD as applicable and enter details of the instrument. Whenever, an EMD/Tender fee is sought, bidders need to pay the tender fee and EMD separately on-line through RTGS.

4.4 A standard BOQ format has been provided with the tender document to be filled by all the bidders. Bidders are requested to note that they should necessarily submit their financial bids in the format provided and no other format is acceptable. Bidders are required to download the BOQ file, open it and complete the white coloured (unprotected) cells with their respective financial quotes and other details (such as name of the bidder). No other cells should be changed. Once the details have been completed, the bidder should save it and submit it online, without changing the filename. If the BOQ file is found to be modified by the bidder, the bid will be rejected.

4.5 The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission.

4.6 All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128 bit encryption technology. Data storage encryption of sensitive fields is done.

4.7 The uploaded tender documents become readable only after the tender opening by the authorized bid openers.

4.8 Upon the successful and timely submission of bids, the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.

4.9 Kindly add scanned PDF of all relevant documents in a single PDF file of compliance sheet.

5.0 Assistance to Bidders

5.1 Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority to the address provided in Critical Data Sheet for a tender or the relevant contact person indicated in the tender.

5.2 Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24x7 CPP Portal Helpdesk. The contact number for the helpdesk is 0120-4001062 / 0120-4001002 / 0120-4001005 / 0120-6277787

6.0 General Instructions to the Bidders

6.1 The tenders will be received online through portal http://eprocure.gov.in/eprocure/app. In the Technical Bids, the bidders are required to upload all the eligibility criteria documents in .pdf format.

6.2 Possession of a Valid Class II/III Digital Signature Certificate (DSC) in the form of smart card/etoken in the company's name is a prerequisite for registration and participating in the bid submission activities through https://eprocure.gov.in/eprocure/app. Digital Signature Certificates can be obtained from the authorized certifying agencies, details of which are available in the web site https://eprocure.gov.in/eprocure/app under the link "Information about DSC".

6.3 Tenderer are advised to follow the instructions provided in the 'Instructions to the Tenderer for the e-submission of the bids online through the Central Public Procurement Portal for e Procurement at https://eprocure.gov.in/eprocure/app.

7.0 Submission of Tender Fee & EMD.

1. Original Copy of Tender fee and EMD should reach the address mentioned in critical data sheet in a proper sealed envelope on and before the last date and time of bid submission.
2. NIT number should be clearly mentioned on the top of the envelope. Also firm's bidder's name with address should be clearly mentioned on the left bottom of the envelope. Bids shall be rejected if NIT number is not mentioned on the Envelope
3. Bids shall be considered as **UNRESPONSIVE** and shall be summarily rejected in the case of non-submission of original EMD and Tender fee as per stipulated date & time OR if any discrepancy is found.

A: GENERAL INSTRUCTIONS

1. Scope of Tender.

1.1 Indian Institute of Technology Roorkee (referred to as Owner in these documents) invites Tender as defined in these documents and referred to as "the works" detailed in the table given in the Notice Inviting Tenders (NIT).

1.2 The successful Bidder shall complete the works within the completion date specified in the Notice Inviting Tenders (NIT).

1.3 The contractor shall supply 60% all the required items as per the approved list within one month from the date of the contract bond to the Central Store. Penalty shall be imposed as per the conditions of tender document for non-compliance.

1.4 Those makes of items will be used which are approved by the Institute Engineer.

2. Non-Association / Relation

2.1 All bidders shall provide in the bid tender and Qualification Information, a statement that the Bidder is not associated, nor has been associated in the past, directly or indirectly, with the Indian Institute of Technology Roorkee or any other entity that has prepared the design, specifications, and other documents for the Project.

3. Qualification of the Bidder

3.1 All Bidders shall provide tender qualification information.

3.2 All Bidders shall include the following information by submitting relevant documents and certificate with their tenders: The Bidder must be registered with the GST Department and should submit the registration certificate of GST, ESIC, EPFO, labour license if applicable etc.

4. Cost of tendering

4.1 The Bidder shall bear all costs associated with the preparation and submission of his tender, and the Owner will in no case be responsible and liable for those costs.

4.2 The Bidder, at its own responsibility and risk is encouraged to visit and examine the Site of Work and its surroundings and obtain all information that may be necessary for preparing the tender. The costs of visiting the Site shall be at the Bidder's own expense.

B: DOCUMENTS INVITING TENDERS

5. Invitation: Tenders are hereby invited on behalf of BOG Indian Institute of Technology Roorkee.

6. Contents of documents as mentioned in the relevant clauses mentioned:

The Bidder shall be deemed to have examined all instructions, forms, terms, and specifications in the Documents. Failure to furnish the information required in the Tender Document or submission of a Bid not substantially responsive to the Tender Documents in every respect will be at the Bidder's risk and may result in the rejection of the bid.

The several documents forming the contract are to be taken as mutually explanatory of one another, detailed drawings being followed in preference to small scale drawing and figured dimensions in preference to scale and Special Conditions in preference to General Conditions.

In case of any discrepancy between the Schedule of Quantities, the specifications and / or the drawings, given in the tender document the following order of preference shall be observed:

1. Description of Schedule of Quantities.
2. Particular Specification and Special condition, if any.
3. Drawings.
4. C. P. W. D. specifications/ E&W, IIT ROORKEE specification.
5. Latest edition Indian Standard Specifications of B. I. S.

7. Amendment of Tendering Documents

7.1 Before the deadline for submission of bids, the Indian Institute of Technology Roorkee may modify the Tender documents by issuing addenda/corrigendum.

7.2 Any addendum thus issued shall be part of the Tendering documents and shall be uploaded on e-Tendering website www.eprocure.gov.in and Institute website http://mm.iitr.ac.in/mmweb/.

7.3 To give prospective Bidders reasonable time in which to take an addendum/corrigendum into account in preparing their bid, the IIT Roorkee may extend if necessary the deadline for submission of tenders.

C: PREPARATION OF DOCUMENT

8. **Tender fee :** Tender fee in favour of Registrar, Indian Institute of Technology Roorkee payable at Roorkee must be submitted as mentioned in critical data sheet. Bids not accompanying with Tender fee will be summarily rejected. Tender fee is nonrefundable.

9. **Earnest Money Deposit (EMD):** EMD as per critical data sheet must be submitted. Bids not accompanying with EMD will be summarily rejected. The EMD of the unsuccessful bidders will be discharged/refunded within Thirty (30) days from the date of opening of the financial bids. The EMD of the successful Bidder shall not be adjusted or converted as Security deposit. The EMD may be forfeited and further the bidders shall not be allowed to participate in the re-bidding process of the work, if the Bidder withdraws his bid during bid validity period or in case of successful Bidder fails to sign the contract/ fails to deposit security amount and performance guarantee.

10. **Period of validity of bids:** The bids shall remain valid for a period of 90 days from the date of opening of financial bids. A bid valid for a shorter period shall be rejected by the Indian Institute of Technology Roorkee as non-responsive.
11. **Language of Bid:** The document shall be written in English/Hindi language. The total amount should be written in the same language.
12. **Document comprising the E-Tender:** No page of this tenders document shall be removed and the set must be submitted as it is. Each page of the tenders document form is to be signed by the Bidder and must bear the Seal of the Company/Firm.

The tender submitted by the Bidder shall comprise as mentioned above in relevant sections.

13. **Tender Prices**

13.1 The contract shall be for the whole works as described in priced Schedule of Quantities submitted by the Bidder.

13.2 The tender submitted on behalf of firm shall be signed by a person who has the proper legal authority on behalf of the firm to enter into the contract; otherwise, the bid is liable to be rejected. Each page of the tender document and each drawing accompanying is required to be signed by the authorized person submitting the bid, with the company seal as the token of their having examined and acquainted themselves with the General conditions of contract, drawings, specifications, special conditions of contract etc. The forms of tender are to be filled in completely. Any bid with any of the documents not signed is liable to be rejected.

13.3 The Bidder shall fill in the percentage rate/in rates for items of the Works described in the Schedule of Quantities along with total bidding price. In case if the rates are not filled for any of the Items of Schedule of Quantities, in such cases the tender shall be summarily rejected. Failure to comply with either of these conditions will make the bid liable for rejection.

13.4 The work shall be carried out by the Bidder in a manner complying in all respect with the requirement of relevant bye-laws/orders of the Local/Municipal bodies and pay all fees and charges which may be liable at his own cost. The completion/ occupancy certificates including clearance from fire committee or any other statutory obligation shall be arranged by the bidder. Any official fees shall be paid by the Owner. All other cost of liasoning shall be borne by the bidder.

13.5 **Taxes -**All duties, taxes, and other levies payable by the Bidder under the contract, or for any other cause, shall be included in the rates, prices and total Bidding Price submitted by the Bidder. Bidders must include in their rates, the cost of transportation of materials to site, GST, labour Cess as per Building & other construction workers cess act, excise duty, octroi, and any other tax and duty levied by the Central / State Government. None of the above taxes & levies will be entertained by the Owner and no tax exemption forms will be issued by the Owner. Estimated has been prepared on current applicable GST rate. However actual payment will be done on the basis of prevailing GST rates at the time of execution of work and its payment.

13.6 **Labour Cess or BOCWW Cess:**- Labour cess @1% shall be deducted from each bill.

13.7 Bidder should also take a Group Insurance Policy for his Workmen, Supervisors and Engineers working on site for an adequate insurance cover. Indian Institute of Technology Roorkee shall not be responsible for any accident or happening of any untoward/unforeseen event involving workmen, labour, supervisor or engineer or any person directly or indirectly associated with the execution of work. The insurance policy to be obtained by the successful Bidder must be comprehensive and shall cover all associated risks (known and unknown).

13.8 The rates quoted in the tender shall include cost of electrical power supply, water supply, cost of all materials, labour, telephone, rent and call charges, water and meter rent charges, temporary electric wiring / lighting for execution of work at site, hire for any tools and plants, shed for materials, marking out and clearing of site,

transportation complete in all respects. The rates quoted in the tender shall be treated as rate for finally completing the item of work.

13.9 The quantities furnished in the schedule of quantities are only probable quantities and are liable to alterations, by omission, deductions or additions to any extent at the discretion of Indian Institute of Technology Roorkee. Payments will be regulated on the actual quantities of work done at accepted rates.

13.10 Errors in the Schedule of Quantities shall be dealt with in the following manner:

i. In the event of a discrepancy between the rates quoted in words and the rates in figures, rate quoted in words shall be considered to be correct.

ii. In the event of an error occurring on account of arithmetical calculations the same shall be corrected according to rates written in words and quantities in B.O.Q.

iii. All the errors in totaling in the amount column and in carrying forward the totals shall be corrected. The tender total shall be accordingly amended. If the bidder doesn't accept the corrected amount then his bid will be rejected.

13.11 The calculations made by the bidder should be based upon quantities of the items of work which are furnished in the Schedule of Quantities, but it must be clearly understood that the contract is not a lump sum contract. The Owners do not in any way assure, represent or guarantee that the said probable quantities are correct or that the work would correspond thereto. The items of work irrespective of the quantities which may vary shall be carried out at the same accepted bidding e-tender rates and no escalation in the rates will be entertained whatsoever. Any item of work may be omitted from the schedule of quantities and may be awarded to another agency at any time / stage of the work.

13.12 The bidders must obtain for themselves on their own responsibility and their own expenses all the information which may be necessary, including risks, contingencies and other circumstances to enable them in making a proper bid and for entering into a contract, and must examine the drawings, specifications and conditions and inspect the site of the work, nature of the work, availability of power, water, shelter for workmen and all the matters pertaining thereto before submitting the bid. They can also get any clarifications required from the Owner, before tendering, by contacting them at their office during working hours.

14. Format and signing of Tender document

14.1 The bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the Bidder. All pages of the tender where entries or amendments have been made shall be initialed by the person or persons signing the tender.

14.2 The tender shall contain no alterations or additions, except those to comply with instructions issued by the Owner, or as necessary to correct errors made by the Bidder, in which case such corrections shall be initialed by the person or persons signing the bid. ANY CONDITIONAL BID WILL BE SUMMARILY REJECTED.

D: MODE OF SUBMISSION OF BID DOCUMENT

15. Sealing and marking of bids (In Case of Hard Copy Submission If Required)

15.1 The entire document to be put in cover-1 should be scanned and uploaded under cover-1 on the e-tendering website. Not hard copy of any document (financial or technical) should be submitted. In case any hardcopy is submitted then the same will not accepted by the department.

15.2 Financial/price bid is to be uploaded online only & no hard copy to be submitted.

16. Deadline for submission of bid: - As per Critical Data Sheet..

E: TENDER OPENING AND EVALUATION

17. Tender opening: The tender will be opened on the date and the place specified in the critical data sheet. In case of any unavoidable circumstances or unforeseen event on the specified date and time of tender opening, the bids will be opened at the appointed time and location on the next working day.

18. Clarification of Tenders: To assist in the examination, evaluation and comparison of bids, the Owner may, at his discretion, ask any Bidder for clarification of his bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by fax, but no change in the price or substance of the tendering shall be sought, offered or permitted.

19. Examination of Bids and Determination of Responsiveness:

19.1 Prior to the detailed evaluation of bids, the Owner will determine whether each bid

a) Meets the eligibility criteria defined

b) Has been properly signed and meets the requirements mentioned
c) is accompanied by the required securities and;
d) is responsive to the requirements of the tendering documents.

19.2 A responsive bid is one which conforms to all the terms, conditions and specifications of the tendering documents, without material deviation or reservation. A material deviation or reservation is one
a) Which affects in any substantial way the scope, quality, or performance of the works;
b) which limits in any substantial way, inconsistent with the tender documents, the Indian Institute of Technology Roorkee rights or the Bidders' obligations under the contract; or
c) Whose rectification would affect unfairly the competitive position of other Bidders presenting responsive bids.

19.3 If a bid is not responsive, it will be rejected by the Indian Institute of Technology Roorkee, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.

20. Evaluation and Comparison of Bids:

20.1 The Owner along will evaluate and compare only the bids determined to be substantially responsive.

20.2 In evaluating the bids, the Owner will determine for each bid the evaluated bids Price by adjusting the bid. Price as follows:
a) Making any correction for errors; or
b) Making an appropriate adjustments for any other acceptable variations, deviations; and
c) Making appropriate adjustments to reflect discounts offered.

21. The Owner reserves the right to accept or reject any variation, deviation, or alternative offer and other factors which are in excess of the requirement of the tender.

22. In Case any information furnished by the bidder is found to be false/forged/incorrect at any stage, their bid shall be rejected and the bidder shall not be allowed to participate in the re-bidding process of the work.

23. Clarification of Bids/Shortfall Documents: IIT Roorkee may, at its discretion, ask the bidder for clarifications/ shortfall documents related to his bid. The request for clarification shall be given in writing. Depending on the reply of the bidder, his bid shall be ignored or considered further.

F: AWARD OF TENDER

24. Award criteria:

24.1 The acceptance of bid will rest with the Owner, which does not bind itself to accept the lowest bid and reserves to itself the authority to reject completely / partially, any or all of the bid/s received without the assignment of a reason.

24.2 The owner reserves to itself the right of accepting the whole or any part of the Bid and the Bidder shall be bound to perform the same at the rate quoted.

24.3 The Owner reserves to itself the right of omission of any item of work from the awarded tender at any time / stage during the execution of work and awards the same to another agency / bidder.

24.4 Tender will be awarded on over all L-1 basis (including BoQ1, BoQ2, BoQ3 etc).

25. Notification of award: The successful Bidder will be issued a Letter of Acceptance (LOA) by the Owner. The issuance of LOA shall not constitute an award of work.

26. Security Deposit: Within ten (10) days of LOA the successful Bidder shall furnish the security deposit @ 5% of value of work in the form of DD/FDR in the favour of Institute Engineer, IIT Roorkee payable at Roorkee from Scheduled bank. The security deposit shall be returned/refunded to the bidder on completion of the defect liability period of contract. In case the bidder fails to deposit the said security deposit within the period as indicated, the Earnest Money deposited by the bidder shall be forfeited automatically without any notice to the bidder.

27. Performance Guarantee (PG): Within ten (10) days of LOA the successful Bidder shall furnish the performance guarantee @ 5% of value of work in the form of DD/FDR/Bankers Cheque/Bank Guarantee from Scheduled bank provided in the tender document. The PG must be valid two months beyond the work completion period. It may be further extended. The Performance guarantee shall be returned / refunded to the bidder on completion of the work and recording of the completion certificate. In case the bidder fails to deposit the said performance guarantee within the period as indicated, the Earnest Money deposited by the bidder shall be forfeited automatically without any notice to the bidder.

28. Signing of contract form: On the acceptance of LOA and submission of security deposit & Performance Guarantee (PG) of the successful Bidder whose tender has been accepted in writing, the Indian Institute of Technology Roorkee will sign an agreement. Article of agreement shall be as per IIT Roorkee.

29. Abnormally High and Low Bids :

a) Tender evaluation committee (TEC) will observe the rates and seek justifications if that are abnormally high/low. Threshold value over which the rates would be judged high/low shall be decided by the TEC looking into the nature of work and their specification on case-to-case basis

b) If required necessary for high bids negotiation will be done with the approval of the Competent Authority. However, if the rates will be found abnormally low additional performance guarantee shall be got deposited as per the following formula:

i) Upto 30% less than the estimated cost : Nil
ii) Above 30% and less than upto 50% : 20%
iii) Above 50% and less than upto 70% : 40%

The Additional Performance Guarantee will be released with Performance Guarantee.

G: DURING EXECUTION

30. During Execution: The Bidder shall carry out all the works strictly in accordance with the drawing, details and instructions of the Owner. If in the opinion of the Owner, changes have to be made in the design, and they desire the bidder to carry out the same, the Bidder shall be bound to comply. The Owner decisions in such cases shall be final.

The Bidder is bound to carry out any items of work necessary for the completion of the job even though such items are not included in the schedule of quantities and rates. Schedule of instructions in respect of such additional items and their quantities with the prior consent from the Owner. Rates for such items of work will be approved by the Owner on the basis of Analysis of Rates which will be derived from actual prevailing market rates of similar item along with 15% as bidder's profit & overhead (or service charge as quoted by the bidder). The rates approved by the Owner in such cases will be final.

The Bidder shall get the quality of work done inspected for material and workmanship at different stages of execution as per instructions given by the Owner or their representative time to time. Any item of work done which is found not conforming to the Contract shall be rejected by the Owner. The decision of the Owner in such cases shall be final.

The Owner may instruct at any stage of execution for testing of samples of any material taken at random. The Owner will decide the testing laboratory / agency and the cost of testing including the expenses for sending the samples to the laboratory / agency and receipt of test reports shall be borne by the Bidder. The material shall be rejected in case the test reports are not within the permissible limits.

The Bidder shall have to present the invoice for purchased material from the manufacturer or from the dealer along with the certificate from the manufacturer. In case material is found to be of substandard quality, the same shall be rejected by the Owner. The decision of the Owner in such cases shall be final.

The Bidder shall not be entitled to any compensation for the Loss suffered by him on account of delays in commencing or executing the work whatever the cause of delay may be, including delays arising out of modifications to the work entrusted to him or in any subcontracts connected therewith or delays in awarding contracts for other trades of the project or in commencement or completion of such other works or in procuring Government controlled or other building materials for any other reasons whatsoever. The Owner shall not be liable for any sum besides the e-tender amount, subject to such variations as are provided for herein and as instructed by Owner. However, necessary time extension will be given if the delays are not attributed to the Bidder.

QUALIFYING INFORMATION

Please furnish the following information along with documentary evidence only in this format (as per eligibility criteria)

1.	Name of the bidder		
2.	Legal Status of the bidder		
3.	Place of registration and registration of the bidder		
4.	Year of establishment of the firm.		
5.	Permanent Address		
6.	Email id		
7.	Contact Numbers		
8.	Principal place of the registration		
9.	PAN No.		
10.	GST No.		
11.	Valid EPFO		
12.	Valid ESIC		
13.	EMD details		
14.	Tender fee details		

2. Average annual financial turnover during the last 3 years, ending 31st March of previous financial year as mentioned in NIT, should be less than 50% of the estimated cost. CA certificate be enclosed as documentary proof. Copies of balance sheets duly certified by CA to be submitted.

Sl. No.	Financial Year	Amount (in Lakhs)
1	2023-2024	
2	2022-2023	
3	2021-2022	

3. PROFORMA FOR LIST OF WORKS EXECUTED BY THE BIDDER DURING THE LAST 7 YEARS.

Sl. No	Name of work/ project with address	Name & postal address of the owner & contact person	Contract Value	Date of Start	Date of Completion	Actual Date of Completion

Note:

1. **Bidder may furnish the above information in separate sheet if the space is not sufficient.**
2. **Work should be performed by bidder or OEM or Authorized Dealer / Authorized Distributor.**

4. PROFORMA FOR LIST OF WORKS IN HAND

Sl. No	Name of work/ project with address	Name & postal address of the owner & contact person	Published Value	Date of Start	Stipulated date of completion	Present Progress

Note: Bidder may furnish the above information in separate sheet if the space is not sufficient

5. DETAILS OF KEY PERSONNEL

Sl. No	Name & Designation	Qualification	Experience	Nature of Works Handled	Date from which employed in your organization

Note: Bidder may furnish the above information in separate sheet if the space is not sufficient.

6. List of equipment, tools and tackles (if applicable)

Annexure-II

(to be submitted by the vendor/ firm on its official letter head)

(Self-Certificate for Local Content)

Tender No.: ……..……. Dated: ……

We hereby certify that the items quoted by us against mentioned tender no. has the local content as per below:

Local Content (in %): ……..

Local Supplier Class: ……..

The details of the make in India items/ parts used in the quoted products is/ are as under:

1.
2.
3.

The details of the location (s) at which the local value addition made manufactured is/ are as under:

1.
2.
3.

We also understand, false declarations will be in breach of the code of integrity under rule 175(1)(i)(h) of the General financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other action as may be permissible under law.

Signature of the contractor(s):
Name:
Designation:

Seal of the firm/ Organization:

Note:

1. The contractor shall ensure in his procurement activities that the Government policy of encouraging "Make in India" is maintained and respected. The following gazetted notifications/orders/guidelines have been issued by the Government of India to ensure Public Procurement Preference (PPP) to Make in India. The contractor shall follow the below PPP-Make in India guidelines/directives and any subsequent revisions/modifications applicable thereon.
   i. Govt. of India Ministry of Commerce and Industry vide their order no. P-45021/2/2017-BE-II dated 15th June, 2017 & amended by order No. P-45021/2/2017-B.E.-II dated 28.05.2018, Order No. P-45021/2/2017-B.E.-II dated 29.05.2019, Order No. P-45021/2/2017-B.E.-II dated 04.06.2020 and Order No. P-45021/2/2017-B.E.-II dated 16.09.2020 & revised 'Public Procurement (Preference to make in India), Order No. P-45021/2/2017-PP (BE-II)-Part(4)Vol.II dated 19.07.2024.

Annexure - III

BANK MANDATE FORM

Sr. No.	Particulars	Information
1.	Firm (Beneficiary) Name	
2.	Address	
3.	Complete Bank Account No. of the Firm (Beneficiary). (In case of change in bank account vendor write to Accounts office)	
4.	Bank Name	
5.	Branch Address	
6.	IFSC Code no.	
7.	Permanent Account Number	
8.	Mobile No. (for SMS)	
9.	E-Mail ID (for Information)	

We undertake that all the information provided above is correct and IIT Roorkee will not be responsible in case of any error on the part of firm.

Verification by bank (one time only) Information given at 1,4,5, 6 & 7 verified by Bank Seal and Signature of the bank	 Seal and Signature of the firm

GENERAL CONDITIONS OF CONTRACT(GCC)

A: GENERAL

1.0 Definitions:

1.1 In this contract, the following terms shall be interpreted as indicated:

a. "The Contract" means the agreement entered into between the Owner and the Bidder, as recorded in the contract form signed by the parties, including all the attachments and appendices thereto and all documents incorporated by reference therein.
b. "The Contract Value" means the amount payable to the Bidder under the contract for the full and proper performance of its contractual obligations.
c. "Contract Bond" means any information provided in the tender document and agreed to by the Bidder.
d. "The Work" means all labour, materials, tools and plant, equipment including government taxes and transport that may be required in preparation of and for and in the full and entire execution and completion of "the Work".
e. "Services" means services ancillary to the execution of the work such as transportation and insurance, and any other incidental services, such as installation, commissioning, provision of technical assistance, training and other obligations of the Bidder covered under the contract.
f. "GCC" mean the General Conditions of Contract contained in this section.
g. "SCC" means the Special Conditions of Contract.
h. "The Owner" means the Indian Institute of Technology Roorkee or its representative.
i. "The Owner" means the Owner/Project Management Consultant appointed by the Owner for preparing all the drawings, details and specifications of items required for the execution of the work and supervise and monitor the execution at site along with checking and verifying Bidder's bill. The Bidder shall offer the Engineer or any representative of Owner every facility and assistance for examining the works and materials. The Engineer or any representative of the Owner shall have power to give notice to the Bidder or to his staff, of non-approval of any work or materials and such work shall be suspended or the use of such materials shall be discontinued until the decision of the Owner. Such examinations shall not in any way exonerate the bidder from the obligations to remedy any defects which may be found to exist at any stage of the work or after the same is completed.
j. "The Bidder" means the individual or the firm executing the work.
k. "The Project Site" where applicable, means the place or places named in SCC.
l. "Day" means calendar day.
m. "Engineer-in-charge (EIC)" means Assistant Executive Engineer.

2.0 Interpretation and Application

2.1 These general conditions shall apply to the extent that provisions in other parts of the contract do not supercede them.

2.2 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Owner will provide instructions clarifying queries about the Conditions of Contract.

2.3 If sectional completion is specified in the Contract Bond, references in the Conditions of Contract to the Works, the Completion Date, and the Intended completion date are for the whole of the Works.

3.0 Standards

3.1 The works executed by the Bidder should be carried out in most professional manner, both as regards material and otherwise, in every respect, in strict accordance with the Technical Specifications. All materials and workmanship shall so far as procurable be of the respective kinds described in the priced schedule of quantities and/ or specifications and in accordance with the Owner' instructions, and the Bidder shall upon the request of

the Owner, furnish them with all invoices, accounts; receipts and other vouchers to prove that the material procured complies therewith. When no applicable standard is mentioned, the work shall be carried out as per the directions of the Owner. The Bidder shall at his own cost arrange for and/or carry out any test of materials which the Owner may require. In case of discrepancies in tender wording as regards the specifications of materials, workmanship etc., written instructions will supersede the tender wording unless otherwise mentioned.

3.2 The Owner in their absolute discretion from time to time shall issue further drawings and/ or written instructions, details, directions and explanations which are hereafter collectively referred to as "the Owner's instructions" in regard to: -

a. The variation or modification of the design quality or quantity of works or the addition or omission or submission on any work.
b. Any discrepancy in the drawings or between the schedule of quantities and / or drawings and /or specifications/ dimensions etc.
c. The removal and / or re-execution of any works executed by the Bidder.
d. The removal from the site of any materials brought thereon by the Bidder and the substitution of any other materials therefore / or rejection of the material brought on site.

4.0 Use of Contract Documents and Information

4.1 The Bidder shall not, without the Owners' prior written consent, disclose the contract or any provision thereof, or any specifications, plan, drawing, pattern, sample or information furnished by or on behalf of the Owner in connection therewith, to any person other than a person employed by the Bidder in performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far, as may be necessary for purposes of such performance.

4.2 The Bidder shall not, without the Owner's prior written consent make use of any document or information enumerated in Para 4.1 except for the purposes of performing the contract.

4.3 All documents included but not limited to contract agreement shall remain the property of the Owner and shall be returned (in all copies) to the Owner on completion of the Bidder's performance under the contract, if so required by the Owner.

5.0 Owner's Decisions: Except where otherwise specifically stated, the Owner will decide contractual matters between the Owner and the Bidder, in the role of representing the Owner.

6.0 Performance Guarantee: The proceeds of the performance guarantee shall be payable to the Owner as compensation for any loss or dues resulting from the Bidder's failure to complete its obligations under the contract.

7.0 Program and Reporting (For New Construction work)

7.1 The bidder shall furnish to the Indian Institute of Technology Roorkee a bar chart laying down weekly financial and physical targets to complete the project within stipulated time for approval within fifteen days from the date of receipt of notification of award or commencement of work at site. Weekly progress report shall be furnished to the owner showing the progress.

7.2 The bidder must submit every week the following information to the Owner in writing:

i. Number of men employed, trade wise;
ii. Progress achieved;
iii. Expected dates for completion of work;
iv. Any actual or potential delay in completion schedule.

8.0 Assignment and Sub-contracting

8.1 The whole of the works included in the Contract shall be executed by the bidder and the bidder shall not directly or indirectly transfer, assign or underlet the contract or any part, share or interest therein without the written consent of the Owner.

8.2 No sub-contracting shall relieve the Bidder from the full and entire responsibility of the Contract or from the active superintendence of the work during their progress.

9.0 Bidder to provide everything necessary for proper execution of work

9.1 The Bidder shall provide everything necessary for the proper execution of the works according to the intent and meaning of the drawings, priced schedule of quantities and specifications taken together whether the same may or may not be particularly shown or described therein provided that the same can reasonably be inferred there from. If the Bidder finds any discrepancy therein he shall immediately and in writing refer the same to the Owner whose decision shall be final and binding. Further, if any sample(s) of material(s), fittings, fixtures or finished item(s), to be used in the construction work, has/have been called for from the bidder, no work related to it/these shall be executed unless the same has/ have been approved by the Owner failing which no payment shall be made to the bidder on this account. Any sample, duly approved by the Owner shall become part of the supply to be used in "the works".

9.2 The Bidder shall arrange for water & power supply at site at his cost for the entire work. The water to be used for construction shall be free from excessive salts and minerals that are harmful to the construction work. Making arrangement of water good for construction either through external supply or through treatment at site shall be entirely the responsibility of the Bidder. The Bidder shall on demand of the Owner / PMC get any random water samples tested at the approved testing laboratories. No extra payment shall be made for arranging water good for construction under any circumstances. No excuse for / of Municipal water / electric supply shall be entertained. The bidder shall ensure provision of electricity by generator and water by tanker transport if necessary. No claim shall be entertained on this account. In case the same will be provided by the Owner at any stage, then water/electricity charges shall be deducted from the Bidders running bills as per Institute Norms.

9.3 The Bidder shall supply fix and maintain at his cost, during the execution of any works, all the necessary power supply, water supply, centering, scaffolding, watching and lighting by night as well as by day, required not only for the proper execution but also for protection of the public and the safety of any adjacent roads, streets, pavements, walls houses, building and other erections, matters or things. The Bidder shall take down and remove any or all such centering, scaffolding, staging, planking, timbering, strutting, shoring pumping, fencing, hoarding, watching and lighting by night as well as by day, required not only for the proper execution but also for protection of the public and the safety of any adjacent roads, streets, pavements, walls houses, building and other erections matters or things. The bidder shall take down and remove any or all such centering, scaffolding, staging, planking, timbering, strutting, shoring etc. as occasion shall require or when ordered so to do so and shall fully reinstate and make good all matters and things disturbed during the execution of the works, to the satisfaction of the Owner.

9.4 Throughout the execution of the work, the Bidder or his representative duly authorized and fully responsible and technically conversant with the work under this agreement, acting on his behalf shall be available at the site for supervising the work. The Bidder shall make adequate arrangements for watchmen to guard the materials brought by them to the site and shall ensure the safety, breakage and any theft of materials fixed or unfixed by him. Any material, T & P brought to the site for bonafide use of the Project shall not be removed/ shifted from the site without the prior written permission of the Engineer/Owner.

9.5 The bidder has to provide at his cost leveling pipe, steel/ metallic tapes etc. required by the supervising staff of the Owner's/Owner' representative during execution of the work.

9.6 Whenever required by the Owner, the Bidder shall provide shop drawings / details before execution of work and get them approved by the Owner.

9.7 Wherever the specification of any item indicates the usage of approved equivalent of any material, the Bidder shall get the sample of the equivalent material approved from the Owner before execution. The approval of the equivalent material is entirely at the discretion of the Owner.

9.8 Institute reserve all rights to execute fully or partially or any additional items and quantities as mentioned in BOQ. The contractor has to execute all additional items as directed by the Engineer in charge at the quoted price only.

10.0 Infrastructure (For New Construction Works): For storage of materials, bidder has to provide at his own cost sufficient fenced and covered appropriate area on site for storage of above materials with lock and key arrangement. For arranging meetings suitable sized table and chairs shall be provided by Bidder. Temporary space shall be provided to the Bidder for construction of stores for storage of materials /site office/ labour hutments for the project period.

11.0 Site Establishment: The bidder shall provide all stores, workmen and materials. All materials likely to deteriorate in the open shall be stored under suitable cover. The security of the bidder's equipment and materials is his own responsibility. The Owner accepts no liability for loss or damage to the bidder's plant tools or materials. The materials issued to the bidder by the Owner will remain under the custody of bidder as a trustee. However, title on

the same will remain with the Owner. The bidder will be responsible for loss or damage to such materials and shall preserve them in good working conditions as required for the contract and good construction practices till such time that they are incorporated in the works and erected, aligned and fully installed in position and handed over to the Owner. In case the Owner feels that arrangements made by the bidder are not adequate he shall so advice the bidder and the bidder shall promptly take corrective action. In case the bidder fails to take corrective action, Owner shall take such corrective actions and recover the cost thereof from the bidder's bills. Accounts of such material on completion of work shall be rendered and surplus material returned to the Owner as per instructions of Owner. The bidder shall clear away periodically or as instructed by Owner any rubbish, scrap materials, etc. and dump the same in the authorized dump sites notified by local authority/area indicated by the Owner. All construction materials shall be neatly stacked in an orderly manner as directed by the Owner and care shall be taken to allow proper access to workmen and easy movement of men, vehicles, cranes and materials. The bidder shall maintain all the drawings carefully mounted on the board of appropriate size and well protected from the ravages of weather, termites and other insects. The bidder shall not permit the entry to the site of any person not directly connected/concerned with the work without first having obtained the written permission of Owner. The bidder shall submit a list of plants, equipment, tools, tackles, etc. which he will use, to perform the work. These tools, etc. shall not be removed from the site till the completion of job. A gate pass must be obtained from the Indian Institute of Technology Roorkee, Dean Infrastructure, in order to remove from site any plant equipment, tools and materials. All items such as instructions and other pertinent data regarding erection/commissioning and maintenance should be typed and classified for transmittal in a manner approved by the Owner. For all employees of Owner, the bidder shall conform for no misconduct from any of his workforce; failure of this will be sufficient cause for removal of such person from the site.

12.0 Messing & Accommodation: The bidder will make his own arrangements for messing and accommodation. No accommodation and messing shall be provided by the Owner.

13.0 Procurement, Consumption and Storage of Materials

13.1 The bidder shall at his own expenses, provide all materials including cement & steel required for the works. Adequate stocks of all materials required for the work are to be maintained at site. No material (unless as provided elsewhere in this document) shall be supplied by the Owner.

13.2 All materials to be provided by the bidder shall be in conformity with the detailed specifications laid down in the contract and the bidder have to prove that the materials conform to the laid down specifications, if requested by the Indian Institute of Technology Roorkee.

13.3 All materials required for execution of work must be got approved by the site representative of the Owner before they are actually put to use. All facilities for prior inspection of materials and subsequent inspection of work by the Site Engineer must be made available.

13.4 The bidder shall, at his own expenses and without delay, supply to the Owner samples of materials proposed to be used in the work. The Owner shall within seven days of supply of samples, or within such further period as Owner may require and intimate the bidder in writing, whether samples are approved by Owner, or not. If samples are not approved, the bidder shall forthwith arrange to supply, for their approval, fresh samples complying with the specification laid down in the contract.

13.5 The Owner shall have full powers to require removal of any or all the materials brought to site by the bidder which are not in accordance with the contract specifications or do not conform in character or quality to the samples approved Owner. In case of default on the part of the bidder in removing rejected materials, the Owner shall be at liberty to have them removed by other means. The Owner shall have full powers to direct other proper materials to be substituted for rejected materials and in the event of the bidder refusing to comply. Owner may cause the same to be supplied by other means. All risks and costs which may attend upon such removal and/or substitution shall be borne by the bidder.

13.6 Bidder shall be responsible for procurement of all materials/equipments etc. No delay due to non-availability of any material equipment will be entertained by Owner.

14.0 Method of storing the materials

14.1 The bidder shall at his own cost, provide for all necessary storage on the site in specified areas for all materials such as steel, cement and such other materials which are likely to deteriorate by the action of sun, wind, rain, dampness or other natural causes due to exposure in the compounds or in stores in such a manner that all materials, tool etc. shall be duly protected from damage by weather or any other cause.

14.2 Materials required for the works, by the bidder be stored by the bidder only at places approved by the Owner. Storage and safe custody of materials shall be the responsibility of the bidder. All the materials including bidder's Tools & Plants brought by the bidder to the site shall become and remain the property of the Owner and shall not be removed off the site without prior written approval of the Owner/Owner. But whenever the works are finally completed and advances, if any, in respect of such materials are fully recovered, the bidder shall at own expenses forthwith remove from the site all surplus materials supplied by him and upon such removal, the same shall revert in and become the property of the bidder.

15.0 Shuttering and Scaffolding Materials: It shall be desirable to have adequate amount of shuttering and scaffolding materials to complete the work speedily and Owner decision so as to the quantum of these desirable/ resources of the site shall be final and binding.

16.0 Completion of Work: Before finally leaving site, all the Bidders stores, plant, tools and rubbish shall be removed and the site left clean and tidy. The space allocated by Owner shall be vacated and handed over to the Owner.

17.0 Water and Electricity for Construction work: Water & Electricity as per relevant section's mentioned above

18.0 Employment of Labour

18.1 The bidder shall comply with the requirement of statutory provisions and shall be solely responsible for fulfillment of all legal obligations under Contract Labour (R&A) Act, Inter State Migrant Workmen (Registration of Employment and condition of Service Act, Payment of Wages Act., Minimum Wages Act, Workmen's Compensation Act, Factories Act, Employee's Provident Fund & Miscellaneous Provisions Act, Payment of Bonus Act, Payment of Gratuity Act, Industrial Disputes Act and all other Industrial/Labour enactments and Rules made there under as applicable from time to time. In case Owner incurs any liability towards payment of any dues, compensation, cost of any other liability of any kind whatsoever, due to non-fulfillment of statutory provisions under any industrial/labour laws by the bidder, the same shall be made good by the bidder and Owner shall have full right to recover and claim the same against the bidder from his outstanding bills or otherwise. No Labour to stay at site.

18.2 The bidder will be expected to employ on the work only his regular skilled employees with experience of this particular work. The permission of the Owner must be obtained before tradesman are recruited locally for the work. This rule does not apply to unskilled labour. No female labour shall be employed in dark hours/ i.e. hours prohibited under the applicable law. No person below the age of eighteen years shall be employed at any point of time. The bidder shall pay, to each person, the wages as per minimum Wages Act of the State Government.

18.3 All traveling expenses including provision of all necessary transport to and from site, lodging allowances and other payments to the bidder's employees are his own responsibility. The hours of work on the site shall be decided by the Owner and bidder shall adhere to the same. All bidders employees shall wear safety helmet and such identifications marks as may be provided by bidder on work site and duly approved by Owner. All notices displayed on the site and any instructions issued by the Owner shall be strictly adhered to by the Bidder's and/or his sub-bidders employees. The bidder shall be required to maintain employment records as covered in relevant Acts and produce documentary evidence to the effect that he has discharged his obligations under the Employees Provident Fund Act 1952, and ESI Act, 1948 Group Insurance and other Acts for the workmen working at site.

18.4 The bidder shall comply with the provisions of the Apprentices Act 1961, and the rules and orders issued there under from time to time. If he fails to do so, his failure will be a breach of the contract and the Dean Infrastructure/Executive Engineer may in his discretion, without prejudice to any other right or remedy available in law, cancel the contract. The bidder shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the said Act.

19.0 Working and Safety Regulations: The bidder shall observe all statutory safety and legal requirements regulations issued by Central and State Governments applicable to the work as well as any local regulations applicable to the site issued by the Owner or any other authority.

20.0 Particular attention is drawn to the following: In case of accident, the Owner shall be informed in writing forthwith and First-Aid, Hospitalization shall be provided by the Bidder. The bidder shall strictly follow regulations laid down by Govt. and State authorities in this regard and all cases are to be defended by the bidder. The Owner shall not refund any insurance claims. Bidder shall fence his plant, platforms, excavations etc. Compliance with all electricity regulations. Compliance with statutory requirements for inspection and test of all lifting appliances and auxiliary lifting gear. Staircase, doors or gangways shall not be obstructed in any way that will interfere with means of access of escape. Where it is necessary to provide and/or store petroleum products or petroleum mixtures and explosive, the bidder shall be responsible for carrying out such provision and/or storage in accordance with the rules and regulation laid down in Petroleum Act 1934. Explosive Act 1948 and Petroleum and Carbide of Calcium Manual Published by the Chief Inspector of Explosive of India. All such storage shall have prior approvals of the Owner. In case any approval or clearance from Chief Inspector of Explosive or any statutory authorities is required, the bidder shall be responsible for obtaining the same.

The bidder shall have his own Fire Fighting Extinguishers and Equipment. The bidder shall be responsible for the provision of all safety notices safety equipments including the safety gadgets for his workmen required by both the relevant legislation and such as the Owner may deem necessary. While working at heights, safety belts and safety helmets shall necessarily be used.

21.0 Owner's and Bidder's Risks: The Owner carries the risks, which this Contract states are The Owner risks, and the Bidder carries the risk, which this Contract states are The Bidder's risks.

21.1 Owner's Risks: The Owner is responsible for the accepted risks which are :

b. Insofar as they directly affect the execution of the Works. These include war, hostilities, invasion, act of foreign enemies, rebellion, revolution, insurrection of military or usurped power, civil war, riot commotion or disorder (unless restricted to the Bidder's Employees), and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive, or

c. A cause due solely to the design of the Works, other than the Bidder's design.

21.2 Bidder's Risks: All risks of loss or damage to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the accepted risks of the owner.

21.3 The Bidder shall be responsible for all injury to persons, animals or things, and for all damages to the structural and/or decorative part of property which may arise from the operations or neglect of himself or of any sub-bidder or of any of his or sub-bidder's employees whether such injury or damage arises from carelessness accident or any other causes whatsoever in any way connected with the carrying out to the Contract. This clause shall be held to include interalia any damage to buildings, whether immediately adjacent or otherwise and any damage to roads, footpaths, or ways as well as all damage caused to the buildings and the work forming the subject to this Contract by frost, rain or other inclemency of the weather. The Bidder shall indemnify the Owner and hold him harmless in respect of all and any expenses arising from any such injury or damage to persons or property as aforesaid and also in respect of any claim made in respect of injury or damage under any acts of Government or otherwise and also in respect of an award of compensation or damages consequent upon such claim. The bidder shall make good all damages of every sort mentioned in the Clause, as to deliver up the whole of the Contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of third parties.

22.0 Insurance

22.1 The Bidder shall provide, in the joint names of the Owner and the Bidder, insurance cover from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles stated in the Contracted Data for the following events which are due to the Bidder's risks and shall be covered under respective policies as under :

a. Workmen Compensation Policy;
b. Bidder's All Risk Policy;
c. Third Party Insurance.

22.2 Policies and certificates for insurance shall be delivered by the Bidder to the Owner for the approval before the Date of Start of work i.e. dates of execution of the contract. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

22.3 If the Bidder does not provide any of the policies and certificates required, the Owner may affect the insurance which the Bidder should have provided and recover the premiums the Owner has paid from payments otherwise due to the Bidder or if no payment is due, the payment of the premiums shall be a debt due.

22.4 Alterations to the terms of the insurance shall not be made without the approval of the Owner.

22.5 Both parties shall comply with the conditions in the insurance policy.

23.0 Setting out Works: The bidder shall set out the works and responsible for the true and perfect setting out of the same and for the correctness of the positions, levels, dimensions and alignment of all parts thereof, if at any time any error shall appear during the progress of any part of works the bidder shall at his own expenses rectify such error, if called upon to the satisfaction of the Owner.

24.0 Bidder to remove all offensive matter, non-suitable material etc immediately.

24.1 All debris, excavated soil, filth or other matter or an offensive nature taken out of any trench, sewer, drain cesspool or other place shall not be deposited on the surface but shall be at once carted away by the bidder out of the premises/ site under intimation to concerned authorities.

24.2 Any material brought on site if found unsuitable shall be removed from site at once by the Bidder under intimation to the concerned authorities.

25.0 Inspections by Owner

25.1 The representative of the Owner at all times have free access to the works and /or to the workshops, factories or other places where materials are being prepared or constructed for the Contract and also to any place where materials are lying or from which they are being obtained. No person except the representatives of Public authorities shall be allowed on the work at any time without the written permission of the Owner. If any work is to be done at a place other than the site of the works, the Bidder shall obtain written permission of the Owner for doing so.

25.2 The Owner and their representatives shall have the right to test and/ or inspect the works to confirm their conformity to the contract, at all times, whenever in progress either on the site on the Bidder's premises wherever situated or any firm or company where work in connection with this contract may be in hand. All records, registers or documents relating to the works including materials used on works shall be kept open to the inspection of the Owner or his Authorized representative when so called for in writing.

25.3 The Bidder shall get the quality of work done inspected for material and workmanship at different stages of execution as per instructions given by the Owner or their representative time to time. Any item of work done which is found not conforming to the Contract shall be rejected by the Owner. The decision of the Owner in such cases shall be final.

25.4 The inspections and tests may be conducted on the premises of the Bidder or at the Project site. When carried out on the premises of the Bidder or its sub-Bidder(s), all reasonable facilities and assistance including access to drawings and production data shall be furnished to the inspectors at no charge to the Owner.

25.5 Should any inspected items of work fail to conform to the specifications, the Owner shall communicate them and the Bidder shall either replace them or make all alterations necessary to meet specification requirements free of cost to the Owner.

25.6 The Bidder shall permit the Owner/Architect to inspect the Bidder's accounts and records relating to the performance of the Bidder and to have them audited by auditors appointed by the Owner, if so required.

26.0 Covering Up/Uncovering of Works

26.1 No part of the works shall be covered up without the approval of Owner and the Bidder shall afford full opportunity for examination and inspection by the Owner. The bidder shall give due notice to the EIC about the work to be covered up for its measurements and examination. The EIC shall within a reasonable time attend for the purpose of examining such work, unless the EIC specifically advises the Bidder in writing of his

unwillingness not to attend for such examination in which case the Bidder may proceed further with the Contract work.

26.2 Should the Owner consider it necessary in order to satisfy himself as to the quality of the work, the Bidder shall at any time during the continuance of the contract pull down or cut into any part of the work and make such opening into and to such an extent through the same, as the Engineer may direct and the Bidder shall make good the whole to the satisfaction of the Engineer, should the work prove to be faulty or in any respect not in accordance with the terms of the contract documents, the Engineer shall be at liberty to order such further removal as he may consider necessary and the whole of the expenses incurred shall be borne by the bidder. If however, the work proves to be sound and in accordance with the contract document, the actual expenses incurred in such examination will be borne by the Owner.

26.3 Rates charged by the Bidder for works performed under the contract shall not vary from the rates quoted by the Bidder in its bid, with the exception of any price adjustments authorized in SCC or in the Owner's request for bid validity extension, as the case may be.

26.4 If requested by the Owner, the Bidder shall provide the Owner with a detailed cost breakdown of any rate in the Schedule of Quantities.

26.5 The Owner may at any time / stage of execution demand for the Analysis of Rates for any item / items of work which in their opinion is / are abnormally high / low rates or required for the Analysis of Rates of other Publish / extra item / items. The Bidder is bound to present the same and if the Bidder is unable to present a justified Analysis of Rates for any item / items, the rate / rates for such item may be adjusted accordingly and the decision of the Owner in such cases shall be final.

27.0 Change in the order/ Extra items of work

27.1 The Owner may at any time, by written order given to the Bidder, make alterations in, omissions from, additions to, or substitutions for, in drawings, designs or specifications or quantities of the items of work

27.2 Owner reserves to itself the right of omission of any item of work from the awarded, Publish at any time / stage during the execution of work and award the same to another agency / bidder.

27.3 The Owner may at nay time, by written order given to the Bidder, increase the scope of work or include any new item of work. The Bidder shall be bound to carry out such works, the rates for which shall be arrived after the approval of competent authority as below-

a) In the case of Extra item(s) being the schedule items (Delhi Schedule of Rates items), these shall be paid as per the schedule rate (at the time of tender) plus/Minus percentage above/below quoted contract amount. Payment of extra items in case of non-schedule items (Non-DSR items) shall be made as per the prevailing market rate.

b) In the case of substitute items(s) being the schedule items (Delhi schedule of rates items). These shall be paid as per the schedule rate (at the time of tender) plus/minus percentage above/below quoted contract amount. Payment of substitute in case of non-schedule items (Non-DSR items) shall be made as per the prevailing market rate.

28.0 Payment

28.1 The method and conditions of payment to be made to the Bidder under the contract shall be specified in SCC.

28.2 Payment shall be made promptly by the Owner after certification of the bill by the Owner.

28.3 All intermediate running payments to the bidder shall be regarded as payments by way of advance against the final payment and shall not preclude the requiring of bad, unsound and imperfect or unskillful work to be removed, taken away and reconstructed or re-erected.

29.0 Variations and Provisional Cost(If applicable):

29.1 Where work cannot be measured and valued properly, the Bidder shall be allowed day work rates on the prices prevailing when such work is carried out (unless otherwise provided in the contract): a. At the rates if any inserted by the Bidder in the priced Schedule of Quantities or b. If no such rates have been inserted then at the rates prevailing in the market for material and labour and at the control rates for the controlled materials including in all cases the rate for delivery of the material at the work.

29.2 Provided that in any case voucher specifying the time daily spent upon the work (and if required by the Owner the workman's names) and the materials used shall be delivered for verification to the Owner, or his authorised representative not later than the end of the week following that in which the work has been executed. Effect shall

be given to the measurement and valuation of variations in interim Certificates and by adjustment of the total Contract Value.

30.0 Claims for Extra or for Deductions

30.1 The Owner shall not be responsible for the payment of any claim for extra work not included in the contract nor the Bidder shall be entitled to claim any addition to the contract sum in respect of any changes or alterations in the materials used unless the same shall have been ordered or sanctioned, as the case may be, in writing by the Owner.

30.2 The Bidder has to submit a monthly return by 10th of the ensuing month for any extra work which in his opinion is not covered by the contract agreement through the Owner's/ Owner's representatives and obtain a receipt from the authorized signatory of the Owner. Failing this, he shall have no right to any such claim, whatsoever may be the circumstances, later on.

30.3 In the event of any dispute arising either as to validity of the claim or as to the account to be paid or allowed in respect thereof, the decision of the Owner shall be final and binding on the bidder. In the meantime, the Bidder may either proceed with the work in question or suspend the same as may be determined by the Owner.

30.4 All extra works (those permitted by Owner) of every description shall be executed by bidder on site of work in pursuance of any of the provision of the contract, shall be measured up, and shall be paid according to actual quantities ascertained by such measurements and the prices as finalized by the Owner based on the priced schedule of quantities so that such priced schedule of quantities shall include all such operations and accessories as appear in the said schedule of prices or specification to be or shall in the opinion of the Owner the contingencies upon the works mentioned in such schedule of prices or required to make such works perfect and fit for use.

30.5 Provided also that if any work shall be ordered by the Owner and executed by the Bidder for the payment of which no provision in the opinion of the Owner have been made in the priced schedule of quantities or the specifications, the Owner shall fix and determine such prices for the same based on the prices appearing in the priced schedule of quantities, such allowance being made as may seem to the Owner sufficient for any difference in the character of conditions of the work. However, rates for extra items shall be fixed on the basis of actual rate analysis.

