



**NOTIFIED AREA AUTHORITY,  
PCC  
(A GOVT. OF GUJARAT UNDERTAKING)**



# ONLINE TENDER PAPERS

**Name of Work: - Construction of Compound Wall Around PCC Office Building Plot No. 08  
under PCC Notified Area**

**NOTIFIED AREA OFFICE, PCC**  
(A GOVT. OF GUJARAT UNDERTAKING)  
**OFFICE OF THE CHIEF OFFICER**  
**SF-2 Anmol Plaza, Nr. Manisha Circle, O P Road, Vadodara-07**  
**Email Id.:- [copccvdr@gmail.com](mailto:copccvdr@gmail.com)**

Signature of Contractor

Chief Officer,  
PCC Notified Area

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under PCC Notified Area**

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જાહેર નિવિદા નં. ૦૩/૨૦૨૬-૨૦૨૭

મુખ્ય અધિકારીની કચેરી પીસીસી નિર્દિષ્ટ વિસ્તાર, એસ.એફ/૨, અનમોલ પ્લાઝા મનીષા સર્કલ પાસે, ઓલ્ડ પાદરા રોડ, વડોદરા-૨૦ ફોન નં. (૦૨૬૫) ૨૩૧૩૨૬૬ email: [copccvdr@gmail.com](mailto:copccvdr@gmail.com) હસ્તકના અનુ. ૧ નું કામ ઓનલાઈન ટેન્ડર web site [www.tender.nprocure.com](http://www.tender.nprocure.com) પર થી મંગાવવામાં આવે છે. ઓનલાઈન ટેન્ડર ની તારીખ ૨૪/૦૬/૨૦૨૬ થી ૦૩/૦૭/૨૦૨૬ ૧૮.૦૦ કલાક સુધી છે. કામની વિગત ઉપર દર્શાવેલ કચેરીના નોટીસ બોર્ડ ઉપર જોઈ શકાશે. નિવિદામાં જણાવેલ તમામ ટેન્ડરો અથવા તે પૈકી કોઈ પણ એક, કારણ જણાવ્યા વગર સ્વીકારવા, ન સ્વીકારવા તેમજ રદ કરવા એ મુખ્ય અધિકારીનો અબાધિત અધિકાર છે, જે તમામને બંધનકર્તા રહેશે. વધુ વિગત માટે ઉપરોક્ત કચેરીના કામકાજ સમય દરમિયાન સંપર્ક સાંધવા વિનંતી.

સહી/

સ્થળ : વડોદરા

મુખ્ય અધિકારી

તા.૨૪/૦૬/૨૦૨૬

પીસીસી નિર્દિષ્ટ વિસ્તાર

**OFFICE OF THE CHIEF OFFICER, PCC NOTIFIED AREA**

**SF/2 Anmol plaza, Near Manisha Circle,**

**Old Padra road, Vadodara**

**E-TENDER NOTICE NO. 03 OF 2026-27**

E-tender for the following works of Notified Area PCC is publicly Re-invited from the intending bidders registered in appropriate class with state Govt. of Gujarat R&BD / W.R.D / GIDC and other State Governments equivalent, by E-tendering only under jurisdiction Chief Officer PCC Notified Area on web site <https://tender.nprocure.com>

**DETAILS FOR ONLINE TENDERS :**

The tenders under Sr. No. 01 Invited percentage (%) above / below – B1 Agreement . The bids will be opened on schedule date and there after on evaluation thereof, the price bid of the pre-qualified bidders, will only be opened.

**GENERAL DETAILS OF WORKS:**

<b>Sr. No</b>	<b>Name of work</b>	<b>(1) Estimated cost (2) Earnest Money Deposit (3) Non-refundable Tender Fee (Inclusive of 18% G.S.T)</b>	<b>Class of registration</b>
1	<b>Construction of Compound Wall Around PCC Office Building Plot No. 08 under PCC Notified Area</b>	(1) Rs. 28,41,152.66 (2) Rs. 28,415.00 (3) Rs. 1,770.00	E1 class and above

**(A) SCHEDULE OF E-TENDERING**

(i)	Downloading of Tender Documents from Web site of <b><a href="https://tender.nprocure.com">https://tender.nprocure.com</a></b>  (The tender document for these work are available only in Electronic format which Bidder can download at free of cost)	From 24th June 2026 to 3rd July 2026 up-to 18.00 hours
(ii)	<b>SUBMISSION OF TENDER</b> <b>(A) Online submission</b> I) Online submission of bid documents. II) Scanned copies of DD for tender fee & EMD in electronic format only through online	From 24th June 2026 to 3rd July 2026 up-to 18.00 hours
	Other Documents required to be submitted by scanning in electronic format only through online  Required Class of registration	From 24th June 2026 to 3rd July 2026 up-to 18.00 hours

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	Valid Bank Solvency and also as per para - C - Sub para 4	
	<b>(B) Submission in physical form</b> I) D.D. / FDR in original ( for Tender fee & EMD) Other documents mentioned in para C, Sr. No. 5 for the purpose of verification only (in physical form) by RPAD/Hand delivery. ( <b>Kindly refer C-1,2 &amp;3</b> )	From 4th July 2026 to 6 <sup>th</sup> July 2026 up-to 15:000 hours (Only Working Days)
(iii)	<b>Opening of Technical Bid documents.</b>	In the Office of the Chief Officer, PCC Notified Area, SF/2 Anmol plaza, Near Manisha Circle, Old Padra road, Vadodara as under :- Preferably  On dtd. 6 <sup>th</sup> July 2026 at 17:00 (if Possible)

**(B) Online Submission of Tender**

- 1) Bidders can prepare & edit their offers number of times before tender submission date & time. After tender submission date & time, bidder cannot edit their offer submitted in any case. No written or online request in this regard shall be granted.
- 2) Bidder shall submit their offer i.e. Pre-qualification document with Technical Bid & Price Bid in Electronic format on above mentioned website & Date shown above after digitally signing the same.
- 3) **For the purpose of verification**, the original documents for Pre-qualification submitted in electronic format for Sr. No. 01 should be submitted in physical form as under:-
  - For Sr. No. 01 O/o the Chief Officer, PCC Notified Area, SF/2 Anmol plaza, Near Manisha Circle, Old Padra road, Vadodara  
By personally i.e by RPAD/hand delivery during office hours.
- 4) Offers submitted without digitally signed will not be accepted.
- 5) Offers i.e. Pre-qualification document with Technical Bid & Price Bid in physical form will not be accepted in any case.
- 6) It is Bidder's responsibility to verify Online Corrigendum / Amendments until last submission date and time as well as before Final Submission of Bid.
- 7) Required documents for Pre-qualification document received later than the time specified will not be accepted in any case and the bid of that bidder shall be considered non-responsive.

**(C) Submission of Tender Fees, EMD**

- 1) Interested Bidders can view these tender documents online, but bidders who are interested in bidding these tenders can download tender documents from web site as mentioned above and bidder who wish to submit their offer shall pay non-refundable tender fee in the form of Account Payee Demand Draft payable, Vadodara respectively for the works as under drawn on any Nationalized Bank in favour of **Chief Officer, PCC Notified Area**
- 2) EMD in the form of Account Payee Demand Draft / F.D.R. payable at Baroda drawn on any Scheduled / Nationalized Bank in favour of Chief Officer, PCC Notified Area for the works pertaining to respective divisions as under. EMD in the form of Bank Guarantee of the

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Scheduled Bank or Nationalized Bank also acceptable as per the manner set out in the prevailing Form B1 & Form B2.

- 3) Demand Draft for E.M.D. & Tender Fee shall be submitted in Electronic Format only through Online (by scanning) while uploading the Bid. This submission shall mean that E.M.D. & Tender Fee are received. Accordingly, offer of those shall be opened whose E.M.D. & Tender Fee is received electronically as well as received in physical form. **For the purpose of realization of D.D. as stated above under para (C- 1 & C - 2). However, bidder shall send the D.D. in original along with other documents (as stated in para C- 5) by personally i.e. by RPAD /Hand delivery during office hours.**
- 4) **Required Documents mentioned as under (a), (b), (c) & (d) are mandatory for submitting scanned copies through ONLINE. Otherwise tender offer shall be treated as NON RESPONSIVE, without any further intimation.**
  - a) Scanned copy of tender fee and EMD
  - b) Required Class of registration, Latest Income Tax return filed R.P.F.C registration certificate with latest challan, Pan Card & GST Registration certificate.
  - c) Fresh Valid Bank Solvency- (Calendar Year) - (20% value of the estimated cost put to tender)
  - d) Other documents mentioned in tender documents PQ Pera .
- 5) For the purpose of verification, the original documents submitted in electronic format should be submitted in physical form for the works in the manner set out below by personally i.e. by hand delivery/RPAD during office hours
  - a) Original tender fee in form of DD and EMD in form of DD/ FDR in favour of **Chief Officer, PCC Notified Area**

Tender fee, EMD in original and other required documents for verification received before or later than the time 4th July 2026 to 6<sup>th</sup> July 2026 up-to 15:000 hours (Only Working Days) will not be accepted in any case and the bid of that bidder shall be considered non-responsive. PCC Notified Area will not be responsible for delay in receipt of such documents due to any reasons by the postal department or any other agencies.

Any documents in supporting of tender bid shall be submitted in electronic format only through online (by Scanning etc.) and hard copy will not be accepted separately.
- 6) If any clarification / query regarding these tenders is required, do not hesitate to contact our concern Chief Officer, PCC Notified Area through phone no For Chief Officer – 0265-2313266

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## **MEMORANDUM OF WORK IN BRIEF**

(1)	<b>Name of Work :-</b>	Construction of Compound Wall Around PCC Office Building Plot No. 08 under PCC Notified Area
(2)	<b>Estimated cost put to tender :-</b>	<b>Rs. 28,41,152.66</b> (Rupees Twenty-Eight Lakh Forty-One Thousand One Hundred Fifty-Two and Paise Sixty-Six Only).
(3)	<b>Earnest Money Deposit (EMD) :-</b>	<b>Rs. 28,415.00</b> (Rupees Twenty-Eight Thousand Four Hundred Fifteen Only)
(4)	<b>Tender Fee :-</b>	<b>Rs. 1,770.00 (By DD Only)</b> Submit scan copy of tender fee online and original Tender fee must reach in office by Speed Post/Currier/Hand Delivery during office hours as per schedule time. Office Address:- Office of the Chief Officer PCC Notified Area, SF/2 Anmol plaza, Near Manisha Circle, Old Padra road, Vadodara
(5)	<b>Validity period of tendered offer :-</b>	120 days from the date of opening of technical bid.
(6)	<b>Security Deposit (5.00%) :-</b>	<b>Rs. 1,42,060.00 (5%)</b> (Rupees One Lakh Forty-Two Thousand Sixty Only)
(i)	Initial Security Deposit in the form of small saving or Narmada Bond or FDR – 2.5% of the estimated cost. (Validity period of 12 months)	<b>Rs.71,030.00 (2.50%)</b> (Rupees Seventy-One Thousand Thirty Only) Submitted before enter in to Agreement
(ii)	To be deducted from R.A. Bill – 2.5% of the estimated cost.	<b>Rs.71,030.00 (2.50%)</b> (Rupees Seventy-One Thousand Thirty Only)
(7)	<b>Time Limit for completion of work from the date of written order to commence. :-</b>	6 (Six) Months
(8)	<b>Defect Liability Period :- Form – B1 – Clause 17A (C)</b>	12 (Twelve) Months from the certified date of completion or one monsoon, whichever is later.
(9)	<b>Liquidated Damages :-</b>	As per Clause no. 2 (B1 Form)
(10)	<b>Workers Welfare cess under the Building &amp; Other Construction Workers Cess act 1996 (Labour Cess) :-</b>	1% of the value of work done shall be deducted from the all bills payable to the contractor.
(11)	<b>Description to be made on sealed cover for documents to be submitted by Speed Post/ RPAD</b>	Work of Construction of Compound Wall Around PCC Office Building Plot No. 08 under PCC Notified Area
(12)	<b>Testing Charges :-</b>	Notified Area will deduct 1% of the Estimated Cost from each Running Account Bill against the testing charges of materials.
(13)	<b>GST &amp; Other Taxes :-</b>	The rates to be quoted by the contractor must be exclusive of GST but inclusive of all other taxes and applicable Cess, levies on such taxes. GST shall be paid extra on the admissible payment as per the approved rates and condition of price variation; GST shall be paid as per prevailing rates at the time of payment.

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		For further clarification in GST, kindly contact our GST Consultant.
(13)A	SGST 1% & CGST 1% :-	As per the prevailing norms of the GST Department of Government SGST 1% & CGST 1% Total 2% amount of running/Final bill will be deducted from contractor each bill as per Government rules & condition. No extra charge will be given by Notified.
(14)	Agreement :-	B-1 Agreement <b>CLAUSES OF B-1 FORM ARE DELETED :-</b> Clause No.2, Clause No.17A and 17B, Clause No.25 and Clause No.31 are deleted in the prevailing B-1 Form. Moreover, Clause No.72 – Secure advance to contractor, Clause No.73 – Advance payment, Clause No.74- Advance against Machineries are not applicable as per GIDC Circular No. GIDC: ENG: CIR: CE: 594 dtd. 18th July 2007 & GIDC Circular No. GIDC: ENG: CIR: CE: 808 dtd. 13.12.2007 and Clause No.75 Mobilization advance shall not be paid as per GIDC prevailing Circular, as the estimated cost put to tender is less than 25.00 Crore. Clause 60 is deleted.
(15)	Tender to be open by :-	Office of the Chief Officer, PCC Notified Area, SF-2 Anmol Plaza, Nr. Manisha Circle, O P Road, Vadodara- 390 007.
(16)	Vehicle Facilities:-	Contractor at his own cost will provide One four wheeler vehicle as desired by Site In charge i.e. Innova / Tavera / Ertiga/ Scorpio with A.C. with driver to facilitate Engineer in charge for inspection of street light as and when required to inspection or surprise checking by Engineer in charge from the starting date of contract and to maintain till actual completion of the work satisfactorily.
(17)	Important Note :-	<ul style="list-style-type: none"> <li>a) For any technical discrepancy, the latest version of MORT&amp;H / IRC shall be applicable.</li> <li>b) Prospective bidders are requested to join the site visit.</li> <li>c) NAO reserves the right, without any obligation or liability, to accept or reject any or all the bid at any stage of the process, to cancel or modify the process or any part thereof or to vary any of the terms and conditions at any time, without assigning any reason whatsoever.</li> <li>d) Registration required “E1 Class and Above”</li> <li>e) GST registration certificate required mandatory</li> </ul>

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		<p>f) Required Documents mentioned in as under (a), (b), (c)&amp; (d) are mandatory for submitting scanned copies through ONLINE. Otherwise, tender offer shall be treated as NON-RESPONSIVE, without any further intimation.</p> <p>g) Scanned copy of tender fee and EMD</p> <p>h) Required Class of registration, Latest Income Tax return filed, RPFC registration certificate with latest challan, Service Tax Registration &amp; Pan Card.</p> <p>i) Fresh Valid Bank Solvency- (20% value of the estimated cost put to tender)</p> <p>j) GST registration certificate</p> <p>k) Submit the required documents online duly named and page numbered in proper manner for simplicity.</p> <p>l) Agencies based in the Vadodara district will be given first preference during the evaluation process, subject to meeting all eligibility and qualification criteria.</p>
(18)	<b>Contact Person :-</b>	<p>Shri. D A Patel Chief Officer, PCC Notified Area Office Phone No. (0265)-2313266</p>

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## **INSTRUCTION TO BIDDERS**

### **Introduction :-**

Bids i.e., Price bid and technical bid with Prequalification Application for Work of Construction of Compound Wall Around PCC Office Building Plot No. 08 under PCC Notified Area. Invited from contractors on e-tendering process. The Contractors, who wish to bid for this contract, should also apply for pre-qualification in the manner set out in this document.

The price bid will be opened only of those tenderers pre-qualified by the PCC Notified Area Authority, GIDC, PCC having necessary qualification, suitability to perform the contract satisfactorily and also opened technical bid with Prequalification Application will be considered. Technical Bid with Prequalification Application of dis-qualified bidders will not be considered

### **(1) Bidder's Responsibilities :-**

The intending Bidders shall be deemed to have visited the site and familiarized themselves thoroughly with the site conditions and all other aspects affecting the work under this Contract before submitting the tender. No claim/extension of time whatsoever shall be entertained on account of prevailing site conditions.

Interested Bidders may obtain further information at the following address:

Office of the Chief Officer PCC Notified Area, SF/2 Anmol plaza, Near Manisha Circle,  
Old Padra road, Vadodara

### **Location of Work :-**

The work site is located at Notified Area PCC Near Undera Village in Vadodara District, at an average distance of 15 to 20 km from Vadodara city.

### **(2) Scope of Works :-**

Physical Parameter of the Proposed works :-

Sr. No.	Description	Amount (Rs.)
1	Construction of Compound Wall Around PCC Office Building Plot No. 08 under PCC Notified Area	Rs. 28,41.152.66

### **(3) Security Deposit (SD) :-**

SD is payable in the manner set out in the tender document by the successful tenderer.

### **(4) Deposit / Bank Guarantee of Nationalized Bank Towards Free Maintenance Guarantee Period :- N.A**

### **(5) Workers Welfare Cess Under the Building & Other Construction workers Cess Act 1996 :-**

1% of the Value of work done shall be deducted from the all bills payable to the contractor.

### **(6) Mobilization Advance :-**

Mobilization advance shall not be paid.

### **(7) Defect Liability Period :-**

12 (Twelve) Months from the certified date of completion or one monsoon, whichever is later.

### **(8) Special Condition :-**

Please read the Special condition attached herewith.

### **(9) Programme of work :-**

Please read the special conditions attached herewith.

### **(10) Units Rates under Schedule "B" :-**

Unit Rates specified for Various items to be executed as per Schedule "B" in the price bid are exclusive GST and inclusive of all labour, materials, testing charges, equipment's, all incidental charges involved in the items & 1% Labour cess and as specified in the mode of

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measurement & payment of detailed specifications of items, incl. all taxes, royalty, octroi, transportation cost etc. all as applicable presently and as to be enforced for future by any / all including central / State Govt. and Statutory bodies from time to time.

**(11) Surveying & Measuring Equipment's :-**

Equipment's for surveying & measurement on the work shall be procured by the contractor for his use. The same also be made available to the Engineer at site or any work connected with the contract without any additional charges.

**(12) Conditions of Contract :-**

Condition of contract will be as per Form B-1 (**CONTRACT AGREEMENT TO BE EXECUTED**) attached with technical bid, or modified as needed for local conditions, others documents will be governed as per the documents and conditions of contract finalized for the work. All works will confirm to the Indian Standards, specifications for road & Bridge works of Ministry of Road Transport and Highway or other equivalent standard mentioned in the contract document as approved by the Engineer-in-charge.

**Please also read the B1 Form (CONTRACT AGREEMENT TO BE EXECUTED) Attached herewith.**

**(13) Supervision of Work :-**

Please read the Special Conditions attached herewith.

**(14) Others :-**

- 14.1** The contractor document shall include the original tender papers of GIDC, submission of contractor negotiation letter, letter of acceptance, agreement in B-1 form and the work order.
- 14.2** In conformity as per prevailing Income Tax rules and surcharge of bill value shall be deducted at source for which necessary certificate shall be released by the Executive Engineer.
- 14.3** Any sort of correction or erasures in the tender shall not be done by the tender, by applying white fluid or any other chemical. The tender with correction made in aforesaid manner shall be out rightly rejected by Corporation.
- 14.4** If any corrections erasures or overwriting are required by the tendered before submitting the tender, all the corrections shall be initialled by the tenderer only before submission of the tender; otherwise, the tender shall be rejected by the corporation.

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## **QUALIFICATION CRITERIA FOR PRE-QUALIFICATION APPLICATION**

(1) Prequalification criteria for the Civil / ~~Mechanical~~ / ~~Electrical~~ works-

(1.1) **Eligibility :-**

(1.1.1) **Bidder's Registration :-**

- Only those bidders shall bid whose names are borne on the approval list of registered contractors in the required **“E1” Class & above Registration.**
- If the Contractor's registration in the required class & category with Gujarat state R&BD / W.R.D. / GIDC is expired on or before the last date of online bidding period of the tender, the bidder must submit through online in electronic form the application for renewal of the same with the concerned department along with receipt of fees paid for it. In such cases, the bidder at his own responsibility must produce valid renewed registration certificate in the required class & category with Gujarat state R&BD / W.R.D. / GIDC before the date of opening of Technical Bid. Failing to which the bidder shall be disqualified for opening of his price bid. Bidder will solely be responsible for obtaining the required registration.
- In context to above Para (1.1.1.2), it is clarified that the bidder who is having registration in class & category below than the minimum required class & category and the bidder has applied for up-gradation in required in class & category Gujarat state R&BD / W.R.D. / GIDC shall not be considered valid. In such cases the bidder shall not be considered eligible for bidding.
- The bidder, who is registered in appropriate category of C.P.W.D., M.E.S., Railways and Indian state government, can also bid provided the bidder produce such registration certificate at the time of bidding and obtain registration in required class & category from the Gujarat state R&BD / W.R.D. / GIDC before issuing work order. Bidder will solely be responsible for obtaining the required registration.

**Note :- Joint Venture (JV) is not allowed.**

(1.2) **Successful experience:**

(1.2.1) Bidder must have experience of successfully completed similar works during last seven years ending last day of month previous to one in which applications are invited. For arriving at update value, final amount of the work, completed in any one financial year shall be multiplied by the enhancement factor corresponding to that financial year. Following enhancement factors will be applied to final amount of work, completed in any one financial year and to bring them to the base year. The current financial year in which bid is invited shall be considered as the base year.

Year	Financial year	Enhancement factor
Base (Year of inviting tender)	2025 to 2026	1.00
-1	2024 to 2025	1.10
-2	2023 to 2024	1.21
-3	2022 to 2023	1.33
-4	2021 to 2022	1.46

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-5	2020 to 2021	1.61
-6	2019 to 2020	1.77
-7	2018 to 2019	1.95

(1.2.2) A work would qualify as similar work only if it meets with definitions given in below

## APPENDIX-A

### Definition of Similar work :-

- 1) Three similar completed works of Compound wall/Civil construction work costing not less than the Equal to 20% of estimated cost i.e. Rs. 5.70 Lacs.
- 2) Two similar completed works of Compound wall/Civil construction work costing not less than the Equal to 40% of estimated cost i.e. Rs. 11.50 Lacs.
- 3) One similar completed works of Compound wall/Civil construction work costing not less than the Equal to 80% of estimated cost i.e. Rs. 22.70 Lacs.

### (1.3) Litigation History :-

(1.3.1) The applicant should provide accurate information on litigation and/or arbitration resulting from contracts completed or under execution by him over the last five financial years. A consistent history of arbitration awards/judgements against the applicant or any partner of a joint venture may result in disqualification for proposed work. If the details of litigation history are hidden by the applicant and later on it comes to knowledge of the employer the bidder shall be disqualified for the proposed work and other appropriate action shall be taken against the bidder.

(1.3.2) Information of litigation history in following statement to be submitted, if any other wise Nil / Not Applicable statement to be submitted.

### Litigation History

#### Name of Applicant :-

Sr. No	Name of Contract	Work completed or under execution	Financial year	Brief Detail of the arbitration / litigation matter	Department in opposition	Whether awards / judgements are pending or made?	Details of Result of arbitration / judgement	Whether judgement in favour or in against

(Signature of Bidder)

Signature of Contractor

Chief Officer,  
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**(1.4) Affidavit regarding Termination / Blacklisting / Ban / Registration kept in Abeyance**

**(1.4.1)** The bidders shall be disqualified for opening of his price bid if he is under blacklist and / or under ban and / or his registration is under abeyance by any Central / State / Government Department, Board, Corporation, Municipal Corporation, Municipality, Government Local Bodies, University etc.

**(1.4.2)** The bidder shall have to submit prescribed notarized affidavit on appropriate stamp paper as under, failing to which the bidder shall be disqualified for opening of his price bid.

**Affidavit regarding Termination / Blacklisting / Ban / Registration kept in Abeyance.**

(To be Submitted on stamp paper of appropriate value & duly notarized.)

Name of Work :-

Tender Id :-

I, \_\_\_\_\_, Age, \_\_\_\_\_, Resident of, \_\_\_\_\_ in the capacity of \_\_\_\_\_ Do hereby solemnly affirm and declare as under.

We are not under blacklist and / or under ban and / or our registration has not been kept under abeyance by any Central / State Government Department, Board, Corporation, Municipal Corporation, Municipality, Government Local Bodies, University etc. as on date of participating for this bid.

**Date :-**

**Place :-**

**Authorised Signatory**

Signature of Contractor

Chief Officer,  
PCC Notified Area

**(1.5) Machinery / Equipment :-**

Bidder shall have to submit a prescribed notarized undertaking on appropriate stamp paper for deploying Machinery / Equipment for the work under tender as per below.

Undertaking for deploying Machineries / Equipment / Tools & Plants  
(To be submitted on Rs. 300/- stamp paper, E-Stamp paper & Notarized.)

To,

(Authority holding the digital key)

Name or Work :-

Tender ID :-

**APPENDIX – A**

List of Minimum Machineries / Equipment / Tools & Plants to be deployed on contract work.

<b>Sr. No</b>	<b>Type of Equipment</b>	<b>Minimum No. of equipment required</b>
2	Water tanker	01
3	Needle Vibrator	01
4	Concrete Mixture	01
5	JCB	01
6	Tractor	01
Total (No.)		<b>05</b>

I / We hereby undertake that if I / We awarded the above said work then I / We shall deploy all Machineries / Equipment / Tools & Plants etc. shown in the Appendix – B in fully working condition and utilize the same while execution of the work.

We also undertake that i/we shall deploy other Machineries /Equipment / Tools & Plants etc. over & above shown in Appendix-B in working condition and utilize the same as per instruction of Engineer-In-Charge.

Failing to above we shall not object any action taken against us within the tender provision.

In case of any dispute, Chief Officer, Notified Area's decision shall be final.

**Date :-**

**Place :-**

**Authorised Signatory**

Signature of Contractor

Chief Officer,  
PCC Notified Area

**(1.6) Site Visit Certificate :-**

Following documents/papers shall form part of the bid & must be submitted through online in electronic form unless specified separately, failing to which the bidder shall be dis-qualified for opening of his price bid.

**“It will be Mandatory to get site visit certificate from “PCC Notified Area Office” in said work.”**

**Site Visit Certificate**  
**(Tender Notice no 03/2026-27)**

Hence, the certificate is given. Today, on...../...../2026, With the Agency.....the Site of..... has been visited.

**PCC Notified Area Office**

**(1.7) Bidding in E-tendering :-**

**(1.7.1)** Submission of documents must be through e-tendering i.e. electronic form, unless specified in Para (1.8).

**(1.7.2)** All of the online submitted documents must be clearly readable, failing to which the same shall be considered as void.

**(1.7.3)** Bids of those bidders who have submitted all information, statistical details as required in the bid documents through E-Tendering will only be considered. If the employer desires any clarification, for verification/clarification, ambiguity of difference found in the documents/statistical details submitted online (by e-tendering) by the bidder the same shall be furnished within stipulated time otherwise further processing will be carried out in absence of above and the bidders shall be liable for any consequence.

**(1.7.4)** No bidder can participate in more than one bid for proposed work.

**(1.8) Submission of Document :-**

**(1.8.1)** Following documents/papers shall form part of the bid & must be submitted through online in electronic form unless specified separately, failing to which the bidder shall be dis-qualified for opening of his price bid.

- DD for require Tender Fee. (To be submitted in electronic form at the time of online submission of the bid & the same to be submitted in original during prescribed time period for submission of documents in physical form.)
- DD/FDR & BG of required EMD. (To be submitted in electronic form at the time of online submission of the bid & the same to be submitted in original during prescribed time period for submission of documents in physical form.)
- Copy of valid bank solvency certificate of minimum 20 % amount of the estimated cost put to the tender of the work. (Bank Solvency certificate issued during current calendar year is considered as valid up to end of the December of the current calendar year. 31<sup>st</sup> march of the next calendar year. In case, where solvency certificate is not obtained in time, the certificate of previous year will be considered valid up to the end of March of current calendar year. In some certificates date of validity is stated. In such cases the same stated date is considered for validation instead of end of December of the current calendar year.)

Signature of Contractor

Chief Officer,  
PCC Notified Area



- Copy of relevant required Registration Certificate / Certificates. (In case of renewal, copy of application & receipt of fee paid.)
  - Copy of Form-3A / Experience certificate issued by employer (Government/Semi Government) showing all details as required as per Pre-Qualification criteria successful experience of similar work and copy of letter of permission given by employer (Government/Semi Government) for subletting the work, if case may be of.
  - When employer is not a government, following need also to be furnished.
    - Copy of Work Order
    - Copy of Agreement
    - Copy of Form-3A / Experience certificate showing all relevant details issued by employer & certified by Chartered Accountant.
    - Copy of Final Bill
    - Copy of TDS Certificate
    - Copy of letter of permission given by employer for subletting the work.
  - Litigation history as per Para (1.3)
  - Affidavit regarding Termination / Blacklisting / Ban / Registration kept in Abeyance as per Para (1.4).
  - The undertaking for deploying machinery/equipment for the work under tender as per Para (1.5).
  - Site Visit Certificate (1.6).
- (1.8.2)** Following documents/papers shall also form part of the bid, these documents are mandatory to be submitted through online in electronic form. if not submitted through online in electronic form, within time period given by authority holding the digital key, failing to which the bidder shall be dis-qualified for opening of his price bid.
- Copy of registration certificate of firm / documents of public limited / private limited / partnership firm / proprietor firm, whichever is applicable. For example, Partnership Deed, Certificate of incorporation, Memorandum of association, Article of Association etc.
  - Copy of Power of Attorney, if any.
  - Copy of PAN Card.
  - Copy of latest income tax return certificate. (Note :- latest income tax return certificate means the income tax return certificate of the last completed financial year for which pre-determined/extended time period by the Income Tax Department for filing income tax return is over on or before last date of online submission.
  - Copy of Goods & Services (G.S.T.) registration certificate.
  - Copy of RPFC registration certificate.
  - Copy of RPFC Challan of the completed latest month from the month of last date of online submission of the tender.
- (1.8.3)** Following Undertaking / Declaration to be incorporated on <https://tender.nprocure.com> website in such a manner that without attending this Undertaking / Declaration the tender cannot be uploaded.

### **UNDERTAKING / DECLARATION**

“I hereby declare that I have after thoroughly understand the Pre-Qualification criteria / conditions and the details filed & documents submitted are true and correct to the best of my knowledge and belief. I shall not have any objection against any action taken by GIDC if any of the information submitted is found to be incorrect / false.”

- Any information, data, statistics etc. which are not related to bid document will not be considered in evaluation even through furnished by the applicant.
- In accordance with stipulated of Para (1.5), employer reserves the right to call any information/documents which is mandatory, essential and critical for the purpose of valuation. Any information provided by the applicant after last date of electronic submission will not be considered in evaluation, unless except the employer has specially asked for any information/document, which is mandatory, essential and critical for evaluation of PQ document. If required information is not furnished within stipulated time, proposal will be liable for rejection.
- If any of the information provided by the bidder is found false during scrutiny or at the later stage, his EMD shall be forfeited and he shall be disqualified for the proposed work. In case when bidder has furnished exemption certificate in lieu of EMD, an amount equal to EMD shall be appropriated from his FDR pledged to avail of exemption certificate. If any of the information provided by the bidder is found false after award of work, the performance security of the bidder shall be forfeited and the contract shall be terminated.
- The authority holding the respective Chief Officer of the Notified Area Office shall be responsible for downloading, evaluating, and verifying all online documents submitted by the bidder in relation to the Pre-Qualification criteria.
- Accordingly, concerned Notified Area Office shall decide to qualify / dis-qualify the bidder & circulate / issue minutes of the meeting to concern for further action.
- Chief Officer, Notified Area, PCC reserves the right, without any obligation or liability to reject work order after assigning the work at any stage. If, specified work will not follow as per tender specification.

Signature of Contractor

Chief Officer,  
PCC Notified Area

**LETTER OF PREQUALIFICATION APPLICATION**

**To,  
The Chief Officer,  
Notified Area,  
PCC**

Dear Sir,

Having examined the Pre-qualification documents attached with this bid including scope of work & frame of Construction, we hereby submit all the necessary information and relevant documents for qualifying us for bidding for this work.

The Application is made by us on behalf of \_\_\_\_\_

\_\_\_\_\_  
In the capacity of \_\_\_\_\_

\_\_\_\_\_ duly authorized to submit the offer.

It is certified that the information furnished in these documents are authentic. We shall gracefully accept the Pre-Qualification and shall not litigate the issue of Disqualification upon the scrutiny of this application of ours.

We, undersigned, accept that the Notified Area reserves the rights to reject any or all applications without assigning any reason.

**Date:**

**Signature of Bidder**

**Name in Brackets incl. Title &  
capacity in which application is  
made.**

**Encl. :-**

- 1.
- 2.
- 3.
- 4.

Signature of Contractor

Chief Officer,  
PCC Notified Area

## **APPENDIX – C**

### **SELF EVALUATION FORM**

Note :- This form is mandatory and required details as per Performa with page number must be field-up. If such detail is not submitted with the bid documents, the bid shall be liable for disqualification.

Name of Work :- Construction of Compound Wall Around PCC Office Building Plot No. 08 under PCC Notified Area

Sr. No.	Component	Requirement as per tender	M/s. .....		Page No.	Remarks
			Details Furnished by BIDDER			
1	Tender Fees including GST	Rs. 1770.00/- By DD	Name of Bank			
			D.D. No. & Dt.			
			Amount in Rs.			
2	EMD	Rs. 28,415.00/- By DD/FDR	Name of Bank			
			D.D./FDR No. and Date			
			Amount in Rs.			
3	Registration Certificate	“E1” Class & above	Name of Department, Authority and Validity Period.			
			Issue date			
			Ex. Date			
4	Latest Income Tax return filed and PAN Card details.	Year of Income Tax return filed	Assessment Year			
		PAN Card No.	PAN Card No.			
5	Bank Solvency Certificate	20% amount of Estimated Cost.	Name of Bank			
		i.e. Rs. 5.70 Lacs	Amount in Rs.			
		Validity Period	Valid up to Date			
6	Proprietorship	Document related Proprietorship	Document related Proprietorship			
7	In case of Partnership firm	Power of Attorney with Partnership deed.	Power of Attorney with Partnership deed.			
8	In case of Company	Power of Attorney with certificate of registration of firm	Power of Attorney with certificate of registration of firm			
9	GST Registration	GST Registration Certificate	GST Registration Certificate provided (Indicate the page no.)			
10	RPFC Registration Certificate	RPFC Registration Certificate	RPFC Registration			
			Certificate Provided			
11	RPFC Paid Challan	Latest Paid Challan	Latest Paid Challan			
12	Successful experience (As per Para No. 1.2)					
13	Litigation History (As per Para No. 1.3)		Statement Duly Signed by Authorized Person			

Signature of Contractor

Chief Officer,  
PCC Notified Area

14	Affidavit Regarding Termination / Blacklisting/Ban/Registration kept in abeyance <b>(As per Para No. 1.4)</b>	Bidder Shall have to submit on Rs. 300 Stamp Paper		
15	Undertaking for deploying Machineries / Equipment / Tools & Plants <b>(As per Para No. 1.5)</b>	Bidder Shall have to submit on Rs. 300 Stamp Paper		
16	Site Visit Certificate <b>(As per Para No. 1.6)</b>			
17	Undertaking / Declaration	Statement Duly Signed by Authorized Person		
18	Other Remarks			
19	Whether qualified or not?			

Signature of Contractor

Chief Officer,  
PCC Notified Area

## INFORMATION AND INSTRUCTION FOR BIDDERS

### INTRODUCTION:

Bids i.e., Price Bid and Technical Bid for the Work of **Construction of Compound Wall Around PCC Office Building Plot No. 08 under PCC Notified Area**, is invited from Contractors on e-tendering process. The contractors, who wish to bid for this contract, should also apply for prequalification in the manner set out in this document.

The price-bid will be opened only of those tenderers pre-qualified by the Notified area as having necessary qualification, suitability to perform the contract satisfactorily and opened Technical Bid with Prequalification Application will be considered. Technical Bid with Prequalification Application of dis-qualified bidders will not be considered.

### LOCATION OF WORK AND SITE INFORMATION:

The work site is in Notified area, Ranoli.

#### 1. BIDDER'S RESPONSIBILITY

The intending Bidders shall be deemed to have visited the site and familiarized themselves thoroughly with the site conditions and all other aspects affecting the work under this Contract before submitting the tender. No claim / extension of time whatsoever shall be entertained on account of prevailing site conditions.

Interested Bidders may obtain further information at the following address:

**Office of the Chief Officer PCC Notified Area, SF/2 Anmol plaza, Near Manisha Circle, Old Padra road, Vadodara-390020**

#### 2. EARNEST MONEY DEPOSIT (EMD)

EMD is payable in the manner set out in the Form B1.

Demand Draft for E.M.D. shall be submitted in electronic format only through online (by scanning) while uploading the bid. The submission shall mean that E.M.D. is received for purpose of opening the bid. Accordingly, offer of those shall be opened whose E.M.D. is received electronically. However, bidder shall submit the DD in original to **Office of the Chief Officer PCC Notified Area, SF/2 Anmol plaza, Near Manisha Circle, Old Padra road, Vadodara-390020**, As per the schedule specified in tender notice for submission of document in physical form i.e **From 4th July 2026 to 6th July 2026 up-to 15:000 hours Only R.P.A.D or Speed Post or Hand Delivery (During office Hour). The submission of document before 4th July 2026 to 6th July 2026 up-to 15:000 hours** will not be considered and offer treated as non-responsive. Exemption certificate shall not be acceptable.