30.6 If, it shall appear that the work has been executed with unsound, imperfect or unskilled workmanship, or with material of any imperfect or any inferior quantity or otherwise not in accordance with the contract documents the Bidder shall at his own cost rectify, reform, remove, or reconstruct the same, wither in the whole or in part, as may be directed by the EIC, whether or not the value of any such work or materials shall have been included in any payment made to the Bidder.

30.7 The Bidder shall remove all malba etc., wash and clean the floors and hand over the site quite clean on the completion of the work.

31.0 Delay in the Bidder's performance

31.1 Execution of the work and performance of the services shall be done by the Bidder in accordance with the time schedule specified by the Owner in the Notice inviting tender.

31.2 If, at any time during performance of the contract, the Bidder should encounter conditions impending timely execution of the works and performance of services, the Bidder shall promptly notify the Owner in writing of the fact of the delay, it's likely duration and its cause(s). As soon as possible, after receipt of the Bidder's notice, the Owner shall evaluate the situation and may, entirely at its discretion, extend the Bidder's time for performance with or without liquidated damages.

32.0 Liquidated Damages: If the Bidder fails to execute any or all of the works or to perform the services within the period(s) specified in the contract, the Owner shall deduct from the contract value, as liquidated damages, a sum specified in the SCC for each week or part thereof delay until actual completion or performance, up to a maximum deduction of the percentage specified in SCC. Once the maximum is reached, the Owner may consider termination of the contract.

33.0 When Contract can be Determined: Subject to other provisions contained in this clause, the Engineer-in-Charge may, without prejudice to any other rights or remedy against the contractor in respect of any delay, not following safety norms inferior workmanship, any claims for damages and/or any other provisions of this contract or otherwise, and whether the date of completion has or has not elapsed, by notice in writing absolutely determine the contract in any of the following cases:

i) If the contractor having been given by the Engineer-in-Charge a notice in writing to rectify, reconstruct or replace any defective work or that the work is being performed in an inefficient or otherwise improper or un-workman like manner shall omit to comply with the requirement of such notice for a period of seven days thereafter.

ii) If the contractor has, without reasonable cause, suspended the progress of the work or has failed to proceed with the work with due diligence and continues to do so after a notice in writing of seven days from the Engineer-in-Charge.

iii) If the contractor fails to complete the work or section of work with individual date of completion on or before the stipulated or justified extended date, on or before such date of completion; and the Engineer in Charge without any prejudice to any other right or remedy under any other provision in the contract has given further reasonable time in a notice given in writing in that behalf as either mutually agreed or in absence of such mutual agreement by his own assessment making such time essence of contract and in the opinion of Engineer-in-Charge the contractor will be unable to complete the same or does not complete the same within the period specified.

iv) If the contractor persistently neglects to carry out his obligations under the contract and/ or commits default in complying with any of the terms and conditions of the contract and does not remedy it or take effective steps to remedy it within 7 days after a notice in writing is given to him in that behalf by the Engineer-in-Charge.

v) If the contractor shall offer or give or agree to give to any person in Government service or to any other person on his behalf any gift or consideration of any kind as an inducement or reward for doing or forbearing to do or for having done or forborne to do any act in relation to the obtaining or execution of this or any other contract for Government.

vi) If the contractor shall enter into a contract with Government in connection with which commission has been paid or agreed to be paid by him or to his knowledge, unless the particulars of any such commission and the terms of payment thereof have been previously disclosed in writing to the Engineer-in-Charge.

vii) If the contractor had secured the contract with Government as a result of wrong tendering or other non-bonafide methods of competitive tendering or commits breach of Integrity Agreement.

viii) If the contractor being an individual, or if a firm, any partner thereof shall at any time be adjudged insolvent or have a receiving order or order for administration of his estate made against him or shall take any proceedings for liquidation or composition (other than a voluntary liquidation for the purpose of amalgamation or reconstruction) under any Insolvency Act for the time being in force or make any conveyance or assignment of his effects or composition or arrangement for the benefit of his creditors or purport so to do, or if any application be made under any Insolvency Act for the time being in force for the sequestration of his estate or if a trust deed be executed by him for benefit of his creditors.

ix) If the contractor being a company shall pass a resolution or the court shall make an order that the company shall be wound up or if a receiver or a manager on behalf of a creditor shall be appointed or if circumstances shall arise which entitle the court or the creditor to appoint a receiver or a manager or which entitle the court to make a winding up order.

x) If the contractor shall suffer an execution being levied on his goods and allow it to be continued for a period of 21 days.

xi) If the contractor assigns (excluding part(s) of work assigned to other agency(s) by the contractor as per terms of contract), transfers, sublets (engagement of labour on a piece-work basis or of labour with materials not to be incorporated in the work, shall not be deemed to be subletting) or otherwise parts with or attempts to assign, transfer, sublet or otherwise parts with the entire works or any portion thereof without the prior written approval of the Engineer -in-Charge. When the contractor has made himself liable for action under any of the cases aforesaid, the Engineer-in- Charge on behalf of the BOG IIT Roorkee shall have powers:

A. To determine the contract as aforesaid so far as performance of work by the Contractor is concerned (of which determination notice in writing to the contractor under the hand of the Engineer-in-Charge shall be conclusive evidence). Upon such determination, Security Deposit already recovered, Security Deposit, payable, Performance Guarantee under the contract shall be liable to be forfeited and shall be absolutely at the disposal of the Government

B. After giving notice to the contractor to measure up the work of the contractor and to take such whole, or the balance or part thereof, as shall be un-executed out of his hands and to give it to another contractor to complete the work. The contractor, whose contract is determined as above, shall not be allowed to participate in the tendering process for the balance work. In the event of above courses being adopted by the Engineer-in-Charge, the contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased or procured any materials or entered into any engagements or made any advances on account or with a view to the execution of the work or the performance of the contract. And in case action is taken under any of the provision aforesaid, the contractor shall not be entitled to recover or be paid any sum for any work thereof or actually performed under this contract unless and until the Engineer-in-Charge has 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.

xii) The owner may terminate the contract bond without prejudice due to financial malpractice/ misbehavior /verbal or physical assault /poor quality of work etc. Further to this the bidder shall be debarred for two years for participating in any tender of IIT Roorkee

34.0 Force Majeure

34.1 The Bidder shall not be liable for forfeiture of its Security Deposit, liquidated damages or termination by default, if and to the extent that, its delay in performance or other failure to perform its obligations under the contract is the result of an event of Force Majeure.

34.2 For purposes of this clause, "Force Majeure" means an unforeseeable event beyond the control of the Bidder and is not because of the Bidder's fault or negligence. Such events may include acts of the Owner either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics.

34.3 If a Force Majeure situation arises, the Bidder shall promptly notify the Owner in writing of such conditions and the cause thereof. Unless otherwise directed by the Owner in writing, the Bidder shall continue to perform its obligations under the contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

35.0 Termination for Insolvency: The Owner may at any time terminate the contract by giving written notice to the Bidder, if the Bidder becomes bankrupt or otherwise insolvent. In this event, termination will be without compensation to the Bidder, provided such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the Owner.

36.0 Termination for Convenience: The Owner, by written 30 days prior notice sent to the Bidder may terminate the contract, in whole or in part, at any time for its convenience. The notice shall specify that the termination is for Owner's convenience, the extent to which performance of the Bidder under the contract is terminated, and the date upon which such termination becomes effective. The items of work that are complete and ready within (1) month after the Bidder's receipt of notice of termination shall be accepted by the Owner at the contract terms and values. For the remaining works, the Owner may elect;

a) to have any portion completed at the contract terms and value and/or

b) to cancel the remainder and pay to the Bidder an amount, finalized by the Owner, for partially completed works and for materials and parts previously procured by the Bidder.

37.0 Resolution of Disputes

37.1 The Owner and the Bidder shall make every effort to resolve amicably by direct informal negotiations any disagreement or dispute arising between them under or in connection with the contract. If, after thirty (30) days from the commencement of such informal negotiations, the Owner and the Bidder have been unable to resolve amicably a contract dispute, either party may require that the dispute be referred for resolutions to the formal mechanisms specified in the SCC. These mechanisms may include but are not limited to, Arbitration in accordance with rules of Arbitration Act and award made in pursuance thereof shall be binding on both the parties.

37.2 All disputes should be under the Jurisdiction of civil court Roorkee.

38.0 Governing language: The contract shall be written in Hindi or English language. All correspondence and other documents pertaining to the contract that are exchanged by the parties shall be written in the same language.

39.0 Governing law: The contract shall be governed by the laws of The Union of India for the time being in force. All disputes are subject to jurisdiction of courts at Roorkee or Honourable High Court Uttrakhandat Nainital.

40.0 Notices: Any notice given by one party to the other pursuant to this contract shall be sent to other party in writing or by cable, telex, or facsimile and confirmed in writing to the other party's address specified in SCC. A notice shall be effective on the date on when it is delivered, or on the notice's effective date, whichever is later.

41.0 Discoveries: Anything of historical or other interest or of significant value unexpectedly discovered on the Site is the property of the Owner. The Bidder is to notify the Owner of such discoveries and carry out the Owner' instructions for dealing with them.

42.0 Dismissals of workmen: The bidder on request from the Owner, immediately dismiss from the works any person employed by him who may be found in the opinion of the client to be unsuitable or incompetent or who has shown misconduct.

43.0 Working Hours: Normal working hours shall be from 08:45 a.m. to 05:30 p.m. No construction work of important structural nature shall be carried out on Sundays, Holidays and during nights. However, permission to work beyond normal working hours can be granted by the Owner in exceptional circumstances to achieve the target schedule of completion**.**

B. TIME CONTROL (NEW CONSTRUCTION WORK)

44.0 Program

44.1 Within the time stated in the Contract Bond the Bidder shall submit to the Owner for approval a Program showing the general methods, arrangements, order, and timing for all the activities in the works, along with weekly cash flow forecast.

An update of the Program shall be a program showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.

44.2 The Bidder shall submit to the Owner, for approval, an updated Program at intervals no longer than the period as stated in the clause no. 7.1. If the Bidder does not submit an updated Program within this period, the Owner may withhold the amount stated in the Contract Bond from the next payment certificate and continue to withhold this amount until the next payment after the date on which the overdue program has been submitted.

44.3 The Owner's/Owner's approval of the Program shall not alter the Bidder's obligations. The Bidder may revise the Program and submit it to the Owner again at any time. A revised Program is to show the effect of Variations at any stage of work, Owner award any item/part of item of work to bidder's workman/ external agency, if in their opinion, the progress of work is suffering because of that. The work done will be added to the Bidder's bill and the amount paid for the job will be deducted from the Bidder's account.

45.0 Delay and Extension of time

If in the opinion of the Owner the work be delayed

a) by force majeure or
b) by reason of any exceptionally inclement weather or
c) by reason of proceedings taken or threatened by or disputes with adjoining or neighboring owners or public authorities or
d) by delays of other bidder or Tradesmen engaged by the Owner or the Owner and the works not referred to in the Schedule of Quantities and/or specification or
e) by reasons of Owner's instruction or
f) by reason of civil commotion, local combination of workmen or strike or lockout affecting any of the building trades or
g) in consequence of the bidder not having received in due time necessary instructions from the Owner for which he shall have specially applied in writing or
h) from other cause which the Owner may certify as beyond the control of the bidder or
i) by reason of nonpayment of interim certificate at specified time, the Owner shall grant for approval by the Owner a fair and reasonable extension of time for completion of the Contract. In case of strike or lockout the bidder shall as soon as may be given written notice thereof to the Owner, but the bidder shall nevertheless constantly use his endeavors to prevent delay and shall do all that may reasonably be required to the satisfaction of Owner to proceed with the work.

C. QUALITY CONTROL

46.0 Identifying Defects: The Owner shall check the Bidder's work and notify the Bidder of any Defects that are found. Such checking shall not affect the Bidder's responsibilities. The Owner may instruct the Bidder to search for a Defect and to uncover and test any work that the Owner considers may have a Defect.

47.0 Correction of Defects

47.1 The Owner shall give notice to the Bidder of any Defects before the end of Defects Liability Period, which begins at Completion and is defined in the Contract Bond. The Defects Liability period shall be extended for as long as Defects remain to be corrected.

47.2 Every time notice of Defect is given, the Bidder shall correct the notified Defect within the length of time specified by the Owner' notice.

48.0 Uncorrected Defects: If the bidder has not corrected a Defect within the time specified in the Owner'snotice in case, it is felt by the owner that undue delay is being done by the bidder, the same will be got done by the owner at risk and cost of the contractor.

D. COST CONTROL

49.0 Schedule of Quantities

49.1 The Schedule of Quantities shall contain items for the construction work, installation, testing, and commissioning work to be done by the Bidder.

49.2 The Schedule of Quantities is used to calculate the Contract Price. The Bidder is paid for the quantity of the work done at the rate in the priced Schedule of Quantities for each item.

50.0 Variations: All variations in the program pursuant to clause no. 7.0 of GCC shall be included in the updated program produced by the Bidder.

51.0 Payments for Variations

51.1 The Bidder shall provide the Owner with a quotation (with breakdown of unit rates) for carrying out the Variation when requested to do so by the Owner. The Owner shall assess and finalise the quotation, which shall be given within seven days of the request or within any longer period stated by the Owner and before the Variation is ordered.

51.2 If the Bidder's quotation is unreasonable, the Owner may order the Variation and make a change to the Contract Price which shall be based on Owner' own forecast of the effects of the Variation on the Bidder's costs.

51.3 If the Owner decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and shall be treated as a Variation.

51.4 The Bidder shall not be entitled to additional payment for costs, which could have been avoided by giving early warning.

E: FINISHING THE CONTRACT

52.0 Completion Certificate: The Bidder shall request the Owner to issue a Certificate of Completion of the Works will do so upon deciding that the Work is completed.

53.0 Taking Over: The Owner shall take over the Site and the Works within Ten days of the Owner issuing a certificate of Completion. Before handing over the site, the bidder must obtain a site clearance certificate from the Owner.

54.0 Final Account: The Bidder shall supply to the Owner a detailed account of the total amount that the Bidder considers payable under the contract before the end of the Defects Liability Period. The owner shall issue a Defect Liability certificate and certify any final payment that is due to the bidder within 5-6 days of receiving the Bidder's account if it is correct and complete. If it is not, the owner shall issue within 5-6 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted. The owner shall decide on the amount payable to the bidder and issue a payment certificate within 5-6 days of receiving the Bidder's revised account.

Sd-
Institute Engineer,
IWD, IIT Roorkee

SPECIAL CONDITIONS OF CONTRACT (SCC)

The following Special Conditions of Contract are supplementary, to the General Conditions of Contract. Whenever there is a conflict, the provisions herein shall prevail over those in the General Conditions of Contract. The corresponding clause number of the General Conditions of Contract is indicated in parentheses.

1. **Definition (GCC clause 1.0)**
   a) Owner means: IIT Roorkee.
   b) Site means the project site situated in IIT Roorkee Main Campus, Saharanpur Campus and Greater Noida Extension Centre (GNEC).

2. **Security Deposit**:
   (i) Total Security Deposit The (Earnest Money Deposit) EMD of the successful Bidder shall form a part of the Total Security Deposit and to be deposited as per critical data sheet.
   (ii) Release of Security Deposit: Security Deposit will be refunded by the Owner after completion of Defect Liability Period i.e. **6 months** from date of virtual completion.

3. Performance Security Within Ten days (10) after the Bidder's receipt of Notification of Award, the Bidder shall furnish Performance Security to the Owner for an amount of 5% of the accepted bid Value in the form of Cash or Bank Guarantee from Nationalized /Scheduled Bank to the Owner. The Performance security shall be refunded/returned to the bidder on completion of work and recording of the completion certificate.

4. **Payment against Running Bills:**

The Bidder shall be paid for the work done against running bills to be raised not more than monthly. The Final bill will be certified within 60 days from the date of submission. The following payment will be recovered from the bills: Statutory deductions like income Tax, Cess under Building and Other Construction Workers Welfare Cess Act, 1996 etc. as applicable. Any other recovery if becomes due.

4.1.1 Payment:

1. No advance payment shall be made.
2. Payment shall not be released against 1st R/A bill until submission of following documents by bidder to the Owner:
   a) GST Invoice with revenue stamp.
   b) EPF & ESI deposit proof
   c) Insurance – Bidder's All Risk (CAR) Policy, Workmen compensation policy and Third-Party Liability Insurance (if applicable)

4.1.2 Basis of Payment in RA bills

Payment in RA bills shall be based on quantity of work executed at site (as per the item of work) & verified by Owner as per the item rate in work orders. Owner is authorized to allow part rate/reduced rate for any item of work.

4.1.3 Disallowance of payment

If payment has been made in RA bill for any item of work but later on some defect is noticed, Owner/Architect is authorized to disallow the payment in the subsequent bills till rectification of the work.

4.2 Final bill

The final bill shall be submitted by the contractor in the same manner as specified in interim bills within three months of physical completion of the work or within one month of the date of the final certificate of completion furnished recorded by the Engineer-in-Charge whichever is earlier. No further claims shall be made by the contractor after submission of the final bill and these shall be deemed to have been waived and extinguished. Payments of those items of the bill in respect of which there is no dispute and of items in dispute, for quantities and rates as approved by Engineer-in-Charge, will, as far as possible be made within three months.

The Contractor will arrange safety gear. such as safety shoes, safety helmets. gloves, etc., for the manpower deployed at his own cost. If the manpower is found not wearing safety gear, a penalty of Rs. 200 per violation will be imposed by the EIC.

4.3 Manpower Engagement .

The Contractor shall engage required manpower separately in order to ensure timely execution of works.

5. Liquidated Damages

0.5% per week of balance/unattended work subject to a maximum of 5% (Five percent) of the Contract value from the stipulated date of completion.

6. Resolution of Disputes

In case the parties don't agree to the advice of owner, then the Director, IIT Roorkee shall appoint a sole arbitrator within 30 days of receipt of request forthwith. The arbitration shall be governed by Arbitration and Reconciliation Act 1956.

7. Notices

For the purpose of all notices, the following shall be the address of the Owner and the Bidder.

Owner: Dean Infrastructure,
Institute Works Department,
Indian Institute of Technology Roorkee

Bidder: _____

(To be filled in at the time of Signing of the Contract)

8. Resolution of Disputes & Arbitration

Except where otherwise provided in the contract all questions and disputes relating to the meaning of the specifications, design, drawings and instructions here in 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 works or the execution or failure to execute the same whether arising during the progress of the work or after the cancellation, terminations, completion or abandonment thereof shall be dealt with as mentioned hereinafter.

If the bidder considers any work demanded of him to be outside the requirements of the contract or disputes any drawings, record or decision given in writing in connection with or arising out of the contract or carrying out of the work, he shall promptly within 15 days request the Owner in writing for written instruction or decision.

If the Bidder is dissatisfied with this decision, the Bidder shall within a period of 30 days from receipt of the decision, give written notice to the IIT Roorkee for appointment of Arbitrator failing which the said decision shall be final binding and conclusive and not referable to adjudication by the Arbitrator.

Except where the decision has become final, binding and conclusive in terms of Sub Para (i) above disputes or difference shall be referred for adjudication through arbitration by a sole arbitrator appointed by The Director, IIT Roorkee. If reason whatsoever another sole arbitrator shall be appointed in the manner aforesaid. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor. It is a terms 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 IIT Roorkee as aforesaid should act as arbitrator and if for any reason that is not possible, the matter shall not be referred to arbitration at all.

It is also a term of this contract that if the contactor does not make any demand for appointment of arbitrator in respect of any claims in writing as aforesaid within 30 days of receiving the intimation from the Owner that the final bill is ready for payment, the claim of the bidder shall be deemed to have been waived and absolutely barred and IIT Roorkee shall be discharged and released of all liabilities under the contract in respect of these claims. The arbitration shall be conducted in accordance with the provisions of the Arbitration and Conciliation Act, 1996 (26 of 1996) or any statutory modifications or reenactment thereof and the rules made there under and for the time being in force shall apply to the arbitration proceedings under this clause.

"If any dispute which may arise with respect to any term and condition or with respect to the interpretation of any term and condition of the Purchase Order/Work order, which may be issued to the qualified and successful tendered subsequently, the same shall be settled strictly in accordance with and in compliance of the Arbitration procedure which is mentioned descriptively in the Purchase Order/Work Order."

For Purchase Order-

"If any dispute arises out of the interpretation of any clause of this purchase Order/Work Order or with respect to any other mater connected with or arising out of any work/service to be done or completed pursuant to this Purchase order/Work order, the aggrieved party shall first serve the Statement of its Grievances to the other party in which the complete details and description of tis grievance should be mentioned descriptively. The true copies of all the relevant documents shall be filed with this statement by the aggrieved party. Both the parties shall then make utmost endeavor

to settle the disputes amicably amongst themselves.

In the case the parties fail to settle their disputes amicably amongst themselves or if any dispute remains unsettled while other disputes are settled, the aggrieved party shall serve a Notice to the other party and to the Director of the Indian Institute of Technology Roorkee, Intimating its desire To invoke the Arbitration for the settlement of the said disputes or any of the unsettled dispute. Such Notice invoking Arbitration shall strictly be given in compliance of the provisions of the Arbitration & Conciliation Act, 1996 or any other statute in force and ruling the law of Arbitration at that time. Such notice shall grant the time not less than 30 days to other party for the appointment of the Arbitrator.

The aggrieved party shall specifically and in very clear terms mention the points of Reference desired to be referred to the Arbitrator, give out the details and description of the dispute which it tends to get settled by the process of the Arbitration. The Notice invoking Arbitration shall contain the true copies of all the relevant documents on which the aggrieved party shall put reliance in support of its claim.

After service of the Notice invoking Arbitration, the Director of the Indian institute of Technology, Roorkee shall appoint the Sole Arbitrator for resolution of the dispute/s or any of the unsettled dispute/s within a period of thirty clear days from the date of receipt of the Notice invoking Arbitration from the aggrieved party. The Arbitration proceedings shall be commenced strictly in compliance of the provisions of the arbitration a& Conciliation Act, 1996 or any other statute in force and ruling the law of Arbitration at that time. The language of Arbitration proceedings shall English. The venue of Arbitration will be the premises of the Indian Institute of Technology Roorkee.

For the purpose of the provisions of the Arbitration & Conciliation Act, 1996 or any other statute in force and ruling the law of Arbitration at that time and for any legal action with regard to this Arbitration and for the purpose of any matter arising out of Arbitration proceedings under this Purchase Order/ Work Order, the courts situate at Roorkee shall only have the jurisdiction to try the legal Action. In this regard, the Commercial Courts having jurisdiction over Roorkee in the matters pertaining to commercial disputes or action arising out of any Arbitral Award passes during the course of the arbitral proceedings held and commenced in Roorkee (currently the commercial Courts located at Dehradun have jurisdiction over the Commercial disputes and the Arbitral Award passed during the course of the Arbitral proceedings held and commenced in Roorkee) shall only have the jurisdiction to try Such legal action. All the legal proceedings shall be subject to the territorial and geographical jurisdiction of Hon'ble High Court of Uttarakhand."

9. Protection of environment

8.1 The Bidder shall take all reasonable steps to protect the environment on and off the Site and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

8.2 During continuance of the contract, the Bidder and his sub-bidders shall at all times abide by all existing enactment on environmental protection and rules made there under, regulations, notifications and bye-law of the State or Central Government, or local authorities and any other law, by-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority.

8.3 Salient features of some of the major laws that are applicable are given below:

The Water (Prevention and Control of Pollution) Act, 1974 This provides for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. 'Pollution' means such contamination of water or alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.

The Air (Prevention and Control of Pollution) Act, 1981, This provides for prevention, control and abatement of air pollution, 'Air Pollution' means the presence in the atmosphere of any air pollutant', which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.

The Environment (Prevention and Control of Pollution) Act, 1986 This provides for the protection and improvement of environment and for matters connected to herewith, and the prevention of hazards to human beings. Other living creatures, plants and property, 'Environment' includes water, air and land and the interrelationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property.

The Public Liability Insurance Act 1991. This provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by the Central Government.

10. Specification to be followed for execution for execution of works are:

For Civil Works: CPWD Specifications 2019 Vol. 1 and Vol. 2 with up-to-date correction slips. (Hereinafter called CPWD specifications also) and Specification mentioned in this Published document for each project(s).

Sd-
Institute Engineer,
IWD, IIT Roorkee

Undertaking

(On non-judicial stamp paper of Rs. 100/-)

Name & address of the bidder: ……...

NIT No……..……

Name of the work: ……..……

Due Date: ……

I/We have read and examined the Tender document for the work. I/We hereby submit bid for the execution of the work specified for the Institute within the time specified in NIT of quantities and in accordance with the specifications, designs, drawing and instructions in writing referred to the conditions of contract and with such materials as are provided for, by, and in respect of accordance with such conditions so far as applicable.

I/We agree to keep the Bid open for ninety (90) days from the due date of its opening and not to make any modification in its terms and conditions.

Earnest Money as mentioned in the critical data sheet is hereby forwarded in Bankers' Cheque / Demand Draft/ Fixed Deposit Receipt issued by scheduled bank. If I/We, fail to furnish the prescribed performance guarantee within prescribed period. I/We agree that the Institute has to right to forfeit the said earnest money absolutely. Further, if I/We fail to commence work as specified, I/We agree that the Institute has to right to forfeit the said performance guarantee absolutely. The said performance guarantee shall be a guarantee to execute all the works referred to in the Tender documents upon the terms and conditions contained or referred to those in excess of that limit at the rates to be determined in accordance with the provision contained in NIT. Further, I/We agree that in case of forfeiture of Earnest Money or Performance Guarantee as aforesaid, I/We shall be debarred for participation in the re-Tendering process of the work.

I/We undertake and confirm that eligible similar work(s) has/have not been got executed through another bidder on back to back basis. Further that, if such a violation comes to the notice of owner, then I/we shall be debarred for tendering in E&W,IIT Roorkee in future forever. Also, if such a violation comes to the notice of owner before date of start of work, the Engineer-in-Charge shall be free to forfeit the entire amount of Earnest Money Deposit/Performance Guarantee.

I/We hereby declare that I/We shall treat the tender documents drawings and other records connected with the work as secret/confidential documents and shall not communicate information/derived there from to any person other than a person to whom I/We am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.

I/We hereby declare that I/We have no near relative connection by marriage to any staff of the Institute.
The information given in the tender form is correct and best of my knowledge.

Dated: **Signature of Bidder:**

Witness: **Postal Address:**

Occupation:

PERFORMANCE GUARANTEE BOND

In consideration of the Indian Institute of Technology Roorkee having agreed under the terms and conditions of agreement No…… dated…… made between .....And

……(hereinafter called "the contractor(s)")…… for the work……(hereinafter called "the said agreement") having agreed to production of a irrevocable Bank Guarantee for…… (Rupees……only) as a security/guarantee from the contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement,

1. We.....(.hereinafter referred to as "the Bank") hereby undertake to pay to IIT Roorkee (Indicate the name of the bank) an amount not exceeding Rs…… (.....only) on demand by the Indian Institute of Technology Roorkee.

2. We ……..do hereby undertake to pay the amounts due…… and payable (Indicate the name of the Bank) under this Guarantee without any demur, merely on a demand from the Indian Institute of Technology Roorkeestating that the amount claimed is required to meet the recoveries due or likely to be due from the said contractor(s). Any such demand made on the bank shall be conclusive as regards the amount due and payable by the bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding (Rupees.....only).

3. We, the said bank further undertake to pay to the Institute any money so demanded notwithstanding any dispute or disputes raised by the contractor(s) in any suit or proceeding pending before any court or tribunal relating thereto, our liability under this present being absolute and unequivocal.

The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the contractor(s) shall have no claim against us for making such payment.

4. We ……further agree that the guarantee herein contained shall (Indicate the name of the Bank) remain in full force and effect during the period that would be taken for performance of the said agreement, and it shall continue to be enforceable till all the dues of the Indian Institute of Technology Roorkeeunder or by virtue of the said agreement have been fully paid and its claims satisfied or discharged or till Engineer-in-charge on behalf of the Institute certified that the terms and conditions of the said agreement have been fully and properly carried out by the said contractor(s) and accordingly discharges this guarantee.

5. We.....(indicate the name of bank) further agree with the Indian Institute of Technology RoorkeethatIndian Institute of Technology Roorkeeshall have the fullest liberty without our consent and without effecting in any manner our obligations hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by the Indian Institute of Technology Roorkeeagainst the said contractor(s) and to forebear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said contractor(s) or for any forbearance, act of omission on the part of the Institute or any indulgence by the Indian Institute of Technology Roorkeeto the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the contractor(s).

7. We.....(Indicate the name of the Bank) lastly undertake not to revoke this guarantee except with the previous consent of the Indian Institute of Technology Roorkeein writing.

8. This guarantee shall be valid up to.....unless extended on demand by Indian Institute of Technology Roorkee. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to ……(Rupees..... only)and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this guarantee all our liabilities under this guarantee shall stand discharged. Dated the ……day of…… for.....(Indicate the name of the Bank)

CONTRACTORS FOR REMOVAL OF DEFECTSAFTER COMPLETION IN RESPECT OF WATER PROOFING WORKS(BASEMENT/LOWER GROUND FLOOR/UNDER GROUND TANK/ROOF) (IF APPLICABLE)

The Agreement made this……day of.....Two thousand between And ……..……..son of .....(hereinafter called the Guarantor of the one part) and the Indian Institute of Technology Roorkee.

WHEREAS THIS agreement is supplementary to a contract (hereinafter called the contract) dated.....and made between the GUARANTOR OF THE ONE part and the Indian Institute of Technology Roorkee of the other Part, whereby the contractor, inter alia, undertook to render the buildings and structures in the contract recited completely water and leak-proof

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the effect that the said structures will remain water and leak-proof for ten years from the date after the maintenance period prescribed in the contract.

NOW THE GUARANTOR hereby guarantees that water proofing treatment given 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 maintenance period prescribed in the contract.

Provided that the Guarantor will not be responsible for the leakage caused by earthquake or structural defects or misuse of roof or alteration and for such purpose:

(a) Misuse of roof shall mean any operation which will damage proofing treatment, like chopping of firewood and things of the same nature which might cause damage to the roof.

(b) Alteration shall mean construction of an additional storey or a part of the roof or construction adjoining to existing roof whereby proofing treatment is removed in parts.

(c) The decision of the Engineer-in–charge with regard to cause of leakage/seepage 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 Engineer-in–charge at his cost and shall commence the work for the rectification within seven days from the date of issue of the notice from the Engineer-in–charge calling upon him to rectify the defects failing which the work shall be done by the COMMITTEE by some other agency contractor at the GUARANTOR's risk and cost. The decision of the Engineer-in–charge as to the cost payable by the Guarantor shall be final and binding.

That if guarantor fails to make good all defects or commits breach there under then the Guarantor will indemnify the principal and his successors against all loss, damage, cost expense 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 Indian Institute of Technology Roorkee the decision of the Engineer-in-Charge will be final and binding on the parties.

IN WITNESS WHEREOF these presents have been executed by the GURANTOR ……and by …..…… and for and on behalf of the Institute on the day, month and year first above written SIGNED, SEALED AND delivered by GURANTOR in the presence of :

1. …….
2. …….

SIGNED FOR AND ON BEHALF OF, INDIAN INSTITUTE OF TECHNOLOGY ROORKEE BY.....in the presence of:

1. …….
2. …….

CONTRACTOR'S FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF ACRYLIC BASED EXTERIOR FINISHES AND EMULSION FINISHESIN BUILDING AND OTHER WORKS

The Agreement made this……day of ……Two thousand between And ……..……..son of ……..…… (here-in-after called the Guarantor of the one part) and the Indian Institute of Technology, Roorkee.

WHEREAS THIS agreement is supplementary to a contract (hereinafter called the contract) dated……..and made between the GUARANTOR OF THE ONE part and the Indian Institute of Technology Roorkee of the other Part, whereby the contractor, inter alia, undertook to render the acrylic based exterior finishes and emulsion finishes in building and other works in the contract recited completely for above-said work

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the effect that the said painting work - acrylic based exterior finishes and emulsion finishes in building and other works for a **period of three (03) years** against blistering, peeling off from the date of completion of maintenance period or defect liability period prescribed in the contract bond.

Provided that the Guarantor will not be responsible for painting finishes defects caused by earthquake or structural defects or misuse of building and for such purpose:

a) Defects arising from improper building maintenances, including damages caused by dampness or condensation due to such improper maintenance.
b) Damages arising from an Act of God or other cause not due to the negligence of the Contractor.
c) The decision of Engineer – in – Charge with regards to blistering, peeling off acrylic based exterior finishes and emulsion finishes shall de final and binding on the Contractor.

During this period of guarantee the guarantor shall make good all acrylic based exterior finishes and emulsion finishes in building and other works defects and in case of any defect being found, render the acrylic based exterior finishes and emulsion finishes in building and other works to the satisfaction of the Engineer-in–charge at his cost and shall commence the work for the rectification within seven days from the date of issue of the notice from the Engineer-in–charge calling upon him to rectify the defects failing which the work shall be done by the COMMITTEE or by some other agency contractor at the GUARANTOR's risk and cost. The decision of the Engineer-in–charge as to the cost payable by the Guarantor shall be final and binding.

That if guarantor fails to make good all defects or commits breach there under then the Guarantor will indemnify the principal and his successors against all loss, damage, cost expense 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 Indian Institute of Technology Roorkee the decision of the Engineer-in-Charge will be final and binding on theparties.

IN WITNESS WHERE OF these presents have been executed by the GUARANTOR

……andby..... and for and on behalf of the Institute on the day, month and year first above written SIGNED, SEALED AND delivered by GURANTOR in the presenceof:

1.…….

2.…….

SIGNED FOR AND ON BEHALF OF, INDIAN INSTITUTE OF TECHNOLOGY ROORKEEBY … ..... in the presence of:

1. …….

2.……

TECHNICAL SPECIFICATIONS FOR CIVIL WORKS

GENERAL INFORMATION

A. GENERAL:

The work under this tender shall be executed strictly in accordance with constructional and material requirements defined under these specifications. The Contractor shall carefully acquaint himself with these specifications to determine his contractual obligations for the work. The conditions of these specifications will be binding on the Contractor and no deviation shall be permissible unless specifically approved by the Engineer-in-charge in writing. In absence of any detailed Specifications these specification, CPWD specification, latest Indian Standard specifications and code of practice shall become applicable. Wherever the codes and specifications are silent then the same shall be governed by sound engineering practices and the decision of the Engineer-in-charge in matters of interpretation etc., shall be final and binding on the Contractor.

B. DRAWINGS /DIMENSIONS:

Figured dimensions on drawings shall supersede measurements by scale and drawings to a large scale take precedence over those to a smaller scale. Special dimensions or directions in the specifications shall be checked on site. Measurements and other information concerning the existing site on the drawings are believed to be correct, but theContractorshall verify them for himself and also examine the nature of the ground as no claim or allowance whatsoever shall be entertained hereinafter on account of any errors or omissions in the levels or the description of the ground turning out to be different from what was expected or shown on thedrawings.

C. CORRELATION OFDRAWING:

Before commencement of work, the Contractor shall correlate all relevant structural, Construction and services drawings and satisfy himself that the information available is complete and unambiguous. The Contractor shall be responsible for any error / difficulty in execution / damage incurred owing to any discrepancy in the drawings which has been overlooked by him and has not been brought to the notice of the Engineer-in-charge beforeexecution.

D. B.I.S CODES OFPRACTICE:

Wherever any reference is made in the specifications to CPWD specification or **bureau of Indian Standard (IS)** code of practice, it shall be understood to indicate the latest version in usage at the time of construction.

E. In case of any discrepancy between the Schedule of Quantities, the specifications and / or the drawings, given in the tender document the following order of preference shall be observed:

1. Description of Schedule of Quantities.
2. Particular Specification and Special condition, if any.
3. Drawings.
4. C. P.W. D. specifications/ E&W, IIT ROORKEE specification.
5. Latest edition Indian Standard Specifications of B. I. S.

SPECIFICATIONS

1. SPECIFICATIONS FOR EXCAVATION ANDEARTHWORK

1.1 SCOPE

The scope of work broadly includes but is not necessarily limited to the following i.e. clearing of the site, excavation of foundation trenches, back-filling, disposal of surplus earth as required including dewatering, shoring and strutting. Contractor shall provide all tools, labour, equipment and incidentals necessary, required for completion of all aspects of work covered in these specifications.

1.2 TYPES OFSOIL

Contractor shall thoroughly acquaint himself with the types of soil in excavation by an inspection of nature of the ground at site & scrutiny of the investigation details available with the Engineer-in-charge.

1.3 CLEARING THESITE

The site on which the structure is to be built shown on the drawing and the area required for setting out and other operations like road, drains, sheds, etc. should be cleared and all obstructions, loose stones, materials, and rubbish of all kinds, stump, brush wood and trees removed as directed, roots being entirely grubbed up. All useful materials obtained will be the property of the IIT ROORKEE and will be handed over to the Engineer-in-charge. Rejected materials will be removed by the contractor to his own dump.

1.4 GROUND LEVELS AND SITE LEVELPLAN

Before starting the excavations, the requisite block levels of the entire plot shall be taken by the contractor in consultation with the Engineer-in-charge and a proper record of these levels to be kept, which shall be jointly signed by the Contractor and the Engineer-in-charge. A block level plan showing-all the ground levels of the plot shall be prepared and shall jointly be signed by the Contractor and the Engineer-in-charge.

1.5 SETTINGOUT

After clearing the site, and preparing the site level plan, the Contractor will set out the center lines of the building or other involved works and get the same approved from the Engineer-in-charge. It shall be the responsibility of the Contractor to install substantial reference marks; bench marks etc. and maintain them as long as required by the Engineer-in-charge. The Contractor will assume full responsibility for proper setting out, alignment, elevation and dimension of each and all parts of the work.

1.6 EXCAVATIONANDPREPARATIONOFFOUNDATIONSFORCONCRETING

1.6.1 General Foundation trenches shall be dug wet or dry to the dimensions as shown on the drawings or as directed by the Engineer-in-charge. The excavated materials shall be stacked at a sufficient distance away from the edge of the excavated pit so as not to endanger the stability of the sides. The soil heap shall not exceed more than 2 m from the ground.

The contractor shall, at his expense and without any extra charge, make provision for all shoring and strutting, extra excavation in slope, extra excavation in working space, dredging or bailing out water, and the excavation shall be kept free from water when the foundation work is in progress.

If excavation is carried out to greater width, length or depth than specified, extra depth shall be made up by filling in lean concrete and extra length or width by filling in with earth rammed hard or by masonry as shall be borne in full by the contractor.

If required to protect the sides of pits and trenches, timber shoring and strutting shall be erected. The timbering shall be closed or open depending on the nature of the soil and work, and arrangement of timbering including sizes and spacing of members used shall be as approved by the Engineer-in-charge. NO extra charges shall be admissible on this account.

The bottoms of all excavation shall be trimmed and leveled in accordance with drawings / directions of the Engineer-in-charge. The bottoms of all excavation shall be rammed and wetted before deposition of concrete. The contractors shall report to the Engineer-in-charge when the excavation is ready to receive concrete. NO concrete shall be placed in foundations until the contractor has obtained the approval of Engineer-in-charge.

1.6.2 PROTECTION

All foundation trenches and similar excavations shall be strong, fenced and marked with red lights at night for watchmen to avoid accidents. Adequate protective measures shall be taken to see that the excavation does not affect or damage adjoining structures. All measures required for the safety of the excavation, the people working in and near the foundation trenches, property and the people in the vicinity shall be taken care by the Contractor at his own cost, being entirely responsible for any injury and damage to property caused by his negligence or accident due to his construction operations.

1.6.3 STACKING OF EXCAVATEDMATERIALS:

Work for excavation shall include sorting out of useful materials and stacking them on site as directed. Materials suitable and useful for back-filling, plinth, filling, leveling of the plot or other use shall be stacked at convenient places, but not in such a way as to obstruct free movement of men, equipment and vehicles or encroach on the area required for constructionalpurposes.

1.7 BACKFILLING

1.7.1 Earth obtained from excavation (or approved earth brought from out sidefor which no extra payment shall be made) shall be filled in layers as described in 1.7.3 around the foundations and under floors, In case extra earth used for filling is required under floors, plinth protection including sit outs, courtyards, the contractor will do at their own cost. The lump sum offer shall be deemed to include the earth filing required under floors and plinth protection with plinth height shown in Drawing above the bottom of foundation concrete and finishedcourtyardlevelshowninDrawingbelowD PC/copinglevelofthemainbuilding.

1.7.2 QUALITY OFFILL

Fill shall be of well compacted, well graded earth or sand and shall be free from tree stumps, organic matter, seed and peat etc Where earth or sand from source other than excavation at site is used, the quality of such earth or sand shall be the same as that obtained from excavation at site, or superior to it. Fine sand for filling is River Sand. Black cotton soil shall not be used for back filling or plinthfilling.

1.7.3 COMPACTION

The fill shall be spread in layers not exceeding 20 cm thick and each layer shall be watered and thoroughly consolidated by suitable mechanical rollers, rammers, vibrators or other approved plant or system of compaction. The fill material shall be pulverized before depositing in place. An optimum moisture content shall be maintained for the filled materials. Compaction shall be done so as to achieve a drydensity of not less than 90% of the maximum density obtained at optimum moisture content, except for the upper 20 cm layer which shall be compacted to a density of not less than 95% of the maximum density. In order that the fill shall be reasonably uniform through out, the material shall be dumped in place in approximately horizontal layers “Edge dumping”, a process by which the materials is pushed off edge of the fill and allowed to roll down the slope shall not be carried out. If there is traffic over the fill during construction, either by construction equipment or otherwise, it should be routed to make the compaction as uniform load shall be maintainedandalsocareshallbetakentopreventanywedgingaction.

1.8 SURPLUS EXCAVATEDMATERIAL

All excavated material certified as surplus and not useful, shall be removed by the Contractor from the site in an approved manner at his own cost and risk so as indemnify owner from any claims any time of whatsoever nature.

1. SPECIFICATIONS FOR ANTI-TERMITE TREATMENT

2.1 GENERAL

Prevention of termite from reaching the super structure can be achieved by creating a chemical barrier between the ground and the building by treating the soil beneath the building and around the foundations. The work shall be carried out as per CPWD SPECIFICATION or IS 6313 part II. of 2001 or the latest edition. This shall be provided to sides and bottom of trenches and footings including treating the backfill of foundations up to ground level and the vertical surface of wall, and filling of each under floors and treating the surface at ground level 900 mm around thebuilding.

2.2 MATERIAL

Anti termite treatment, shall be carried out strictly in accordance with CPWD specifications using Chloropyrifos (CPP) an **Emulsified concentrate @ 1% concentration or any other approved chemical.**

2.3 PRE-CONSTRUCTION CHEMICALTREATMENT

This is a process in which chemical treatment is applied to a building in the early stages of its construction at the rate specified in CPWD specification or **IS 6313 part II of 2001** or the latest edition. Hand operated pressure pump shall be used for uniform spraying of the chemical. To have proper check for uniform spraying of chemical graduated containers shall be used. Proper check should be kept that specified quantity of chemical is used for the required areas during the operation.

2.4 TIME OFAPPLICATION

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

2.5 DISTURBANCE

The treated soil barriers shall not be disturbed after they are formed. If by chance, treated soil barriers are disturbed, immediate steps shall be taken to restore the continuity and completeness of the barrier system.

2.6 TREATMENTOFCOLUMNPITSANDWALLTRENCHES

a) The bottom surface and the sides (up to a height of above 300 mm) of the excavation made for column pits and trenches shall be treated with the chemical at the rate specified in CPWD specification or IS 6313 Part II of 2001 or the latestedition.

b) After the column foundation and the wall foundation come up, the back fill in immediate contact with the foundation structure shall be treated at the rate specified in CPWD specification or IS 6313 Part II of 2001 or the latest edition of the vertical surface of the substructure for each side If water is used for ramming the earth fill, the chemical treatment shall be carried out after the ramming operation is done by prodding the earth at 150 mm centers close to the wall surface and spraying the chemical with the above dose. The earth is usually returned in layers and the treatment shall be carried out in similar stages. The chemical emulsion shall be directed towards the concrete to masonry surface of the columnsand walls so that the earth in contact with these surfaces is well treated with the chemical.

c) In the case of R.C.C. framed structure with columns and plinth beams and R.C.C basement with concrete, mix is rich and dense (being 1:2:4 or richer), it is unnecessary to start the treatment from the bottom of excavation for columns and plinth beams. The treatment shall start at the depth of 500 mm below ground level. From this depth the back-fill around the columns, beams and R.C.C. basement wall shall be treated at the rate as per CPWD specification or IS 6313 Part II of 2001 or the latest edition. The other details of treatment shall be as laid down in the Clause (b)above.

2.7 TREATMENT OF TOP SURFACE OF PLINTHFILLING

The top surface of the filled earth within plinth wall shall be treated with chemical emulsion at the rate as per CPWD specification or IS 6313 Part II 2001 or the latest direction (surface area) before the sand/sub -grade is laid. Holes up to 50 to70 mm deep at 150 mm centersboth ways shall be made with crow bars on the surface to facilitate saturation of the soil with chemicalemulsion.

2.8 TREATMENTOFJUNCTIONOFWALLANDFLOOR

To achieve continuity of the vertical chemical barrier on inner wall surface from the ground level, small channel 30 X 30 mm shall be made at all the junctions of wall and columns with the floor (before laying the sub-grade) and rod holes made in the channel up to ground level 150 mm apart and the chemical emulsion poured along the channel as per rate of application, mentioned in IS 6313 Part II (2001) or the latest edition soastosoakthesoilrightuptobottom.Thesoilshallbetampedbackintoplaceafterthisoperation.

2.9 TREATEMENTOFSOILALONGEXTERNALPERMIETEROFBUILDING

During progress of work, provide hole in the soil with iron rods along the external perimeter of the building at intervals of about 150 mm and depth 300 mm and filling these holes with chemical emulsion at the rate (as per CPWD specification or IS 6313 Part II of 2001 or the latest edition) per meter of perimeter of the externalwall.

2.10 TREATMENT FOR EXPANSIONJOINTS

Anti-termite treatment shall be supplemented by treating through the expansion joint after the sub grade has been laid as per CPWD specification or IS 6313 Part II of 2001 or the latest edition.

2.11 TREATMENTOFSOILSURROUNDINGPIPESANDCONDUITS

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

2.12 SAFETYPRECAUTIONS

All chemicals used for anti-termite treatment are poisonous and hazardous to health. These chemicals can have an adverse effect upon health when absorbed through the skin, inhaled as vaporsor spray mists or swallowed. Person using or handling these chemicals should be warned of these dangers and advised that absorption through the skin is the most likely source of accidental poisoning. They should be cautioned to observe carefully the safety precautions given below.

These chemicals are usually brought to site in the form of emulsifiable concentrates. The containers should be clearly labeled and should be stored carefully so that children and pets cannot get at them. They should be kept securelyclosed.

Special care should be taken to prevent skin contact with concentrates. Prolonged exposure to dilute emulsions should also be avoided Workers should wear clean clothing and should wash thoroughly with soap and water, especially before eating or smoking. In the event of severe contamination, clothing should be removed at once and the skin washed with soap and water, if chemicals splash into the eyes they should be flushed with plenty of fresh water and immediate medical attention should besought.

The concentrates are oil solutions and present a fire hazard owing to the use of petroleum solvents. Flames should not be allowed nearby during the mixing. Care should be taken in the applications and present a fire hazard owing to the use of petroleum solvents Flames should not be allowed nearby during the mixing.

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.

2.13 GUARANTEE

The contractor shall guarantee through a guarantee bond, the anti-termite work for 10 years from the date of completion of the project, and shall indemnify the Engineer-in-charge against any defects that arise therein during the guarantee period as aforesaid. They shall immediately rectify, any defects that may occur therein, and repair all other damage occurring to any part of the structure on account of defect in Anti-termite treatment, during the guarantee period of aforesaid.

3. SPECIFICATION FOR CAST – IN – SITU REINFORCED CEMENTCONCRETE

3.1 GENERAL

3.1.1 DESCRIPTION

This section covers the requirements for finishing of cement concrete, proportioning, batching, mixing, testing, placing, compacting, finishing, jointing, curing and all other work as required for cast in place reinforced concrete. The contractor shall provide all the materials including cement, steel, labour, equipment, 'form work', scaffolding etc., required for completion of all reinforced concrete works as per drawings and documents. Cement concrete shall be composed of cement, fine aggregate, coarse aggregate, water, with or withoutadmixtureasapproved, proportionedandmixed asspecifiedherein.

3.1.2 RELATED WORK SPECIFIEDELSEWHERE

a) Steelreinforcement
b) Formwork

3.1.3 APPLICABLE CODES ANDSTANDARDS

The codes and standards generally applicable to the work of this section are listed hereinafter.
CPWD specification Volume 1 & 2 2009 or latest
IS 383 Coarse and fine aggregates from natural sources for concrete
IS 456 Code of practice for plain and reinforced concrete IS
516 Methods of testing for strength of concrete
IS 1199 Methods of sampling and analysis of concrete
IS 1838 Performed fillers for expansion joints in concrete non-extruding and resilient type
IS 1946 Code of practice for use of fixing devices in walls, ceiling and floors of solid Construction
IS 2389 Methods of testing of aggregate for concrete's IS
2505 Concrete vibrators, immersion type
IS 2645 Integral cement water proofing compounds
IS 3414 Code of practice for design and installation of joints in buildings
IS 3558 Code of practice for use for immersion vibrators for consolidating concrete IS
4082 Recommendation on stacking and storage of construction materials at
IS 7861 Code of practice for extreme weather concretizing
IS 7861 Recommended practice for hot weather (part I) concretizing IS
8112 Ordinary Portland Cement grade 43
IS 12269 Ordinary Portland Cement grade 53

PART— I

The following clauses are intended to amplify the requirements of the reference document listed above and the contractor shall comply with these clauses

3.2 SUBMITTALS

3.2.1 MaterialReport

3.2.2 Prior to start of delivery of materials required, the following shall be submitted by the contractor to the Engineer-in-charge forapproval

Suppliers and / or sources of all consumable materials including cement, steel, fine and coarse aggregates, water additives, bricks and timber etc.

Quality Inspection Plan to ensure continuing quality control of ingredients by periodic sampling, testing and reporting to the Engineer-in-charge on the quality of materials being supplied.PLANT ANDEQUIPMENT

The contractor shall submit the following to the Engineer-in-charge well in advance.
The proposed program, methods and details of plant and Equipment for be used to testing of ingredients and concrete samples.
The proposed programme, methods and details of plant & equipment to be used for concrete work.

3.3 REPORTS FOR INSPECTION ANDTESTING

During concreting operations, the contractor shall conduct inspection and testing as described under the list of Required tests in this volume and all reports thereon shall be submitted in summary form to the Engineer-in-charge.

3.4 SCHEDULES

Before commencement of the work the contractor shall prepare working schedules of concreting giving dates and rate of pour for each item of work and submit the same to the Engineer-in-charge for their approval.

3.5 MATERIALS

Before bringing to the site, all materials for cement concrete shall be approved by the Engineer-in-charge. All approved samples shall be deposited in the office of the Engineer-in-charge before placing orders for the materials with suppliers The materials brought on to the work shall conform in every respect to their approved samples.

Fresh samples shall be deposited with the Engineer-in-charge whenever type or source of any material changes. The contractor shall check each fresh consignment of materials as it is brought on to the works to ensure that they conform to the specification and / or approved samples.

The Engineer-in-charge shall have the option to have any of the materials tested to find whether they are in accordance with specifications at the contractor's expense. All bills vouchers and test certificates which in the opinion of the Engineer-in-charge are necessary to convince him as to the quality of materials or their suitability shall be produced for his inspection when required.