Earnest money in specified form @ 1 % of the estimated cost must be sent as mentioned above preceding electronically. Tenderer may pay earnest money up to Rs. 50,000 in cash or in the form of Crossed Demand Draft or fixed deposit or fixed deposit at-call receipts with a validity period of not less than 180 days of Nationalized or Scheduled bank or Narmada/Shrinidhi F.D.Rs. drawn in favour of Chief Officer, Notified Area PCC concerned. Earnest money by cheque & Bank Guarantee shall not be accepted. (vide R & BD G. R. No. TNC/ 1090/(100) (4 )-C, dated 4-11 -2000). However, in respect of the works estimated to cost above Rs. 50 Lakh, the amount of earnest money in excess of Rs. 50,000 can be offered by the contractor, at his choice, in the form of Bank Guarantee of the Scheduled or nationalized Bank only. The Bank Guarantee in such cases will be furnished in the following form. In such cases also, the amount of earnest money first Rs. 50,000 will be paid only in the form of crossed demand drafts or fixed deposit receipts or deposit at call receipts worth the validity period of not less 180 days of the nationalized or scheduled or Narmada/ Shrinidhi F.D.

If the contractor does not turn up to pay the Security Deposit and execute contract agreement within specified (or extended) time after intimation to him about acceptance of his offer, the earnest money

Signature of Contractor

Chief Officer,  
PCC Notified Area

paid for this work will be forfeited according to Clause-1 of this tender form tenderer's tender shall be rejected and then according to aforesaid provision of tender, action to blacklist the Contractor will be initiated without Delay. (Vide R & B D G.R. No. Misc. - 1097 -90-1091/97 -Z/C dated 04-10-97 & Parach-102008-5-C-Partfile dated 27-11-08).

***Bank Guarantee is permissible only when the estimated cost of work is more than Rs. 50 Lakh.***

***BANK GUARANTEE***

Where as M/s \_\_\_\_\_ (hereinafter called the Tenderer) is desirous and preferred to tender for works in accordance with the terms and conditions of tender for the work of \_\_\_\_\_ and where as We, Bank, agree to give the tenderer a guarantee for the Earnest Money.

Therefore, we hereby affirm that we are guarantors on behalf of the Tenderer up-to total rupees \_\_\_\_\_ in words) Rs. \_\_\_\_\_ ( in figures) and we undertake to pay to Executive Engineer \_\_\_\_\_ Division \_\_\_\_\_ Department of Government of Gujarat \_\_\_\_\_ up-to his first written demand, without demur, without delay and without the necessity of a previous notice of judicial or administrative procedures and without the necessity to prove to the Bank the defects or shortcomings or debits of the contractor any sum within the limit of Rs. \_\_\_\_\_.

We further agree that the Guarantee herein contained, shall remain in full force and effect during the period that would be taken for the acceptance of tender.

However, unless a demand of claim under this guarantee is made on us in writing on or before the \_\_\_\_\_ (Date to be specified - will not be less than 180 days from the stipulated date of receiving the tender) we shall be discharged from all liabilities under this guarantee thereafter.

We undertake not to revoke the guarantee during its currency except with the previous consent of the Executive Engineer \_\_\_\_\_ Division \_\_\_\_\_ in writing.

We lastly undertake not to revoke the guarantee for any charge in constitution of the Tenderer or of the Bank.

**Date Signature & Seal of Guarantor** \_\_\_\_\_

**Bank Address** \_\_\_\_\_

The Earnest Money submitted in the form of Deposit-At-call receipt shall need minimum validity of six months from the last date of online submission of tender. **Tender not supported with tender fee, Earnest Money & documents and not submitted in electronic format (by scanning) while uploading the bid shall be rejected as NON- Responsive.** If the tenderer modifies or withdraws his tender, the Earnest Money (in case of EMD exemption certificate, proportionate amount equivalent to EMD of a particular tender) shall be forfeited and the tenderer may be disqualified from tendering for future works under the Government.

The Earnest Money will be returned to the unsuccessful tenderers. The Earnest Money will be returned to the successful tenderer after he furnishes security deposit and duly enters into the contract.

Within Ten days or within such time as may be decided by the Tender Inviting Authority from date of receipt of the Letter accepting his tender, the successful tenderer shall furnish the required security deposit and attend the office of the Tender Inviting Authority for execution of the contract documents. If he fails to furnish the security deposit or execute the contract document, his Earnest Money (in case of EMD exemption certificate equivalent amount there from) shall be forfeited and action to blacklist the contractor will be initiated without delay (Vide R & B.D. G. R. No. Misc. 1097-90-1091-97 -Z/C dated 4-10-97).

Signature of Contractor

Chief Officer,  
PCC Notified Area

**3. SECURITY DEPOSIT (SD) – 5% of Estimated Cost put to tender.**

SD is payable in the manner set out in the Technical Bid with Prequalification Application by the successful tenderer / Bidder.

Initial Security Deposit in the form of small saving or Narmada Bond or FDR – 2.5% of the estimated cost. (Validity period of 18 Months)	<b>Rs. 71,030.00</b>
To be deducted from R.A. Bill - 2.5% of the estimated cost.	<b>Rs. 71,030.00</b>

**4. PERFORMANCE BOND**

Not-Applicable

**5. PROGRAMME OF WORK:**

The program of work for this contract is as under.

<b>Online Submission of Bid Document</b>	<b>Period for Validity of offer</b>	<b>Period of completion</b>
<b>From 4th July 2026 to 6th July 2026 up-to 15:00 Hrs</b>	<b>120 days from the stipulated date of receiving of the tender but no modification shall be allowed after handing over tender to postal authorities.</b>	<b>06 (Six) Month from the date of work order</b>

The time is essence of the contract. The contractor shall have to ensure progress of the work proportionately as per Schedule-C of B-1 agreement.

**6. SUPERVISION OF WORK:**

The quality assurance and quality control in addition to the Engineer-in-charge of the work.

**7. FREE MAINTENANCE GUARANTEE PERIOD:**

Not Applicable & Deleted

**8. DEFECT LIABILITY PERIOD:**

The defect liability period shall be **One years** from the certified date of completion of work.

For details, please refer **Clause NO. 17A** and **Clause NO.7 of Form B-1**.

**9. PRICE VARIATION CLAUSE & STAR RATE FOR CEMENT, STEEL AND BULK BITUMEN:**

Not Applicable & Deleted

**10. MOBILIZATION ADVANCE:**

Not Applicable.

**11. PURCHASE OF BITUMEN BY THE AGENCY:**

The contractor shall have to purchase the bitumen in Bulk only from only Govt. recognized refinery & shall have to produce the original purchase bills along with the original gate passes etc. The bitumen to be brought on site includes all transportation charges, taxes etc. with all lead and lift.

**12. POWER SUPPLY / WATER SUPPLY / OTHER UTILITIES:**

The Contractor will make his own arrangement at his cost for power supply / water supply and other utilities required for the execution of work and arrangements for temporary distribution. All the works will be done as per IEA regulations. The Contractor shall ensure at his cost that all electrical lines, water

Signature of Contractor

Chief Officer,  
PCC Notified Area



supply lines and equipment & all installations are approved by the state electricity inspector before power can be supplied by State Electricity Board & GIDC for water/ other utilities.

### 13. CONDITIONS OF CONTRACT:

Successful bidder shall have to enter in to prevailing agreement B-1 with NAA, all the tender documents including pre-bid meeting minutes, negotiation letter and acceptance letter will form-An integral part of the contract. All works will confirm to the Indian Standards, specifications for road & Bridge works of Ministry of Road Transport and Highway or other equivalent standard mentioned in the contract document as approved by the Engineer-in-charge.

### 14. GENERAL:

- 1) Bids of those bidders who have submitted all information, statistical details as required in the bid documents through E-tendering will only be considered by Competent Authority of PCC Notified Area
- 2) BOM (Board of management)/NAO, PCC Notified Area reserves the rights to reject or accept any bid, and cancel the prequalification process and reject all bids.
- 3) The Chief Officer PCC Notified Area shall neither be liable for any such actions nor not be under any obligation to inform the applicant of the grounds for them. The Chief Officer, PCC Notified Area decision shall be final and binding.
- 4) The bidder should have a registered office located within 20 km of the site

**Name of Work: Construction of Compound Wall Around PCC Office Building Plot No. 08 under PCC Notified Area**

### SPECIAL CONDITIONS

- 1) EMD:
  - a) The amount of EMD to be paid should be in the form of demand draft or FDR for more than 180 days of Nationalized / Scheduled Banks and ICICI, IDBI, HDFC & Axis Banks in favour of Chief Officer,
  - b) Units registered with Industries Dept. or with NSIC as a Small-Scale Unit shall have also to pay prescribed tender fees and earnest money deposit. Exemption certificate issued by Govt. / any other authority for EMD shall not be valid for Notified works.
  - c) The amount of earnest money deposit to be paid in the form of DD / FDR in favour of "Chief Officer, PCC Notified Area" should be attached, along with the tender only, otherwise it will not be accepted. It may be noted that DD / FDR brought personally at the time of opening, will not be accepted at all.
  - d) The earnest money deposit of the unsuccessful contractor(s) shall be returned without interest within reasonable time after final decision on the tenders and after entering into a contract with the Corporation by the contractor whose tender is accepted.
- 2) The contractor shall have to furnish Income Tax Clearance certificate before his tender is accepted and intimate assessment number and ward under which is accessed.  
**As Per GIDC Circular No. GIDC: ENG: CIR: CE: 594 dtd. 18<sup>th</sup> July 2007. &GIDC Circular No. GIDC: ENG: CIR: CE: 808 dtd. 13.12.2007** and Due to Modification /Changes in the clauses of B1 agreement of R & B department and to match the R&B department tender agreement, it is decided to adopt the Performa of B1 agreement of R & B Department for Notified tender works, except for the following clauses: -
  - i) **Clause: 60 and 60/A Price variation clause (Star Rate)**  
     Not Applicable & ..... Deleted.....
  - ii) **Clause No 72: Secured Advance to Contractor** .....Deleted.....
  - ii) **Clause No 73: Advance Payment** .....Deleted.....

Signature of Contractor

Chief Officer,  
PCC Notified Area

iii) **Clause No. 74: Advance against Machineries** ..... Deleted.....

iv) **Clause No 75: Mobilization Advance** ..... Deleted.....

v) **For EMD:** - Exemption certificates for EMD issued against standing security by any other authority shall not be valid for Notified works.

vi) Copies of certificate as regards previous experience, if any, must accompany the tender.

### 3) SUPERVISION OF WORK:

NAO-G.I.D.C reserves the right to appoint Third Party Inspectors (TPI) for quality assurance and quality control in addition to the Engineer-in-charge of the work & Quality Control branch of G.I.D.C. Head Office.

- 4) There are also chances that some items may not be required to execute / to execute in very less quantity than tendered quantity, as per finally approved decisions from NAO-GIDC. In this situation, the bidder shall not have any right to claim anything extra for such items.
5. The contract shall be governed by the law and order of India for the time being in force and subject to the jurisdiction of total works at Bharuch district.
6. As applicable Income tax deduction shall be made at source at every running bill.
7. As applicable Sales tax deduction shall be made at source at every running bill
8. Security Deposit
  - ❖ 5.0 % of the estimated cost put to tender payable in two stages.
  - ❖ 2.5 % of the estimated cost put to tender Submitted Initial SD before enter in to Agreement
  - ❖ 2.5 % of the estimated cost put to tender through running bills submitted before enter in to Agreement
- 9) Labour welfare cess shall be applicable as per the latest circular /G.R.
- 10) Recovery of royalty charges should be applicable as per latest Government policy.
- 11) Testing charges of material shall be born by agency. The same shall be deducted from the running account bills of the contractor for testing the quality of materials and workmanship. However, the agency must establish at site of work, the fully equipped laboratory for day-to-day testing like gradation, density, cube tests, slum test etc. for more details please read Clause No 77 of B1 agreement and strictly follow the same.

Signature of Contractor

Chief Officer,  
PCC Notified Area

**Name of work: Construction of Compound Wall Around PCC Office Building Plot No. 08 under PCC Notified Area.**

**GENERAL CONDITIONS**

**Contractors may please read be carefully**

**1. LABOUR CONTRACT ACT:**

The contractor tendering for the work shall have to obtain licence under the labour contract (Regulation and Abolitions) Act, 1970 within a week or award of work comply with all the provision of Act. As licence. Also, they shall provide all the amenities for the amenity I not provided by the contractor such amenity shall be provided by the Contractor such amenity shall be provided by the Chief Officer, as principal employer as his representative within the prescribed time and the expense incurred by the principal employer providing the evenly shall be recovered by the amount payable by the Contractor. The Contractor shall act in accordance with the provisions of the act in all respect and shall absolve the principal employer from any consequence whatsoever. Every principal Employer shall nominate a representative duly authorized by him to be present at the time of disbursement of wages and it shall be the duty of such representative to certify the amount paid as wages in such manner as may be prescribed, shall nominate representative duly authorized by him to be present at the time of disbursement of wages and it shall be the duty of such representative to certify the amount paid as wages in such manner as may be prescribed.

In case the Contractor fails to make payment of wages within the prescribed period or makes short payment. The principal employer shall be liable to make payment of wages in full or the unpaid balance due as the case may be the contract labour employed by the contractors and recover the amount so paid from the contractor by deduction from any amount form the contractor by deduction from any amount payable to the contractor under contract.

The contractor shall provide every facility to the principal employer to maintain registers and records giving particulars of contract labour employers. The nature of work performed by the contact labour the contractor labour rate of wages paid to the contact labour and such other particulars that are prescribed under the provision of said Act.

**2. CONDITION**

The contractor shall be responsible for complying with the provisions of the employee's provident fund and Miscellaneous Act 1992 scheme and modification of the Act from time to time.

The contractor shall get themselves enrolled with Regional Provident Fund Commissioner or any competent officer appointed under the Act and shall have to get separate code number in respect of their respective establishment as decided in section-3 of the Employees Provident Fund Act and shall discharge all the liabilities arising out of aforesaid Act as provided in pere-36 A of the scheme and other provisions of the Act.

The Engineer-in-charge on receiving a report from the competent inspecting officer under the said Act shall have the power to deduct from the payment to the contractor any sum required or estimated to be

Signature of Contractor

Chief Officer,  
PCC Notified Area

required for good the loss suffered by the worker or workers by reasons of non fulfillment of the conditions of the contractor for the benefit of the workers under the said Act. The contractor shall indemnify GIDC against any payment to be made and for the observance of the Regulations aforesaid.

### 3. GENERAL CONDITION:

Tender shall very carefully read through a take Note of following conditions.

1. The successful tender shall have to enter into an agreement, in prescribed "B1" Form.
2. The tenderer shall get himself well acquainted with the job requirement, site conditions, route and alignment etc.
3. Contractor shall make his own agreement for all the necessary tools, plants equipment and provide for manpower as and when required. No extra payment in any such respect be payable to contractor.
4. Contractor shall while entering into agreement shall produce the registration certificate of his establishment with the competent authority of Regional Provident Fund Commissioner failing which 3% (Three percent) of the bill value due to be paid to Contractor shall be deducted at source and will be dealt as per Clause 74 of B-1 from.
5. In conformity with prevailing Income-Tax Rules necessary of bill value shall be deducted at source for which necessary certificate shall be deducted by the Chief Officer.
6. Contractor shall also provide assistance representative and/or authentic person for the purpose of inspection and verification of transit damages, defects etc. for the insurance claims but shall not charge any extra payment against such assistance provided.
7. Security deposit of 10% of contract value will be deposited by contractor as per rules.
8. Tender fees, EMD etc. payable to GIDC, by the tenderer by D.D. of FDR etc. shall be drawn in favour of **Chief Officer, PCC Notified Area**. The validity of FDR should not be less than 180 days.
9. Bank guarantee shall not be accepted in any case.

### 4. GENERAL SPECIFICATION

The entire work shall have to be carried out as per the specification of P.W.D. Hand Book Vol. I & II.

The entire work shall be carried out as per the instructions of the Engineer and to his entire specification.

The specifications of the materials shall be followed as per front sheet.

No extra payment will be made due to change in design and plans of the structure.

The contractor shall have to make his own arrangements for water to be used in the construction work.

### 5. FOLLOWING CORRECTIONS ARE THERE IN B1 AGREEMENT BOOKLET.

**CONTRACTORS MAY PLEASE BE READ CAREFULLY.**

1. Any sort of correction or erasures in the tender shall not be done by the tender, by applying white fluid or any other chemical. The tender with correction made in aforesaid manner shall be outrightly rejected by Corporation.
2. If any corrections erasures or overwriting are required by the tendered before submitting the tender, all the corrections shall be initialled by the tenderer only before submission of the tender, otherwise the tender shall be rejected by the corporation.

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## **CONTRACTORS TO PLEASE READ THIS CAREFULLY**

**Name of Work :- Construction of Compound Wall Around PCC Office Building Plot No. 08 under PCC Notified Area**

1. The Time limit is to be accounted for 6(Six) Month from the date of the work order to complete the work in all respects.
2. In all the items of Schedule-B is to be considered for the purpose of measurements and payments.
3. Successful tenderer shall have to enter into an agreement with N.A in prescribed "B1 form for this works contract.
4. The contract documents shall include the original tender papers of N.A submission of contractor negotiation letters, Letter of acceptance, agreement in "B1" form and the work order.
5. Time is the essence of the contract: The contractor shall have to ensure progress of the work proportionately failure to adhere to this he shall be liable to compensation as per the clause-2B, 15 & 15A agreement form.
6. No price escalation, secured advance or mobilization advance shall be paid by N.A.
7. **CONDITION FOR EMPLOYEES PROVIDENT FUND AND MISC.PROVISION ACT-1952**

The contractor shall responsible for complying with the provision of the employee provident fund and miscellaneous provision Act-1952 scheme and modifications of the Act from time to time. The contractor shall get themselves enrolled with the Regional Provident Fund commissioner of any competent officer appointed under the Act and shall have to get a separate number in respect of their respective establishment as defined in Sec. 3 of the employees Provident Fund Act and shall discharge all the liabilities arising out of the aforesaid Act as provided in Para 36A of the scheme and other provisions of the Act.

"The Engineer – in – charge on receiving a report from the competent inspecting officer under the said Act shall have the power to deduct from the payment to the contractor any sum required or estimated to be required for making good the loss/suffered by the worker or workers by reason of non-fulfilment of the condition of the contractor for the benefit of the workers under the said Act. The contractor shall indemnify NAA against any payment to be made for the observance of the regulations aforesaid.

The contractor shall produce the certificate and registration number with R.P.F.C. while entering into agreement, the same shall be produced within one month from the date of work order. If the contractor fails to produce proof of its registration R.P.F.C. and an amount of equal to 3% of the gross amount payable to the contractor shall be recovered from his running account bills from the 1<sup>st</sup> R.A. bill at the rate of 3% of the gross amount of the R.A. Bill till the registration from R.P.F.C. is obtained and produced to the GIDC. In all 3% on the total gross payment made for the work shall stands to be recovered from the running account bills to contractor. If even till completion of works and deducting the amount 3% contractor has not registered its establishment with R.P.F.C., Security Deposit when payment shall also not be refunded till the clearance certificate of the compliance of the provisions of the Act is obtained by the contractor and Produced to the Executive Engineer, contractor shall sign indemnity bond in favour of GIDC but amount shall be withheld till R.P.F.C. registration certificate is received by N.A.

**8. LABOUR CONTRACT :-**

The contractor tendering for the work shall have to obtain licence under the labour contract (Regulation and Abolitions) Act, 1970 within a week or award of work comply with all the

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provision of Act. As licence. Also, they shall provide all the amenities for the amenity I not provided by the contractor such amenity shall be provided by the Contractor such amenity shall be provided by the Chief Officer, as principal employer as his representative within the prescribed time and the expense incurred by the principal employer providing the evenly shall be recovered by the amount payable by the Contractor. The Contractor shall act in accordance with the provisions of the act in all respect and shall absolve the principal employer from any consequence whatsoever. Every principal Employer shall nominate a representative duly authorized by him to be present at the time of disbursement of wages and it shall be the duty of such representative to certify the amount paid as wages in such manner as may be prescribed, shall nominate representative duly authorized by him to be present at the time of disbursement of wages and it shall be the duty of such representative to certify the amount paid as wages in such manner as may be prescribed.

In case the Contractor fails to make payment of wages within the prescribed period or makes short payment. The principal employer shall be liable to make payment of wages in full or the unpaid balance due as the case may be the contract labour employed by the contractors and recover the amount so paid from the contractor by deduction from any amount form the contractor by deduction from any amount payable to the contractor under any contract.

The contractor shall provide every facility to the principal employer to maintain registers and records giving particulars of contract labour employers. The nature of work performed by the contact labour the contractor labour rate of wages paid to the contact labour and such other particulars that are prescribed under the provision of said Act.

9. Rate specified for various items to be executed as per **Schedule-B, (Exclusive GST) price bid is inclusive of all taxes (except GST), Royalties, Octroi etc.** all as applicable presently and as to be enforced for future by any / all including central / State Government and statutory bodies from time to time.
10. GST-TDS, Sales tax and Income tax with surcharge shall be recovered from bill of contractor as per govt. Notification. Agency may produce certificate from competent officer of sale tax department if deduction at source is not to be operated.
11. All works shall be carried out as per PWD HB Vol. I & II and other specification of the GIDC Technical specification Book or as directed.
12. The contractor shall exhibit a board as per requirement of GIDC with detailed specification and details of work and amount involved at site at his own cost as directed by Engineer in charge.
13. Material delivered either in broken condition of non-confirming to the quality ordered shall not be accepted and claim for whatever reason shall not be entertained.
14. The tenderer shall have to give testing in presence of concern Engineer and test report shall be produce along with materials.
15. Earnest money as mentioned in the memorandum of work in brief attached herewith shall be paid in the form of DD/FDR for the minimum period of 180 days and documents for the same should be attached with the technical bid only.
16. If the tender is taken in favour of the company a power of attorney/necessary authorization in favour of the person who may have signed the tender for the company must accompany the tender.
17. All the work shall be carried out as per the specifications attached with the technical bid.
18. The rate quoted include clearance of site (Prior to commencement of work & at its close) in all respects and hold good for work under all conditions including site moisture, weather etc.
19. Any sort of correction or erasure in the tender shall not be done by the tenderer by applying white fluid or any other chemical. The tenders with corrections made in aforesaid manner shall be out rightly rejected by the Corporation if not initiated at corrected figures & words.

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20. If any corrections, erasures or overwriting are required by the tenderer before submitting the tender, all the corrections, shall be initiated by the tenderer only before submission of the tender, otherwise the tender shall be rejected by the corporation.
21. The contractor shall have to furnish the Permanent Account No. Assessment No. & Ward under which he is assessed.
22. Unit Rates specified for various items to be executed as per Scheduled as per Schedule-B in the price bid are inclusive of all labour, materials, testing charges, Equipment, all incidental charges involved in the items and as specified in the mode of measurement and payment of detailed specifications of items including all taxes royalty, Octroi, transportation cost etc. all as applicable presently and as to be enforced for future by any / all including central/State Government and statutory bodies from time to time. (GST Exclusive)
23. The contractor shall have to furnish the True copy of the GST Registration and R.P.F.C. registration certificate.
24. The contractor shall have to obtain registration for GST
25. The contractor shall have to obtain the Insurance of all the labour, staff working at site and hand over the receipt of Insurance Policy etc.
26. The contractor will be required to pay labour cess of 1% of construction cost to the industrial Safety and Health Department Valsad/competent authority or by challan at respective treasury office or it will be deducted from RA bill.
27. **CONDITIONS :-**  
 The contractor shall be responsible for complying with the provisions of the employee's provident fund and Miscellaneous Act 1992 scheme and modification of the Act from time to time.  
 The contractor shall get themselves enrolled with Regional Provident Fund Commissioner or any competent officer appointed under the Act and shall have to get separate code number in respect of their respective establishment as decided in section-3 of the Employees Provident Fund Act and shall discharge all the liabilities arising out of aforesaid Act as provided in pere-36 A of the scheme and other provisions of the Act.  
 The Engineer-in-charge on receiving a report from the competent inspecting officer under the said Act shall have the power to deduct from the payment to the contractor any sum required or estimated to be required for good the loss suffered by the worker or workers by reasons of non-fulfilment of the conditions of the contractor for the benefit of the workers under the said Act. The contractor shall indemnify GIDC against any payment to be made and for the observance of the Regulations aforesaid.
28. **General :-**
  1. Bidders who already have a valid digital certificate need not procure new Digital certificate.
  2. Intending bidders or their representative who wish to remain present at the time of tender opening can do so.
  3. Tenderer shall submit their offer in Electronic format on line only, after digitally signing the same.
  4. Offers which are not digitally signed will not be accepted.
  5. No offer in physical form except specified documents will be accepted.
  6. Conditional tender shall not be accepted.
  7. Scanned copies of DD for tender fee & EMD shall submit in electronic format through online (By scanning) while uploading the bid.
  8. Rules of Notified Area Authority, PCC are bidding to the tenderer.
  9. Tenders without tender fee, Earnest Money Deposit (EMD) and other required documents specified above which do not fulfil all or any of the condition or submitted incomplete in any respect will be rejected.

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10. The Internet site address for e-tendering is <https://tender.nprocure.com>

11. Notified Area Authority, PCC reserves the right to reject any or all tenders without assigning any reason thereof.

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## **SPECIAL CONDITION**

**1. SUPERVISION OF WORK :-**

Material Testing charges 1% shall be deducted from R.A. Bill as per the manner set out under Clause No.77.7 of B-1 Form.

The contractor will set up at site, Material / Field testing laboratory of minimum 25 Sq. mtr area dully connected with water and electric supply and will provide testing instrument as directed by Engineer- in –Charge. The instruments provided should be as per I.S. Standard, so certified and be regularly and periodically calibrated.

**2. MOBILIZATION ADVANCE :-**

Not Applicable.

**3. PRICE VARIATION CLAUSE & STAR RATE FOR ASPHALT (ClauseNo.60A of B1 form) :- Not Applicable**

**4. SURVEYONG & MEASURING EQUIPMENTS :-**

Equipment's for surveying & measurement on the work shall be procured by the contractor for his use. The same also be made available to the Engineer at site or any work connected with the contract without any additional charges.

**5. UNITS RATES UNDER SHCEDULE "B" :-**

The Unit rates specified for various items to be executed as per Schedule "B" are inclusive all labours, materials, testing charges, equipment's, all incidental charges involving in the work and as specified in the Mode of measurement & payment of detailed specifications of items incl. all taxes, (Excluding GST), royalty, transportation cost etc. all as applicable presently as to be enforced for future by any / all including Central/State Government & Statutory bodies from time to time.

**6. OTHERS :-**

- In all the items of Schedule "B", the thickness mentioned is compacted thickness to be considered for the purpose of measurements and payments.
- The contractor document shall include the original tender papers of GIDC, submission of contractor negotiation letter, letter of acceptance, agreement in B-1 form and the work order.
- In conformity with prevailing Income Tax rules and surcharge of bill value or applicable at time to time shall be deducted at source for which necessary certificate shall be released by the Executive Engineer.
- In conformity with prevailing GST, published by Govt. of Gujarat, applicable of bill value or applicable at time to time shall be deducted at source for which necessary certificate shall be released by Executive Engineer.
- The contractor shall exhibit a board as per requirement of GIDC with detailed specification and details of work and amount at site at his own cost as directed by the Engineer-in - charge.
- The tenders are invited by GIDC as implementing agency (i.e. Client) and hence agreement is to be executed between GIDC and successful agency.

**7. SITE OFFICE ACCOMODATION :-**

As per Directed by Engineer-In-Charge.

**8. DRAWINGS :-**

The Drawings attached in Technical bid are only for ready and reference and not for Execution.

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**Important Note :-**

1. The rate of each item should be offered Excluding GST.
2. Please note that the agency, in whose favour the tender is finalized by the competent authority, should have to submit the document like insurance of the staff engaged RPFC No., Labour license etc.
3. I / we agree to supply the above materials at the rate mentioned above.
4. I / we have read the conditions mentioned in this tender & agree to abide by the same.
5. NAA, PCC will not issue any tax exemption from i.e. 'P', 'C' or 'D'. The tenderer may quote rates accordingly.
6. The agency in whose Favor tender is finalized has to enter into B1 agreement and conditions and clauses of the agreement shall be binding to the agency. If agency desire to study, the same is available in the office of Chief Officer, NAA, PCC during working days and office hours.

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## **SPECIFICATION OF MATERIALS**

### **GENERAL SPECIFICATION FOR QUALITY CONTROL ON WORKS & MATERIALS:**

#### **SPECIFICATION OF MATERIALS**

**General:**

- (1) All materials to be used shall conform to the relevant specifications as per the latest edition of Indian Standard, unless otherwise stated in the detailed specifications of items of work.
- (2) Wherever a reference to any Indian Standard appears in the specification, it shall be taken to mean as a reference to the latest version of the standard.
- (3) Tests for materials shall invariable be got carried out by the contractor when the same are specified in the specifications. Tests shall also have to be carried out, even though the same are not specifically mentioned in the specifications. If in the opinion of the Engineer-in-charge, the same are required to be carried out. All such tests shall be got carried out in Government or as approved laboratories and cost there of shall be entirely boned by the Contractor.
- (4) No collection of materials shall be made before it is got approved from the Engineer-in-charge.
- (5) Collection of approved materials shall be done at site of work in a systematic manner. Materials shall be stored in such a manner as to prevent deterioration or intrusions of foreign matter and to ensure the preservation of their quality and fitness for the work.
- (6) Materials, if rejected by the Engineer-in-charge, shall be immediately removed from the site of work. If they are not removed within twenty four hours of receiving such an intimation, Engineer-in-charge shall get the same removed at contractor's cost.
- (7) The Engineer-in-charge shall dispose off such materials in a manner as he chooses and the contractor shall not be entitled to any compensation for the cost of such materials.
- (8) Approval to the samples of various materials given by the Engineer-in-charge will not absolve the contractor from the responsibility of replacing the defective material brought on site or materials used in the work found defective at a latter date. The contractor shall have no claim to any payment or compensation whatsoever on account of any such materials being rejected by the Engineer-in-charge.
- (9) The contractor shall be responsible for observing the laws, rules and regulations imposed under the "Mineral Acts" and such other laws and rules prescribed by Government from time to time.

**M-1. Water:**

- 1.1 Water shall not be salty or brackish and shall be clean, reasonably clear and free from objectionable quantities of silt and traces of oil and injurious alkalis, salts, organic matter and other deleterious material which will either weaken the mortar or concrete or cause efflorescence or attack the steel in R.C.C Container for transport, storage and handling of water shall be clean. Water shall conform to the standards specified I.S 456-1978.
- 1.2 If required by Engineer-in-charge it shall be tested by comparison with distilled water. Comparison shall be made by means of standard cement tests for soundness, time of setting and mortar strength as specified in I.S.269 1976. Any indication of unsoundness, change in time of setting by 30 minutes or more or decrease of more than 10 per cent in strength of mortar prepared with water sample when compared with the results obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.
- 1.3 Water for curing mortar, concrete or masonry should not be too acidic or too alkaline. It shall be free of
- 1.4 elements which significantly affect the hydration reaction or otherwise interfere with the hardening of

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1.5 concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces.

1.6 Hard and bitter water shall not be used for curing. Potable water will be generally found suitable for curing mortar or concrete.

**M-2. Lime:**

2.1 Lime shall be hydraulic lime as per I.S. 712-1973. Necessary test shall be carried out as per I.S. 6932

2.2 (Parts I to X), 1973.

2.3 The following field tests for limes are to be carried out :

(1) A very rough idea can be formed about the type of lime by its visual examination i.e. fat lime bears pure white color, lime in form of porous lumps of dirty white color indicates quick lime, and solid lumps are the unburnt lime stone.

(2) Acid tests for determining the carbonate content in lime. Excessive amount of impurities and rough determination of class of lime.

2.4 Storage shall comply with I.S. 712-1973. The slaked lime, if stored, shall be kept in a weather proof and damp-proof shed with impervious floor and sides to protect it against rain, moisture, weather and extraneous materials mixing with it. All lime that has been damaged in any way shall be rejected and all rejected materials shall be removed from site of work.

2.5 Field testing shall be done according to I.S. 1624-1974 to show the acceptability of materials.

**M-3. Cement:**

3.1 Cement shall be ordinary Portland slag cement as per I.S. 269-1976 or Portland slag cement as per I.S. 455-1976.

**M-4. White Cement:**

4.1 The white cement shall conform to I.S. 80412-E 1978.

**M-5. Colored Cement:**

5.1 Colored cement shall be with white or gray Portland cement as specified in the item of the work.

5.2 The pigments used for colored cement shall be of approved quality and shall not exceed 10% of cement used in the Mix. The mixture of pigment shall be properly grounded to have a uniform color and shade. The pigments shall have such properties to provide for durability under exposure to sunlight and weather.

5.3 The pigment shall have the property such that it is neither affected by the cement nor detrimental to it.

**M-6 Sand:**

6.1 Sand shall be natural sand, clean, well graded, hard strong durable and gritty particle free from injurious amounts of dust clay, kankar nodules, soft or flaky particles shale, alkali, salts organic matter, loam, mica or other deleterious substance and shall be got approved from the Engineer-in-charge. The sand shall not contain more than 8 percent of silt as determined by field test. If necessary the sand shall be washed to make it clean.

6.2 Coarse Sand: The fineness modulus of coarse sand shall not be less than 2.5 and shall not exceed 3.0.

**The sieve analysis or coarse shall be as under:**

I.S. Sieve Designation	Percentage by weight Passing sieve	I.S. Sieve Designation	Percentage by weight Passing sieve
4.75 mm.	100	600 Micron	30-100

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2.36 mm.	90 to 100	300 Micron	5-70
1.18 mm.	70-100	150 Micron	0-50

**6.3 Fine Sand:** The fineness modulus shall not exceed 1.0. The sieve analysis of fine sand shall be as under:

<b>I.S. Sieve Designation</b>	<b>Percentage by weight Passing through</b>	<b>I.S. Sieve Designation</b>	<b>Percentage by weight Passing through</b>
4.75 mm.	100	600 Micron	40-85
2.36 mm.	100	300 Micron	5-50
1.18 mm.	70-100	150 Micron	0-10

#### **M-7 Stone Dust:**

- 7.1** This shall be obtained from crushing hard black trap or equivalent. It shall not contain more than 8% of silt as determined by field test with measuring cylinder. The method of determining silt contents by field test is given as under :
- 7.2** A sample of stone dust to be tested shall be placed without drying in 200 mm. measuring cylinder. The quantity of the sample shall be such that it fills the cylinder up to 100 mm. The clean water shall be added up to 150 mm. mark. The mixture shall be stirred vigorously and the content allowed to settle for 3 hours.
- 7.3** The height of silt visible as settled layer above the stone dust shall be expressed as percentage of the height of the stone dust below. The stone dust containing more than 8% silt shall be washed so as to bring the silt content within the allowable limit.
- 7.4** The fineness modulus of stone dust shall not be less than 1.80.

#### **M-8 Stone Grit:**

- 8.1** Grit shall consist of crushed or broken stone and be hard strong, dense, durable, clean, of proper gradation and free from skin or coating likely to prevent adhesion of mortar. Grit shall generally be cubical in shape and as far as possible flaky elongated pieces shall be avoided. It shall generally comply with the provisions of I.S. 383-1970. Unless special stone of particular quarries is mentioned, grit shall be obtained from the best black trap or equivalent hard stone as approved by the Engineer-in-charge. The grit shall have no deleterious reaction with cement.
- 8.2** The grit shall conform to the following gradation as per sieve analysis :

<b>I.S. Sieve Designation</b>	<b>Percentage Passing through sieve</b>	<b>I.S. Sieve Designation</b>	<b>Percentage Passing through sieve</b>
12.50 mm.	100 %	4.75 mm.	0-20%
10.00 mm.	85-100%	2.36 mm.	0-25%

- 8.3** The crushing strength of grit will be such as to allow the concrete in which it is used to built up the specified strength of concrete.
- 8.4** The necessary tests for grit shall carried out as per the requirements of I.S.2386 (Parts I to VII) 1963, as per instructions of the Engineer-in-charge. The necessity of test will be decided by the Engineer-in-charge.

#### **M-9 Cinder:**

- 9.1** Cinder is well burnt furnace residue which has been fused or sintered into lumps of varying sizes.

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**9.2** Cinder aggregates shall be well burnt furnace residue obtained from furnace using coal fuel only. It shall be sound clean free from clay, dirt, ash or other deleterious matter.

**9.3** The average grading for cinder aggregates shall be as mentioned below :

<b>I.S. Sieve Designation</b>	<b>Percentage Passing</b>	<b>I.S. Sieve Designation</b>	<b>Percentage Passing</b>
20 mm.	100	4.75 mm.	70
10 mm.	86	2.36 mm.	52

**M-10 Lime Mortar:**

**10.1** Lime shall conform to specification M-2. Water shall conform to specification M-1. Sand shall conform to specification M-6.

**10.2 Proportion of Mix: 10.2.1.** Mortar shall consist of such proportions of slaked lime and sand as may be specified in the item. The slaked lime and sand be measured by volume.

**10.3 Preparation of Mortar: 10.3.1.** Lime mortar shall be prepared by wet process as per I.S. 1625-1971. Power driven mill shall be used for preparation of lime mortar. The slaked lime shall be placed in the mill in an even layer and ground for the 180 revolutions with sufficient water. Water shall be added as required during grinding (care being taken not to add more water) that will bring the mixed material to a consistency of stiff paste. Thoroughly wetted sand shall then be added evenly and the mixture ground for another 180 revolutions.

**10.4 Storage: 10.4.1** Mortar shall always be kept damp, protected from sun and rain till used up, covering it by tarpaulin or open sheds.

**10.5 Use: 10.5.1** All mortar shall be used as soon as possible after grinding. It should be used on the day on which it is prepared. But in no case mortar made earlier than 36 hours shall be permitted for use.

**M-11. Cement Mortar:**

**11.1** Water shall conform to specification M-1. **Cement:** Cement shall conform to specification M-3. **Sand:** Sand shall conform to M-6.

**11.2 Proportion of Mix: 11.2.1** Cement and sand shall be mixed to specified proportion, sand being measured by measuring boxes. The proportion of cement will be by volume on the basis of 50 Kg. /Bag of cement being equal to 0.0342 Cu. m. The mortar may be hand mixed or machine mixed as directed.

**11.3 Preparation of Mortar: 11.3.1** In hand mixed mortar cement and sand in the specified proportions shall be thoroughly mixed dry on a clean impervious platform by turning over at least 3 times or more till a homogenous mixture of uniform color is obtained. Mixing platform shall be so arranged that no deleterious extraneous material shall get mixed with mortar or mortar shall flow out. While mixing, the water shall be gradually added and thoroughly mixed to form a stiff plastic mass of uniform color so that each particle of sand shall be completely covered with a film of wet cement. The water cement ratio shall be adopted as directed.

**11.3.1** The mortar so prepared shall be used within 30 minutes of adding water. Only such quantity of mortar shall be prepared as can be used within 30 minutes.

**M-12 Stone Coarse Aggregate For Nominal Mix Concrete :**

**12.1** Coarse aggregate shall be machine crushed stone of black trap or equivalent and be hard, strong, dense, durable, clean and free from skin and coating likely to prevent proper adhesion of mortar.

**12.2** The aggregate shall generally be cubical in shape. Unless special stones of particular quarries are mentioned aggregates shall be machine crushed from the best black trap or equivalent hard stone as approved. Aggregate shall have no deleterious reaction with cement. The size of the coarse aggregate for plain cement concrete and ordinary reinforced cement concrete shall

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generally be as per the table given below, However in case of reinforced cement concrete the maximum limit may be restricted to 6 mm. less than the minimum lateral clear distance between bars or 6 mm. less than the cover, whichever is smaller.

TABLE

I.S. Sieve Designation	Percentage passing for single sized aggregates of nominal size			I.S. Sieve Designation	Percentage passing for single sized aggregates of Nominal size		
	40 mm.	20 mm.	16 mm.		40 mm.	20 mm.	16 mm.
80 mm.	--	--	--	12.5 mm.	--	--	--
63 mm.	100	--	--	10 mm.	0.5	0.02	0.30
40 mm.	85-100	100	--	4.75 mm.	--	0.5	0.5
20 mm.	0-20	85-100	100 mm.	2.35 mm.	--	--	
16 mm.	--	--	85-100				

**Note:** This percentage may be varied some what by Engineer-in-charge when considered necessary for obtaining better density and strength of concrete.

- 12.3** The grading test shall be taken in the beginning and at the change of source of materials. The necessary test indicated in I. S. 383-1970 and I.S. 456-1978 shall have to be carried out to be carried out to ensure the acceptability. The aggregates shall be stored separately and handled in such a manner as to prevent the intermixing of different aggregates. If the aggregates are covered with dust, they shall be washed with water to make them clean.

**M-13 Black Trap or Equivalent Hard Stone Coarse :**

- 13.1** Aggregate for Design mix Concrete : Coarse aggregate shall be of machine crushed stone of black trap or equivalent hard stone and be hard strong dense, durable clean and free from skin and coating likely to prevent proper adhesion of mortar.
- 13.2** The aggregates shall generally be cubical in shape. Unless special stones of particular quarries are mentioned, aggregates shall be machine crushed from the best, black trap or equivalent hard stones as approved. Aggregate shall have no deleterious reaction with cement.
- 13.3** The necessary tests indicated in I.S. 383-1970 and I.S. 456-1978 shall have to be carried out to ensure the acceptability of the material.
- 13.4** If aggregate is covered with dust it shall be washed with water to make it clean.

**M-14 Brick Bats Aggregate:**

- 14.1** Brickbat aggregate shall be broken from well burnt or slightly over burnt and dense brick. It shall be homogeneous in texture roughly cubical in shape, clean and free from dirt of any other foreign material. The brickbats shall be of 40 mm. to 50 mm. size unless otherwise specified in the item. The under burnt or over burnt brick bats shall not be allowed.
- 14.2** The brickbats shall be measured by volume by suitable boxes or as directed.

**M-15 Bricks:**

- 15.1** The bricks shall be hand or machine molded and made from suitable soils and kiln-burnt. They shall be free from crack and nodules of free lime. They shall have smooth rectangular faces with sharp corners and shall be of uniform color. The bricks shall be

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molded with a frog of 100 mm. x 40 mm. and 10 mm. to 20 mm. deep on one of its flat sides. The bricks shall not break when thrown on the ground from a height of 600 mm.

**15.2** The size of modular bricks shall be 190 mm. x 90 mm. x 90 mm.

**15.3** The size of the conventional bricks shall be as under : (9" x 4 3/8 "x 2 3/4 ") 225 x 110 x 75 mm.

**15.4** Only bricks of one standard size shall be used on one work. The following tolerances shall be permitted in the conventional size adopted in a particular work. Length: 1.8(3.0 mm.) Width: 1/6" (1.51 mm.) Height: 1/6" (1.50 mm.)

**15.5** The crushing strength of the bricks shall not be less than 35 Kg./Sq. Cm. The average water absorption shall not be more than 20 percent by weight. Necessary tests for crushing strength and water absorption etc. shall be carried out as per I. S. 3495 (Part-I to IV) 1976.

#### **M-16 Stone:**

**16.1** The stone shall be of the specified variety such as Granite/Trap Stone/Quartzite or any other type of good hard stones.

The Stones shall be obtained only from the approved quarry and shall be hard, sound, durable and free from defects like cavities, cracks, sand holes, flaws, injurious veins, patches of loose or soft materials etc. and weathered portions and other structural defects or imperfections tending to affect their soundness and strength. The stone with round surface shall not be used. The percentage of water absorption shall not be more than 5% of dry weight, when tested in accordance with I.S. 1134-1974. The minimum crushing strength of the stone shall be 200 Kg/Sq. Cm. unless otherwise specified.

**16.2** The samples of the stone to be used shall be got approved before the work is started.

**16.3** The Khanki facing stone shall be dressed by chisel as specified in the item for khanki facing in required shape and size. The face of stone shall be so dressed that the bushing on the exposed face shall not project by more than 40 mm. from the general wall surface and on face to be plastered it shall not project by more than 19 mm. nor shall it have depressions more than 10 mm. from the average wall surface.

#### **M-17 Laterite Stone:**

**17.1** Laterite stone shall be obtained from the approved quarry. It shall be compacted in texture, sound, durable and free from soft patches. It shall have a minimum crushing strength of 100 Kg./Sq. Cm. In its dry condition. It shall not absorb water more than 20% of its own weight, when immersed for 24 hours in water. After quarrying the stone shall be allowed to weather for some time before using in work.

**17.2** The stone shall be dressed into regular rectangular blocks so that all faces are free waviness and unevenness, edges true and square.

**17.3** Those types of stone in which white clay occur, should not be used.

**17.4** Special corner stones shall be provided where so directed.

#### **M-18 Mild Steel Bars:**

**18.1** Mild steel bars reinforcement for R.C.C. work shall conform to I.S. 432 (Part-II) 1966 and shall be of tested quality. It shall also comply with relevant part of I.S. 456-1978.

**18.2** All the reinforcement shall be clean and free from dirt, paint, grease, mill scale or loose or thick rust at the time of placing.

**18.3** For the purpose of payment, the bar shall be measured correct up to 100 mm. length and weight payable worked out at the rate specified below :

1	6 mm	0.22 Kg./Rmt.	8.	20 mm.	2.47 Kg./Rmt.
2	8 mm	0.39 Kg./Rmt.	9.	22 mm.	2.98 Kg./Rmt.
3	10 mm.	0.62 Kg./Rmt.	10.	25 mm.	3.85 Kg./Rmt.
4	12 mm.	0.89 Kg./Rmt.	11.	28 mm.	4.83 Kg./Rmt.

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5	14 mm	1.21 Kg./Rmt.	12.	32 mm.	6.31 Kg./Rmt.
6	16 mm	1.58 Kg./Rmt.	13.	36 mm.	7.99 Kg./Rmt.
7	18 mm	3.00 Kg./Rmt.	14.	40 mm.	9.86 Kg./Rmt.

**M-19 High Yield Strength Steel Deformed Bars:**

**19.1** High yield strength steel deformed bars be either cold twisted or hot rolled, shall conform to I. S. 1739-1966 and I. S. 1139-1966 respectively.

**19.2** Other provision and requirements shall conform to specification No. M-18 for mild steel bars.

**M-20 High Tensile Steel Wire:**

**20.1** The high tensile wires for the use in prestressed concrete work shall conform to I. S. 2090-1962.

**20.2** The tensile strength of the high tensile steel bars shall be as specified in the item. In absence of the given strength, the minimum strength shall be taken as per Para 6.1 of I.S. 1785-1962. Testing shall be done as per I.S. requirements.

**20.3** The high tensile steel shall be free from loose mill scale, rust oil, grease, or any other harmful matter. Cleaning of steel bars may be carried out by immersion in solvent solution, wire brushing or passing through a pressure box containing carborundum.

**20.4** The high tensile wire shall be obtained from manufactures in coil having diameter not less than 350 times the diameter of wire itself so that wire springs back straight on being uncoiled.

**M-21 Mild Steel Binding Wire:**

**21.1** The mild steel wire shall be of 1.63 mm. or 1.22 mm. (16 or 18 gauge) diameter and shall conform to I. S. 280-1972.

**21.2** The use of black wire will be permitted for binding reinforcement bars. It shall be free from rust, oil paint, grease, loose mill scale or any other undesirable coating which may prevent adhesion of cement mortar.

**M-22 Structural Steel:**

**22.1** All structural steel shall conform to I. S. 226-1965. The steel shall be free from the defects mentioned in I. S. 226-1975 and shall have a smooth finish. The materials shall be free from loose mill scale, rust pits or other defects affecting the strength and durability. Rivet bars shall conform to I. S. 1148-1973.

**22.2** When the steel is supplied by the Contractor test certificates of the manufactures shall be obtained according to I. S. 226-1975 and other relevant Indian Standards.

**M-23 Galvanized Iron Sheets :**

**23.1** The galvanized iron sheets shall be plain or corrugated sheets of specified in item. The G. I. Sheets shall conform to I. S. 277-1977. The sheets shall be undamaged in carriage and handling either by rubbing off of zinc coating or otherwise they shall have clean and bright surface and shall be free from dents, holes, rust or white powdery deposit.

**23.2** The length and width of G. I. Sheet shall be as directed as per site condition.

**M-23-A G. I. Valleys gutter ridges :**

**23.A.1.** The G. I. Ridges and hips shall be of plain galvanized sheets class-3 of the thickness as specified in item. These shall be 600 mm. in width and properly bent up to shape without damage to the sheets in process of bending.

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- 23.A.2.** Valleys gutters and flashings shall also be galvanized sheets of thickness as specified in item. Valleys shall be 900 mm. wide overall and finishing shall be 380 mm. wide overall. They shall be bent to the required shape without damage to the sheet in the process of bending.

**M-24 Asbestos Cement Sheets :**

- 24.1** Asbestos cement sheets plain, corrugated or semi corrugated shall conform to I. S. 459-1970.

**24.2 Ridges & Hips :**

- 24.2.1** Ridges and hips shall be of same thickness as that of A. C. sheets. The types of ridges suitable for the type of sheets and locations.

- 24.2.2** Other accessories to be used in roof such as flashing pieces, caves filler pieces, valley gutters, north light and ventilator curves, barge boards etc. shall be standard manufacture and shall be suitable for the type of sheets and location.

**M-25 Mangalore Pattern Roof Tiles :**

- 25.1** The Mangalore pattern tiles shall conform to I. S. 654-1972 for Class 'A' type as specified in item. Samples of the tiles to be provided shall be got approved from the Engineer-in-charge. Necessary tests shall be carried out as directed.

**M-26 Shuttering :**

- 26.1** The shuttering shall be either of wooden planking of 30 mm. minimum thickness with or without steel lining or of steel plates stiffened by steel angles. The shuttering shall be supported on battens and beams and props of vertical bullies properly cross braced together so as to make the centering rigid. In places of bullies props, brick pillar of adequate section built in mud mortar may be used.
- 26.2** The form work shall be sufficiently strong and shall have camber, so that it assumes correct shape after deposition of the concrete and shall be able to resist forces caused by vibration of live load of men working over it and other incidental loads associated with it. The shuttering shall have smooth and even surface and its joints shall not permit leakage of cement grout.
- 26.3** If at any stage of work during or after placing concrete in the structure, the form work sags or bulges out beyond the required shape of the structure, the concrete shall be removed and work redone with fresh concrete and adequately rigid form work. The complete form work shall be got inspected by and got approved from the Engineer-in-charge, before the reinforcement bars are placed in position.
- 26.4** The props shall consist of bullies having 100 mm. minimum diameters measured at mid length and 80 mm. at thin end and shall be placed as per design requirement. These shall rest squarely on wooden sole plates 40 mm. thick and minimum bearing area of 0-10 sq. m. laid on sufficiently hard base.
- 26.5** Double wedges shall further be provided between the sole plate and the wooden props so as to facilitate tightening and easing of shuttering without jerking the concrete.
- 26.6** The timber used in shuttering shall not be so dry as to absorb water from concrete and swell or bulge nor so green or wet as to shrink after erection. The timber shall be properly sawn and planed on the sides and surface coming in contact with concrete. Wooden form work with metal sheet lining or steel plates stiffened by steel angles shall be permitted.
- 26.7** As far as practicable, clamps shall be used to hold the forms together and use of nails and spikes avoided.
- 26.8** The surface of timber shuttering that would come in contact with concrete shall be well wetted and coated with soap solution before the concreting is done. Alternatively coat of raw linseed oil or oil of approved manufacturer may be applied in place of soap solution. In case of steel shuttering either soap solution or raw linseed oil shall be applied after thoroughly cleaning the surface. Under no circumstances black or burnt oil shall be permitted.
- 26.9** The shuttering for beams and slabs shall have camber of 4 mm. per meter (1 in 250) or as directed by the Engineer-in-charge so as to offset the subsequent deflection. For cantilevers,

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the camber at free end shall be 1/50 of the projected length or as directed by the Engineer-in-charge.

**M-27 Expansion joints Pre-molded filter :**

- 27.1 The item provides for expansion joints in R.C.C. frame structures for internal joints, as well as exposed joints, with the use of pre-moulded bituminous joints filler.
- 27.2 Premoulded bituminous joints filler, i.e. performed strip of expansion joint filler shall not get deformed or broken by twisting, bending or other handling when exposed to atmospheric condition. Pieces of joint filler that have been damaged shall be rejected.
- 27.3 Thickness of the pre-moulded joint filler shall be 25 mm. unless otherwise specified.
- 27.4 Pre-moulded bituminous joint filler shall conform to I.S. 1838-1961.

**M-28 Expansion joints-Copper strips & hold fasts :**

- 28.1 The item provide for expansion joints in R.C.C. frame structure for internal joints as well as for exposed joints with the use of necessary copper strip and holdfasts.
- 28.2 Copper sheet shall be of 1.25 mm. thick and of 1.25 mm. width the 'U' shape in the middle. Copper strip shall have hold fast 3 mm. diameter copper rod fixed to the plate soldered on strip at intervals of about 30 cm. or as shown in the drawing or as directed. The width of each flange (horizontal side) of the copper plate to be embedded in the concrete work shall be 25 mm. Depth of 'U' to be provide in the expansion joint, in the copper plate shall be of 25 mm.

**M-29 Teak Wood :**

- 29.1 The teak wood shall be of good quality as required for the item to be executed. When the kind of wood is not specifically mentioned, good Indian teak wood as approved shall be used.
- 29.2 Teak wood shall generally be free from large, loose, dead or cluster knots, flaws, shakes, warps, twists bends, or any other defects. It shall generally be uniform in substance and of straight fibers as far as possible. If shall be free from rot, decay, harmful fungi and other defects if harmful nature which will affect the strength durability of its usefulness for the purpose for which it is required. The color shall be uniform as far as possible. Any effort like painting, using any adhesive or resins materials made to hide the defects shall render the pieces liable to rejection by the Engineer-in-charge.
- 29.3 All scantlings, planks etc. shall be sawn in straight lines and planes in the direction of grains and of uniform thickness.
- 29.4 The tolerances in the dimensions shall be allowed at the rate of 1.5 mm. per face to be planed.
- 29.5 **First class teak wood : 29.5.1** First class teak wood shall have no individual hard and sound knots, more than 6 sq. cm. size and the aggregate area of such knots shall not be more than 1% of area of piece. The timber shall be closed grained.
- 29.6 **Second Class Teak Wood : 29.6.1** No individual hard and sound knots shall be more than 15 sq. cms. in size and aggregate area of such knots shall not exceed 2% of the area of piece.

**M-29 A. Non-teak Wood :**

The non teak-wood shall be chemically treated, seasoned as per IS Specifications and of good quality. The type of wood shall be got approved before collecting the same on site. Fabrication of wooden members shall be started only after approval.

For this purpose wood of Bio, Kalali, Siras, Behda, Jamun, Sisoo will be used for door frames where as only Kalali, Siras, Halda, Kalam etc. will be permitted for shutters after proper seasoning and chemical treatment.

The non-teak wood shall be free from large, loose, dead of cluster knots, flows, shakes, warps, bends or any other defect. It shall be uniform in substance and of straight fibers as far as possible. If shall be free from rots, decay harmful fungi and other defects of nature which effect

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the strength, durability or its usefulness for the purpose for which it is required. The color of wood shall be uniform as far as possible. The scantlings planks wet. shall be sawn in straight lines and planes in the direction of grain and uniform thickness.

The department will use the Agency to produce certificate from Forest Department in event of Dispute and the decision of the Department shall be final and binding to the contractor.

The tolerance in the dimension shall be allowed as 1.5 mm. per face to be planed.

### **M-30 Wooden flush door shutters (solid core) :**

- 30.1** The solid core type flush door shutters shall be decorative or non-decorative type as specified in the drawing. The size and thickness of the shutter shall be as specified in drawings or as directed. The timber species for core shall be used as per I.S. 2202 – (Part-I) 1980. The timber shall be free from decay and insect attack. Knots and knot holes less than half the width of cross-section of the members in which they occur may be permitted. Pitch pockets, pitch streaks and harmless pin holes shall be permissible except in the exposed edges of the core members. The commercial plywood, cross-bands shall conform to I.S. 303-1275.
- 30.2** The face panel of the shutters shall be formed by gluing by the hot press process on both faces of the core with either plywood or cross-bands and face veneers. The hopping rebating opening, venation etc. shall be provided if specified in the drawing.
- 30.3** All edges of the door shutters shall be square. The shutters shall be free from twist or warp in its plane. Both faces of the shutters shall be sand papered to smooth even texture.
- 30.4** The shutters shall be tested for
  - (1) End immersion test :** The test shall be carried out as per I.S. 2202 (part-I) 1980. There shall be no delamination at the end of the test.
  - (2) Knife Test :** The face panel when tested in accordance with I.S. 1659-1979 shall pass the test.
  - (3) Glue adhesion test :** The flush door shall be tested for glue adhesive test in accordance with I. S. 2202 (Part-I) 1980. The shutters shall be considered to have passed the test if no delamination occurs in the glue lines in the plywood and if no single delamination more than 80 mm. in length and more than 3 mm. in depth has occurred in the assembly glue lines between the plywood face and the style and rail. Delamination at the corner shall be measured continuously around the corner. Delamination at the knots, knot holes and other permissible wood defects shall not be considered in assessing the sample.
- 30.5** The tolerance in size of solid core type flush door shall be as under : In Normal thickness  $\pm$  1.2 mm. In Normal height  $\pm$  3 mm.
- 30.6** The thick of the shutters shall be uniform throughout with a permissible variation of not more than 0.8 mm. when measured at any Three points.

### **M-31 Aluminum doors, windows, ventilators**

- 31.1** Aluminum alloy used in the manufacture of extruded window section shall conform to I.S. designation HEA-WP of I.S. : 733-1975 and also to I.S. Designation WVG-WP of I.S. 1285-1975. The Section shall be as specified in the drawing and design. The fabrication shall be done as directed.
- 31.2** The hinges shall be cast or extruded aluminum hinge of same type as in window but of large size.
- 31.3** The hinges shall normally be of 50 mm. projecting type. Non-projecting type of hinges may also be used if directed. The handles of door shall be of specified design. A suitable lock for the door operatable either from outside or inside shall be provided. In double shutter door, the first closing shutter shall have concealed aluminum alloy bolt at top and bottom.

### **M-32 Rolling Shutters :**

- 32.1** The rolling shutters shall conform to I.S. 6248-1979. Rolling shutters shall be supplied of specification type with accessories.

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The size of the rolling shutters shall be specified in the drawings. The shutters shall be constructed with interlocking lath section formed from cold rolled steel strips not less than 0.9 mm. thick and 80 mm. wide for shutters up to 3.5 mm., width not less than 1.25 mm. thick and 80 mm. wide for shutters 3.5 mm in width and above unless otherwise specified.

- 32.2** Guide channels shall be of mild steel deep channel section and of rolled pressed or built up (fabricated) joint less construction. The thickness of sheet used shall not be less than 3.15 mm.
- 32.3** Hood covers shall be made of M.S. Sheets not less than 0.92 mm. thickness. For shutters having width 3.5 Meter and above, the thickness of M.S. Sheet for the hood cover shall be not less than 1.25 mm.
- 32.4** The spring shall be of best quality and shall be manufactured from tested high tensile spring steel wire or strip of adequate strength to balance the shutters in all position. The spring pipe shaft etc. shall be supported on strong M. S. or malleable C. I. brackets. The brackets shall be fixed on or fixed on or under the lintel as specified with raw plugs and screws bolts etc.
- 32.5** The rolling shutters shall be of self rolling type up to 8 Sq. m. clear area without ball veering and up to 12 Sq. m. clear area with ball bearing. If the rolling shutters are larger, then gear operated type shutters shall be used.
- 32.6** The locking arrangement shall be provided at the bottom of shutter at both ends. The shutters shall be opened from outside.
- 32.7** The shutters shall be completed with door suspension shafts, locking arrangements, pulling hooks, handles and other accessories.

#### **M-33 Collapsible Steel Gate :**

- 33.1** The collapsible steel gate shall be in one or Three leaves and size as per approved drawings or as specified. The gate shall be fabricated from best quality mild steel channels, flats etc. Either steel pulleys or ball bearings shall be provided in every double channel. Unless otherwise specified the particulars of collapsible gate shall be as under :
  - (a) Pickets: These shall be of 20 mm. M. S. Channels of heavy sections unless otherwise shown on drawings. The distance center to center of pickets shall be 12 cms. with an opening of 10 cms.
  - (b) Pivoted M. S. Flats shall be 20 mm x 6 mm.
  - (c) Top and bottom guides shall be from tee or flat iron of approved size.
  - (d) The fittings like stoppers, fixing hold fasts, locking cleats, brass handles and cast iron rollers shall be of approved design and size.

#### **M-34 Welded Steel Wire Fabric :**

- 34.1** Welded steel wire fabric for general purpose shall be manufactured from cold drawn steel wire "as drawn" or galvanized steel conforming to I. S. 226-1975 with longitudinal and transverse wire securely connected at every intersection by a process of electrical resistance welding and conforming to I.S. 4948-1974. It shall be fabricated and finished in workmanlike manner and shall be free from injurious defects and shall be rust proof. The type of mesh shall be oblong or square as directed. The mesh sizes and size of wire for square as well as oblong welded steel wire fabric shall be as directed. The steel wire fabric in panels shall be in one whole piece in each panel as far as stock size permit.

#### **M-35 Expanded Metal Sheets :**

- 35.1** The expanded metal sheets shall be free from flaws, joints, broken strands, laminations and other harmful surface. Expanded metal steel sheet shall conform to I. S. 412-1975, except that blank sheets need not be with guaranteed mechanical properties. The size of the diamond mesh of expended metal and dimensions of strands (width and thickness) shall be as specified. The tolerance in nominal weight of expanded metal sheets shall be of  $\pm 10$  percent.

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- 35.2** Expanded metal in panels shall be in one whole piece panel each as far as stock size permit. The expanded metal sheets shall be coated with suitable protective coating to prevent corrosion.

**M-36 Mild Steel Wire (Wire Gauze Jali) :**

- 36.1** Mild steel wire may be galvanized, as indicated. All finished steel wire shall be well cleanly drawn to the dimensions and size of wire as specified in item. The wire shall be sound, free from splits, surface flaws, rough jagged and imperfect edges and other harmful surface defects and shall conform to I. S. 280-1978.

**M-37 Plywood:**

- 37.1** The plywood for general purpose shall conform I. S. 303-1975. Plywood is made by cementing together thin boards or sheets of wood into panels. There are always an odd number of layers 3,5,7,9 ply etc. The plies are placed so that grain of each layer is right angle to the grain in the adjacent layer.
- 37.2** The advantages of plywood over a single board of the same thickness is the more uniform strength of the plywood, along the length and width of the plywood and greater resistance to cracking and splitting with change in moisture content.
- 37.3** Usually synthetic resins are used for gluing, pherolic resins are usually cured in a hot press which compresses and simultaneously heats the plies between hot plates which maintain a temperature of 90 degree. C. to 140 degree C. and a pressure of 11 to 14 Kg. Sq. Cm. on the wood. The times of heating may be anything from 2 to 60 minutes depending up to thickness.
- 37.4** When water glue are used, the wood absorbs so much water that the finished plywood must be dried carefully. When synthetic resins are used as adhesive finished plywood must be exposed to an atmosphere of controlled humidity until the proper amount of moisture has been absorbed.
- 37.5** According to I. S. 303-1975 the plywood for general purpose shall be of three grades namely **BWR, WWR** and **CWR** depending upon the adhesives used for bonding and veneers, and it will be further classified into six types namely AA, AB, AC, BB, BC and CC based on the quality of the Three faces, each face being of three kinds namely, A,B and C. After pressing the finished plywood should be reconditioned to a moisture content not less than 8 percent and not more than 16 percent.

**37.6 Thickness of plywood Boards :**

Board	Thickness	Board	Thickness	Board	Thickness	Board	Thickness
3 ply	3 mm.	5 ply.	5 mm.	7 ply.	9 mm.	9 ply.	16 mm.
	4 mm.		6 mm.		13 mm.		19 mm.
	5 mm.		8 mm.		16 mm.	11 ply.	19 mm.
	6 mm.		9 mm.	9 ply.	13 mm.		22 mm.
							25 mm.

**M-38 Glass:**

- 38.1** All glass shall be of the best quality, free from specks, bubbles, smokes, veins, air holes blisters and other defects. The kind of glass to be used shall be mentioned in the item or specification or in the special provisions or as shown in detailed drawings. Thickness of glass panes shall be uniform. The specifications or different kinds of glass shall be as under :

**38.2 Sheet Glass :**

- 38.2.1** In absence of any specified thickness or weight in the item or detailed specifications of the item of work sheet glass shall be weighing 7.5 Kg/Sq. m. for panes up to 600 mm x 600 mm.

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**38.2.2** For panes larger than 600 mm. x 600 mm. and up to 800 mm. x 800 mm. the glass weighing not less than 8.75 Kg./Sq. m. shall be used. For bigger panes up to 900 mm. x 900 mm. glass weighing not less than 11.25 Kg./Sq. m. shall be used.

**38.2.3** Sheet glass shall be patent flattened glass of best quality and for glazing and framing purposes shall conform to I. S. : 1761- 1960. Sheet glass of the specified colors shall be used, if so shown on detailed drawings or so specified. For important building and for panes with any dimension over 900 mm. plate glass of specified thickness shall be used.

**38.3 Plate Glass 38.3.1** When plate glass is specified, it shall be 'Polished patent plate glass' of best quality. It shall have both the surface ground flat and parallel and polished to obtain clear undisturbed vision and reflection. The plate glass shall be of the thickness mentioned in the item or as shown in the detailed drawing or as specified. In absence of any specified thickness, the thickness of plate glass to be supplied shall be 6 mm. and a tolerance of 0.20 mm. shall be admissible.

**38.4 Obscured Glass : 38.4.1** This type of glass transmits light so that vision is partially or almost completely obscured. Glass shall be plain rolled, figured, ribbed or fluted or frosted glass as may be specified as required. The thickness and type of glass shall be as per details on drawings or as specified or as directed.

**38.5 Wired Glass : 38.5.1** Glass shall be with wire netting embedded in a sheet of plate glass electrically welded 13 mm. Georgian square mesh may be used. Thickness of glass shall not be less than 6 mm. Wired glass shall be of type and thickness as specified.

#### **M-39 Acrylic Sheets :**

**39.1** Acrylic sheet shall be of thickness as specified in the item and of an specified shape and size as the case may be. Panels may be flat or curved. It should be light in weight. It shall be colorless or colored or opaque as specified in the item. Colorless sheet shall be as transparent as the finest optical glass. Its light transmission rate shall be about 95%, Transparency shall not be affected for the sheets of larger thickness. It shall be extremely resistant to sunlight, weather and low temperatures. It shall not show any significant yellowing or change in physical properties or loss of light transmission over a longer period of use. The sheet shall be impact resistant also. Sheets should be available in complete range of standard transparent, translucent and opaque colors. Sheets shall be of such quality that they can be cut, bent and jointed as desired. Solution for the joints shall be used as per the requirement of manufacturer.

#### **M-40 Particle board :**

**40.1** The particle boards used for face panels shall be of best quality free from any defects. The particle boards shall be made with phenolmaldehyde adhesive. The particle boards shall conform to I. S. : 3087-1965. "Specification for wood particle board for general purpose". The size and the thickness shall be as indicated.

#### **M-41. Expanded polystyrene of framed sty roper slabs :**

**41.1** The expanded polystyrene ceiling boards and tiles shall be of approved make and shall be size, thickness, finish and color as indicated. It shall be of high density and suitable for use as insulating material. The insulating materials shall be like slab of Thermo Cole etc.

#### **M-42 Resin bonded fiber glass :**

**42.1** The resin bonded fiber glass tiles, or rolls shall be of approved make and shall be of sizes, thickness and finish as indicated.

**42.2** For test of Mineral wool thermal insulation Blanket I. S. : 3144/1965 shall be followed.

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- 42.3** Insulation wool blanket shall be with following coverings on one or both sides as indicated.
- (1) Bituminized hessian Kraft paper suitable for use in position where moisture has to be excluded.
  - (2) Hessian cloth or Kraft paper for keeping out dust.
  - (3) G. I. wire netting, suitable for surfaces to be plastered over.

**M-43 Fixtures and fastenings:**

**43.1 General :**

- 43.1.1** The fixtures and fastenings, that is butt, hinges, tee and strap hinges, sliding door bolts, tower bolts, door latch, bath room latch, handles, door stoppers, casement window fasteners, casement stays and ventilators catch shall be made of the metal as specified in the item or its specifications.
- 43.1.2** They shall be of iron, brass, aluminum, chromium plated iron, chromium plated brass, copper oxidized iron, copper oxidized brass or anodized aluminum as specified.
- 43.1.3** The fixtures shall be heavy, medium or light type. The fixtures and fastenings shall be smooth finished and shall be such as will ensure ease of operation.
- 43.1.4** The samples of fixtures and fastenings shall be got approved as regards quality and shape before providing them in position.
- 43.1.5** Brass and anodized aluminum fixtures and fastenings shall be bright finished

**43.2 Holdfasts:**

- 43.2.1** Holdfasts shall be made from mild steel flat 30 cm. length and one of the hold fasts shall be bent at right angle and Three nos. of 6 mm. diameter holes shall be made in it for fixing it to the frame with screws. At the other end, the holdfast shall be forked and bent at right angles in opposite directions.

**43.3 Butt hinges :**

- 43.3.1** Railway standard heavy type butt hinges shall be used when so specified.

- 43.3.2** Tee and strap hinges shall be manufactured from M. S. Sheet.

- 43.4 Siding door bolts (Aldrops) :** **43.4.1** The aldrops as specified in the item shall be used and shall be got approved.

- 43.5 Tower bolts (Barrel Type) :** **43.5.1** Tower bolts as specified in the item shall be used and shall be got approved.

- 43.6 Door latch :** **43.6.1** The size of door latch shall be taken as the length of latch.

- 43.7 Bathroom Latch :** **43.7.1** Bathroom latch shall be similar to tower bolt.

- 43.8 Handle :** The size of the handles shall be determined by the inside grip length of the handles. Handles shall have a base plate of length 50 mm. more than the size of the handle.

- 43.9 Door Stoppers :** **43.9.1** Door stoppers shall be either floor door stopper type or door catch type. Floor stopper shall be of overall size as specified and shall have a rubber cushion.

- 43.10 Door Catch :** **43.10.1** Door catch shall be fixed at a height of about 900 mm. from the floor level so that one part of the catch is fitted on the inside of the shutter and the other part is fixed in the wall with necessary wooden plug arrangements for appropriate fixity. The catch shall be fixed 20 mm. inside the face of the door for easy operation of catch.



**43.11 Wooden Door Stop with hinges :** **43.11.1** Wooden door stop of size 100 mm x 60 mm x 40 mm shall be fixed on the door frame with a hinge of 75 mm size and at a height of 900 mm. from the floor level. The wooden door stop shall be provided with 3 coats of approved oil paints.

**43.12 Casement window Fastener :** Casement window fastener for single leaf window shutter shall be left or right handled as directed.

**43.13 Casement stays (Straight Peg Stay) :** **43.13.1** The stays shall be made from a channel section having three holes at appropriate position so that the window can be opened either fully or practically as directed. Size of the stay shall be 250 mm. to 300 mm. as directed.

**43.14 Ventilator Catch :** **43.14.1** The pattern and shape of the catch shall be as approved.

**43.15 Pivot :** **43.15.1** The base and socket plate shall be made from minimum 3 mm. thick plate and projected pivot shall not be less than 12 mm. diameter and 12 mm. length and shall be firmly riveted to the base plate in case of iron pivot and in single piece base plate in the case of brass pivot.

#### **M-44 Paints :**

##### **44.1 (A) Oil Paints :**

**44.1.1** Oil paints shall be of the specified color and shade, and as approved. The ready mixed paints shall only be used. However, if ready mixed paint or specific shade or tint is not available, white ready mixed paint with approved strainer will be allowed. In such a case, the contractor shall ensure that the shade of the paint so allowed shall be uniform.

**44.1.2** All the paints shall meet with following general requirements :

(I) Paint shall not show excessive setting in a freshly opened full can and shall easily be redispersed with a paddle to a smooth homogeneous state. The paint shall show no curdling, livering, caking or color separation and shall be free from lumps and skins.

(ii) The paint as received shall brush easily, posses good leveling properties and show no running or sagging tendencies.

(iii) The paint shall not skin within 48 hours in a three quarters filled closed container.

(iv) The paint shall dry to a smooth uniform finish free from roughness, grit, unevenness and other imperfections.

**44.1.3** Ready mixed paint shall be used exactly as received from the manufactures and generally according to their instructions and without any admixtures whatsoever.

##### **44.2 (B) Enamel Paints :**

**44.2.1** The enamel paint shall satisfy in general requirements as mentioned in specification of oil paints. Enamel paint shall conform to I. S. 2933-1975.

#### **M-45 French polish :**

**45.1** The French polish of required tint and shape shall be prepared with the below mentioned ingredients and other necessary materials :

(i) Denatured sprit of approved quality (ii) Chandras (iii) Shellac (iv) Pigment.

**45.2** The French polish so prepared shall conform to I. S. : 348-1968.

#### **M-46 Marble chips for marble mosaic terrazzo :**

**46.1** The marble chips shall be of approved quality and shades. It shall be hard, sound, dense and homogeneous in texture with crystalline and coarse grains. It shall be uniform in color and free from stains, cracks decay and weathering.

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**46.2** The size of various colors of marble chips ranging from the smallest up to 20 mm. shall be used where the thickness of top wearing layer is 6 mm. size. The marble chips of approved quality and colors only as per grading as decided by the Engineer-in-charge shall be used for marble mosaic tiles or works.

**46.3** The marble chips shall be machine crushed. They shall be free from foreign matter, dust etc. Except as above, the chips shall conform to I. S. : 2114-1962.

**M-47 Flooring Tiles :**

**47.1 (A) Plain Cement Tiles :**

**47.1.1** The plain cement tiles shall be general purpose type. These are the tiles in the manufacturer of which no pigments are used. Cement used in the manufacture of tiles shall be as per Indian Standards.

**47.1.2** The tiles shall be manufactured from a mixture of cement and natural aggregates by pressure process. During manufacture, the tiles shall be subjected to a pressure of not less than 140 Kg/Sq. Cm. The proportion of cement to aggregate in the backing of the tiles shall be not less than 1:3 by weight. The wearing face though the tiles are of plain cement, shall be provided with stone chips of 1 to 2 mm. size. The proportions of cement to the marble chips aggregate in the wearing layer of the tiles shall be three parts of cement to one part chips by weight.

The minimum thickness of wearing layer shall be 3 mm. The color and texture of wearing layer shall be uniform throughout its face and thickness. On removal from mould, the tiles shall be kept in moist conditions continuously at least for seven days and subsequently, if necessary, for such long period as would ensure their conformity to requirements of I. S. : 1237-1980 regarding strength resistance to wear and water absorption.

**47.1.3** The wearing face of the tiles shall be plain, free from projections, depressions and cracks and shall be reasonably parallel to the back face of the tile. All angles shall be right and all edges shall be right and all edges shall be sharp and true.

**47.1.4** The size of tiles shall generally be square shape 24.85 Cm. x 24.85 Cm. or 25 Cm. x 25 Cm. The thickness of tiles shall be 20 mm.

**47.1.5** Tolerance of length and breadth shall be plus or minus one millimeter. Tolerance on thickness shall be plus 5 mm.

**47.1.6** The tiles shall satisfy the tests as regards transverse strength, resistance to wear and water absorption as per I. S. : 1237-1980.

**47.2 (B) Plain Colored Tiles :**

**47.2.1** These tiles shall have the same specification as per plain cement tiles as per (A) above except that they shall have a plain wearing surface wherein pigments are use. They shall conform to I. S. 1237-1980.

**47.2.2** The pigment used for coloring cement shall not exceed 10 percent by weight of cement used in the mix. The pigments, synthetic or otherwise, used for coloring tiles shall have permanent color and shall not contain materials detrimental to concrete.

**47.2.3** The color of the tiles shall be specified in the item or as directed.

**47.3 (C) Marble mosaic tiles :**

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**47.3.1** These tiles have the same specifications as per plain cement tiles except the requirements as stated below :

**47.3.2** The marble mosaic tiles shall conform to I. S. 1237-1980. The wearing face of the tiles shall be mechanically ground and filled. The wearing face of tiles shall be free projections, depressions and cracks and shall be reasonably parallel to the back face of the tiles. All angles shall be right angles and all edges shall be sharp and true.

**47.3.3** Chips used in the tiles be from smallest up to 20 mm. size. The minimum thickness of wearing layer of tiles shall of 6 mm. For pattern of chips to be used on the wearing face, a few samples with or without their full size photographs as directed shall be presented to the Engineer-in-charge for approval.