Any materials which have not been found to the specification and not approved by the Engineer-in- charge shall be rejected forthwith and shall be removed from the site by the Contractor's at his own cost within the time stipulated by the Engineer-in-charge. The Engineer-in-charge shall have the powers to cause the contractors to purchase and use materials from any particular source, as may in their opinion be necessary for the proper execution of work.

3.5.1 CEMENT

Cement shall be provided by the Contractor. On the following types of cement as specified shall be used

a. OrdinaryPortlandCement43gradeconfirmingtoBIS8112-1987

b. OrdinaryPortlandCement53gradeconfirmingtoBIS12269-1987

Cement at site shall be stored in dry weather proof go-downs (or shed) built by the Contractor at his owncosts in stacks which are not higher than 10 bags. The cement go-down shall be constructed as per CPWD specifications. The contractor shall conduct all necessary tests as specified in the IS, at his own cost to ascertain himself on quality of thematerial.

3.5.2 AGGREGATES

a) Aggregates from natural sources shall be in accordance with IS:383 and CPWD specifications. The contractor shall submit to the Engineer-in-charge certificates of grading and compliance from the suppliers for all consignments of aggregate. In addition at site from time to time, the contractor shall test the aggregates in accordance with IS: 2386 parts I, II, III and IV. The contractor shall allow for and provide all necessary apparatus for carrying out each test and for supplying test records to theEngineer-in-charge.

b) For fair faced concrete, the contractor shall ensure that aggregates are free from iron pyrites and impurities which may causediscoloration.

c) The fine aggregates shall be river sand, stone dust or other approved sand. It shall be free from clay, loam, earth or vegetables matter and from salt or other harmful chemical impurities It shall be dean sharp, strong angular and composed of hard siliceousmaterial.

The grading of sand as determined by the method prescribed in IS: 2386 part I shall be within the limits of grading zone III given in Table 1. When the grading falls outside the percentage limits given for sieves other than 600 micron, 300 micron, and 150 micron (I.S) sieves by not more 5 percent, it shall be regarded as fallingwithin this zone. The 5 percent can be excess submission on one moresieves.

TABLE 1

FINE AGGREGATE
I. S.Sieve Percentage passing forGrading

IV	ZONEI	ZONEII	ZONE III	ZONE IV
10 mm	100	100	100	100
4.75 mm	90-95	90-100	90-100	95-100
2 36 mm	60-95	75-100	85-100	95-100
1.18mm	30-70	55-90	75-100	90-100
600 micron	15-34	35-59	35-60	80-100
300 micron	5-20	8-30	8-30	20-65
150 micron	0-10	0-10	0-10	0-15

The maximum quantity of silt as determined by the method prescribed in IS: 2386 Part II shall not exceed 8%. Stone dust shall be within the limits of Grading Zone III given in table 1. When the grading falls outside the percentage limits given for the sieves other than 600 micron and 300 micron (IS) sieves by not more than 5 percent and on 150 micron sieves by not more than 20 percent it shall be regarded as falling within this zone. The 5 percent can be excess summation on one or more sieves.

COARSE AGGREGATE

The coarse aggregate shall be crushed stone or broken stone. Coarse aggregate obtained from crushed or broken stone shall be angular, hay, strong, dense, durable clean and free from soft, friable, thin, flat, elongated flaky pieces. The coarse aggregate should be from the approved source/quarry. Coarse aggregate River shingle or pit gravel shall be rounded, sound hard, clean, non-porous, suitably graded in size with or without broken fragments and free from flat particle of shale, clay, silt, loam andother impurities.

Except where it can be shown to the satisfaction of the Engineer-in-charge than a supply of properly graded aggregate of uniform quality can be maintained over the period of the obtaining the coarse aggregate in different sizes & blending them in correct proportions as and when required.

The maximum size of coarse aggregate shall be such that the concrete can be placed without difficulty so s to surround all reinforcement thoroughly and fill the comers of form work.

3.5.3 WATER

Water used in the works shall be potable water and free from deleterious materials. Water used for mixing and curing concrete as well as for cooling and/or washing aggregate shall be fresh and clean, free from injuriousamountsofoil, salts,acids,alkali, otherchemicalsandorganicmatter.

Water shall be from the source approved by the Engineer-in-charge and shall be in accordance with Clause 4.3 of IS:456.

Before starting any concreting work and whenever the source of water changes, the water shall be tested for its chemical and other impurities to ascertain its suitability for use in concrete for approval of the Engineer-in-charge. No water shall be used until tested and found satisfactory. Cost of all such tests shall be borne by the contractor.

3.5.4 ADMIXTURES ANDADDITIVES

Chemical admixtures are not to be used until permitted by the Engineer-in-charge in case their use is permitted, the type, amount and method of use of any admixture proposed by the contractor shall besubmitted to the Engineer-in-charge forapproval. The contractor shall further provide the following information concerning each admixture to the Engineer-in-charge.

a) Normal dosage and detrimental effects, if any, of under dosage and overdosage.
b) Thechemicalnamesofthemainingredientsintheadmixture.
c) Thechlorideioncontent,ifany,expressedasapercentagebyweightofadmixture.
d) Whether or not the admixture leads to the entertainment of air when used in the manufacturer's recommendeddosage.
e) Where two or more admixtures are proposed to be used in any one mix, the manufacturer's written confirmation of theircompatibility.

In reinforced concrete, the chloride ion of any admixture as determined in accordance with IS: 6925 and the total chloride ion in all admixtures used in concrete mix shall not exceed 0.30 percent by weight of cement. The admixtures when used shall conform to IS: 9103. The suitability of all admixtures shall be verified by trialmixes.

The addition of calcium chloride to concrete containing embedded metal will not be permitted under any circumstances.

Regarding admixtures when used shall be based on lingo-sulphonateswith due consideration to clause 5.2 and 5.30 of IS:7861.

Waterproofing admixtures shall comply with IS: 2645.

3.6 PLANT

The contractor shall obtain the approval of the Engineer-in-charge for all plant items he proposes to use for the manufacture and placing of concrete. The arrangement shall maintain all items of plant at all times in a clean and efficient working condition.

3.7 STORAGE

All goods and products covered by these specifications shall be procured well in advance and stored as specified below.

3.7.1 CEMENT

Cement shall be stored on a raised floor in dry weather **proof & dust free but** well ventilated shed.

Cement bags shall be stacked close together away from external walls and in stacks of not more than ten bags to avoid lumping under pressure.

Cement stored during monsoons or cement expected to be in store for more than eight weeks shall be completely enclosed in 700 micron polyethylene sheet so arranged that the flap closes on the top stack. The contractor shall ensure that protective polyethylene sheet is not damaged at any time during use.

Consignments of cement shall be used in order of delivery. A record shall be kept of the batch numbers of cement deliveries in such a form that the part of the works in which the cement is used can be readily identified. If during delivery or by test, the cement is found to be defective, the same shall be returned back forthwith.

The contractor shall be responsible for the storage of cement at the site and no claim will be entertained in the event of any damage occurring to cement due to faulty storage by the contractors or on account of his negligence.

Cement stored onsite for a period longer than eight weeks shall be tested to the satisfaction of the Engineer-in-charge before it is used in the works. Cement that has failed the tests conducted shallnotbeusedintheworksandshallberemovedfromthesiteimmediatelywithoutfail.

3.7.2 STORING OFAGGREGATE

Aggregates shall be stored on a suitable well drained raft of concrete, timber, metal or other approved material. The storage of aggregates on the ground will not bepermitted.

Each size of aggregate shall be stored separately in such a manner as to prevent spillage and mixing of one aggregate with an adjacent aggregate The dividing walls of any bin shall be of sufficient height and the aggregate shall be so deposited that a distance of 100 mm shall be left between the top of the division wall and any part of the aggregatestack

When stack piling, the aggregate shall not form pyramids resulting in segregation of different size particles. The stacks shall be regular and of a height not exceeding two meters.

3.8 GRADES OFCONCRETE

The grades of concrete shall be in accordance with the following table. The grade of concrete to be used in each section of work will be shown in the drawings or in the Bill of Quantities:

CHARACTERSTIC STRENGTH

Grade of Concrete	**Grade of Concrete Characteristic strength i.e. compressive strength of 15 cm. Cubes at 28 days (N/mm2)**	**Nominal maximum aggregate size (mm)**
10	10	25
15	15	25
20	20	20
25	25	20
30	30	20
35	35	20

Unless otherwise specified in the drawings, the maximum nominal size of coarse aggregates for different grades of concrete shall be as under:

a) For concreting in very narrow space or in verysmallthickness 12mm
b) For all reinforced concrete work except inmassivefoundations 20mm
c) For all ordinary plain concrete and massivereinforcedfoundations 10mm

3.9 MixDesign

At the commencement of the contract, the Contractor shall make preliminary tests to determine the proportions by weight of cement, fine aggregates, coarse aggregates and water necessary to produce required grades of concrete. The mix proportions shall be selected to ensure that workability of the fresh concrete is suitable for the conditions of handling and placing and when concrete hardens, it shall have the required strength, durability and surface finish. The Contractor shall get approval of the Engineer to such proportions before start of concreting. However, such approval shall not relieve Contractor of his responsibility to produce concrete having compressive strengths as laid down in the foregoing table.
No departure from the approved proportions will be permitted during the works unless and until the Engineer gives written authorization for any change in proportion. The Engineer shall have authority at any time to checkwhetherthemixingofconcreteisbeingcarriedoutaccordingtotheapprovedproportions.

For the major and important RC works and for all special works, the design of mixes shall be made by the Contractor at his own cost, for each grade of concrete as well as for various workability. The design of mixes shall be made according to relevant CPWD specification or I.S. codes or to approved standard methods.

The concrete made by designing the mix is termed hereinafter as "Design Mix Concrete".

3.10 Water/CementRatio

Where a particular water/cement ratio is stipulated in the design or drawing along with the characteristic grade of concrete, the design of mix shall be carried out by adjusting the other variable factors to obtain characteristicstrengthofconcretewithstipulatedwater/cementratio.

In the structures where the impermeability and shrinkage of concrete have an important bearing on the durability and serviceability of the structures, such as water retaining structures, basements, underground premises, tunnels, pump houses, exposed structures near sea side or deserts, pre-stressed structure, thin precastmembersetc., the water/cementratioshall bekeptlowandpreferablynotexceeding0.45.

The water cement ratio as achieved in the mix design or as specified in the drawings shall be adhered to strictlyand shall not be varied without the permission of the Engineer.

3.11 Workability

The workability of fresh concrete shall be such that the concrete is just suitable for the conditions of handling and placing so that after compaction, it becomes completely consistent and homogeneously surrounds all the reinforcement and completely fills the formwork.

The workability of fresh concrete at the place of batching/mixing shall be measured by compacting factor test and at the place of disposition by means of slump test. During the finalization of trial mixes, the relationship between compacting factor and slump test shall be established for each grade of concrete as well as for various levels forworkability.

Normally, in the condition of low water cement ratio as well as for medium/high workability, the workability shall be achieved by increasing the cementcontent.

In cases where the cement content is to be limited to reduce the heat of hydration, and the water / cement ratio is also to be kept low to reduce the permeability or due to other requirements the desired workability may be achieved with the use of limited doses of plasticizer or air entraining agent. In such cases, the method of mixing and dosage of the plasticiser / air entraining agent shall be according to the manufacturer's specification and with the approval of theEngineer.

Consistency and workability of concrete shall be checked by measuring the slump of a truncated cone of concrete straight from the mixer under normal working conditions. The slump range of concrete shall be as per the tabulation given below or as per as well as standards.

Slump tests shall be performed as per CPWD specification/IS:1881 at specified intervals established by the Engineer in charge at the Contractor's cost in such a way as to check that the degree of consistency for work in progress is

maintained. The table below gives the general slump range to be followed for various types of construction unless otherwise shown on drawings or instructed by the Engineer.

Various types of construction	....Slump (in mm).	Max.	Min.
Reinforced foundation walls and footings		80	35
Plain footings, caissons and structure walls		75	30
Compressor foundations and for heavy mass	constructions	50	20
Pumps and other misc.equipmentfoundations		75	
		35Columns, slabs,	
beams andreinforcedwalls		100	50

3.12 Durability

The durability of concrete, depending on the exposure condition, is to be taken into account while designing the mix. For given aggregates, the cement content should be sufficient to make sufficiently low water/cement ratioandAppendixAofIS:456shallbetakenasguidelinefordurabilityconsiderations.

3.13 TrialMixes

After approval of the mix design by the Engineer, the Contractor shall make in presence of the Engineer the trial mixes for each grade of concrete as well as for requiredworkability. Before starting the trial mixes, necessary preparatory works like determination of sieve analysis of the aggregates, densities of different ingredients, moisture contents in the aggregates, shall be completed according to the CPWD specification or relevant BIS Codes. Each trial mix shall be handled and compacted by the method which the Contractor proposes to use for that mixinthe worksandthemixesshallnot showtendencyofinadequatecompactionbythemethodproposed.The compacting factor and the slump of each trial mix shall be determined immediately after mixing and the values shall not exceed the maximum value obtained in the mix design.

Six (6) 150 mm test cubes shall be made from each trial mix. These shall be cured and tested in accordance with CPWD specification or relevant BIS codes. In order to have the specified characteristic strength in the field, the concrete mix as designed in the design mix shall have higher average compressive strength depending on the degree of quality of control atsite. Before commencement of the concreting works of particular grade of concrete, the Contractor must complete the work of trial mixes and subsequent testing of the test cubes obtained there from and the desire of the approved mix for that particular grade ofconcrete.

The entire cost of all the trial mixes including all the preparatory works for trial mixes, preparationof test cubes and their testing shall be borne bythe Contractor.

3.14 Nominal MixConcrete

Nominal mix concrete may be used for all concrete of grade M-20 and below. If design mix concrete cannot be used for any reason for grade M-15 and M-20, nominal mix concrete may be used with the permission of the Engineer. Nominal mix concrete shall be in accordance with Table-3 of clause 8.3 of I S 456. The stipulationsofclauses8.3.1and8.3.2ofIS:456shallalso betakenintoconsideration.

3.15 Volumetric MixConcrete

Where concrete is specified in volumetric proportions such as 1:5:10, 1:4:8, 1:3:6, 1:2:4, 1:1.5:3, 1:1:2 etc., in the Bill of Quantities, coarse & fine aggregates shall be measured by volume & cement by weight. The water cement ratio shall be within 0.45 & 0.70 depending upon the workability.

3.16 Batching ofConcrete

3.16.1 Cement

Cement shall always be batched by weight. A separate weighing device shall be provided for weighing cement. Where the weight of cement is determined by accepting the weight per bag, a number of bags shall be weighed separately to determine the average net weight of cement per bag and the same shall be checked regularly.

3.16.2 Aggregates:

For both design mix concrete and nominal mix concrete, the aggregates,(coarse and fine) shall be batched by weight. In particular cases, or where weight-batching is not possible, proportioning by volume batching may be allowed by the aggregates throughout the period of construction. For this purpose, the Contractor shall submit to the Engineer sufficient data indicating the weight/volume relationship of the aggregates shall be made by the Contractor to the satisfaction of the Engineer. Where aggregates are moist and volume batching is adopted, allowance shall be bulking in accordance with IS (PartIII). Suitable adjustments shall be made for the variation in the weight of aggregates due to variation in their moisture contents.

3.17 Water

3.17.1 General

Water may be measured either by weight or by volume. When measured by volume, it shall be by well calibrated conical shaped jar or vessel or from a calibrated tank filled to the mixer.

Adjustment of Water Due to Moisture Contents in Coarse and Fine Aggregates It is very important to maintain the water cement ratio constant at its correct value. For the correct determination of the amount of water to be added in the concrete mix, to maintain the water cement ratio constant, the amount of moisture content in both coarse and fine aggregates shall be taken into consideration, be checked as frequently as possible,thefrequencyforagivenjob beingdeterminedbytheEngineeraccordingtoweathercondition.

Determination of Moisture Content in the Aggregates

Determination of moisture content in the aggregates shall be according to IS 2386 (Part-III). Where tests are not conducted, the amount of surface water may be estimated from the following table:

Aggregates	Surfacewater	Carried byAggregates
	% by weight	l/m3
Very wet sand	7.50	120
Moderately wet sand	5.00	80
Moist Sand	2.50	40
Moist gravel stone chips*	125.25	20-40

• coarser the aggregate, less the water it willcarry

3.17.2 Admixtures

Any solid admixture, to be added, shall be measured by weight, but liquid or semi-liquid admixture may be measured by weight or volume. The Bidder shall indicate the brand name, the Manufacturer and the properties of any admixture to be used forthe concrete as per Bill of Quantity items or on his owninitiative.

3.17.3 Admixtures

Any solid admixture, to be added, shall be measured by weight, but liquid or semi-liquid admixture may be measured by weight or volume. The Bidder shall indicate the brand name, the Manufacturer and the properties of any admixture to be used forthe concrete as per Bill of Quantity items or on his owninitiative.

3.17.4 Accuracy ofBatching

The accuracy of batching shall be within the following tolerance:
1. Cement within + 2% byweight
2. Aggregate within + 5% byweight
3.Waterwithin + 0.5% byweight.

3.17.5 Admixtures

Any solid admixture, to be added, shall be measured by weight, but liquid or semi-liquid admixture may be measured by weight or volume. The Bidder shall indicate the brand name, the Manufacturer and the properties of any admixture to be used forthe concrete as per Bill of Quantity items or on his owninitiative.

3.17.6 Accuracy ofBatching

The accuracy of batching shall be within the following tolerance:
3. Cement within + 2% byweight
4. Aggregate within + 5% byweight
3.Waterwithin + 0.5% byweight.

3.17.7 Admixtures

Any solid admixture, to be added, shall be measured by weight, but liquid or semi-liquid admixture may be measured by weight or volume. The Bidder shall indicate the brand name, the Manufacturer and the properties of any admixture to be used forthe concrete as per Bill of Quantity items or on his owninitiative.

3.17.8 Admixtures

Any solid admixture, to be added, shall be measured by weight, but liquid or semi-liquid admixture may be measured by weight or volume. The Bidder shall indicate the brand name, the Manufacturer and the properties of any admixture to be used forthe concrete as per Bill of Quantity items or on his owninitiative.

3.17.9 Admixtures

Any solid admixture, to be added, shall be measured by weight, but liquid or semi-liquid admixture may be measured by weight or volume. The Bidder shall indicate the brand name, the Manufacturer and the properties of any admixture to be used forthe concrete as per Bill of Quantity items or on his owninitiative.

3.17.10 Accuracy ofBatching

The accuracy of batching shall be within the following tolerance:
5. Cement within + 2% byweight
6. Aggregate within + 5% byweight
3.Waterwithin + 0.5% byweight.

3.18 Mixing ofConcrete

3.18.1 MachineMixing

Concrete shall always be mixed in mechanical mixer. Water shall not, normally, be charged into the drum of the mixer until all other ingredients are already in the drum and mixed for at least one minute. Mixing shall be continued until there is uniform distribution of materials and the mass is uniform in colour and consistency. The mixing time from the time of adding water shall be in accordance with IS 1791, but in no case less than 2 minutes or at least 40revolutions.

3.18.2 HandMixing

When hand mixing is permitted by the Engineer, it shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. In case, ofhandmixing, 10%extracementshallbeaddedtoeach batch atnoextracosttoEMPLOYER,

3.19 Transportation ofConcrete

Concrete shall be transported from the place of mixing to the place of placing concrete as rapidly as practicable by any means, which will prevent the segregation or loss of any of the ingredients and maintain the required workability. No water shall be mixed with the concrete after it has left themixer.

Where concrete is transported over long distances, the Contractor shall provide suitable means by which different grades of concrete are readily identifiable at the place of final deposit.

3.20 Preparatory Works/SurfacePreparation

3.20.1 For Concrete Directly on EarthFoundation

Earth foundation on which direct placement of concrete is specified, shall be rammed and consolidated as directed by the Engineer such that it does not crumble and get mixed with concrete during or after placement. If the foundation is quite wet, the same shall be kept dry and then sufficiently consolidated, if necessary, a thin top layer of the wet soil shall be removed and replaced by sand or other suitable materials as directed by the Engineer, Care shall also be taken that earth from the sides also does notgetmixedwiththeconcrete,duringorafterplacement,beforeithassufficientlysetandhardened.

The earth foundation, over which concrete is to be placed directly, shall not be kept abandon at the specified level and concrete shall be placed immediately following otherwise suitable measures shall be taken, as directed by the Engineer **without extra cost** to EMPLOYER.

3.20.2 For ConstructionJoints

Concrete shall be cast, as far as possible, continuously until the parts of structure to be built are finished. Should this not be feasible, the type, number and location of construction joints shall be approved by the Engineer prior to placing concrete.

All such joints shall have continuous square bond grooves to produce substantial and water-tight-key and the exposed faces of joints shall be monolithic with the main mass of concrete formed and completed under substantially shattered faces. The Contractor shall take all the necessary steps by means of timber edgings etc. to ensure an exact horizontal straight finish to outside edge of any lift of concrete. Subject to the approval of the Engineer, the Contractor is at liberty to arrange his own construction joints but the following restrictions are to be observed:

1. There shall be no vertical constructionjoints
2. No longitudinal joints shall be made in the walls and floors of trenches and pits unless otherwise shown in thedrawings.
3. Concretepouringshallbereasonablylarge, butinnocaseshalltheheightof pouring concrete exceed 1.5 m without the Engineer's firm approval. Such approval of the Engineer shall not in any way relieve the Contractor of his responsibility to ensure that the construction is water tight and that no segregation takesplace.
4. Laitance shall be removed from the surface of concrete before it has set hard by washing and wire brushing so as to expose the stones of the top layer without undue erosion of the mortar or damage to the under layingconcrete.

All beds and joints in concrete faces, which have become set, are to be picked all over and all loose materials removed before fresh concrete is deposited thereon. The indentations shall be at least 12 mm deep and not lessthanseventy-fivepercentoftheareaoftheexistingconcretefacetobecoveredover.

Immediately before depositing fresh concrete, the exposed surface shall be cleaned of foreign matter by further wire brushing, if necessary. It shall then be thoroughly washed and surplus water removed. The surface, while still moist, shall be covered with layer of 1:1 cement mortar which must be vigorously stippled into the surface by means of a stiff brush, the depositing of the fresh concrete following on closely. Pockets to form keys shall be left in the surface of the concrete at constructional joints, 75 mm deep and approximately **equal to 20% of the exposedsurface.**

All costs in connection with the forming of construction joints shall be to the account of the Contractor and shall be deemed to be included in the rates for concreting and formwork and shall not be separately paid for. In a column, the joint shall be formed 75 mm below the lowest soffits of the beams, including haunches, if any.

Concrete in a beam shall be placed throughout without a joint but if the provision of a joint is unavoidable, then the joint shall be vertical and at the centre of or within, middle third of the span, unless otherwise shown on the drawings.

3.20.3 On Vertical Surfaces of Masonry

When the concrete is placed on the vertical surface of masonry (as in the case of thin concrete fins projected from the vertical masonry surface), a groove of dimension as directed by the Engineer shall be cut in the masonry to ensure a proper bond and the surface shall be cleaned thoroughly. Before the placement of concrete, the surface shall be kept moist by spraying water at least for the period of 2 hours and a thick coat ofcementslurryshallbe appliedimmediatelybeforetheplacementofconcrete.

Inside the Form Works (Cleaning, Surface Preparation etc.)

The interior of the form works, where the concrete is to be placed, shall be thoroughly washed by high pressure water jet or air jet to completely clean the entire volume from the dirts, grease/oil foreign and deleterious materials etc. The reinforcements shall be completely cleaned and free from all sorts of dirts grease/oil, rust, foreign/deleterious materials etc. Before placement of concrete, the form works coming in contact with concrete, shall be coated highly with form oil or raw linseed oily material or provided with any approved material to prevent adhesion of concrete to the form work, but utmost care shall be taken so that such oily material does not come in contact with thereinforcement.

3.21 Placing and Compaction ofConcrete

Before placing the concrete, the Contractor shall ensure that:

1. Allmixingandplacingequipmentisthoroughlycleaned
2. All concreting space is free from debris andrubbish
3. All forms have been thoroughly wetted or oiled and firmly installed in line and plumb to the Engineer'sapproval.
4. All reinforcement is cleaned of loose rust, scales and other injurious adherents and is firmly bound andcorrectlyplacedandhasbeensoapprovedbytheEngineer.
5. All inserts, sleeves, foundation bolts and embedded parts have been correctly and firmly installed to conform to the Engineer's drawings and have been carefully checked to comply with the drawings. Special care shall be taken to locate and check sleeves or inserts, which may not be symmetrically placed with respect to centrelines.

The Contractor and Engineer shall separately inspect and check the above mentioned points and record and sign the results in a register which shall be maintained by the Contractor in a approved form. No concrete shall be placed without the Engineer having inspected and approved in writing. Inspiteof ensuring the above requirements, the Contractor shall fill pour cards furnishing the necessary details of the job, duly signed by the Engineer. This, however, will not absolve the Contractor from his responsibility to correctly execute the work. Pour cards shall contain the followinginformation:

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Design Index

- Date
- Slump
- Workability
- Work testspecimen
- Typeoffinishingandadmixturesused(ifany)
- Period of removal ofshuttering/props/forms.

a. The concrete pouring method shall be submitted to the Engineer for approval and shall always be such as to avoid any possibility of segregation of the components or shifting of thereinforcement.

b. Special grout or mix shall be used for difficult and intricate locations as specified by the Engineer. During placing, the concrete shall be thoroughly worked around reinforcement, embedded parts and corners of theformwork.

c. Greatest possible care shall be taken by the Contractor that reinforcement and embedded parts, particularly foundation bolts and sleeves, are not displaced during placement of concrete. While concreting mats and other such locations where top and bottom reinforcement are adopted, top reinforcement shall be thoroughly cleaned of all slurry and mortar sticking to them at the time of concreting toplayers.

d. The concrete shall be placed and compacted before setting commences and should not be subsequently disturbed. No water shall be mixed with the concrete after it has left the mixer. Method of placing should be such as to preclude segregation. Approved mechanical vibrator shall be used for compacting concrete, and concrete shall not be non vibratedor under vibrated. No concrete shall be placed until the place of deposit has been thoroughly inspected and approved by the Engineer, all inserts and embedment properly secured in position and checked and forms properly oiled. No concreteshallbeplacedintheabsenceoftheengineer.

e. Concrete shall be placed on clean bed having the designed level. The bed shall be cleanedof all debris and other objectionable materials. Seepage water, if any, shall be controlled ordiverted.

f. Concreting shall not be carried on during rains unless all precautions have been taken by the Contractor and necessary permission has been given by the Engineer. Suitable measures shall be taken to control the temperature ofconcrete.

g. Where plums are permitted in massive concrete, they shall be washed and carefully placed. No stone shallbecloserthan30cmtoanexposedface, nornearerthan15cmtoanadjacentstone.

h. Concrete shall not be dropped from a height of more than 2 m except through a chute, the design and type of which shall be subjected to approval of theEngineer.

i. The concrete shall be placed, spread and compacted by approved mechanical vibrator. Vibrators shall not be used for pushing concrete to adjoiningareas.

j. For members involving vertical placing of concrete (e.g. columns, walls etc.), each lift shall be deposited in horizontal layer extending for the full width between shuttering and of such depth that each layer can be easily and effectively vibrated and incorporated with the layer below by means of compaction beingemployed

k. For members involving horizontal placing of concrete (e.g., slabs, beams etc.), the concrete shall be placed along the line of starting point in such quantities as will allow members to be cast to theirfull depth along the full width between side shuttering and then gradually brought towards the finishing point along its entire front parallel to the starting line. Vibration and surface finish shall follow behind the placement as closely aspossible.

l. Utmost care shall be taken to avoid the displacement of reinforcements/ embedded parts ormovement of form work or damage to faces of the form work or transmission of any harmful vibration/shocks to the concrete which has not yet hardenedsufficiently.

m. All members shall be concreted at such a rate that no cold joint is formed and fresh concrete is placed always against green concrete, which is still plastic andworkable.

n. Should any unforeseen occurrence result in a stoppage of concreting for one hour or such other time as might allow the concrete, already placed, to begin to set before the next batches can be placed, the Contractor shall make at his own cost, suitable tongue, and groove construction joint, as approved by the Engineer. Any additional reinforcement required as directed by the Engineer shall also be provided by the Contractor at his own cost. Before placement of new batches of concrete over that construction joint, the surface preparation according to this specification stipulated earlier, shall be done by theContractor.

o. The concrete shall be worked well up against whatever surface it adjoins and compacted to such a degree that it reaches its maximum density as a homogeneous mass, free from air and water holes and penetrates to all corners of moulds and shuttering and completely surrounds the reinforcement. All measures shall be taken to make the shape, size, and location of the finished concrete including its embedment, holes, openings etc, well within the accepted tolerancelimit

3.22 ConstructionJoints

Normally, the construction joints including crack inducing joints shall be constructed as per locations and details indicated on the drawings. Where the location of the joint is not specified in the drawings, it shall be in accordance with the following guidelines. In all construction joints, the reinforcements shall pass through as per drawingsand the same shall not be disturbed in any way.

a) InColumns

i) In case of Projection from **Basement Slab, 300 mm from the top of base slab or 75 mm from the top of the haunches whichever ishigher.**

ii) In framing the beam at different elevation, 75 mm below the lowest soffit of the beam and in caseof projection from beams and slabs 75 mm from the top surface of the beam/slab or at the top surface of beam/slab whichever facilitatesformwork.

iii) Forcolumnsbelowflatslabs, 75mmbelowthelowestsoffitoftheslab.

b) In Walls (Horizontal ConstructionJoints)

i) For WallsProjectingFromBaseSlab, 300mmfromtopofbaseslab.

ii) ForWallssupportingthesuspendedslab,75mmfromthelowestsoffitoftheslab.

Note: In the case of water retaining structures and structures under the influence of ground water, approved water bars of suitable size shall be provided to make the joint completely watertight.

c) InBeams

Beams shall be cast, as a rule, without a joint. But if provision of a joint is unavoidable, the joints from simply supported beam shall be vertical and at the middle of the span; in continuous beam, the same shall be at the point of minimum shear force.

d) In SuspendedSlabs

i) In slab of small span, there shall be reconstructionjoints.

ii) In slabs of large span and continuous slabs, the Construction joint, if allowed by the Engineer, shall be vertical at the middle of span and at right angles to the principalreinforcement.

e) In Walls (Vertical ConstructionJoint)

As a rule, walls shall be cast monolithically without any vertical construction joint, unless specified in the drawing. However, for a long wall, Engineer may allow vertical construction joint and the same shall be at the place of minimum shearforce.

f) In Slabs Resting onGround

i) For PlainConcrete

Concreting shall be done in alternate panels not exceeding 10 m^2 in area. The largest panel dimension shall be 5 m.

ii) ForNominallyReinforcedSlabThearea ofpourshallnotexceed40m^2andthe maximum panel dimension shall not exceed8m.

iii) For the Basement Slabs Which Act as Structural Member There shall be no constructionjoint.

g) In Ribbed Beams The beams shall be monolithic with the slab in onecontinuous operation.

3.23 Cold Joints:

An advancing face of pour, which could not be covered before expiry of initial setting time for unexpected reasons, is called a cold joint. The Contractor shall remain always vigilant to avoid cold joints. If however, a cold joint is formed due to unavoidable reasons, the following procedures shall be adopted for treating it:

1. If the concrete is so green that it can be removed manually and if vibrators can penetrate the surface without much effort, fresh concrete can be placed directly over the old surface and the fresh concrete along with the old concrete shall be vibrated systematically andthoroughly.

2. In case the concrete has hardened a bit more than (1), but can still be easily removed by a light hand pick, the surface shall be raked thoroughly and the loose concrete removed completely without disturbing the rest of the concrete in depth. Then a rich mortar layer of 12 mm thickness, shall be placed on one cold joint and then the fresh concrete shall be placed on the mortar layer and vibrated thoroughly penetrating deep into the layer ofconcrete.

3. In case the concrete at the joint has become so stiff that it cannot be remoulded and mortar or slurry does not rise in spite of extensive vibration, a tongue and groove joint shall be made by removing some of the older concrete and the joint shall be left to harden at least for 12-24 hours. It will then be treated as regular construction joint and the surface preparation of the same, before placement of concrete, shall be as described in the appropriate clauses of thesespecifications.

3.24 Sub-standardconcrete

Should the work strength of controlled concrete fall below the specified strength, Engineer shall decide:

1. To reject the work, in which case the Contractor shall replace the defective work with concrete of required strength and bear all costs for dismantling and replacing including cost of associated form work,reinforcement,embeddedparts&allassociatedworks.

2. To accept the work at a reduced rate, in which case the unit rate payable for sub-standard work will be reduced by EMPLOYER, directly in proportion to the work strength as compared to the specified strength. The Engineer may, in addition, require other tests performed on the respective structural member so accepted period to its acceptance with or without necessary corrective measures and in each such case, the Contractor shall bear all costs for all such tests or corrective measures, besides the reduction in the unit rates as specifiedherein.

3. Concreteofstrengthbelowfifteen(15)percentofthespecifiedstrengthwillnotbe accepted.

4. The test load shall be 125% of the maximum superimposed load for which the structure was designed. Such test load shall not be applied before 56 days after the effective hardening of concrete. During the test, struts strong enough to take the whole load shall be placed in position leaving a gap underthemembers.Thetestloadshallbemaintainedfor24hoursbeforeremoval.

5. If, within 24 hours of the removal of the load, the structure does not show a recovery of at least 75% of the maximum deflection shown during the 24 hours under load, the test loading shall be repeated after a lapse of alteast 72 hours. The structure shall be considered to have failed to pass the test if the recovery after the second test is not at least 75% of the maximum deflection shown during the second test. If the structure is certified as failed by the Engineer, the cost of the load test shall be borne by theContractor.

3.25 OptionalTests

The Engineer, if he so desires, may order tests to be carried out on cement, sand, coarse aggregate, water in accordance with the relevant Indian Standards.

Tests on cement shall include
1. Finenesstest
2. Test for normalconsistency
3. Test for settingtime
4. Test forsoundness
5. Test for tensilestrength
6. Test for compressivestrength
7. TestforheatofhydrationbyexperimentandbycalculationinaccordancewithIS:269.

Tests on sand shall include
1. Sievetest.
2. Test for organic impurities.
3. Decantation test for determining clay and siltcontent.
4. Specific gravitytest.
5. Test for unit weight and bulkagefactor.
6. Test for sieve analysis and finenessmodulus.

Tests on coarse aggregates shall include
1. Sieveanalysis.
2. Specificgravityandunitweightofdry,looseandroddedaggregate.
3. Soundness and alkali aggregatereactivity.
4. Petrographicexamination.
5. Deleterious materials and organicimpurities.
6. Test for aggregate crushingvalue.

Any or all these tests would normally be ordered to be carried out only if the Engineer feels the materials are not in accordance with the specifications or if the specified concrete strengths are not obtained and shall be performed by the Contractor at an approved test laboratory at the cost of the Contractor. If the work cubes do not give the stipulated strengths, the Engineer reserves the right to ask the Contractor to dismantle such portions of the work which, in his opinion, are unacceptable and re-do the work to standards stipulated, at the Contractor's cost. The unit rate for concrete shall be all inclusive, including making preliminary mix design and test cubes works, cubes, testing themas per specification, slump tests, optional tests etc.,

3.26 Concrete for Equipment or steel structuresfoundations:-

Concrete for equipment foundation, whether principal or auxiliary, shall be poured continuously so that the structure becomes monolithic, particular care being exercised to see that the base slabs, if any, are of compact impervious construction. Tunnels, passages, apertures and so forth shall be provided in accordance with the drawings for the installation of mechanical and electrical equipment, pipes or cables. The top elevation of the equipment foundations or parts shall be accurately cast to 20/50 mm (or more as may be specified on the drawings) above the level required for grouting and it shall be pneumatically chiseled off and well roughened just prior to the erection of the equipment concerned. All embedded anchor bolts or bolt sleeves shall be accurately and firmly set with the aid of approved templates, steel supports and/or other accessories. For holding the embedded bolts or sleeves in the correct position during concreting, template shall have to be of steel of suitable section approved by the Engineer. Two sets of templates shall have to provided, one to hold the bottom and the other the top of the bolts or sleeves. The bottom template shall be securely and rigidly fixed by providing anchorage arrangement and by welding to the lowest part of the steel reinforcement and other structural supports. The top templates shall be securely fixed by tying with guy wires and turn buckle arrangements to firm and rigid adjoining structures and staging. The bottom template that is embedded in concrete will be measured and paid for as embedded steel. Bolt pockets, where required, shall be cast with wooden taper wedges. These shall be withdrawn at an appropriate time when the concretehas set, the pockets cleaned, roughened and then covered or blocked thoroughly to prevent debris getting into these. The exposed portions of bolts and embedded parts shall be kept well greased and adequately protected from damage throughout construction. Any damages found shall have to be corrected at the Contractor's cost. EMPLOYER, shall have the right to use the foundations, pads, piers, slabs, floors and all concrete work as needed for other works or equipment erected prior to its "TakingOver".

3.27 Requirement for Concreting in Special Cases

3.27.1 **Concreting in DeepLifts**	**N.A.**
3.27.2 Concreting UnderWater	**N.A.**
3.27.3 Cold WeatherConcretingN.A.	
3.27.4 Hot WeatherConcreting	**N.A**

3.27.1 Concreting in Large Pours (MassConcrete) N.A.

3.28 Finishes to Exposed Surface ofConcrete

The Contractor is to include his quoted rate for concrete, the provision of normal finishes in both formed and unformed surfaces as and where required by the Engineer without any extra cost to EMPLOYER, Some common finishes are indicated below:

3.28.1 Surfaces which do not RequirePlastering

Surface in contact with casing shall be brought to a fair and even surface by working the concrete smooth against casings with a steel trowel while it is being deposited and also by working over the surface with a trowel immediately after the removal of the casings or centering, removing any irregularities and stopping air holes, etc. Use of mortar plaster is not permissible for correcting levels, removing unevenness etc. However, if in the opinion of the Engineer, such plastering is unavoidable, then the thickness of plaster shall in no case exceed 6 mm and the plastering shall be in CM(1:3).

3.28.2 Faces of Foundations which will be BackFilled

Neither the smoothness of the surface not the positions of the joints in the form work are important. Small blemishes caused by entrapped air are permitted. No special surface finish is required.

3.28.3 ExposedSurfaces

Surface of beams/columns flushing with the block work or other structures where it is intended to plaster, shall be hacked adequately as soon as the shuttering is stripped off so that proper bond with the plaster can develop.

3.28.4 Surface for Non-integralFinish

Where a non integral finish such as floor finish is specified or required, the surface of the concrete shall be struck off at the specified levels shall be furnished and finished rough.

3.28.5 For MonolithicFinish

Where no more finishing course is to be supplied as in the case of basement floor, industrial flooring or the screed concrete flooring etc., the concrete shall be completed and struck off at the specified levels and slopes in a screed board and then floated with a wooden float. Steel trowel ling is then started after the concrete has hardened enough to prevent the excess of fines and water to rise to the surface but not hard enough to prevent proper finishing. Trowelling shall be such that the surface is flat, smooth and neatly finished.

3.29 Curing ofConcrete

3.29.1 General

The purpose of curing is either to provide sufficient water at optimum temperature or to prevent loss of moisture from the concrete itself so that the cement inside the concrete is sufficiently hydrated which, of course, is a slow and prolonged process. As soon as the concrete has hardened sufficiently, the curing shall be started.

3.29.2 Different Methods ofCuring

Any one of the following may be used for curing as approved by the Engineer.

a) Curing by DirectWater

This is done either by pounding or spraying water.

Ponding

Ponding is widely used for curing slabs and pavement. Earth bands are formed over the slabs and water is pumped or poured into them and the same is replenished at interval to make up for the loss of evaporation. As this type of curing is one of the best methods, 10 days of curing after final setting is sufficient.

By Spraying Water Curing is done by spraying water by suitable means at approved time intervals. While spraying, it shall be ensured that the complete area is covered. In order to avoid cracking, cold water shall not be applied to massive members immediately after striking the form work, while the concrete is still warm.

Alternative wetting and over drying shall be avoided.

Curing by spraying water shall be continued at least for 18 days.

a) Curing of Concrete with Absorbent Material Kept Damp The entire concrete surface is covered either with hessian, burlap, sawdust, sand, canvas or similar material and kept wet continuously for at least 12 days after finalsettings.

b) Curing by Covering Concrete Surface with an Impressive Sheet This is achieved by covering the entire concrete surface with water proof paper or plastic sheets specially manufactured for this purpose. The waterproof papers are stuck together by adhesive compound and the plastic sheets can be welded at site. Such type of covering shall be kept at least for 24 days after the final setting. It is preferable to have sheet as white in appearance since the white colourwill reflect hot sunrays and keep the concrete temperature at reasonablelevel.

c) Curing by Providing Protective Membrane by Applying curing compound This is achieved by applying a membrane forming compound (curing compound) over the concrete surface. Generally, these are available in the emulsion form. The application of the curing compound should be started immediately after stripping off the shuttering in case of formed surface and after the surface has hardened in case of unformedsurface.

The curing compound membrane forming emulsions dry up within 3 to 4 hours after application and forms a continuous coherent adhesive membrane over the concrete surface. Such membrane serves as a physical barrier to prevent the loss of moisture from the concrete itself. Membrane forming emulsions are generally coloured black or white to improve visibility for ensuring uniform application. Black colour shall never be used for curing in very hot weather. In order to prevent glare, a colouring pigment may be added to white compounds. Black curing compounds are either Bituminous or Asphaltic emulsions and shall be used to surfaces which are to be covered by back filling or on the floor which is to be covered with tiles andlinoleum.

White curing compound shall be used for the surfaces of tall structures under exposure of hot sun where other method of curing can not be properly ensured.

d) Curing by Chemical Coating For chemical curing, sodium silicate or calcium chloride is used. The use of calcium chloride shall be done with the approval of the Engineer. Normally, the sodium silicate mixed with

water is applied over concrete surface and, when it dries up, it forms a thin varnish like film, which fills up the pores, and surface voids and prevents evaporation of water. This also acts like curing compound but only difference is that curing compounds are available in ready mixed emulsion forms while sodium silicate is to be mixed with water atsite.

3.29.3 Limitation to Use of Different Methods ofCuring

i) Curing by the processes as indicated in Section B – Clause 3-24 and more specifically as per sub-clause 2(b) of the above clause gives very good results in normal warm climate for maturity of concrete. ii) In cold weather, the process as indicated in sub-clause 2(b) of clause 3-24 gives very good result for maturity of concrete. iii) Where water cement ratio is less than 0.5, the methods indicated in sub-clause 2(d) and 2(e) of clause 3-24 of Section B, shall not be used. iv) In warm climate also, where the methods of curing as indicated in sub-clauses 2(a) and 2(b) of clause 3-24 cannot be properly ensured, any suitable method of curing as indicated in subclasses 2(c) to 2(e) of clause 3-24 of Section B, as approved/directed by the Engineer, shall beadopted.

3.30 Testing ofConcrete

3.30.1 General

The Contractor shall carry out, entirely at his own cost, all sampling and testing in accordance with the CPWD specification or relevant IS standards and as supplemented herein. The Contractor shall get all tests done in an approved laboratoryandsubmittotheEngineer,thetest resultintriplicatewithin3daysaftercompletionofthe test.

3.30.2 Consistency Test (Tests of FreshConcrete)

At the place of deposition/pouring of the concrete, to control the consistency slump tests and/or compacting factor tests shall be carried out by the Contractor in accordance with IS 1199 as directed by the Engineer.

The results of the slump tests/compacting factor tests shall be recorded in a register for reference duly signed by both the Contractor and the Engineer. That register shall be considered as the property of EMPLOYER, and shall be kept by the Contractor at site in safecustody.

The results of the slump tests/compacting factor tests shall tally, within accepted variation of 12%, with the results in the respective design mix, in case of mix design concrete and with the values indicated in the table under clause 6.1 of IS:456 in case of nominal mix concrete. For any particular batch of concrete, if the results do not conform to the requirements as specified in IS 456, the Engineer has the right to reject that batch and theContractorshallremovethesameimmediatelyfromthesite, atnocosttoEMPLOYER.

3.30.3 Consistency Test (Tests of FreshConcrete)

At the place of deposition/pouring of the concrete, to control the consistency slump tests and/or compacting factor tests shall be carried out by the Contractor in accordance with IS 1199 as directed by the Engineer.

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3.30.4 Strength Test ofConcrete

While placing concrete, the Contractor shall make six (6) 150 mm test cubes from particular batches of concrete as desired by the Engineer. The frequency of taking test cubes shall be either according to clause 14.2 of IS:456 or as directed by the Engineer.

The cubes shall be prepared, cured and tested according to IS 516. Out of the six (6) test cubes, 3 shall be tested for compressive strength at 7 days after casting and the remaining 3 at 28 days after casting A register shall be maintained at site by the Contractor with the following details entered and signed by both the ContractorandtheEngineer.ThatregistershallbeconsideredastheпropertyofEMPLOYER,

a) Reference to the specific structuralmember
b) Mark oncubes
c) The grade ofconcrete
d) The mix ofconcrete
e) Date andtime
f) Crushing strength at 7days
g) Crushing strength at 28days
h) Any other information directed bythe Engineer.

3.30.5 Consistency Test (Tests of FreshConcrete)

At the place of deposition/pouring of the concrete, to control the consistency slump tests and/or compacting factor tests shall be carried out by the Contractor in accordance with IS 1199 as directed by the Engineer.
The results of the slump tests/compacting factor tests shall be recorded in a register for reference duly signed by both the Contractor and the Engineer. That register shall be considered as the property of EMPLOYER, and shall be kept by the Contractor at site in safecustody.

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e) Date andtime
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g) Crushing strength at 28days
h) Any other information directed bythe Engineer.

3.30.7 Consistency Test (Tests of FreshConcrete)

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The results of the slump tests/compacting factor tests shall tally, within accepted variation of 12%, with the results in the respective design mix, in case of mix design concrete and with the values indicated in the table under clause 6.1 of IS:456 in case of nominal mix concrete. For any particular batch of concrete, if the results do not conform to the requirements as specified in IS 456, the Engineer has the right to reject that batch and theContractorshallremovethesameimmediatelyfromthesite, atnocosttoEMPLOYER,.

3.30.8 Consistency Test (Tests of FreshConcrete)

At the place of deposition/pouring of the concrete, to control the consistency slump tests and/or compacting factor tests shall be carried out by the Contractor in accordance with IS 1199 as directed by the Engineer.

The results of the slump tests/compacting factor tests shall be recorded in a register for reference duly signed by both the Contractor and the Engineer. That register shall be considered as the property of EMPLOYER, and shall be kept by the Contractor at site in safecustody.

The results of the slump tests/compacting factor tests shall tally, within accepted variation of 12%, with the results in the respective design mix, in case of mix design concrete and with the values indicated in the table under clause 6.1 of IS:456 in case of nominal mix concrete. For any particular batch of concrete, if the results do not conform to the requirements as specified in IS 456, the Engineer has the right to reject that batch and theContractorshallremovethesameimmediatelyfromthesite, atnocosttoEMPLOYER,.

3.30.9 Strength Test ofConcrete

While placing concrete, the Contractor shall make six (6) 150 mm test cubes from particular batches of concrete as desired by the Engineer. The frequency of taking test cubes shall be either according to clause 14.2 of IS:456 or as directed by the Engineer.

The cubes shall be prepared, cured and tested according to IS 516. Out of the six (6) test cubes, 3 shall be tested for compressive strength at 7 days after casting and the remaining 3 at 28 days after casting A register shall be maintained at site by the Contractor with the following details entered and signed by both the ContractorandtheEngineer.ThatregistershallbeconsideredastheпropertyofEMPLOYER,

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b) Mark oncubes
c) The grade ofconcrete
d) The mix ofconcrete
e) Date andtime
f) Crushing strength at 7days
g) Crushing strength at 28days
h) Any other information directed bythe Engineer.

3.30.10 Acceptance Criteria for TestCubes

The acceptance criteria of concrete on strength requirement shall be in accordance with the stipulations under clause 15 of IS:456.

3.30.11 Non-destructive Tests on HardenedConcrete

If there is doubt about the strength or quality of a particular work or the test results do not comply with the acceptance criteria as stipulated under clause 15 of IS:456, non-destructive tests on hardened concrete like core tests and/or load tests or other type of non destructive tests like ultrasonic impulse test etc. shall be carriedout,asmaybedirectedbythe Engineer,bytheContractoratentirelyhis owncost. The core tests and load tests shall comply with the requirements of clause 16.6 of IS: 456.

3.30.12 Concrete Below SpecifiedStrength

In case of failure of test cubes to meet the specified requirements, the Engineer may take one of the following actions:

1. Reject the work and instruct that section of the works to which the failed cubes relate shall be cut out and replaced at the Contractor'sexpense.
2. Instruct the Contractor to carry out additional tests and/or works to ensure the soundness of the structure at the Contractor'sexpense.
3. Accept the work with reduction in the rate in appropriateitem.

3.30.13 Concrete failed in Non-destructionTests

In case test results of the core tests or load tests in a particular work do not comply with requirements of respective clause (16.3 for core test and 16.5 for load tests) of IS 456, the whole or part of the work concerned shall be dismantled and replaced by the Contractor as may be directed by the Engineer at no extra cost to EMPLOYER, and to the satisfaction of the Engineer. No payment for the dismantled concrete including relevant form work, reinforcement, embedded fixtures etc. shall be made. In the course of dismantling if any damage occurs to the adjacent structure or embedded item, the same shall be made good, free of charge by the Contractor, to the satisfaction of the Engineer.

3.31 EXPANSIONJOINTS

3.31.1 GENERAL

Expansion joints shall be provided where shown on the drawings or as directed by Engineer-in-charge. They shall be constructed with an initial gap between the adjoining parts of the works of the width specified in the drawings.

The contractor shall ensure that no debris is allowed to enter expansion joints Expansion joints shall be provided as per drawings. Contractor shall ensure that expansion joints are made water-tight and that no leakage occurs through these joints for which he shall be responsible to redo at his own cost.

3.31.2 OPEN JOINTFILLERS

Where shown on the drawings, open joints in the structure shall be filled with joint fillers.

The joint filler shall be easily and uniformly compressible to its original thickness, tampable, easily cut or sawn, robust, durable, resistant to decay due to termite or weathering, unaffected by water and free of any constituent which will bleed into or stain the concrete.

The joint filler shall be of same thickness of the joint width, it shall extend through the full thickness of the concrete unless otherwise specified and shall be sufficiently rigid during handling and placing to permit the formation of straight joints

3.31.3 JOINT SEALINGCOMPOUNDS

Joints sealing compounds shall seal joints in concrete against the passage of water prevent the ingress of grit orother foreign material and protect the joint filler. The compound shall have good extensibility and adhesion to concrete shall have good extensibility and adhesion to concrete surfaces and shall have resistant to flow and weathering. Polysulphide joints where specified on the drawings shall be seated with polysulphide liquid polymer, stored, mixed handled, applied and cured strictly in dimensions, thoroughly cleaned and treated with recommended primer strictly in accordance with the manufacturer's written instructions prior to sealing. The Contractor shall use only competent personnel experienced in the application of polysulphide for suchwork.

Where specified in the drawings, rubber/bituminous based sealant shall be of an approved manufacturer. The treatment of the joint and the use of sealing compound shall be strictly in accordance with the manufacturer's written instructions.

3.31.4 WATERBARS

Where water bars are shown on the drawings, the joints shall incorporate an approved PVC external type water-bar complete with all necessary moldedor prefabricated intersection pieces assembled in accordance with the drawings with bends and butt joints in running lengths made by heat welding in an electrically heatedjig.

Jointing and fixing of water-bars shall be carried out strictly in accordance with the manufacturers written instructions.

The water-bars shall be installed so that they are securely held in their correct position during the placing and compacting of the concrete.

Where reinforcement is present adjacent to water-bars, adequate clearance shall be left between the reinforcement and water-beds to facilitate of the concrete.