**47.3.4** Any particular samples, if found suitable shall be approved by the Engineer-in-charge or he may ask for a few more samples to be prepared indicating roughly the particular sized chips to be more or less in the samples presented. The samples have to be made but the contractor till a suitable sample is finally approved for use in the work.

The contractor shall ensure that the tiles supplied for the work shall be in conformity with the approved sample only, in terms of its dimensions, thickness of backing layer and wearing surface, materials, ingredients, color shade, Chips, distribution etc. required.

**47.3.5** The tiles shall be prepared from cement conforming to Indian Standards or colored Portland cement generally depending upon the color of tiles to be used or as directed.

**47.4 (D) Chequered Tiles :**

**47.4.1** Chequered tiles shall be plain cement tiles or marble mosaic tiles. The former shall have the same specification as per (A) above and the latter as per marble mosaic tiles as per (C) except as mentioned below

**47.4.2** The tiles shall be of nominal size of 250 mm. x 250 mm. or as specified. The center to center distance of chequer shall not be less than 25 mm. and not more than 50 mm. The overall thickness of the tile shall be 22 mm.

**47.4.3** The grooves in the chequers shall be uniform and straight. The depth of the grooves shall not be less than 3 mm. The chequered shall be plain, colored or mosaic as specified. The thickness of the upper layer measured from the top of the chequers shall not be less than 6 mm. The tiles shall be given the first grinding with machine before delivery to site.

**47.4.4** Tiles shall conform to relevant I. S. 1237-1980.

**47.5 (E) Chequered Tiles for Stair cases :**

**47.5.1** The requirements of these tiles shall be the same as chequered as per (D) above except in following respects;

- (1) The length of a tile including nose shall be 330 mm.
- (2) The minimum thickness shall be 28 mm.
- (3) The nosing shall have also the same wearing layer as at the top.
- (4) The nosing edge shall be rounded.
- (5) The front portion of the tile for a minimum length of 75 mm. from and including the nosing shall have grooves running parallel to nosing and at center not exceeding 25 mm. Beyond that the tiles shall have normal chequer pattern.

**M-48 Rough Kota Stone :**

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- 48.1 The kota stones shall be hard, even, sound, and regular in shape and generally uniform in color. The color of the stone shall generally be green. Brown color stones shall not be allowed for use. They shall be without any soft veins, cracks or flows.
- 48.2 The size of the stones to be used for flooring shall be of size 600 mm x 600 mm and / or size 600 mm x 450 mm as directed. However smaller sizes will be allowed to be used to the extent of maintaining required pattern. Thickness shall be as specified. 1. Tolerance of minus 30 mm. on account of chisel dressing of edges shall be permitted for length as well as breadth. Tolerance in thickness shall be + 3 mm.
- 48.3 The edges of stones shall be truly chiseled and table rubbed with coarse sand before paving. All angles and edges of the stone shall be true, square and free from chipping and the surface shall be true and plain.
- 48.4 When machine cut edges are specified, the exposed edges and the edges at joints shall be machine cut. The thickness of the exposed machine cut edges shall be uniform.

#### **M-49 Polished Kota Stones**

- 49.1 Polished kota stone shall have the same specifications as per rough kota stone except as mentioned below :
- 49.2 The stones shall have machine polished smooth surface. When brought on site, the stones shall be single polished or double polished depending upon its use. The stones for paving shall generally be single polished. The stones to be used for dado, skirting, platforms, sink, veneering, sills, etc. where machine polishing after the stones are fixed in site is not possible, shall be double polished.

#### **M-50 Dholapur Stone Slab :**

- 50.1 Dholapur stone slab shall be of best quality as approved by the Engineer-in-charge. The stone slab shall be even, sound and durable, regular in shape and of uniform color.
- 50.2 The size of the stone shall be specified in the item or detailed drawings or as approved by the Engineer-in-charge. The thickness of the stone shall be as specified in the item of work with the permissible tolerance of plus or minus 2 mm. The provisions in respect of polishing as for polished Kota stone shall apply to polished Dholapur stone also. All angles and edges of the face of the stone slab shall be fine chiseled or polished as specified in the item of work and all the four edges shall be machine cut. All angle and edges of the stone slab shall be true and plane.
- 50.3 The sample of stone shall be got approved from the Engineer-in-charge for shade and tint for a particular work. It shall be ensured that the stones to be used in a particular work shall not differ much in shade or tint from the approved sample.

#### **M-51 Marble Slab :**

- 51.1 Marble slab shall be white or of other color and of best quality as approved by the Engineer-in-charge.
- 51.2 Slabs shall be hard, uniform and homogeneous in texture. They shall have even crystalline grain and free from defects and cracks. The surface shall be machine polished to an even and perfectly plane surface and edges machine cut true and square. The rear face shall be rough to provide key for the mortar.
- 51.3 Marble slabs with natural veins, if selected shall have to be laid as per the pattern given by the Engineer-in-charge. Size of the slab shall be minimum 450 mm x 450 mm. and preferable 600 mm x 600 mm. However, smaller sizes will be allowed to be used to the extent of maintaining required pattern.
- 51.4 The slab shall not be thinner than the specified thickness at its thinnest part. A few specimen of finished slab to be used shall be deposited by the Contractor in the office for reference.
- 51.5 Except as above the marble slabs shall conform to I. S. 1130-1969.

#### **M-52 Granite Stone Slab :**

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- 52.1** Granite shall be of approved color and quality. The stone shall be hard, even, sound regular in shape and generally uniform in color. It shall be without any soft veins, cracks or flows.
- 52.2** The thickness of the stone shall be as specified in the items.
- 52.3** All exposed face shall be double polished to tender truly smooth and the even reflecting surface. The exposed edges and corners shall be rounded off as directed. The exposed edges shall be machine cut and shall have uniform thickness.

**M-53 P.V.C. Flooring :**

- 53.1** P.V.C. Sheets for P.V.C. floor covering shall be of homogeneous flexible type, conforming to I. S. 3452-1966. The P.V.C. covering shall neither develop any toxic effect while put to use nor shall give off any disagreeable odour.
- 53.2** Thickness of flexible type covering tiles shall be as specified in the description of the item.
- 53.3** The flexible type shall be backed with hessain or other woven fabric. The following tolerances shall be applicable on the nominal dimension of the sheet rolls or tiles :
- (a) Thickness  $\pm 0.15$  mm.
- (b) Length or Width :

<b>1</b>	300 mm. square tiles	$\pm 0.20$ mm.	<b>3.</b>	900mm.square tiles	$\pm 0.30$ mm.
<b>2</b>	600 mm. “ “	$\pm 0.40$ mm.	<b>4.</b>	Sheets and rolls	$\pm 0.10$ percent

**53.4 Adhesive :**

- 53.4.1** The adhesive for PVC flooring shall be of the type and make recommended by the manufacturers of PVC sheets/tiles.

**M-54 Facing tiles :**

- 54.1** The facing tiles (burnt clay facing bricks) shall be free from cracks, flaws and nodules of free lime. They shall be thoroughly burnt and shall have plane rectangular faces with parallel sides and sharp straight right edged faces. The texture of the finished surface that will be exposed when in place, shall conform to an approved sample consisting not less than four stretcher bricks each representing the texture desired. The facing tiles shall have a pleasing appearance, sufficient resistance to penetration by rain and greater durability than common bricks. The tiles shall conform to I. S. 2691-1972.
- 54.2** The standard size of facing brick tiles shall be 19x9x4 cms. The facing bricks tiles shall be provided with frog which shall conform to I. S. 1077-1976.
- 54.3** The permissible tolerance in dimensions specified above shall be as follows :

Size Tolerance for	1 <sup>st</sup> class Brick	2 <sup>nd</sup> class Brick
<b>19 cm.</b>	$\pm 6$ mm.	$\pm 10$ mm.
<b>9 cm.</b>	$\pm 3$ mm.	$\pm 7$ mm.
<b>4 cm.</b>	$\pm 1.5$ mm.	$\pm 3$ mm.

- 54.4** The tolerance for distortion or warp age of face or edges of individual brick from a plane surface and from a straight line respectively shall be as follows :
- Facing dimensions Permissible Tolerance

Max. below 19 cms. Max.2.5mm.

-do- above 19cm. Max. 3.0 mm.

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- 54.5** The average compressive strength obtained as a sample of five tiles when tested in accordance with the procedure laid as per I.S. 1077-1976 shall be not less than 175 Kg/Sq. Cm. The average compressive strength of any individual bricks shall be not less than 160 Kg./Sq. Cm.
- 54.6** The average water absorption for five bricks tiles shall not exceed 12 percent of average weight of brick before testing.  
The absorption for each individual bricks shall not exceed 25 percent.
- 54.7** The bricks tiles when tested in accordance with I.S. 1077-1976, the rate of efflorescence shall not be more than Slightly effloresced.

**M-55 White glazed tiles :**

- 55.1** The tiles shall be of best quality as approved by the Engineer-in-charge. They shall be flat and true to shape. They shall be free from cracks, crazing, spots, chipped edges and corners. The glazing shall be of uniform shade.
- 55.2** The tiles shall be nominal size of 150 mm. x 150 mm. unless otherwise specified. The maximum variation from the stated sizes, other than the thickness of tile, shall be plus or minus 1.5 mm. The thickness of tile shall be 6 mm. Except as above the tiles shall conform to I. S. 777-1970.

**M-56 Galvanized iron pipes and fittings :**

- 56.1** Galvanized iron pipe shall be of the medium type and of required diameter and shall comply with I.S. 1239-1979. The specified diameter of the pipes shall refer to the inside diameter of the bore. Clamps, screw and all galvanized iron fittings shall be of the standard 'R' or equivalent make.

**M-57 Bib cock and stop cock :**

- 57.1** A bib cock is a draw off tap with a horizontal inlet and free outlet. A stop cock is a valve with a suitable means of connection for insertion in a pipe line for controlling or stopping the flow.
- 57.2** They shall be of screw down type and of brass chromium plated and of diameter as specified in the description of the item. They shall conform to I.S. 781-1977 and they shall be of best Indian make. They shall be polished bright.
- 57.3** The minimum finished weight of bib cock and stop cock shall be as given below

Diameter	Bib cock	Stop cock	Diameter	Bib cock	Stop cock
8 mm.	0.25 Kg.	0.25 kg.	15 mm.	0.40 Kg.	0.40 Kg.
10 mm.	0.30 kg.	0.35 kg.	20 mm.	0.75 kg.	0.75 kg.

**M-58 Gun metal wheel valve :**

- 58.1** The gun metal wheel valve be of approved quality. These shall be gun metal fitted with wheel and shall be of gate valve opening full way and of the size as specified. These shall conform to I. S. 778-1971.

**M-59 White glazed porcelain wash basin :**

- 59.1** Washbasin shall be of white porcelain first quality best Indian make and it shall conform to I. S. 2566 (Part-IV) 1972 and I. S. 771-1979.

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The size of the washbasin shall be as specified in the item, Washbasin shall be of one piece construction with continued over-flow arrangements. All internal angles shall be designed so as to facilities cleaning. Washbasin shall have single tap hole or Three holes as specified. Each basin shall have a circular waste hole which is either rebated or bevelled internally with 65 mm. diameter at top and 10 mm. depth to suit the waste fitting. The necessary stud slot to receive the bracket on the under side of the basin shall be provided. Basin shall have an internal soap holder recess which shall fully drain into the bowl.

- 59.2** White glazed pedestal of the quality and color as that of the basin shall be provided where specified in the item. It shall be completely recessed at the back for reception of supply and wash pipe. It shall be capable of supporting the basin rigidly and adequately and shall be so designed as to make the height from floor to top of the rim of basin 750 mm. to 800 mm. as directed.

**M-60 European type water closet /with low level flushing :**

- 60.1** The European type water closet shall be white glazed porcelain first quality and shall be of wash down type conforming to I. S. 2556-1973 and I. S. 771-1979.

- 60.2** 'S' trap shall be provided as required with water seal not less than 50 mm. The solid plastic sent and cover shall be of the best Indian make conforming to I.S. 2548-1980. They shall be made of moulded synthetic materials which shall be tough and hard with high resistance to solvents and shall be free from blisters and other surface defects and shall have chromium plated brass hinges and rubber buffer of suitable size.

**M-61 Orissa type water closet :**

- 61.1** The specification of Orissa type white glazed water closet of first quality shall conform to I. S. 2556 (Part-III) 1981 and relevant specification of Indian type water closet except that pan will be with the integral squatting pan of size 580 mm. x 440 mm. with raised footrest.

**M-62 Indian type water closet :**

- 62.1** The Indian type white glazed water closet of first quality shall be of size as specified in the item and conforming to I. S. 771-1979 and I. S. 2556 (Part-II) 1981. Each pan shall have integral flushing ring of suitable type with adequate number of holes around as directed to have satisfactory flushing. It shall also have an inlet at back or front for connecting flush pipe as directed. The inside of the bottom of the pan shall have sufficient slope from the front towards the outlet and surface shall be uniform and smooth.

Pan shall be provided with 100 mm. diameter 'P' or 'S' trap with approximately 50 mm. water seal and 50 mm. diameter vent horn.

**M-62.A Foot Rests :**

- 62-A-1** A pair of white glazed earthen ware rectangular foot rests of minimum size 250 mm. x 130 mm. 20 mm. shall be provided with water closet.

**M-63 Glazed Earthen Ware Sink :**

- 63.1** The glazed earthenware sink shall be specified size, color and quality. The sink shall conform to I. S. 771 Part-II-1979. The brackets for sinks shall conform to I. S. 775-1970.

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- 63.2** The pipes shall conform to I. S. 1239-Part-I 1973 and I. S. 404-1962 for steel and lead pipes respectively 32 mm. brass waste coupling of standard pattern with brass chain and rubber plug shall be provided with sink.

**M-64 Glazed earthen ware Lipped type flat back urinal/corner type urinal :**

- 64.1** The lipped type urinal shall be flat back or corner type as specified in the item and shall conform to I. S. 771-1979. It shall be of Indian make and size as specified and approved by the Engineer-in-charge. The flat back or corner type urinal must be of 1<sup>st</sup> quality free from any defects, cracks, etc.

**M-64 Low level enamel flushing tank :**

- 65.1** The low level enamel flushing tank shall be of 15 liters capacity. It shall conform to I. S. 774-1971. The flushing cistern shall be of best quality and free from any defects. The flushing tank shall have outlet 32 mm. diameter. The outlet shall be connected with W. C. Pan by lead pipe or P.V.C. pipe as specified. The flushing tank shall be provided with inlet and outlet for fixing G. I. inlet pipes and over-flow pipes. The flushing cistern shall be provided with chromium plated handle for flushing. The flushing tank shall be provided with bracket of cast iron so that it can be fixed on wall at specified height. The brackets shall conform to I. S. 775-1970.

**M-66 Cast iron flushing cistern :**

- 66.1** The cast iron flushing cistern shall be of 15 liters capacity. It shall conform to I. S. 774-1971. The flushing cistern shall be of best quality free from any defects. The flushing cistern shall have outlet of 32 mm. diameter. The outlet shall be connected to lead pipe of 32 mm. diameter. The lead pipe shall conform to I. S. 404 (Part-I) 1962. For fixing G. I. inlet pipes and overflow pipe 20 mm. dia inlet and outlet shall be provided. The flushing cistern shall be provided with galvanized iron chain pull of sufficient length and shall be got approved from the Engineer-in-charge. The cast iron flushing cistern shall be painted with one coat of anticorrosive paint and Three coats of paint. The flushing cistern shall be fixed on Three C.I. brackets. The C. I. brackets shall conform to I. S. 775-1970.

**M-67 Flush cock :**

- 67.1** Half turn flush cask (Heavy weight) shall be of gun metal chromium plated of diameter as specified in the description of the item. The flush cock shall conform to relevant Indian Standard.

**M-68 Cast iron pipes and fittings :**

- 68.1** All soil, waster, vent and anti syphonage pipes and fittings shall conform to I. S. 1729-1964. The pipe shall have spigot and socket ends with head on spigot end. The pipes and fittings shall be true to shape, smooth, cylindrical, their inner and outlet surfaces being as nearly as practicable concentric. They shall be sound and nicely cast and shall be free from cracks. Laps, pinholes or other imperfection and shall be neatly dressed and carefully fettled.
- 68.2** The end of pipes and fittings shall be reasonable square to their axis.
- 68.3** The sand cast iron pipes shall be of the diameter as specified in the description and shall be in lengths of 1.5 M, 1.8 M and 2 m. including socket ends of the pipe unless shorter lengths are either specified or required at junctions etc. The pipes and fittings shall be supplied without ears unless specified or directed otherwise.

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**68.4.1** The Standard weight and thickness of pipes shall be as shown in the following table : A tolerance up to minus 10 percent may however be allowed against these standard weights.

Sr. No.	Nominal dia. of bore	Thickness	Overall Weight of Pipe excluding ears		
			1.5 m long	1.8 m. Long	2 m. long
1.	75 mm.	5.0 mm.	12.83 Kg.	16.52 Kg.	18.37 Kg.
2	100 mm.	5.0 mm.	18.14 Kg.	21.67 kg.	24.15 Kg.

**68.4.2** A tolerance up to minus 15 percent in thickness and 20 mm. in length will be allowed. For fittings tolerance in lengths shall be plus 15 mm. and minus 10 mm.

**68.4.3** The thickness of fittings and their socket and spigot dimensions shall conform to the thickness and dimensions specified for the corresponding sizes of straight pipes. The tolerances in weights and thickness shall be the same as for straight pipes.

#### **M-69 Nahni Trap :**

- 69.1** Nahni trap shall be of cast iron and shall be sound and free from porosity or other defects which affect serviceability, The thickness of the base metal shall not be less than 6.5 mm. The surface shall be smooth and free from craze, ships and other flaws or any other kind of defects which affect serviceability. The size of nahni trap shall be as specified and shall be of self cleansing design.
- 69.2** The nahni trap shall be of quality approved by the Engineer-in-charge and shall generally conform to the relevant Indian Standards.
- 69.3** The nahni trap provided shall be with deep seal, minimum 500 mm. except at places where trap with deep seal can not be accommodated. The cover shall be cast iron. Perforated cover shall be provided on the trap of appropriate size.

#### **M-70 Gully Trap :**

- 70.1** gully trap shall conform to I. S. 651-1980. It shall be sound, free from defects such as fire cracks. The glaze of the traps shall be free from crazing. They shall give a smart clear note when struck with light hammer, There shall be no broken blisters.
- 70.2** The size of the gully trap shall be as specified in the item.
- 70.3** Each gully trap shall have one C. I. grating of square size corresponding to the dimensions of inlet of gully trap. It will also have a water tight C. I. cover with frame inside dimensions 300 mm. x 300 mm. the cover with frame inside dimension, 300 mm. x 300 mm. the cover weighing not less than 4.53 Kg. and the frame not less than 2.72 Kg. The grating cover and frame shall be of sound and good casting and shall have truly square machined seating faces.

#### **M-71 Glaze Stone Ware pipe and fitting :**

- 71.1** The pipes and fittings shall be of best quality as approved by the Engineer-in-charge. The pipe shall be best quality manufactured from stone-ware of fire clay, salt glazed thoroughly burnt through the whole thickness of a close even texture, free from air blows, fire blisters, crack and other imperfections, which effect the serviceability. The inner and outer surfaces shall be smooth and perfectly glazed. The pipe shall be capable

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to withstand pressure of 1.5 m. head without showing sign of leakage. The thickness of the wall shall not be less than  $1/12^{\text{th}}$  of the internal dia. The depth of socket shall not be less than 38 mm. The socket shall be sufficiently large to allow a joint of 1 mm. around the pipe.

**71.2** The pipes shall generally conform to relevant I. S. 651-1980.

**M-72 Wall Peg Rail :**

**72.1** The aluminum wall peg rail shall have three aluminum pegs of approved quality and size. It shall be fixed on teakwood plank of size 450 mm. x 75 mm. x 20 mm. The teakwood shall be French polished or oil painted as specified.

**M-73 G. I. Water Spot :**

**73.1** The G. I. pipes of 40 mm. dia shall be of medium quality and specials shall be of 'R' brand or equivalent brand of best approved quality.

**73.2** The pipe shall have length as required for the thickness of wall in which it is fixed and at the outside end tee and bend cut at half the length shall be provided and at other end coupling shall be provided to have better fixing. The water spout shall be provided as per detailed drawing or as directed.

**M-74 Asbestos Cement Pipe (A. C. Pipe) :**

**74.1** The asbestos cement pipe of diameter as specified in the description of the item shall conform to I. S. 1626-1980. Specials like bends, shoes cowls, etc. shall conform to relevant Indian Standards. The interior of pipe shall have a smooth finish, regular surface and regular, internal diameter. The tolerance in all dimensions shall be as per I. S. 1626-Part-I 1980.

**M-75 Crydon Ball Valve :**

**75.1** Ball valve of screwed type including polyethylene float and necessary lever etc. shall be of the size as mentioned in the description of item and shall conform to I. S. 1703-1977.

**M-76 Bitumen Felt For Water Proofing And Damp Proofing :**

**76.1** Bitumen felt shall be on the fiber bases and shall be type 2, self finished grade-2 and shall conform to I. S. 1322-1970.

**M-77 Selected Earth :**

**77.1** The selected earth shall be that obtained from excavated material or shall have to be brought from outside as indicated in the item. If item does not indicate anything, the selected earth shall have to be brought from outside.

**77.2** The selected earth shall be good yellow soil and shall be got approved from the Engineer-in-charge. In no case black cotton soil or similar expansive and shrinkable soil shall be used. It shall be clean and free from all rubbish and perishable materials, stones or brick bats. The clods shall be broken to a size of 50 mm. or less, Contractor shall make his own arrangement at his own cost for land for borrowing selected earth. The stacking of material shall be done as directed by the Engineer-in-charge in such a way as not to interfere with any constructional activities and in proper stacks.

**77.3** When excavated materials is to be used, only selected stuff got approved from the Engineer-in-charge shall be used. It shall be stacked separately and shall comply with all the requirements of selected earth mentioned above :

**M-78 Barbed Wire :**

**78.1** The barbed wire shall be of galvanized steel and it shall generally conform to I. S. 278-1978. The barbed wire shall be of type-I whose nominal diameter for line wire shall be 2.5 mm. and point wire 2.24 mm. The nominal distance between Three bars shall be 75

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mm. unless otherwise specified in the item. The barbed wire shall be formed by twisting together Three line wires, one containing the barbs. The size of the line and point wires and barb spacing shall be as specified above. The permissible deviation from the nominal diameter of the line wire and point wire shall not exceed  $\pm 0.08$  mm.

- 78.2** The barbs shall carry four points shall be formed by twisting Three point wires, each Three turns, lightly round one line wire, making altogether four complete turns. The barbs shall be so finished that the four points are set and locked at right angles to each other. The barbs shall have a length of not less than 13 mm. and not more than 18 mm. The point shall be sharp and cut at angle not greater than 35 degree of the axis of the wire forming the barbs.
- 78.3** The line and point wire shall be circular section free from scale and other defects and shall be uniformly galvanized. The line wire shall be in continuous length and shall not contain any weld other than those in the rod before it is drawn. The distance between Three successive splices shall not be less than 15 meters.
- 78.4** The lengths per 100 Kg. of barbed wire I. S. type I shall be as under Nominal 1000 meter Minimum 834 Meter Maximum 1066 Meter.

## CODE OF PRACTICE

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### GENERAL

- (1) The method of execution of the items shall conform to the relevant specifications as per the latest version of the Indian Standard unless specified otherwise and as far as applicable.
- (2) Wherever a reference to ANY Indian Standard appears in the specification, it shall be taken to mean as a reference to the latest version of the standard.
- (3) The following specifications, standards, and codes are made as a part of this specification.  
**Indian Standards :** specification for building materials, specification for equipment, method of test, method of measurement of building works ,code of practice for construction , safety code for demolition of building, safety code for scaffolds etc. published by the Bureau of Indian Standards
- (4) The contractor shall invariably carry out Materials & work Tests as specified in the tender document **(B2- Form)** and IS code. However, if the additional tests are required as per the opinion of the Engineer-in-charge, the same shall also have to be carried out. All such tests shall be got carried out in Government or as approved laboratories and cost thereof shall be entirely borne by the contractor. No collection of materials shall be made before it is got approved from the Engineer-in-charge.

All moulds, equipment's etc. required of preparing specimens for the test shall be kept in sufficient numbers and in good state, as directed by the Engineer-in-charge on the site of work.

Specimen for tests shall sent to the laboratory along with representative of GIDC in time and the results thereof shall be promptly obtained and reported to the Engineer-in-charge.

- (5) Satisfactory test results shall not observed the contractor from dismantling and re-doing any work revealed to the defective at a later date. The contractor shall have no claim for any payment or compensation whatsoever on account of replacement of such defective work. Contractor shall take all precautions and care during dismantling and re-doing the work to ensure that any other work so far executed does not get damage or affected.

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- (6) The work shall be carried out in true line and level and in conformity with the detailed drawing and specified patterns.
- (7) All the work shall be carried out in a workmanship like manner and as per the best techniques for the particular item.
- (8) All tools, tempts equipment's etc. for correct execution of the work as well as for checking lines, levels, alignments of the works, during execution shall be kept in sufficient numbers on the side of work.
- (9) All installations pertaining to water supply and its fixtures as well as drainage lines and sanitary fitting shall be deemed to be completed only after giving satisfactory tests by the contractor.
- (10) Scaffolding being provided by the contractor at his own cost for such of the items for the execution of which it is essential.

#### **C1 Excavation**

##### **General:**

In all sorts of soil, sand, gravel, soft murrum and other similar soft or loose material. The excavation will generally refer to the open excavation for foundation.

##### **Clearing the site:**

The site on which the structure is to be built shall be cleared and all obstructions, loose stones, material, and rubbish of all kind, bush, wood, and trees shall be removed as directed. The materials so obtained shall be the property of the GIDC and shall be conveyed the stacked as directed by the Engineer-in-charge.

##### **Setting out:**

After clearing the site the centre lines will be given by the Engineer. The contractor shall assume full responsibility for alignment, elevation, and dimension of each and all parts of the work. Contractors shall supply labour materials, etc. required for setting out the reference marks and bench marks and shall maintain them as long as required.

##### **Excavation:**

It shall be all sorts of soil, sand, gravel, soft murrum, or other similar soft or loose materials.

The excavating for foundation and for basement shall be carried out in true line and level and shall have the width and depth as shown in the drawing or as directed by the Engineer-in-charge. The contractor shall do the necessary shorting and shutting or slopes to a safe angel, if necessary including bailing and pumping out water when separate provision does not exist for it in tender, at his own cost. The bottom of the excavated area shall be leveled both longitudinally and transversely as directed by the Engineer-in-charge. No earth filling will be allowed to bring it to level if by mistake or any other reasons excavation is made deeper or wider than shown on the plan or directed by the Engineer-in- charge. The extra depth or width shall be made up with concrete or masonry of the foundation grade as directed by the Engineer-in- charge and at the cost of the contractor.

##### **Disposal of the excavated stuff:**

The excavated stuff of the selected type shall be used in filling the trenches in layers including ramming and watering etc.

The balance of the excavated quantity shall be removed by the contractor from site of work to a place as directed by the Engineer-in-charge with all lead and lift but within the same estate.

##### **1 Excavation in Hard murrum :**

Same as C-1/1 except that the excavation shall be in hard murrum.

##### **2 Excavation in Hard murrum and boulders.**

Same as C-1/1 except that the excavation shall be in hard murrum and boulders.

##### **3 Excavation in soft rock :**

Same as C-1/1 except that the excavation shall be in soft rock.

##### **4 Excavation in Hard rock.**

Same as C-1/1 except that the excavation shall be in hard rock

#### **C-2 Plain Cement Concrete Laying in Foundation / for Floor Bedding :**

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**General:**

Before starting concrete, the bed of the foundation trenches shall be cleared of all loose materials and watered as directed.

**Proportioning of Mix:**

The proportion of the cement to sand and coarse aggregates shall be as specified in the item and shall be measured by volume.

**Mixing:**

The concrete shall be mixed in a mechanical mixer at the site of work. Hand mixing may however be allowed for smaller quantities of work if approved by the Engineer-in-charge. The mixing shall be done for a period of 1 1/2 to 2 minutes. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the purpose.

**Scaffolding:**

All scaffolding, hoisting arrangement and ladders etc. required for the facility of concrete shall be provided by the contractor and removed on completion of work. The scaffolding, hoisting arrangement and ladders shall allow easy approach to the work and afford easy inspection.

**Form work:**

The form work shall be provided if necessary as directed by the Engineer-in-charge and shall be as per I.S. 461-1972 or revised from time to time.

**Transporting & placing the concrete:**

The concrete shall be handled from the place of mixing to the final position by not more than 15 minutes by the method as directed by the Engineer-in-charge and shall be placed into its final position, compacted and finished within 30 minutes of mixing with water i.e. before the setting commences.

The concrete shall be laid in layers of 15 cms to 20 cms.

**Compaction:**

The concrete shall be thoroughly compacted by hammers immediately after depositing to get a dense concrete. Concrete shall not be disturbed once it has set.

**Curing:**

After the final set, the concrete shall be kept continuously wet, if required by pounding for a period of not less than 7 days from the date of placement.

**C-3 Lime Cinder Concrete Laying :**

This shall be as per C-2 of code of practice. The coarse aggregate in this case shall cylinder.

**C-4 Ordinary Cement Concrete Plain or Reinforce :**

I.S. 466-1978 or as revised from time to time shall be followed in general cement sand by black trap grit and coarse aggregate shall be measured by volume. For proportioning of cement by volume one bag of cement shall be taken as 0.0342 cu.m. (1.2 cft)

**Mixing:**

Concrete shall be mixed in a mechanical mixer. Mixing shall be continued until there is a uniform distribution of the materials and the mass is uniform in colour and consistency but in no case shall mixing be done for less and 1 1/2 minutes. When hand mixing is permitted by the Engineer-in-charge in case of small work or in case of break down of machineries and in the interest of the work 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. However, in such cases 10% more cement than otherwise required have to be used without any extra cost.

**Transporting:**

Concrete shall be handled from the place of mixing of the final position as quickly as practicable by methods which will prevent segregation or loss of ingredients. In no case operation shall be taken more than 15 minutes.

**Placing:**

The concrete shall be placed into its final position and completed and finished within 30 minutes of mixing the

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water and before setting commence. Method of placing shall be such as to avoid segregation, approved by the Engineer-in-charge. Concreting shall be carried out continuously up to construction joints, the position and arrangement of which, shall be pre-determined by the designer.

When the work has to be resumed on a surface which has hardened, such surface shall be roughened. It shall then be swept clean thoroughly wetted and covered with a thin layer of mortar composed of cement and sand in the same proportion as the cement and sand in the concrete mix. This layer of mortar shall be freshly mixed and placed immediately before the placing of the concrete.

When the concrete has not fully hardened, all laitance shall be removed by scrapping the wet surface with wire or bristles care being taken to avoid dislodgement of particles or aggregates. The surface shall be thoroughly wetted and all free water removed. The surface shall be coated with neat cement grout. The first layer of concrete to be placed on this surface shall not exceed 150mm in thickness and shall be well rammed against old work. Particular attention is paid no corners and spots.

#### **Compaction:**

Concrete shall be thoroughly compacted during the operation of placing and thoroughly worked around the reinforcement, around embedded fixtures and into corners of the form work. Compacting shall be done by mechanical vibrations, in such a way that a dense mix is obtained.

#### **Curing:**

The concrete shall be kept covered with a layer of sacking canvas or similar materials or by pounding and kept constantly wet for twenty one days from the date of placing concrete. Curing by pounding shall preferably be done by erecting suitable dykes of lean mortar.

#### **Form work:**

##### **General:**

The form work shall conform to the shape, lines and dimensions as on the plans and be so constructed as to remain sufficiently rigid during the placing and compacting of the concrete, and shall be sufficiently water tight to prevent loss of liquid from concrete. Adequate arrangements shall be made by the contractor to safeguard against any settlement of the form work during the course of concreting and after concreting. The design of the form work and centering shall be got approved from Engineer-in-charge before erection.

#### **Cleaning & Treatment of Forms:**

All rubbish, particularly chipping shavings and saw dust shall be removed from the interior of the forms before the concrete is placed and the form work in contact with concrete shall be cleaned and thoroughly wetted or treatment with an approved composition. Care shall be taken that such approved composition is kept out of contact with reinforcement.

#### **Stripping Time:**

In normal circumstances and where ordinary cement is used, forms may be struck after expiry of following period

(a)	Walls columns & vertical side of beams	24 to 48 hours as may be decided by the Engineer-in-charge.
(b)	Side of slabs	3 days
(c)	Beam	7 days
(d)	Removal of props to slabs.	
	(i) Slabs spanning up to 4.5 M	7 days.
	(ii) Spanning over 4.5 M	14 days.

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(e)	Removal of props to beams & arches.	
	(i) Spanning up to 6 M	14 days
	(ii) Spanning over 5 M	21 days

**Procedure when removing the Form work:**

All form shall be removed without such shock or vibrations as would damage the reinforced concrete surface. Before the soffits and struts are removed and concrete surface shall be exposed where necessary in order to ascertain that the concrete has sufficiently hardened. The form work will be paid under the respective item if provided in the tender.

**Centering:**

The centering to be provided shall be got approved from the Engineer-in-charge. It shall be sufficiently strong to ensure absolute safety of the form work and concrete work before, during, and after pouring concrete. Watch should be kept to see that behavior of centering and formwork is satisfactory during concreting. Erection should also be such that it would allow removal of forms in proper sequence without damaging either the concrete or the forms to be removed.

The props of centering shall be provided on firm foundation of base of sufficient strength to carry the loads without settlement.

The centering and form work will be inspected and approved by the Engineer-in-charge before concreting. But this will not relieve the contractor or his responsibility for strength, adequacy, and safety of form work and if there is a failure of form work or centering, contractor shall be responsible for the damages to work, injury to life and damage to the property.

**Scaffolding:**

All scaffolding, hoisting arrangements etc. required for the facility of concreting shall be provided and removed on completion of work by the contractor at his own expenses. The scaffolding, hoisting arrangement and ladders etc. shall be strong enough to withstand all live, dead and impact loads expected to act and shall be subject to the approval of the Engineer-in-charge. However, contractor shall be solely responsible for the safety of the scaffolding, hoisting arrangement, ladders, work, and workmanship etc.

The scaffolding, hoisting arrangement and ladders shall allow easy approach to the work spot and afford easy inspection.

**Testing:**

Work sample of concrete 150mmx150mm x 150mm shall be taken as under:

Qty. of work in M3	No. of sample
1.5	1
6.15	2
16-30	3
31-50	4
51 & above	4+1 for each additional quantity of 50 M or part thereof.

The contractor shall make his own arrangement for taking sample and testing of the sample in the Government or the approved laboratories. The test shall be carried out in accordance with IS 516-1959 or as revised from time to time. A register of cubes shall be maintained the site of work in the prescribed Performa. The result of the cubes shall be submitted to the Engineer-in-charge by the contractor.

Note: (1) At least one sample shall be taken from each shift

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(2) Each sample consists of three test specimens for testing at 28 days.

Additional cubes may be required for various purposes. Such as to determine the strength of concrete at 7 days or at the time of striking the form work or to determine the duration of curing or to check the testing error.

Finishing unless otherwise specified in the item to keep the exposed concrete surface, the concrete surface shall be finished with cement mortar 1:4 (1- cement: 4-sand) in true line level in accordance with M-9 of specification of materials.

#### **C-5 Controlled concrete :**

##### **Grade:**

The concrete shall be designed as M-150, M-200, M-250, M -300 & M-400 as prescribed in I.S. 456-1978 or as revised from time to time.

##### **Aggregates:**

Samples of the aggregates proposed to be used shall be got approved from the Engineer-in-charge prior to collection of the materials at the site of work field test for determining the content of silt, loam, clay etc. In fine aggregate and grading and moisture content in both fine and coarse aggregate shall be carried out before commencing the concreting work and record of the test shall be maintained till the completion of the work.

The grading of aggregate shall be controlled by obtaining the fine and coarse aggregate in different size being stocked in separate stock piles. The grading of coarse and fine aggregate shall be checked as frequently as possible. The frequency shall be as directed by the Engineer-in-charge, to ensure that the uniform grading as per approved samples used in the preliminary tests is maintained.

As soon as possible, after receiving the order to commence the work the contractor shall design the mix for different grades of concrete required in the work submit details in respect of proportion of cement and aggregates water cement ration etc. and arrangement to make trial mixes for preliminary tests to be carried out in the Government or any other approved laboratory to satisfy the Engineer-in-charge that the designed mix meets with the prescribed strength. The maximum total quantity to aggregates by weight per 50 Kg. of cement shall not exceed 450 Kg. except where otherwise specifically permitted by the Engineer-in-charge.

The minimum number of specimens for preliminary test and criteria for acceptance of test strength shall conform to Table –V **Acceptance criteria for concrete of I.S. 456-1978.**

On the satisfactory results of the above tests, the mix actually to be used shall be got approved from Engineer-in-charge. The approval of the Engineer-in-charge will not relieve the contractor of his responsibility for obtaining the required minimum strength in the work test. Record of all tests in support of mix design shall be maintained as a part of record of the contract.

#### **STRENGTH REQUIREMENT OF CONCRETE:**

The compressive strength requirements for various grades of concrete shall not be lower than the figures given below:

Grade of concrete	Compressive strength of 15 cms cubes conducted in accordance with I.S. 516-1959.		
	After 28 days after mixing in preliminary test (Kg/cm <sup>2</sup> )	At 7 days after mixing in work test	At 28 days after mixing in work test (Kg/cm <sup>2</sup> )
M-100	135	70	100
M-150	200	100	150
M-200	260	135	200
M-250	320	170	200
M-300	380	200	300
M-350	440	235	350

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M-400	500	270	400
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### **PROPORTIONING & WORKS CONTROL:**

The mix proportions shall be selected to ensure that the workability of the fresh concrete suitable for the condition of handling and placing, so that after compaction it surrounds all reinforcement and completely fills the form work. When concrete is hardened, it shall have the required strength, durability and surface finish.

The determination of the proportions of cement, aggregate and water to attain the required strength shall as follows:

- (a) By designing the concrete mix; such concrete shall be called "Design Mix Concrete" or "Controlled Concrete".
- (b) By adopting nominal mix, such concrete shall be called "Nominal Mix Concrete".