3.32 CRACKS

If any cracks develop in the reinforced cement concrete construction which in the opinion of the Engineer-in-charge may be detrimental to the strength of the construction, the contractor at his own expense shall test the structural element in question If under these test loads the cracks shall develop further the contractor at his own expense shall dismantle the construction, cart away the debris, replace the construction and carry out all consequential work there to at no extracost.

If the cracks are not detrimental to the stability of the construction in the opinion of the Engineer-in-charge, the contractor at his own expense shall grout the cracks with pneumatically applied mortar. At his own expense and risk he shall also make good all other building works such as plaster, molding, surface finish of floods, roofs, ceiling etc. which in the opinion of the Engineer-in-charge have suffered damage either in appearance or stability owing to suchcracks.

The repair work shallbe carried out to the satisfaction of the Engineer-in-charge. The decision of the Engineer-in-charge as to the extent of the liability of the contractor in the above matter shall be final and binding on thecontractor.

3.33 SUPERVISION

All concreting work shall be done under strict supervision of the qualified and experienced representatives of the Contractor as well as those of the Engineer-in-charge The contractor's Engineer and supervisor who are in charge of concreting work shall be skilled in this class of work and shall personally supervise all the concreting operations.

Special attention shall be paid to the following:-

(a) Proportioning, mixing and quality testing of the materials with particular control on the water cementratio.

(b) Laying of material in place and thorough compaction of the concrete to ensure solidity and freedom from voids and honeycombing.

(c) Proper curing for the requisiteperiod.

(d) Reinforcement and inserts/embodiments position are not disturbed during concreting and consolidation byvibration.

3.34 QUALITYCONTROL

The Engineer-in-charge reserves the right to make changes in the mix proportions including the increased cement content or/and a change in the Contractor's control procedure, should the quality control during progress of the works prove to be inadequate in his opinion. All the concrete work shall be true to level, plumb and square within the acceptable tolerance. The corners, edges and rises in all cases shall be unbroken and finished properly andcarefully.

3.35 TOLERANCES

The acceptable tolerances for formed concrete surfaces shall be given below: -

a) Variation from plumb for -
   i. Columns and walls to be rendered 6 mmin 3 meters
   ii. Exposed columns and walls 3 mm in 3meters

b) Variation in cross sectional dimensions of columns and beams and in the thickness of slabs and walls: - 6 mm & + 12mm

All the works executed beyond the tolerance limits are liable to be rejected and no extra cost shall be paid to the contractor for reconstructing the same as desired by the Engineer-in-charge.

TESTING ROOM IF REQUIRED (FOR NEW CONSTRUCTION WORK)

A testing room of not less than 10 sqm equipped with the following apparatus and qualified concrete technician, labour and materials required for carrying out tests therein shall be provided by the contractor at hisowncost:

1. Sieve Set (For aggregate 20 mmdown)
   40 mm, 20 mm, 16 mm, 12.5 mm, 10 mm, 4.75 mm, 600 micron, 300 micron, and 75 micron having diameter of 45 cms.
2. Weighing

a) Physical balance cap. 200 gmswith weigh box (accuracy 0.5gm)
b) Counter Scale cap 20Kg
c) Weights

5 kg	1No	500gms	1 No.
2kg	2Nos.	200gms	1 No.
1 kg	1No.	100gms	1 No.

3. Slump Cones 2Nos
4. 15 cms moulds 18no.
5. Electric/Kerosene Heater
6. Pans etc. as directed by theEngineer-in-charge
7. Measuring Cylindersof 1000 ml., 500 ml and 100ml.
8. Wash bottles of the Capacity of 500 ml., 2Nos.
9. Sink
10. Workbenches, shelves,desks andanyotherfurnitureandlightingasrequiredbythe Engineer-in-charge.
11. Spring balance dial type cap. 100k
12. Sieve Set (For aggregate 20 mmdown)
    40 mm, 20 mm, 16 mm, 12.5 mm, 10 mm, 4.75 mm, 600 micron, 300 micron, and 75 micron having diameter of 45 cms.
13. Weighing

d) Physical balance cap. 200 gmswith weigh box (accuracy 0.5gm)
e) Counter Scale cap 20Kg
f) Weights

5 kg	1No	500gms	1 No.
2kg	2Nos.	200gms	1 No.
1 kg	1No.	100gms	1 No.

14. SlumpCones 2Nos
15. 15 cmsmoulds 18no.
16. Electric/KeroseneHeater
17. Pans etc. as directed by theEngineer-in-charge
18. Measuring Cylindersof 1000 ml., 500 ml and 100ml.
19. Wash bottles of the Capacity of 500 ml., 2Nos.
20. Sink
21. Workbenches, shelves,desks andanyotherfurnitureandlightingasrequiredbythe Engineer-in-charge.
22. Spring balance dial type cap. 100kg
23. Litremeasures
    a) 10 Lit 1No.
    b) 5 Lit 1No.
    c) 2 Lit 2Nos
    d) 1 Lit 1No.
    e) 1/2 Lit 1No.
24. Cube Testing Machine 100Tons.
25. Oven.
26. Cores/ Apparatus for conducting Proctor DensityTests.

3.36 CO-ORDINATION OFWORK

The contractor is fully responsible for coordinating with the other agencies for sanitary, electrical work, etc. to ensure execution of their work related to commencement of concreting. Nothing extra shall be payable to the contractor, if the works pertaining to concreting have to be dismantled and redone due to lack of co- ordination on the part of the contractor in ensuring completion of works of such agencies before concreting had been undertaken.

4 SPECIFICATIONS FOR STEELREINFORCEMENT

4.1 GENERAL

4.1.1 DESCRIPTION

This section covers the requirements for fabricating, delivering and placing of steel reinforcement in position for casting all types of concretework

4.1.2 RELATED WORK SPECIFIEDELSEWHERE

Applicable Codes and Standards:
Thecodesandstandardsgenerallyapplicableto theworkin thissectionsarelisted below:-
CPWD specification Vol I & II
IS: 280 Mild wire for general engineeringpurpose
IS: 432 Part I Mild steel and medium tensile steel bars Part II Hard drawn steel wire
IS: 456 Code of practice for plain and reinforcedconcrete
IS: 1139 Hot rolled mild steel, medium tensile steel and high yield strength steel deformed bars for concretereinforcement
IS: 1566 Hard drawn steel wire fabric for concretereinforcement
IS: 2502CodeofPracticeforbendingandfixingofbarsforconcretereinforcement
The following clauses are intended to amplify the requirements of the reference documents listed above and the contractor/Engineer-in-charge shall comply with these clauses.

4.2 SUBMITALS

4.2.1. BAR BENDINGSCHEDULE

The Contractor shall prepare Bar Bending Schedule for reinforcement before fabrication

4.3 MATERIALS

4.3.1 STEELREINFORCEMENT

Steel reinforcement to be procured by the Contractor for works shall be either of the following types:-
(a) MildsteelofGrade1testedqualityconformingtoIS:432-Part-_____
(b) 3370Codeofpracticeforconcretestructures for(PartItoIV)thestorageofliquids
(c) High yield strength cold worked deformed steel bars of tested quality conforming to IS: 1786 or hot rolled hightensiledeformed steelbars oftestedqualityconformingtoIS:1139.
(d) Hard drawn steel fabric conforming to IS:1566.
(e) Where galvanized reinforcement is specified in the drawings, the bars or mesh shall be hot-dip galvanized after bending generally in accordance with IS: 2629 and IS: 4759. Galvanized reinforcement shall be coated with a layer of zinc no where less than 0.05 mm inthickness.

All reinforcement shall be stored horizontally above ground level on supports, skids or other approved supports, clear of any running or standing water. Contact with soil should be avoided. Proper drainage and protection from the elements shall be provided to minimize corrosion.

Before steel reinforcement is placed in position, the surface of the reinforcement shall be cleaned of rust, dust, grease and other objectionable substances. In order to confirm the quality periodical tests as specified as the relevant IS shall be conducted by the contractor at his own cost.

4.3.2. BINDINGWIRE

Binding wire shall be black annealed steel wire conforming to IS: 280 and of minimum 18 gauge.

4.3.3. WELDINGELECTRODES

Electrodes used for welding of steel bars shall be of ordinary mild steel grade electrodes conforming to IS: 814 and shall be of the best quality approved byEngineer-in-charge.

4.4 STORAGE

Reinforcement steel shall be handled and stored in a manner that bending or distortion of the bars is avoided and contamination of steel is prevented.

All reinforcement shall be stored horizontally above ground level on supports, skids or other approved supports, clear of any running or standing water Contact with soil should be avoided. Proper drainage and protection from the elements shall be provided to minimize corrosion Bars of different classifications and diameters shall be stored separately A record shall be kept of the batch numbers of reinforcement deliveries in such a form that the part of the works in which particular reinforcement is used can be readily identified. Welding electrodes shall be stored in moisture control-led environment in accordance with the manufacturer's recommendations.

4.5 FABRICATION

Reinforcement steel shall be carefully and accurately cut, bent or formed to the dimensions and configurations shown on the drawings and as per bar bending schedules approved by the Engineer-in-Charge. All reinforcement shall be bent cold using appropriate pin size. Bars may be preheated only on approvaloftheEngineer-in-charge.Quenchingshallnotcoolhotbars. BendsshallbeinaccordancewithIS:2502.
It shall be ensured that the bars are not straightened in any manner that will injure the material. Any bars incorrectly bent shall be used only if means for straightening and rebinding be such as not to affect adversely the material. Reinforcement shall not be re-bent or straightened without prior review by the Engineer-in-charge. No reinforcement shall be placed in position on the works without approval of the Engineer-in-charge, whether or not it is partially embedded in hardened concrete.

Reinforcement steel having a reduced section, visible transverse cracks in bends, or otherwise damaged in anyway shall not be used.

Spiral reinforcement shall be accurately fabricated to the diameter and pitch shown on the drawings. One and one half finishing turns shall be provided at both top and bottom unless shown otherwise. Cut ends of galvanized rods shall be given a protective coat of an approved zinc paint immediately after cutting.

4.6 LAPPING

As far as possible bars of maximum length available shall be used. All bars shall be in one length unless otherwise shown on the drawings or agreed with the Engineer-in-charge. Laps shown on the drawings or otherwise specified by the Engineer-in-charge shall be based on the use of bars of maximum length by the contractor. Not more than 1/3 rd of the bars or as specified in the drawings shall be lapped at one section. Reinforcement bars shall not be welded unless shown on the drawings or instructed by the Engineer-in-charge.

4.7 PLACEMENT

All reinforcement shall be placed accurately and maintained in the position indicated on the drawings. The contractor shall provide approved type of supports for maintaining the bars in position and ensuring required spacing and correct cover of concrete to the reinforcement as called for in drawings. Pre-cast cement concrete blocks of required shapes and size, MS. chairs and spacers bars shall be used in order to ensure accurate positioning of reinforcement. Pre-cast concrete blocks shall be cast well in advance and shall be at least equal in quality to the class of concrete specified in the work.

In fair faces of concrete, temporary spacers only shall be used and removed or withdrawn as compaction of concrete proceeds. Spacers will not be permitted to be left in fair faces of concrete.

All intersections of the reinforcements shall be securely tied with two strands of binds wire twisted tight to make the skeleton or network rigid so that the reinforcement is not displaced during placing of concrete.

Tack welding of crossing bars shall not be done except as authorized or directed by the Engineer-in-charge. Nothing extra will be paid for tack welding.

The contractor shall take all responsible precautions to ensure that when handling or erecting reinforcement no damage shall be done to finished concrete. Bars that are partially embedded in concrete shall not be filed bentunlessconcurrencehasbeenobtainedfromtheEngineer-in-charge.

Walkways and borrow runs for placing and compacting the concrete shall be independent of the reinforcement.

Loose binding wire and other extraneous metal shall be removed from inside the form work prior to concrete placing.

Without relieving the Contractor of the responsibilities for the correctness thereof, the reinforcement shall be inspected and approved by the Engineer-in-charge in writing before any concrete is placed and the contractor shall allow sufficient time for such inspecting and any subsequent remedial action to be carried out No part of the reinforcement shall be used for conducting electrical currents.

4.8 COVER TOREINFORCEMENT

Unless shown otherwise on the drawings, minimum cover for all reinforcement shall be provided as per IS: 456 care shall be taken to maintain the correct cover to reinforcement. For concrete members exposed to weather, earth, action of harmful chemicals, acid vapor, saline atmosphere, sulphurous smoke etc minimum cover for reinforcement shall be increased by 15 cm to 40 mm as directed by the Engineer-in-charge. The maximum cover for reinforcement shall not be greater than that specified above or shown onthe drawings plus 10 mm except for bundledbars. For bundled bars, minimum, concrete cover shall be equal to the equivalent diameter of the bundle but need not be greater than 50mm. Exposed reinforcement intended for binding with future extensions shall be protected from corrosion as shown in thedrawings.

4.9 CLEANING

After placing, the reinforcement shall be maintained in a clean condition until the concrete is placed. On no account the bars shall be oiled or painted or mould oil used on the formwork be allowed to come in contact with thebars. Before concreting is commenced, the bars shall be thoroughly cleaned with dry gunny bags if they are coated lightly with rust or other impurities.

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4.10 WORK WILLINCLUDE

a) All cutting to lengths, labour in bending and cranking, forming hook ends, handling, hoisting and all that is necessary to fix reinforcement in work as per Drawings and specifications This shall also includeallthatisfairlyintendedandisnecessaryforcompletionofwork.
b) Cost of pre-cast concrete cover blocks to maintain cover and holding reinforcement in position, chairs, spaces, dowels, pins, laps,etc.
c) For fabricating and fixing reinforcement in any structural member irrespective of its location, dimension andlevel.
d) Work at alllevels.
e) All the above mentioned works shall be included in the quoted rates Nothing extra shall be payable to the contractor on thisaccount
f) ReinforcementSteelprocurementshallbedonebytheContractor.

5 SPECIFICATIONS FORFORMWORK

5.1 GENERAL

5.1.1 DESCRIPTION

This section covers the requirements for providing, fabricating and erecting of form work including propping, bracing, shoring, strutting, rising, bolting, wedging and all other temporary and all other temporary supports totheconcreteduringtheprocess ofsettingsubsequentremovalofforms.

5.1.2 RELATED WORK SPECIFIEDELSEWHERE

a. Cast-in-place ReinforcedConcrete

5.1.3 APPLICABLE CODES ANDSTANDARDS

Thecodesandstandardsgenerallyapplicabletotheworkofthissectionarelistedhereinafter

CPWD Specification Vol I & II

IS: 456 Code of practice for plain and reinforcedconcrete.

IS: 4990 Ply wood for concrete shutteringwork.

4.1 SUBMITTALS

4.1.1 TYPE OF FORMWORK

Prior to start of delivery of material for formwork, the contractor shall prepare samples of different types of formwork for about 10 sqm. and obtain approval of the Engineer-in-charge.

4.1.2 DESIGN OFFORMS

Before fabricating of forms, the contractor shall submit design calculations for proposed form work to Engineer-in-charge for his approval However, the approval of his responsibility for adequately constructing and maintaining the forms so that they will function properly.

4.1.1 TIEBOLTS

In case the contractor proposes to use tie bolts running through the concrete, the location and size of such tie bolts shall be submitted to the Engineer-in-charge for his Approval.

4.2 MATERIALS

4.2.1 Formwork shall be timber, plywood, steel or any other material capable of resisting damage to the contact faces under normal conditions of erecting forms, fixing steel and placing concrete. The selection of materials suitable for formwork shall be made by the Contractor based on the maximum quality consistent with the specified finished andsafety.

4.2.2 TIMBER

Timber used for formwork shall be easily workable with nails without splitting. It shall be stable and into liable to warp when exposed to sun and rain or wetted duringconcreting.

4.2.3 PLYWOOD

Plywoodusedforformworkshallbe12mmthickshutteringqualityplywoodcomplyingwithIS: 4990andof make approved by theEngineer-in-charge

4.2.4 STEEL

Steel form work shall be made of minimum 2 mm thick or more as required black sheets stiffened with angle iron frame made out of M S angles 40 mm X 6mm.

4.3 DESIGNCRITERIA

Formwork shall be designed for the loads and lateral pressures due to dead weight of concrete, superimposed live loads of workmen, materials and plants and for other loads as indicated on the drawings. Forms shall be designed to have sufficient strength to carry on the hydrostatic head of concrete as a liquid without deflection tolerances exceeding the acceptablelimits. Where necessary to maintain the tolerances indicated on the drawings. The formwork shall be cambered to compensate for anticipated deflections due to the weight and pressure of the fresh concrete, and also due to anyotherconstructionloads. Unlessotherwiseshownorspecified,thecambershallbeprovidedasbelow:-

Types of member	Compression Steel As % of tensile steel	Camber Co-efficient
Simple span	0%	0.066
Continuous Restrained	50%	0.037
span Cantilever Cantilever	0%	0.032
	50%	0.020
	0%	0.086
	50%	0.046

Camber incmsWhere (K X L X2.54)/D
K= Cambercoefficient
L= Length of member inmeter
D= Depth of member inmeter

4.4 ERECTION OFFORMWORK

Forms shall be used wherever necessary to confine the concrete during vibration and to shape it to the required line. The formwork shall conform to shapes, lines, levels and dimensions of the concrete sections shown on thedrawings.

Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of concrete and shall be maintained rigidly in position. Form work shall be adequately supported by adequate number and size of struts, braces, ties and props to ensure rigidity of forms during concreting. Where props rest on natural or filled up ground, to avoid any settlement, the soil shall be thoroughly compacted and bases of props shall be sufficient size so as to restrict the bearing on the ground to 50 t/ sqm Forms shall be tight enough to prevent loss of mortar from the concrete and to produce dense, homogenous and uniformly coloredconcrete completely free

from honeycombing or surface roughness. Joints in formwork shall be designed to prevent leakage, not only between individual elements forming the panels but also from the horizontalandverticaljunctionbetweenthepanelsthemselves.

If form work is held together by bolts or wires, those shall be so fixed that no reinforcement bar is exposed on surface against which concrete is to be laid. The Engineer-in-charge may at his discretion allow the contractor to use tie bolts running through the concrete at his owncost.

Hole left in the concrete by these tie-bolts shall be filled as specified by him at the Contractor's expense. Formwork shall be constructed so as to facilitate loosening and permit removal without jarring the concrete Wedges, clamps and bolts shall be used wherever practicable instead of nails.

CLEANING AND OILING OFFORMS

At the time concrete is placed in the forms, the surface of the forms in contact with the concrete shall be free from encrustations of mortar, grout or other foreign materials. Temporary openings shall be left at the bottom of formwork to enable, sawdust, shavings, wire cuttings and other foreign material to be worked out form the interior of the forms before the concrete is placed.

The surface of the forms to be in contact with the concrete shall be coated with an approved coating that will effectively prevent sticking and will not stain the concrete surfaces. After each use the surfaces of forms in contact with concrete shall be cleaned, well settled and treated with form oil approved by the Engineer-in-charge. Lubricating (machine) oils shall not be used. Oiling shall be done before reinforcement has been placed and care shall be taken that no oil comes in contact with the reinforcement while it is being placed in positions. Immediately before concreting is commenced the formworks shall be carefully examined to see that all dirt, shavings, sawdust and other refuse have been removed and the formwork shall be wetted thoroughly to prevent absorption of water from concrete. The formwork shall be kept wet during concreting and for the whole time that it is left inplace.

4.5 REMOVAL OF FORMWORK

Form works shall be removed carefully so as to prevent damage to the concrete. Wooden wedge only shall be used between the concrete surface and the form where force is necessary to separate the form from the concrete. Metal wedge, bars or tools shall not be used for this purpose. Any concrete damaged in the process ofremovingtheformsshallberepairedinaccordancewiththeprovisionofconcretespecifications.

Unless otherwise permitted by the Engineer-in-charge, the forms shall not be stripped in less than the minimum periods specified in IS: 456. Howeverthe Engineer-in-charge may increase the above period if he considers it necessary for structuralstability

All non-supporting forms shall be loosened and removed during regular working hours, and as soon as the concrete has hardened sufficiently to prevent damage from the removal of the forms All false work and forms supporting concrete beam and slabs, or other members subject to direct bending stress, shall not be removed or released until the concrete has attained sufficient strength to ensure structural stability and to carry both the deadandliveloadsincludinganyconstructionloadswhichmaybeplaceduponit.

No construction loads exceeding the combination of superimposed dead load plus specified live load shall be supported on any unshared portion of the structure under construction, unless analysis indicates adequate strength to support such additional loads Form work shall be removed in such a manner so as not to impair safety and serviceability of the structure It shall be removed gradually to prevent sudden application of loads to the concrete All concrete to be exposed shall have sufficient strength to prevent any damage caused by removal offormwork.

5.7.1. HACKING:

Immediately after removal of forms, the concrete surface intended to be either plastered or finished, shall be roughened with brush hammer or with chisel and hammer as directed by the Engineer In Charge to make thesurfacesufficientlycoarseandroughtoprovideabondingkeyforplaster.

No extra payments shall be made to the Contractor for such work on concrete surface after removal of the form work. No payment shall be made for temporary formwork used in concreting, or for form work required for joints or bulk-heads, in floor or elsewhere, whether such joints are to be covered later with concrete or mastic or othermaterials.

5.7.2. POCKETS ANDOPENINGS:

Where boxes, pockets or openings are required (not exceeding 0.1 sqm) to be formed in the concrete. No deduction shall be made for the area of box or pockets in measuring the area of concrete surface shuttered. In other words the area of shuttering shall be reckoned as if box of pocket or openings were not present.

However, on measuring the concrete quantity, the volume of the box or pocket shall be deducted. If the area of box or pocket or openings against the shuttered faces exceeds 0.1 sqm. It shall be paid not as a box or pocket or opening but as formwork at the rates forformwork.
No extra payment shall be made for holes to be made in the form work for inserting electrical conduits hooks for fans etc.

4.6 REUSE OFFORMS

Immediately after the forms are removed, they shall be cleaned with jet of water and a soft brush before they are reused.The contractor shall not be permitted reuse of any forms which in the opinion of the Engineer-in-charge has worn out and has become unfit for formwork. The Engineer-in-charge may in his absolute discretion, order rejection of any forms he considers unfit for use in the works, and order their removal from the site.

5 SPECIFICATIONSFORBRICKMASONRYWORK :-

5.1 SCOPE: -

The Contractor shall provide all labour, materials, scaffolding operations, equipment and incidentals necessary required for the completion of all brickwork called for in the drawings and documents and that which is fairly intended for smooth completion of thework.

5.1.1 BRICKS

The bricks shall be well burnt locally available from good brick earth and shall be ofuniformsize(9”x 4.5”x3”) unless otherwise specified they shall be of uniform deep red, cherry or copper colour, thoroughly well burnt without being verified and regular inshapes. The bricks shall be as per CPWD Specification.

6.1.3 MORTARS:-

All brick work shall laid with specified mortar of good workable consistency.

6.1.4 SOAKING OFBRICKS:-

All bricks required for masonry in cement or composite lime mortars shall be thoroughly soaked in clean water for at least one hour in advance of sufficient quantity size for immediate use. The cessation of bubbles whenthebricksareimmersedinwaterisanindicationofthoroughsoakingofbricks.

6.1.5 LAYING:-

a) Bricks shall be laid in English bond, unless otherwise specified. Half or cut bricks shall not be used except where necessary to complete the bond. Closers in such cases shall be cut to the required size and used near the ends of thewalls.

b) The walls shall be taken up truly plumb. All courses shall be laid truly horizontal and all vertical joints join shall be truly vertical. Vertical joints in alternate courses shall come directly one over the other. The thickness of brick courses shall be kept uniform and for this purpose straight edge with graduations showing the thickness of each brick course including joint shall be used. Bricks shall be laid with frogsupwards.

c) The walls of a structure shall be carried up regularly and nearly at one level and no portion of the work shall be left more than 3 ft. below the rest of the work. Where this is not possible the work shall be raked back accordingtobond(andnotlefttoothed)atananglenotexceeding45°.

d) All iron fixtures pipes, outlets of water, holdfasts of doors and windows, etc., which are required to be built in walls, shall be embedded in cement mortar or in cement concrete as specified, in their correct positions as the work proceeds. Nothing extra shall be paid for such extra cement mortar or of the nature statedabove.

6.1.6. JOINTS: -

Bricks shall be so laid that all joints are quite full of mortar. The thickness of the bed joints shall in no case exceed 10 mm, unless otherwise specified. The face of joints shall be raked to a minimum depth of 10/12 mm by raking tool daily during the progress of work when the mortar is still green, so as to provide proper key for the plaster or pointing to be done. Where plastering or pointing is not required to be done, the joints shall be struck flush and finished at the time of laying. The face of brick work shall be cleaned daily and all mortar droppingsremoved.

6.1.7 BRICK-IN-EDGECOPING

The top course of all plinths, parapets, steps and tops of walls below R C.C. slabs or beams shall be laid with brick on edge, unless otherwise specified Proper care shall be taken that the bricks forming the top corners andendsofwallsshallbeproperlyradiateandkeyedintoposition.

6.1.8. CURING:-

Green Work shall be protected from rain by suitable covering Brick Masonry with cement or composite mortar shall be kept constantly moist on all faces for a minimum period of 7 (Seven) days. In caseof fat lime mortar, curing shall commence two days after the laying of masonry and shall continue for 7 (seven) days

6.1.9 SCAFFOLDING:

Double scaffolding having two sets of vertical supports shall be provided Thesupports shall be sound and strong Tied together with horizontal pieces over which the scaffolding planks shall be fixed. In building up to two stories, single scaffolding shall be allowed In this case, the inner end of the horizontal scaffolding pole shall rest in a hole provided in the header course only. Only one header or each pole shall be left out. The holds left in masonry work for supporting the scaffoldings shall be filled and made good, before plastering. The Contractor shall be responsible for providing and maintaining sufficiently strong scaffolding so as to withstand all loads likely to comeupon it.

5.2 HALFBRICKANDTHREEINCHTHICKMASONRY:-

6.2.1. The work shall be done exactly similar to the specification 'BRICK WORK' except that all courses shall be laidwith stretchers.

6.2.2 CementMortar1:4(1cement:4sand)shallbeusedunlessotherwisespecifiedinthedescription oftheitem.

6.2.3 The description of the item shall mention whether or not, reinforcement is to be provided, when the brick work is to be reinforced, hoop iron band 1" x 1/16" (2.5 c.m. x 1.6. mm) shall be embedded in the cement mortar at every fourth course or as described in the description of the item. The hoop iron shall be hooked (given a doubellap) with minimum of 9" hooks at all angles and junctions. At either end of the wall, 2" (5 c.m.) lengths of the hoops shall be bent up or down so as to take a firm grip of the brick work. When hoop ironisnotavailable.TheEngineer-in-chargemayallowequivalentreinforcementintheformofmildsteel.

5.3 RUBBLEMASONRY:-

N.A.

7. SPECIFICATIONFORDOORS&WINDOWS:

7.1 MATERIAL

7.1.1 TIMBER

7.1.1.1 TEAKWOOD

Teakwood shall be second class Indian Teakwood conforming to CPWD Specification or IS: 4021 of good quality, well seasoned and free from defects such as cracks, dead knots, sapwood etc. No individual and sound knot shall be more than 15 sq.cm in size and the aggregate area of such knots shall not exceed 2% of the areas of the piece. The timbershallbefairlyclosegrainedhavingnotlessthan2growthringspercm. Widthincross–section.

7.1.1.2 HardWood:

Hard wood shall be first class conforming to IS 4021 of good quality, well seasoned and free from defects such as dead knots, cracks, sapwood etc. No individual hard and sound knot shall exceed 6 sq.cm in size with no dimension more than 50 mm and the aggregate area of such knots shall not be more than 1% of the area of the piece. There shall not be less than 5 growth rings per cm. Width incross-section.

7.1.1.3.1 Moisture content in timber

The maximum permissible percentage of moisture content for well seasoned timber shall be as per CPWD specification or IS 287.

7.1.1.4 Workmanship of woodwork

Workmanship for wood and joinery shall be as per CPWD Specification or IS 1200 and IS 4021.

7.1.1.5 Painting / Polishing of woodwork

Painting / polishing of wood work shall be in accordance with CPWD Specification.

7.2 WOODEN DOOR / WINDOWFRAME

Wooden door / window frame shall be made of specified wood as per item description and shall be in accordance with detailed drawings. The wooden members of the frame shall be planed smooth and accurate to the full dimensions. Rebates, rounding, moulding etc., shall be done before the members are jointed into frames. Joints in the frame work shall be perfect with square edges and shall be pinned with hard wood / bamboo pins of 10 to 15 mm dia.

Wood work shall be painted / polished or otherwise treated as specified. All exposed portions shall be coated with wood primer and concealed surface by bituminous paints.

Before any surface treatment is applied, the wood work shall be got approved by the Engineer-in-charge. The frames shall be fixed only after acceptance by the Project-in-charge. The frames shall be fixed to the masonry as per CPWD specification or by 250 mm x 40 mm x 6mm MS hold fasts embedded in M-15 grade concrete block of 350 mm x 100mm x 100 mm in the hole of the masonry. In case of concrete, frames shall be fixed by 96 mm long 12 mm dia metallic dash fasteners.

7.3 SHUTTERS:

7.3.1. Particle Board flushshutter:
Particle board flush shutter shall in general conform to IS: 2202

7.3.1.1 Materials

7.3.1.1.1 ParticleBoard
Particle board shall conform to IS 3097 and shall be three layer flat pressed teak wood based and of exterior grade (Grade –1), type – 1, BWP type, bonded with phenol Formaldehyde synthetic resin conforming to IS:848.

7.3.1.1.2 Veneers
Veneers shall conform to class – 1 of IS 303 and (BS 476 Part – 7)

7.3.1.1.3 Teakwood
Specification of Teak wood shall same as specified in clause 9.1.1.1

7.3.1.2.1 Workmanship

The particle board of required size and thickness shall be lipped on all the edges with T- type, teak wood lipping. The overall board lipping composition shall be uniform and specifiedthicknessandshallbeproperlysizedinviewoftheoperationofshutter.

All the four edges of the door shutter shall be square. The shutter shall be free from twist or warp in its plane. In case of double leaf shutters, the meeting of the stiles shall be rebated by one third the thickness of shutter. The rebating shall besplayed.

The shutter then shall be veneered on both faces by gluing approved shade and textured commercial type 0.5 mm thick veneering conforming to class 1 of IS 303. The veneering shall be done by gluing the veneer with BWP type, phenol formal dehyde synthetic resin conforming to IS 848 by not press process on the shutter. Workmanship and finish of the veneering shall conform to IS 303. The exposed surfaces of the lipping of the edges, shall befrench polished in accordance with clause No. 6.9.2.4.2 of specification No.6. The shutter shall be fixed to the door frame, by means of hinges @ minimum 3 hinges per leaf, maximum spacing of hinges being 600 mm or as per drawing with suitable sizedscrews.

The shutter when fitted to the frame shall satisfy all operational aspects of the door like smooth movement, proper closing against the door frame etc.

7.3.2 Glazed Wooden Doorshutter

7.3.2.1 Materials

7.3.2.1.1 Wood

Teakwood for various members like stiles, rails etc., shall be as specified in clause No.9.1.1.1.

7.3.2.1.1 GLAZING

Glass sheets for glazing shall be

i. 4 mm thick plain glass (wt. 7.2 kg/m2) conforming IS : 2835,or
ii. 5.5 mm thick wired glass conforming to IS: 5437or
iii. 6.3mmthicklaminatedglassconformingtoIS:2553ascasemaybeasperitemdescriptionor
iv. 5.5 mm thick toughenedglass.

Glass sheets shall be free from flaws, scratches, cracks, bubbles etc.

7.3.2.1.3 WORKMANSHIP

Teakwood stiles and rails of size as specified in item description shall be cut accurately and planned smoothly to required dimensions as per drawings. The stiles and rails shall be provided with rebates for fixing the glazing and shall be jointed together to form the profile of the shutter as per drawings. The joinery work shall be as approved by Engineer-in-charge. Only after such approval, the joints shall be coated with whitelead, pressed and secured by hardwood pins of about 6 mm dia. All the four edges of the shutter shall be square. In case of double leaf doors, rebates shall be provided at the meeting of stiles. Rebates shall be splayed type and one third the thickness of the stiles. The glass sheets for glazing shall be fixed by teak wood beading having mitered joints as per drawings and shall be fixed by means of approved neoprene based adhesive and nailing, the spacing between the nails being no more than 300 mm. All wooden surfaces shall be coated with 2 coats of approved make polyurethane with strainer mixed to achieve desired shade.

The shutter shall be fixed to the door frame, by means of hinge @ minimum 3 hinges per leaf, maximum spacing of hinges being 600 mm or as per drawing with suitable sized screws.

The shutter when fitted to the frame shall satisfy all operational aspects of the door like smooth movement, proper closing against the door frame etc.

7.4 Aluminium Glazed Doors / Windows /Ventilators

7.4.1 General

Aluminium glazed doors / windows / ventilators shall be of specified sectional size, dimension and profile as perdrawings.

7.4.2 Materials

All Aluminium sections shall be extruded sections of aluminium alloy as per IS:733 and IS:1285. Aluminium sections shall be anodized as per IS: 7088 to min, 25 microns. Glass used for glazing shall be of following type in accordance with item description.

i. 5.5mmthickwiredglassconformingtoIS5437.
ii. 6.3 mm thick laminated safety glass conformingto IS 2553.
iii. 5.5mmthicktransparentsheetglassconformingtoIS:2853(Wt. 7.2kg/sq.m).

7.4.3 Workmanship

Frames shall be square and flat, the corner of the frame being fabricated to true right angles. Details of construction of frames, shutters etc., shall be as per drawings.

Side hung window shutters shall either be fixed to the frame with pivots, or aluminium alloy hinges. For fixing the hinges, slots shall be cut in the fixed frames and the hinges inserted inside may be riveted to the frame. The hinges shall normally be of the projecting type conforming to IS designation A-5-M of IS –617, IS 733. In which case peg stay of 300 mm long complete with locking bracket and conforming to IS codes same as for hinges shall be provided. Friction hinges may also be provided in which case peg stays are notrequired.

The handles for side hung shutters shall be of cast aluminium conforming to IS designation A-5-M of IS 617 and shall be mounted on a handle plate riveted to the opening frames. The handle shall have anodized finish with minimum anodic film thickness of 25 micron of Electro colour finish. The handle shall have a two point nose which shall engage with an aluminium striking plate on the fixed frame. The striking plate shall be finished in the same manner as for the handle.

In case of top hung shutters, aluminium alloy cast hinges and peg stays (same as per side hung shutters) shall be provided.
Center hung shutters shall be hung on the two pairs of cup pivots of aluminium alloy of IS designation NS – 4 of IS 737 and IS designation A-5-M of IS 617 or chromium / cadmium plated brass / bronze cup pivots riveted to the outer and inner frames to permit to swing through an angle of 850. Cast aluminium (conforming to IS designation A-5-M of IS 617) or chromium / cadmium plated bronze spring catches shall be fitted in the centre of the top bar of the shutter. The spring catch shall be secured to the frame by screwing / riveting to the frame and shall close into and aluminium catch plate riveted / welded to the outside of the outer shutter frame bar. Aluminium or cadmium plated brass chord pulley wheel in an aluminium bracket shall be fitted at the sill of the shutter with Aluminium or galvanized / cdmium plated steelscrews.

The door shutters shall be fitted with pivots as specified. The handle for doors shall be of aluminium and as per design. The door shutters shall be provided with locking device, floor spring, O/H door closer and any other hardwares, specified initem.

In case of composite Door / window / ventilator units shall be coupled as per drawing. Weather bar shall be provided whenever a coupling member is fitted over an external opening shutter. Glazing shall be fixed to the extruded sections by means of extruded aluminium beading. Glass panes shall be provided with rubber lining before fixing.

The aluminium frames shall be fixed to the masonry by means of aluminium lugs fixed to the frame (by counter sunk galvanized machine screws) and grouted with M-15 grade concrete in the hole in the masonry as per drawing. In case of concrete wall, the frames shall be fixed by 96 mm long, 12 mm dia metallic dash fasteners. Any steel material coming in contact with aluminium shall be galvanized. The windows / ventilators/doorsshallbecheckedtoensuresmoothoperation,perfectlevelandplumb.

8. SPECIFICATION FOR FLOORING &PAVING

8.1 SCOPE

The Contractor shall furnish all labour, materials, tools, equipment, machinery operations and related items necessary and required for the full performance of the contract under this section, as shown onthe drawings or as specified or reasonably implied or incidental to theconstruction.

8.2 GENERAL

The flooring shall be laid to the level except where slopes are called for on the drawings, in which case the slopes shall be uniform and arranged to drain into the indicated outlets. Particular care shall be exercised to ensure that all flooring, skirting etc., is perfectly matched for color and finish. The Contractor shall pave the areas indicated on the plans and schedule of finishes with materials therein called for. All work shall be laid to the best practice known to thetrade.

The Contractor shall furnish for approval by the Engineer-in-charge, samples of each type of floor, paving etc., the samples shall be of sizes and thickness as specified.

8.3 POLISHED GRANITE STONE SLABS FOR FLOORING, STEPS, STAIRS, CLADDING ON PANTRY AND WASH BASINCOUNTERS

Providing & fixing granite of approved quality and colour of required size mm double polished M/C cut of 18 mm thick over floor surface in proper line. Level in CM 1:4 including finishing the joint with matching colour cement, polishing the top surface etc., complete as per instruction of EIC/Engineer-in-charge.

Granite stone shall be of best quality machine polished, Machine Cut and of approved colour, dense and homogenous in texture free from cracks, decay, weathering and flaws. The stone shall be of required size and shall be 18 mm thick. The material shall have to be approved by Engineer-in-charge before and after procurement. Before laying flooring, the surface shall be paved and thoroughly hacked, cleaned off all mortar scales, loose materials etc., unless and until the surface is approved by Engineer-in-charge, the laying shall not be done. The bedding with CM 1:4 proportion as directed by Engineer-in-charge with minimum thickness of 20 mm layer shall be laid evenly and to the required slope. The granite shall be truly and evenly set in thin paste of next cement apply to the bottom and to the prepared base. The stone then shall be temped downwithwoodenmalletuntiltheyare exactlyintrueplaneandinlinewithadjacentstone.

The stone shall be closed jointed and filled with matching cement. The entire surface of flooring shall be polished with machine upto to mirror polish achieved including necessary use of antimony trioxide anxilix acid etc., as directed by Engineer-in-charge.

8.4.1 FINISHING

The finishing of the surface shall follow immediately after the cessation of beating. The surface shall be left for sometime, till moisture gets dried from its joints or top, Excessive trowelling shall be avoided. Use of dry cement or cement and sand mixture sprinkled on the surface to stiffen the concrete or absorb excessive moisture, shall not bepermitted.

8.4.2 CURING

The curing shall be done for a minimum period of ten days. Curing shall not becommenced until the top layer has hardened. Covering with empty cement gunnies shall be avoided as the coloris likely to be bleached withtheremanentsofcementmatterfromthebags.

9 CERAMICTILESGLAZEDANDMATTFINISH

Ceramic tiles in toilets and other areas where called for shall be non-slip ceramic tiles of approved make and shade. The tiles shall be laid to the pattern as approved by the Engineer-in-charge. The tiles shall be of uniform color, true to size and shape and free from cracks, twists, uneven edges, crazing and other defects. The size and thickness of the tiles shall be asspecified.

The tiles shall be laid as per the pattern shown in the drawings over a bed of specified thickness of cement mortar leveled to a true surface. The surface of the bedding mortar shall be left rough to provide bond for the tiles. A floating coat of thick cement slurry shall be laid over the screed to proper levels and the tiles set over the same firmly to correct line andlevels.

The joints shall be filled and finished neat with cement paste pigmented to the shade of the tile. The joints shall be finished neat as directed and shall be straight, regular and uniform. On completion, the surface shall be washed with water, rubbed with fine saw dust and leftclean. The finished floor surface shall be true to required levels.

9.1 VITRIFIED TILES IN FLOORING ANDSKIRTING

9.1.1. VITRIFIEDTILES

The tiles shall generally conform to latest IS standards shall be procured by the contractor. They shall be flat, true to shape and free from cracks, crazing spots, chipped edges and corners. The glazing shall be of uniform shade and color shall be as shown in the drawings.

The tiles shall be of specified size and thickness as per drawing. The tolerance on facial dimension value shall be +/- 1.0mm and +/- 0.5 mm in thickness.

The top surface of the tiles shall be glazed. The glazed shall be either glossy or matt as specified. The underside of the tiles shall be completely free glazed in order that the tile may adhere properly to the base. Type edges of the tiles shall be preferably free form glaze, however, and glazed if unavoidable, shall be permissible on any one edge of thetile.

9.1.2 LAYING

The Vitrified tiles shall be laid over ferrow cement slab & it shall be cleaned, wetted Mortar of specified mix shall be spread to required thickness over a small area. The slab, washed clean, shall be laid on the mortar, pissed tapped, with a wooden mallet, and brought to required level The tiles shall be laid as per the pattern shown on the drawings or as approved by Engineer-in-charge.

It shall then be removed and laid a side. The top of the mortar shall then by corrected by adding fresh mortar at hollows. The mortar is then allowed to harden and cement slurry of paste like consistency shall be spread over the same at the rate of 1 bag per sqmt. area. The edges of the tile already laid shall be buttered with slurry of cement and pigment to match the shade of slabs. The tile to be laid shall then be placed back in position, pressed and properly bedded in level with adjoining tiles with as fine a joint as possible. Other tiles are also laid in similar manner to correct levels with fine joints. The surplus slurry on the surface shall be cleaned off. The tiles shall be soaked in water, washed clean, and a coat of cement slurry applied liberally at the back of tiles and set in the bedding mortar. The tiles shall be tamped and corrected to proper plans and lines.

The tiles shall be set in required pattern and butt jointed. The joints shall be as fine as possible. Where full sizetilescannotbefixedtheseshallbecuttotherequiredsizeandtheiredgesrubbedsmooth.

9.1.3 CURING ANDFINISHING

The joints shall be cleaned off of the grey cement grout with soft wire brush or trowel to a depth of 2mm to 3mm and all dust and loose mortar removed Joints shall then be flush pointed with white cement added with pigment if required to match the color of tiles. The surface shall then be kept wet for 7 days. After curing, the surface shall bewashed and finished clean. The finished work shall not soundhollow when tapped with woodenmallet.

10 WATER-PROOFING FORROOF

The waterproofing shall be integral cement based water proofing treatment including preparation of surface as required for treatment of roofs, balconies, terraces etc. consisting of following operations:

a) Applying and grouting a slurry coat of neat cement using 2.75 kg/sqm. of cement admixed with proprietary water proofing compound conforming to IS : 2645 over the RCC slab including cleaning the surface beforetreatment.

b) Laying cement concrete using broken bricks/brick bats 25mm to 100mm size with 50% of cement mortar 1:5 (1 cement: 5 coarse sand) admixed with proprietary water proofing compound conforming to IS: 2645 over 20mm thick layer of cement mortar of mix 1:5 (1 cement: 5 coarse sand) admixed with proprietary water proofing compound conforming to IS: 2645 to required slope and treating similarly the adjoining walls upto 300mm height including rounding of junctions of walls andslabs.

c) After two days of proper curing applying a second coat of cement slurry admixed with proprietary water proofing compound conforming to IS:2645.

d) Finishing the surface with 20mm thick jointless cement mortar of mix 1:4 (1 cement: 4 coarse sand) admixed with proprietary water proofing compound conforming to IS: 2645 and finally finishing the surfacewithtrowelwithneatcementslurryandmakingof300x300mmsquare.

e) The whole terrace so finished shall be flooded with water for a minimum period of two weeks for curing and for final test. All above operations to be done in order and as directed and specified by theEngineer-in-charge.

With average thickness of 120mm & minimum thickness at khurra as 65mm.

10.1 GUARANTEE

The treatment shall carry a guarantee for 10 years against leakage of water, dampness, seating and other defects. The treated roof shall be tested by allowing water to stand on the areas to a depth of 150 mm for at least 72 hours. All guarantee shall be furnished in the format approved by the Engineer-in-charge duly signed by the contractor.

10.2 SPECIFICATIONS FORCURING

The finished surface shall be cured for at least 7 days

10.3 KHURRAS

The Khurras shall be constructed before the brick masonry work in parapet wall is taken up, and it shall be 5 cm x 45 cm and shall be formed of cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate20mmnominalsize)unlessotherwisespecifiedinthedrawings.

10.4 LAYING

A PVC sheet 1M X 1M X 400 micron shall be laid under the khurras and then cement concrete shall be laid over it to a minimum thickness of 3 cm with its top surface lower than the level of adjoining roof surface as approved.

10.5 FINISHING

The khurras and sides of the outlet shall then be rendered with cement plaster of mix and thickness stipulated in the drawings. This shall be done when the concrete is still green and shall be finished with a floating coat of neat cement The sides of the khurras and sizes of finished outlet opening shall be as directed by the Engineer-in-charge.

11 SPECIFICATION FOR PLASTERINGWORK

11.1 SCOPE

The Contractor shall furnish all labour, materials scaffolding, equipment, tools, plants and incidentals necessary and required for the completion of all plaster work.

11.2 GENERAL

Plaster as herein specified shall be applied to all internal surface where called for All plasterwork shallbeexecutedbyskilledworkmeninaworkmanlikemannerandshallbeofthebestworkmanshipandinstrictaccorda ncewiththedimensionsondrawingssubjecttotheapprovaloftheEngineer-in-charge. The primary requirement of plaster work shall be to provide dense, smooth and hard enclosureand devoid of any cracks of the interior and/or exterior.

11.3 SCAFFOLDING

Double scaffolding having two seats 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. The contractor shall get the scaffolding approved from the Engineer-in-charge well in advance.

11.4 CHASING ANDBREAKAGE

Fixing of door and window frame, shall be completed before any plaster work is commenced on a surface. No chasing or cutting of plaster shall be permitted normally. However, if the same is felt unavoidable at places, written permission shall be obtained from the Engineer-in-charge before cutting any such plaster. Broken corners shall be obtained from the Engineer-in-charge before cutting any such plaster, Broken corners shall be cut back out less than 150 mm on sides and patched with cement mortar as directed. All corners shall be rounded to a radius of 80 mm or as directed by theEngineer-in-charge.

11.5 PREPARATION

Masonry and concrete surfaces which call for application of plaster shall be clean, free from dust and loose mortar. Efflorescence if any shall be removed by brushing and scrapping. For masonry surfaces the joints shallbe raked out properly, while the concrete surfaces shall be roughed by wire brushing and hacking to provide the key, thereby ensuring proper bond to the satisfaction of the Engineer-in-charge. The surface shall then be thoroughlywashedwithwater,cleanedandkeptwetbeforeplasteringiscommenced.

11.6 CHICKEN WIREMESH

Galvanized chicken mesh (22 gauge, 12 mm size) shall be provided at junctions of brick masonry and concrete members, to be plastered and other locations as called for, properly stretched and nailed with galvanized wire nails, ensuring equal thickness of plaster on both sides of the mesh. The width of the mesh shall be as approved by the Engineer-in-charge. The chicken mesh wherever. Specified, shall be fixed in place beforeplastering.

11.7 Samples of each type of plaster shall be prepared well in advance of undertaking the work for the approval of theEngineer-in-charge.

11.8.1 MORTAR

Themortar ofthespecifiedmixshallbeusedMortarshallbepreparedas specifiedunder"BrickWork". It shall be made in small quantities, as required, and applied within 30 minutes of adding water to the plaster mix.

11.8.2 CEMENT:

Cement shall be as per specifications under "Concrete Work"

11.8.3 WATER:

Water shall be as per specifications under "Concrete Work"

11.8.4 SAND

For plaster work normally clean river sand shall be used.

11.8.4 **WATER PROOFINGCOMPOUND**

As per approved make.

11.9. CEILINGPLASTER

6mm thick Ceiling plaster shall be completed before commencement of wall plaster.

Plastering shall be started from the top and worked down towards the floor. To ensure even thickness and true surface, plaster (Thias) about 15 x 15 cm shall be first applied, horizontally and vertically, at not more than 2 meters intervals over the entire surface to the plaster to serve as gauges. The surface of these gauged areas shall be truly in place of the finished plaster surface. The mortar shall be laid between thegauges.

with a trowel ensuring through filling of joints. The mortar shall be applied in a uniform surface slightly more than the specified thickness and then brought to a true surface, by working a wooden straight edge reachingacrossthegauge, withsmallupwardandsidemovementsatatime. Finallythesurfaceshall be finished off true with trowel or wooden float according as a smooth or a sandy granular texture is required. Excessive trawling or over working the float shall be avoided.

All corners, arises angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Rounding or chamfering corners, arises, junctions etc. Where required shall be done without any extra payment. Such rounding shall be carried out with proper templates to the sizes required. No portion of the surface shall be left out initially to be patched up late on. Grooves shall be provided at the junction of ceiling and wall plaster without any extracost.

In suspending work at the end of the day, plaster shall be left, cut clean to line both horizontally andvertically. When recommencing the plastering, the edge of the old work shall be scraped, cleaned and wetted with cement slurry before plaster is applied to the adjacent areas, to enable the two to be properly joined together. Plastering work shall be closed at the end a of day on the body of the surface and not nearer than 15 cm to any corners or arises. It shall not be closed on the body of the features such as pilasters, bands and cornices. Horizontal joints in plaster work shall not also occur on parapet tops and copings, as these invariably lead toleakages.

11.9.1 GROOVES

Wherever directed all joints between concrete and brick masonry besides other locations as called for shall be expressed by a groove cut in plaster at no extracost.

11.9.2 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 workproceeds.

11.9.3 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 atleast 7 days. During this period, it shall be suitably protected from alldamages

11.9.4 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 by the Engineer-in-charge

11.9.5 FLOATING COAT OF NEATCEMENT

Where finishing with a floating coat of neat cement is specified in the drawings or directed by the Engineer-in-charge, specification, for this item of work shall be same described above except for the additional floating coat

which shall be carried out as below. When the plaster has been brought to a true surface with the wooden straight edge, it shall be uniformly treated over its entire area with a paste of neat cement and rubbed smooth, so that the whole surface is covered with neat cement coating. The quantity of cement applied for floating coatshall 1 kg. per sq. mt. smooth finishing shall be completed with trowel immediately and in no case later than half an hour of adding water to the plastermix.

11.10 BEARINGPLASTER

This shall be consist of cement plaster 1:3(1 cement : 3 coarse sand) 20 mm thick finished with a coat neat cement laid on top of walls as bearing for RCC lintels, beams and slabs. When dry, a thick coat of lime wash shall be given.

12. SPECIFICATION FOR PAINTINGWORK

12.1 OIL BOUNDDISTEMPER

12.1.1 MATERIALS

Oil emulsion (Oil Bound) washable distemper (IS : 428) of approved brand and manufacture shall be used. The primer shall be of the same manufacture as distemper shall be diluted with water of any other prescribed thinner in a manner recommendedby the manufacturer. Only sufficient quantity of distemper required for day's work shall beprepared. The distemper and primer shall be brought by the contractor in sealed tins in sufficient quantities at a time to suffice for a fortnight's work, and the same shall be kept in the joint custody of the contractor and the Engineer- in-charge. The empty tins shall not be removed from the site of work, till this item of work has been completed and passed by the Engineer-in-charge.

12.1.2 PREPARATION OFSURFACE

The surface shall be thoroughly cleaned of dust. Any unevenness shall be made good by applying putty, made of plaster of Paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry.

Pitting in plaster shall be made good with plaster of Paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of the distemper shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied

12.1.3 APPLICATION

15 cm double bristled distemper brushes shall be used. After each days work, brushes shall be thoroughly washed in hot water with soap solution and hung down to dry. Old brushes which are dirty and caked with distemper shall not be used on the work.

12.1.4 SCAFFOLDING

The specifications in respect of scaffolding, protective measures shall be as described under white washing.