**TABLE - 2.8**  
**OPTIONAL WORK TEST REQUIREMENTS OF CONCRETE (All values in N/mm<sup>2</sup>)**  
**(All tests conducted in accordance with IS: 516)**

Grade of Concrete	Compressive Strength of 150mm cubes, min at 7 days	Modulus of Rupture by Beams Test Min.	
		At 72 + 2 hrs.	at 7 days
M - 10	7	1.2	1.7
M - 15	10	1.5	2.1
M - 20	13.5	1.7	2.4
M - 25	17	1.9	2.7
M - 30	20	2.1	3.0
M - 35	23.5	2.3	3.2
M - 40	27	2.5	3.4

The concrete mix shall be designed to have an average strength corresponding to the values specified for preliminary tests in Table. The proportions chosen should be such that the concrete is of adequate workability for the conditions prevailing on the work in question, and can be properly compacted with the means available. The maximum total quantity of aggregate by weight per 50 kg. Of cement shall not exceed 450 kg. except where otherwise specially permitted by the Engineer-in-Charge.

Except where it can be shown to the satisfaction of the Engineer-in-Charge that supply of properly graded aggregate of uniform quality can be maintained over the period of work, the grading of aggregate should be controlled by obtaining the coarse aggregate in different sizes and blending them in the right portions when required, the different sizes being stocked in separate stock piles. The material should be stock piled for several hours preferably a day before use. The grading of coarse and fine aggregate should be checked as frequently as possible, the frequency for a given job being determined by the Engineer-in-Charge to ensure that the suppliers are maintaining the grading uniform with that of the samples used in the preliminary test.

In proportioning concrete, the quantity of both cement and aggregate should be determined by weight, where the weight of cement is determined by accepting the maker's weight per bag. A reasonable number of bags should be weighted separately to check the net weight. Where the cement is weighed on the site and not in bags, it should be either measured by volume in calibrated tanks or weighed. All measuring equipment should be maintained in clean serviceable conditions, and their accuracy periodically checked.

It is most important to maintain the water cement ratio constant at its correct value. To this end, determination of moisture contents in both fine and coarse aggregates should be made as frequently as possible, the frequency

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for a given job being determined by the Engineer-in-Charge according to weather conditions. The amount of the added water shall be justified to compensate for any observed variations in the moisture contents. For the determination of moisture content in the aggregate for concrete: Part-III specific gravity, density, voids, absorption and bulking may be referred to. To allow for the variation in weight of aggregate due to variation in their moisture content, suitable adjustments in the weights of aggregate should also be made.

No substitutions in materials used on the work or alterations in the established proportions, except as permitted in the above para shall be made without additional tests to show that the quality and strength of concrete are satisfactory.

#### **WORKABILITY OF CONCRETE:**

The concrete mix proportions chosen should be such that concrete is of adequate workability for the placing conditions of the concrete and can properly be compacted with the means available. The definitions of the ranges of "workability" of concrete as measured by either the slump or V-B tests (IS: 1199) and the range to be adopted for different kinds of work unless specified otherwise is given in Table - 2.9.

**TABLE - 2.9**  
**WORKABILITY OF CONCRETE**

Placing conditions	Degree of Workability	Slump (mm)	Values of Workability	
			Vee-Bee	Compacting Factor
Blinding concrete; Shallow Sections; Pavements using pavers	Very Low	--	20- 10 secs	0.75 - 0.80
Mass concrete; Lightly reinforced sections in slabs, beams, walls, columns; Floors; Hand placed pavements; Canal lining; Strip footings	Low	25 - 75	10 - 5 secs	0.80 - 0.85
Heavily reinforced sections in slabs, beams walls, columns; Slip form work; Pumped concrete	Medium	50 - 100 75 - 100	5 - 2 secs	0.85 - 0.92*
Trench fill; In-situ piling Termite concrete	High Very high	100 - 150 Workability to be decided by determination of flow (IS: 9103)	--	Above 0.92** Above 0.92**

**Note:** For most of the placing conditions, internal vibrators (needle vibrators) are suitable. The diameter of the needle shall be determined based on the density and spacing of reinforcement bars and thickness of sections. For tremie concrete, vibrators are not required to be used.

A competent person should be employed whose duty will be to supervise all stages in the preparation and placing of the concrete. All works test specimens should be prepared and site tests carried out under his direct supervision

#### **REQUIREMENT FOR DURABILITY:**

Minimum cement content required in cement concrete to ensure durability under specified conditions of exposure should be as given in Table 2.12 unless otherwise specified. The general environment to which the concrete will be exposed during its working life is classified into five levels of severity, that is, mild, moderate, severe, very severe and extreme as described in Table 2.13.

**TABLE - 2.12**

**Minimum Cement Content, Maximum Water Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20mm Nominal Maximum Size**

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Sr. No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content kg/m <sup>3</sup>	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete
1.	Mild	220	0.60	--	300	0.55	M-20
2.	Moderate	240	0.60	M-15	300	0.50	M-25
3.	Severe	250	0.50	M-20	320	0.45	M-30
4.	Very Severe	260	0.45	M-20	340	0.45	M-35
5.	Extreme	280	0.40	M-25	360	0.40	M-40

The general environment to which the concrete will be exposed during its working life is classified into five levels of severity, that is, mild moderate, severe, very severe and extreme as described in Table 2.13.

**TABLE 2.13**  
**ENVIRONMENTAL EXPOSURE CONDITIONS**

Sr. No.	Environment	Exposure Conditions
1.	Mild	Concrete surfaces protected against weather or aggressive conditions, except those situated in coastal area.
2	Moderate	Concrete surfaces sheltered from severe rain or freezing whilst wet. Concrete exposed to condensation and rain Concrete continuously under water Concrete in contact or buried under non-aggressive soil/ground water Concrete surfaces sheltered from saturated salt air in coastal area
3.	Severe	Concrete surfaces exposed to severe rain, alternate wetting and drying or occasional freezing whilst wet or severe condensation. Concrete completely immersed in seawater Concrete exposed to coastal environment
4.	Very Severe	Concrete surfaces exposed to seawater spray, corrosive fumes or severe freezing conditions whilst wet. Concrete in contact with or buried under aggressive sub-soil/ground water
5.	Extreme	Surface of members in tidal zone Members in direct contact with liquid/solid aggressive chemicals

#### **MIX DESIGN AND SAMPLING AND TESTING FOR CONCRETE**

Facilities required for sampling materials, shall be provided when required by the Engineer. The methods used in sampling, laying curing and testing the concrete samples, either in the field or in the laboratory, shall be in accordance with the appropriate Indian Standards. This is to investigate the grading of aggregate, water cement ratio, workability and the quantity of cement required to give works cubes of the minimum strength specified.

The mix shall be designed to produce the grade of concrete having required workability and desired characteristic strength. As long as the quality of the materials does not change, a mix design done earlier may be considered adequate for later work. As already stated under "proportioning" the proportion of the mix shall be by weight. In case uniformity in the materials used for concrete making has been established over a period of time, the proportioning may be done by volume batching, by the use of bulk densities, provided periodic checks are made on mass/volume relationships of materials. Where weigh batching is not practicable, the

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quantities of fine and coarse aggregate (not cement) may be determined by volume. If aggregate is moist and volume batching is adopted, allowance shall be made for bulging in accordance with IS: 2386 (Part-III). Mix proportioning shall be carried out according to the ACI Standard ACI 631 or "Design of Concrete Mixes" Road Research Note No.4 of Department of Scientific and Industrial Research, U.K.

Whenever there is either a change in strength of concrete required, water cement ratio, workability or the source of aggregates and cement, preliminary tests shall be conducted again to determine the revised proportions of the mix to suit the later conditions. While designing mix proportions, over wet mixes should always be avoided.

#### **PRELIMINARY**

#### **TESTS:**

The materials and proportion used in main preliminary tests shall be similar in all respects to those to be actually employed in the works as the object of this test is to determine proportion of cement, aggregates and water necessary to produce the concrete of consistency required to give the strength specified. It will be the contractor's sole responsibility to carry out these tests and he shall therefore furnish to the Engineer, statement of proportions proposed to be used for concrete mix. For preliminary tests, the following procedure shall be followed. Materials shall be brought to the room temperature and all materials shall be in a dry condition. The quantities of water, cement and aggregate for each batch shall be determined by weight to an accuracy of 1 Part in 1000.

#### **(a) Mixing:**

Concrete shall be mixed in a mechanical mixer. The mixer should comply with IS: 1791. The cement and fine aggregate shall first be mixed dry until the mixture is in uniform colour. The coarse aggregate shall then be added, mixed and water added and mixed thoroughly for a period of not less than two minutes after all the materials are in the drum and until the resulting concrete is uniform in appearance. If there is segregation after unloading from the mixer, the concrete should be remixed.

(b) The consistency of each batch of concrete shall be measured immediately after mixing, by the slump test in accordance with IS: 1999. In the slump test, care shall be taken to ensure that no water is lost; the material used for slump test may be remixed with the remainder of concrete for making the test specimen. The period of remixing shall be as short as possible yet sufficient to produce a homogeneous mass.

Note: In exceptional circumstances such as mechanical breakdown of mixer, work in the remote areas or when the quantity of concrete work is very small, hand mixing may be permitted, subject to adding 10% extra cement at his (contractor's) cost. When hand mixing is permitted, it shall be carried out on a watertight platform and care shall be taken to ensure that mixing is continued until the concrete is uniform in colour and consistency.

#### **CONCRETE CUBES:**

#### **(a) Size of test specimen & moulds:**

Test specimens cubical in shape shall be 150 x 150 x 150 mm. If the largest nominal size of the aggregate does not exceed 200mm, 100 mm cubes may be used as an alternative.

A cube mould should be of metal and stout enough to prevent distortion. It shall be constructed in such a manner as to facilitate the removal of the moulded specimen without damage, and shall be so machined that, when it is assembled ready for use, the dimensions and internal faces shall be accurate within the following limits:

Height of mould and distance between opposite faces: Specified size + 0.2 mm.

Angle between adjacent faces: 90 + 0.5 degree

Each mould shall have a plane face metal base plate of such size as to support the mould during the filling without leakage and shall be attached to the moulds; when assembled shall be positively and rigidly held together and suitable methods of ensuring this, both during filling and on subsequent handling of the filled mould, shall be provided. In assembling the mould for use, the joints between the sections of mould shall be thinly coated with mould oil and a similar coating of mould oil shall be applied between the contact surfaces of the bottom of the mould and the base plate in order to ensure that no water escapes during filling. The interior surfaces of the assembled mould shall be thinly coated with mould oil to prevent adhesion of the concrete. The tamping bar shall be a steel bar 16 mm. in diameter, 0.6 m. long and bullet pointed at the lower end.

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**(b) Compacting:**

The test specimens shall be made as soon as practicable after mixing and in such a way as to produce full compaction of the concrete with neither segregation nor excessive laitance. The concrete shall be filled into the mould in layers approximately 50 mm deep. In placing each scoopful of concrete, the scoop shall be moved around the top edge of the mould as the concrete slides from it, in order to ensure a symmetrical distribution of the concrete within the mould. Each layer shall be compacted as described below. After the top layer has been compacted, the surface of the concrete shall be finished level with the top of the mould using a trowel, and covered with a glass or metal plate to prevent evaporation.

For compacting, standard tamping bar shall be used and the strokes of the bar shall be distributed in a uniform manner over the cross section of the mould. The number of strokes per layer required to produce specified conditions will vary according to the type of concrete but in no cases shall be less than 35 strokes per layer for 150 mm cubes or 25 strokes per layer for 100 mm cubes. The strokes shall penetrate into the underlying layer and the bottom layer shall be rodded throughout its depth. Where the tamping bar leaves voids, the sides of the mould shall be tapped to close the voids.

**(c) Curing:**

The test specimen shall be stored on the site at a place free from vibration under damp-matting, sacks or other similar material for 24 hours + 0.5 hour from the time of adding water to the other ingredients at a temperature range of 22° C to 32° C. After 24 hours, they shall be marked for later identification, removed from the moulds and stored in clean water at a temperature of 24° C to 30° C. They shall be sent to the testing laboratory well packed in damp sand, sacks or other suitable material so as to arrive there in a damp condition not less than 24 hours before the time of test. On arrival at the testing laboratory, the specimen shall be stored in water at 27° C + 2° C temperature until the time of test. Records of the daily maximum and minimum temperature shall be kept both during the period the specimens remain on the site and in the laboratory.

**(d) Tests for Cube Specimen:**

The concrete cubes shall be tested in standard testing machines by skilled personnel. Tests shall be made at recognized ages of the test specimen, the most usual being 7 and 28 days. Tests may be made at 24 hours + 1/2 hour and 72 hours + 2 hours if early strengths are needed. The age shall be calculated from the time of the addition of water to the dry ingredients.

At least three specimens, preferably from different batches shall be made for testing at each selected age.

Specimens stored in water shall be tested immediately on removal from the water and while they are still in the wet condition. Surface water and grit shall be wiped off the specimens and any projecting fins removed.

The bearing surface of the testing machine shall be wiped clean and any loose sand or other material removed from the surfaces of the specimen, which are to be in contact with the compression platens. The specimen shall be so placed in the machine that the load shall be applied to the opposite sides of the cubes as cast, that is, not to the top and bottom. The axis of the specimen shall be carefully aligned with the centre of thrust of the spherically seated platen. No packing plates shall be used between specimen and platens of the machine. Once the uniform seating is obtained, load shall be applied without shock and increased continuously at a rate of approximately 14.0 N/mm<sup>2</sup> /Min. until the resistance of the specimen to the increasing load breaks down and no greater load can be sustained. The maximum load applied to the specimen shall be recorded and the appearance of the concrete and any unusual features in the type of failure shall be noted.

The measured compressive strength of the specimen shall be the maximum load applied to the specimen divided by the cross sectional area of the specimen and shall be expressed to the nearest N. per sq. mm. Average of the values shall be taken as the representative of the batch provided the individual variation is not more than + 15 percent of the average. Otherwise repeat tests shall be made. Cube crushing strength shall conform to the values given in Tables 2. 7 and 2.8.

**(e) Frequency of Sampling of Concrete Cubes:**

A random sampling procedure should be adopted to ensure that each concrete batch shall have a reasonable chance of being tested; that is, the sampling should be spread over the entire period of concreting covering all mixing units. The minimum frequency of sampling of concrete of each grade shall be as follows:

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Quantity of concrete in the work cu. m.	No.of samples
1 - 5	1
6 - 15	2
16 - 30	3
31 - 50	4
51 and above	5 Plus one additional sample for each additional 50m or part thereof

The test specimens shall be made from each sample for testing at 28 days. Additional cubes may be required for determining strength of concrete at 7 days. The test strength of the sample shall be the average strength of three specimens. The individual variation should not be more than 15 percent of the average.

Concrete shall be assessed daily for compliance. The contractor shall keep a record at site of all such tests identifying them with the proportion of the work to which they relate. The Architects will check this record from time to time. The said record shall give the following details and shall be initiated by the Engineer-in-Charge.

- (i) Reference to specific structural member receiving the batch of concrete from which the cubes were cast.
- (ii) Mark on cubes.
- (iii) Mix of concrete.
- (iv) Data and time of casting.
- (v) Water cement ratio by weight and slump.
- (vi) Crushing strength as obtained at the end of 7 days for 3 cubes out of a set of 6 cubes and the end of 28 days for the remaining 3 cubes.
- (vii) Laboratory in which tested and reference to test certificates.
- (viii) The quantity of concrete, incorporated in work that is represented by the quantity of concrete of the set of the cubes.
- (ix) Any other information required by Architects.

**(f) Consistency:**

The consistency of each sample of concrete shall be measured immediately after remixing by the slump test. The slump shall be as directed by the Engineer, which would be based on the preliminary test result keeping in view, the workability of the concrete. The approved slump shall be maintained through the field operations unless otherwise directed by the Engineer. In order to ensure the maintenance of uniform consistency, slump tests shall be carried out as often as demanded by the Engineer and invariably with the batch of concrete from which test cubes are made.

**(g) Record of Temperature:**

A record of maximum and minimum temperature at the places of storage of the cube shall be maintained, during the period they remain at site, by the Contractor.

**OPTIONAL TESTS:**

The Engineer, if he so desires, may order tests to be carried out on cement, sand, coarse aggregate in accordance with the Indian Code of Practice or any other approved code.

Tests on cement shall include:

- (i) Fineness Test,
- (ii) Test for Normal Consistency,
- (iii) Test for Setting Time,

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- (iv) Test for Soundness,
- (v) Test for Tensile Strength,
- (vi) Test for Heat of Hydration (by experiment and by calculations) in accordance with BIS or any other approved standard for cements.

Test on sand shall include:

- (i) Sieve Test
- (ii) Test for Organic Impurities
- (iii) Decantation Test for Determining Clay
- (iv) Specific Gravity Test
- (v) Test for Sieve Analysis and Fineness Modulus.

Tests on coarse aggregate shall include:

- (i) Sieve Analysis
- (ii) Specific Gravity and Unit Weight of Dry Loose and Rodded Aggregate (Bulk Density Test)
- (iii) Determination of Yield of a Dry Mixture
- (iv) Petrographic Examination of Deleterious Minerals in Aggregates.
- (v) Test for Aggregate Crushing Value and 10% Fine Value Test.
- (vi) Aggregate Impact Value
- (vii) Toughness Test
- (viii) Soundness Test
- (ix) Hardness Test
- (x) Alkali Aggregate Reaction
- (xi) Deleterious Material

Any or all these test would normally be ordered to be carried out, if the specified concrete strengths are not obtained, at the Contractor's cost. If the works cubes do not give the stipulated results, 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 the standard stipulated at his (Contractor's) cost. It shall be very clearly understood by the Contractor that no extra claims shall be entertained by the Owner for excess use of cement over the minimum quantity stipulated to give the works cubes of required strength. The unit rate for design and test cubes, works cubes, testing them as per specifications, optional tests etc.

Unless otherwise stipulated, the concreting, testing, etc. shall be carried out as directed by the Engineer and to the appropriate BIS Specifications. In the event of any work being suspected of faulty materials or workmanship or both, the Engineer before requiring its removal and reconstruction, may order, or the contractor may request, that it should be load tested in accordance with the following provisions.

#### **LOAD TEST ON MEMBERS OR ANY OTHER TEST:**

The test load shall be 125 percent of the specified super imposed load for which the structure was designed in addition to the full dead load (self weight of structure members plus weight of finishes and walls or partitions, if any as considered in the design). Such test load shall not be applied before 28 days after the time of placing of concrete.

During the tests, struts strong enough to take the whole load shall be placed in position leaving a gap under the members. The test load shall be kept for 24 hours before removal.

If within 24 hours of the removal of the load, the structure does not show a recovery of at least 75 percent of the maximum deflection shown during the 24 hours under load, the test loading shall be repeated after a lapse of at least 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 80 percent of the maximum deflection shown during the second test.

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If during the test, or upon removal of the load, the structure shows signs of weakness, undue deflection or faulty construction it shall be reconstructed or strengthened as necessary.

Any other test, e.g. taking out concrete cores, examination and test on such cores removed from such parts of the members in an approved manner and as directed by the Engineer shall be carried out by the Contractor at his own cost, if so directed.

#### **TESTING CONCRETE OF TANKS FOR LEAKAGE:**

In addition to the structural test given in clause above, structures (tanks, chests, pits, etc.) to be used for storage of liquids shall also be tested for water tightness at full storage level as described below:

(a) In case of structure whose external faces are exposed such as elevated tanks, the requirements of the test shall be deemed to be satisfied if the external faces show no sign of leakage or sweating and remain completely dry over the period of observation of seven days after allowing a seven days period for absorption after filling with water.

(b) In case of structures whose external faces are backfilled and are not accessible for inspection, such as underground tanks, the tanks shall be filled with water and after the expiry of seven days after the filling; the level of the surface of the water shall be recorded. The level of water shall be recorded again at subsequent intervals of 24 hours over a period of 7 days. The total drop in surface level over a period of seven days shall be taken as an indication of the water tightness of the tank. The Engineer shall decide on the actual permissible rate of this drop in the surface level, taking into consideration whether the tanks are open or closed and the corresponding effect it has on evaporation losses. Backfilling shall be withheld till the tanks are tested if directed by the Engineer

#### **Costs of Tests:**

The entire cost of tests as specified, in clause above shall be borne by the Contractor.

#### **Unsatisfactory Test:**

If the results of any test prove unsatisfactory, the Contractor shall remove and rebuild the member or members involved or carry out such other remedial measures as may be required by the Engineer or his representative. The Contractor shall bear the cost of so doing, unless the failure of the member or members to fulfil the test condition is solely due to faulty design.

#### **PLACING:**

The procedure for placing of concrete shall be as follows:

Preparation before placing of concrete shall be as given below.

##### **(i) Engineer's Approval of Equipment & Method:**

Before any concrete is placed, the entire placing programme, consisting of equipment, layout, proposed procedure and methods shall be submitted to the Engineer for approval if so demanded by the Engineer and no concrete shall be placed until the Engineer's approval has been received.

- (ii) Hardened concrete and foreign materials should be removed from the inner surface of the conveying equipments.
- (iii) Form work shall have been completed; snow, ice and water shall have been removed. Reinforcement shall have been secured in place, expansion joint material, anchors and other embedded items shall have been positioned and the entire preparation shall have been approved.
- (iv) No concrete shall be placed on watered surface.
- (v) Rain or Wash Water:

No concrete shall be placed in wet weather and any concrete that has been washed by heavy rains shall be entirely removed, if there is any sign of cement and sand having been washed away from the concrete mixtures. To guard against damage which may be caused by heavy rains, the works shall be covered with gunny bags immediately after the concrete has been placed in position on the surface of the newly placed concrete and shall be removed by approved means and no further concrete shall be placed thereon.

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a. **Time interval between mixing and placing:**

Concrete shall be placed in the forms within 30 (thirty) minutes as rapidly as practicable, after addition of water to cement and aggregate, unless otherwise authorised by the Engineer.

b. **Concrete placing by manual labour:**

Except when otherwise approved by the Engineer, concrete shall be placed in the shuttering by shovels or other approved implements and shall not be dropped from a height or handled in a manner, which will cause segregation. Accumulation of set concrete shall be avoided. Concrete shall be placed directly in its permanent position and shall not be worked along the shuttering to that position.

c. **Avoiding segregation:**

Concrete shall, in all cases, be deposited as nearly as practicable directly in its final position, and shall not be caused to flow in a manner, which will cause segregation, loss of materials and impair its strength. For locations where direct placement is not possible, and in narrow forms, the Contractor shall provide suitable drop chutes and "Elephant Trunks" to confine the concrete in movement.

d. **Concrete placing by Mechanical Equipment:**

The following specification shall apply where placing of concrete by use of mechanical equipment is specifically called for while inviting bids or is warranted considering the nature of the work involved.

The control of placing shall begin at the mixer discharge. Concrete shall be discharged by the vertical drop into the middle of the bucket or hopper and this principle of a vertical discharge of concrete shall be adhered to throughout all stages of delivery until the concrete comes to rest in the structures.

e. **Type of Buckets:**

Central bottom dump buckets of a type that provides for positive regulation of the amount and rate of deposit of concrete in all dumping positions shall be employed.

f. **Operation of Bucket:**

In placing concrete in large open areas, the bucket shall be spotted directly over the position designated and then lowered for dumping. The open bucket shall just clear the concrete already in place and the height of drop shall not exceed 1.00 M. The bucket shall be opened slowly to avoid high vertical bounce. Dumping of buckets on the swing, or in any manner which results in segregation of ingredients or disturbances of previously placed concrete will not be permitted.

g. **Placement in Restricted Forms:**

Concrete placed in restricted forms by borrows, buggies, cars, short chutes or hand shovelling shall be subject to the requirement for vertical delivery of limited height to avoid segregation and shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or falling.

h. **Chuting:**

Where it is necessary to use transfer chutes between mixer, containers or hoppers, and point of deposit in the forms, specific approval of the Engineer must be obtained as regards the type, length, slopes, baffles and vertical terminals. Concrete shall not be permitted to fall from the end of the chutes or tube more than 1.00 M. Chutes, when approved for use shall have slope not flatter than 1to3 and not steeper than 1to2.

i. **Placing by Pumping:**

Concrete may be conveyed and placed by mechanically operated pressure equipment only with the written permission of the Engineer. Water cement ratio may not be increased above that for the same class of concrete placed by bucket and the slump shall be held to the minimum necessary for conveying concrete by this method.

j. **Bonding Mortar:**

Immediately before concrete placement begins, prepared surfaces except formwork, which will be in contact with the concrete to be placed, shall be covered with a bonding mortar as specified.

k. **Thickness of Layers:**

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Concrete shall be placed in successive horizontal layers ranging in thickness from 15 to 90 mm. as directed by the Engineer the bucket loads, or other units of deposit shall be potted progressively along the face of the layer with such overlap as will facilitate spreading the layer to uniform depth and texture with a minimum of shovelling. Any tendency to segregation shall be corrected by shovelling stones into mortar then mortar on the stones. Such a condition shall be corrected by redesign of mix or other means, as directed by the Engineer.

**l. Bedding of layers:**

Bedding planes shall be approximately horizontal unless otherwise instructed.

**m. Compaction:**

Concrete shall be compacted with approved mechanical vibrating equipment until the concrete has been consolidated to the maximum practicable density, and is free of pockets of coarse aggregate, and fits tightly against all form surfaces and embedded materials.

**TYPE OF VIBRATORS:**

- (i) Vibrators shall be the internal or immersion high frequency type, with speed of not less than 6000 revolutions per minute when immersed in the concrete. Vibrators shall be used in sufficient number of units and power of each unit shall be adequate to properly consolidate the concrete.

**(ii) Use of Vibrators:**

Vibrators shall be inserted in a vertical position at intervals of about 600 mm depending upon the mix; the equipment used, and continued experience on the job. Vibrators shall be withdrawn slowly. In no case shall vibrators be used to transport concrete inside the forms.

**(iii) Successive Batches:**

In placing concrete in layers, which are advancing horizontally as the work progresses, great care shall be exercised to ensure adequate vibration, blending of the concrete between the succeeding batches.

**(iv) Vibrator Penetration of under layer:**

The vibrator shall penetrate the layer being placed and also penetrate the layer below while under layer is still plastic to ensure good bond and homogeneity between the two layers and prevent the formation of cold joints.

**(v) Vibrating Against Reinforcement:**

Care shall be taken to prevent contact of vibrators against reinforcement steel. Vibrators shall not be allowed to come in contact with reinforcement steel after start of initial set. Vibrators shall not be allowed to come in contact with forms of finished surface.

**(vi) Use of form attached Vibrators:**

The use of form attached Vibrators shall be used only with specific authorization of the Engineer.

**(vii) Use of Surface Vibrators:**

The use of surface vibrators will not be permitted under ordinary conditions. However, for thin slabs such as highways, runways, and similar construction surface vibration by specially designed vibrators may be permitted, upon the approval of the Engineer.

**(viii) Stone pockets and Mortar Poundage's:**

The formation of stone pockets and mortar poundage in corners and against form face shall not be permitted. If these occur, they shall be dug out, reformed and refilled to sufficient depth and shape for the rough blending, as directed by Engineer.

**CONSTRUCTION JOINTS AND KEYS:**

Concrete shall be placed continuously unless otherwise specified.

If stopping of concreting becomes unavoidable anywhere, the construction joint shall be made, where the work is stopped, concrete that is in the process of setting shall not be disturbed or shaken by traffic either on the concrete itself or upon the shuttering. Horizontal and vertical construction joints and bonding keys shall be

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located and shall conform in details to the requirements of the plans unless and otherwise directed by the Engineer. Where not described, the joint shall be in accordance with the following:

**(a) Column joint:**

In a column, the joint shall be formed 75 mm. below the lowest soffit of the beams joining to it.

**(b) Beam and Slab joint:**

Concrete in a beam shall be placed throughout without a joint but, if the provision of a joint is unavoidable, the joint shall be vertical and at the middle of the span. A joint in a slab shall be vertical and parallel to the principal reinforcement. Where it is unavoidable, the joint at right angles to the principal reinforcement, shall be vertical and at the middle of the span.

**CURING, PROTECTING, REPAIRING AND FINISHING:**

All concrete shall be cured by keeping it damp for the period of time required for complete hydration and hardening to take place.

Certain types of finish, or preparation for overlaying, concreting must be done at certain stages of the process and special treatment may be required for specific concrete surface finish.

**(i) Curing with water:**

Fresh concrete shall be kept continuously wet for a minimum period of at least 21 days since lapse of 24 hours after laying concrete. Quantity of water supplied shall be controlled so as to prevent the erosion of freshly placed concrete.

**(ii) Continuous Spraying:**

Curing shall be assured by use of an ample water supply under pressure in pipes, with all necessary appliances of hose (sprinklers to be used), unless otherwise specified or approved by the Engineer.

**(iii) Alternate Curing Methods:**

Whenever, in the judgement of the Engineer, it may be necessary, the continuous spray method may be omitted and a covering of sand, or other approved mulching such as wet gunny bags, which will prevent loss of moisture from the concrete, may be used. No type of covering will be approved which should strain or damage the concrete during or after curing period. Covering shall be kept continuously wet during the curing period.

**(iv) Curing compounds:**

Surface coating type-curing compounds shall be used only by special permission of and under the direction of the Engineer. Curing compounds shall be colourless / pigmented, liquid type, conforming to approved specifications. No curing compound shall be used on surfaces where future blending with concrete or painting is specified.

**(v) Ponding:**

For curing of concrete in pavement, sidewalks, floors, flat roofs or other level surfaces, the ponding method of curing is preferred. The method of containing the ponded water shall be approved by the Engineer. Special attention shall be given to edges and corners of the slabs to ensure proper protection to these areas. The ponded areas shall be kept continuously filled with water.

**(vi) Curing Equipment:**

All equipment and materials required for curing shall be on hand and ready for the use before concrete is placed.

**(vii) Protection of Fresh Concrete:**

Fresh concrete shall be protected by leaving forms in place for an ample period as specified later in this specification. Newly placed concrete shall be protected by approved means from rain, sun and winds. Steps as approved by the Engineer shall also be taken to protect immature concrete from damage by debris, excessive loading, vibration, abrasion or other materials etc. that may impair the strength and/or

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durability of the concrete. Workmen shall be warned against and prevented from disturbing green concrete during its setting period. If it is necessary that workmen enter the area of freshly placed concrete, the Engineer may require that bridges be placed over the area.

**(viii) Repair and Replacement of Unsatisfactory Concrete:**

Immediately after the shuttering is removed, the surface of concrete shall be very carefully one over and holes noticed shall be filled up and made good with mortar composed of one part of cement to one part of sand after removing any loose stones adhering to the concrete. Concrete surfaces shall be finished as described under the particular items of work. Superficial honeycombed surfaces shall be made good immediately after removal of shuttering, in presence of Architect's representative and superficial water and air holes shall be filled in. Unless otherwise instructed by the Engineer, the surface of the exposed concrete placed against shuttering shall be rubbed down immediately on removal of shuttering to remove fins or other irregularities.

Unsatisfactory concrete shall be cut out and replaced with new concrete, as soon as practicable after removal of forms. Anchors, tees, or dovetail slots shall be provided wherever necessary to attach the new material securely in place. Surface of prepared voids shall be wetted for 24 hours immediately before the patching material is placed. Use of an epoxy for blending fresh concrete used for repairs will be permitted upon written approval of the Engineer. Epoxies shall be applied in strict accordance with the instructions of the manufacturer.

**FINISHING - GENERAL:**

The specification is intended to cover the treatment of concrete surfaces of all structures. Area requiring special finish not covered by this specification may be clearly indicated on the drawings and specifications will be furnished.

**(a) Finish for Formed Surfaces:**

The type of finish for formed concrete surfaces shall be as follows, unless otherwise specified by the Engineer:

**(i) Cement plaster finish:**

The concrete shall be properly roughened immediately after the shuttering is removed, taking care to remove the laitance completely without disturbing concrete. The roughening shall be done by hacking. Before the surface is plastered, it shall be cleaned and wetted so as to give good bond between concrete and plaster.

- (ii) For surface against which backfill or concrete is to be placed, 'no' treatment is required except tie holes & repair of defective areas shall be patched with cement mortar.
- (iii) For surfaces below grade, which will receive waterproofing treatment, the concrete shall be free of surface irregularities, which would interfere with proper application of the waterproofing material, which may be specified for use.
- (iv) Surfaces which will be exposed when the structure is in service shall receive no special finish except repair of damaged or defective concrete, removal of fins and abrupt irregularities, filling of holes left by form ties and rods, and clean up of loose or adhering debris.

**(b) Finishing:**

Finishing of exposed concrete surface shall conform to the following.

**Smooth form finish:**

The form facing material shall produce a smooth, hard, uniform texture on the concrete; it may be plywood or other approved material capable of producing the desired finish. All ties, burns and fins are to be removed. Mix one part of Portland cement and one part fine sand with sufficient water to produce a stiff mortar. The mortar after drying shall match the rest of the surface in colour. Before application of mortar, concrete surface is to be dampened. Mortar is to be applied by firm rubber float or trowel, filling all surface voids. Compressing mortar into voids by using carborundum stone shall be continued till uniform colour and texture is produced. If the mortar surface dries too rapidly to permit proper

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compaction and finishing, apply a small amount of water with a sprayer. Quoted rate of exposed shuttering shall be inclusive of this treatment.

(c) **Finish for Unformed Surfaces:**

Surfaces which will be exposed to the weather and which would normally be a specified level, a horizontal surface or shows the slope required, the tops of narrow surfaces, such as stair treads, walls, curbs and parapets shall be sloped approximately 10mm in 300mm width, broader surfaces such as walkways, roads, parking areas and platforms shall be sloped about 1 in 50. Surfaces that will be covered by backfill or concrete, sub-floors to be covered with concrete topping, terrazzo or quarry tile, and similar surfaces shall be smooth screened and levelled to produce even surfaces. Surfaces which will not be covered by backfill, concrete or tile toppings such as outside desks, floors of galleries and sumps, parapet, gutters, sidewalks and slabs shall be consolidated, screened and flattened. Flattening may be done with hand and started as soon as the screened has attained a stiffness to permit finishing operations, and shall be the minimum required to produce surface uniform in texture and free from screened marks or other imperfections. Joints and edges shall be tooled as called for on the drawings or as directed by the Engineer.

(d) **Protection:**

All concrete shall be protected against damage until final acceptance by the Architect or his representative.

**CONCRETING IN HOT WEATHER:**

Concreting in extreme hot weather shall be avoided. Special care shall be exercised and measure undertaken when temperature on site exceeds 105° F or 40° C. Such measures shall include:

- (i) Provision of a shade for coarse aggregate so that the same do not absorb heat from the directly indenting rays of sun.
- (ii) Continuously wetting coarse aggregates to keep their temperature down, fog sprays.
- (iii) Providing a shade for the mixing machine.
- (iv) Depositing the concrete from the machine as quickly as possible.
- (v) Adjusting water proportions throughout the day to account for water in the wet aggregate, giving desired strength and workability.
- (vi) (Covering the deposited concrete by a membrane as soon after the placing as possible without damaging the fresh concrete.
- (vii) Wet gunny bags shall be laid immediately after two hours of concreting on the top surfaces of slab and shall be kept wet for curing period.
- (viii) Use of retarder (2% of Calcium Chloride).
- (ix) Use of Zero Heat Portland Cement or even the Portland Pozzolana Cement.
- (x) Use of higher water cement ratio.
- (xi) Keep moist, the formwork continuously for the period of 2 hours at least.

On such days of hot weather, concreting records shall be kept of the atmospheric temperature and corresponding temperatures of concrete discharged from the mixing machine.

**CURING OF DIFFERENT ITEMS:**

For all the time during construction, curing shall be carried out especially from 7.00 AM to 7.00 PM even on holidays with proper manpower, necessary pumps and pipe lines, connections, etc.

Exposed surfaces of concrete shall be kept continuously in a damp or wet condition by ponding or by covering with a layer of sacking, canvas, hessian or similar material and kept constantly wet for at least seven days from the date of placing concrete in case of OPC and at least 10 days where mineral admixtures or blended cements are used. The period of curing shall not be less than 10 days for concrete exposed to dry and hot weather conditions. In the case of concrete where mineral admixtures or blended cements are used it is recommended

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that above minimum periods may be extended to 14 days. For the concretes containing PPC or Portland Slag Cements, period of curing may be increased.

### **FORM WORK:**

#### **General:**

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

- (a) All forms shall be checked frequently during the concreting operations and until removed so that they may be driven up if any settlement occurs.

The design, fabrication and erection of formwork are solely the responsibility of the Contractor. The formwork should be safe and stable to withstand dead load of concrete, men etc. Further, the form should yield security to the structure or its members.

#### **(b) Materials:**

The selection of materials suitable for formwork shall be based on economy and consistency with safety and quality required in the finished work. Formwork shall be of timber, plywood, steel or any other materials as approved by Architect/Engineer-in-Charge whose decision in this respect shall be final. Props and shores shall be of steel, timber posts, bullies or any other material as approved by Architects.

- (c) Chamfer strips shall be placed in corner of forms to produce bevelled edges on permanent exposed surface, if specified.
- (d) Temporary openings shall be provided at the base of column forms and wall forms and at other points where necessary to facilitate cleaning and observation immediately before concrete is placed.

#### **(e) Mould Oil:**

Care should be taken to see that the formwork is perfectly cleaned and two coats of mould oil or any other approved material is applied before placing the concrete. Such coating shall be insoluble in water, non-staining and non-injuries to the concrete. It shall not become flaky or be removed by rain or wash water. Block boards or equivalent shall be used for shuttering columns, beams, etc. and steel sheets for slab shuttering will be allowed.

#### **(f) Chamfers and fillets:**

All concrete and angles exposed in the finished structure shall be formed with mouldings to form chamfers or fillets on the finished concrete. The standard dimensions of chamfers and fillets, unless otherwise specified, shall be 20 mm. Care should be exercised to ensure accurate mouldings. The diagonal face of the moulding shall be placed or surfaced to the same textures as the forms to which it is attached.

#### **(g) Vertical construction joint chamfers:**

Vertical construction joints on faces, which will be exposed at the completion of the project, shall be chamfered as above except where not permitted by the Engineer for structural or other reasons.