12.2 WATER PROOF CEMENTPAINT

12.2.1 MATERIAL

Cement paint of required colour and of approved brand and manufacture conforming to IS : 5410 shall be used. Before application of the cement paint the shade shall be got approved from the Engineer-in-charge. Cement paint shall be mixed with water in two stages. The first stage shall comprise of 2 parts of cement paint and one part of water stirred thoroughly and allowed to stand for 5 minutes. Care shall comprise of adding further one part of water to mix and stirring thoroughly to obtain a liquid of workable and uniform consistency.Inallcasesthemanufacturer'sinstructionsshallbefollowedmeticulously. Cement paint shall be mixed in such quantities as can be used up within a hour of its mixing as otherwise the mixture will set and thicken, affecting flow and finish. The lids of cement paint shall be kept tightly closed when not in use, as by exposure to atmosphere the cementpaintrapidlybecomeairsetduetoitshygroscopicqualities.

12.2.2 PREPARATION OFSURFACE

For new work, the surface shall thoroughly be cleaned of all mortar dropping, dirt, dust, algae, grease and other foreign matter by brushing and washing. The surface shall be thoroughly wetted with clean water before the cement paint isapplied.

12.2.3 APPLICATION

For new work, the treatment shall consist of a priming coat of cement paint following by the application of two or more coats of cement paint till the surface shows on even colour. For each coat, the entire surface shall be coated with the mixture, uniformly, with proper cement paint brushes in horizontal strokes followed immediatelybyverticaloneswhichtogethershallconstituteonecoat. The subsequent coats shall be applied only after the previous coat has dried the finished surface shall be even and uniform and shall show no brushmarks. Enough cement paint shall be mixed to finish one room at a time the application of a coat in each room shall be finished in one operation and no work shall be started in any room, which cannot be completed the same day After each days work, the brushes shall be washed in hot water and hung down to dry Old brushes which are dirty or caked with painting shall not be used.

12.2.4 SCAFFOLDING

The specifications in respect to 12.1.1 scaffolding protective measures shall be as described above under whitewashing.

13. SPECIFICATIONSFORACRYLICEMULSIONPAINTING:

13.1 Workmanship:

13.1.1 Scaffolding:

Wherever scaffolding is necessary, it shall be erected on double supports ties together by horizontal pieces, over which scaffolding planks will be fixed No ballies, bamboos or planks shall rest on or touch the surface which is being white washed Where ladders are used, pieces of old gunny bags shall be tied on their tops to avoid damage or scratches to walls.

13.1.2 Preparation ofsurface:

Preparation of surface shall in general be in accordance with, except that any uneveness shall be made good by applying putty (white cement based) mixed with water including up the undulation and then sand papering the same after it isdry.

13.1.3 Preparation ofpaint

The paint mix, shall be continuously stirred while applying for maintaining uniform consistency. Number of coats shall be as per item description. The painting shall be laid evenly and smoothly by means of crossing and laying off. The crossing and laying off consists of covering the area with paint, brushing the surfaceard at first, then brushing alternatively in opposite direction 2/3 times and then finally brushing lightly in a direction at right angles to the same. In this process, no brush marks, no hair marks no clogging of paint puddlesshallbepermitted.Thefullprocessofcrossingandlayingoffwithconstituteonecoat. The paint shall be applied by means of brush or roller. Before starting painting with plastic emulsion paint, the prepared surface shall be reacted with two coats of primer consisting of cement primer whiting and plastic emulsion paint shall start only after the preceding coat has become sufficiently hard to resist brush marking. Subsequent coats of plastic emulsion paint shall also be started after the preceding coat is dried by evaporation of water content. The surface of finishing shall present a flat, velvets smooth finish, even and uniform shade without patches, marks, paint drops etc.

13.1.4 Precautions:

i. Brushes shall be quickly washed in water immediately after use and kept immersed in water during break periods to prevent the paint from hardening on the brush. Old brushes, if used shall becompletelydriedofturpentine/oilpaintsbywashinginwarmsoapwater.
ii. No oil base puttied shall be used in filling cracks /holes.
iii. Washing of painted surface shall not be done within 3-4 weeksof application.

13.1.5 Protectivemeasures

Surface of distempering over existing distempered surface, the existing distempering shall be scrapped by steel scrapers leaving a cleansurface. All nails shall be removed. Pitting in plaster shall be made good with plaster of paris mixed with dry distemperof colour to be used. The surface then shall be rubbed down again with a fine grade sand paper and made smooth. A coat of distemper shall be applied over the patches. The surface shall be allowed to drythoroughlybefore the regular coat of distemper is allowed. The surface affected by moss, fungus, algae efflorescence shall be treated in accordance with CPWD Specification or IS 2395.

13.2 ACRYLICCOPOLYMERAGGREGATEFINISH

13.2.1 Material

It shall be an acrylic based textured wall coating consisting of quartz and silica aggregate, inorganic pigments and other additives to form a crack free, flexible, tough, water proof coating.

13.2.2 Preparation ofSurface

The surface to be coated shall be cleaned and all dirt, dust, grease and loose particles shall be removed. Any old textures surface shall be removed with removing agent as per manufacturer's instructions.

13.2.3 Application

Bonding agent and water shall be mixed first. Then the flakes / granules shall be added and mixed thoroughly and kneaded till no lumps are found. The dough shall be leftfor 20-30 minutes before starting application. The bonding agent, flakes / granules and water shall be mixed in different ratiosfor different finishes as per manufacturer's specifications.

The first application shall be by steel trowel. It shall be smoothened, if the specified finish required, by a plastic trowel.

13.3 VARNISHING

Varnishing of wood and wood based material shall be in accordance with IS 2338 (Part – II). Surface to be Varnished shall be prepared to produce a smooth, dry and matt surface and all dust and dirt shall be removed from the surface.

The varnish shall be applied liberally with a bush and spread evenly over a portion of the surface with short light strokes to avoid fronting. It shall be allowed to flow out while the next section is being laid in. Excess, varnish shall be scraped out of the brush and then the first section be crossed, re crossed and laid off lightly. The varnish, once it has begun to set, shall not be retouched. In case of any mistake, the Varnish shall be removed and the work shall be started afresh.

Where two coats of varnish are applied, the first coat shall be hard drying under coating or flatting varnish which shall be allowed to dry hard and then be flatted down before applying the finishing coat.
Sufficient time shall be allowed in between two coats.

When flat varnishing is used for finishing, a preparatory coat of hard drying under coating of flatting varnish shall first be applied and shall be allowed to harden thoroughly. It shall then be lightly rubbed down before the flat varnish isapplied.

On larger areas, the flat varnish shall be applied rapidly, and the edges of each patch applied shall not be allowed to set, but shall be followed up whilst in free working conditions.

13.3.1 Frenchpolish

French polish shall conform to IS: 348. Suitable pigments shall be added to get the required colour. The surface to be French polished shall be rubbed down to smoothness with sand paper and shall be well dusted. Pores in the surface shall be filled up with fillers. A pad of woolen cloth covered by a fine cloth shall be used to apply the finish. The pad shall be moistened with polish and rubbed hard on the surface in a series of over lapping circles applying the polish sparingly but uniformly over the entire area to give an even surface. A trace of linseed oil may be used on the face of the pad for the purpose. The surface shall be allowed to dry and the remaining coats applied in the same way. To finish off, the pad shall be covered with a fresh piece of clean fine cloth, slightly damped with methylated spirit and rubbed lightly and quickly with circular motions. Thefinishedsurfaceshallhaveauniformtextureandhighgloss.

13.4 PAINTINGOFSTEELANDOTHERMETALSURFACES

13.4.1 GENERAL

Reference shall be made to the following Indian Standards: IS 2524, IS 1447.

13.4.2 Preparation ofsurface

The surface, before painting, shall be cleaned of all rust, scale, dirt and other foreign matter withwire brushes, steel wool, scrappers, sand paper etc. The surface shall then be wiped finally with mineral turpentine which shall then be removed of grease etc. The surface then shall be allowed to dry. In case of GI surface so prepared shall be treated with Mordant solution (5 litersfor about 100 sq.m) by rubbing the solution generously with brush. After about half an hour, the surface if required shall be retouched and washed down thoroughly with clean cold water & allowed todry.

13.4.3 Application of priming andpaints

Approved quality primer and paint in specified no. of coats shall be applied as per manufacturer's recommendations either by brushing or spraying. Each subsequent coat shall be applied only after the preceding coat is dried.

13.5 SYNTHETICENAMELPAINTTOWOODWORK

13.5.1 Synthetic enamel paint of approved brand and manufacture and of the required colourshall be used for the topcoatandanundercoatofshadetomatchthetopcoatasrecommendedbythemanufactureshallbe used.

13.5.2 One coat of specified paint of shade suited to the shade of the top coat shall be applied after rubbing with the finest grade of wet abrasive paper to ensure a smooth and evensurface, free from brush marks and all loose particles dustoff.

13.5.3 Top coats of specified paint of required shade shall be applied after the first coat is thoroughly dry. Additionalfinishingcoatsshall be appliediffoundnecessarytoensureproperlyuniformglossysurface.

14. SPECIFICATION FOR FALSECEILING

1. FALSE CEILING GRIDSYSTEMS

1.1.1 ALUMINIUM GRIDSYSTEM

Aluminium grid system for supporting false ceiling tiles shall be of approved make and shall be perfectly levelled aligned at desired height and in accordance with the false ceiling pattern as per drawings.

1.1.2.1 MATERIAL

a. Main Runner shall be of extruded anodized (25 micron) aluminium Tee sections of 25mm x 35mm size (approved make), 2.5 mmthick.

1.1.1.2 ERECTION

The grid system shall be assembled by interlocking the main and cross runners @ 600 mm c/c max. on `bothways by means of aluminium angle cleats. The main runners shall be suspended from the ceiling by means of 3 mm thick MS flat clamp fixed to main runners @ 1200 mm max. and fixed to 6 mm dia MS hook which again is fixed to the ceiling. 3 mm thick MS flat clamp shall be connected to main runner with 25 mm long MS clamp with leveling nut and @ 1200 mm maximum. The MS hooks shall be suspended from the ceiling by means of slotting in 25mm x 3mm thick MS flat, `L' shaped, fixed to the slab by 12 mm dia Dash fasteners @ 1200 mm C/C. The overall grid system shall be rigid, in accordance with false ceiling pattern, perfectly leveled and aligned at desirable height.

1.1.2 GI GRIDSYSTEM

GI grid system for supporting false ceiling tiles shall be perfectly leveled, aligned at desired height in accordance with false ceiling pattern.

1.1.3.1 **MATERIAL AND WORKMANSHIP**

a. WallChannels
Wall channels shall be made 0.5 mm thick GI of size 27 mm, one flange 20 mm and other 30 mm. Wall channels shall be fixed to peripheral walls by raw plugs / dash fasteners @ 450 mm C/C.

b. Intermediate Channels (main runners) GI intermediate channels shall be 0.9 mm thick, of size 45 mm and with two flanges of 15 mm each. The intermediate channels shall be suspended from the soft @ 1200 mm with 25 mm x 0.5 mm GI hanger bolted to the channel and fixed to the ceiling (by means of bolting to GI cleat fixed to the ceiling with dash fasteners).

c. Ceiling Sections (Crossrunners)

GI channel shaped ceiling sections shall be 0.5 mm thick having a knurled Web of 51.1 mm and two flanges of 26 mm each with lips of 10.5 mm. The ceiling sections shall be fixed to the intermediate channels in perpendicular direction at 450 mm C/C with the help of connectingclips.

GYPSUM BOARDTILES:

Gypsum board shall conform to IS: 2095

The Gypsum boards used for false ceiling shall have followingproperties.

i Thermal Conductivity – 0 16 W /mk
ii ThermalResistance

a. For 9.5 mm thick board – 0.06 m2K/W
b. For 12.5 mm thick board – 0.08 m2K/W
c. For 15 mm thick board – 0.09 m2K/W

iii FirePropagation
a. FirePropagation

Index of performance not exceeding 12 and a sub index not exceeding 6 (when each sideis tested separately to BS 476 Part –6).

b. Surface spread of flame Class 1 (both sides) as / test to BS 476 Part –7).
Gypsum boards shall be of specified thickness, and of specified finish (painted / prelaminated). The Gypsum `boards shall be screw fixed to the under side of false ceiling grid system with 12.5 mm dry wall screw @ 230 mm C/C by drilling machine. Joint in the board shall be finished flush with fillers, finisher and primer as per manufacturer's recommendation to give a seamless finish.

Necessary cut-outs for Electrical / AC and other fixtures shall be provided with a framing of wall channels. In case of fixing on modular grid system, the boards shall be cut to required size and fixed in the same manner as in clause11.2.1.The finished false ceiling shall be perfectly leveled and aligned, at desired height as per drawings.

SPECIFICATION OF PLUMBING AND SANITARY STALLATION

1. GENERAL

1.1 The works include installation of sanitary ware, internal water supply distribution, cold water supply, rainwater disposal from the terrace, soil and waste disposalfrom various fixtures.

1.2 The contractor shall also guarantee the perfect operation of the installation and accessories supplied and installed by him. All these items shall be compulsorily of first qualityand best choice.

1.3 The contractor shall ensure that all the fixtures are fed with the supply distribution system to deliver adequatepressureandflowtakingintoconsiderationthesimultaneousdemand.

1.4 Theworksshallbecarriedoutstrictlyinaccordancewiththelatest CPWD Specification or BISspecifications.

1.5 All the materials not approved by the Engineer-in-charge and not conforming to the approved brands listed in the schedule are liable to be rejected. The contractor shall have to remove all such rejected materials and substitute it with the approved materials as required by the Engineer-in-charge. No extra payment shall be admissible to the contractor on thisaccount.

1.6 All the soil and waste connection shall be connected to themanhole.

1.7 All the Pipes to be used in the works shall be tested at site before incorporating it in works pertaining to solid and waste lines. Nothing extra shall be payable to the contractor on thisaccount.

1.8 The work shall be executed according to the drawings and specifications and as per the contract documents. Any missing details in the drawings or specifications but which are fairly intended for successful functioning shall have to be supplemented by the standard BIS code or CPWD specifications.

2. SCOPE OFWORK

2.1 The scope of work under this contract shall comprise of providing and installation of all material, equipment and labouras described in detail under various heads of specification and as shown on drawings.

2.2 The contractor's work shall include all materials, tools and plants, scaffolding and everything necessary for the completion of the work to the satisfaction of Engineer-in-charge. All materials and workmanship used in the execution of the work shall be the first quality unless otherwise stated. All materials used in the work shall conform to the current CPWD specifications whether or not specific mention is made thereof. The contractor shall be responsible for and shall replace or make good at this own expense, any materials lost or damaged or of quality notapproved.

2.3 Excavation in all types of soil refilling and carting away surplus materials to contractors own dump or as directed, for manholes, inspection chambers, gully traps watersupply.

2.4 Two coats of approved ready mixed paint over red oxide primer to all exposed iron or woodwork including G.I. Pipes and C.I. gratings. All G.I. Pipes whether laid in ground or concealed in walls or floors shall be coated withbitumen.

2.5 Work shall be inclusive of making holes through concrete / masonry, making good the work and redoingandre-plasteringthesametomatchthesurroundings.

2.6 For all pipes, work shall be inclusive of all fittings and specials such as coupling, bends, unions, cleaning eyes, tees, plugs, reducer etc., and making joints and connection to valves, tanks, pumps and existing pipe lines etc asrequired.

2.7 Cutting chase for concealing pipes in walls and floors and making good with cement plaster 1:3.

2.8 Work quoted shall include for hoisting to and work at all levels and list of materials shall not form any criterion for any extraclaims.

3. SAMPLES

3.1 Before commencement of the work the contractor shall furnish the samples of material of workmanship at the first opportunity that may be called for by the Engineer-in-charge for their approval and any further samples in case of rejection until such samples are approved. Nothing extra shall be paid to the contractor for the same. Work shall be executed in accordance with the approvedsamples.

4. MATERIAL

4.1 All the materials to be used in the work shall be of approved make/brand as given in the statement or as directed by theEngineer-in-charge.

5. DRAWINGS

5.1 All water supply, sanitary and drainage drawings are to be used as guide lines and to be followed as close aspossible.

5.2 The contractor shall submit to the Engineer-in-charge the shop drawings to suit the water supply sanitaryand drainage layouts.

5.3 Nodimensionstobemeasuredondrawingsandonlywrittendimensionsaretobefollowed.

5.4 Contractor shall refer for further details, dimensions to the Constructional and structural detailed drawings.

5.5 Discrepancies, variations changes in drawings should be brought to the notice of the Engineer-in-charge and writtenapprovalshouldbeobtainedbythecontractorbeforestartingthework.

6. AS BUILTDRAWINGS

6.1 Contractor shall submit as built drawings on completion of work, one complete set of original reproducibletracingsandthreeprintstotheEngineer-in-charge.

6.1.1 A run of all open/concealed piping, with diameters from terrace to tapping points with various controls for water supply, clean outs access panels, soils waste, vent, rain water piping at alllevels.

6.1.2 Drainage water supply layout, location of inspection chambers, diameter of drainage pipes, from WC to chamber, from Gully trap to chamber, and between two chambers with ground levels of drainage pipes inchambers

WATER SUPPLY (GI PIPE CLASS `B'):

1. Scope :Scope of internal water supply will include thefollowing.

a) All GI pipes fittings and valves of rising main from finished Ground level to over head tanks as indicated in thedrawings.

b) All GI pipes with fittings and valves from over head tank to all taps, wash basins, cisterns,sinks.

1. MATERIALS

1.1. Galvanized Iron Pipes andFittings:

1.1.1. The pipes shall be galvanized mild steel tubes medium grade conforming to BIS 1239. All pipes shall be electric resistance welded screwed with taper, threads and sockets with paralleled threads, Threads shall conform to BIS 554-1964 The pipes and sockets shall be clearly finished, well galvanized in and out and free from cracks, surface flaws, laminations and other defects All screws threads shall be clean and well cut The ends shall be cut cleanly and square with axis of thetube

1.1.2. The fittings shall be malleable iron and comply with all the requirements that of pipes. The fittings shallbe designedbytherespectivenominalboresofthepipesforwhichtheyareintended,

2.1.3 The standard weight and thickness of pipes shall be as shown in the following tables.

Nominal of Bore tubes mm	Class	Wall thick- ness in mm	Nominal weight black Tube kg/m	Nominal weight Galvanised kg/m
15	M	2.65	1.22	1.274
	H	3.25	1.45	1.504
20	M	2.65	1.58	1.642
	H	3.25	1.90	1.953
25	M	3.25	2.44	2.525
	H	4.05	2.97	3.05
32	M	3.25	3.14	3.247
	H	4.05	3.84	3.937
40	M	3.25	3.61	3.731
	H	4.05	4.43	4.545

NOTE: M= Medium, H-Heavy

2. CUTTING, LAYING AND JOINTING OFPIPES AND FITTINGS

3.1 Where pipes have to be cut or re-threaded, ends, shall be carefully filed out so that no obstruction to bore is offered. The ends of the pipes shall then be threaded conforming to requirements of BIS 554-1964 with pipe dies and tapes carefully in such a manner as will into result in slackness of joints when twopiecesarescrewed together. The pipe shall be clean and cleared of all foreign matters before being laid. All pipes and fittings shall be properly jointed to make the joints completely water tight and all pipes kept free from dust during fixing. Burr shall be removed from the joints afterscrewing.

3.2 All GI pipes below ground shall be laid in trenches and shall have a minimum cover of 600 mm, painted with two coats anticorrosive bitumastic paint, filling 150 mm thick sand all round the G.I. pipes.

3.3 The runs of the pipe shall be truly vertical and horizontal. Proper bends, elbows, tees at turning/ corners shall beused.

3.4 All GI pipes with necessary fittings wherever they are laid on internal faces of the walls shall be concealed in chase, sand painted with two coats of anticorrosive bitumastic paint. On external faces they will be laid on walls fixed with GIclamps.

3.5 In the concealed portion of the piping no joint shall be provided in the pipe lines except in the fittings i.e. bend, elbows, tees and nipples whererequired.

3.6 As far as possible no GI pipes shall be laid under floors of thetoilet/kitchen.

3.7 No GI pipe shall be laid in lime concrete, where required shall be embedded in PCC of 1:3:6minimum 75 mm all around or as directed by theEngineer-in-charge.

3.8 Sizes of the rising main, branch pipes from the rising main, down corners from the over head tank andbranchfromdowncornersshallbeofsizeas shownindrawings.

3. CLAMPS & HOLDERBATS

4.1 All pipes and fittings shall be fixed truly vertical and horizontal unless unavoidable. The pipes shall be fixed to walls with standard pattern holder bat clamps of required shape and size so as to fit tightlyon the pipes when tightened with screwed bolts. The clamps shall be embedded in brick work in cement mortar 1:3 (1 cement : 3 coarse sand) and shall be spaced at regular intervals in straight lengthsasshowninthetablegivenbelow:-

Size of pipe mm……	lengths Horizontalruns(m)	Vertical runs(m)
15	2.00	2.50
20 to 32	2.50	3.00
40 to 50	3.00	3.50
65 to 100	3.50	5.00

The clamps shall be fixed at shorter lengths near the fittings as directed by the Engineer-in-charge. All pipes shall be provided with unions at the location of fixing valves, pumps or any other fixed equipmentsoastohaveeasydetachment.

4. TESTING

5.1 After laying and jointing the pipes and fittings shall be inspected under working conditions of pressure and flow. Any joint found leaking shall be redone and all leaking pipes removed and replaced without extra cost. The pipe shall be slowly and carefully charged with water so that all air is expelled from the lines. The draw of taps and stop cocks shall then be plugged and hydraulic pressure of 6 kg/sq.cm. shall be applied, gradually. Pressure gauge shall be accurate and recalibrated before the test. The test pump having been stopped, the pressure shall maintain itself without measurable loss for atleast half anhour.

5. CLEANING AND DISINFECTION OF SUPPLYSYSTEM

6.1 All water lines shall be thoroughly and efficiently disinfected before being taken into use and also after every major repair. The method of dis-infection shall be subject to the approval of the Engineer-in-charge.

6. INTERNALWORK:

7.1 The internal work shall include the cost of labour and material involved in all the operations described above. It shall include the cost of cutting holes in walls, floors and making good thesame.

7.2 This shall also include, concealed pipe work in which case cutting of chase and making good the same or painting ofpipes.

7. CUTTING CHASES IN MASONRYWALL

8.1 The chases up to 7.5 x 7.5 cm shall be made in the walls for housing GI pipes etc. These shall be provided in correct position as shown in the drawings or as directed by the Engineer-in-charge. Chases shall be made by the chiseling out the masonry to proper line and depth. After GI pipes etc., are fixed in chases, the chases, shall be filled with cement with cement concrete 1:3:6 (1 cement: 3 coarse sand: 6 graded stone aggregate of 20 mm nominal size) or cement mortar 1:4 (1 cement: 4 coarse sand) as may be specified and made flush with the masonry surface. The concrete surface shall be roughened with wire brush to provide a key forplastering.

9. WATER SUPPLYFITTINGS

9.1 Unless otherwise specified all gunmetal/brass such as ball valves, non-return valves, full-way valves, stop cocks, bib taps, etc. shall confirm to relevant BIS specifications and shall be of heavyquality.

10. PAINTING

10.1 All vertical / horizontal pipes shall suitably painted with two coats anticorrosive paint ofquality over a coat of primer.

11. SCOPE OF SEWERAGE DISPOSAL ANDDRAINAGE

Scope of internal sewerage disposal and drainage system will include all PVC waste pipes connections up to Gully traps and PVC Soil pipe connections up to manholes including vent pipes with vertical stacks manhole including all floor traps, gully traps as shown in the drawings.

11.2 Scope of internal drainage i.e. Rain water system under this contract will include all PVC rain water pipes connecting from terrace/balcony including PVC bends upto storm water drainage line, gully chamberandincludingstormwaterDrainagesystemasshowninthedrawings.

II SANITARY

INSTALLATION

GENERALREQUIR

EMENTS

a. All sanitary appliances including sanitary fittings, fixtures, toilet requisites, shall be of size, make and design of first quality as per sample approved by the Engineer-in-charges as shown in the drawings.

b. All exposed and visible G.I. pipe and fittings shall be painted with approved quality of two coats of synthetic enamel paint over a coat of primer of approved shade asapproved.

c. Allnecessaryandplumbingworkshallbecarriedoutthroughlicensedplumbers.

d. All sanitary fittings such as water closet pans (pedestal or squatting patterns), flush pipes, brackets, wash basins, baths, sinks, soil and vent pipes etc. and fittings holders for toilet paper, glass shelves and other fittings together with the fixing of the same shall be complete in all respects and fit for properfunctioning.

e. All damage done to floors, walls, R.C.C. work etc. during process of execution, fixing or installation of sanitary fittings, pipes, internal water supply and house drainage etc., shall be restored to its originalconditionandthecostofthe sameisincludedintherates.

1. SANITATRYWARES

EUROPEAN TYPE W.C. PAN WITH LOW LEVEL FLUSHING CISTERN

European type W.C. pan shall be of white vitreous china first quality water closet ‘P’ or ‘S’ trap coupled with fittings, brackets, complete in all respects. The W.C. pan shall be free from cracks, crazes, blisters, and shall have smooth surface.

1.2 FIXING

W.C. pan shall be fixed to floor walls with C P. brass screws or by means of 75 mm long 6.5 mm counter sunk bolts and nuts embedded in floor concrete. The base of the pedestal of the pan shall squarely rest on the finished floor Any gap between the finished floor and the pedestal shall be filled with white mastic mixed withpigmenttomatchtheshadeoffloororasdirectedbytheEngineer-in-charges.

Following measures shall be adopted for fixing the W.C. pan

a) The central axis of the pan shall be perpendicular to the finished face ofwall.

b) The outlet of the pan shall becentrally placed in the socketof PVC connector pipe with a uniform space all around for jointing Jointing shall be done with yarn, linseed oil, white lead, cement and water-proofing compound and shall be made watertight.

d) The distance between centre line of outlet of W C pan and finished wall face shall be so adjusted as to rest square against the finished wallface.

1.3 SEAT ANDLID

Seat and lid shall be of heavy quality and shall be fitted exactly on the rim of the W.C. pan with CP brass hinges rubber buffers and CP brass nuts. It should be fixed in such a way that it is easily workable.

1.4 STOPCOCK

Angle Stop cock shall be of CP brass/brass or as specified in the drawing.

1.5 PAINTING

Brackets shall be painted with two coats of white synthetic enamel paint of approved manufacturer over a priming coat.

ANGLE VALVE

Angle valve shall be of 15mm dia CP brass with 15mm dia GI supply pipe of required length with nuts and washers.

Theconnectionbetweenanglevalveandsupplylinelaidinchaseshallbemadeinamannersothattheflange is flush with finished face of the wall and no threaded portion of the angle valve or supply line isvisible.

URINALS

Half stall type / full size urinal shall be conforming to IS:2556 Part VI. Urinals shall be of single piece construction with integral flushing box rim. These shall be mounted on walls. The flushing inlet pipe shall be of CP brass 15mm dia and waste pipe 32 mm dia GI, 750 mm long shall be embedded in wall. Necessary unions and CP bottle trap shall be provided in the waste line. Rawl plugs with CP brass screws shall be used forfixingtheurinal. Fixingshallensurethatnoliquidisleftoverinthepanafterflushing.

Urinals shall be connected to sensor system as per manufacturer's instructions.
Rate quoted shall include cost of urinals inlet and outlet pipes, auto censor flushing cistern, breaking and making good the walls and flooring, making inlet and outlet connections, painting exposed brackets and GI pipes etc.

1.8 HALF ROUNDCHANNEL

1.8.1 Half round channel shall be plain or with stop end and shall have internal dia of 100mm, approved by the Project-in-charge. The jointing work shall be done with white cement slurry. The drains shall be provided with proper slopes as indicated in drawings or as specified by the Engineer-in-charge. Channel shall be covered with matching tiles leaving provision for cleaning thesame.

1.9 H.C.I. NAHANI TRAP (FLOORTRAP)

1.9.1 Nahani trap shall be of heavy cast iron as per IS : 3989 with 100 mm inlet and 80/100mm outlet with CP pressed steel grating. It shall of self – cleaning design. (Grating shall be of either hinged or screwed downtype).

It shall be fixed in cement mortar 1:2 and as directed by Engineer-in-charge.

1.10. STONEWARE GULLY TRAPCHAMBER

1.10.1 The square mouth gully trap shall be of 100mm dia, conforming to IS:651 of specified and / or approved quality stoneware, complete with cast iron grating, and shall be got approved by the Engineer-in-charge.

The size of CI frame and cover shall be 300mm x 300mm. It shall be properly fixed as directed by theEngineer-in-charge.

The size of the chamber shall be 300 x 300 x 675mm (internal). It shall be constructed of brick masonry walls 115mm tk. In 1:4 cement mortar and M-15 concrete foundations. Inside and outside faces of the masonry walls shall be plastered with 1:3 cement mortar. The top of the chamber shall be provided with CI cover andframe.

1.11 BRICKMASONRY(MANHOLES/INSPECTIONCHAMBER&VALVECHAMBER)

1.11.1 The size of the manholes and valve chambers shall be as specified in the drawings. It shall be constructed of brick masonry walls 230mm thick in CM 1:4 (1 cement : 4 sand) resting on M-15 concrete foundations. The inside and outside face of the masonry wall shall be plastered with 13mm thick plaster of cement mortar 1:3 (1 cement : 3sand).

The top of the chamber shall be provided with reinforced concrete M-20 grade slab as per drawing and directions of theEngineer-in-charge.

MS rungs made out of 16 mm dia MS bars shall be fixed inside the manhole as shown in the drawing and directions of theEngineer-in-charge.

Valve chambers shall be provided and fixed with a light duty CI cover and frame.

The top of chambers shall be provided with reinforced cement concrete M-15 grade as per drawings and direction of Engineer-in-charge.

The CI manhole covers and frames shall conform to IS: 726. The type, size and grade shall be as per drawing and directions of the Engineer-in-charge.

The frame shall be fixed in position during concreting of top slab, inside faces of frame and cover shall be given to coats of approved anti-corrosive, paint.

The specification for brick masonry, plastering, concreting, excavation and backfilling etc., as given under relevant clauses shall be applicable for this work also.

WASHBASIN

Wash basins shall be 760 x 500 mm white vitreous china or Oval Shape Counter Basin as shown in drawing of 1st quality with three tap holes, or with single tap hole or the size as given in Scope of Work. These shall be free from cracks, crazes, blisters and shall have smooth surfaces.

FIXING

The basins shall be supported on a pair of CI brackets cantilevering from wall face as directed by the Engineer-in-charges. There shall be no gap between top edge of the basin and finished face of wall.

PILLAR TAP

Pillar tap shall be 15mm dia CP brass AOS make with auto censor.

1.15 ANGLEVALVE

Angle valve shall be 15mm dia brass with 15mm dia brass inlet tube of required length with union and CP brass cap for each of the two pillar taps.

The connection between angle valve and supply line laid in chase shall be made in a manner so that the union is flush with finished face of the wall and so threaded that portion of the angle valve of supply is visible

WASTE

Waste shall be 32mm dia CP brass heavy type with solid rubber plug and bail chain.

BOTTLE TRAP

Bottle trap 32mm of approved quality.

SINK

Sink shall be SS sink with drain bolt and granite platform in sides built in 20mm tk. Polished granite of Black color / platform of size specified in schedule with integral over flow and shall have 40mm Dia outlet and shall be connected to 40 mm Dia. GI waste pipe.

FIXING

These shall be fixed in stone counter. The joint between the sink & stone shall be filled with Araldite filler to make it absolutely watertight.

1.20 **C.P.BRASSFITTINGS**

C.P. Brass fittings shall be CP brass comprising of long body BIB cocks of 15mm, CP brass angle valves with CP inlet tube and CP brass cap.

2. TOILET

REQUISITES

MIRROR

Mirror shall be of approved make and of best quality. These shall be free from bubbles, ripples or any other defects. The glass shall be uniform silver plated at the back. Size shall be 450 x 600 mm or as specified in drawing. These shall have plastic frame all around with keyhole to wall with screw forhanging as directed by the Engineer-in-charges.

FIXING

The mirror shall be fixed on wall face with wooden cleats, with CP brass screws and washers, above the lavatory basins at the height, as directed by the Engineer-in-charges.

TOWEL RAIL

Towel rail shall be of CP brass 600 mm long, 20 mm dia with 2 CP brass brackets or size specified indrawing

FIXING

Brackets shall be fixed to wall by means of CP brass screws to wooden plugs or raw plugs, embedded in the wall or as directed by theEngineer-in-charges

BIB COCK – TWO IN ONE HEALTH FAUCIT

Bib cock of two in one shall be of 15mm CP brass with 1 long PVC pipe with health faucet.

3 SOIL,WASTE,RAINWATER,VENTANDANTI-SIPHONAGEPIPES&FITTINGS:

3.1 LYING AND JOINTING PVC. PIPES (INTERALWORK)

3.1.1 Jointing

3.1.1.1 Solvent welded joints: Non heat applicationMethod:

In this method instead of forming a socket on one pipe and an injection molded socket fitting couplers is used with a provision to take in the pipes at both ends, the surface to be jointed and the joint is made at ambient temperature Injection molded fitting only shall be used in preference to fabricated fittings only, solvent recommended by the manufacturers of the pipes shall be used and full load on the joints applied only after 24 hours. The pipe shall be cut perpendicular to the axis of the pipe length with a metal cutting saw or an ordinary hand saw with small teeth . Pipe ends have to be beveled slightly with a bevelingtool (Reamer) at an angle of about 30 degree. The total length of insertion socket (injection molded socket or couplet) shall be marked on the pipe end could be inserted into fitting socket. Attempt shall be made to push the pipe to the marked distance if not possible it shall at least be pushed for 2/3 of thisdistance.

Dust , oil, water grease etc. shall be wiped cut with a dry cloth from the surface .Further the grease should be removed thoroughly removed with a suitable solvent , such as ethylene chloride or as an alternative the outside surface of there pipe and the inside of the fitting may be roughed with emery paper .

Generous coating of solvent cement shall be evenly applied on the inside of the fitting all-round the circumference for the full length of insertion and on the outside of the pipe end up to the marked line with non-synthetic brush of suitable dimension .The pipe shall be pushed into the fitting socket and held for 1 or 2 minutes as otherwise the pipe may come out of the fitting due to the slippery quality of cement and the tapering inside bore of the fitting. The surplus cement on the pipe surface shall be wiped out. If the solvent cement has dried up too much or the tapering of the socket is too steep, jointing will not be proper and pipe will come out of thefitting.

In summer months joints shall be made preferable early in the morning or in the evening when it is cooler .This will prevent joint from pulling apart when the pipe cools off at night. Heat application method for jointing shall not be allowed.

3.1.1.2 FlangedJoints

For jointing PVC pipes particularly of larger sizes to valves and vessels and larger size metal pipe where the tensile strength is required the joint is made by the compression of a gasket or ring seal set in the face of C I flange .Flanges solvent welded to the P.V.C. pipes shall be supplied by the manufacturer.

3.1.1.3 Rubber RingJoints:

Rubber ring joints can provide a water tight seal but do not resist pull. As such these may be used only as repairs collar and for jointing pipes larger than 110 mm. Such joints may be provided on pipes which are buried in the ground and supported through out on a bedding so that they are not subjected to movement and longitudinal pull .The material of rubber ring shall conform to IS:5382 where aggressive soil are met with , synthetic rubbers perform better for jointing The ring shall be housed in a groove formed in plastic or metallic housing .The ring shape and the method of compressing the ring vary considerably in different types of joints . Most joints often require the application of lubricating paste which shall be procured from the manufacturers of P.V.C.pipes
.Rubber rings shall be supplied by the manufacturer's .The rubber ring joints can be either of. With spigot and socket , or With separate collar pieces having two rubber rings one at either end

3.1.2 Crossing Road or drain

Where the pipe line crosses a road or a drain, it shall be through C.I. or RCC pipe.

3.1.3 Supports for Valve andHydrant:-

Valve and hydrant tees shall be so that the torque applied in operating a valve is not transmitted to the pipeline.

3.1.4 Inspection andTesting

Solvent welded pipe shall not be pressure tested until; at least 24 hours after the last solvent cemented joint has beendone.

All control valves shall be positioned open for the duration of the test and open end closed with water tight fitting .The testing pressure on completion of the work shall not be less than one and half time the working pressure of thepipes.

Pressure shall be applied either by hand pump or power driven pump .Pressure gauges shall be correctly positioned and closely observed to ensure that at no time are the test pressure exceeded . The system shall be slowly and carefully filled with water to avoid surge pressure or water hammer. Airventsshallbeopenatallhighpointssothatairmaybeexpelledfromthesystemduringfilling.

When the system has been fully charged with water and air displaced from the line air vent shall be closed and the line initially inspected for seepage at joints and firmness of supporters under load. Pressure may then be applied until the required test pressure is reached.

Clamping

The pipe shall be laid and clamped to wooden plugs fixed above the surface of the wall as shown Alternatively plastic clamps of suitable design wherever manufactured , shall be preferred .Provision shall be made for the effect of thermal movement by not gripping or distracting the pipe at supports between the anchors for suspended pipes . The supports shall allow the repeated longitudinal temperature movement to take place with out abrasion Line or point contact with the pipe shall be avoided .Heavy components such as metal valves shall be individually supported .

3.1.6 Supports:

PV.C . pipes require supports at the close interval .Recommended supports spacing for unplasticised P.V.C. pipes are given in table .This spacing may be increased by 50% for vertical runs supports.

TABLE

Pipe Dia . mm	Support spacing mm
20	700
25	750
32	825
40	975
50	975

It is essential that P.V.C. pipes shall be aligned properly before fixing them on the wooden plugswith clamps. Even if the wooden plugs are fixed using a plumb line, PVC pipe shall also be checked for its alignments before clamping. The pipe line will be wavy if the clamps are not fixed keeping the pipeplumb.

3.1.7 Connection to a watertap

Connection to a water tap shall be made by means of a G.I. adopter as shown. G.I. adopter shall preferably be supplied by the same manufacturer as that of P.V.C. pipe. In any threaded coupling between P.V.C. and GI it is preferable that P.V.C. is fitted inside the G.I. fitting. If, however greater projection is desired, same shall be achieved by joining a short piece of a GI pipe (Nipple).

3.2 Inspection chambers, gully traps, etcwithin the building i.e. for diversion of pipes at upper flows or on service floor shall be cast iron chambers with bolts, nuts to close the cover, all to be fabricated as per actualrequirement

3.3 Supports, pedestal and base for inspection chambers, gully traps and pipes when provided as per above shall be in 1:2:4 cement concretemix.

3.4 Pipe sleeves and inserts, etc. through RCC walls of buildings either external or internal or for water tanks shall be of C.I. or M.S. provided with water barflange.

3.5 During installation open ends of pipes shall be closed with a plug made of wood, cut in to required shapeandcoveredwithgunnybagstopreventaccesstodirtintothepipe

3.6 G.I. Waste pipes and fittings shall be 'C' class with G.I. unions, tail piece reducers and connections to be provided between joints to either lead or C.I.Pipes.

3.7 W.C. pan connectors shall be to suit the requirements as per drawing, with 40 dia vent horn for connection to the anti-siphonage pipe Pan connector shall be of C.I. orlead

3.8 Connection to the sewer or storm water collection sumps to be perfectly water tight and as specified in thedrawing

3.9 Rainwater flashing shall be of 150 X 100 or 230 X 150 fitted on to the bell mouth of rainwater pipes inlet and then covered with cast iron grating and extensionpiece

3.10 Allrainwaterpipesandfittingsshallbe UPVC typevarietyconformingto CPWD specification or latest IScode.

3.11 The floor traps for toilet blocks shall be PVC with CP brass grating, bolted down design. The traps hall be provided with minimum water seals of 40 to 50mm.

3.12 Where toilet slabs are sunk, the floor trap shall be of 100 x 75 heavy duty type PVC 'P' trap, with C P Brass grating, bolted downdesign

3.13 Bathroom CP grating shall be of bolted down design out of heavy cast brass with chromium plating of the best approvedstandard

3.14 Cast iron gratings shall be flat with perfect edge and of the best quality procurable of the specified width and thickness and in the availablelengths

FLOOR TRAPS

Floor traps shall be deep seal, 'P' or 'S' type of approved make with CP brass gratings.

FIXING

The traps shall be placed in position and encased all around with 150 mm thick concrete 1:2:4 whenever necessary vertical pieces with sockets shall be joined to traps to accommodate CP brass gratings.

BALL VALVE

These shall be brass heavy quality with plastic floats of size that of the inlet pipe to the over head tank.

4.0 EXTERNALSEWERAGE

The work under this section shall consists of furnishing all labour, material, equipments and appliances necessary and required to completing install the sewerage system as specified hereinafter shown in the drawings.

4.1 GENERALREQUIREMENTS

a) All materials shall be new and of the best quality conforming to specifications and subject to the approval of theEngineer-in-charge.

b) Drainagelinesshallbelaidtotherequiredgradientsandprofiles.

c) Alldrainageworkshallbedoneinaccordancewiththelocalmunicipalbyelaws.

d) The contractor shall take necessary permissions from the local traffic police, and civic and other competent local authorities for cutting the main/municipal roads, closing and road/street to vehicular traffic for laying his services. The contractor shall not be liable for any extra payment on this account.

e) Location of all manholes, catch basins etc., shall be got confirmed from the Engineer-in- before the actual execution of work atsite.

f) All works shall be executed as per approved drawings, working drawings or as directed by the Engineer-in-charge.

ALIGNMENT AND GRADIENT.

The sewer drainage pipes shall be laid to alignment and gradient shown on the drawings but subject to such modifications as shall be ordered by the Engineer-in-charge from time to time to meet the requirements of the works. No deviation from the lines, depth of cutting or gradients of sewers shown on the plans and sections shall be permitted except by the express direction in writing of theEngineer-in-charge.

EXCAVATION

The excavation for sewer works shall be open cutting unless the permission of the Engineer-in-charge for the ground to be tunneled is obtained in writing Where sewers have to be constructed along arrow passages, the Engineer-in-charge may order the excavation to be made partly in tunnel and in such cases the excavated soil shall be brought back later on for refilling the trenches or tunnel

OBSTRUCTION OF ROADS

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 be then left (or public and private transit, and 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 Engineer-in-charge in writing before closing any road to vehicular traffic and the foot walks must be clear at alltimes.

4.1.4 EXCAVATIONTOBETAKENTOPROPERDEPTH

The trenches shall be excavated to such a depth that the sewer shall rest on concrete as described in the several clauses relating thereto and so that the inverts may be at the levels given in the sections In bad ground, the Engineer-in-charge may order the contractor to excavate to a greater depth than that shown on the drawings and to fill up excavation to the level of the sewers with the concrete, broken stone gravel or othermaterials.

REFILLING

After the sewer or other works has been laid and proved to be water tight, the trench or other excavation shall be refilled Utmost care shall be taken in doing this, so that no damage shall be caused to the sewer and other permanent work. The filling in the haunches and up to 75 cms. above the crown of the sewer shall consist of the finest selected materials placed carefully in 15 cms. Layers and consolidated. After this has been laid, the trench and other excavation shall be refilled in 15 cms. Layers with materials taken -from the excavation, each layer being watered to assist in the consolidation,unlesstheEngineer-in-chargeshallotherwisedirect.

CONTRACTOR TO RESTORE SETTLEMENT AND DAMAGES

The contractor shall at his own costs and charges make good promptly during the whole period for the works in hand any settlement that any occur in the surfaces of roads, berms, footpaths, open spaces etc. whether public or private 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, repairand make good any damage done to building and other property. If in the opinion of the Engineer-in-charge, he fails to make good such works with all practicable dispatch, the Engineer-in-charge 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 in any other manner according to the law of land.

DISPOSAL OF SURPLUS SOIL

The contractor shall at his own cost shall provide places inclusive of transportation for disposal of all surplus materials not required to be used in the works. As each trench is refilled the surplus soil shall be immediately removed and the surface properly restored the roadways and sides shall be left clear.

TIMBERING OF SEWERS ANDTRENCHES

a) The contractor shall at all times support efficiently and effectively the sides of the sewer trenches and other excavations by suitable timbering, piling and sheeting and they shall be closed, timbered in loose or sandy strata and below the surface of the subsoil water level.

b) All timbering sheeting and piling with their wallings and supports shall be of adequate dimension and strength and fully braced and strutted so that no risk of collapse of subsidence of the wall of the trench shall takeplace.

c) The contractor shall he held responsible and will be accountable for the insufficiency of all timbering sheeting and pilling used as also for all damage to persons and property resulting form improper quality, strength, maintaining or removing of thesame

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 work and shall be fully responsible for all damages to persons or property resulting from anyaccidents

REMOVALOFWATERFROMSEWERSANDTRENCHES

a) The contractor shall at all times during the progress of the work keep the trenches and excavations free from water which shall be disposed of by him in the manner as will neither cause injury to the public health nor to the public or private property nor the work completed or in progress nor to the surfaceofanyroadsorstreets,norcauseanyinterferencewiththeuse ofthesamebythepublic.

b) If any excavation is carried out at any point or points to a greater width than specified cross section of the sewer with its envelope, the full width of the trench shall be filled with concrete by the contractorathisownexpenseandchargestotherequirementsoftheEngineer-in-charge.

WIDTH OF TRENCHES

The Engineer-in-charge shall have power by giving an order in writing to the contractor to increase the maximum width in respect of which payment will be allowed for excavation in trenches for various classes of sewer, manholes and other works in certain lengths to be specifically laid down by him where on account of bad ground or other unusual conditions, he considers that such increased widths are necessary in view of the site conditions.

4.1.12 RECOMMENDEDWIDTHOFTRENCHESat thebottom ofthetrenchareasfollows:- 100 mmdia pipe 55cms

150 mmdia pipe 55cms
225 - 250 mmdiapipe 60cms
300 mmdia pipe 75cms

Maximum width of the bed concrete shall also be as above. No additional payment is admissible for widths greater than specified.

SALT GLAZED STONEWARE PIPES

Stoneware pipes shall be of first class quality salt glazed and free from rough texture inside and outside and straight. All pipes shall have the manufacturers names marked on it and shall comply to IS : 651-1971.

I) LAYINGANDJOINTINGOFSTONEWARESALT GLAZEDPIPES

a) Pipes are liable to be damaged in transit and not with standing tests that may have been made before dispatching pipe shall be examined carefully on arrival at site. Each pipe shall be rung witha wooden hammer or mallet and those that did not ring true and clear shall be rejected. Sound pipes shall be carefully stacked to preventdamage.

b) The pipes shall be laid down with sockets leading uphill and should rest on solid and even foundations for the full length of the barrel. Socket holes shall be formed in the foundation sufficiently deep to allow the pipe jointer room to work right round the pipe and as short as practicabletoadmitthe socketandallowthe jointstobemade.

c) Where pipes are not bedded in concrete the trench bottom shall be left slightly high and carefully bottomed up as pipe laying process, so that the pipe barrels rest on firm ground If excavation has beencarriedtoolowitshallbemadeupwithcementconcreteatthecontractor'scostandcharges

d) If the bottom of the trench consists of rock of very hard ground that cannot be easily excavated to a smooth surface the pipes shall be laid on cement concrete bed to ensure evenbearing

II) JOINTING OFPIPES

a) Tarred gaskin shall first be wrapped round the spigot of each pipe and the spigot shall then be placed into the socket of the pipe previously laid, the pipe shall then be adjusted and fixed in its correct positions and the asking caulked tightly home so as to fill not more than on quarter of the total length of thesocket

b) The remainder of the socket shall be filled with stiff mix of cement mortar (1 cement: 1 clear sharp washed sand) When the socket is filled, a fillet should be formed round the joint with a trowel forming an angle of 45 degrees with the barrel of the pipe. The mortar shall be mixed as needed for immediateuseandnomortarshallbebeatenupandusedafterithasbeguntoset.

c) After the joint has been made, any extraneous material shall be removed from inside of the joint with a suitable scraper. The newly made joints shall be protected until set from the sun, drying winds, rains or dust. Sacking or other materialist which can keep damp shall be used. The joints shall be exposed and space left all round the pipes for inspection by the Engineer-in-charge. The inside of the sewer must be left absolutely clear in bore and free from cement mortar or other obstructionsthroughoutitentirelength,andshallefficientlydrainanddischarge

III) TESTING

a) All lengths of the sewer drain shall be fully 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 subjected to a test pressure of atleast 1.5 M head of water. The test pressure shall, however, not exceed 6 M head at any point. The pipes shall be plugged preferably with standard design plugs 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 onetime.

b) Sewer lines shall be tested for a straightness by:-

i) Insertingasmoothball12mmlessthantheinternaldiameterofthepipe.

ii) In the absence of obstruction such as yarn or mortar projecting at the joints the ball should roll down the invert of the pipe and emerge at the lower end. Means of a mirror at one end and a lamp at the other end. If the pipe line is straight the full circle of light will be seen otherwise obstructions or deviations will beapparent.

iii) The contractor shall give a smoke test to the drain and sewer at his own expense and charges, if directed by the Engineer-in-charge.

iv) A test register shall be maintained which shall be signed and dated by the Contractor, Engineer-in-charge/ Project-in-charge.

MASONRY WORK

Masonry work for manhole, chambers, specific tanks and such other works as required shall be constructed from local best quality bricks in cement mortar 1:4 mix (1 cement: 4 coarse sand) or as specified in the schedule of quantities All joints shall be properly raked to receive plaster.

TESTING

All pipes shall be tested to a hydraulic test of 1.5 M head for atleast 30 minutes at the highest point in the section under test. Test shall be carried out similar to those for stoneware pipes given above. The smoke test shall be carried out by the contractor, if directed by the Engineer-in-charge, at the expense and charges of the contractor. A test register shall be maintained which shall be signed and dated by the contractor. The works failing during the test have to be redone by the contractor and nothing extra shall be payable to his on thisaccount.

S.W. GULLY TRAP

Gully traps shall conform to IS 65-1965. These shall be sound, free from visible defects such as fine cracks or hair cracks. The glaze of the traps shall be free from graze. They shall give a sharp clear note when struck with light hammer. There shall be no broken blisters. The size of the gully trap shallbe specified along with dimension and shall be installed in a chamber as described hereafter Each gully trap shall have a C.I. grating of square size corresponding to the dimensions of inlet of gully trap. It will also have a watertight C.I. cover weighing not less than 2.72 kg. The grating cover &frameshallbe sound&goodcastingandshallhavetrulysquaremachinedseatingfaces.

The excavation for gully traps shall be done true to dimensions and levels as indicated on plans or as directed by the Project-in-charge

4.5.1 FIXING

The gully trap shall be fixed on cement concrete foundation 600 x 600 cm square and not less than 10cm. thick The mix for the concrete will be 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate 40mm nominal size) The jointing of gully outlet to the branch drain shall be done similar to jointing of S W pipe as directed in213

BRICK MASONRY CHAMBER

After fixing and testing gully and branch drain, a brick masonry chamber 300 x 200 (inside) (with class50 brick in cement mortar 1:5 (1 cement: 5 fine sand) shall be built with a 115mm thick brick work round the gully trap from the top of the bed concrete upto ground level. The space between the chamber walls and the trap shall be filled in with cement concrete 1:5:10 (1 cement: 5 course sand: 10 graded stone aggregate). The upper portion of the chamber i.e. above the top level of the trap shall be plastered inside with cement mortar 1:3 (1 cement: 3 coarse sand) finished with a floating coat of neat cement, the corners and bottom to the chamber shall be rounded off as to slope towards the grating and form a hopper. C.I. cover with frame 300 x 200 mm (inside) shall then be fixed on the top of the brick masonry with cement concrete 1:2:4 (1 cement 2 coarse: 4 graded stone aggregate 20mm normal size) and rendered smooth The finished top of cover shall be left about 4 cm.abovetheadjoininggroundlevelsoasexcludethesurfacewaterfromenteringthegullytrap.