#### **(h) Reuse of Forms:**

Before reuse, all forms shall be thoroughly scraped, cleaned, joints examined and when necessary, repaired and the inside retreated to prevent adhesion, to the satisfaction of the Engineer. The Contractor shall equip himself with enough shuttering to complete the job in the stipulated time.

- (i) The contractor shall record on the drawing or a special register the date upon which the concrete is placed in each part of the work and the date on which the shuttering is removed there from. Striking of forms in the case of sides of beams, columns and slabs can be carried out after 24 hours of concreting. The striking of forms shall be done as para 2.12.4. Striking shall be done with utmost care without shock or vibration by gently easing the wedges. If, after removing the formwork, it is found that the timber is embedded in the concrete, it has to be cut out and made good with fine concrete. Due care shall be given to the provision of correct form work for holes and openings in the slabs, inserts, grounding cables,

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conduits and pipe sleeves, foundation or anchor bolts etc. as per approved drawings or as directed by the Engineer.

### **CLEANING AND TREATMENT OF FORMS:**

The forms shall be carefully examined to see that they are vertical and horizontal and the joints are properly closed. If forms are to be reused, they should be carefully examined before such reuse, properly aligned and open joints shall be repaired and coated with crude oil. The centring planks for columns shall be joined together and provided with threaded bolts and nuts.

The centring and props for the various members shall be fixed in a workman like manner to be approved by the Engineer-in-Charge. They shall be of such size as the Engineer-in-Charge thinks fit and proper. The centring shall be removed only after the permission has been obtained from the Engineer-in-Charge. Props shall be supported on wedges placed on planks and the planks shall be 25 mm thick.

All rubbish, particularly chippings, shavings and saw dust shall be removed from the interior of the forms before the concrete is placed and the form work in contact with the concrete shall be cleaned and thoroughly wetted or treated with an approved composition. Care shall be taken that such approved composition is kept out of contact with the reinforcement.

- (a) In columns of any forms where access to the interior is not available otherwise, a sufficient area of one side shall be left loose so that it may be removed for cleaning out all chips, dirt, sawdust and other extra materials.
- (b) Where the shoring bores on the ground, the Contractor shall spread the load from shores by suitable brick platforms in order to prevent settlement.

### **ARCHITECTURAL EXPOSED REINFORCED CEMENT CONCRETE:**

#### **(i) General:**

Generally specification for reinforced cement concrete work shall also apply to this type of work and additional specification set-forth below.

#### **(ii) Materials:**

- (i) Cement used for such work shall be of a uniform colour and obtained from one source of manufacture.

#### **(ii) Aggregate:**

##### **a) Fine Aggregates:**

Colour being an important consideration for exposed concrete, colour of sand used shall also be uniform through out the entire construction. Preferably total quantity required for the work shall be collected and well mixed together to a uniform shade.

##### **b) Coarse Aggregate:**

The colour of the aggregate shall be maintained the same through out. Unless otherwise specified, exposed concrete in walls, fences and parapets which are no-load bearing and are less than 120 mm. in thickness the maximum size of coarse aggregate shall be limited to 12 mm for which nothing extra shall be admissible. Flat and flaky pieces shall not be allowed.

#### **(iii) Reinforcement & Cover of the Concrete:**

Correct placing of the reinforcement with proper cover is important in all exposed work to avoid discolouration by rusting. The minimum cover specified in the Specification shall be maintained throughout.

Concrete blocks or spacers shall be sparingly used at exposed surfaces. When used, such blocks shall preferably be cast on vibrating tables or in some other similar manner so that it may match the concrete surface in texture and colour. Cover blocks of materials other than precast blocks shall not be allowed to be used.

#### **(iii) Construction of shuttering:**

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All centring and framework shall be rigid and of robust construction. All vertical props shall be cut square at ends and shall rest on double wedges, placed on continuous horizontal runners on firm natural soil. Resting of props or runners on made up soil shall not be permitted on any account. All members of the formwork shall be closely fixed without any gap between them so as to safeguard against any settlement or displacement of shuttering at the time of concreting.

i) **Timber Shuttering:**

Formwork for exposed work shall be of seasoned wrought hard wood timber planks free from loose knots. The planks shall be 50 mm thick, 100 to 125 mm wide with tongue and groove joints, assembled to a pattern approved by the Architect. The formwork shall be so constructed, braced, and stayed as to remain absolutely rigid and true during and after concreting. The boards shall be planed to a suitable thickness in order that the surface against the concrete shall not be broken at joints between boards. Chamfers, grooves, drips mouldings, bevelled edges etc. shall be made in the form itself to the size, profiles and details called for on the drawings.

ii) **Plywood Shuttering:**

The contractor shall provide shuttering quality plywood not less than 12 mm thickness as per IS.4990 (type-I) of approved make or equivalent approved by the Architect in place of timber plank shuttering mentioned above for such location as called for by the Architects. The joints in plywood shuttering shall be located as directed by the Architects. Shuttering, centring and form work for all exposed concrete work like exposed columns, beams, ribs, slabs, chajjas, fascia, walls etc. shall be of such finish and rigidity as to produce all faces fair and smooth, true to line level and plumb. No rendering or touching shall be permitted on these faces.

iii) **Steel shuttering:**

Steel shuttering for exposed concrete work shall be made of shuttering plates of standard sizes and to suit the pattern of exposed concrete indicated in Architect's drawings. The shutter plates used will be made of steel sheets strengthened at the edges and in middle to prevent sagging or any deflection and concrete deformity or dents and should fit with each other properly without any space or groove being left between adjacent plates to avoid and leakage of concrete slurry. If any concrete projects out between plates this will be neatly cut away.

The contractor shall be required to produce details of working showing the general construction of formwork and panels with details such as nail position and holes for supports that may be required; nail heads shall be positioned as instructed by the Architects. Grooves and chamfers shall be formed as shown on the drawings without any extra cost.

Any holes for the supports, which the contractor may need, shall be permitted only if approved by the Architects. All such holes shall be subsequently filled in carefully as to match with the other surface. Walls, columns etc. shall generally be cast to the full height in one operation and the formwork shall be provided accordingly. If permitted by the Architects, these may be completed in two or more heights when the formwork shall be carefully and correctly raised for further height so as to ensure a neat joint without disturbing the pattern. Any groove desired by the Architect at the joint shall be provided by the Contractor at no extra cost. .

(iv) **Coating for shuttering:**

Shuttering oil, colourless and emulsifiable in water shall be used for oiling the woodwork, when only a thin film shall be neatly applied avoiding collection at one place. Any mark left by the shuttering oil shall be washed clean.

(v) **Measurements and proportioning of concrete materials:**

This shall be as laid down generally for R.C.C. work. In no case extra dust or sand or additional water shall be allowed with the intention of getting better finish, which shall only be obtained by erecting centring as specified above and proper vibrating of the mix after placing. In no case, the slump limit, specified in the Specification shall be exceeded.

(vi) **Preparation for placing concrete:**

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Special care is essential to see that all saw dust, chips, nails or any foreign material is washed out or otherwise removed from the shuttering.

(vii) **Mechanical vibration:**

All concrete for exposed concrete work shall be vibrated, using needle vibrators -30/32 mm. Surface or trough vibrators may be permitted to be used for thin slabs. External vibrators for walls may be allowed but this shall be done carefully to safeguard the displacement of the shuttering. Vibrators shall only be operated by skilled labour; over or under vibration shall not be permitted. Any spillage, or leakage, which is unavoidable and which flows down the exposed concrete surfaces, shall be immediately washed away with clean water and brush. Exposed concrete members shall be finished to desired surface while the concrete is still green.

(viii) **Curing and protection of concrete:**

Curing will be done with clean water, so as not to discolour the concrete. All exposed concrete work shall be properly protected by Alkathene film, gunny bags, wooden boards etc. so the surfaces and edges are not damaged or discoloured till the entire construction is handed over, at no extra cost. All such damages shall be set right or replaced by the contractor at his own cost; the contractor is deemed to have considered this in quoting his rate.

(i) **Removal of shuttering:**

Striking and removing of formwork for exposed concrete shall be done very carefully without damaging the surface or edges. All such damages shall be set right or replaced by the contractor at his own cost.

(ii) **Finishing:**

Finishing of exposed concrete surface shall be as specified.

Exposed concrete surface shall on no account be permitted to any sort of repairs or patching after striking the formwork. In the event of any portion not coming up to standard, this shall be taken down by the contractor at no extra cost. Decision of the Architects as to the rejection of such work shall be final and binding on the contractor.

**STRIPPING TIME:**

In normal circumstances (generally where temperatures are above 20° C) and where Ordinary Portland Cement is used, forms may generally be removed after expiry of following periods:

Type of Formwork		Minimum Period Before Striking Formwork
(a)	Vertical formwork to columns, walls, beams	16 - 24 h
(b)	Soffit formwork to slabs (Props to be refixed immediately after removal of formwork)	3 days
(c)	Soffit formwork to beams (props to be refixed immediately after removal of formwork)	7 days
(d)	Props to slabs:	
	(a) Spanning up to 4.5 m.	7 days
	(b) Spanning over 4.5 m.	14 days
(e)	Props to beams and arches:	
	(a) Spanning up to 6 m	14 days
	(b) Spanning over 6 m	21 days

The number of props left under, their sizes, load and disposition shall be such as to be able to safely carry the full dead of the slab, beam or arch as the case may be together with live load likely to occur during curing or further construction.

However, this period may be increased or decreased at the discretion of Architects. In case when the cube strengths at seven days are found to be low or in the cases when other cements are used, the curing period and

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stripping time for forms and removal of props may have to be extended. This shall be decided by the Architect and the contractor shall not claim any extra costs for such increased periods of curing and stripping of forms etc. Special care shall be taken while removing the cantilever slab, canopies, portal frames, folded plates construction etc. Stripping time for such special structure as shell roofs etc. shall be determined from tests of stripping cubes taken especially for the purpose. These cubes shall give strength of 75% of the 28 days strength.

For rapid hardening cement 3/7 of the above period will be sufficient in all cases except vertical sides of slabs, beams and columns, which should be retained for 24 hours.

**Note:**

The props left under shall mean that the form work for slabs and beams soffits at 3 days and 7 days respectively can be removed only if the same can be done without disturbing the props which are required to support the slab or beam completely. In normal cases this will mean that period for removal of formwork for slabs and beam soffits will be 7 days and 14 days respectively.

**PROCEDURE WHEN REMOVING THE FORMWORK:**

All formwork shall be removed without such shock or vibration as would damage the reinforced concrete. Before the soffit and struts are removed, the concrete surface shall be exposed, where necessary, in order to ascertain that the concrete has sufficiently hardened. Proper precautions shall be taken to allow for the decrease in the rate of hardening that occurs with all cements in the cold weather.

**CAMBER:**

It is generally desirable to give forms an upward camber to ensure that the beams do not have a sag when they have taken up their deflection, but this should not be done unless allowed for in the design calculation of the beams.

**TOLERANCES:**

The Contractor shall, before putting any concrete in any unit, check all dimensions according to the drawing governing the accuracy of the dimension of all the units and the necessary formwork shall be approved by the Engineer-in-charge and if any error is found in dimensions, the Engineer-in-charge will not allow in any case more than the tolerances specified as below and any unit which does not comply will be liable to rejection at the discretion the Engineer-in-charge.

The formwork shall be designed and constructed to the shapes, lines and dimensions shown on the drawings within the tolerances as given below. The tolerances in footings apply to concrete dimensions only and no to positioning of vertical reinforcing steel or dowels.

(a)	Deviation from specified dimensions of cross sections of columns and beams	- 6 mm +12 mm
(b)	Deviation from dimensions of footings:	
	(i) Dimensions in plan	-12 mm
	(ii) Eccentricity	0.2 times the width of the footing in the direction of deviation but not more than 50 mm.
	(iii) Thickness	+0.05 times the specified thickness

**TRANSPORTING AND PLACING OF CONCRETE:**

The concrete shall be mixed in quantities required for immediate use and shall be deposited on the sub-grade/sub-base to the required depth and width of the pavement section in successive batches and in continuous operation without the use of intermediate form between the joints. Care shall be taken to see that no segregation of materials results whilst the concrete is being transported from the mixer to the place where it is to be deposited. The spreading shall be as uniform as possible to avoid re-handling of concrete. Where, however a certain amount of redistribution is necessary, it shall be done with shovels and not with the rakes.

While being placed the concrete should be rodded with suitable tools so that formation of voids or honeycomb pockets is prevented. The concrete shall be well placed and tamped against the forms and along all joints.

**COMPACTION OF FLOOR CONCRETE:**

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The concrete at the side of the forms and between the reinforcements at joints and at corners to be compacted with internal vibrator (needle vibrators) to avoid honeycombing and to get perfect compaction at these locations.

The vibrating screed shall rest on side forms and it shall be lowered vertically on the concrete surface, (evenly spread to an appropriate level above the base) to provide the required surcharge for compaction; allowed to remain in position for few seconds until compaction is completed, then lifted vertically and lowered on to the adjacent strip of un-compacted concrete. The amplitude of vibration of the screed shall not be less than 1.5 mm and speed of travel not more than 0.60 m per minute. The screed shall again be taken slowly over the surface, sliding with its axis slightly fitted away from the direction of sliding and operation repeated until the required dense, close knit textured finish surface is obtained.

**Notes:**Precautionary measures to be taken before starting concrete floor.

(a) The working of vibrators shall be regularly checked and standbys shall always be maintained for emergency use.

(b) The segregated particles of coarse aggregates which collect in front of the tamper or screed shall be thrown outside the forms. Under no circumstances shall such segregated particles be carried forward and pushed on to the base in front of the mass.

### **CONCRETE FLOOR FINISHING:**

Immediately after completing the compaction by screed vibrator and excess water has disappeared but while the concrete is still plastic, the floor top surface shall be tested for true-ness with a 3.65 M long straight edge (Aluminum Box Section).

The straight edge shall be held in successive positions parallel to the guide channels in contact with top surface of floor laid and the whole area gone over from the one side of the floor to the other. Advance along the floor shall be in successive stages of not more than one half length of straight edge. Any area of the depressions found shall be scooped to a depth of 40 to 50 mm filled immediately with freshly mixed concrete, struck, compacted and refinished. High areas shall be cut down and refinished. The straight edging and re-floating shall continue until the entire surface is found to be free from observable departures from straight edge and top surface has the required levelled surface.

The floor top surface shall be re-tested for trueness before the concrete begins to set with the 3.60 M long master straight edge (Aluminum Box Patti). Any irregularity in surface to be rectified.

### **PREPARATION OF SURFACE AND USE OF FLOOR HARDNER (FIRST DRY SHAKE):**

Following types of floor hardeners are used for increasing strength of concrete floors.

- Ironite based
- Silica / Quartz based
- Carborandum based

The quantity of floor hardener shall be used as specified by the Consultants (or as per manufacturers specification) and according to light / medium / heavy-duty floor as specified.

Scrap the concrete deposited, if any, on the top of side form during concreting. As soon as concrete is firm enough to support the weight of workmen and their equipment and no water is observed on surface; apply first shake of hardener evenly using 2/3 of total mix e.g. 2/3 of 7.5 Kg./Smt. Treat areas adjacent to walls and columns first, spread the materials evenly by sprinkling at right angles in two passes close to floor level. Do not broadcast (spread) the hardener from a station position but use a wooden scraper to spread the hardener. Alternatively, a mechanical spreader can be used for better application.

### **FLOATING: (With Finishing Machine Having DISC)**

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Power float the shake application promptly, work near wall, columns and door area first. Avoid excessive floating but ensure that the shake application is completely wetted and incorporated in to the base slab.

**C-6 Form work for “off the form exposed concrete surfaces having board marked pattern and time texture.”**

Relevant specification of form work above (**Given in C-5** above) shall be made applicable.

Concrete surface, which are to be “form finish shall be cast in an approved form work and shall be free from honey combined, fine, projections, and air holes. All external angles to form finish concrete surfaces shall be chaffed if and as directed. All interesting flush surfaces, surfaces horizontally or vertically between columns and beams of other structural members shall be separated by grooves if and as directed by the Engineer-in-charge.

The pattern of the form boards, the disposition of construction joints and lifts, and the incorporation of recessed or raised joints shall be carefully studied by the contractor for its proper implementation.

The contractor shall submit shuttering drawings and details of pattern and the method of forming joints in the exposed (form finish) concrete to the Engineer-in-charge. For his approval and all changes and modification specified by the letter shall be appropriated by the former and final approval whereof obtained from the Engineer-in-charge.

No work of form finished exposed concrete shall be carried out until the contractor has produced acceptable sample of shuttering and concrete to the approval of the Engineer-in-charge.

Utmost care shall be then be constantly exercised by the contractor in the :

- a. Design workmanships and fixing of form work.
- b. Control of concrete ingredients, mixing and placing.
- c. Adequate technical supervision of all process involved.

Listed below are some form work specifications, for form finished exposed concrete to be used on site as directed by the Engineer-in-charge.

**i. Smooth Board Surfaces :**

The smooth board marked surfaces are produced by new dressed tongued and grooved boards of uniform thickness of not less than 45 mm. These boards should be brought and dressed on both faces as well as on all side.

**ii. Rough Board Surfaces :**

A rough texture is obtained by the use of new sawn boards with dressed square edges.

**Steel Mould Surface:**

Steel moulds must be rigid enough are perfectly plane and clean. They must be painted with a protective point and absolutely free from rust or have a special section at their edges to prevent cement leakage and produce a water tight joint.

This type of form work is to be entrusted to a skilled and specialized manufacture who has produce satisfactorily similar form work and who must be approved by the Engineer-in-charge.

In all type of form work to form finished exposed concrete. Only non-staining mould oil supplied by an approved manufacturer will be used.

The repetitive usages of the same form work to cast form finished exposed concrete shall be as decided by the Engineer-in-charge and no case form work not guaranteed to produce the required form finish to the satisfaction of the Engineer-in-charge shall be used.

The exposed concrete shall have uniform finish. The finish of the concrete when shuttering and form work is removed will generally be without blemish and will be such as will not require touch up. Slight touch up a small work or two if necessary shall be carried out immediately on removal of form work by 1:1 proportions. This shall be carried out expertly on removal of form work with entire surface.

**C-7 Fabricating placing reinforcement in position :**

**Fabrication:**

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The reinforcement bars shall be out to be required length including necessary bends hooks, overlaps, etc. as shown on the plan or as directed by the Engineer-in-charge and shall conform to I.S. 2502-1963 or as revised from time to time. Details of length and bending diagrams shall be got approved from the Engineer-in-charge.

**Placing and Binding:**

All reinforcement shall be accurately placed in position with spacing as shown in the drawing and firmly held so during placing and setting of concrete. The bars shall be tied diagonally both ways, at all inter-sections with M.S. binding wire of 1.22mm or 1.63mm dia (16 or 18 gauge). Spot welding instead of tying brass by wires will be permitted by the Engineer-in-charge, if required. Spacing of bars shall be maintained by means of stays, blocks, tiles, spacers, hangers or other approved supports or devices at sufficiently close intervals.

All bars protruding from concrete to which other bars are to be spliced and which are likely to be exposed for indefinite period shall be protected from rusting by thin coat of cement wash.

**Welding:**

Welding (instead of overlaps) by gas or electricity will be permitted under suitable conditions and with suitable safe-guards. In case such permission is granted, relevant Indian Standards for welding of steel reinforcement bars including carrying out necessary tests shall be followed.

**Inspection:**

No concrete shall be deposited unless the Engineer-in-charge has inspected the reinforcement work, recorded measurements, and given permission to place the concrete. After the approval of the reinforcement by the Engineer-in-charge, it will be the contractor's responsibility to see that reinforcement is not disturbed from its position till the concreting is completed.

**C-8      Fixing Expansion Joints :**

The expansion joints shall be provided in R.C.C. structural members:

1. For the joints between twin internal beams of RCC frame structure, copper strip of 1.5mm thickness and width and shape as shown in the detailed drawing shall be placed near the bottom in the first beam such that one Kg. of the specified width is embedded in the beam and "U" fold (of 80mm depth unless otherwise specified) will come in the joint.  
The "U" shape gap of the copper strip shall be filled with poured bituminous joint filler and nearly finished on top. Before casting of the jointing member pre-molded bitumen joint filler or required thickness shall be placed in position as directed and concrete then cast, embedding the other leg.
2. The joint between the twin terrace beam shall be prepared in a manner similar to (1) above except that the raised concrete edge shall be provided and the copper plate shall be fixed in the raised edge as directed. It shall be covered by lead flashing 1.5mm thick fixed to one seat with copper screws to the wood blocks embedded in the concrete as shown in the detailed drawing.
3. For the joints between twin internal or external columns, while casting the first column, one leg of each of the copper strips of 1.5mm thickness shall be embedded into the column and "U" fold will come in the joints nearer the exterior faces of the column. The copper strips shall be fixed with hold fast of copper rod as shown in the detailed drawing. Before casting the second column pre-molded bituminous joint filler shall be placed against the face of the first column all along between the two steps as directed by the Engineer-in-charge.

**C-9      Constructing Brick masonry :**

**Classification of brick work :**

The bricks work shall be classified as first sort or second sort according as first class and second class brick respectively are used.

**Wetling of Bricks:**

Bricks required for masonry shall be thoroughly wetted with clean water for at least two hours before use or as directed by the Engineer-in-charge. The cessations of bubbles, when the bricks are wetted with water, are an indication of through wetting of bricks.

**Laying:**

Bricks shall be laid in English bond directed otherwise.

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Half or cut bricks shall not be used except when necessary to complete the bond. Closers in such cases shall be cut to required size and used near the ends of walls. A layer of mortar shall be spread on full width for suitable length of the lower course. Each brick shall first be properly bedded and set home by gentle tapping with handle or wooden mallet. It's inside face shall be flashed with mortar before the next brick is laid and pressed against it. On completion of course, the vertical joints shall be fully filled from the top with mortar.

The walls shall be taken up truly plumb. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical. Vertical joints in alternate course will generally directly one over the other. The thickness of brick courses shall be kept uniform. The bricks shall be laid with frogs upwards. A set or tools comprising of wooden straight edge, masons spirit level square half meter cub and pins string and plumb shall be kept on the site of work for frequent checking during the progress of work.

Both the faces of thickness greater than 23 cm shall be kept in proper plane. All the connected brick work shall be carried up nearly at the level and no portion of the work shall be left more than one meter below the rest of the work. Where this is not possible, the work shall be racked back according to bond (and not left toothed) at angle not steeper than 45 degrees.

All fixtures, pipes, outlets of water hold fasts of doors and windows etc. which are required to be built in wall shall be embedded in cement mortar.

#### **Joints:**

Bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not exceed 12 mm. The face joints shall be racked as directed by racking tool, daily during the progress of work, when the mortar is steel green so as to provide key for plaster or pointing to be done.

The face of brick work shall be cleaned on the same day the brick work is laid and mortar dropping shall be removed.

#### **Curing:**

Green work shall be protected from rain suitably. Masonry work shall be kept moist on all the faces for a period of seven days, the top of masonry work shall be kept well wetted at the close of the day.

#### **Scaffolding:**

The supports or scaffoldings shall be sound and strong tied together with horizontal pieces over which the scaffolding planks shall be fixed. Single scaffolding shall be allowed normally in this case inner end of the horizontal scaffolding pole shall rest in a whole header course only. Only one headed for each pole shall be left out. Such holes shall not however, be allowed in pillars under one meter in width. The holes left in masonry shall be filled and made good before plastering.

The contractor shall be responsible for providing and maintaining sufficient strong scaffolding so as to withstand all loads likely to come upon it.

#### **C-10      Construction of brick masonry partition walls :**

The partition walls shall be half brick.

(A) All the bricks shall be laid stretcher wise breaking joints with those in the upper and lower course. The wall shall be taken truly plumbed. All courses shall be laid truly horizontal and all of vertical joints will be truly vertical. The bricks will be laid with frog upwards. Fixtures, plugs holdfasts, frames of doors, windows etc. shall be housed in the brick work while laying only and at the correct levels and position. Holes of required size and shapes shall be left in the brick work for fixing pipes or service lines etc. After service lines etc. are fixed, the extra hollow left in the hole shall be filled with 1:3 cement mortar or 1:3:6 cement concrete. A set of mason's tools shall be maintained on work as required for frequent checking. The ends of walls shall be bonded into the side walls where necessary joints, curing and scaffolding shall be as per C-10 of code of practice.

(B) Laying 2 numbers of mild steel bars of 6mm diameter in brick masonry partition walls. Two mild steel reinforcement bars of 6mm diameter shall be used longitudinally at every fourth course of the brick work. The first reinforcement shall be placed on the top of bottom most course. The bars shall be fully embedded in the mortar and the end shall be properly bonded in the vertical joints of brick work or to the main wall as directed by the Engineer-in-charge. Bars shall be of length equal 45 times diameter of mild steel bars. The joints in the course, where reinforcement is placed, shall be admitted the mortar cover of at least 5mm in thickness of the reinforcement.

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**C-11      Constructing Brick Masonry Cavity Walls :****General:**

The cavity wall shall be constructed with 2 Nos. 90mm thick reinforced brick partition with cavity of 50mm in between wall shall be connected with metallic walls ties.

**Reinforced Brick Partition:**

Wall ties shall be of mild steel bars of 6mm dia of the shape as directed by the Engineer-in-charge. The wall ties shall be placed at not more than 800mm apart horizontally and not more than 500mm vertically and shall be placed staggered. Before placing the ties same shall be dripped in hot tar and sanded to protect from rust. The additional ties shall be placed at the opening.

**Construction:**

The bond used for each skin or leaf of a cavity wall shall be stretcher bond. Flemish bond or any other arrangement of bricks shall not be used during erecting of wall. Sufficient care shall be taken to keep the wall ties and cavity free from mortar dropping, 25mm thick and 40mm wide teak wood batten shall be placed across the wall ties and raised as each row of ties are raised for reducing the mortar dropping in the cavity. The temporary openings shall be provided to permit the daily removal of mortar dropping from the bottom of cavity. At the points where the two leaves of the hollow wall come into contact or above the lintels of doors and windows and at solid at jambs, necessary damp proof membrane of approved quality shall be provided as per the direction of Engineer-in-charge. Except as above the work in general shall be executed as per provision of I.S. 2212-1962 or as revised from time to time so far applicable.

**C-12      Preparing and fixing doors, windows and ventilators, teak wood paneled or Glazed or partly paneled and partly glazed.****General:**

The code covers the requirement of preparation of doors, windows, & ventilators with frames and their supply and fixing.

They shall be made on site of work only.

**Frames:**

All members of frame shall be exactly at right angle shall be checked from inside surface of the respective members.

All members of frames shall be straight without any warp and shall have smooth surface well planned on the three sides exposed at right angle to each other. The surface touching the wall may not be planned unless it is required in order to strengthen up the members or to obtain the overall sizes within tolerance as specified.

Frames shall have overall joints when ventilator is included it shall be provided by having full length one piece post for door or window and ventilator extending the frame on top of the head to the required extent. Horns shall not be provided in the head of the frame when no sills are provided the vertical post of the frame in the ground floor shall be embedded in the sill masonry for 100mm. On upper floors the vertical posts shall be fixed in the floor by forming notches 10mm deep. Slight adjustment of spacing as necessary shall be done to have the holdfasts in the joints of masonry course. The frame shall be done to have the holdfast in the joints of masonry course. The frame shall be erected in position to hold plump with strong supports from both sides and built in masonry as it is being built. The transom shall be thorough tenoned into the mortises of the jamb post to the full width of the jamb post and the thickness of the tendon shall be not less than 15mm. There shall be closely fitted into the mortise and suitably pinned with wood dowels not less than 10mm diameter. The depth of rebate for housing the shutter shall be as shown in detailed drawings or as directed by the Engineer-in-charge.

The contact surfaced or tendon and mortises shall be treated before putting together with an adhesive of approved make.

M.S. hold fasts shall be protected with a coating of primer. The surface of frame abutting the masonry or concrete a faces shall be properly treated by applying a coat of approved premier coal tar shall not be used for this purpose.

**Shutter:**

Paneled shutters shall be constructed in the form of timber frame work of styles and rails with panel inserted

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of type as specified in the item of work. Panel shall be fixed by providing grooves in the style and rail. The styles and rails shall be jointed to each other by mortise and tendon joint at right angles.

All members of the shutters shall be straight without any warp or bow and shall have smooth well planned faces of right angles to each other.

Styles and rails of shutters shall be made out of one piece only.

Schedule of fixtures and fastening for Doors, Windows, Ventilators, Wardrobe, and Cupboards.

Notations.

Da- Teakwood doors fully paneled or fully glazed or partly paneled and partly glazed.

Db- Bathroom & W.C. door with single shutter.

Si- Single shutter.

B- Breadth of door shutter.

T- Thickness of door shutter.

900mm & below

900 above 970 mm

Sr. No.	Particular of Fixture & Fastening.	Size in mm	Da. SI:B:900 T-38	Da. SI:B:900 T-38	Db.SI
1	Hold fast	150x16x3m	4	6	4
2	But hinges	10	3	3	3
3	Sliding door bolts	300x16 250x16	1	-	-
4	Tower bolts (Barrel bolts)	200x10	1	1	-
5	Tower bolts (Barrel bolts)	150x10	-	-	-
6	Door latch	260x16x5	1	1	1
7	Handles	100	2	2	2
8	Door stopper	75	1	1	-

#### **Timber Paneling:**

Thickness of the panel shall be as specified in item. When made from more than one piece, as shown in the drawing or as directed by the Engineer-in-charge, the places shall be finished as shown in the detailed drawings and shall be jointed with specified size of plywood filled. The end pieces of the panel and the top and bottom of the panel shall be provided with continuous tongue to frame into groove of the frame of shutter. An air space of 15mm will be left groove of frame of shutter while framing the panels in it.

The faces of the panel as well as various pieces of the panel shall be closely fitted to the side of the grooves.

Finishing of the corners of raised panel edges shall be done as shown on drawings or as directed by the Engineer-in-charge.

#### **Glass Paneling:**

The glass panels shall be embedded putty and secured to the rebate of wooden beads or moldings of shape and size as approved with counter sunk screws of suitable size.

#### **Fixtures & Fastenings:**

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All fixtures and fastenings shall be fixed with appropriate screws in sound and efficient manner to ensure easy operation. They shall be appropriately positioned and shall be truly horizontal or vertical as required.

Height of the shutter shall be such as not allow clearness of more than 6mm above the flooring level.

**C-13 Lime Brick bat Concrete :**

This shall be as per C-2 of code of practice. The brick bats shall conform to M-12.

**C-14 Glazing :**

The glass panels shall be properly cut to fit the rebates of the frames and sashes truly with a slight minus margin of about 1.5mm on all sides. Before glazing, the frames shall be primed and prepared for painting so that wood may not draw oil out of putty. The rebate shall be putted to an extent to provide bedding all around the glass edges.

The glass shall then be bedded in putty and fitted with wooden beads or molding as directed and secured with counter sunk screws.

The size of the rebate in the frame and size and shape of beads or moldings shall be as per detailed drawings or as directed by the Engineer-in-charge. The beads or moldings shall have mitered corners. The glazing in metal frame shall be done in the same way as in wooden frames. Except as stated above glazing in metal frames shall be done as specified in I.S. 1081-1960 or as revised from time to time.

**C-15 Oil Painting / Synthetic Enamel Painting :**

**Preparation of surfaces:**

The surface to be painted shall be thoroughly.

The screw shall be spaced not more than 100mm from each corner and not more than 200mm apart clean and rubbed smooth with sand paper to bring it to a true plane, when finished. No scratches from sand paper should be shown.

**Application:**

This shall be applied in 2 coats as per normal practice. After preparing surface as above one coat of white oil paint shall be applied as priming coat. After priming coat, all small holes, cracks, open joints and similar other minor defects of every kind shall be stopped with putty made from pure whiting mixed to the appropriate consistency with raw linseed oil little white lead being worked in after mixing to help in hardening of putty.

The work shall be little rubbed down smooth with sand paper and the consequent coats of paint of the specified shade approved by the Engineer-in-charge shall be applied. The paint shall be applied with brush. It shall be spread as smoothly as possible. Final coat shall be very carefully crossed and laid off, so that brush marks are not visible.. Each coat of paint shall be allowed to dry thoroughly and shall be little rubbed down for the next one is laid. Finished surface shall now show any hair marks, ridges or dry patches of paints and no puddles shall be left in the corner of panels' angle of molding etc.

**C-16 French Polishing :**

French polish to be used shall conform to I.S. 348-1968 in the requirement of quality.

**Preparation of surface:**

All unevenness shall be rubbed down to smoothness with sand paper and the surface shall be well dusted. The wood to be polished should be first painted with a filler by mixing whiting in hyphenated spirit to obtain a good glossy surface shall be again rubbed down perfectly smooth with paper.

**Application:**

The number of coats of polished to be applied shall be as specified in the item. On the wood work thus treated a thin coat of French polish shall be applied by a pad of woolen cloth covered by fine cloth. The pad shall be moisture with polish 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 on the face of the pad facilitates that operation. The surface shall be allowed to dry and the remaining coats applied in the same way to finish off the pad should be covered with a fresh piece of clean fine cloth, slightly dampened with mentholated spirit, and rubbed lightly and quickly with circular motions. The finished surface shall have a uniform texture and high gloss.

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**C-17     Laying in Situ Cement Concrete Flooring (I.P.S.) :**

The flooring shall be provided with ordinary cement concrete 1:2:4 (1- cement: 2- coarse sand & 4- graded stone aggregate 20 mm nominal size). The work of plain cement concrete 1: 2: 4 shall be carried out as per C-2 above. The thickness flooring shall be specified in the item of work.

The surface of the sub-grade shall be cleaned and all loose materials and moistened immediately before laying flooring.

The concrete shall be laid immediately after mixing white being placed, the concrete shall be vigorously sliced and spaced with suitable tools to prevent formation of voids or honey comp pockets. The concrete shall be brought to the specified levels by means of heavy straight edge resting on the side forms and drawn ahead with a sawing motion in combination with a series of lifts and drops alternating with small lateral shifts immediately after laying concrete the surface shall be checked for high or low sports and any needed corrections made up by adding or removing the concrete. After striking off the surface it shall be compacted with wooden float. The blows shall be fairly heavy in the beginning but as consolidation takes place light rapid strokes shall be given to complete the ramming. The floating shall be followed by steel traveling after concrete has hardened sufficiently to prevent excess of fine material from working to the surface. The finish shall be brought to a smooth and even surface free from defects and blemishes and tested with a straight edges. Dry cement or mixture of dry cement and sand shall not be sprinkled directly on the surface to absorb moisture or to stiffen the mix. After the concrete has dried, sufficiently to allow rendering to a thin floating coat of neat cement slurry uniformly floated.

If so specified in the item of a work approved mineral colour, pigment shall be added to cement mortar to give mortar rendering is sufficiently stiff lines may be marked on it so specified or directed. With strings or any other devices to give the appearance of 250 mm x 250mm tiles of any other size diagonally or square as directed. The junctions of floor with the walls shall be rounded off, if so directed.

**Curing:**

Curing shall start on the next day after finishing and shall be continued for fourteen days.

**C-18     Laying In-Situ Terrazzo Flooring :****Under layer of cement concrete:**

The under layer shall be laid as described in C-17 of the code of practice except that only black trap grit shall be used in place of coarse aggregate and no finishing shall be done to make the surface smooth. The compacted thickness of concrete under layer shall be as specified in the item. This layer shall be laid to the require level and grade. The top surface of the under layer concrete shall be kept sufficiently rough to form a key to the top layer.

Dividing strips shall be fixed on the base to the exact surface level of floor so as to divide the surface of the base into the required arrangement of panels. Anchorage arrangement shall be provided either by fixing 4 cms. Long cross nails through the strips or by cutting the edge as directed.

Before spreading the under layers the base shall be cleaned of all dirt laitance or loose material and than well wetted with water without forming any water pools on the surface it shall then be smeared with cement slurry just before the spreading of under layer.

After application of cement slurry, the under layer shall be spread and leveled with a

Screening board. This slightly rough surface left by the screening board will form a satisfactory key for the terrazzo.

**Mixing of Materials:**

Mixing shall be done manually in a tub. To avoid variation in colour the complete quantity of cement and pigment required for one operation shall be mixed at the beginning of the work and stored properly.

Where the different colour chips are used they shall be well mixed in required proportion of various colour and size. Coloured cement may be ready mix or properly mixed at site. White cement (with or without pigment as directed) or colour cement and marble powder shall be in the proportion of 3 parts of cement and 1 part of marble powder by weight. For every part of this marble mix, the proportion of the aggregate by volume shall be ½ parts.

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While mixing the aggregates care shall be taken not to get the materials into a heap as this would result in the coarsest chips failing to the edge of the heap and the cement working to the centre at the bottom. The materials shall be kept, as far as possible in an even layer during mixing.

After the materials have been through mixed in the dry state, water shall be added in small quantities; preferably in a fine spray while the materials are being proper consistency is obtained. The mixing shall be plastic but not so wet that it will flow; a rough indication for the addition of proper quantity of water in the mix is that it shall be capable of being molded when squeezed in hand without water flowing out. The mix shall be used in the work within half an hour of the addition of water during preparation.

#### **Laying Terrazzo Topping:**

Terrazzo topping shall be laid while the under layer is still plastic but it has hardened sufficiently to prevent cement from rising to the surface, this is normally achieved between 18 to 24 hours after the under layer has been laid. A cement slurry preferably of the same colour as the topping shall be brushed on the surface immediately before laying is commenced. If possible, the entire work of laying the topping shall be completed at one stretch.

The terrazzo mix shall be placed on the screed bed and be compacted thoroughly by tamping or rolling and toweling smooth. The time interval allowed between each successive toweling is important at only that much toweling which is just sufficient to give a level surface is needed immediately after laying. Further compacting shall be carried out at intervals, the amount depending upon the temperature and rate of set of the cement. Excessive trowelling or rolling in early stages shall be avoided as this will tend to work up cement to the surface which produce a finish liable to cracking and will also necessitate more grinding of surface to expose the marble chips.

The surface shall then be rammed in order to consolidate the terrazzo, it is not sufficient just to "float" lightly, as this would cause depression which have to be filled with mortar. A piece of smooth marble stone of size 15 cm x 2.5 cm may be advantageously used for ramming. Following the rammer a trowel may be used. When using the trowel, the object should be make the surface level smooth with a little use of the float as possible relying upon pressure rather than upon a trowelling action to achieve this end. Rolling will be easier than tamping and patting, but a rolled terrazzo is more like to crack since the roller would draw the cement to the surface unless the mixture is very dry. The best results will be obtained by tamping combined with a minimum of trowelling. The compaction shall ensure that air bubbles are cleared from the mix.

#### **Curing:**

The surface shall be left dry for air curing for duration of 12 to 18 hours depending upon atmospheric temperature conditions. It shall then be cured by allowing water to stand in pools over it for a period of not less than four days. Precautions shall also be taken to prevent the floor from being subject to extreme temperature.

#### **Grinding:**

The grinding processing and polishing of terrazzo may be commenced not less than 7 days from the time of completion of laying. The grinding shall be done by machine only. The filling shall be done with a grout using the same coloured cement (without marble powder) as it is original max for terrazzo topping and a portion of the coloured cement shall be kept for this purpose when the floor is laid and this will make sure that patches do not differ in appearance from the remainder of the floor.

After the first grinding is done, the surface shall be washed clean and grouted with neat coloured or white cement grout as the case may be of creak like consistency. It shall be allowed to dry for 24 hours and watered for 4 days. The second, third and fourth grinding shall be done in the above manner excepting that the grinding shall be done with finer carborundum stones as directed for each successive grinding.

The floor shall finally be washed clean with dilute oxalic acid solution and dried. In case wax polished surface is required by the Engineer-in-charge. The wax polish shall be sparingly applied with soft Indian on the clean and dry surface then the polishing machine fitted with bobs shall be run over it. Clean saw dust shall then be spread over the floor and polishing machine again applied, mopping us surplus wax and leaving glossy surface. Care shall be taken that the floor is not slippery.

#### **C-19 Laying and finishing of Marble / granite slab Flooring :**

##### **General:**

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The marble stone flooring shall be laid on the cement mortar bedding with neat cement finishing.

**Proportion of mix:**

The cement mortar bedding shall be as per **M-9** of specification of materials in 1:6 proportions of cement and sand by volume unless otherwise specified in item of work.

**Preparation of Bed of cement Mortar:**

The bed of cement mortar shall be laid on the compacted base to reasonably true plane surface and to the required slopes. Care shall be taken in preparing the mortar bed to ensure that there are no hard lumps that would interfere with the sub-floor or base shall be cleaned of all dirt, scum, or laitance and of loose materials and then well wetted without forming any pool of water on the surface. All points of level for the finished paying surface shall be marked out. The mortar shall then be evenly and smoothly spread over the base by the use of screed battens only over so much area as will be covered with slabs within half an hour. The thickness of the mortar bedding shall not be less than 20 mm and not more than 25mm. The required slope shall be given to the bed.

**Fixing stone slab:**

Before laying the marble stone slab shall be thoroughly wetted with water, neat cement grout of honey like consistency shall be spread on the mortar bed over as much area as could be covered with the slab within half an hour. Marble slab shall be laid on the neat cement float and shall be evenly and firmly bedded to the required level and slope on the mortar bed. Each slab shall be generally tapped with a wooden mallet till it is firmly and properly bedded. There shall be no hollows left. If there is a hollow sound on gently tapping of the slab such slab shall be removed and reset properly. The joints shall be of uniform thickness and in straight line. The joint shall not be more than 1.5mm thick and filled solidly with mortar, for their full depth. The joints shall be struck smooth but there shall be no smearing or mortar over the slabs. The slabs shall be laid so as to give continuous parallel long joint with cross joint at right angles to them. The edges of the adjoining slabs shall be in one plane when the slabs cover open edges of the floor or window, sills the edges shall be neatly rounded off.

**Pointing:**

When pointing is to be done the joints shall be pointed with cement screening of the colour matching the colour of the marble stone slabs. The cement mortar spread on the marble slabs shall be cleared immediately after pointing.

**Curing:**

The flooring shall be kept well wetted with the damp & or water fourteen days.

**Polishing:**

The polishing shall be done generally by polishing machine. After the floor is completely dry a hot mixture of turpentine and bees wax (4:1 by weight) shall be applied to the surface and rubbed clean with cotton waste.

Wherever big area of floor are to be tiled the level of the central portion of the floor shall be kept about 10 mm higher than the level marked at the walls unless specified otherwise.

**C-20 Laying Kotah stone flooring paving :**

**Bedding:**

Before spreading the mortar, the sub base of the floor shall be cleaned of all dirt, scum, and loose materials and then well wetted without forming any pools of water on the surface.

In case of R.C.C. floors, the top shall be left a little rough. All points of level for the finished surface shall be marked out. The mortar shall then be evenly and smoothly spread over the base. Bedding layer of cement mortar in proportion 1:6 or 1:3 shall not be less than 20 mm or 12 mm average.

**Laying:**

Before laying the stones, they shall be thoroughly wetted with water. Neat cement grout of required consistency shall be spread on the mortar bed. The stones shall be laid on the neat cement fiber and shall be evenly and firmly bedded to the required level and slope. There shall be no hollows left the joints shall be uniform thickness and in straight lines. They shall be filled solidly with a mortar / cement slurry for the full depth. The joints shall be struck smooth. But there shall be no smearing of mortar over the stones. When pointing is to be done, the joints shall be raked out for not less than the width of the joints while the mortar is steel green. The flooring

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shall be in true plane.

The thickness of joints shall normally be as follows unless otherwise specified or :

- (i) Polished kotah stone with fine chisel 1.55mm dressed edges.
- (ii) Rough kotah stone with dressed 8 mm to 12 mm edges.

**Curing:**

The flooring shall be kept wetted with damp sand or water for fourteen days. It shall be kept undisturbed at least for seven days.

**Cleaning:**

Flooring shall be thoroughly cleaned as directed by the Engineer-in- charge.

**Polishing:**

The polishing shall be done generally by polishing machine. After the floor is completely dry a hot mixture of turpentine and bees wax (4:1 by weight) shall be applied to the surface and rubbed clean with cotton waste.

Wherever big area of floor are to be tiled the level of the central portion of the floor shall be kept about 10 mm higher than the level marked at the walls unless specified otherwise.

**C-21 Laying Dholpur Stone paving :**

This shall be as per C-20 of code of practice as applicable to rough kotah stone. The stone in this case shall be Dholpur stone.

**C-22 Laying and finishing of cement concrete flooring tiles :**

The work shall be carried out as per IS 1443-1972 or as revised from time to time as far as is applicable.

**Bedding:**

Before laying the tiles they shall be thoroughly wetted with water. Neat cement grout of required consistency shall be spread on the mortar bed. The tiles shall be laid on the neat cement float and shall be evenly and finally bedded to the required level and slope as per pattern given during the execution of the work. There shall be no hollows left. The joints shall be of uniform thickness and in straight line as per the pattern.

**Joints:**

The flooring shall be kept wetted with damp sand or water for fourteen days. It shall be kept undisturbed at least for seven days.

**Polishing:**

After the tiles are properly cured, it shall be polished by machine and shall be waxed to give thoroughly polished even surface. If any part of the building like doors, windows etc. is spoiled or damaged, it shall be repaired to its original condition by the contractor at his own cost.

**C-23 Laying & Finishing to marble/granite skirting or dedo :**

The work consists of laying of marble stone slab, skirting or dedo in cement mortar.

**Preparation of surface:**

Before fixing marble stone slab on brick or concrete wall the wall surface shall first be wetted with water. Thereafter about 10mm thick backing of cement mortar in the specified proportion shall be applied on the surface in true line and level generally as per C-31 or practice.

**Fixing:**

The back of each marble stone slab, to be fixed shall be smeared with cement paste of matching colour and the marble stone slab shall then be gently tapped against wall with a wooden mallet. The skirting shall be done only after the flooring is completed. Any pipe coming out of the wall through the marble stone slab of dedo or skirting shall be approximately so positioned that its centre shall only be at the intersection of horizontal and vertical joints. The tiles shall not have staggered joints, the joints shall be true to centre line both way and the vertical joints shall be in line with the joint in the marble stone flooring. The joints shall not be more than 1.5 mm thick. Each marble stone slab shall be fixed as close as possible to the one adjoining and any difference in the thickness of the marble stone slab shall be even out in the cement paste. So that the entire tile faces are

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set in conformity with one another. The skirting shall project uniformly and not more than half the tile thickness beyond the finished surface above.

**Curing:**

Curing shall be done as per C-22 of Code of practice.

**Finishing:**

Skirting and dedo will be hand polished to have an even smooth and shining surface chamfering shall be done on the junction of cement plaster and cement tiles.

**C-24 Laying and finishing of kotah stone skirting or dedo :**

This shall be carried out as per C-20 of code of practice except that the skirting or dedo in this case shall be of polished kotah stone and joints shall be 15mm in case of stones with machine cut edges and 3 mm in case of fine chiseled dressed edges.

**C-25 Laying & finishing of in Situ Terrazzo Skirting or Dedo :**

Under layer of concrete mixing of materials laying terrazzo topping curing and grinding shall be as per C-18 of Code of practice except that the grinding will have to be done manually and the skirting / dedo shall not project more than 7mm and the plaster at the junction at top shall be leveled suitably.

**C-26 Laying & Finishing of cement concrete tiles skirting or dedo :**

This shall be carried out as per C-23 of code of practice except that the skirting or dedo in the case will be of cement concrete tiles and that joints shall be fitted in with slurry of matching colour cement.

**C-27 Laying White Glazed Tiles / Ceramic vitrified tiles flooring :**

**Bedding:**

Mortar shall give sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of bedding. The base shall be cleaned and well wetted. The mortar then shall be spread in thickness not less than 12 mm and not more than 20mm to have a required slope.

**Fixing Tiles:**

The tiles before laying shall be soaked in water for at least two hours. Neat cement grout of honey like consistency shall be spread over the mortar beddings as directed. The edges of the tiles shall be smeared with neat white cement slurry. The tiles shall be well pressed and gently trove with a wooden mallet till it is properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints between the tiles shall not exceed 1.0 mm.

The tiles shall not have staged joints. The joint shall be true to centre line both way. The nahn trap coming in the flooring shall be positioned that its grating shall replace only one tile. After fixing the tiles finally in an even plane, the flooring shall be kept wet and allowed to mature undisturbed for 14 days.

**Cleaning:**

The surplus cement grout that may have come out of the joints shall be cleaned off before it sets. Once the floor has set it shall be carefully washed cleaned by dilute acid and dire proper precautions and measures shall be taken to ensure that the tiles are not damaged any way till the completion of the construction work.

**C-28 Laying White glazed tiles / vitrified tiles skirting or dedo :**

This shall be carried out as per C-27 of code of practice except that the skirting or dedo in this case shall be of white glazed tiles and the edges of the tiles shall be smeared with and fixed in with neat white cement slurry.

**C-29 Laying Tar felt treatment :**

**General:**

The tar felting shall be done on smooth surface previously preparing for making them water proof and damp proof.

**Prepare of surfaces:**

The surface on which the tar felt is to be laid shall be cleaned with brush and all dust and foreign materials removed. Any cracks in the surface shall be cut to V- section, cleaned and filled up flush with cement and slurry or a suitable grade of bitumen or both.

**Laying:**

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The five layers of the treatment shall be laid as under.

**Premier coat:**

The first coat of bitumen primer shall be applied as directed by the Engineer-in-charge. The second and fourth coats shall be of hot blown bitumen of approved grade applied at the rate of 1.5 kg. Per sq.mtr.

The third layer shall be of the fiber base self finished felt. The felt shall be laid as mentioned below:

- (a) The felt shall be first cut to required length, brushed clean of dusting materials and laid out flat on a level, dry and clean surface.
- (b) After the surface has been prepared and cement rendering and the corner fillets have set and a primer coat has been applied, the strip of tare felt for laying is rolled up.
- (c) The rolled up felt is laid on one end of the floor, the hot bonding materials is prepared on to the floor in front of it across the full width of the felt, which is then unrolled gradually with a slight pressure to squeeze out the excess bitumen fit and final coat shall be of screened grave or grit laid at the rate of 0.008 cmt / sq.cmt.

The water proofing treatment shall be continuous through out as far as possible. However, where the points are unavoidable the minimum over lapping shall be 100mm and the joints shall be made perfectly water tight.

**C-30 Cement pointing :**

The joints shall be brushed clean of dust and loose particles with a stiff brush. The area shall be washed and the joints thoroughly wetted before pointing is commenced. The racking out of joint shall be 20mm deep. The surface shall be applied with two coats of Geru wash.

The racked out joints shall be filled with cement mortar as specified in the item. The mortar shall be of required consistency & well pressed and rubbed smooth. The pointing shall be flush or as directed by the Engineer-in-charge.

**C-31 Application of cement plaster finish :**

**Preparatory work:**

The smooth surface of concrete / masonry shall be suitable roughened to provide necessary bond. All dirt, swat, oil, or any others material that might interfere with satisfactory be shall be removed. The surface shall be cleaned and scrubbed with fresh water and kept wet for 6 hours prior to plastering. It shall be kept damp during the progress of the work.

**Gauge:**

Patches of plaster 150mm x 150mm shall be put on above 3 mtr. Apart as gauges to ensure even plastering in one plane.

**Plastering: (a) BASE COAT:**

In all plaster work, the mortar shall be firmly applied with some what more than required thickness and well pressed into the joints and the surface rubbed and leveled with a flat wooden rule to give required thickness. Long straight edges shall be freely used to ensure a perfectly plane and even surface. All corners shall be finished their true angles or founded as directed by the Engineer-in-charge. The surface shall be finished to plane or curved surface as shown on the plan or as directed by the Engineer-in-charge and shall present a neat appearance. The mortar shall adhere to the concrete surface firmly when set and there shall be no hollow when struck. Cement plastering shall be done in squares or strips as directed. Plastering shall be done from top down wards. All exposed angles and junctions with door frame etc. shall be carefully finished.

**(b) FINISHING COAT:**

Finishing coat shall be provided to the plaster as specified. A coat of cement slurry shall be applied to the plaster surface with a trowel to provide uniform texture while the base coat is still plastic. In any continuous faced of a wall, finishing treatment should be carried out continuously and day to day breaks made to coincide with architectural breaks in order to avoid unsightly injunction. All tools and accessories used in plaster work shall be cleaned by scraping and washing at the end of each day's works after use. Metal tools shall be cleaned after operation.

**(c) Watering & Curing:**

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All plaster work shall be kept damp continuously for a period of fourteen days.

**C-32 Application of Water proof cement plaster :**

The cement plaster of specified thickness shall be provided in cement mortar with integral cement water proofing compound of approved quality.

The plastering work of specified thickness shall be done as per C-31 of Code of practice. Except that while preparing the cement mortar, the approved water proofing compound at the rate 1 kg / 1 bag as per manufacturers specifications of cement shall be added while mixing the mortar. The contractor shall bring the water proof materials to site of work in their original packing the water proofing material shall be mixed in dry cement and sufficient care shall be taken while mixing to see that the water proofing materials gets integrally mixed with the cement and does not run out separately when water is added.

**C-33 Application of sand faced plaster :**

**Base coat:**

The base coat plaster shall be of cement mortar of specified properties and thickness. The base coat shall be laid in a similar manner of laying plaster as per C-31 of code of practice. However, instead of finishing the top surface smooth keys shall be formed on the surface by thoroughly combing it with way horizontal lines about 12mm apart and about 3 mm deep when the mortar is still plastics. The base coat shall be cured for minimum 2 days.

**Second coat:**

Second coat shall be cement mortar with specified kind of cement and specified preparation of thickness. The coat shall be applied evenly in true lines and level by using approved quality of coarse and the surface shall be finished with a wooden float. The necessary rubber sponge as approved by the Engineer-in-charge shall be applied over this coat to obtain the surface textures as per previously approved sample.

When the finishing coat has hardened, the surface shall be kept watered continuously for 14 days.

**C-34 Application of coloured cement plaster :**

The plaster shall be applied in two coats namely base coat and finishing coat. The base coat of thickness specified in the item shall be applied as per that under C-31 of Code of Practice. The finishing coat shall be thickness as specified in the item and shall be carried out as per that under C-31 of Code of Practice except that cement of colour and shade as approved by the Engineer-in-charge shall be used.

**C-35 Laying and finishing stone veneering / Lining :**

The code covers the requirement of preparing the Dholapur stone of machine polished machine cut edge for stone veneering, lining including laying and finishing.

The exposed veneering / lining face of the stones shall be double machine polished patches or streaks on the face shall not be allowed. The machine cut machine polished stones shall be provided with appropriate six rectangular groove on the top edge to receive one leg of gun metal cramp.

The groove shall be positioned centrally thickness wise or as directed by the Engineer-in-charge.

Circular holes of appropriate depth in the vertical edges shall be provided to receive 6mm diameter copper pin dowels of 75mm length. The holes shall be positioned as directed by the Engineer-in-charge.

The samples of stones prepared as above shall be first got approved from the Engineer-in-charge. In case wax polished surface is designed the wax polish shall be sparingly applied with soft linen on the clean and dry surface and clean saw dust shall then be spread over the surface, and the sample wax mopped up, leaving glossy surface. Care shall be exercised to see that the wax shall not at all stain the edges.

The stones shall be well wetted before laying while applying mortar for fixing the stones in position, no chips or filling of any short shall be used. The surface to be veneered shall be cleaned of all dirt, maintenances of loose materials and then will wet with water.

The stones shall be secured to the backing by channeled shape gum metal cramps, 30 cm long, 25mm wide and 6mm thick. The legs of the channel shall be 25 cm high. The adjoining stone shall be secured to each other by 6mm dia 75mm long copper pin dowels. The swamps and pin dowels shall be spaced not more than 600mm apart. The samples of pin, dowels and cramps shall be got approved form the Engineer-in-charge. One end of the cramp shall be positioned in the groove in the top edge of the stone and the other end in the joint of the

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brick masonry at the back.

The pin dowel shall remain inserted in the adjoining stone so that equal length remains in each stone.

The pin dowels and cramps shall be laid in cement mortar of cement and fine sand in proportions as specified in the item.

While laying face work all care shall be taken to see that the edges and corners of the stones are not damaged in any way and that the stone face are not disfigured or stained or any indentation formed on the face if any stone is damaged in any of the above way the same shall be replaced by unblemished and work redone.

The pattern of stone veneering shall be as per the detailed drawing or as directed by the Engineer-in-charge. Few samples of finished stone veneering shall be prepared by the contractor for the approval of the Engineer-in-charge. The work shall be carried out solely in conformity with the approved sample.

The backing joints shall be filled with cement mortar of appropriate proportion and shall be of thickness not more than 10 mm. All these joints shall be full of mortar if any hollow sounding is detected by tapping the stone this shall be taken out and re-laid properly without hollow. The backing joint shall be carried out simultaneously with the face work.

The thickness of the face joints shall not exceed 5mm or as directed by the Engineer-in-charge. The face joints shall be uniform through out. A uniform recess of 10mm depth from face shall be left with the help of steel plates sections. The cement to be used for face joints shall be of matching colour and shade as approved by the Engineer-in-charge.

In case of cement concrete backing, the stone shall be secured with backing after it has set and got cured. The cramps shall be fixed in concrete in the required position while laying.

The method of executing this work shall be got approved from the Engineer-in-charge in all its details such as scaffoldings, method of handlings transporting keeping in position of stones, manner and operational phasing of applying the back joints etc. in submitting the data, the contractor shall give due weight age and consideration to the fact that the work is to be carried out at a very great height and such other critical factors.

The curing shall be carried out continuously for 14 days and if possible curing may be carried out by providing perforated pipes horizontally laid.

The face work shall be cleaned off all mortar markings, stain etc.

The face joints of the veneering shall be neat, true to line i.e. perfectly horizontal and perfectly vertical. The face work shall be truly in plane. It shall present a neat appearance.

#### **C-36      Application of flat paint :**

The surface on which the flat paint is to be applied shall be thoroughly cleaned of all mortar droppings, dust, algae, grease, and other foreign matter by brushing. The holes and undulations shall be filled up with plaster of Paris and rubbed smooth. The surface so prepared shall be got approved from the Engineer-in-charge prior to painting work is commenced.

##### **Application of paint :**

##### **Primer coat :**

The specified primer shall be applied with brush in an uniform layer over the surface prepared as above.

##### **Painting coats:**

Flat paint shall be applied with brushes when the surface is dry, Paint shall be applied in even and uniform layers. The number of coats shall be specified in the item of work. Each coat shall be allowed to dry overnight and lightly rubbed with very fine grade of sand paper and loose particles shall be brushed off before the next coat is applied. The paint shall be applied evenly and smoothly by brushes with crossing and laying process. The crossing and laying process shall consist of covering the area over with paint and then painting alternatively in opposite direction two or three times and then finally painting lightly in a direction at right angle to the same. This entire process of crossing and laying shall constitute one coat.

No hair marks or clogging of paint puddle in corners etc. shall be left on the surface.

All wood work, glazing, floors etc. shall be protected by covering and stains, splashing, if any shall be removed and any damage done shall be made good by the contractor at his cost.

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**C-37     While Washing or Colour Washing :****White wash:**

Lime shall be dissolved with sufficient quantity of water (about 4 to 5 liters per kg. of lime) thoroughly mixed and stirred to attain consistency within screen. The wash shall be strained through a clean cloth. Clean colour dissolved in hot water shall be added in suitable proportion Indigo will be added to obtain required white tint.

**Preparation of Surface:**

The surface shall be prepared by removing the mortar droppings and foreign matter and thoroughly cleaned with a wire or fiber brush or any other suitable means as directed by the Engineer-in-charge. All loose pieces and scale shall be scrapped off and holes filled with mortar.

**Application of white wash:**

On the surface so prepared the white wash shall be laid with brush. The first coat shall be from top downwards, and similarly second coat shall be from the right to the left or to right. Each coat must be allowed to dry before the laid it shall present smooth and uniform finish free from brush marks and it should not come off easily when rubbed with finger.

Splashing and dropping, if any, on the doors, windows, ventilators etc. shall be removed and the surface cleaned.

**Colour Wash:**

Colour wash shall be prepared by adding necessary approved colour matter of the white wash which has been strained and prepared as above. Other provisions as mentioned in white wash shall apply for colour wash.

**C-38     Constructing Cooking Platform: (Kitchen, Pantry, Services etc.)**

The code covers constructing platform for kitchen service meant for other similar work purpose.

The cooking platform shall have following components.

**(a) Raised Masonry platform of specified height and width as required :**

The vertical face of masonry shall be covered with 12mm thick plaster. The top surface work, cement plaster and I.P.S. specified thickness. The masonry work, cement plaster and I.P.S. shall be as per C-9, C-31 & C-17 respectively of this code of practice.

**(b) Partition wall :**

Hall brick partition wall duly plastered on the faces as per detailed drawings or as directed by the Engineer-in-charge shall be carried out as per C-12 and C-31 of code of practice.

**(c) Cooking Platform Proper:**

This shall be of R.C.C. slab topped with Double polished Telephone black Granite Stone with exposed machine cut edges. The size of various components and kind of stone shall be as specified as per detailed drawings or as directed by the Engineer-in-charge.

The work of cement concrete and reinforcement for 75mm thick slab shall be executed as per C-4, C-6 and C-7 of code of practice.

The vertical exposed face of the slab shall also be veneered with matching stone. The top of the slab shall be suitably slopped towards sink as directed. The veneering shall be provided such that the edge of the veneering shall not be less than 10 mm above the finished surface of the platform.

**C-39     Application of Anti Termite Treatment :**

The purpose of providing the treatment is to create a chemical barrier between the ground from where the termites come and wood work cellulose material and other components of building, which may form food for the termite. The treatment is expected to provide complete chemical barrier all around, which will prevent the termite from reaching the super structure of the building and its contents, it may, therefore be understood clearly and distinctly that this is a very important treatment is to be given to the building and therefore has to be carried out through specialized firms only having established reputation and reputed past performance. The name of such specialized firms shall have to be got approved from the Engineer-in-charge. Use of chemical and method of treatment shall be as detailed below:

**(1)             Chemical and Preparation :**

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- (a) The chemicals used for soil treatment shall be any one or a combination of the following with the concentration shown against each in emulsion :

Chemicals	Concentration
Aldrin	0.51% (by weight)
Chlordane	1.0%
Dieldrin	0.5%
Heptachlor	0.5%

- (b) The dilution guide for preparing the emulsions is given below :

Emulsion liters				
Aldrin 30 EC	Dieldrin 18 EC	Chlordane 75 BC	Heptachlor 29 EC	20 EC
1267	2280	1000	500	2500

- (2) **Treatment of column pits, wall, trenches & basement excavation :**

The bottom surface and (up to a height of 300mm from the bottom) of the excavation made for column pits, trenches, and basements shall be treated with the chemical emulsion mentioned above at 5 lit. As per sq.mtr of surface area.

- (3) **Treatment to backfill earth :**

After the column foundation, wall foundation, and retaining walls of the basement come up the backfill in immediate contact with the foundation structure shall be treated with the chemical emulsion at the rate of 15 lit. Per sq.m. of the vertical surface of the structure for each side. The selected earth is to be refilled in layers and the treatment shall be carried out in similar stage. Chemical emulsion shall be directed towards the concrete or masonry surface of the columns and walls so that the earth in contact with this surface is well treated with the chemical.

- (4) **Treatment of top surface of plinth filling :**

After the earth filling is completed with plinth area and before dry sand packing of sub grade is laid, the entire surface of the filled earth shall be treated with chemical emulsion at 5 lit. per sq.m.

Light rodding of the surface may be carried out to facilitate proper absorption of the emulsion.

- (5) **Treatment at junction of walls and floor :**

Special care shall be taken to establish continuity the vertical chemical barrier on inner wall surface from the ground level (where it has stopped with the treatment described in 3 above) up to the level of the filled earth surface. To achieve this a small channel 3x3 cm 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 the ground level 15 cm apart and the rod moved backward and forward to break up the earth and chemical emulsion poured along the channel at the rate of 45 lit. per sq.m. of the area of the vertical surface of the sub-structure so as to soak the soil right to the bottom. The soil should be tamped back into place after this operation.

- (6) When the building is completed in all respects or when the plinth protection work is commenced. Whichever is earlier, the earth around the external perimeter of the building up to a depth of 30 cm. shall be finally treated at the rate of 4.5 liters per running meter of the plinth wall. To facilitate this treatment, solid M.S. rods should be driven into the soil as close as possible to the plinth wall at intervals of 15 cm. and up to a depth of 30 cm. and the rods

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moved backward and forward in a direction parallel to the wall to break up the earth so that the chemical emulsion mixes immediately with the soil.

(7) **Treatment of soil surrounded pipes wastes and conduits :**

When the pipes wet and conduits enter in side the area of the foundation, the soil surrounding the point of entry must be loose around in such pipe, waste of conduit for a distance of 15 cm. and up to a depth of 7.50 cm. before treatment is commenced. When they enter the soil external to the foundation, they shall be similar treated unless they stand clear of the walls of the building by about 7.5 cm. for a distance of over 30 cm.

(8) **Spraying Equipment :**

A pressure pump shall be used to carry out spraying operations to facilitate proper penetration of chemical into earth.

**Guarantee of Anti-Termite Treatment:**

The treatment against termite infestation shall remain fully effective for a period of not less than ten years from the date of issue of the final certificate of completion of the work. If at any time during this period, any defect in any part of the building or structure is noticed, the contractor shall have to rectify defects within fifteen days of receipt of the notice from Engineer-in-charge. On the contractor's failure to do so the Engineer-in-charge may get the same rectified through any other agency at the contractors risk and cost and the decision of the Engineer-in-charge as the cost payable by the contractor for the same shall be final and binding to the contractor.

A guarantee bond on appropriately stamped papers shall be given by the contractor to the department in the manner and form as prescribed below:

**Form of Guarantee Bond:**

I/We (contractor) hereby guarantee that the work will remain unexpected and will not be in any way damaged by white ant or any other germs of similar types for a period of 10 (ten) years after completion of the work of anti-termite treatment as per terms and condition of the contract and the contractor hereby identifies and agree to save harmless and GIDC from any loss and /or damage that might be caused on account of white ant and/or other similar type of germs and hereby guarantees to make good and loss or damages suffered by GIDC and further guarantees to redo the defective work without claiming any extra cost.

This guarantee shall remain in force for the period of 10 years from the completion of the work under the contract and it shall remain binding the contractor for the said period of 10 (ten) years.

The deposit at the rate of 5% of the cost of this item from the running and final bill shall be recovered and shall be refunded only after the completion of the guarantee period.

**C-40 Laying and fixing Galvanized Iron Pipes with fittings :**

The trench of laying the pipes shall be excavated true to lines and levels as shown on the plans or as directed by the Engineer-in-charge. The bed of the trench shall be made even. Unless otherwise specified as instructed by the Engineer-in-charge. The trenches shall be excavated 30 cms. Wide and not less than 45 cms. Deep. All pipes, water mains, cables etc. met in the excavation shall be carefully protected and supported. Any damages done shall be made good by the contractor at his own cost. The refilling work in the trenches shall be done in layers and shall be properly rammed except at joints. The refilling at joints shall be done after satisfactory testing of joints and on approval of the Engineer-in-charge. Suitable additional filling shall be done to account for subsequent settlement. Any surplus excavated stuff shall be disposed off as directed.

**Laying & Fixing:**

The completed lay out of the water supply system of the building shall be got approved from the Engineer-in-charge. The pipes shall be laid plumb, and in straight and parallel lines unless directed otherwise.

In making the joints few turns of line hemp smeared with white zinc shall be taken over the threaded end of the pipes and the socket shall be fastened with a pipe wrench. When the pipe is to be fixed clear to the walls, it shall be fixed with standard brackets or clips held by wooden blocks. The supporting brackets clips etc. for the pipes shall be spaced at an interval of 1 mtr. Or as directed.

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Whenever such pipe is to be taken through wall or slab, suitable square hole shall be driven in the wall or slab carefully without damaging the reinforcement or slab. After the pipe is laid, the hole shall be made good with cement concrete and cement mortar. Finishing shall be done similar to wall and slab finishing.

**Painting:**

The pipes laid under ground shall be painted with one coat of hot asphalt.

**Testing:**

On completion of laying the pipe line shall be tested for any leakage at the joints. The defects if any revealed after test shall be remedied to the satisfaction of the Engineer-in-charge.

**C-41 Fixing Wash basin :**

The code covers fulfilling of wash basin including assembling and fixing brass chromium plated pillar cock, cast iron cantilever brackets, rubber plug, chromium plated brass chain, chromium plated brass stop cock, chromium plated brass waste coupling 32mm diameter, P.V.C. bottle trap, P.V.C. connection etc.

The wash basin shall be fixed on the wall at the location and level as shown on the detail drawing or as directed by the Engineer-in-charge. The wash basin shall be supported on brackets fixed to the wall with wooden cleats and screws. The size of the brackets shall be as per detailed drawings or as directed by the Engineer-in-charge. The brackets shall be securely fixed to the wall and the basin fixed on the brackets.

The PVC bottle trap and union shall be fixed in the hole waste kept at the bottom of wash basin. It shall be ensured that the joints are water tight. This bottle trap shall be then coupled with the waste water pipe.

The waste pipe of required length shall run through the wall. If holes are not left in the wall, they shall be cut and the chase surrounding the pipe made good after fixing the pipe.

C.P. brass stop cock of required size shall be fixed in the supply line. PVC flexible pipe of required diameter shall be provided for supply of water from stopcock to pillar cock. The joints of PVC connections shall be made water tight. The pillar cock shall be fixed on the hole provided in the wash basin. Chain and rubber plug shall be fixed in the hole provided in the wash basin.

The exposed pipe & CI brackets shall be painted with one coat of red lead and three coats of approved oil paints as per C-15 of this code.

The wash basin shall be with one tap hole unless otherwise specified in the item or as directed by the Engineer-in-charge and the case when the tap holes are more than one, equivalent number of taps and allied provisions shall be provided & appropriately connected as directed by the Engineer-in-charge.

**C-42 Fixing Indian Type Water Closet :**

**(a) W.C. pan:**

The water closet pan shall be fixed into the place indicated on the drawing or as directed by the Engineer. The vent and soil pipe shall run through the holes left in wall and the wall made good. If holes not left in the wall, they shall be cut and the cavity surrounding the pipe made good properly after fixing the pipes. The pan shall be placed into position with the trap jointed in cement mortar 1:11 and the connecting pipes duly connected including the flush pipes from the flush cock. The jointing of cast iron pipes with the trap shall be with 1:1 cement mortar as directed.

Brick bat cement concrete 1.5:10 shall be cast and pressed around the embedded surface of the pan fittings and pipes to get a solid embedment without any hollows. The whole are for W.C. shall be provided with 1.5:10 blocks bat cement concrete. The pan shall be fixed at slightly lower level than the floor level of the general flooring which should slope on side towards the pan. The pan shall be fixed such that its top glazed ring around under the surrounding flooring shall be in the same level. After the flooring is completed the rectangular foot rests shall be fixed in cement mortar 1:1

**C-43 Fixing Orissa Type Water Closet Pan :**

The work shall be carried out as per C -41 of the code of practice except that the Orissa type water closet pan shall be provided instead of Indian type water closet pan and that the separate foot rests are not provided.

**C-44 Fixing European Type Water Closet:**

The European type water closet pan and the low level flushing tank shall be fixed at the places indicated on drawing of as directed by the Engineer-in-charge. The vent and soil pipe shall run through the holes left in the

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wall and floor. If the holes are not left in wall and floor, they will be cut. The cavity surrounding the pipes shall be made good properly after fixing the pipe. The pan shall be fixed into the position in cement mortar 1:1 (1-cement: 1-sand) with connecting pipe duly connected including flush pipe from the cistern. The joints at the lid then shall be fixed to the pan with chromium plated hinges. The brackets shall be painted with white enamel paint.

**C-45     Fixing of urinal :**

This code includes fixing of floor mounted wall type urinal necessary spreader arrangement chromium plated pipe connection with stop cock and C.P. brass tap etc. The wall urinal shall be fixed on to the wall as per the detailed drawing or as directed by the Engineer-in-charge in mortar. The floor slab in not shall be suitably sunk to receive the wall urinal. Where the floor slab is not sunk, the wall urinal shall be provided over platform. The lip of the wall urinal shall be flushed with the finished plan level adjacent to it. The wall urinal shall be laid over a fine sand cushion of average 25mm thickness. A space of not less than 3 mm shall be provided all around in front and side and filled with water proofing compound of approved quality.

The C.P. brass trap shall be fixed as directed by the Engineer-in-charge and the trap shall be connected with necessary C.I. waste pipe, the waste pipe shall run through the wall or outside of the wall if necessary.

C.P. brass stop cock of specified diameter shall be provided as shown in the detailed drawing or as directed by the Engineer-in-charge. Chromium plated flushing pipe of specified diameter and length shall be provided and fixed with the stop cock and spreading arrangement.

Spreading arrangement shall be made by providing a spreader nozzle at the end of flushing pipe.

**C-46     Fixing Nahni Trap :**

The Nahni trap with bend and pipe price up to the outside face of the wall and grating as specified shall be fixed as per drawing or instruction of the Engineer-in-charge. The joints shall be sealed with cement mortar.

The hole shall be kept in the floor and masonry if not left and the same be made good properly after the nahni trap and pipe are fixed. The nahni trap in the white glazed tiles flooring shall be positioned that its grating shall replace only one tile.

**C-47     Fixing of Gully Trap :**

The gully trap shall be set into 1:4:8 cement concrete extending 300 mm beyond the trap on three sides over which shall be constructed one brick masonry chamber of the dimensions indicated on the drawings or as directed by the Engineer-in-charge. The building wall will be the fourth side. The brick masonry shall be constructed in cement mortar 1:3. The inside shall be plastered with cement mortar 1:3. The top lid of pre-cast concrete cover of 40mm thickness of required size shall be provided on the chamber as directed. The trap in the chamber shall have cast iron grating.

**C-48     Fixing Cast Iron Pipes :**

The code covers fixing of pipes on walls, filling joints with cement mortar 1:1. Cast iron pipe shall be secured to the face of wall at all joints by standard holder bat clamp.

The bat clamps shall consist of a cast iron base with a projecting shaped lug, to the web of which the 2 semi circular halves of the flat iron clamps are bolted. The base of the holder bat clamps shall be screwed on a pair of wooden plugs fixed in the wall with wood screws driven through the holes in the base. The screws shall be not less than 75mm long for 80mm diameter pipe and 100 mm long for 100 mm dia pipe. The plugs shall be fixed in the wall to depth of 150mm in cement mortar 1:2 (1-cement: 2- fine sand) centrally to the holes in the base in the base of the bat clamps and with the front face projecting to such a length from the brick face that when the bat clamps is fixed the outer face of its base shall be flush with the plaster face of wall. The plugs shall be 110 mm x 50 mm wide at face increasing to 160mm x 70mm wide at rear and shall be 70 mm deep throughout.

**Laying of pipe & specials:**

The pipes before being laid, shall be examined to see that there are no cracks or defects. Care shall be taken to clean the pipes inside of the socket and outside of the spigot. Spigot of the upper pipe shall be properly fitted in the socket of the lower pipe. The depth of the annular space between socket and spigot shall be filled in with cement mortar 1:1. The joints shall be finished smooth and shall be flush with the top ring or the socket.

The joints of the horizontal pipes running below flooring shall also be filled with cement mortar 1:1. The joints

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ends of the pipe coming out of the wall shall be provided with required specials, such as Tees, “Y” bends etc. with or without inspection eyes as required and all the joints shall be filled with cement mortar 1:1 as above.

The pipe lines shall be truly vertical or to lines and slopping as directed and shall be at a uniform distance of 20mm from the finished face of the wall.

**C-49     Fixing Asbestos Cement pipes :**

The provision made in C-48 of code of practice shall be followed in this case also excepting the following changes:

- (1)     Instead of cast iron pipes, this code provides for fixing of asbestos cement pipes.
- (2)     The joints shall be filled in with stiff cement mortar 1:1 (1-cement: 1- fine sand) instead of lead joints.
- (3)     The joints shall be finished smooth at top at an angel of 45 degree sloped up with cement mortar and will be cured for period of 7 days by tying piece of gunny bags to the joints keeping it wet.

**C-50     Laying & stoneware pipe :**

**Excavation:**

The trench shall be excavated to the exact grading and 450mm wide or as directed by the Engineer-in-charge. The bottom of the trench shall be trimmed off to present a plane surface and excavation below joints shall be taken sufficiently deep so as to accommodate the socket of pipe and all irregularities shall be removed.