5.0 EXTERNAL WATERSUPPLY

5.1.0 SCOPE OFWORK

The work shall consist of furnishing all materials Labour equipment and appliances necessary and required to completely install the water supply system as required by the Drawings.

Without restricting to the generality of the foregoing the water supply system shall include the following:

a) Water supply mains and submains
b) Controlvalves
c) Masonry chambers and otherappurtenances
d) Excavation and refilling pipetrenches
e) Concrete anchorblocks
f) Ferrules,FerrulechambersG.I.pipebelowgroundfromferruletoouterfaceofthebuilding up to finished groundlevel.

CONTRACTOR TO RESTORE SETTLEMENT AND DAMAGES

The contractor shall, at his own cost, make good during the whole period the works are in hand and during defect liability period thereafter, any settlement that may occur on the surfaces of roads, beams, footpaths, gardens, open spaces etc., whether public or private caused by trenches or by other excavations and shall be liable for any accidents caused thereby He shall also, at his own expense and charges, repairand make good any damage done to buildings and other property. If in the opinion of the Engineer-in-charge/Engineer-incharge, he fails to make such works with all practicable dispatch, the Engineer-in-charge/Project-in-charge shall be at 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 becomedue tohimorrecoveredfromhiminanyothermanneraccordingtothelawofthe land.

DISPOSAL OF SURPLUS SOIL

The contractor shall at his own cost shall provide places inclusive of transportation for disposal of all surplus materials not required to be used in the works. As each trench is refilled the surplus soil shall be immediately removed and the surface properly restored the roadways and sides shall be left clear

5.2 Trenches: The width and depth of trenches for different diameter of G.I. under- DiaofPipe width oftrench Depth oftrench

a)	15 to 50mm	39 cm	60cm
b)	up to 100mm	50cm	90cm
c)	Over 100mm	60cm	90cm

At joints the width of trench shall be widened where necessary

CUTTING AND THREADING

Where pipes have been or re-threaded the ends shall be carefully filled out so that no obstruction to flow is offered the ends of pipes shall then be carefully threaded, in such a manner as will not result in slackness orjoints.

JOINTING

Screwed steel pipes shall be jointed with screwed and socket joints using screwed fittings of wrought iron, steel or malleable cast iron The pipes shall be cleaned and cleared of all foreign matter and may burrs from the ends or pipes removed before laying. In joining the pipes, the inside of the socket and the screwed end of the pipe shall be oiled and rubbed over with white lead and a few strands of fine yarn or thread wrapped round the screwed in the socket, tee etc. Care shall be taken that all the pipes and fittings are properly jointed so as to make the joints completely water tight.

5.2.3 PROTECTION

G.I. pipes below ground shall be protected against corrosion by the application of two coats of bitumen paint covered with polyethylene tape and a final coat of anticorrosive bitumen paint.

5.2.4 TRENCH FILLING OF G.I.PIPES

The pipe shall be laid on layer of 10 cm sand and filled up to 15 cm above the pipes The remaining portion of the trench shall than be filled with excavated earth and the surplus earth shall be disposed off as directed by Project-in-charge/Engineer-in-charge The pipes shall be embedded in sand or soft soil free from rock and gargle and where the pipeline crosses a road or a drain, it shall be through RCC pipe

FERRULE CONNECTION

Ferrule connection shall be inclusive of necessary excavation, boring a hole in cast iron mains, tapping it providing necessary saddles, and bailing out of water.

5.2.6 TESTING

a) On completion the pipe line laying shall be tested to a Hydraulic pressure of 7 kg/sq.cm. (70 meter), Pressure shall be maintained for a period of two hours without drop. Any joint found leaking shall be redone and all leaking pipes removed and replaced Testing shall be done before the trenches are refilled. The contractor shall arrange all the equipment required for testing and the rate quoted shall be deemed to be inclusive of thiscost.

b) Contractor shall maintain a test register and tests shall be recorded in it. The entries shall be signed and dated by Engineer-in-charge, Project-in-Charge and Contractor. This register shall be handed over to the Project-in-Charge on completion ofwork.

c) G. I. pipes shall be measured per linear meter (to be nearest centimeter) and shall be inclusive of all fittings, earth work, pipe protection and other items asspecified.

FERRULES

The ferrules for connection with CI shall generally conform to IS 2692: 1964. It shall be of non ferrous materials with CI bell mouth cover and shall be nominal bore as specified. The ferrule shall be fitted with screw and plug or valve capable of completely shutting off the water supply to communication pipe as and whenrequired.

VALVE CHAMBERS

Contractor shall provide suitable brick masonry chambers in cement mortar 1:5 (1 cement: 5 coarse sand) on cement concrete foundations 150 mm thick 1:5:10 (1 cement: 5 coarse sand: 10 graded stone aggregate 40 mm nominal size) 15 mm thick cement plaster inside and outside finished with a floating coat of neat cement inside with cast iron surface box including excavation, back filling complete

Valve chambers shall be of following sizes :-

For depths90cms.	60 x 60
cmsFordepths up to 100cms.beyond	120 x 120cms

5.4 TESTING

a) Allpipes, fittingsandvalvesshall betestedbyhydrostaticpressureof7kg./sq.cm.
b) Pressure shall be maintained for a period of at least two hours without appreciable drop in the pressure after fixing at site (+/ -,10%)
d) Register shall be maintained and all entries shall be signed and dated by contractor(s) and Engineer-in-charge. 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 leakage, 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 madegoodduringthedefects liabilityperiodwithoutanyextra cost.
e) After commissioning of the water supply system, contractor shall test valve by closing and opening it a number of times to observe if it is working efficiently. Valves which do not effectively operate shallbe replacedbynewonesatnoextracostandthesameshallbe testedas above.

5.5 DISINFECTION

a) After completion of the work, contractor shall flush clean the entire system with the City's filtered water after connection has beenmade.
b) After the first flushing, add commercial bleaching powder to achieve a dosage of 2 to 3 mg/Ltrof water in the system and flushed. This operation should be performed twice to ensure that the system is fully disinfected andusable.

5.6 PRE-COMMISSIONING

a) Ensurethatallpipesarefreefromdebrisandobstructions
b) Check all valves and for effective opening and closing action Defects should be rectified or valves replaced
c) Ensurethatallconnectiontobrancheshavebeenmade
d) Ensurethatmainshavebeenconnectedtotherespectivepumps, undergroundandoverheadtanks
e) Water supply should be available at main undergroundtank
f) All main line valves should beclosed

5.6.1 COMMISSIONING

a) Fill underground tank with water Add 1 kg of fresh bleaching powder after making a solution, to be added nearinlet
b) Start water supply pump and allow water to fill main under ground tank Water will first fill the fire tankandthenoverflowtothedomestictanks.
c) After overhead reservoir drain the same to its one forth capacity through tank scour valve. This is to ensure removal of all mud, debris, etc. in thetank
d) Fill overhead tank tofull
e) Release water in the main lines by opened valves in each circuit Drain out water in the system through scour valves in lower regions Ensure clean water is now coming out of thesystem
f) Open valves for individual sectors Observe for leakages or malfunctions, check pressure and flow at endofline byopeninghydrantsetc.,removeandrectifydefectsnotice.
g) The entire water supply system should be disinfected with bleaching powder and system flushclean.
h) Send four samples of water drawn from four extreme locations for testing for bacteriological test in sterilized bottles obtained from the concerned laboratory. Laboratory personal may collect the samplesthemselves.

RESPONSIBILITY:

Responsibility for various activities in pre-commissioning and commissioning procedures will rest with the contractor.

STORM DRAINS

6. GENERALREQUIREMENTS

a) All materials shall be new and of the best quality conforming to specification and subject to the approval of theEngineer-in-charge.

b) Drainagelinesshallbelaidtotherequiredgradientsandprofiles.

c) Alldrainageworkshallbedoneinaccordancewiththelocalmunicipalbylaws.

d) Contractor shall obtain necessary approval and permission for the drainage system from the municipal or any other competentauthority.

e) Location of all manholes, catch basins etc., shall be got confirmed by the Engineer-in-charges before the actual execution of work atsite.

f) All works shall be executed as directed byEngineer-in-charges.

RUBBLE MASONRY

As specified under item No. 6.3 of civil works for rubble masonry with black granite stones.

REINFORCED CEMENT CONCRETE PIPES

Underground storm water drainage NP2 pipes shall be centrifugally spun RCC pipes of specified size. Pipes shall be true and straight with uniform bore throughout. Cracked, warped pipes shall not be used on the work. All pipes shall be tested by manufacturer and the contractor shall produce, when directed a certificate to the effect from themanufacturer.

TESTING

All pipes shall be tested to a hydraulic test of 1.5 M head for atleast 30 minutes at the highest point in the section under test. Test shall be carried out similar to those for stoneware pipes given above Thesmoke test shall be carried out by the contractor, if directed by the Engineer-in-charge, at the expense and charges of the contractor. A test register shall be carried out similar to those for stoneware pipes given above. The smoke test shall be carried out by the contractor, if directed by the Engineer-in-charge, at the expense and charges of the contractor. A test register shall be maintained which shall be signed and dated by theContractor/Engineer-in-charge.

PRE CAST SLABS

Pre cast layer slabs shall be casted in RCC and shall be placed over RR masonry drain as per drawing.

Special condition for White/ Colour wash & Painting work:-

1. Rates are including the cost of all the materials, labour, T&P, scaffolding etc. for the execution and completion of the work.

2. Rates are applicable for all heights and levels of the buildings.

3. The cleaning of all the white wash and painting spots over the doors, windows, floors, glass, electric switches & fixtures, is the responsibility of the Contractor nothing extra on account of this would be paid. If the contractor fails to clean these spots it would be got cleaned departmentally and expenditure incurred would be debited to the contractors account.

4. All the safety measures which are for safe execution of the work is in the scope of the contractor. If any accident/ mishappening occurred during the execution of work at site the contractor shall be solely responsible for the same.

5. The work shall be taken up strictly as per the latest IS codes, consumption factors and CPWD specifications with updated latest amendments.

Signature of the Contractor **Signature of the A.E.E.**

1. The REQUIRED tests shall be carried out when the quantity of materials to incorporate in the work exceeds the minimum quantityspecified.

2. Optional tests specified or any other tests, shall be carried out in case of specialized works or important structures as per direction of theEngineer-in-Charge.

3. Testing charges, including incidental charges and cost of sample for testing shall be borne by the contractor for all tests.

4. Testing charges for optional tests shall be reimbursed by the Department. However, the incidental charges and cost of sample for testing shall be borne by thecontractor.

5. In case of non-IS materials, it shall be the responsibility of the contractor to establish the conformity of material with relevant IS specification by carrying out necessary tests. Testing charges including incidental charge and cost of sample for testing shall be borne by the contractor for suchtests.

TESTS SHALL BE AS FOLLOWS:

Material	**Test**	**Field / laboratory test**	**Test procedure**	**Minimum quantity of material / Work for carrying out the test**	**Frequency of testing**
Reinforced cement concrete work					
Water for construction purposes	Ph value Limits of Acidity Limits of Alkality Percentage of solidsChlorides Suspended matter Sulphates Inorganic solids Organic solids	Lab	IS 3025	Water from each source	Before commencement of work & thereafter: Mandatory - Once in one year from each source; Optional: once in 3 months from each source; Municipal supply - optional.
Reinforced cement concrete	b) slump test	Field	IS: 1199	a) 20 cu.m. for slabs, beams and connected columns . b) 5 Cu.m in case ofcolumns	a) 20 cu.m. Part there of or morefrequently asrequired by theEIC/Engineer-in-charge b) Every 5Cu.m.
	c) cube test	Lab	IS : 516	a) 20 cu.m. In slab, beams, & connected columns. b) 5 cum in columns	a) every 20 cum of a day's concreting .(Ref. as per frequency of sampling). b) Every 5 cum.
Ready mixed cement concrete (IS-4926)	Cube test	Lab	IS-516 and as per para 6.3.2 of IS-4926-2003	50 cum	One for every 50cum of production or every 50 batches, whichever is the greater frequency
Note : for all other small items and where RCC done in a day is less than 5 cum, test may be carried out as required by EIC/Engineer-in-charge					

Material	Test	Field / laboratory test	Test procedure	Minimum quantity of material / Work for carrying out the test	Frequency of testing
Mortars: Lime	Chemical & physical properties of lime	Laboratory	IS; 6932 (part 1 to x)	5 M.T.	10 M.T. or part there of as decided by the EIC/Engineer-in-charge
Sand	Bulking of Sand	Field		20 CU.M.	Every 20 cu.morpart there of or more frequently as decided by EIC/Engineer-in-charge
	Silt content	Field	IS:383	20 CU.M.	Every 20 cu.morpart there of or more frequently as decided by EIC/Engineer-in-charge
	Particle size and distribution	Field or Laboratory as decided by the EIC/Engineer-in-charge	IS:383	40 CU.M.	Every 40 cu.m. o fine aggregate / sand required in RCC. Work only
	Organic Impurities	Field	..DO..	20 CU.M.	Every 20 cu.m. or part thereof or more frequently as decidedby theEIC/Engineer-in-charge
	Chloride & sulphate content tests		Optional		Once in three months.
Cement	Test requirement	Fineness (m2/kg)	IS 4031 (Part-II)	Each fresh lot	Every 50 MT or part thereof
		Normal consistency	IS 4031 (Part-IV)		
		Settingtime (minute) a) Initial b) Final	IS 4031 (Part-V)		
		Soundness a) Le-Chat expansion (mm) b) Auto clave (%)	IS 4031 (Part-III)		
		Compressive strength(Mp) a) 72+/-1 hr b)168+/-2hr	IS 4031 (Part-VI)		

Material	Test	Field / laboratory test	Test procedure	Minimum quantity of material / Work for carrying out the test	Frequency of testing
Stone Aggregate	a) Percentage of soft or deleterious materials	General visual inspection/ Lab test where required by the EIC/Engineer-in-charge	IS 2386 Part II	One test for eachsource	One test for each source
	Particle size distribution	Field / Lab	-	10 cu.m	Every 40 cum. Or part thereof and
	Once in three months for each source for coarse and fine aggregates required in RCC works, for a minimum quantity - 10 cum for coarse aggregate and 40 cum for fine aggregate.				
	a) Estimation of Organicimpurities	Field / Lab	IS 2386 Part II	10 Cum	-do-
	b) Specific Gravity	Field / Lab	IS 2386	10 Cum	-do-
	a) Bulk Density	Field / Lab	IS 2386	10 Cum	-do-
	b) Aggregate crushingstrength	Field / Lab	IS 2386	10 Cum	-do-
	c) Aggregate impact value	Field / Lab	IS 2386	10 Cum	-do-
Timber	Moisture	Field (by moisture meter) Laboratory test as required by EIC/Engineer-in-charge		1 Cu. M.	Every one Cum or part thereof
Flush Door	End immersion test Knife test Adhesion test	Laboratory	IS: 2202 (Part 1) & Part II	26 shutters	As per sampling and testing as instructed by theEIC/Engineer-in-charge
Aluminium door or window fittings	Thickness of anaodic coating	Laboratory	IS: 5523	If the cost offittings exceed Rs. 20,000/-	**Rs.20,000/- or part there of as required by the EIC/Engineer-in-charge.**
Bricks	Testing of bricks /brick tiles for dimensions **Compressive strength** **Water absorption**	Laboratory	IS 3495 Part I to IV	**No of bricks to be selected & bricks lot** **20 : 2001 to 10000** **32 : 10001 to35000.** **50 : 35001 to50000** **20 : for every addl. 50000 or part thereof** **If <2000, As per decision of the EIC/Engineer-in-charge**	Permissible defective bricks in the sample 1 2 3
	Efflorescence				

Material	Test	Field / laboratory test	Test procedure	Minimum quantity of material / Work for carrying out the test	Frequency of testing
Steel for RCC	Physical tests a) Tensile strength b)Retest c) Re-bound test d) Nominal mass e) Bendtest **f) Elongationtest** g) Proofstress	Lab / field	IS 1608 IS 1786 IS 1786 IS 1786 IS 1599 IS 1786 IS 1786	Each lot from each source from each diameter of bar	Below 100 Tons Dia < 10 mm one sample for each 25 tonnesor part thereof If dia is >10 mm but less than 16 mm: One sample each 35 tonnesor partthereof. If dia>16 mm one sample for each 45tonnes
	Chemical Tests: 1.Carbon Constituent 2.Sulphur 3.Phosphorus 4.Phosphorus& Sulphur		IS 1786		For every fresh lot of one truckor less as directed by the Engineer-in Charge/Engineer-in-charge
Soil core test	OMC Proctor density		As per IS 12175	Two for every 50 sqm	As per notes 1 & 2below
Mosaic tiles			As per IS 13801 Para 14.6	5000 tiles and more for each manufacturer & thereafter for every 10000 tiles or part thereof.	
Ceramic tiles			As per IS 13630	3000 tiles and more for each manufacturer and thereafter for every 3000 tiles or part thereof.	

OTHER TESTS: Soil core tests; Testing aggregate - particle size distribution; Ceramic tiles, Mosaic tiles

Testing structural steel; Chequered plate, Unit weight, Thickness, Chemical and physical properties

Presence of preservative on factory made panelled door, kiln seasoned chemically treated wood products, Moisture content in wood products.

CI pipes: Dimensional, mass, Hydrostatic; GI pipes; Lead; RCC Hume pipes; Stoneware pipes.

ROAD WORK: Soil core tests; Grading of metal for WBM; Bitumen grade; Bitumen content; Load test on concrete gratings.

OPTIONAL TESTS: Testing aggregate-surface moisture, impact value, spectrographic alkali reaction; Dimensional tests of bricks; Testing the mass of zinc coating on GI door frame, steel windows, test for chemical and physical properties; Anodic coating on aluminium fittings and aluminium sections, Unit weight of aluminium sections; Nondestructive Test of Concrete like Non-Destructive Testing(NDT), Ultra Sonic Pulse Velocity (UPV or USPV) by Rebound Hammer (Schmidt Hammer with impact energy of the hammer is about 2.2Nm and with Ultrasonic Pulse VelocityTester.

1. BACK FILLING IN SIDES OF FOUNDATIONS, PLINTH, UNDER FLOOR ETC.:

The back filling shall be done after the concrete or masonry has fully set and shall be done in such a way as not to cause under-thrust on any part of the structure. Where suitable excavated material is to be used for back filling, it shall be brought from the place where it was temporarily deposited and shall be used in backfilling. The scope of work for back filling/filling in foundation, plinth, under floors etc. shall include filling for all the buildings covered under the contract. Surplus earth available from one building, if required, shall be used forbackfilling/filling for other buildings also within the specified lead mentioned in theitem.

All timber shoring and form work left in the trenches, pits, floors etc. shall be removed after their necessity ceases and trash of any sort shall be cleared out from the excavation. All the space between foundation masonry or concrete and the sides of excavation s h a l l b e b a c k f i l l e d to the o r i g i n a l s u r f a c e with approved materials in layers not exceeding 150 mm. in thickness, watered and well consolidated by means of rammers to at least 90% of the consolidation o b t a i n a b l e at o p t i m u m m o i s t u r e c o n t e n t (Proctor density). Flooding with water for consolidation will not be allowed. Areasinaccessible tomechanicalequipmentsuchasareasadjacenttowallsandcolumnsetc.shallbe tamped by hand rammer or by hand held power rammers to the required density. The backfill shall be uniform in character and free from large lumps, stones, shingle or boulder not larger than 75 mm. in any direction, salt, clods, organic or other foreign materials which might rot. The backfilling in plinth and under floors shall be done in similar way in layers not exceeding 150 mm. thick and shall be well consolidated by means of mechanical or hand operated rammers as specified to achieve the required density.

Test to establish proper consolidation as required will be carried out by the Contractor cost. Two tests per50 sqm. will be taken to ascertain the proper consolidation.

1. FILLING IN PLINTH AND UNDERFLOORS:

After the available suitable excavated materials are exhausted as backfilling, the contractor shall notify the Engineer-in-Charge, of the fact and levels taken jointly with Site Engineer / Engineer-in-charge/Authority of CIPET Authority. The earth, murrum, sand, gravel etc.or such materials suitable for filling proposed to be filled under floors and so mentioned in the item of schedule of quantities shall then be brought to site from approved locations andsources.

i) Earth Filling : The earth, soft murrum etc. so brought shall be filled up in layers of 15 cm depth, each layer being well watered and consolidated by approved hand or mechanical tampers or other suitable means to achieve the requireddensity.

ii) Gravel or Sand Filling : Gravel if required to be filled under floors, shall be single washed gravel of approved quality and of size varying from 12 mm. to 20 mm. it shall be uniformly blinded with approved type of soil and/or sand to obtain full compaction. Gravel shall be filled in specified thickness and shall be well watered and rammed entirely to the satisfaction of the Site Engineer / Engineer-in-charge.

If sand is required to be filled under floors, it shall be clean, medium grained and free from impurities. The filled in sand shall be kept floodedwith water for 24 hrs. to ensure maximum consolidation. Any temporary work required to maintain sand under flooded condition shall be done by the contractor at his own cost. The surface shall then be well dressed and got approved from Engineer-in-charge before any other work is taken over thefill.

BILL OF QUANTITY

Name of the Work: **Civil Maintenance/ Renovation Work of Hostels, Departments & Residences at Zone 'D' of IIT Roorkee**

Sl. No.	DSR 2023 Item No.	Particulars	Quantity	Unit	Rate/Unit as per DSR 2023	Amount
1	2.6	Earth work in excavation by mechanical means (Hydraulic excavator)/ manual means over areas (exceeding 30 cm in depth, 1.5 m in width as well as 10 Sqm on plan) including getting out and disposal of excavated earth lead upto 50 m and for all lift, as directed by Engineer-in-charge				
2	2.6.1	All kinds of soil	30.00	cum	177.50	5,325.00
3	2.25	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 and for all lift.	30.00	cum	196.00	5,880.00
4	2.27	Supplying and filling in plinth with sand under floors, including watering, ramming, consolidating and dressing complete.	16.00	cum	2,123.75	33,980.00
5	2.28	Surface dressing of the ground including removing vegetation and inequalities not exceeding 15 cm deep and disposal of rubbish, lead up to 50 m and lift up to 1.5 m.				
6	2.28.1	All kinds of soil	240.00	Sqm	34.15	8,196.00
7	4.1	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level:				
8	4.1.3	1:2:4 (1 cement : 2 coarse sand (zone-III) derived from natural sources : 4 graded stone aggregate 20 mm nominal size derived from natural sources)	10.00	cum	7,878.50	78,785.00
9	4.1.8	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)	10.00	cum	6,812.00	68,120.00
10	4.1.10	1:5:10 (1 cement : 5 coarse sand (zone-III) derived from natural sources : 10 graded stone aggregate 40 mm nominal size derived from natural sources)	40.00	cum	6,518.60	2,60,744.00

11	4.11	Providing and laying damp-proof course 50 mm thick with cement concrete 1:2:4 (1 cement: 2 coarse sand (zone-III) derived from natural sources : 4 graded stone aggregate 20 mm nominal size erived from natural sources).	40.00	Sqm	495.75	19,830.00
12	4.12	Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification.	800.00	per bag of 50kg cement used	18.15	290.40
13	4.13	Providing & applying a coat of residual petroleum bitumen of grade of VG-10 of approved quality using 1.7 kg per square metre on damp proof course after cleaning the surface with brushes and finally with a piece of cloth lightly soaked in kerosene oil.	60.00	Sqm	146.15	8,769.00
14	5.1	Providing and laying in position specified grade of reinforced cement concrete, excluding the cost of centering, shuttering, finishing and reinforcement -All work up to plinth level :				
15	5.1.2	1:1.5:3 (1 cement : 1.5 coarse sand (zone-Ill} derived from natural sources : 3 graded stone aggregate 20 mm nominal size derived from natural sources)	4.00	cum	9,045.75	36,183.00
16	5.3	Reinforced cement concrete work in beams, suspended floors, roofs having slope up to 15° landings, balconies, shelves, chajjas, lintels, bands, plain window sills, staircases and spiral stair cases above plinth level up to floor five level, excluding the cost of centering, shuttering, finishing and reinforcement with 1:1.5:3 (1 cement: 1.5 coarse sand(zone-III) derived from natural sources : 3 graded stone aggregae 20 mm nominal size derived from natural sources).	2.00	cum	11,505.50	23,011.00
17	5.9	Centering and shuttering including strutting, propping etc. and removal of form for				
18	5.9.1	Foundations, footings, bases of columns, etc. for mass concrete	50.00	Sqm	392.15	19,607.50
19	5.9.3	Suspended floors, roofs, landings, balconies and access platform	50.00	Sqm	927.25	46,362.50
20	5.9.5	Lintels, beams, plinth beams, girders, bressumers and cantilevers	50.00	Sqm	736.40	36,820.00
21	5.9.6	Columns, Pillars, Piers, Abutments, Posts and Struts	50.00	Sqm	961.30	48,065.00
22	5.22	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level.				
23	5.22.6	Thermo-Mechanically Treated bars of grade Fe-500D or more.	200.00	kg	107.85	21,570.00

24	5.22A	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete above plinth level.				
25	5.22A.6	Thermo-Mechanically Treated bars of grade Fe-500D or more	200.00	Kg	107.85	21,570.00
26	5.23	Smooth finishing of the exposed surface of R.C.C. work with 6 mm thick cement mortar 1:3 (1 Cement : 3 fine sand).	80.00	Sqm	300.45	24,036.00
27	5.24	Extra for rendering smooth the top of suspended floors, landings and staircases (treads and risers) with cement mortar 1:2 (1 cement : 2 coarse sand), including a floating coat of neat cement and protecting the surface with a layer of 7.5 cm of earth laid over 15 mm of fine sand in case of suspended floor and bricks laid in mud mortar in case of landings and steps, including subsequent removal and cleaning of the same	40.00	Sqm	150.50	6,020.00
28	5.30	Add for plaster drip course/ groove in plastered surface or moulding to R.C.C. projections.	20.00	metre	78.40	1,568.00
29	6.1	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in:				
30	6.1.1	Cement mortar 1:4 (1 cement : 4 coarse sand)	6.00	cum	7,370.65	44,223.90
31	6.1.2	Cement mortar 1:6 (1 cement : 6 coarse sand)	6.00	cum	7,132.25	42,793.50
32	6.4	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level in all shapes and sizes in :				
33	6.4.1	Cement mortar 1:4 (1 cement : 4 coarse sand)	6.00	cum	9,344.35	56,066.10
34	6.4.2	Cement mortar 1:6 (1 cement : 6 coarse sand)	6.00	cum	9,105.95	54,635.70
35	6.13	Half brick masonry with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor Vlevel				
36	6.13.2	Cement mortar 1:4 (1 cement :4 coarse sand)	24.00	Sqm	1,123.80	26,971.20
37	6.15	Extra for providing and placing in position 2 Nos 6 mm dia. M.S. bars at every third course of half brick masonry	60.00	Sqm	104.80	6,288.00
38	6.44	Brick edging 7cm wide 11.4 cm deep to plinth protection with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 including grouting with cement mortar 1:4 (1 cement : 4 fine sand).	20.00	metre	60.85	1,217.00

39	8.2	Providing and fixing 18 mm thick gang saw cut, mirror polished, premoulded and prepolished, machine cut for kitchen platforms, vanity counters, window sills, facias and similar locations of required size, approved shade, colour and texture laid over 20 mm thick base cement mortar 1:4 (1 cement : 4 coarse sand), joints treated with white cement, mixed with matching pigment, epoxy touch ups, including rubbing, curing, moulding and polishing of edges to give high gloss finish etc. Complete at all levels.				
40	8.2.1	Raj Nagar Plain white marble/ Udaipur green marble/ Zebra black marble				
41	8.2.1.2	Area of slab over 0.50 Sqm	12.00	Sqm	3,078.40	36,940.80
42	8.2.2	Granite stone slab of colour black, Cherry/Ruby red				
43	8.2.2.2	Area of slab over 0.50 Sqm	10.00	Sqm	5,136.30	51,363.00
44	8.2.3	Granite stone slab of all colour and texture except black, Cherry/Ruby red				
45	8.2.3.2	Area of slab over 0.50 Sqm	8.00	Sqm	3,848.70	30,789.60
46	8.3	Providing edge moulding to 18 mm thick marble stone counters, Vanities etc., including machine polishing to edge to give high gloss finish etc. complete as per design approved by Engineer-in-Charge.				
47	8.3.1	Marble work	40.00	metre	298.60	11,944.00
48	8.3.2	Granite work	40.00	metre	510.95	20,438.00
49	8.4	Extra for fixing marble /granite stone, over and above corresponding basic item, in facia and drops of width upto 150 mm with epoxy resin based adhesive, including cleaning etc. complete.	44.00	metre	568.55	25,016.20
50	8.5	Extra for providing opening of required size & shape for wash basin/ kitchen sink in kitchen platform, vanity counter and similar location in marble/ Granite/ stone work, including necessary holes for pillar taps etc. including moulding, rubbing and polishing of cut edges etc. complete	44.00	Each	978.70	43,062.80
51	8.31	Providing and fixing 1st quality ceramic glazed wall tiles conforming to IS: 15622 (thickness to be specified by the manufacturer), of approved make, in all colours, shades except burgundy, bottle green, black of anysize as approved by Engineer-in-Charge, in skirting, risers of steps and dados, over 12 mm thick bed of cement mortar 1:3 (1 cement : 3 coarse sand) and jointing with grey cement slurry @ 3.3kg per Sqm, includingpointing in white cement mixed with pigment of matching	10.00	Sqm	1,267.95	12,679.50

		shade complete				
52	9.1	Providing wood work in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position with hold fast lugs or with dash fasteners of required dia & length (hold fast lugs or dash fastener shall be paid for separately).				
53	9.1.1	Second class teak wood	1.00	cum	1,42,949.70	1,42,949.70
54	9.1.2	Sal wood	1.00	cum	1,16,520.30	1,16,520.30
55	9.7	Providing and fixing panelling or panelling and glazing in panelled or panelled and glazed shutters for doors, windows and clerestory windows (Area of opening for panel inserts excluding portion inside grooves or rebates to be measured). Panelling for panelled or panelled and glazed shutters 25 mm to 40 mm thick.				
56	9.7.5	Particle Board 12 mm thick				
57	9.7.5.2	Veneered flat pressed three layer or graded wood particle board with commercial veneering on both sides conforming to IS:3097, grade I	20.00	Sqm	2,012.05	40,241.00
58	9.9	Providing and fixing glazed shutters for doors, windows and clerestory windows using 4 mm thick float glass panes (weight not less than 10 kg per Sqm) fixing with ISi marked M.S. pressed butt hinges bright finished of required size with necessary screws.				
59	9.9.1	Second class teak wood				
60	9.9.1.1	35 mm thick	4.00	Sqm	4,940.20	19,760.80
61	9.9.1.2	30 mm thick	4.00	Sqm	4,523.40	18,093.60
62	9.9.3	Kiln seasoned selected planks of sheesham wood				
63	9.9.3.1	35 mm thick	4.00	Sqm	4,401.55	17,606.20
64	9.9.3.2	30 mm thick	4.00	Sqm	4,059.05	16,236.20

65	9.12	Extra for providing frosted glass panes 4 mm thick (weight not less than 10 kg per Sqm) instead of ordinary float glass panes 4 mm thick (weight not less than 10 kg per Sqm) in doors, windows and clerestory window shutters. (Area of opening for glass panes excluding portion inside rebate shall be measured).	20.00	Sqm	176.40	3,528.00
66	9.13	Deduct for providing pin headed glass panes instead of ordinary float glass panes 4 mm thick (weight not less than 10 kg per Sqm) in doors, windows and clerestory windows shutters (Area of opening for glass panes excluding portion inside rebate shall be measured).	20.00	Sqm	73.95	-1,479.00
67	9.21	Providing and fixing ISi marked flush door shutters conforming to IS : 2202 (Part I) non-decorative type, core of block board construction with frame of 1st class hard wood and well matched commercial 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters:				
68	9.21.1	35 mm thick including ISi marked Stainless Steel butt hinges with necessary screws	6.00	Sqm	2,392.65	14,355.90
69	9.21.2	30 mm thick including ISi marked Stainless Steel butt hinges with necessary screws	6.00	Sqm	2,172.10	13,032.60
70	9.21.3	25 mm thick (for cupboard) including ISi marked nickel plated bright finished M.S. piano hinges with necessary screws	6.00	Sqm	2,093.70	12,562.20
71	9.23	Extra for providing lipping with 2nd class teak wood battens 25 mm minimum depth on all edges of flush door shutters (over all area of doorshutter to be measured).	12.00	Sqm	462.35	5,548.20
72	9.26	Extra for cutting rebate in flush door shutters (Total area of the shutter to be measured).	12.00	Sqm	106.70	1,280.40
73	9.27	Providing and fixing wire gauge shutters using galvanized M.S. wire gauge of average width of aperture 1.4 mm in both directions with wire of dia 0.63 mm, for doors, windows and clerestory windows with hinges and necessary screws				
74	9.27.2	30 mm thick shutters				
75	9.27.2.1	with ISI marked M.S. pressed butt hinges bright finished of required size				
76	9.27.2.1.1	Second class teak wood	4.00	Sqm	4,326.80	17,307.20
77	9.27.2.1.3	Kiln seasoned selected class of sheesham wood	4.00	Sqm	3,918.15	15,672.60
78	9.40	Providing and fixing wooden moulded beading to door and window frames with iron screws, plugs and priming coat on unexposed surface etc. complete :				
79	9.40.1	2nd class teak wood				

80	9.40.1.1	50x12 mm	24.00	metre	221.10	5,306.40
81	9.48	Providing and fixing M.S. grills of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. including priming coat with approved steel primer all complete				
82	9.48.1	Fixed to steel windows by welding	1,000.00	kg	219.10	2,19,100.00
83	9.55	Providing and fixing ISi marked IS: 1341 M.S. pressed butt hinges bright finished with necessary screws etc. complete				
84	9.55.2	100x58x1.90 mm	30.00	Each	45.00	1,350.00
85	9.55.3	75x47x1.70 mm	40.00	Each	39.30	1,572.00
86	9.62	Providing and fixing ISi marked oxidised M.S. sliding door bolts with nuts and screws etc. complete (Copper oxidised as per IS 1378				
87	9.62.1	300x16 mm	20.00	Each	216.55	4,331.00
88	9.62.2	250x16 mm	20.00	Each	193.70	3,874.00
89	9.63	Providing and fixing ISi marked oxidised M.S. tower bolt black finish, (Barrel type) with necessary screws etc. complete (Copper oxidised as per IS 1378)				
90	9.63.1	250x10 mm	10.00	Each	83.90	839.00
91	9.63.2	200x10 mm	10.00	Each	69.40	694.00
92	9.63.3	150x10 mm	6.00	Each	59.45	356.70
93	9.63.4	100x10 mm	6.00	Each	44.30	265.80
94	9.64	Providing and fixing ISi marked 85x42 mm oxidised M.S. pull bolt lock conforming to IS : 7534 with necessary screws bolts, nut and washers etc. complete (Copper oxidised as per IS 1378	6.00	Each	122.15	732.90
95	9.66	Providing and fixing ISi marked oxidised M.S. handles conforming to IS:4992 with necessary screws etc. complete (Copper oxidised as per IS 1378)				
96	9.66.1	125 mm	6.00	Each	39.95	239.70
97	9.66.2	100 mm	6.00	Each	32.55	195.30
98	9.66.3	75 mm	6.00	Each	29.70	178.20
99	9.68	Providing and fixing oxidised M.S. casement stays (straight peg type) with necessary screws etc. complete (Copper oxidised as per IS 1378)				
100	9.68.3	200 mm weighing not less than 240 grams	30.00	Each	53.95	1,618.50

101	9.70	Providing and fixing IS : 12817 marked stainless steel butt hinges with stainless steel screws etc. complete				
102	9.70.2	100X58X1.90 mm	140.00	Each	107.10	14,994.00
103	9.84	Providing and fixing aluminium extruded section body tubular type universal hydraulic door closer (having brand logo with ISi, IS : 3564, embossed on the body, door weight upto 36 kg to 80 kg and door width from 701 mm to 1000 mm), with double speed adjustment with necessary accessories and screws etc. complete	4.00	Each	983.15	3,932.60
104	9.96	Providing and fixing aluminium sliding door bolts, ISi marked anodised (anodic coating not less than grade AC 10 as per IS : 1868), transparent or dyed to required colour or shade, with nuts and screws etc. complete :				
105	9.96.1	300x16 mm	6.00	Each	303.25	1,819.50
106	9.96.2	250x16 mm	6.00	Each	260.60	1,563.60
107	9.97	Providing and fixing aluminium tower bolts, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade, with necessary screws etc. complete				
108	9.97.1	300x10 mm	6.00	Each	130.10	780.60
109	9.97.2	250x10 mm	6.00	Each	115.15	690.90
110	9.97.3	200x10 mm	10.00	Each	99.70	997.00
111	9.97.4	150x10 mm	10.00	Each	82.55	825.50
112	9.97.5	100x10 mm	100.00	Each	64.70	6,470.00
113	9.100	Providing and fixing aluminium handles, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour or shade, with necessary screws etc.complete				
114	9.100.1	125 mm	22.00	Each	66.25	1,457.50
115	9.100.2	100 mm	20.00	Each	59.55	1,191.00
116	9.101	Providing and fixing aluminium hanging floor door stopper, ISi marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour and shade, with necessary screws etc. complete.				
117	9.101.2	Twin rubber stopper	10.00	Each	72.35	723.50

118	9.103	Providing and fixing bright finished brass 100 mm mortice latch and lock, ISI marked, with six levers and a pair of anodised (anodic coating not less than grade AC 10 as per IS : 1868) aluminium lever handles of approved quality with necessary screws etc. complete.	20.00	Each	868.95	17,379.00
119	9.113	Providing and fixing bright finished 100 mm mortice lock with 6 levers without pair of handles of approved quality for aluminium door, with necessary screws etc complete as per direction of Engineer- in-charge	6.00	Each	850.05	5,100.30
120	9.127	Providing & Fixing decorative high pressure laminated sheet of plain I wood grain in gloss / matt/ suede finish with high density protective surface layer and reverse side of adhesive bonding quality conforming to IS : 2046 Type S, including cost of adhesive of approved quality				
121	9.127.2	1.0 mm thick	16.00	Sqm	897.30	14,356.80
122	9.147	Providing and fixing factory made uPVC glazed/wire mesh windows/ doors comprising of lead free uPVC multi-chambered frame, sash and mullion/coupler (where ever required) extruded profiles having minimum wall thickness of 1. 70 mm for Series R 1 and R2 profiles and 2.10 mm for Series R3 and R4 profiles conforming to EN: 12608 in any shape, colour and design duly reinforced with galvanized mild steel section made of required shape & size as per CPWD Specification, uPVC extruded glazing beads, interlocks and Inline sash adaptor (where ever required) of appropriate dimension, EPDM gasket, hardware, SS 304 grade fasteners of minimum 8 mm dia with countersunk head, comprising of matching polyamide PA6 grade sleeve for fixing frame to finished wall as per IS 1367 : Part 1 to 14, plastic packers, plastic caps and necessary stainless steel screws etc. Profile of frame, sash & mullion (if required) shall be mitred cut and fusion welded/mechanically jointed duly sealed at all corners, including drilling of holes for fixing hardware and drainage of water etc. After fixing frame the gap between frame and adjacent finished wall shall be filled with weather proof silicon sealant over backer rod of approved size and quality, all complete as per approved drawing conforming to CPWD specification & direction of Engineer-in-Charge. Section of steel reinforcement and cross sections of uPVC profiles to be as per design approved by Engineer-in-Charge. Wire mesh / Glazing of plain/ toughened/ laminated/ double glass unit with / without high performance coatings as per design requirements and conforming to IS: 3548 & IS: 16231 shall be paid separately. Note:- Structural design proof checked from a GovernmentEngineering Institute, to be provided by the manufacturer for (i) Sites with basic wind speed > 45 m/sec as per IS 875 - Part 3 (ii) Sites with structure height more than 20m for all wind speeds				
123	9.147A.1	Two track two panels sliding window with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body.				
124	9.147.A1.1	Using R2 series with frame (40 mm & above) x (40 mm & above) & sash (25 mm & above) x (50 mm & above) with zinc alloy (zamak) powder coated touch locks with hook (Height upto 1.2 metre).	4.00	Sqm	8,298.85	33,195.40

125	9.147.A1.2	Using R3 series with frame (55 mm & above) x (40 mm & above) & sash (30 mm & above) x (55 mm & above) with zinc alloy (zamak) powder coated handle on every panel along with multi-point locking system (Height upto 1.8m).	4.00	Sqm	8,799.25	35,197.00
126	9.147.A1.3	Using R4 series with frame (64 mm & above) x (45 mm & above) & sash (44 mm & above) x (55 mm & above) with zinc alloy (zamak) powder coated handle on every panel along with multi-point locking system (Height above 1.8m).	4.00	Sqm	9,628.60	38,514.40
127	9.147.A2	Two track four panels sliding windows with Aluminium channel for roller track, wool pile, zinc alloy (zamak) powder coated handle on three panels along with multi-point locking system, nylon rollers with SS 304 body.				
128	9.147.A2.1	Using R3 series with frame (55 mm & above) x (40 mm & above) & sash (30 mm & above) x (55 mm & above) (Height upto 1.8m).	4.00	Sqm	7,860.35	31,441.40
129	9.147.A2.2	Using R4 series with frame (64 mm & above) x (45 mm & above) & sash (44 mm & above) x (55 mm & above) (Height above 1.8m).	4.00	Sqm	8,579.55	34,318.20
130	9.147.A3	Two and half track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body				
131	9.147.A3.1	Using R2 series with frame (65 mm & above) x (40 mm & above) & glazed sash (25 mm & above) x (50 mm & above) & fly screen sash (18 mm & above) x (40 mm & above) with zinc alloy (zamak) powder coated touch locks with hook (Height upto 1.2 metre).	4.00	Sqm	9,933.40	39,733.60
132	9.147.A3.2	Using R3 series with frame (85 mm & above) x (40 mm & above) & glazed sash (30 mm & above) x (55 mm & above) & fly screen sash (20 mm & above) x (50 mm & above) with zinc alloy (zamak) powder coated handle on every glazed panel along with multi-point locking system. (Height upto 1.8 metre).	4.00	Sqm	9,968.70	39,874.80
133	9.147.A4	Three track three panels sliding window with two glazed & one wire mesh panels with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body				
134	9.147.A4.1	Using R2 series with frame (70 mm & above) x (40 mm & above) & both glazed and fly screen sash (25 mm & above) x (50 mm & above) with zinc alloy (zamak) powder coated touch locks with hook. (Height upto 1.2 etre).	4.00	Sqm	10,993.55	43,974.20

135	9.147.A4.2	Using R3 series with frame (98 mm & above) x (40 mm & above) & both glazed and fly screen sash (30 mm & above) x (55 mm & above) with zinc alloy (zamak) powder coated handle on every glazed panel along with multi-point locking system. (Height upto 1.8m).	4.00	Sqm	10,874.20	43,496.80
136	9.147.A4.3	Using R4 series with frame (115 mm & above) x (45 mm & above) & both glazed and fly screen sash (44 mm & above) x (55 mm & above) with zinc alloy (zamak) powder coated handle on every glazed panel along with multipoint locking system. (Height above 1.8m)	4.00	Sqm	12,372.25	49,489.00
137	9.147.A5	Three track three panels sliding window with Aluminium channel for roller track, wool pile, nylon rollers with SS 304 body				
138	9.147.A5.1	Using R2 series with frame (70 mm & above) x (40 mm & above) & sash (25 mm & above) x (50 mm & above) with zinc alloy (zamak) powder coated touch locks with hook. (Height upto 1.2 metre).	4.00	Sqm	8,748.35	34,993.40
139	9.147.A5.2	Using R3 series with frame (98 mm & above) x (40 mm & above) & sash (30 mm & above) x (55 mm & above) with zinc alloy (zamak) powder coated handle on two end panels along with multi-point locking system (Height upto 1.8 metre).	4.00	Sqm	8,543.60	34,174.40
140	9.147.A5.3	Using R4 series with frame (115 mm & above) x (45 mm & above) & sash (44 mm & above) x (55 mm & above) with zinc alloy (zamak) powder coated handle on two end panels along with multi-point locking system. (Height above 1.8 metre).	4.00	Sqm	9,888.35	39,553.40
141	9.147.B1	Two track two panels sliding door with Aluminium channel for roller track, wool pile, zinc alloy (zamak) powder coated handle on every panel along with multi-point locking system, adjustable nylon rollers with SS 304 body.				
142	9.147.B1.1	Using R3 series with frame (55 mm & above) x (40 mm & above) & sash (30 mm & above) x (74 mm & above). (Height upto 2.5 metre).	4.00	Sqm	8,106.30	32,425.20
143	9.147.B1 .2	Using R4 series with frame (64 mm & above) x (45 mm & above) & sash (44 mm & above)' x (85 mm & above). (Height above 2.5 metre).	4.00	Sqm	7,732.85	30,931.40
144	9.147.B2	Two track four panels sliding door with Aluminium channel for roller track, wool pile, zinc alloy (zamak) powder coated handle on three panels along with multi-point locking system, adjustable nylon rollers with SS 304 body				
145	9.147.B2.1	Using R3 series with frame (55 mm & above) x (40 mm & above) & sash (30 mm & above) x (74 mm & above). (Height upto 2.5 metre).	4.00	Sqm	7,345.35	29,381.40

146	9.147.B2.2	Using R4 series with frame (64 mm & above) x (45 mm & above) & sash (44 mm & above) x (85 mm & above). (Height above 2.5 metre).	4.00	Sqm	7,196.70	28,786.80
147	9.147.B3	Three track three panels sliding door with two glazed & one wire mesh panels with Aluminium channel for roller track wool pile, zinc alloy (zamak) powder coated handle on two panels along with multi-point locking system, adjustable nylon rollers with SS 304 body.				
148	9.147.B3.1	Using R3 series with frame (98 mm & above) x (40 mm & above) & both glazed and fly screen sash (30 mm & above) x (74 mm & above). (Height upto 2.5 metre).	4.00	Sqm	10,078.95	40,315.80
149	9.147.B3.2	Using R4 series with frame (115 mm & above) x (45 mm & above) & both glazed and fly screen sash (44 mm & above) x (85 mm & above). (Height above 2.5 metre).	4.00	Sqm	9,894.80	39,579.20
150	9.147.B4	Three track three panels sliding door with Aluminium channel for roller track, wool pile, zinc alloy (zamak) powder coated handle on two panels along with multi-point locking system, adjustable nylon rollers with SS 304 body				
151	9.147.B4.1	Using R3 series with frame (98 mm & above) x (40 mm & above) & sash (30 mm & above) x (74 mm & above). (Height upto 2.5 metre	4.00	Sqm	8,287.05	33,148.20
152	9.147.B4.2	Using R4 series with frame (115 mm & above) x (45 mm & above) & sash (44 mm & above) x (85 mm & above). (Height above 2.5 metre).	4.00	Sqm	7,943.95	31,775.80
153	9.147.C1	Fixed window/ ventilator without mullion/ transom.				
154	9.147.C1.1	Using R1 series with frame (33 mm & above) x (35 mm & above). (Height upto 0.90 metre)	4.00	Sqm	8,247.25	32,989.00
155	9.147.C1.2	Using R2 series with frame (39 mm & above) x (39 mm & above). (Height upto 1.2 metre)	4.00	Sqm	8,054.75	32,219.00
156	9.147.C1.3	Using R3 series with frame (55 mm & above) x (45 mm & above). (Height upto 2.5 metre)	4.00	Sqm	7,080.05	28,320.20
157	9.147.C1.4	Using R4 series with frame (64 mm & above) x (50 mm & above). (Height above 2.5 metre)	4.00	Sqm	6,032.85	24,131.40
158	9.147.C2	Fixed window/ ventilator with mullion / transom				
159	9.147.C2.1	Using R 1 series with frame (33 mm & above) x (35 mm & above) & mullion (33 mm & above) x (50 mm & above). (Height upto 0.90 metre)	4.00	Sqm	9,155.20	36,620.80
160	9.147.C2.2	Using R2 series with frame (39 mm & above) x (39 mm & above) & mullion (39 mm & above) x (60 mm & above). (Height upto 1.2 metre)	4.00	Sqm	8,765.40	35,061.60
161	9.147.C2.3	Using R3 series with frame (55 mm & above) x (45 mm & above) & mullion (55 mm & above) x (65 mm & above). (Height upto 2.5 metre	4.00	Sqm	7,827.75	31,311.00

162	9.147.C2.4	Using R4 series with frame (64 mm & above) x (50 mm & above) & mullion (64 mm & above) x (70 mm & above). (Height above 2.5 metre)	4.00	Sqm	6,528.80	26,115.20
163	9.147.D1	Ventilator Casement window single panel with or without fixed panel with S.S. 304 friction hinges as per size and weight of sash, single point locking zinc alloy (zamak) powder coated handles.				
164	9.147.D1.1	Using R1 series with frame (33 mm & above) x (35 mm & above) & sash /mullion (33 mm & above) x (50 mm & above). (Height upto 0.90 metre).	4.00	Sqm	13,201.20	52,804.80
165	9.147.D1.2	Using R2 series with frame (39 mm & above) x (39 mm & above) & sash /mullion (39 mm & above) x (60 mm & above). (Height upto 1.2metre)	4.00	Sqm	12,254.90	49,019.60
166	9.147.D1.3	Using R3 series with frame (55 mm & above) x (45 mm & above) & sash /mullion (55 mm & above) x (65 mm & above). (Height above 1.2 metre)	4.00	Sqm	11,919.85	47,679.40
167	9.147.E1	Casement window single panel with S.S. 304 friction hinges as per size and weight of sash, multi-point locking system zinc alloy (zamak) powder coated handles.				
168	9.147.E1.1	Using R2 series with frame (39 mm & above) x (39 mm & above) & sash (39 mm & above) x (60 mm & above). Height upto 1.2 metre)	4.00	Sqm	14,449.25	57,797.00
169	9.147.E1.2	Using R3 series with frame (55 mm & above) x (45 mm & above) & sash (55 mm & above) x (65 mm & above). (Height upto 1.8 metre	4.00	Sqm	13,387.15	53,548.60
170	9.147.E1.3	Using R4 series with frame (64 mm & above) x (50 mm & above) & sash (64 mm & above) x (70 mm & above). (Height above 1.8 metre)	4.00	Sqm	14,587.05	58,348.20
171	9.147.E2	Casement window double panels with fixed mullion with S.S. 304 friction hinges as per size and weight of sash, multi-point locking system, zinc alloy (zamak) powder coated handles				
172	9.147.E2.1	Using R2 series with frame (39 mm & above) x (39 mm & above) & sash (39 mm & above) x (60 mm & above) & mullion (39 mm & above) x (60 mm & above). (Height upto 1.2 metre).	4.00	Sqm	13,078.70	52,314.80
173	9.147.E2.2	Using R3 series with frame (55 mm & above) x (45 mm & above) & sash (55 mm & above) x (65 mm & above) & mullion (55 mm & above) x (65 mm & above). (Height upto 1.8 metre).	4.00	Sqm	12,472.95	49,891.80
174	9.147.E2.3	Using R4 series with frame (64 mm & above) x (50 mm & above) & sash (64 mm & above) x (70 mm & above) & mullion (64 mm & above) x (70 mm & above). (Height above 1.8 metre)	4.00	Sqm	13,477.10	53,908.40

175	9.147.E3	Casement window double panels with French (False) Mullion with S.S. 304 friction hinges as per size and weight of sash, multi-point locking system, zinc alloy (zamak) powder coated handles				
176	9.147.E3.1	Using R2 series with frame (39 mm & above) x (39 mm & above) & sash (39 mm & above) x (60 mm & above) & French (False) mullion (39 mm & above) x (60 mm & above). (Height upto 1.2 metre).	4.00	Sqm	11,715.95	46,863.80
177	9.147.E3.2	Using R3 series with frame (55 mm & above) x (45 mm & above) & sash (55 mm & above) x (65 mm & above) & French (False) mullion (55 mm & above) x (60 mm & above). (Height upto 1.8 metre).	4.00	Sqm	11,466.80	45,867.20
178	9.147.E3.3	Using R4 series with frame (64 mm & above) x (50 mm & above) & sash (64 mm & above) x (70 mm & above) & French (False) mullion (64 mm & above) x (60 mm & above). (Height above 1.8 metre).	4.00	Sqm	12,496.30	49,985.20
179	9.147.E4	Casement cum fixed panel window having one single casement panel & one fixed panel with S.S 304 friction hinges as per size and weight of sash, multi-point locking system, zinc alloy (zamak) powder coated handles				
180	9.147.E4.1	Using R2 series with frame (39 mm & above) x (39 mm & above) & sash (39 mm & above) x (60 mm & above) & mullion (39 mm & above)x (60 mm & above). (Height upto 1.2 metre; Each openable shutter upto 0.8m width)	4.00	Sqm	9,870.15	39,480.60
181	9.147.E4.2	Using R3 series with frame (55 mm & above) x (45 mm & above) & sash (55 mm & above) x (65 mm & above) & mullion (55 mm & above) x (65 mm & above). (Height upto 1.8 metre; Each openable shutter upto 0.8m width)	4.00	Sqm	9,308.00	37,232.00
182	9.147.E4.3	Using R4 series with frame (64 mm & above) x (50 mm & above) & sash (64 mm & above) x (70 mm & above) & mullion (64 mm & above) x (70 mm & above). (Height above 1.8 metre; Each openable shutter upto 0.8m width)	4.00	Sqm	10,212.60	40,850.40
183	9.147.E5	Casement cum fixed panel window having single casement panel at both ends & middle fixed panel with S.S 304 friction hinges as per size and weight of sash, multi-point locking system, zinc alloy (zamak) powder coated handles.				
184	9.147.E5.1	Using R2 series with frame (39 mm & above) x (39 mm & above) & sash (39 mm & above) x (60 mm & above) & mullion (39 mm & above) x (60 mm & above). (Height upto 1.2 metre; Each openable shutter upto 0.8m width)	4.00	Sqm	10,474.05	41,896.20

185	9.147.E5.2	Using R3 series with frame (55 mm & above) x (45 mm & above) & sash (55 mm & above) x (65 mm & above) & mullion (55 mm & above) x (65 mm & above). (Height upto 1.8 metre; Each openable shutter upto 0.8m width)	4.00	Sqm	10,051.20	40,204.80
186	9.147.E5.3	Using R4 series with frame (64 mm & above) x (50 mm & above) & sash (64 mm & above) x (70 mm & above) & mullion (64 mm & above) x (70 mm & above). (Height above 1.8 metre; Each openable shutter upto 0.8m width)	4.00	Sqm	10,200.75	40,803.00
187	9.147.E6	Casement Window with Double Rebate Frame with one Side Hung Glazed Panel and one Side Hung wire mesh Panel with S.S. 304 friction hinges as per size and weight of sash, multi-point locking system, zinc alloy (zamak) powder coated handles on both glazed and fly screen panel				
188	9.147.E6.1	Using R3 series with frame (110 mm & above) x (45 mm & above) & glazed sash (55 mm & above) x (65 mm & above) & fly screen sash (30 mm & above) x (55 mm & above) & metal grill (if required to be paid separately). (Height upto 1.8 metre)	4.00	Sqm	22,785.35	91,141.40
189	9.147.E7	Casement Window with Double Rebate Frame with two Side Hung Glazed Panel and two Side Hung wire mesh Pane and Fixed Mullion with S.S. 304 friction hinges as per siez and weight of sash, multi-point locking system, zinc alloy (zamak) powder coated handles on both glazed and fly screen panel.				
190	9.147.E7.1	Using R3 series with frame (110 mm & above) x (45 mm & above) & glazed sash (55 mm & above) x (65 mm & above) & fly screen sash (30 mm & above) x (55 mm & above) & mullion (55 mm & above) x (65 mm & above) & metal grill (if required to be paid separately). (Height upto 1.8 metre	4.00	Sqm	20,576.30	82,305.20
191	9.147.E8	Casement Window with Double Rebate Frame with two Side Hung Glazed Panel on outside and two Side Hung wire mesh Panel on inside and French (False) Mullion with S.S. 304 friction hinges as per size and weight of sash, multipoint locking system, zinc alloy (zamak) powder coated handles with shoot bolt on both glazed and fly screen panel				
192	9.147.E8.1	Using R3 series with frame (110 mm & above) x (45 mm & above) & glazed sash (55 mm &above) x (65 mm & above) & fly screen sash(30 mm & above) x (55 mm & above) & French(False) mullion (55 mm & above) x (60 mm& above) & metal grill (if required to be paid separately). (Height upto 1.8 metre).	4.00	Sqm	19,047.60	76,190.40

193	9.147.F1	Casement door single panel with zinc alloy (zamak) 3D hinges, multi-point locking system with cylinder, zinc alloy (zamak) powder coated handles on both sides.				
194	9.147.F1.1	Using R3 series with frame (55 mm & above) x (50 mm & above) & sash (55 mm & above) x (85 mm & above) (Height upto 2.5 metre	4.00	Sqm	12,496.05	49,984.20
195	9.147.F1.2	Using R4 series with frame (64 mm & above) x (55 mm & above) & sash (64 mm & above) x (100 mm & above). (Height above 2.5 metre).	4.00	Sqm	12,454.40	49,817.60
196	9.147.F2	Casement door double panel with French (False) Mullion with zinc alloy (zamak) 3D hinges, multi-point locking system with cylinder, zinc alloy (zamak) powder coated handles on both sides.				
197	9.147.F2.1	Using R3 series with frame (55 mm & above) x (50 mm & above) & sash (55 mm & above) x (85 mm & above) & French (False) mullion (55 mm & above) x (60 mm & above). (Height upto 2.5 metre).	4.00	Sqm	11,903.75	47,615.00
198	9.147.F2.2	Using R4 series with frame (64 mm & above) x (55 mm & above) & sash (64 mm & above) x (100 mm & above) & French (False) mullion (64 mm & above) x (60 mm & above). (Height above 2.5 metre).	4.00	Sqm	11,818.95	47,275.80
199	9.147.F3	Casement Door with Double Rebate Frame with one Side Hung Glazed Panel and one Side Hung wire mesh Panel with zinc alloy (zamak) 3D hinges, multi-point locking system with cylinder, zinc alloy (zamak) powder coated handles on both sides of glazed panel and zinc alloy (Zamak) powder coated handle along with multi-point locking system on one side of fly screen panel.				
200	9.147.F3.1	Using R3 series with frame (110 mm & above) x (45 mm & above) & glazed sash (55 mm & above) x (85 mm & above) & fly screen sash (55 mm & above) x (65 mm & above). (Height upto 2.5 metre).	4.00	Sqm	19,994.40	79,977.60
201	9.148	Providing and fixing stainless steel (SS-304 grade) friction hinges to the side/top hung uPVC windows, of approved quality, with necessary stainless steel screws etc. as per direction of Engineer-in-charge.				
202	9.148.1	200 x 19 x 1.9 mm	14.00	Each	381.30	5,338.20
203	9.148.2	250 x 19 x 1.9 mm	14.00	Each	422.55	5,915.70
204	9.148.3	300 x 19 x 1.9 mm	14.00	Each	459.55	6,433.70
205	9.148.4	350 x 19 x 1.9 mm	14.00	Each	624.60	8,744.40
206	9.148.5	400 x 19 x 1.9 mm	14.00	Each	610.35	8,544.90

207	9.149	Providing and fixing casement handle made of zinc alloyed (white powder coated) for uPVC casement window with necessary screws etc. complete.	6.00	Each	231.05	1,386.30
208	9.150	Providing and fixing zinc alloyed (white powder coated) touch lock for \uPVC sliding window with necessary screws etc. complete	6.00	Each	204.00	1,224.00
209	9.151	Providing and fixing steel roller for uPVC sliding window with necessary screws etc. complete.	6.00	Each	115.80	694.80
210	9.152	Providing and fixing steel roller for uPVC sliding door with necessary screws etc. complete	6.00	Each	185.50	1,113.00
211	9.153	Providing and fixing steel (white power coated) crescent lock for uPVC sliding window/ door with necessary screws etc. complete.	6.00	Each	198.30	1,189.80
212	9.165	Providing and fixing bright /matt finished Stainless Steel handles of approved quality & make with necessary screws etc all complete.				
213	9.165.1	125 mm	80.00	Each	119.20	9,536.00
214	9.165.2	100mm	80.00	Each	90.45	7,236.00
215	9.165.3	75 mm	80.00	Each	58.75	4,700.00
216	10.2	Structural steel work riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.	1,000.00	Kg	133.70	1,33,700.00
217	10.3	Providing and fixing in position collapsible steel shutters with vertical channels 20x1 0x2 mm and braced with flat iron diagonals 20x5 mm size, with top and bottom rail of T-iron 40x40x6 mm, with 40 mm diasteel pulleys, complete with bolts, nuts, locking arrangement, stoppers, handles, including applying a priming coat of approved steel primer	2.00	Sqm	11,439.60	22,879.20
218	10.5	Providing and fixing 1 mm thick M.S. sheet door with frame of 40x40x6 mm angle iron and 3 mm M.S. gusset plates at the junctions and corners, all necessary fittings complete, including applying a priming coat of approved steel primer				
219	10.5.1	Using M.S. angels 40x40x6 mm for diagonal braces	14.00	Sqm	5,804.35	81,260.90
220	10.5.2	Using flats 30x6mm for diagonal braces and central cross piece	14.00	Sqm	5,563.75	77,892.50

221	10.11	Providing and fixing factory made ISi marked steel glazed doors, windows and ventilators, side /top /centre hung, with beading and all members such as F7D,F4B, K11 Band K12 B etc. complete of standard rolled steel sections, joints mitred and flash butt welded and sash bars tenoned and riveted, including providing and fixing of hinges, pivots, priming coat of approved steel primer, but excluding the cost of other fittings,glass panes complete all as per approved design, (sectional weight of only steel members shall be measured for payment).				
222	10.11.1	Fixing with 15x3 mm lugs 10 cm long embedded in cement concrete block 15x10x10 cm of C.C. 1:3:6 (1 Cement : 3 coarse sand: 6 graded stone aggregate 20 mm nominal size)	20.00	kg	131.05	2,621.00
223	10.13	Providing and fixing T-iron frames for doors, windows and ventilators of mild steel Tee-sections, joints mitred and welded, including fixing of necessary butt hinges and screws and applying a priming coat of approved steel primer				
224	10.13.1	Fixing with 15x3 mm lugs 10 cm long embedded in cement concrete block 15x10x10 cm of C.C. 1:3:6 (1 Cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size).	20.00	Kg	141.70	2,834.00
225	10.14	Providing and fixing pressed steel door frames conforming to IS: 4351, manufactured from commercial mild steel sheet of 1.60 mm thickness, including hinges, jamb, lock jamb, bead and if required angle threshold ofmild steel angle of section 50x25 mm, or base ties of 1.60 mm, pressed mild steel welded or rigidly fixed together by mechanical means, including M.S. pressed butt hinges 2.5 mm thick with mortar guards, lock strikeplate and shock absorbers as specified and applying a coat of approved steel primer after pre-treatment of the surface as directed by Engineer in-charge				
226	10.14.1	Profile B				
227	10.14.1.1	Fixing with adjustable lugs with split end tail to Each jamb	40.00	meter	583.30	23,332.00
228	10.14.1.2	Fixing with carbon steel galvanised dash fastener of required dia and size (to be paid for separately)	20.00	meter	570.40	11,408.00
229	10.14.2	Profile C				
230	10.14.2.1	Fixing with adjustable lugs with split end tail to Each jamb	40.00	meter	611.75	24,470.00
231	10.14.2.2	Fixing with carbon steel galvanised dash fastener of required dia and size (to be paid for separately)	20.00	meter	598.85	11,977.00

232	10.14.3	Profile E				
233	10.14.3.1	Fixing with adjustable lugs with split end tail to Each jamb	40.00	meter	640.20	25,608.00
234	10.14.3.2	Fixing with carbon steel galvanised dash fastener of required dia and size (to be paid for separately)	20.00	meter	627.30	12,546.00
235	10.15	Providing and fixing M.S. Tubular frames for doors, windows, ventilators and cupboard with rectangular/ L-Type sections, made of 1.60 mm thick M.S. Sheet, joints mitred, welded and grinded finish, with profiles of required size, including fixing of necessary butt hinges and screws and applying a priming coat of approved steel primer.				
236	10.15.1	Fixing with 15x3 mm lugs 10 cm long embedded in cement concrete block 15x10x10 cm of C.C. 1:3:6 (1 Cement : 3 coarse sand: 6 graded stone aggregate 20 mm nominal size)	80.00	Kg	195.20	15,616.00
237	10.16	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.				
238	10.16.1	Hot finished welded type tubes	50.00	Kg	194.40	9,720.00
239	10.26	Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approved steel primer				
240	10.26.1	M.S. tube	30.00	Kg	196.80	5,904.00
241	10.26.3	G.I. pipes	30.00	Kg	203.05	6,091.50
242	10.27	Providing and fixing carbon steel galvanised (minimum coating 5 micron) dash fastener of 10 mm dia double threaded 6.8 grade (yield strength 480 N/mm2), counter sunk head, comprising of 10 mm dia polyamide PA 6 grade sleeve, including drilling of hole in frame , concrete/ masonry, etc. as per direction of Engineer-in-charge.				
243	10.27.1	10 x 60 mm	20.00	Each	131.10	2,622.00
244	10.27.2	10 x 80 mm	20.00	Each	137.65	2,753.00
245	10.27.3	10 x 120 mm	20.00	Each	170.95	3,419.00
246	10.27.4	10 x 140 mm	10.00	Each	182.20	1,822.00
247	10.27.5	10 x 160 mm	10.00	Each	224.50	2,245.00

248	10.28	Providing and fixing stainless steel (Grade 304) railing made of Hollow tubes, channels, plates etc., including welding, grinding, buffing, polishing and making curvature (wherever required) and fitting the same with necessary stainless steel nuts and bolts complete, i/c fixing the railing with necessary accessories & stainless steel dash fasteners , stainless steel bolts etc., of required size, on the top of the floor or the side of waist slab with suitable arrangement as per approval of Engineer-incharge, (for payment purpose only weight of stainless steel members shall be considered excluding fixing accessories such as nuts, bolts, fasteners etc.).	30.00	Kg	772.40	23,172.00
249	10.29	Providing & fixing fly proof wire gauze to windows, clerestory windows & doors with M.S. Flat 15x3 mm and nuts & bolts complete.				
250	10.29.1	Galvanised M.S. Wire gauze with 0.63 mm dia wire and 1.4 mm aperture on both sides	6.00	Sqm	844.70	5,068.20
251	10.29.2	Stainless steel (grade 304) wire gauze of 0.5 mm dia wire and 1.4 mm aperture on both sides	4.00	Sqm	1,133.55	4,534.20
252	10.30	Providing & fixing glass panes with putty and glazing clips in steel doors, windows, clerestory windows, all complete with				
253	10.30.1	4.0 mm thick glass panes	12.00	Sqm	1,064.65	12,775.80
254	10.30.2	5.5 mm thick glass panes	12.00	Sqm	1,390.15	16,681.80
255	11.3	Cement concrete flooring 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate) finished with a floating coat of neat cement, including cement slurry, but excluding the cost of nosing of steps etc. complete.				
256	11.3.1	40 mm thick with 20 mm nominal size stone aggregate	50.00	Sqm	614.20	30,710.00
257	11.6	Cement plaster skirting up to 30 cm height, with cement mortar 1:3 (1 cement : 3 coarse sand), finished with a floating coat of neat cement				
258	11.6.1	18 mm thick	6.00	Sqm	662.05	3,972.30
259	11.7	Cement concrete pavement with 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm nominal size), including finishing complete	2.00	CUM	8,595.15	17,190.30
260	11.13	Providing and fixing glass strips in joints of terrazo/ cement concrete floors.				
261	11.13.1	40 mm wide and 4 mm thick	80.00	metre	91.75	7,340.00

262	11.20	Chequerred precast cement concrete tiles 22 mm thick in footpath & courtyard, jointed with neat cement slurry mixed with pigment to match the shade of tiles, including rubbing and cleaning etc. complete, on 20 mm thick bed of cement mortar 1 :4 (1 cement: 4 coarse sand).				
263	11.20.3	Dark shade pigment using ordinary cement	20.00	sqm	1,119.50	22,390.00
264	11.26	Kata stone slab flooring over 20 mm (average) thick base laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab, including rubbing and polishing complete with base of cement mortar 1:4 (1 cement : 4 coarse sand)				
265	11.26.1	25 mm thick	14.00	Sqm	1,948.25	27,275.50
266	11.27	Kata stone slabs 20 mm thick in risers of steps, skirting, dado and pillars laid on 12 mm (average) thick cement mortar 1:3 (1 cement: 3 coarse sand) and jointed with grey cement slurry mixed with pigment to match the shade of the slabs, including rubbing and polishing complete.	2.00	Sqm	2,354.70	4,709.40
267	11.37	Providing and laying Ceramic glazed floor tiles of size 300x300 mm (thickness to be specified by the manufacturer) of 1st quality conforming to IS : 15622 of approved make in colours such as White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick cement mortar 1:4 (1 Cement : 4 Coarse sand), Jointing with grey cement slurry @ 3.3 kg/Sqm including pointing the joints with white cement and matching pigment etc., complete	12.00	Sqm	1,096.55	13,158.60
268	11.39	Providing and laying rectified Glazed Ceramic floor tiles of size 300x300 mm or more (thickness to be specified by the manufacturer), of 1st quality conforming to IS : 15622, of approved make, in colours White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick cement mortar 1:4 (1 Cement: 4 Coarse sand), jointing with grey cement slurry @ 3.3 kg/ Sqm including grouting the joints with white cement and matching pigments etc., complete	12.00	Sqm	1,330.00	15,960.00
269	11.40	Providing and laying rectified Glazed Ceramic floor tiles of size 300x300 mm or more (thickness to be specified by the manufacturer), of 1st quality conforming to IS : 15622, of approved make, in all colours, shades, except White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick Cement Mortar 1:4 (1 Cement: 4 Coarse sand), jointing with grey cement slurry@ 3.3 kg/ Sqm including pointing the joints with white cement and matching pigments etc., complete.	2.00	Sqm	1,439.40	2,878.80

270	11.41	Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS: 15622, of approved make, in all colours and shades, laid on 20 mm thick cement mortar 1:4 (1 cement: 4 coarse sand), jointing with grey cement slurry @ 3.3 kg/ Sqm including grouting the joints with white cement and matching pigments etc., complete				
271	11.41.2	Size of Tile 600x600 mm	50.00	Sqm	1,553.45	77,672.50
272	11.41A	Providing and laying Vitrified tiles in floor in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS: 15622, of approved brand & manufacturer, in all colours and shade, laid on 20 mm thick cement mortar 1:4 (1 cement: 4 coarse sand) jointing with grey cement slurry @3.3 kg/Sqm including grouting the joints with white cement and matching pigments etc. The tiles must be cut with the zero chipping diamond cutter only . Laying of tiles will be done with the notch trowel, plier, wedge, clips of required thickness, leveling system and rubber mallet for placing the tiles gently and easily				
273	11.41A.1	Double charge vitrified tile polished finish of size				
274	11.41A.1.1	Size of Tile 600 x 600 mm	60.00	Sqm	1,453.65	87,219.00
275	11.42	Deduct for not using 20 mm thick cement mortar 1:4 (1 cement : 4 coarse sand) bedding in laying of floor tiles and jointing with grey cement slurry @ 3.3 kg/ Sqm.	60.00	Sqm	850.10	-51,006.00
276	11.43	Fixing glazed/ Ceramic/ Vitrified floor tiles with cement based high polymer modified quick-set tile adhesive (Water based) conforming to IS: 15477, in average 3 mm thickness.	60.00	Sqm	753.25	45,195.00
277	11.46	Providing and laying Vitrified tiles in different sizes (thickness to be specified by manufacturer), with water absorption less than 0.08 % and conforming to I.S. 15622, of approved make, in all colours & shade, in skirting, riser of steps, over 12 mm thick bed of cement mortar 1:3 (1 cement: 3 coarse sand), jointing with grey cement slurry @ 3.3 kg/ Sqm including grouting the joint with white cement & matching pigments etc. complete.				
278	11.46.2	Size of Tile 600x600 mm	12.00	Sqm	1,623.05	19,476.60

279	11.48	Grouting the joints of flooring tiles having joints of 3 mm width, using epoxy grout mix of 0.70 kg of organic coated filler of desired shade (0.10 kg of hardener and 0.20 kg of resin per kg), including filling / grouting and finishing complete as per direction of Engineer-in-charge				
280	11.48.2	Size of Tile 600x600 mm	12.00	Sqm	309.05	3,708.60
281	11.49	Providing and laying Vitrified tiles in floor with different sizes (thickness to be specified by the manufacturer), with water absorption less than 0.08% and conforming to IS:15622, of approved brand & manufacturer, in all colours and shade, laid with cement based high polymer modified quick set tile adhesive (water based) conforming to IS : 15477, in average 6 mm thickness, including grouting of joints (Payment for grouting of joints to be made separately).				
282	11.49.2	Size of Tile 600x600 mm	70.00	Sqm	1,725.35	1,20,774.50
283	11.50	Deduct for not grouting the joints with white cement and matching pigment in the items of fixing of vitrified tiles	50.00	Sqm	13.30	-665.00
284	12.8	Providing reinforced by organic fibres and/or inorganic synthetic fibres cement 6 mm thick corrugated sheets (as per IS: 14871) roofing up to any pitch and fixing with polymer coated J or L hooks, bolts and nuts 8 mm dia. G.I. plain and bitumen washers or with self drilling fastener and EPDM washers etc. complete (excluding the cost of purlins, rafters and trusses), including cutting sheets to size and shape wherever required	16.00	Sqm	536.40	8,582.40
285	12.21	Providing gala 75x75 mm in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 stone aggregate 10 mm and down gauge), including finishing with cement mortar 1:3 (1 cement : 3 fine sand) as per standard design				
286	12.21.1	In 75x75 mm deep chase	16.00	metre	305.15	4,882.40
287	12.41	Providing and fixing on wall face unplasticised Rigid PVC rain water pipes conforming to IS : 13592 Type A, including jointing with seal ring conforming to IS : 5382, leaving 10 mm gap for thermal expansion, (i) Single socketed pipes.				
288	12.41.1	75 mm diameter	8.00	metre	248.80	1,990.40
289	12.41.2	110 mm diameter	16.00	metre	377.40	6,038.40

290	12.42	Providing and fixing on wall face unplasticised - PVC moulded fittings/accessories for unplasticised Rigid PVC rain water pipes conforming to IS : 13592 Type A, including jointing with seal ring conforming to IS : 5382, leaving 10 mm gap for thermal expansion				
291	12.42.1	Coupler				
292	12.42.1.1	75mm	4.00	Each	91.70	366.80
293	12.42.1.2	110mm	4.00	Each	136.15	544.60
294	12.42.2	Single pushfit Coupler :				
295	12.42.2.1	75mm	4.00	Each	93.10	372.40
296	12.42.2.2	110mm	4.00	Each	127.60	510.40
297	12.42.3	Single tee with door				
298	12.42.3.1	75x75x75 mm	4.00	Each	164.20	656.80
299	12.42.3.2	110x110x110 mm	6.00	Each	234.15	1,404.90
300	12.42.4	Single tee without door				
301	12.42.4.1	75x75x75 mm	6.00	Each	144.30	865.80
302	12.42.4.2	110x110x110 mm	6.00	Each	221.35	1,328.10
303	12.42.5	Bend 87.5°				
304	12.42.5.1	75 mm bend	6.00	Each	105.90	635.40
305	12.42.5.2	110 mm bend	6.00	Each	150.35	902.10
306	12.42.6	Shoe (Plain)				
307	12.42.6.1	75 mm Shoe	6.00	Each	93.10	558.60
308	12.42.6.2	110 mm Shoe	6.00	Each	131.85	791.10

309	12.50	Providing and fixing precoated galvanised iron profile sheets (size, shapeand pitch of corrugation as approved by Engineer-in-Charge) of total coated thickness 0.50 mm (base metal of minimum 0.45 mm thickness with total coating thickness of 0.05mm) with zinc coating 120 grams per Sqm as per IS: 277, in 240 mpa steel grade, 5-7 microns epoxy primer on both side of the sheet and polyester top coat 15-18 microns. Sheet should have protective guard film of 25 microns minimum to avoid scratches during transportation and should be supplied in single length upto 12 metre or as desired by Engineer-in-charge. The sheet shall be fixed using self drilling /self tapping screws of size (5.5x 55 mm) with EPDM seal, complete upto any pitch in horizontal/ vertical or curved surfaces, excluding the cost of purlins, rafters and trusses and including cutting to size and shape wherever required.	4.00	Sqm	738.65	2,954.60
310	12.52	Providing and fixing tiled false ceiling of specified materials of size 595x595 mm in true horizontal level, suspended on inter locking metal grid of hot dipped galvanized steel sections (galvanized @ 120 grams/ Sqm, both side inclusive) consisting of main 'T' runner with suitably spaced joints to get required length and of size 24x38 mm made from 0.30 mm thick (minimum) sheet, spaced at 1200 mm center to center and cross "T" of size 24x25 mm made of 0.30 mm thick (minimum) sheet, 1200 mm long spaced between main 'T' at 600 mm center to center to form a grid of 1200x600 mm and secondary cross "T" of length 600 mm and size 24x25 mm made of 0.30 mm thick (minimum) sheet to be interlocked at middle of the 1200x600 mm panel to form grids of 600x600 mm and wall angle of size 24x24x0.3 mm and laying false ceiling tiles of approved texture in the grid including, required cutting/making, opening for services like diffusers, grills, light fittings, fixtures, smoke detectors etc. Main "T" runners to be suspended from ceiling using GI slotted cleats of size 27 x 37 x 25 x1.6 mm fixed to ceiling with 12.5 mm dia and 50 mm long dash fasteners, 4 mm GI adjustable rods with galvanised butterfly level clips of size 85 x 30 x 0.8 mm spaced at 1200 mm center to center along main T, bottom exposed width of 24 mm of all T-sections shall be pre-painted with polyester paint, all complete for all heights as per specifications, drawings and as directed by Engineer-in-charge				
311	12.52.1	GI Metal Ceiling Lay in plain Tegular edge Global white color tiles of size 595x595 mm, and 0.5 mm thick with 8 mm drop; made of G I sheet having galvanizing of 100 gms/Sqm (both sides inclusive) and electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending.	4.00	Sqm	1,902.95	7,611.80

312	12.52.2	GI Metal Ceiling Lay in perforated Tegular edge global white color tiles of size 595x595 mm and 0.5 mm thick with 8 mm drop; made of GI sheet having galvanizing of 100 gms/Sqm (both sides inclusive) and 20% perforation area with 1.8 mm dia holes and having NRC (Noise Reduction Coefficient) of 0.5, electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending and perforation and backed with a black Glass fiber acoustical fleece.	4.00	Sqm	2,068.75	8,275.00
313	12.53	Providing and Fixing 15 mm thick densified tegular edged eco friendly light weight calcium silicate false ceiling tiles of approved texture of size 595 x 595 mm in true horizontal level, suspended on inter locking metal grid of hot dipped galvanised steel sections (galvanising @ 120 grams per sqm including both side) consisting of main 'T' runner suitably spaced at joints to get required length and of size 24x38 mm made from 0.33 mm thick (minimum) sheet, spaced 1200 mm centre to centre, and cross "T" of size 24x28 mm made out of 0.33 mm (Minimum) sheet, 1200 mm long spaced between main'T' at 600 mm centre to centre to form a grid of 1200x600 mm and secondary cross 'T' of length 600 mm and size 24 x28 mm made of 0.33 mm thick (Minimum) sheet to be inter locked at middle of the 1200x600 mm panel to from grid of size 600x600 mm, resting on periphery walls /partitions on a Perimeter wall angle pre-coated steel of size (24x 24 X3000 mm made of 0.40 mm thick (minimum) sheet with the help of rawl plugs at 450 mm centre to centre with 25 mm long dry wall screws @ 230 mm interval and laying 15 mm thick densified edges calicum silicate ceiling tiles of approved texture in the grid, including, cutting/ making openingfor services like diffusers, grills, light fittings, fixtures, smoke detectors etc., wherever required. Main 'T' runners to be suspended from ceiling using G.I. slotted cleats of size 25x35x1 .6 mm fixed to ceiling with 12.5 mm dia and 50 mm long dash fasteners, 4 mm G.I. adjustable rods with galvanised steel level clips of size 85 x 30 x 0.8 mm, spaced at 1200 mm centre to centre along main 'T'. Bottom exposed with 24 mm of all T-sections shall be pre-painted with polyster baked paint, for all heights,as per specifications, drawings and as directed by Engineer-in-Charge.	4.00	Sqm	2,158.15	8,632.60

314	12.54	Providing and fixing GI Clip in Metal Ceiling System of 600x600 mm module which includes providing and fixing 'C' wall angle of size 20x30x20 mm made of 0.5 mm thick pre painted steel along the perimeter of the room with help of nylon sleeves and wooden screws at 300 mm center to centre, suspending the main C carrier of size 10x38x10 mm made of G.I steel 0.7 mm thick from the soffit with the help of soffit cleat 37x27x25x1 .6 mm, rawl plugs of size 38x12 mm and C carrier suspension clip and main carrier bracket at 1000 mm c/c. Inverted triangle shaped Spring Tee having height of 24 mm and width of 34 mm made of GI steel 0.45 mm thick is then fixed to the main C carrier and in direction perpendicular to it at 600 mm centers with the help of suspension brackets. Wherever the main C carrier and spring T have to join, C carrier and spring T connectors have to be used. All sections to be galvanized@ 120 gms/Sqm (both side inclusive), fixing with clip in tiles into spring T with				
315	12.54.1	GI Metal Ceiling Clip in plain Beveled edge global white color tiles of size 600x600 and 0.5 mm thick with 25 mm height, made of G I sheet having galvanizing of 100 gms/ Sqm (both sides inclusive) and electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending.	4.00	Sqm	2,221.70	8,886.80
316	12.54.2	GI Metal Ceiling Clip in plain Beveled edge global white color tiles of size 600x600 and 0.5 mm thick with 25 mm height, made of G I sheet having galvanizing of 100 gms/ Sqm (both sides inclusive) and 20% perforation area with 1.8 mm dia holes and having NRG of 0.5, electro statically polyester powder coated of thickness 60 microns (minimum), includingfactory painted after bending and perforation.	4.00	Sqm	2,354.65	9,418.60
317	13.4	12 mm cement plaster of mix :				
318	13.4.1	1:4 (1 cement: 4 coarse sand)	30.04	Sqm	357.35	10,734.79
319	13.4.2	1:6 (1 cement: 6 coarse sand)	30.00	Sqm	343.65	10,309.50
320	13.5	15 mm cement plaster on rough side of single or half brick wall of mix :				
321	13.5.1	1:4 (1 cement: 4 coarse sand)	39.98	Sqm	411.75	16,461.77
322	13.5.2	1:6 (1 cement: 6 coarse sand)	40.00	Sqm	395.35	15,814.00
323	13.7	12 mm cement plaster finished with a floating coat of neat cement of mix :				
324	13.7.1	1:3 (1 cement: 3 fine sand)	20.00	Sqm	439.25	8,785.00

325	13.7.2	1:4 (1 cement: 4 fine sand)	20.00	Sqm	425.55	8,511.00
326	13.17	6 mm cement plaster 1:3 (1 cement : 3 fine sand) finished with a floatingb coat of neat cement and thick coat of Lime wash on top of walls when dry for bearing of R.C.C. slabs and beams	80.00	Sqm	396.65	31,732.00
327	13.21	Extra for providing and mixing water proofing material in cement plaster work in proportion recommended by the manufacturers	112.00	per bag of 50 kg cement used in the mix	22.10	49.50
328	13.22	Extra for plastering exterior walls of height more than 10 m from ground level for every additional height of 3 m or part thereof	20.00	Sqm	87.10	1,742.00
329	13.31	Pointing on brick work or brick flooring with cement mortar 1:3 (1 cement : 3 fine sand):				
330	13.31.1	Flush / Ruled/ Struck or weathered pointing	12.00	Sqm	257.35	3,088.20
331	14.1	Repairs to plaster of thickness 12 mm to 20 mm in patches of area 2.5 sq.meters and under, including cutting the patch in proper shape, raking out joints and preparing and plastering the surface of the walls complete, including disposal of rubbish to the dumping ground, all complete as per direction of Engineer-in-Charge				
332	14.1.2	With cement mortar 1:4 (1cement: 4 coarse sand)	12.00	Sqm	560.50	6,726.00
333	14.2	Fixing chowkhats in existing opening including embedding chowkhats in floors or walls cutting masonry for holdfasts, embedding hold fasts in cement concrete blocks of size 15 x 10 x 10 cm with cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size), painting two coats of approved wood preservative to sides of chowkhats and making good the damages to walls and floors as required complete, including disposal of rubbish to the dumping ground, all complete as per direction of Engineer-in-Charge.				
334	14.2.1	Door chowkhats .	2.00	Each	1,782.55	3,565.10
335	14.2.2	Window chowkhats .	2.00	Each	1,125.15	2,250.30
336	14.2.3	Clerestory window chowkhats .	2.00	Each	851.00	1,702.00
337	14.3	Fixing chowkhat in existing opening in brick/ RCC wall with dash fasteners/ Chemical fasteners of appropriate size (3 nos on Each vertical member of door chowkhat and 2 nos on Each vertical member of window chowkhats), including Cost of dash fasteners/ chemical fastener.	2.00	Each	217.10	434.20

338	14.4	Making the opening in brick masonry including dismantling in floor or walls by cutting masonry and making good the damages to walls, flooring and jambs complete, to match existing surface including disposal of mulba/ rubbish to the nearest municipal dumping ground, all complete as per direction of Engineer-in-Charge				
339	14.4.1	For door/ window/ clerestory window	2.00	Sqm	1,264.35	2,528.70
340	14.5	Renewing glass panes, with putty and nails wherever necessary including racking out the old putty:				
341	14.5.1	Float glass panes of nominal thickness 4 mm (weight not less than 10kg/Sqm)	2.00	Sqm	1,090.65	2,181.30
342	14.5.2	Float glass panes of nominal thickness 5 mm (weight not less than 12.5kg/Sqm)	2.00	Sqm	1,416.15	2,832.30
343	14.6	Renewing glass panes, with wooden fillets wherever necessary				
344	14.6.1	Float glass panes of nominal thickness 4 mm (weight not less than 10kg/Sqm)	30.00	Sqm	1,580.90	47,427.00
345	14.6.2	Float glass panes of nominal thickness 5 mm (weight not less than 12.5kg/Sqm)	30.00	Sqm	1,906.40	57,192.00
346	14.9	Renewal of old putty of glass panes (length)	4.00	metre	56.15	224.60
347	14.10	Refixing old glass panes with putty and nails	4.00	Sqm	729.85	2,919.40
348	14.17	Raking out joints in lime or cement mortar and preparing the surface for re-pointing or replastering, including disposal of rubbish to the dumping ground, all complete as per direction of Engineer-in-Charge	30.00	Sqm	72.45	2,173.50
349	14.21	Renewing bottom rail and/or top runner of collapsible gate including making good all damages and applying priming coat of zinc chromate yellow primer of approved brand and manufacturer	50.00	kg	298.85	14,942.50
350	14.34	Providing and fixing 150 mm bright finished floor brass door stopper with rubber cushion, necessary brass screws etc. to suit shutter thickness complete	20.00	Each	271.45	5,429.00
351	14.39	Providing and fixing bright finished brass helical door spring (superior quality).	20.00	Each	543.95	10,879.00

352	14.72	Providing and fixing double scaffolding system (cup lock type) on the exterior side, up to seven story height made with 40 mm dia M.S. tube 1.5 m centre to centre, horizontal & vertical tubes joining with cup & lock system with M.S. tubes, M.S. tube challies, M.S. clamps and M.S. staircase system in the scaffolding for working platform etc. and maintaining it in a serviceable condition for the required duration as approved and removing it there after. The scaffolding system shall be stiffened with bracings, runners, connection with the building etc wherever required for inspection of work at required locations with essential safety features for the workmen etc. complete as per directions and approval of Engineer-in-charge. The elevational area of the scaffolding shall be measured for payment purpose. The payment will be made once irrespective of duration of scaffolding. Note: - This item to be used for maintenance work judicially, necessary deduction for scaffolding in the existing item to be done.	100.00	Sqm	338.25	33,825.00
353	14.80	Providing & fixing White vitreous china water closet squatting pan (Indian type) along with “S” or “P” trap including dismantling of old WC seat and “S” or “P” trap at site complete with all operations including all necessary materials, labour and disposal of dismantled material including malba, all complete as per the direction of Engineer-in charge				
354	14.80.2	Orissa pattern W.C Pan of size 580x440 mm	2.00	Each	4,478.75	8,957.50
355	14.82	Dismantling W.C. Pan of all sizes including disposal of dismantled materials including malba all complete as per directions of Engineer-in-Charge	12.00	Each	134.10	1,609.20
356	14.83	Hacking of CC flooring including cleaning for surface etc. complete as per direction of the Engineer-in-Charge	50.00	Sqm	3.45	172.50
357	14.84	Dismantling 15 to 40 mm dia G.I. pipe including stacking of dismantled pipes (within 50 metres lead) as per direction of Engineer-in-Charge. (a) Internal Work- Exposed on wall	30.00	metre	3.25	97.50
358	14.85	Taking out existing wooden door shutter, repair by cutting, painting etc. and refixing of repaired door shutters to existing door frames, including replacement of hinges with screws, etc. as required, all complete as per the direction of the Engineer-in-charge	8.00	Each	429.10	3,432.80

359	14.91	Providing and laying APP (Atactic Polypropylene Polymer) modified prefabricated five layer 3 mm thick water proofing membrane, black finished reinforced with non-woven polyester matt consisting of a coat of bitumen primer for bitumen membrane @ 0.40 litre/Sqm by the same membrane manufacture of density at 25°C, 0.87-0.89 kg/ litre and viscocity 70-160 cps. Over the primer coat the layer of membrane shall be laid using Butane Torch and sealing all joints etc, and preparing the surface complete. The vital physical and chemical parameters of the membrane shall be as under : Joint strength in longitudinal and transverse direction at 23°C as 650/ 450N/ 5cm. Tear strength in longitudinal and transverse direction as 300/250N. Softening point of membrane not less than 150°C. Cold flexibility shall be upto -2°C when tested in accordance with ASTM, D-5147. The laying of membrane shall be got done through the authorised applicator of the manufacturer of membrane				
360	14.91.1	3 mm thick	40.00	Sqm	560.95	22,438.00
361	15.2	Demolishing cement concrete manually/ by mechanical means including disposal of material within 50 metres lead as per direction of Engineer - in - charge.				
362	15.2.1	Nominal concrete 1:3:6 or richer mix (i/c equivalent design mix)	2.00	cum	2,434.25	4,868.50
363	15.2.2	Nominal concrete 1:4:8 or leaner mix (i/c equivalent design mix)	6.00	cum	1,503.60	9,021.60
364	15.3	Demolishing R.C.C. work manually/ by mechanical means including stacking of steel bars and disposal of unserviceable material within 50 metres lead as per direction of Engineer - in- charge	2.00	cum	3,551.25	7,102.50
365	15.7	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.				
366	15.7.3	In lime mortar	2.00	cum	851.50	1,703.00
367	15.7.4	In cement mortar	2.00	cum	2,060.20	4,120.40
368	15.8	Removing mortar from bricks and cleaning bricks including stacking within a lead of 50 m (stacks of cleaned bricks shall be measured):				
369	15.8.2	From brick work in lime mortar	3,000.00	1000 nos.	5,355.30	16,065.90
370	15.8.3	From brick work in cement mortar	3,000.00	1000 nos.	6,700.80	20,102.40

371	15.12	Dismantling doors, windows and clerestory windows (steel or wood) shutter including chowkhats, architrave, holdfasts etc. complete and stacking within 50 metres lead :				
372	15.12.1	Of area 3 sq. metres and below	6.00	Each	367.20	2,203.20
373	15.12.2	Of area beyond 3 sq. metres	2.00	Each	502.75	1,005.50
374	15.13	Taking out doors, windows and clerestory window shutters (steel or wood) including stacking within 50 metres lead				
375	15.13.1	Of area 3 sq. metres and below	10.00	Each	143.50	1,435.00
376	15.13.2	Of area beyond 3 sq. metres	6.00	Each	188.90	1,133.40
377	15.18	Dismantling steel work in built up sections in angles, tees, flats and channels including all gusset plates, bolts, nuts, cutting rivets, welding etc. including dismembering and stacking within 50 metres lead.	26.00	kg	5.65	146.90
378	15.19	Dismantling steel work manually/ by mechanical means in built up sections without dismembering and stacking within 50 metres lead as per direction of Engineer-in-charge	200.00	kg	3.85	770.00
379	15.23	Dismantling tile work in floors and roofs laid in cement mortar including stacking material within 50 metres lead.				
380	15.23.1	For thickness of tiles 10 mm to 25 mm	60.00	Sqm	73.40	4,404.00
381	15.25	Dismantling stone slab flooring laid in cement mortar including stacking of serviceable material and disposal of unserviceable material within 50 metres lead	70.00	Sqm	266.45	18,651.50
382	15.28	Dismantling roofing including ridges, hips, valleys and gutters etc., and stacking the material within 50 metres lead of:				
383	15.28.1	G.S. Sheet	30.00	Sqm	164.95	4,948.50
384	15.28.2	Asbestos Cement sheet	32.00	Sqm	77.30	2,473.60
385	15.42	Dismantling C.I. or asbestos rain water pipe with fittings and clamps including stacking the material within 50 metres lead :				
386	15.42.1	75 to 80 mm dia pipe	20.00	metre	75.70	1,514.00
387	15.42.2	100 mm dia pipe	70.00	metre	78.00	5,460.00
388	15.52	Dismantling of flushing cistern of all types (C.I./PVC/Vitrious China) including stacking of useful materials near the site and disposal of unserviceable materials within 50 metres lead.	6.00	Each	112.05	672.30

389	15.56	Dismantling old plaster or skirting raking out joints and cleaning the surface for plaster including disposal of rubbish to the dumping ground within 50 metres lead.	300.00	Sqm	54.65	16,395.00
390	15.57	Dismantling aluminium/ Gypsum partitions, doors, windows, fixed glazing and false ceiling including disposal of unserviceable material and stacking of serviceable material with in 50 meters lead as directed by Engineerin-charge.	100.00	Sqm	56.35	5,635.00
391	15.60	Disposal of building rubbish / malba / similar unserviceable, dismantled or waste materials by mechanical means, including loading, transporting, unloading to approved municipal dumping ground or as approved by Engineer-in-charge, beyond 50 m initial lead, for all leads including all lifts involved.	140.00	cum	263.95	36,953.00
392	16.7	Brick edging in full brick width and half brick depth including excavation, refilling and disposal of surplus earth lead upto 50 metres				
393	16.7.1	With common burnt clay F.P.S. (non modular) bricks of class designation 7.5	30.00	metre	194.30	5,829.00
394	16.53	Providing and fixing concertina coil fencing with punched tape concertina coil 600 mm dia 10 metre openable length (total length 90 m), having 50 nos rounds per 6 metre length, upto 3 m height of wall with existing angle iron 'Y' shaped placed 2.4m or 3.00 m apart and with 9 horizontal R.B.T. reinforced barbed wire, stud tied with G.I. staples and G.I. clips to retain horizontal, including necessary bolts or G.I. barbed wire tied to angle iron, all complete as per direction of Engineer-in-charge, with reinforced barbed tape (R.B.T.) / Spring core (2.5 mm thick) wire of high tensile strength of 165 kg/ sq. mm with tape (0.52 mm thick) and weight 43.478 gm/ metre (cost of M.S. angle, C.C. blocks shall be paid separately)	30.00	metre	375.80	11,274.00
395	16.68	Providing and laying 60 mm thick faciory made cement concrete interlocking paver block of M-30 grade made by block making machine with strong vibratory compaction, of approved size, design & shape, laid in required colour and pattern over and including 50 mm thick compacted bed of coarse sand, filling the joints with line sand etc. all complete as per the direction of Engineer-in-charge.	16.00	Sqm	972.00	15,552.00

396	16.69	Providing and laying at or near ground level factory made kerb stone of M-25 grade cement concrete in position to the required line, level and curvature, jointed with cement mortar 1:3 (1 cement : 3 coarse sand), including making joints with or without grooves (thickness of joints except at sharp curve shall not to more than 5 mm), including making drainage opening wherever required complete etc. as per direction of Engineer-in-charge (length of finished kerb edging shall be measured to calculate volume for payment). (Precast C.C. kerb stone shall be approved by Engineer-in-charge).	2.00	cum	10,117.60	20,235.20
397	16.82	Taking out existing kerb stones of all types from footpath/ central verge, including removal of mortar etc., disposal of unserviceable material to the dumping ground, for which payment shall be made separately and stacking of serviceable material within 50 metre lead as per direction of Engineer-in-Charge	8.00	meter	39.35	314.80
398	16.83	Taking out existing CC interlocking paver blocks from footpath/ central verge, including removal of rubbish etc., disposal of unserviceable material to the dumping ground, for which payment shall be made separately and stacking of serviceable material within 50 metre lead as per direction of Engineer-in-Charge	60.00	Sqm	131.75	7,905.00
399	16.84	Laying old cement cocrete interlocking paver blocks of any design/ shape laid in required line, level, curvature, colour and pattern over and including 50 mm thick compacted bed of coarse sand, filling the joints with fine sand etc. all complete as per the direction of Engineer-in-charge. (Old CC paver blocks shall be supplied by the department free of cost).	100.00	Sqm	402.95	40,295.00
400	16.85	Laying at or near ground level old kerb stones of all types in position to the required line, level and curvature, jointed with cement mortar 1:3 (1 cement : 3 coarse sand), including making joints with or without grooves (thickness of joints, except at sharp curve, shall not be more than 5 mm), including making drainage opening wherever required etc. complete as per direction of Engineer-in-charge. (Length of finished kerb edging shall be measured for payment). (Old kerb stones shall be supplied by the department free of cost)	6.00	meter	109.45	656.70

401	16.91	Providing and laying factory made chamfered edge Cement Concrete paver blocks in footpath, parks, lawns, drive ways or light traffic parking etc, of required strength, thickness & size/ shape, made by table vibratory method using PU mould, laid in required colour & pattern over 50 mm thick compacted bed of sand, compacting and proper embedding/laying of inter locking paver blocks into the sand bedding layer through vibratory compaction by using plate vibrator, filling the joints with sand and cutting of paver blocks as per required size and pattern, finishing and sweeping extra sand. complete all as per direction of Engineer-in-Charge				
402	16.91.1	60 mm thick cement concrete paver block of M-35 grade with approved colour, design & pattern	12.00	Sqm	1,045.65	12,547.80
403	16.91.2	80 mm thick C.C. paver block of M-35 grade with approved colour design and pattern	12.00	Sqm	1,091.50	13,098.00
404	16.93	Providing and placing in position 100 mm thick factory made machine batched & machine mixed Precast RCC Rectangular Covers on drains of footpath of various sizes, of M-25 grade cement concrete for RCC work, including cost of centering, shuttering, reinforcement of 8 mm dia TMT bars of Fe 500 grade @ maximum 100 mm c/c on both ways, neat cement punning on finished surface, properly encased on all edges with 1.6 mm thick, 100 mm wide MS sheet duly painted over priming coat, reinforcement to be welded at edges with MS sheet and providing 2 Nos. 12 mm dia bar for hooks etc including cost of cartage, all leads & lift, handling at site etc. all complete as per direction of Engineer-in-Charge.	80.00	Sqm	3,081.95	2,46,556.00
405	17.1	Providing and fixing water closet squatting pan (Indian type W.C. pan) with 100 mm sand cast Iron P or S trap, 10 litre low level white P.V.C. flushing cistern, including flush pipe, with manually controlled device (handle lever) conforming to IS : 7231, with all fittings and fixtures complete, including cutting and making good the walls and floors wherever required				
406	17.1.1	White Vitreous china Orissa pattern W.C. pan of size 580x440 mm with integral type foot rests	2.00	Each	6,767.40	13,534.80
407	17.2	Providing and fixing white vitreous china pedestal type water closet (European type W.C. pan) with seat and lid, 10 litre low level white P.V.C. flushing cistern, including flush pipe, with manually controlled device (handle lever), conforming to IS : 7231, with all fittings and fixtures complete, including cutting and making good the walls and floors wherever required :				

408	17.2.1	W.C. pan with ISI marked white solid plastic seat and lid	2.00	Each	6,515.55	13,031.10
409	17.7	Providing and fixing wash basin with C.I. brackets, 15 mm C.P. brass pillar taps, 32 mm C.P. brass waste of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever require				
410	17.7.2	White Vitreous China Wash basin size 630x450 mm with a single 15 mm C.P. brass pillar tap	2.00	Each	2,226.35	4,452.70
411	17.7B	Providing and fixing wash basin with C.I. brackets, 15 mm PTMT pillar cock, 32 mm PTMT waste coupling of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever required. White Vitreous China Flat back wash basin size 550x400 mm with single 15 mm PTMT pillar cock	2.00	Each	1,550.60	3,101.20
412	17.10	Providing and fixing Stainless Steel A ISI 304 (18/8) kitchen sink as per IS:13983 with C.I. brackets and stainless steel plug 40 mm, including painting of fittings and brackets, cutting and making good the walls wherever required :				
413	17.10.1	Kitchen sink with drain board				
414	17.10.1.1	510x1040 mm bowl depth 250 mm	2.00	Each	6,945.60	13,891.20
415	17.10.2	Kitchen sink without drain board				
416	17.10.2.2	610x460 mm bowl depth 200 mm	2.00	Each	3,873.80	7,747.60
417	17.11	Providing and fixing white vitreous china laboratory sink with C.I. brackets, C.P. brass chain with rubber plug, 40 mm C.P brass waste and 40 mm C.P. brass trap with necessary C.P. brass unions complete, including painting of fittings and brackets, cutting and making good the wall wherever required				
418	17.11.2	Size 600x450x200 mm	2.00	Each	6,585.80	13,171.60
419	17.16A	Providing and fixing 8 mm dia C.P. / S.S. Jet with flexible tube upto 1 metre long with S.S. triangular plate to Eureopean type W.C. of quality and make as approved by Engineer - in - charge.	4.00	Each	349.15	1,396.60
420	17.18	Providing and fixing P.V.C. low level flushing cistern with manually controlled device (handle lever) conforming to IS : 7231, with all fittings and fixtures complete				
421	17.18.1	10 litre capacity - White	2.00	Each	1,190.65	2,381.30
422	17.28	Providing and fixing P.V.C. waste pipe for sink or wash basin including P.V.C. waste fittings complete.				
423	17.28.1	Semi rigid pipe				

424	17.28.1.1	32 mm dia	12.00	Each	103.90	1,246.80
425	17.28.1.2	40 mm dia	12.00	Each	116.70	1,400.40
426	17.28.2	Flexible pipe				
427	17.28.2.1	32 mm dia	12.00	Each	119.55	1,434.60
428	17.28.2.2	40 mm dia	12.00	Each	119.55	1,434.60
429	17.31	Providing and fixing 600x450 mm beveled edge mirror of superior glass (of approved quality) complete with 6 mm thick hard board ground fixed to wooden cleats with C.P. brass screws and washers complete	2.00	Each	1,607.95	3,215.90
430	18.8	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings and fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and the cost of cutting chases and making good the same including testing of joints complete as per direction of Engineer in Charge. Concealed work, including cutting chases and making good the walls etc				
431	18.8.1	15 mm nominal dia .Pipes.	6.00	metre	497.80	2,986.80
432	18.8.2	20 mm nominal dia .Pipes.	4.00	metre	537.60	2,150.40
433	18.8.3	25 mm nominal dia .Pipes.	4.00	metre	627.25	2,509.00
434	18.8.4	32 mm nominal dia .Pipes.	4.00	metre	739.30	2,957.20
435	18.11	Providing and fixing G.I. Pipes complete with G.I. fittings and clamps, including making good the walls etc. concealed pipe, including painting with anti corrosive bitumastic paint, cutting chases and making good the wall :				
436	18.11.1	15 mm dia. nominal bore	12.00	metre	580.45	6,965.40
437	18.11.2	20 mm dia. nominal bore	4.00	metre	635.20	2,540.80
438	18.12	Providing and fixing G.I. pipes complete with G.I. fittings including trenching and refilling etc.				
439	18.12.1	15 mm dia. nominal bore	12.00	metre	322.15	3,865.80
440	18.12.2	20 mm dia. nominal bore	4.00	metre	368.60	1,474.40
441	18.12.3	25 mm dia. nominal bore	4.00	metre	467.75	1,871.00
442	18.12.4	32 mm dia. nominal bore	4.00	metre	540.30	2,161.20
443	18.12.5	40 mm dia. nominal bore	4.00	metre	617.05	2,468.20

444	18.12.6	50 mm dia. nominal bore	4.00	metre	762.15	3,048.60
445	18.12.7	65 mm dia. nominal bore	4.00	metre	896.60	3,586.40
446	18.12.8	80 mm dia. nominal bore	4.00	metre	1,041.70	4,166.80
447	18.13	Making connection of G.I. distribution branch with G.I. main of following sizes by providing and fixing tee, including cutting and threading the pipe etc. complete :				
448	18.13.1	25 to 40 mm nominal bore	6.00	Each	911.90	5,471.40
449	18.13.2	50 to 80 mm nominal bore	2.00	Each	1,785.35	3,570.70
450	18.46	Providing and fixing G.I. Union in G.I. pipe including cutting and threading the pipe and making long screws etc. complete (New work) :				
451	18.46.1	15 mm nominal bore	4.00	Each	318.35	1,273.40
452	18.49	Providing and fixing C.P. brass bib cock of approved quality conforming to IS:8931				
453	18.49.1	15 mm nominal bore	4.00	Each	506.80	2,027.20
454	18.51	Providing and fixing C.P. brass long body bib cock of approved quality conforming to IS standards and weighing not less than 690 gms.				
455	18.51.1	15 mm nominal bore	4.00	Each	798.95	3,195.80
456	18.52	Providing and fixing C.P. brass stop cock (concealed) of standard design and of approved make conforming to IS:8931				
457	18.52.1	15 mm nominal bore	4.00	Each	670.45	2,681.80
458	18.53	Providing and fixing C.P. brass angle valve for basin mixer and geyser points of approved quality conforming to IS:8931				
459	18.53.1	15mm nominal bore	4.00	Each	574.30	2,297.20
460	19.5	Dismantling of old S.W. pipes including breaking of joints and bed concrete stacking of useful materials near the site within 50 m lead and disposal of unserviceable materials into municipal dumps				
461	19.5.1	100 mm diameter	10.00	meter	89.00	890.00
462	19.5.2	150 mm diameter	10.00	meter	98.45	984.50
463	19.6	Providing and laying non-pressure NP2 class (light duty) R.C.C. pipes with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc. complete :				
464	19.6.3	250 mm dia. R.C.C. pipe	170.00	metre	899.80	1,52,966.00

465	19.6.4	300 mm dia. R.C.C. pipe	120.00	metre	994.30	1,19,316.00
466	19.18	Supplying and fixing C.I. cover without frame for manholes :				
467	19.18.1	455x610 mm rectangular C.I. cover (light duty) the weight of the cover to be not less than 23 kg	4.00	Each	1,358.00	5,432.00
468	19.20	Supplying and fixing C.I. cover 300x300 mm without frame for gully trap (standard pattern) the weight of cover to be not less than 4.5 kg	4.00	Each	787.00	3,148.00
469	21.1	Providing and fixing aluminium work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS: 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed echanicallywherever required including cleat angle, Aluminium snap beading for glazing / panelling, C.P. brass / stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge. (Glazing, paneling and dash fasteners to be paid for separately) :				
470	21.1.1	For fixed portion				
471	21.1.1.1	Anodised aluminium (anodised transparent or dyed to required shade according to IS: 1868, Minimum anodic coating of grade AC 15)	10.00	kg	495.05	4,950.50
472	21.1.1.2	Powder coated aluminium (minimum thickness of powder coating 50 micron)	10.00	kg	530.90	5,309.00
473	21.1.2	For shutters of doors, windows & ventilators including providing and fixing hinges/ pivots and making provision for fixing of fittings wherever required including the cost of EPDM rubber / neoprene gasket required (Fittings shall be paid for separately)				
474	21.1.2.1	Anodised aluminium (anodised transparent or dyed to required shade according to IS: 1868, Minimum anodic coating of grade AC 15)	6.00	kg	598.60	3,591.60
475	21.1.2.2	Powder coated aluminium (minimum thickness of powder coating 50 micron	6.00	kg	634.45	3,806.70

476	21.2	Providing and fixing 12 mm thick prelaminated particle board flat pressed three layer or graded wood particle board conforming to IS: 12823 Grade I Type II, in panelling fixed in aluminum doors, windows shutters and partition frames with C.P. brass / stainless steel screws etc. complete as per architectural drawings and directions of engineer-in-charge				
477	21.2.1	Pre-laminated particle board with decorative lamination on one side and balancing lamination on other side	2.00	Sqm	1,139.30	2,278.60
478	21.2.2	Pre-laminated particle board with decorative lamination on both sides	2.00	Sqm	1,115.40	2,230.80
479	21.3	Providing and fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of engineer-in-charge. (Cost of aluminium snap beading shall be paid in basic item):				
480	21.3.1	With float glass panes of 4.0 mm thickness (weight not less than 10kg/Sqm)	2.00	Sqm	1,176.80	2,353.60
481	21.3.2	With float glass panes of 5 mm thickness (weight not less than 12.50 kg/Sqm)	2.00	Sqm	1,505.25	3,010.50
482	21.3.3	With float glass panes of 8 mm thickness (weight not less than 20 kg/Sqm)	2.00	Sqm	1,685.40	3,370.80
483	21.4	Providing and fixing double action hydraulic floor spring of approved brand and manufacture conforming to IS : 6315, having brand logo embossed on the body / plate with double spring mechanism and door weight upto 125 kg, for doors, including cost of cutting floors, embedding in floors as required and making good the same matching to the existing floor finishing and cover plates with brass pivot and single piece M.S. sheet outer box with slide plate etc. complete as per the direction of Engineer-in-charge.				
484	21.4.1	With stainless steel cover plate minimum 1.25 mm thickness	2.00	Each	2,823.85	5,647.70

485	21.5	Providing and fixing powder coated aluminium work (minimum thickness of powder coating 50 micron) consisting of tee/ angle sections, of approved make conforming to IS : 733 in frames of false ceiling including aluminium angle cleats with necessary C.P. brass/ stainless steel sunk screws, aluminium perimeter angles fixed to wall with stainless steel rawl plugs @ 450 mm centre to centre and fixing the frame work to G.I. level adjusting hangers 6 mm dia. with necessary cadmium plated machine screws all complete as per approved architectural drawings and direction of the Engineer-in-charge (level adjusting hangers, ceiling cleats and expansion hold fasteners to be paid for separately).	2.00	kg	817.15	1,634.30
486	21.6	Providing and fixing 6 mm dia. G.I. level adjusting hangers (upto 1200 mm length), fixed to roof slabs by means of ceiling cleats made out of G.I. flat 40x3 mm size 60 mm long and stainless steel expandable dash fastener of 12.5 mm dia and 50 mm long, complete as per direcion of Engineer-in charge.	4.00	Each	82.45	329.80
487	21.8	Filling the gap in between aluminium frame & adjacent RCC/ Brick/ Stone work by providing weather silicon sealant over backer rod of approved quality as per architectural drawings and direction of Engineer-in-charge complete.				
488	21.8.1	Upto 5mm depth and 5 mm width	16.00	metre	96.75	1,548.00
489	21.13	Providing and fixing Brass 100 mm mortice latch and lock with 6 levers without pair of handles (best make of approved quality) for aluminium doors including necessary cutting and making good etc. complete	2.00	Each	528.85	1,057.70
490	21.17	Providing and fixing anodised aluminium grill (anodised transparent or dyed to required shade according to IS: 1868 with minimum anodic coating of grade AC 15) of approved design/pattern, with approved standard section and fixed to the existing window frame with C.P. brass/stainless steel screws @ 200 mm centre to centre, including cutting the grill to proper opening size for fixing and operation of handles and fixing approved anodised aluminium standard section around the opening, all complete as per requirement and direction of Engineer-in-charge. (Only weight of grill to be measured for payment).	2.00	kg	638.35	1,276.70

491	21.18	Providing and fixing 12 mm thick frameless toughened glass door shutter of approved brand and manufacture, including providing and fixing top & bottom pivot & double acting hydraulic floor spring type fixing arrangement and making necessary holes etc. for fixing required door fittings, all complete as per direction of Engineer-in-charge (Door handle, lock and stopper etc.to be paid separately).	12.00	Sqm	5,325.90	63,910.80
492	21.19	Filling the gap in between aluminium/ stone/ wood frame and adjacent RCC/Brick/ Stone/ wood/ Ceramic/ Gypsum work by providing weather/ structural non sag elastomeric PU sealant over backer rod of approved quality as per architectural drawings and direction of Engineer-in-charge complete, complying to ASTM C920, DIN 18540-F & ISO 11600				
493	21.19.1	Upto 5 mm depth and 5 mm width	40.00	metre	148.10	5,924.00
494	21.19.2	Upto 10 mm depth and 10 mm width	40.00	metre	200.95	8,038.00
495	21.19.3	Upto 20 mm depth and 20 mm width	10.00	metre	363.20	3,632.00
496	22.5	Providing and laying water proofing treatment in sunken portion of WCs, bathroom etc., by applying cement slurry mixed with water proofing cement compound consisting of applying (a) First layer of slurry of cement @ 0.488 kg/Sqm mixed with water proofing cement compound @ 0.253 kg/ Sqm. This layer will be allowed to air cure for 4 hours. (b) Second layer of slurry of cement @ 0.242 kg/Sqm mixed with water proofing cement compound @ 0.126 kg/Sqm. This layer will be allowed to air cure for 4 hours followed with water curing for 48 hours. The rate includes preparation of surface, treatment and sealing of all joints, corners, junctions of pipes and masonry with polymer mixed slurry.	6.00	Sqm	617.05	3,702.30
497	22.14	Grading roof for water proofing treatment with				
498	22.14.1	Cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size)	2.00	cum	8,042.30	16,084.60
499	22.14.2	Cement mortar 1:3 (1 cement : 3 coarse sand)	2.00	cum	16,112.10	32,224.20
500	22.14.3	Cement mortar 1:4 (1cement : 4 coarse sand)	2.00	cum	15,155.60	30,311.20

501	26.25	Providing and fixing 15 mm thick false ceiling tiles at all heights with integral densified calcium silicate reinforced with fibre and natural filler false ceiling tiles of Size 595x595 mm of approved texture, design and patterns having NRC (Noise Reduction coefficient) of 0.50 (minimum) as per IS 8225:1987, Light reflectance of 85% (minimum). Non combustible as per BS:476 (part-4), fire performance as per BS:476 (part 6&7), humidity resistance of 100%, thermal conductivity < 0.043 W/m K as per ASTM 518:1991,in true horizontal level on the exiting frame work consisting of T-sections and Lsections suitably fixed according to tile size as per direction of Engineer-in-charge	2.00	Sqm	1,781.20	3,562.40
502	26.26	Providing & fixing false ceiling at all heights with GRG (Glass Fibre Reinforced Gypsum) false ceiling tiles of Size 595x595 mm of approved texture, design and patterns having moisture content less than 2%, humidity resistance of 99%, NRC0.50 to 0.75 as per IS 8225:1987, Non combustible as per BS 476 (part 4)-1970 and light reflectance of 85% (minimum) to be laid in true horizontal level suspended on inter-locking metal T-Grid of hot dipped galvanised iron section of 0.33 mm thick (galvanized @ 120 gram per Sqm including both sides) comprising of main-T runners of size 15x32 mm of length 3000 mm, cross - T of size 15x32 mm of length 1200 mm and secondary intermediate cross-T of size 15x32 mm of length 600 mm to form grid module of size 600 x 600 mm, suspended from ceiling using galvanised mild steel items (galvanizing @ 80 grams per Sqm) i.e. 50 mm long, 8 mm outer diameter M-6 dash fasteners, 6 mm dia fully threaded hanger rod upto 1000 mm length and L-shape level adjuster of size 85x25x2 mm. Galvanised iron perimeter wall angle of size 24x24x0.40 mm of length 3000 mm to be fixed on periphery wall / partition with the help of plastic rawl plugs at 450 mm center to center and 40 mm long dry wall wood screws. The work shall be carried out as per specifications, drawing and as per directions of the Engineer-in-Charge.				
503	26.26.1	With semi perforated 12 mm thick micro tegular edged GRG \false ceiling tiles	4.00	Sqm	1,852.05	7,408.20

504	26.27	Providing and fixing mineral fibre false ceiling tiles at all heights of size 595X595 mm of approved texture, design and pattern. The tiles should have Humidity Resistance (RH) of 99%, Light Reflectance ≥ 85%, Thermal Conductivity k = 0.052 - 0.057 w/m K, Fire Performance as per (BS 476 pt - 6 &7)in true horizontal level suspended on interlocking T-Grid of hot dipped all round galvanized iron section of 0.33 mm thick (galvanized @120 gsm) comprising of main T runners of 15x32 mm of length 3000 mm, cross T of size 15x32 mm of length 1200 mm and secondary intermediate cross T of size 15x32 mm of length 600 mm to form grid module of size 600x600 mm suspended from ceiling using galvanized mild steel item (galvanised@80gsm) 50 mm long 8 mm outer diameter M-6 dash fasteners, 6 mm diameter fully threaded hanger rod up to 1000 mm length and L-shape level adjuster of size 85x25x2 mm, spaced at 1200 mm centre to centre along main 'T'. The system should rest on periphery walls /partitions with the help of GI perimeter wall angle of size24x24X3000 mm made of 0.40 mm thick sheet, to be fixed to the wall with help of plastic rawl plug at 450 mm centre to centre & 40 mm long dry wall S.S. screws. The exposed bottom portion of all T-sections used in false ceiling support system shall be pre-painted with polyester baked paint, for all heights. The work shall be carried out as per specifications, drawings and as per directions of the engineer-in-charge				
505	26.27.1	With 16 mm thick beveled tegular mineral fibre false ceiling tile (NRC 0.55 to 0.6	2.00	Sqm	2,333.60	4,667.20
506	26.86	Providing and fixing factory made single extruded WPC (Wood Polymer Composite) solid Poor/window/Clerestory windows & other Frames/ Chowkhat comprising of virgin PVC polymer of K value 58-60 (Suspension Grade), calcium carbonate and natural fibers (wood powder/ rice husk/ wheat husk) and non toxic additives (maximum toxicity index of 12 for 100 gms) fabricated with miter joints after applying PVC solvent cement and screwed with full body threaded star headed SS screws having minimum frame density of 750 kg/cum, screw withdrawal strength of 2200 N (Face) & 1100 N (Edge), minimum compressive strength of 58 N/mm2, modulus of elasticity 900 N/mm2 and resistance to spread of flame of Class A category with property of being termite/borer proof, water/moisture proof and fire retardant and fixed in position with M.S hold fast/lugs/SS dash fasteners of required dia and length complete as per direction of Engineer-In- Charge. (M.S hold fast/lugs or SS dash fasteners shall be paid for separately). Note: For WPC solid door/window frames, minus 5 mm tolerance in dimensions i.e depth and width of profile shall be acceptable. Variation in profile dimensions on plus side shall be acceptable but no extra payment on this account shall be made				
507	26.86.1	Frame size 45 x 70 mm	2.00	metre	705.85	1,411.70

508	26.86.2	Frame size 45 x 85 mm	2.00	metre	926.35	1,852.70
509	26.86.3	Frame size 50 x 100 mm	2.00	metre	947.70	1,895.40
510	26.86.4	Frame size 50 x 125 mm	2.00	metre	1,075.70	2,151.40
511	26.86.5	Frame size 65 x 100 mm	2.00	metre	1,111.30	2,222.60
512	26.86.6	Frame size 65 x 125 mm	2.00	metre	1,381.60	2,763.20
513	26.86.7	Frame size 65 x 150 mm	2.00	metre	1,637.65	3,275.30
514	26.87	Providing and fixing factory made single extruded WPC (Wood Polymer Composite) solid plain flush door shutter of required size comprising of virgin polymer of K value 58-60 (Suspension Grade), calcium carbonate and natural fibers (wood powder/ rice husk/wheat husk) and non toxic additives (maximum toxicity index of 12 for 100 gms) having minimum density of 650 kg/cum and screw withdrawal strength of 1800 N (Face) & 900 N (Edge), minimum compressive strength 50 N/mm2, modulus of elasticity 850 N/mm2 and resistance to spread of flame of Class A category with property of being termite/borer proof, water/moisture proof and fire retardant and fixing with stainless steel butt hinges of required size with necessary full body threaded star headed counter sunk S.S screws, all as per direction of Engineer-In-Charge. (Note: stainless steel butt hinges and necessary S.S screws shall be paid separately)				
515	26.87.1	30 mm thick	2.00	Sqm	4,346.70	8,693.40
516	26.87.2	35 mm thick	2.00	Sqm	5,015.35	10,030.70

517	26.88	Providing and fixing factory made single extruded WPC (Wood Polymer Composite) solid decorative type flush door shutter of required size comprising of virgin polymer of K value 58-60 (Suspension Grade), calcium carbonate and natural fibers (wood powder/ rice husk/wheat husk) and non toxic additives (maximum toxicity index of 12 for 100 gms) having minimum density of 650 kg/cum and screw withdrawal strength of 1800 N (Face) & 900 N (Edge), minimum compressive strength 50 N/mm2, modulus of elasticity 850 N/mm2 and resistance to spread of flame of Class A category with property of being termite/borer proof, water/moisture proof and fire retardant. WPC to be laminated with PVC foil of minimum 14 microns thick of approved design pasted with hot melt adhesive on both faces of shutter and fixing with stainless steel butt hinges of required size with necessary full body threaded star headed counter sunk S.S screws, all as per direction of Engineer-In-Charge. (Note: stainless steel butt hinges and necessary S.S screws shall be paid separately)				
518	26.88.1	30 mm thick	2.00	Sqm	4,764.20	9,528.40
519	26.88.2	35 mm thick	2.00	Sqm	5,432.85	10,865.70
520	NS	P/F stainless steel first quality curtain rod with all fitting and fixture i/c bracket and all other necessary accessories complete as per direction of engineer in charge.	40.00	meter	460.41	18,416.40
521	NS	Providing and fixing 25mm dia meter curtain rods of 1.25mm thick brass plates with two brass brackets fixed with brass screws and PVC plugs etc. wherever necessary complete .	6.00	metre	223.29	1,339.74
522	NS	Fixing of old girder or grill in position including welding, drilling, cutting etc. complete as per direction of EIC (labour rate only)	200.00	per kg	24.30	4,860.00
523	NS	Dismantiling CC Floor Nominal Concrete 1:3:6 or richer mix (i/c equivalent design mix) i/C base concrete Nominal Concrete 1:4:8 or leaner mix (i/C equivalent design mix) manually by mechanical means including disposal of material withing 50 meters lead as per direction of EIC.	50.00	Sqm	217.60	10,880.00
524	NS	Grinding of Existing Stone Floor/DADO/Skirting including polishing complete in all respect.	200.00	Sqm	176.90	35,380.00

525	NS	S/F of MS steel shutter Almirah type made from 1.0mm. Thick MS Sheet including frame hold fast mortise handle lock with double key looking mirror frame steel pegs on back side and i/c hammer painting of approved shade on front and three coats of synthetic enamel paint at backside i/c grouting in wall with 1:2:4 cement concrete i/c supply of all material labour & T&P etc. required for proper completion of the work	16.00	Sqm	2,961.80	47,388.80
526	NS	S/F of 100 mm wide vertical blinds NEHA/VISTA/CLASSIC or any other equivalent approved brand with prior approval of EIC, complete in all respect.	6.00	Sqm	1,568.00	9,408.00
527	NS	Providing & fixing of rolling blinds NEHA/VISTA/CLASSIC or any other equivalent approved brand with prior approval of EIC, complete in all respect	16.00	Sqm	2,270.70	36,331.20
528	NS	Providing laying and jointing 160 mm dia UPVC pipe of Ist quality complete in all respect as per direction of EIC	4.00	metre	1,029.00	4,116.00
529	NS	Providing laying and jointing 110 mm dia UPVC pipe of Ist quality complete in all respect as as per direction of EIC	20.00	metre	487.80	9,756.00
530	NS	Providing laying and jointing 75 mm dia UPVC pipe of Ist quality complete in all respect as as per direction of EIC	40.00	metre	347.00	13,880.00
531	NS	Making Knobs in 12 mm square bar used in fencing including smithy work complete in all respect.	40.00	Each	8.00	320.00
532	NS	Providing and fixing aluminium sheet 0.50 thick on existing door shutter (Bathroom and WC door) using nails	40.00	Sqm	840.70	33,628.00
533	NS	Providing laying and jointing 75 mm dia SWR pipe single socket type B of Ist quality prince make or equivalent approved make complete in all respects as per directions of EIC	160.00	metre	660.75	1,05,720.00
534	NS	Providing laying and jointing 90 mm dia SWR pipe single socket type B of Ist quality prince make or equivalent approved make complete in all respects as per directions of EIC	40.00	metre	777.90	31,116.00
535	NS	Providing laying and jointing 110 mm dia SWR pipe single socket type B of Ist quality prince make or equivalent approved make complete in all respects as per directions of EIC	50.00	metre	980.70	49,035.00
536	NS	Providing laying and jointing 160 mm dia SWR pipe single socket type B of Ist quality prince make or equivalent approved make complete in all respects as per directions of EIC	40.00	metre	1,772.35	70,894.00

537	NS	Providing and fixing shower essco make model no. EOS-542N or equivalent approved make overhead shower 100 mm dia round shape single flow (ABS Body Chrome Plated with Gray Face plate) with Rubit Cleaning System fixied with ALE-536A Shower arm 240 mm Long (light weight) Round Shape for wall mounted shower with Wall Flange all complete as per direction of engineer in charge.	6.00	Each	1,477.00	8,862.00
538	NS	Providing and fixing health faucet (ABS body) with 8mm dia. 1.2 meter long Flexible Tube & Wall hook ESSCO make model no. ALE-CHR-593 or equivalent approved make as per directions of EIC.	6.00	Each	1,798.00	10,788.00
539	NS	Providing and fixing CP Brass pillar cock rocket type with Aerator ESSCO make model no. SQT 507KN or equivalent approved make as per direction of EIC.	10.00	Each	1,522.15	15,221.50
540	NS	Providing and fixing Toilet Paper Holder Essco make model no. AEC-1151N or equivalent approved make etc, complete as per direction of the EIC	6.00	Each	1,195.00	7,170.00
541	NS	Providing and fixing Bottle Trrap with Fully casted body 32mm with 190mm & 125mm long connecting pipes Essco make model no. ALE-773ML300X125 or equivalent approved make as per directions of EIC	6.00	Each	1,612.60	9,675.60
542	NS	Providing and fixing CP brass Basin inlet connection angle valve ESSCO make model no. SQT-526NKM or equivalent approved make etc complete as per direction of EIC.	4.00	Each	949.45	3,797.80
543	NS	Providing and fixing CP brass concealed stop cock with sliding flange, size-16mm ESSCO make model no SQT-5414FKN or equivalent approved make etc. complete as per directions of EIC	6.00	Each	1,461.85	8,771.10
544	NS	Providing and fixing table mounted sink cock with swinging pipe spout (Table Mounted Model) with ESSCO make model no. SQT 523S or equivalent approved make as per directions of EIC	4.00	Each	2,381.15	9,524.60
545	NS	Providing and fixing wall mounted sink cock with swinging pipe spout with ESSCO make model no. SQT-522S or equivalent approved make etc. complete as per directions of EIC	6.00	Each	2,019.45	12,116.70
546	NS	Providing and fixing short body bib cock with ESSCO make model no. SQT-511KN or equivalent approved make as per directions of EIC	10.00	Each	1,115.20	11,152.00
547	NS	Providing and fixing long body bib cock with Wall Flange & Aerator ESSCO make model no. SQT-512KN or equivalent approved as per instruction of EIC	6.00	Each	1,657.75	9,946.50

548	NS	Providing and fixing shower jaquar make model no. OHS1605 (150x150mm) or equivalent approved make as per directions of EIC.	4.00	Each	5,485.60	21,942.40
549	NS	Providing and fixing shower Arm 400x25x25 mm square shape for wall mounted showers with flange jaquar make model no. SHA 455L400 or equuvalent approved make as per direction of EIC	22.00	Each	2,893.50	63,657.00
550	NS	Providing and fixing health faucet with 8 mm dia, 1 meter long flexible Tube & Wall hook. Jaquar make model no. ALD 573 or equivalent approved make as per directions of EIC	12.00	Each	2,310.20	27,722.40
551	NS	Providing and fixing Bowl with Cistern for Extended wall hung WC with PP soft close seat cover, Hinges, Dual Flush cistern fitting. Accessories set, size 380x630x770 mm jaquar make model no. CNS-WHT-353SPPZ or equivalent approved make as per directions of EIC	4.00	Each	13,546.20	54,184.80
552	NS	Providing and fixing under counter wash basin with fitting accessories size 485x370x205 mm shape rectagular jaquar make model no. CNS-WHT-701 or equivalent approved make as per directions of EIC	4.00	Each	4,199.65	16,798.60
553	NS	Providing and fixing wall hung full padestal wash Basin with fixing Accessories size 560x415x200 mm pedestal jaquar make model no. CNSWHT 801 & CNW WHT 301 or equivalent approved make as per directions of EIC	4.00	Each	4,883.60	19,534.40
554	NS	Providing and fixing CP brass angular stop cock with valve flange Jaquar Make Model No. CON-059KN or equivalent approved make as per directions of EIC	6.00	Each	1,281.00	7,686.00
555	NS	Providing and fixing CP brass pillar cock Auto closing system jaquar Make Model No. PRS-031 or equivalent approved make as per directions of EIC	6.00	Each	3,029.15	18,174.90
556	NS	P/F CP brass pillar cock jaquar make CON011KN or equivalent of approved make as per direction of EIC	6.00	Each	1,733.10	10,398.60
557	NS	P/F CP brass long neck pillar cock with aerator jaquar model no. CON-021KN or equivalent approved make as per direction of EIC	6.00	Each	2,275.65	13,653.90
558	NS	Providing and fixing CP brass wall mixer with provision for overhead shower with 115 mm long bend pipe or upper side, connecting legs & Wall flanges jaquar make model no. CON-273KNUPR or equivalent approved make as per directions of EIC	6.00	Each	6,751.70	40,510.20

559	NS	P/F Central hole basin mixer without popup waste system with 450 mm long braided hose jaquar make model No. CON-167-KNB or equivalent of approved make as per direction of Engineer in Charge.	6.00	Each	5,048.70	30,292.20
560	NS	Providing and fixing Corner Glass Shelf (With Bracket) jaquar make model no. ACN-1173 or equivalent approved make as per directions of EIC	4.00	Each	2,445.40	9,781.60
561	NS	Providing and fixing Toilet Paper Holder with stainless steel flap jaquar make model no. ACN-1153S or equivalent approved make to be fixed with C.P. brass screws complete as per direction of the engineer-in-charge.	6.00	Each	1,888.20	11,329.20
562	NS	Providing and fixing Bottle Trap jaquar make 32 mm size with 250 mm x 190 mm long wall connection pipe & Wall Flange model no. ALD-PHR-769L 250x190 or equivalent approved make as per directions of EIC	12.00	Each	2,305.80	27,669.60
563	NS	Providing and fixing Towel Ringround with Round Flange jaquar model no. Can-1121BN or equivalent approved make to be fixed with CP brass screws etc. complete as per direction of the engineer in charge.	6.00	Each	1,616.95	9,701.70
564	NS	P/F CP brass bib cock jaquar make CON-047KN with wall flange or equivalent of approved make as per directions of Engineer in Charge.	10.00	Each	1,507.10	15,071.00
565	NS	P/F 15mm dia long body bib cock Jaquar make Model No. CON-107-KN or equivalent of approved make as per direction of Engineer in Charge.	10.00	Each	1,989.30	19,893.00
566	NS	Providing and fixing 75 mm dia upvc nahani trap with material and labour etc complete as per directions of EIC	10.00	Each	168.80	1,688.00
567	NS	Providing and fixing 100 mm dia CP floor jali (Heavy Duty) as per direction of EIC	40.00	Each	54.70	2,188.00
568	NS	Brick work with old bricks (supplied free of cost at our stores) in superstructure above plinth level up to floor V level in cement mortar 1:4 (1 cement : 4 coarse sand)	2.00	Cum	5,825.20	11,650.40
569	NS	Brick work with old bricks (supplied free of cost at our stores) in superstructure above plinth level up to floor V level in cement mortar 1:6 (1 cement : 6 coarse sand)	2.00	Cum	5,587.30	11,174.60
570	NS	Half brick masonry with old bricks (supplied free of cost at our central stores) in superstructure above plinth level up to floor V level in cement mortar 1:4 (1 cement : 4 coarse sand) masaonry with old bricks (1:4 cm) etc. complete in all respects as per directions of EIC	4.00	Sqm	713.55	2,854.20

571	NS	Supplying and fixing SS pull handle H type (pair) size of 450 mm Dorset make model no. SH 18 P SS or equivalent of approved make as per direction of EIC	4.00	Each pair	4,044.95	16,179.80
572	NS	Supplying and fixing SS pull handle H type (pair) size of 300 mm Dorset make model no. SH 12 P SS or equivalent of approved make as per direction of EIC	4.00	Each pair	2,905.65	11,622.60
573	NS	Supplying and fixing SS pull handle H type (pair) size of 600 mm dorset make model no. SH 24 P SS or equivalent of approved make as per direction of EIC	4.00	Each pair	5,383.20	21,532.80
574	NS	Extra difference cost for providing and fixing glass door fitting combo set with lock patch. Top bottom patch fittings of dorset model no. CS 100 WL or equivalent approved make having brand logo embossed on the body/plate with a double spring mechanism and door weight upto 100 kg for doors, including cost of cutting floor, embedding in floors as required and making good the same matching to the existing floor finishing and cover plate with brass pivot and single piece MS sheet (With SS Cover plate minimum 1.25 mm thickness) outer box with slide plate etc. complete as per the direction of EIC.	10.00	Each	11,422.30	1,14,223.00
575	NS	Extra difference cost for providing and fixing glass door fitting combo set with lock patch. Top bottom patch fittings of dorset model no. CS 70 WL or equivalent approved make having brand logo embossed on the body/plate with a double spring mechanism and door weight upto 70 kg for doors, including cost of cutting floor , embedding in floors as required and making good the same matching to the existing floor finishing and cover plate with brass pivot and single piece MS sheet (With SS cover plate minimum 1.25 mm thickness) outer box with slide plate etc. complete as per the direction of EIC.	16.00	Each	7,033.80	1,12,540.80
576	NS	Refixing old AC Sheet etc, complete as per directions of engineer in charge. (old sheets supplied free of cost from central store)	160.00	Sqm	95.60	15,296.00
577	NS	Supplying & fixing of 10 mm thick pvc wall penaling with prior approval of EIC, complete in all respect.	160.00	Sqm	1,451.90	2,32,304.00
578	NS	Providing, mixing and applying 12 mm thick ready mix cement plaster of approved make as per specifications and directions of Engineer-in-charge.	360.00	Sqm	376.00	1,35,360.00
579	NS	Providing, mixing and applying 15 mm thick ready mix cement plaster of approved make as per specifications and directions of Engineer-in-charge.	300.00	Sqm	455.00	1,36,500.00

580	NS	Brick work with old bricks (supplied free of cost at our stores) in foundation and plinth in cement mortar 1:4 (1 cement : 4 coarse sand)	10.00	cum	4,091.90	40,919.00
581	NS	Brick work with old bricks (supplied free of cost at our stores) in foundation & plinth in cement mortar 1:6 (1 cement: 6 coarse sand)	10.00	cum	3,853.95	38,539.50
582	NS	Providing and fixing 1mm thick lamination on door of green Lam make or equivalent of approved colour and shade as per direction of the EIC.	90.00	Sqm	1,272.45	1,14,520.50
583	NS	Providing and fixing 12 mm thick toughened glass in fixed portion including godrej glass clip fittings or equivalent as per approved make necessary holes etc. for fixing required fitting, all complete as per direction of EIC	40.00	Sqm	5,979.25	2,39,170.00
584	NS	Providing and fixing 35 mm thick ISI mark ply flush door shutters non-decorative type of century ply make or equivalent approved make complete in all respects as per directions of EIC	16.00	Sqm	3,733.25	59,732.00
585	NS	Providing and fixing 32 mm thick ISI mark flush door shutters non-decorative type of centuryply make or equivalent approved make complete in all respects as per directions of EIC	16.00	Sqm	3,494.75	55,916.00
586	NS	Providing and fixing S.S. Sliding door bolt of 200x16 mm with nuts and screw etc. complete as per direction of EIC	20.00	Each	573.55	11,471.00
587	NS	Providing and fixing mortice handle lock with of doorset make model no. Cetto	10.00	Each	5,210.00	52,100.00
588	NS	Providing and fixing hydraulic door closer Godrej make or equivalent approved make with necessary accessories and screws etc. complete in all respects as per directions of EIC	20.00	Each	2,404.55	48,091.00
589	NS	Providing and fixing 10/5 ltr. capacity polymer dual flush cistern of parryware make model E8109 Economy D/F or equivalent approved make as per directions of EIC	4.00	Each	2,302.80	9,211.20
590	NS	Providing and fixing Parryware piller cock auto closing Model No. G2013A1 or equivalent of approved make as per direction of Engineer in charge.	16.00	Each	2,366.10	37,857.60
591	NS	Providing and fixing of white glazed earthenwave half stall (Flat Back Large) urinal 1st quality HINDWARE, CERA, PARRYWARE make of required specials fitting and 32mm dia G.I. waste pipe etc complete in all respects as per directions of E.I.C.	20.00	Each	8,396.10	1,67,922.00
592	NS	Providing and fixing Urinal valve auto closing system with built- in control cock & Wall Flange Jaquar Make Model No. PRS-077 or equivalent of approved make as per direction of engineer in charge.	6.00	Each	3,149.75	18,898.50

593	NS	Providing and fixing Shower jaquar make model no. OHS-CHR-1709 or equivalent of approved make as per directions of E.I.C.	8.00	Each	3,677.20	29,417.60
594	NS	Providing and fixing Shower Arm jaquar make model no. SHA-CHR-477 or equivalent of approved make as per directions of E.I.C.	20.00	Each	904.35	18,087.00
595	NS	Providing and fixing Wall hung Urinal division HINDWARE make model no. SU810SC-C-STD-CR or equivalent of approved make as per directions of E.I.C.	4.00	Each	6,760.45	27,041.80
596	NS	Providing and fixing counter top Wash basin MEDIAN model no. 91069 of Hindware make or equivalent of approved make as per directions of E.I.C.	4.00	Each	13,575.80	54,303.20
597	NS	Providing and fixing wash basin size of 630x450 mm with C.I. brackets, 32 mm C.P. brass waste of standard pattern, cutting and making good the walls wherever required as per instruction of EIC.	4.00	Each	1,569.60	6,278.40
598	NS	S/F 6mm grey corrugated asbestor sheet in position i/c supply ofall materials labour and T&P etc. required for proper completion of the work.	10.00	Sqm	392.00	3,920.00
599	NS	Dismantling and re-fixing of old aluminium door, window, and partition work in all respect Engineer Incharge.	12.00	Sqm	212.66	2,551.92
600	NS	Providing and fixing 75mm overall thickness partition with 12.5mm thick double shin fire rated Glass Reinforced Gypsum (GRG) plater board conforming to IS:2095: part 3 (Board with BIS certification marks) as per the direction of Engineer-in-charge.	4.00	Sqm	1,820.70	7,282.80
601	NS	Providing and fixing 5 mm thick toughened glass etc complete as per directions of E.I.C.	4.00	Sqm	2,357.00	9,428.00
					Total	**99,99,847.52**

Signature of Contract

SCHEDULE 'C'

LIST OF APPROVED MAKES/AGENCY OF MATERIALS

The following guidelines are to be noted with regard to use of materials in the work.

1. The CONTRACTOR shall be required to use material of the make given in the list of approved make or specifically mentioned in the Bill of Quantities. EMPLOYER is free to demand the CONTRACTOR to use any particular make from the approved list of items.

2. However in case of non-availability of any item as per the list of approved make CONTRACTOR shall use alternative item of ISI make with prior written permission from the ENGINEER-IN-CHARGE.

3. In case it is established that Standard material (bearing ISI mark) as well as the materials indicated in the list (as mentioned in the above para) are not available in the market, then approved equivalent materials may be used in the work subject to approval from the Engineer-in-charge.

4. For materials bearing "Standard Mark (ISI)" ordinarily no testing is to be done. However, in case of doubt or with a view to check the quality of materials, ENGINEER-in-charge may send samples for random testing.

5. For use of materials other than materials bearing "Standard Mark (ISI)" Mandatory tests shall be conducted at the frequency specified in the contract. In case frequency of testing is not stipulated in the contract then standard specification (CPWD, ISI etc.) may be considered for frequency at which materials are to be tested.

6. Before bulk purchase of quantities of materials, it is the responsibility of the Contractor to get the samples of materials approved from Engineer-in-charge and ENGINEER-in-charge

7. The consumption of cement shall be calculated as per CPWD/DSR norms.

8. Brick bats will be supplied from Central Store @ Rs.500.00/ M^3 as per consumption if available in the Central Store.

List of Approved Makes of Civil & Sanitary Materials

S.No.	Materials	Manufacturer/ Make
1	(i) Ordinary Portland Cement/ Portland Pozzolana Cement/ Portland Slag Cement.	Ultratech, ACC, Ambuja Cement, J.K. Cement, Birla Uttam Cement, Shree Cement, Jaypee Cement, Wonder Cement
	(ii) White Cement	Birla White, J.K. White Cement, Saint Gobain(Weber), ACC
	(iii) Readymix Cement Plaster	Ultratech, ACC, Saint Gobain, JK Cement, Birla White, Birla Aerocon
	(iv) POP (Plaster of Paris)	JK Lakshmi, Shriram Nirman, Sakarni, JK Cement Gypsomaxx
2	Reinforcement Steel	SAIL, TATA Steel, Rashtriyalspat Nigam Ltd. (RINL), JSW Steel Ltd., Jindal Steel & Power Ltd., Kamdhenu, Indostar
3	Structural Steel	SAIL, TATA Steel, Rashtriya Ispat Nigam (RINL), JSW Steel ltd., JSPL, APL Apollo, MSP Steel
4	Polycarbonate Sheet	Danpalon, DPI Daylighting, Lexan, Tuflite, MG Polyplast
5	Profile steel sheet (Precoated)/ Decking Metal Sheet	TATA, Lloyd, JSW, JSPL, SAIL, Kamdhenu
6	(a) Aluminium Section	Hindalco, Jindal, Indalco, Bhoruka, Maan
	(b) Anodised Aluminium Hardware (Heavy Duty)	Kilong, Alualpha, Classic, Ebco
7	Plasticizer, Admixtures, Other Construction Chemical	Fosroc, Pidilite, SIKA, STP, MYK-arment, Thermax
8	Micro-concreting	SIKA, FOSROC, CICO, STP LTD
9	Injection Grout	SIKA, FOSROC, CICO, STP LTD, Thermax
10	Bonding Agent	SIKA, FOSROC, CICO, STP LTD, Thermax
11	Polymer Modified Mortar	SIKA, FOSROC, CICO, STP LTD
12	Rust Remover	SIKA, FOSROC, CICO, STP LTD
13	Epoxy based Zinc Rich Protective Coating	SIKA, FOSROC, CICO, STP LTD
14	Water Proofing Compound	FOSROC, SIKA, Pidilite, ARDEX ENDURA, MC-Bauchemie, STP, ROFF, J.K Cement(JK Profix), MYK-arment, Thermax
15	Crystalline water proofing compound	FOSROC, Pidilite, Xypex, ARDEX ENDURA, Ultratech, SIKA, STP, Asian Paints
16	EPDM Waterproofing Membrane	Pidilite, STP, Polygomma, MYK-arment, Duratuf, SIKA, Asian Paint
17	PU Elastomeric Membrane(Spray applied for Deck Waterproofing)	Pidilite, SIKA, Asian Paints, STP, Berger, Fosroc, MYK-arment
18	Glasswool/ Rockwool Insulation	UP Twiga, Lloyds, Rockwool India, Saint Gobain, SIPL, India Gypsum
19	Swellable Bar	Pidilite, Fosroc, SIKA, STP, Asian Paint
20	Rebarring Chemical	Hilti, 3M India, Birla, FOSROC, Wurth
21	Expansion Joint- Modular	C.S, Hercules, Sanfield, SIKA, STP
22	Fire Sealant	Hilti, 3M India, Fischer

23	AAC Block	Ultratech, Instablock, Biltech, JK Smartblox, Shree Cement, Birla Aerocon, Siporex, Ecolite, Ultralyte, Green Block, JK Lakshmi
24	AAC Mortar/ Adhesive	Ultralyte, Ultratech, JKCement, Ambuja Cement, Bulwark Conchem
25	Veneered Particle Board	Kitply, Action TESA, Greenlam, Merino, Greenply, Centuryply, Archidply
26	Laminated Particle Board/ Laminates	Kitply, Action TESA, Greenlam, Merino, Greenply, Centuryply, Archidply
27	Flush Door/ Laminated Flush Door Shutters/ Block board	Kitply, Centuryply, Durian, Greenply, Archidply, Merino, Duro
28	Cement/ Bison Board	Everest, NCL, Visaka Industries, Birla Aerocon, Ecopro, Gyproc, Centuryply
29	Gypsum Board	Saint Gobain, India Gypsum, Walplast, USG Boral
30	WPC Board & Door	Rajshri, Centuryply, Alstone, Ecoste, Archidply, Plasto Green
31	Fire Rated Doors	I clean, Shakti Hormann, Navair, Beardsell, GMP
32	Hardware for Fire Check Doors	Dormakaba, Hafale, Dorset, Assa Abloy
33	Plywood/ Veneer	Kitply, Action TESA, Greenlam, Merino, Greenply, Centuryply, Archidply
34	Melamine Polish	Asian Paints-MelamyneGold, Pidilite-Wudfin, Dulux-Timbertone, Berger-Woodkeeper, JK Maxx Paints(Melamyn)
35	Toilet Cubicles	Merino, Greenlam, Stylam
36	Floor Spring/ Door Closure	Godrej, Dormakaba, Dorset, Kich, Hafele, Geze, Ozone, Everite, Everest
37	S.S Railing, Doors & window fittings Accessories etc.	Dorma, Kich, GEZE, Hettich, D-line, Ozone, Jindal, Technorail
38	Steel/Metal Primer	Asian Paints, Nerolac, Berger, JK Primera ROMP, ICI Dulux
39	Wood Primer	Asian Paints(Wood Primer), Berger, ICI Dulux, JK Maxx(Wood Amore), Nerolac
40	UPVC Doors & Windows (Profile makers & their authorized Fabricators only)	Koemmerling, Aluplast, Fenesta, Dimex, Encraft, Simta Astrix
41	UPVC door and window hardwares	Rotto, Dorset, Kinglong
42	Cement Based Wall Putty	Birla wall care, JK Cement Wall Maxx, Berger, Asian Paints
43	Water Proof Putty	JK Cement Shieldmaxx, Asian Paints Waterproof Putty, Birla White wall seal, Berger Homeshield
44	Oil Bound Washable Distemper/ Dry Distemper	Asian Paints (Profesional Acrylic Distemper), Nerolac (Beauty Acrylic Distemper), Berger (Bison Acrylic Distemper), ICI Dulux (Maxilite)

45	1st Quality Acrylic Distemper (washable/ Ready mix/ Low VOC)	Asian Paints (Tractor Aqua Lock Paint), JK Maxx (Jumbo), Berger (Commando or equivalent paints of Nerolac or ICI Dulux)
46	Acrylic Emulsion Paints	Asian Paints (Professional Premium Interior Emulsion Paint), Nerolac (Beauty Gold), JK (Trendz), Berger (Rangoli Total Care), ICI Dulux (Super Cover)
47	Plastic Emulsion Paints	Asian Paints (Apcolite Heavy Duty Premium Emulsion Paint), JK (WipEazy), Nerolac (Impression), Berger (Easy clean)
48	Premium Acrylic Emulsion Paints (Interior)	Asian Paints (Royale Luxury Emulsion), Nerolac (Impression), JK (Majesta), Berger (Silk), ICI Dulux (Velvet touch)
49	Textured Exterior Paint	Asian Paints, Nerolac, Berger Paints, Nerolac Paints, Luxture, JK (Maxx), Birla White
50	Acrylic smooth exterior paint	Asian Paints (Apex/Professional Premium Exterior Emulsion), Nerolac (XL), JK (Armour), Berger (Weather coat), ICI Dulux (Weather Shield)
51	Premium Acrylic smooth exterior paints with Silicon additives	Asian Paints (Apex Ultima), Nerolac (XL Total), JK (Maximo), Berger (Weather coat all guard), ICI Dulux (Weather Shield max)
52	Synthetic Enamel paint	Asian Paints (Apcolite Premium gloss enamel), Nerolac (Synthetic Hi-gloss), JK (Enamelo), Berger (Luxol Hi-gloss), ICI Dulux (Gloss Synthetic enamel)
53	Cement Primer	Nerolac, Berger (BP White Primer-WT), Asian (Decoprime- WT), ICI Dulux, Ultratech
54	Epoxy Paint	Asian Paints, Nerolac, Berger, ICI Dulux, Pidilite, Tuffcoat
55	Water proofing Cement Paint	Snowcem, Acrocem, Birla Cem, Indigo Paints
56	Fire Paint/ Fire Retarded Paint	Asian Paints, Akzo Nobel coatings India Ltd., PROMAT, Jotun, Caboline
57	Gypsum Plaster	Ferrous Crete, Gyproc- Saint Gobain, Ultratech, J.K Cement Gypsomax
58	False Ceiling System	Saint Gobain, India Gypsum, Armstrong, Aerolite, Hilux
59	False Ceiling- Gypsum	Saint Gobain, India Gypsum, USG Boral
60	False Ceiling-Metal	Saint Gobain, Hunter Douglas, Armstrong, India Gypsum, Aerolite, Hi-steel
61	False Ceiling- Calcium Silicate	Anakon, Aerolite, Hilux
62	Baffle / Open Ceiling	Hunter Douglas, Armstrong, Saint Gobain, Hi-Steel
63	Clear/ Float/ Frosted/ Refractive/ Coated Glass	Saint Gobain, Modiguard, Asahi (AIS), Pilkington, Goldplus, Atul
64	Silicon based water repellant/ Weather sealant	Nerolac, Berger, Akzonobel, Ultratech, Asian Paints, STP, JK Cement(JK Profix)

65	Poly-Sulphide Seal	FOSROC, Pidilite (Dr. Fixit/Roff), Sika, Tuffseal, Laticrete, Wacker, Dow Corning, Fairmate
66	Mosaic tiles/ Chequered Tiles/ Tactiles/ Paver Blocks/ Kerstone	Unistone, Dalal Tiles, Mayur Dynamic Tiles, Tulip, Vyara, Basant Becons
67	Ceramic Tiles	Kajaria, Somany, Rak Ceramics, Asian (AGL), Marbito
68	Vitrified Tiles (Anti-skid/ Matt/ Glazed)	Kajaria, Somany, Rak Ceramics, Asian (AGL), Marbito
69	Vinyl Flooring	Responsive, Tarkett, Polyflor, Ebaco, Armstrong, Pergo
70	Epoxy Flooring	Dubond, Ultratech, Sikafloor, Asian Paint, STP, Thermax
71	Wooden Flooring	Pergo, Tarkett, Ebaco, Action Tesa
72	Grouts/ Tile Adhesives	MYK-Latecrete, Ferrous Crete, ARDEX ENDURA, Weber (Saint Gobain), Pidilite, Thermoshield, Fairmate, Ultratech, JK Cement(Tylo), Somany
73	Acoustic wall Panels	Anutone, Armstrong, Knauf, Ecotone, Credence
74	Aluminium Composite Panels (ACP)	Alstone, Virgo, Alucobond, Alstrong, Aludecor, Eurobond
75	Floor Hardner	Sika, Duraflor, MYK-Arment, STPL, Thermax
76	Heat Resistant Tiles	Swastik, Thermatek, Rocotile
77	GRC/ FRP Jaali	Swastik, Unistone, Birla White, Dalal Tiles
78	Dash/ Anchoring Fasteners	Hilti, Fischer, Bosch, Wurth
79	Sanitary ware, Fittings & accessories	Kohler, Duravit, Roca, Hindware, Parryware, Jaquar, Grohe, Euronics
80	C.P. Brass Fittings	Kohler, Duravit, Roca, Hindware, Parryware,
81	G.I./ M.S. Pipe	TATA, Jindal, APL Apollo, Prakash Surya, Swastik, Zenith
82	G.I. Fittings	Unik, AVR, Zoloto, TATA, Zenith, R-Brand, Surya
83	S.S Pipes & fittings	TATA, Jindal, JSW, APL Apollo
84	HDPE Pipe	Reliance, Oriplast, Supreme, Vectus, Vertex, SFMC, Jain Irrigation, Ashirvad
85	D.I. Pipes & fittings	Electrosteel, Jindal, TATA Ductura
86	Float Valve	IVC, Leader, Zoloto, KSB, DRP, Castle
87	UPVC/SWR Pipe and Fittings	Astral, Supreme, Ashirvad, Finolex, Vectus, Prince, AKG, SFMC, APL Apollo
88	PVC Pipe & fittings	AKG, Supreme, Finolex, Vectus, APL Apollo, Prince, Pearl, Prayag
89	CPVC Pipe & fittings	AKG, Supreme, Finolex, Vectus, APL Apollo, Astral, Prince, Prayag
90	Centrifulgally Cast (spum) Iron Pipes & Fittings.	NECO, Kapilansh, Electrosteel, SKF, BIC, Tata
91	C.I. Manhole covers, frames & G.I. gratings	NECO, RAJ Iron Foundry Agra, BIC, SKF, Kapilansh, Jain Spun Pipe Co.

92	SFRC Manhole covers & gratings	KK, Jain Spun Pipe Co., Pragati, T-Con, OM Spun, OCR
93	Polyethylene water Storage Tank	Sintex, Polycon, SPL, Vectus
94	Mirror Glass	Atul, Modi Guard, Golden Fish
95	Stainless Steel Sink	Neelkanth, Nirali, Hindware, Jayna, Franke, Cera, Silver Shine
96	RCC Pipes	Lakshmi, Sood & Sood, Jain & Co., Diwan Spun Pipe, ACS, Kisan Industries, Sai Concrete
Note:	Deviation in the approved make(s) may be obtained with due approval of the competent authority with due justification.	