**Laying:**

Before laying the pipes all pipes and fittings shall be inspected and shall be rung with a light hammer to detect cracks. The pipe shall then be laid in trench to the alignment, levels and gradients as shown. The spigot end of one pipe shall be centered in the socket and of other pipe with socket up the gradient. The cutting of pipe for inseting fit or close pipe shall be done in neat and workmanship like manner.

**Jointing of pipe:**

The stoneware pipe shall be jointed with cement mortar 1:1 (1-cement: 1- sand). The jointing shall be done as follows:

In each joint spun yarn socked in a neat cement slurry shall be passed round the joint and inserted init by means of a caulking tool. Yarn so rammed as shall not occupy more than ¼ the of the depth of socket. Cement mortar 1:1 (1-cement: 1-sand) prepared as per M-11 of specification of materials. The mortar shall be slightly moistened and shall be inserted by hand into remaining space of the joint after yarn. The mortar shall then be caulked into the jointed with a caulking tool. More cement mortar shall be added until the space of the joint has been completely filled with tightly.

The joint shall then be finished off neatly outside the socket at angle of 45 degree.

**Curing:**

The cement mortar joint shall be cured for seven days.

**Testing:**

The pipe line shall be tested for leakage before refilling of the trenches etc.

**Back Filling:**

After satisfactory testing the trenches shall be back filled as per C-53 of code of practice.

**C-51     Constructing Inspection Chamber:**

This code covers excavation for foundation, laying of cement concrete bedding brick masonry wall with cement plaster on inside surface, cement concrete, benching (channel) fixing of inspection chamber frame and cover R.C.C. slab etc.

The inspection chamber shall be of size as specified in the item or as shown on the drawing or as directed by the Engineer. The various components shall be executed as detailed below.

**Excavation:**

The excavation shall be done as per C-1 of code of practice or as directed by the Engineer-in-charge so as to

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have at least 150mm offset from outside face of the brick masonry.

**Cement concrete:**

The bedding of 150mm thick cement concrete shall be done as per C-2 of code of practice.

**Brick masonry:**

One thick brick masonry wall in cement mortar 1:6 shall be done as per C-10 of code of practice.

**Benching:**

Plain cement concrete for benching (channel) of required thickness shall be done as per C-17 of code of practice.

**Cement plaster:**

Cement plaster work shall be carried out as per C-31 of code of practice, cast iron frame shall be fixed in the slab and then concrete shall be cast. Concrete work shall be finished with cement mortar 1:3 (1-cement: 3 sand)

**Pre-cast RCC slab with C.I. manhole cover & Frame:**

C.I. manhole cover shall be placed into the CI frame fixed in the slab. It shall be painted with one coat of red lead paint and two coats of black oil paint.

**Cement plaster:**

Cement plaster work shall be carried out as per C-31 of code of practice. Cast iron frame shall be fixed in the slab and then concrete shall be cast. Concrete work shall be finished with cement mortar 1:4 (1-cement: 4-sand).

**C-52 Filling in plinth with selected materials :**

The code provides for filling in plinth with selected materials lying and layers of uniform thickness, watering ramming etc.

The ground over which the filling is to be done shall be cleared of all grass, loose stones, rubbish of all kind as well as trees, roots of trees etc.

The approved selected materials shall be cleared of all rubbish; larger size stones etc clods broken down to a size of 59mm or less and conveyed to site of work of filling. The material shall be laid and layers of about 200mm as directed by the Engineer-in-charge. Each layer shall be watered and compacted with heavy hammers before the upper layer is laid till the final level is reached so as to form a thoroughly compacted base.

The process of filling in plinth, watering and compaction shall be carried out in such a way as not be endanger the foundation, columns, plinth, walls etc. already built up. Under no circumstances, black cotton soil shall be used for filling the plinth.

**C-53 Fixing of Steel Rolling Shutters:**

Fixing of rolling shutter shall be done in a workmanship like manner so that the operation of the shutter is easy and smooth. The hold fast shall be embedded in CC 1:2:4 (1-cement: 2- coarse sand: 4- graded stone) aggregate 20mm nominal size and shall be properly fixed with 100mm long catch bolts of 10mm. All the works disturbed of cut away shall be made good.

The guide channels, shall be attached to the jams in plumb and true either in the over lapping fashion, projection fashion or embedded in grooves, depending on the method of fixing.

The bracket plate shall be fitted at the centre. A “U” shape cast iron or mild steel clamp riveted or welded to it. Since the bracket plate carries the full load of the shutter it should have sufficient cross sectional area to resist the force and it shall be held in position rigidly by means of suitable foundation bolts. When the bracket is to fix on concrete the angle is suitable bent and fixed to the concrete beam of lintel with anchor bolts of at least 16x75 mm size. The pipes of the suspension shaft which are crimped to the bracket shall be fitted with rotted cast iron pulleys to which the curtain is attached. The pulleys and the pipe shaft be connected by means of pretension helical spring to counter balance the weight of the curtain and to keep the shutter in equilibrium in any partly opened position.

The hood cover shall be fixed to the bracket plate by means of angle cleats and supported at the top at suitable intervals for preventing sagging.

Rolling shutter shall be painted with two coats of approved oil paints of approved shades on anti-corrosive

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paint as directed by Engineer-in-charge.

**C-54 Fixing of Urinal :**

The fixing of flat back lip type urinal a wall include of PVC connection with stop cock and waste pipe etc.

Urinal shall be fixed on the wall as per the detailed drawing or as directed by Engineer-in-charge. Urinal shall be fixed to the wall wooden putty previously embedded in walls and screw of suitable size.

The C.P. brass stop cock shall be fixed as directed by the Engineer-in-charge and PVC connection of suitable length be provided and connected with G.I. pipe of water supply. PVC reducer shall be connected with PVC waste of specified size and fixed on wall properly with CI clamp, screw etc. The waste pipe run through the wall of outside of the wall as per instruction of Engineer-in-charge.

After fixing of urinal all the floor and wall shall be made good to the satisfaction of the Engineer-in-charge.

Fixing of remaining procedure shall be reversed.

**C-55 Fixing of Windows / Ventilators :**

Fixing of window and ventilators shall be done workmanship like manner. The hold fast shall be embedded in CC 1:2:4 of size 10 cm x 10 cm x 10 cm (1 cement: 2 coarse sand: 4 graded stone aggregate 20mm nominal size)

The window frame shall be erected in position and held plumb with strong support from both sides and built in masonry as it is being built.

The glass paneling shall be carried out as per C-14 of Code of Practice or as directed and oil painting shall be carried out as per C-15 of Code of Practice.

All fixtures and fastening shall be fixed with appropriate screws in sound and efficient manner to ensure ease of operation. They shall be appropriately positioned and shall be truly horizontal or vertical as required.

Oil painting shall be carried out with one coat of primer and 2 coats of approved oil paints of approved shade and shall conform to C-15 of Code of practice.

**C-56 Fixing of Door frame :**

Fixing of door frame shall be done in workmanship like manner. The hold fast shall be embedded in CC 1:2:4 of the size 10 cm x 10 cm x 15 cm (1- cement: 2 coarse sand: 4 graded stone aggregate 20mm nominal size).

The door frame shall be erected in position and held plumb with strong support from both sides and built in masonry as it is being built.

The shutter shall be prepared as per the detail drawing and shall conform to C-13 of Code of practice or as directed.

Timber/PVC/Aluminum paneling shall be carried out as per C-13 of Code of practice or as directed.

All fixtures and fastening shall be fixed with appropriate screws. Nos. of fixtures and fastening shall be provided as per C.

Oil painting shall be carried out with one coat of primer and 2 coats of approved oil paints of approved shade and shall conform to C-15 of Code of practice.

**C-57 Construction of Rubble Uncoursed Stone Masonry :**

Pucca approved stone of approved size for un-coursed rubble masonry shall be collected on site. The rubble shall be laid on broad faces. Earthy or dis-coloured weathered or weatherworn stone shall not be used.

The length of the stone shall not exceed three times the height and the breadth on base shall not be greater than three fourths of the thickness of wall nor less than 15 cm. The height of stone for rubble masonry may be up to 30 cm.

Stone shall be hammer-dressed on the face, the sides and the beds to enable it to come in proximity with the neighboring stone. The bushing on the face shall not be more than 40 mm. on an exposed face.

Chips and spalls of stones shall be used wherever necessary to avoid thick mortar beds or joints and it shall be ensured that no hollow spaces are left anywhere in the masonry. The chips shall not be used below hearting stones to bring these upon level of face stones. The use of chips shall be restricted to the filling of interstices between the adjacent stones in hearing and these shall not exceed 20 percent of the quantity of a stone masonry.

The hearting or interior filling of a wall face shall consist of rubble stone not less than 150mm in any direction

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carefully laid hammered down with a wooden mallet in the position and solidly bedded in mortar. Treating should be laid nearly with facing and backing.

Though bond stones shall be provided in the walls up to 60 cm. thick, in case of highly absorbent type of stone (Limestone or sand stones) the bond stone shall extend about 2/3 in the wall. Each bond stone shall be provided for every of 0.5 m<sup>2</sup> of the wall surface.

Quoin stone shall not be less than 0.03 m<sup>3</sup> in volume.

The plum stone at about 90 cm. interval shall be provided.

The masonry shall be laid with or without courses as the case may be as per general requirement. The quoins shall be laid header and stretcher alternatively. Every stone shall be carefully fitted to the adjacent stone so as to form neat and close joint. Face stone shall be extend and bond well in the back. These shall be arranged to break joints as much as possible and to avoid long vertical lines of joints.

The cement mortar or proportion as specified in the item shall be spread over width and the stone shall be well embedded in it. Joints in the surface shall be carried out in line level plum and of dimensions as mentioned in the drawing. The stone shall be used only after spreading plenty of water over it. No side filling shall be done without obtaining permission of Engineer-in-charge. The work shall be kept wet at least fourteen days.

**C-58      Filling of plinth with selected sand :**

The code provides, for filling in plinth with sand of approved quality, laying in layers of uniform thickness, watering ramming etc. The ground over which the filling is to be done shall be cleared of all grass, loose stones, rubbish of all kind, as well as trees, roots of trees etc. The approved quality of sand shall be cleared of all rubbish and shall be conveyed to site of work of filling the sand shall be laid in layers, of about 200mm as directed by the Engineer-in-charge. Each layers shall be watered and compacted with heavy rammer before of the upper layers is laid, till the final level is reached, so as to form a thoroughly compacted base.

The process of filling in plinth, watering and compaction shall be carried out in such a way as not to endanger the foundation columns, plinth walls etc. already built up.

**C-59      Application of Water proofing cement paint :**

The surfaces shall be thoroughly wetted with clean water before cement water proofing paint is applied. Cement paint shall be prepared by adding paint powder to water and stirring to obtain a thick paste, which shall then be diluted to a brushable consistency. Generally, equal volumes of paint powder and water make a satisfactory paint. In all cases, the manufacturer's instruction shall be followed. The paint shall be mixed in such quantities as can use of within a hour of mixing as otherwise the mixture will set and thickness, affecting flowing and finish. The libs of cement paint drums shall be kept tightly when not in use. To maintain the uniform mixture and to prevent segregation, the paint shall be stirred frequently in the bucket. For undecorated surface, the surface shall be treated with minimum two coats of water proof cement paint. Not less then 20 hours, shall be allowed between two coats. Next coat shall not be started until the preceding coat has become sufficiently hard to resist marking by the brush being used if hot dry weather, the preceding coat shall be allowed between two coats. Next coat shall not be started until the preceding coat has become sufficient hard to resist the marking by the brush being used. In hot dry weather, the preceding coat slightly moistened before applying the subsequent coat. The finish surface shall be even a uniform in shade, without patches, brush masks, paint drops etc. The cement paint shall be applied with a brush with relatively short stiff hob or fiber bristles. The paint shall be brushed in uniform thickness and shall be free from excess heavy brush mark. The lamps shall be well brushed out. The water proofing cement paint shall not be applied on surface already treated with white wash, colour wash, distemper, dry or oil bound varnishes paint etc. It shall not be applied on gypsum, wood and metal surface. Painted surface shall be sprinkled with water two or three times a day. This shall be done between coats and for at least two days following the final coat. The curing shall be started as soon as the paint has hardened so as not to be damage by the sprinkling of water say about 12 hours after the application.

**C-60      Construction of bela or block in course rough dressed stone masonry:**

The work shall be carried out with pucca approved white stone bela of uniform size and well dressed. Earthly or discolored, weathered or water worm stone shall not be used. The size of bela stone to suit the width of wall, shall be as directed by the Engineer. The corner stones and quoins shall be of good quality stones

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dressed to correct angle.

The cement mortar of proportion specified in the item shall be spread for full width of wall. The stone shall be placed in it. Joint in the surface shall be flushed or raked out 20mm deep during construction as directed by Engineer. The work shall be carried out, in line, level, and plumb & of the dimensions as mentioned in the drawing. The stones shall be used only after spreading, plenty of water over it. The work shall be kept wet for at least 14 days. The scaffolding shall be provided as per C-9 of code of practice.

**C-61      Application of plastic emulsion paint :**

The work of preparing the surface shall be carried out as per C-36.

The scaffolding work shall be carried out as per the C-9.

**Preparation of mix:**

This shall be done as per the Manufacturer's instruction. The thinning of emulsion is to be done with water and not with turpentine. The quantity of thinner to be added shall be as per Manufacturer's instruction or as directed by the Engineer.

**Application:**

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

The paint shall be laid on evenly and smoothly by means of crossing and laying of the crossing and laying of consist of covering the area over with paint, brush the surface hard for the first time over and then brushing alternately in opposite direction two or three times and then, finally brushing lightly in a direction at right angles to the same. In this process, no brush marks shall be left after the laying of is finished. No hair marks from the brush clogging of paint puddles in the corner of panels, angle of moldings etc. shall be left on the work. The full process of crossing and laying off will constitute one coat.

The paint shall be applied with brush or rollers. For undercoated surface, the surface shall be treated with minimum two coats of cement water proofing paint. The second or substitute coat shall not be started until the preceding has before sufficiently hard to resist marking by brush being used.

The surface on finishing shall present a flat velvety smooth finish. It shall be even a uniform in shade without patches, brush marks, paint drops etc.

**Precautions:**

Old brushes, if they are to be used with emulsion paints, shall be completely dried of turpentine oil paint by washing in warm soap water.

Brushes shall be quickly washed in water immediately after use and kept emerged in water during break period to prevent the paint from hardening of the brush.

In the preparation of wall for plastic emulsion painting, no oil base putties shall be used in filling cracks, holes, etc.

Splashes on floors etc. shall be cleaned out without delay as they will be difficult to remove after hardening.

The washing of surface treated with emulsion paint shall not be done within 3 to 4 weeks of application.

**C-62      Fixing of Asbestos cement corrugated sheet roofing:**

Fixing accessory such as J-bolts, L-bolts, roof washers etc. shall conform to IS – 730-1956.

The sheet shall be laid with a side lap of half corrugation. For normal roof pitches (that is inclinations greater than or equal to 18). The end laps in sheet shall not be less than 150mm. For low roof pitches (that is inclinations less than 18) or for normal pitched on roof exposed positions the end laps shall be increased.

The side lap shall as far as possible be sheltered from the prevailing wind direction. The free over-hang at eaves measured as the length of sheet from its lower edge to the center of bolt holes shall not be more than 300mm for 6mm thick and 400mm for 7mm thick sheets.

Wherever four corners of sheets overlap to of them shall be mitred in order to secure a perfect fit.

All A.C. sheets shall be stored and protected from any damage.

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No persons other than workman employed shall be permitted access to any area over which the sheeting is being laid.

Ridge purlins shall be fixed with suitable type of bolt 75mm to 115mm from the apex of the roof.

Sheets shall be cut as necessary with a wood saw. Holes in the sheets shall be drilled; they shall on no account be punched. The holes for fixing shall be 2mm larger than the diameter of the fixing bolts, and shall always be drilled through the crown of the corrugation and not on the valleys. No hole shall be nearer the 40mm to any edge of a sheet or an accessory.

Galvanized iron J-type hook bolts or cranked hook bolts, and nuts bearing on galvanized iron washers and bitumen washers shall be used for fixing sheets on angle iron purling.

It is essential that the bolts holes are made water tight by the use of bituminous felt washers in conjunction with suitable galvanized iron washers.

The length of bolts shall be 75mm longer than the depth of the purling for single sheet fixing and 90mm longer than the depth purling where two sheets overlap or where ridges or other accessories are to be fixed with the sheet. The number and length of bolts and number of bitumen and galvanized iron washers for fixing asbestos cement corrugated sheet shall be as given in table below.

**Number and Length of Bolts and Number of Bituminous Felt and galvanized iron washers.**

Sr.No	Situation	No. of Bolts and Bituminous washers and Galvanized Iron washer.	Length of bolts.
i	At horizontal (end) laps of sheets at eves when filler pieces are used. At rigid non- corrugated sheets and ridge pcs. Are secured by the same bolts.	Twice the number of sheets in one horizontal course	Depth of purling plus 90mm
ii	At eves when filler pieces are not used at ridge when corrugated sheet and ridge pieces are not secured by the same bolt.	Twice the number of sheets in one horizontal course	Depth of purling plus 75mm
iii	At intermediate purling where horizontal laps do not occur.	Twice the number of sheets in one horizontal course	Depth of purling plus 75mm.

Asbestos cement corrugated sheets shall be laid starting at the caves, either from left to right or from right to left depending upon the prevailing direction of the wind. If laid from left to right, the first sheet shall be laid uncut, but the remaining sheets in this bottom row shall have the top left hand corners cut or mitred. The sheet in the second and other intermediate rows shall have the bottom right hand corner of the first sheet cut all other sheets except the last sheet shall have both the bottom right hand corner and top left hand corner cut; the last sheet shall have only the top left hand corner cut. The last or the top, row sheets shall have the bottom right hand corner cut with the exception of the last sheets which shall be laid uncut. If the sheets are laid from right to left the first sheet shall be laid uncut and the remaining procedure shall be reversed.

**C-63 Structural steel work**

All steel shall be tested and Indian approved manufacturers. One sample would with exact dimensions of all the members of the truss shall be got approved by the Engineer before erecting and fixing the same. Welding shall be properly done to the exact length and shall be got approved by the Engineer and welding shall conform to IS – 816-1956 or as revised from time to time. This items including providing, supplying, fabricating and

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erecting the same in proper position.

The entire steel surface shall be made clear and free from rust, scales, dust etc. before painting. All the steel work shall be painted with one coat of anti-corrosive paint and two coats of approved enamel paint and shade complete as directed.

There shall be no holes left after welding. The welding shall be carried out by welders, well experienced in the job and possessing certificate. The cutting should be smooth and the steel shall be made perfectly straight as required. The bolts, nuts, washers, etc. used shall be of best approved quality. After welding is done the welding surface shall be made clear by removing all the flux by chipping hammer wire brush.

The entire steel structure after erection shall be in perfect line and level and plumb and shall structure after erection shall be in perfect in line and level and plumb and shall be approved by the Engineer-in-charge before the sheeting work is started.

### **GENERAL SPECIFICATIONS**

- (1) All materials to be used shall conform to the relevant specifications as per the latest edition of Indian Standard, unless otherwise stated in the detailed specifications of items of work.
- (2) Wherever a reference to any Indian Standard appears in the specification, it shall be taken to mean as a reference to the latest version of the standard.
- (3) The following specifications, standards, and codes are made a part of this specification\Tender document.  
**Indian Standards:** specification for building materials, specification for equipment, method of test, method of measurement of building works, code of practice for construction, safety code for demolition of building, safety code for scaffolds etc. published by the Bureau of Indian Standards
- (4) The contractor shall invariably carry out Materials & work Tests as specified in the **Schedule "D"** attached with tender documents and IS code. However, if the additional tests are required as per the opinion of the Engineer-in-charge, the same shall also have to be carried out. All such tests shall be got carried out in Government or as approved laboratories and cost thereof shall be entirely borne by the contractor. No collection of materials shall be made before it is got approved from the Engineer-in-charge.
- (5) Collection of approved materials shall be done at site of work in a systematic manner. Materials shall be stored in such a manner as to prevent deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness for the work.
- (6) Materials, if rejected by the Engineer-in-charge, shall be immediately removed from the site of work. If they are not removed within twenty-four hours of receiving such intimation, Engineer-in-charge shall get the same removed at contractor's cost.  
The Engineer-in-charge shall dispose of such materials in a manner as he chooses and the contractor shall not entitle to any compensation for the cost of such materials.
- (7) Approval to the samples of various materials given by the Engineer-in-charge will not absolve the contractor from the responsibility of replacing the defective material brought on site of materials used in the work found defective at a later date. The contractor shall have no claim to any payment or compensation whatsoever on account of any such materials being rejected by the Engineer-in-charge.
- (8) The contractor shall be responsible for observing the law, rules and regulations imposed under the "Minor Minerals Act "and such officer laws and rules prescribed by Government from time to time.

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**SCHEDULE D**  
**MATERIAL TESTING SCHEDULE**

**CONTROL TEST & THEIR MINIMUM FREQUENCY**

SR.NO.	TYPE OF CONSTRUCTION & MATERIALS.	TEST		FREQUENCY
1	E/w for embankment with excavated stuff / selected soil having MDD not less than 19.5 KN / m <sup>3</sup>	1)	M.D.D. Test	As Required.
		2)	Moisture content prior to compaction.	One Test per 200 m <sup>3</sup>
		3)	Density of compacted layer.	One test per 500 m <sup>3</sup>
		4)	Deleterious constituents.	As required.
2	Cement	1)	Physical & chemical test. IS – 269,455,1489, 8112 & 12269.	Once for each source of supply and occasionally when called for in case of long/improper storage, Besides, the Contractor also will submit daily data on cement released by the Manufacturer.
3	Sand	1)	Silt content	1 sample per 150 m <sup>3</sup>
		2)	Fineness modules.	1 sample per 150 m <sup>3</sup>
		3)	Gradation	1 sample per 150 m <sup>3</sup>
4	Course & fine aggregates.	1)	Gradation IS: 2386 (Part-1)	One test for every day's work of each section of course aggregate and fine aggregate as above or as approved by Engineer-in-charge.
		2)	Deleterious constituents IS: 2386 (Part-2)	-do-
		3)	Water absorption IS: 2386 (Part-3)	Regularly as required to a minimum of one test a day for course aggregate and two tests a day for fine aggregate and as directed by Engineer-in-charge.
5	Bricks	1)	Compressive strength	<b>1 Test / 50000 No. (5 bricks)</b>
		2)	Water absorption	
6	Course aggregate	1)	Los angles abrasion value of aggregate impact value IS: 2386 (Part-4)	Once for each source of supply and subsequently on monthly basis.

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SR.NO.	TYPE OF CONSTRUCTION & MATERIALS.	TEST		FREQUENCY
		2)	Soundness IS: 2386 (Part-5)	Before approving the aggregates and every month subsequently
		3)	Alkali aggregate reactivity IS: 2386 (Part-7)	-do-
7	Water		Chemical test IS: 456	Once for approval of source of supply subsequently only in case of doubt or as directed by the Engineer-in-charge.
8	Concrete	1)	Strength of concrete IS: 516	As per frequency tests shown on the page No. 19 of B-1 agreement attached herewith.
		2)	Course strength on hardened concrete IS: 516	As per the requirement of Engineer.
		3)	Workability of fresh concrete – Slump test IS: 1199.	One test per each dumper load at both Batching plant site and paving site initially when work starts. Subsequently sampling may be done from alternate dumper.
		4)	Thickness determination	From the level data of concrete pavement surface and sub-base at grid points of 5/6.25 m x 3.5 m
		5)	Thickness measurement for trial length.	3 cores per trial length
		6)	Verification of level of string line (SWD PCC lining work) and sub structure and structure (Head wall for CD works)	String line or steel forms shall be checked for level at an interval of 5 mtr. Or 6.25 mtr. The level tolerance allowed shall be +/- 2mm. These shall be got approved 1-2 hours before the commencement of the concreting activity.

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SR.NO.	TYPE OF CONSTRUCTION & MATERIALS.	TEST		FREQUENCY
9	M.S./H.Y.S.D./TMT bars	1) 2) 3)	Ultimate tensile strength Yield stress (Proof stress) Percentage elongation	1 sample / 40 MT for each diameter.
10	Cement concrete cubes	1) 2)	Compressive strength for 7 days Compressive strength for 28 days	1 samples / 1-5 M3 2 samples / 6-15 M3 3 samples / 16-30 M3 4 samples / 31-50 M3 4+1 samples for each additional 50 M3 or part thereof.
11	Cement mortar	1)	Compressive strength	As per the requirement of Engineer

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## ITEM WISE DETAILED SPECIFICATION

**Item No:01:- Excavation for foundation up-to 1.5 m depth including sorting out and stacking of useful materials and disposing off the excavated stuff up-to 3.00 km lead.(A) Loose or soft soil**

**1.0. General:**

1.1. Any soil which generally yields to the application of pickaxes and shovels, phawaras, rakes or any such ordinary excavating implement or organic soil, gravel, silt, sand turf loam, clay, peat etc., fall under this category.

**2.0 Clearing the site :**

2.1 The site on which the structure is to be built shall be cleared and all obstructions, loose stone, materials and rubbish of all kind, bush, wood and trees shall be removed as directed: The materials so obtained shall be property of the Government and be conveyed and stacked as directed within 3.00 km lead. The roots of the trees coming in the sides shall be cut and coated with a hot asphalt.

2.2 The rate of site clearance is deemed to be included in the rate of earth work for which no extra will be paid.

**3.0 Setting out:**

After clearing the site, the centre lines will be given by the Engineer-in-charge. The contractor shall assume full responsibility for alignment, elevation and dimension of each and all parts of the tractor shall assume full responsibility for alignment elevation and dimension of each and all parts of the work. Contractor shall supply labourers, materials, etc. required for setting out the reference marks and bench marks and shall maintain them as long as required and directed.

**4.0 Excavation :**

The excavation in foundation shall be carried out in true line and level and shall have the width and depth as shown in the drawings or as directed. The contractor shall do the necessary shoring and shutting or providing necessary slopes to a safe angle, at his own cost. The payment for such precautionary measures shall be paid separately if not specified. The bottom of the excavated area shall bevelled both longitudinally and transversely as directed by removing and watering as required. No earth filling will be allowed for bringing it to level, if by mistake or any; other reason excavation is made deeper or wider than shown on the plan or directed. The extra depth or width shall be made up with concrete of same proportion as specified for the foundation concrete at the cost of the contractor. The excavation up-to 1.5 m. depth shall be measured under this item.

**5.0. Disposal of the excavated stuff :**

5.1. The excavated stuff of the selected type shall be used in filling the trenches and plinth or levelling the ground in layers including ramming and watering etc.

5.2. The balance of the excavated quantity shall be removed by the contractor from the site of work to a place as directed with lead up-to 3.00 km and all lift.

**6.0. Mode of measurement and payment:**

6.1. The measurement of excavation in trenches for foundation shall be made according to the sections of trenches shown on the drawing or as per sections given by the Engineer-in-charge. No payment shall be made for surplus excavation made in excess of above requirements or due to slopping and sloping back as found necessary on account of conditions of soil and requirements of safety.

6.2. The rate shall be for a unit of **one cubic metre**.

**Item No:02:- Excavation for foundation for depth from 1.5 m to 3.0 m including sorting out and stacking of useful materials and disposing off the excavated stuff up-to 3.00 km lead (A) Loose or soft soil**

**1.0. Workmanship:**

1.1. The relevant specifications of item No. 1.0.0. (A) shall be followed except that the excavation work shall be carried out in loose or soft soil with lift 1.5 M. to 3.0 M.

**2.0 Mode of measurement and payment:**

2.1. The relevant specification of item No. 4.0.0. (A) shall be followed.

2.2. The excavation work of lift 1.5 M. to 3.0 M. shall be measured under this item.

2.3. The rate shall be for a unit of **one cubic metre**.

**Item No.03:- Providing & laying CC 1:3:6 (1- cement : 3 -coarse sand : 6- M/c stone aggregate 20 mm nominal size) in foundation concrete incl. machine mixing, ramming, consolidation & curing etc. complete incl. cost of form work if required etc.**

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**1.0 Materials:**

Water, shall conform to M-1. Sand shall conform to M-6. Cement shall conform to M-3. Stone aggregate 40 mm. nominal size shall conform to M-12.

**2.0 Workmanship:**

General: 2.1.1.

Before starting concrete bed of foundation trenches shall be cleared of all loose materials, levelled, watered and rammed as directed. Proportion of Mix: 2.2.1. The Proportion of cement, sand and coarse aggregate shall be one part of cement, 3 parts of sand, 6 parts of stone aggregates and shall so measured by volume Mixing: 2.3.1. The concrete shall be mixed in a mechanical mixer at the site of work. Hand mixing may however be allowed for smaller quantity of work if approved by the Engineer-in-charge. When hand mixing is permitted by the Engineering-charge in case of break-down of machineries and in the interest of the work, 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. However such cases 10% more cement than otherwise required shall have to be used without any extra cost. The mixing in mechanical mixer shall be done for a period 1 to 2 minutes. The quantity of water shall be sufficient to produce a dense concrete of required workability for the purpose.

**3.0 Transporting & Placing the concrete :**

The concrete shall be handled from the place of mixing to the final position in not more than 15 minutes by the methods directed and shall be placed into its final position, compacted and finished within 30 minutes of mixing with water i.e. Before the setting commences. 1.4.2. The concrete shall be laid in layers of 15 cms. to 20 CMS. Compacting: 2.5.1. The concrete shall be rammed with heavy iron rammers and rapidly to get the required compaction and allow all the interstices to be filled with mortar.

Curing : 2.6.1. After the final set, the concrete shall be kept continuously wet, if required by ponding for a period of not less than 7 days from the date of placement.

**4.0 Mode of measurement and Payment:**

The concrete shall be measured for its length breadth and depth, limiting dimensions to those specified on plan or as directed.

The rate shall be for a unit of **one cubic metre**.

**Item No.04:- Providing & laying controlled cement concrete M-200 exposed work for RCC works incl. machine mixing, vibrating, scaffolding, curing incl. cost of form work but excluding cost of reinforcement etc. complete for all levels**

**1.0 Materials**

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Grit shall conform to M-8 Course aggregate shall conform M-12.

**2.0 General**

The relevant specification of item No. 5.4.1. of ordinary concrete shall be followed except that the concrete mix shall be designed from preliminary tests. The proportioning of cement and aggregates shall be done by weight and necessary precautions shall be taken in the production to ensure that the required work cube strength is attained and maintained. The controlled concrete shall be in grades of M-200 with prefix controlled added to it. The letter M refers to mix and the numbers specify 28 days works cube compressive strength of 150 mm. cubes of the mix expressed in Kg./Cmt.

The proportion of cement, sand and coarse aggregate shall be determined of weight. The weight batch machine shall be used for maintaining proper control over the proportion of aggregates as per mix design. The strength requirements of different grades of concrete shall be as under:

Grade Concrete	Compressive strength of 15 cms. cubes in Kg./Cmt. at 28 days, conducted in accordance with I.S. 516-1959. Preliminary test Min.	Work test Min.
M-150	200	150
M-200	260	200
M-250	320	250

In all cases, the 28 days compressive strength specified in above be the criteria for acceptance or rejection of the concrete. Where the strength of a concrete mix as indicated by tests, lies in between the strength of any two

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grades specified in the above table, such concrete shall be classified in for purpose as concrete belonging to the lower of the grades between which its strength lies.

### 3.0 Workmanship

The proportions for ingredients chosen shall be such that concrete has adequate workability for conditions prevailing on the work question and can be properly compacted with means available except where it can be shown to the satisfaction of the Engineer-in-charge, that supply of properly graded aggregate of uniform quality can be maintained till the completion of work, grading of aggregate shall be controlled by obtaining the coarse aggregates in different sizes and bending them in the right proportions as required. Aggregates of different sizes shall be stocked in separate stock piles. The required quantity of material shall be stock piled several hours, preferably a day before use. The grading of coarse and fine aggregate shall be checked as frequently as possible, the frequency for a given job being determined by Engineer-in-charge to ensure that the suppliers are maintaining the uniform grading as approved for samples used in the preliminary tests.

In proportioning concrete, the quantity of both cement and aggregate shall be determined by weight. Where the weight of cement is determined by accepting the maker's weight per bag, a reasonable number of bags shall be weighted separately to check the net weight. Where cement is weighted from bulk stocks at site and not by bags, it shall be weighed separately from the aggregate. Water, shall either be measured by volume in calibrated tanks or weighed. All measuring equipment shall be maintained in clean, and serviceable condition. Their accuracy shall be periodically checked.

It is most important to keep the specified water cement ratio constant and at its correct value. To this end, moisture content in both fine and coarse aggregates shall be determined by the Engineer-in-charge according to the weather conditions. The amount of mixing water shall then be adjusted to compensate for variations in the moisture content. For the determination of moisture content in the aggregates. I.S. 2386 (Part-III) shall be referred to. Suitable adjustments shall also be made in the weights of aggregates due to variation in their moisture content. Minimum quantity of cement to be used in controlled concrete shall not be less than 220 kg./M-3 in plain concrete and not less than 200 kg/M-3 in reinforced concrete.

The rates for Item Nos. 4A (Footings), 4B (Ground Beams), 4C (Columns), 4D (RCC Tie Beams), and 4E (Coping) shall be deemed to include all required formwork, shuttering, centering/staging, supports, bracing, erection, maintenance, and removal necessary for execution of the RCC works under Item No. 4.

### 3.0 Mode of measurement & payment

The consolidated cubical contents of concrete work as specified in item shall be measured. No deduction shall be made for (a) Ends of dissimilar materials such as joints, beams, posts, girders, falters, purling trusses, corbels and steps etc., up to 500 Sq. Cm. in section.

The rate includes cost of all materials labour, tools and plant required for mixing, placing in position, vibrating and compacting, finishing, as directed, curing and all other incidental expenses for producing concrete of specified strength. The rate Include the cost of form work.

The rate shall be for a unit of **one cubic meter**.

### **Item No.05:- Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20 cm. in depth consolidating each deposited layer by ramming and watering**

#### **1.0. Material**

Normally excavated earth from same area shall be used for filling. Earth used for filling shall be free from shrubs, rank, vegetation, grass, brushwood, stone shingle and boulders (larger than 75mm in any direction), organic or any other foreign matter. Earth containing deleterious materials, salt peter earth etc. shall not be used for filling. All clods and lumps of earth exceeding 8 cm in any direction shall be broken or removed before the earth is used for filling. All fill material will be subjected to the approval of Engineer-In-charge. If any material is rejected by the Engineer-In-charge the contractor shall remove the same forthwith from the site at no extra cost to the owner. Surplus fill material shall be deposited /disposed off as directed by the Engineer-In-charge after the fill work is complete.

To the extent available selected surplus spoils from excavated materials shall be used as backfill. Fill material shall be free from clods, salts, sulphates, organic or other foreign material. All clods of earth shall be broken or removed. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size, mixed with properly graded fine material consisting of murrum or earth to fill up the mixture

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used for filling.

## **2.0. Workmanship**

As soon as the work in foundations has been accepted and measured the spaces around the foundations, structures, pits, trenches etc. shall be cleared of all debris and filled with selected/ approved earth in layers not exceeding 150 mm each layer being watered, rammed and properly consolidated before the succeeding one is laid. Each layer shall be consolidated to the full satisfaction of the Engineer-In-charge. Filled earth shall be rammed with approved compaction method. Usually no manual compaction shall be allowed unless the Engineer-In-charge is satisfied that in some cases manual compaction by tampers cannot be avoided. The final back-fill surfaces shall be trimmed and levelled to proper profile as directed by the Engineer-In- charge of indicated on the drawings.

Filling in trenches for pipes and drains shall be commenced as soon as the joints of pipes and drains have been tested and approved by the Engineer-In- charge. The backfilling material shall be properly consolidated by watering and ramming taking due care that no damage is caused to the pipes.

Where the trenches are excavated in soil the filling from the bottom of the trench to the level of the centre line of the pipe shall be done by hand compaction with selected approved earth in layers not exceeding 80 mm. Backfilling above the level of the centre line of the pipe shall be done with selected earth by hand compaction of other approved means in layers not exceeding 150 mm. Plinth filling shall be carried out with approved material as described hereinbefore in layers not exceeding 150 mm watered and compacted mechanically. The Engineer-In-charge may however permit manual compaction by hand tampers in case he is satisfied that mechanical compaction is not possible. When filling reaches the finished level the surface shall be flooded with water for at least 24 hours unless otherwise directed by the Engineer-In-charge. The surfaces shall then be allowed to dry and again compacted as specified above to avoid settlements at the later stage. The finished level of the filling shall be trimmed to specified the level, slope etc. The contractor shall protect the earth fill from being washed away by rain or damaged in any other way. If any slip occurs the contractor shall remove the affected material and make good the slip at his own cost. If so specified the rock as obtained from excavation may be used for filling and levelling to indicated grades without further breaking. In such event filling shall be done in layers not exceeding 500 mm approximately. After rock filling to the approximate required level the void in the rocks shall be filled with finer material such as earth, broken stone etc. and area flooded so that be taken to ensure that the finer fill material does not get washed out. Over the layer so filled a 100 mm thick mixed layer of broken material and earth shall be laid and consolidated to the full satisfaction the Engineer-In- charge.

## **3.0. Mode of measurements and payment**

Back filling as per specifications in the sides of foundations, columns, footings, structures, walls, tanks, rafts, trenches etc. with selected excavated material will not be paid for separately. It shall be clearly understood that the rate quoted for excavation shall include stacking of excavated material as directed and carting it back and backfilling around the foundations as specified above.

Generally the material to be backfilled may be stacked temporarily up-to basic lead of 50 meters unless otherwise directed by the Engineer-In-charge. Payment for fill inside trenches, plinth or similar filling with selected excavated material will be made only after compaction as specified /directed. Cost of all other operations shall be deemed to have been covered in the rate quoted for excavation.

The rate shall be for a unit of **one cubic meter**

**Item No.06: - Providing Thermo-Mechanically Treated bars (TMT bars) FE - 500 D for RCC work including cutting, bending, binding, hooking, tying and placing in position as per detailed drawings incl. cost of binding wire etc. complete at all levels.**

### **1.0 Material**

TMT bars conforming to IS 1786 - 1979 with minimum yield strength of 415N/sq.mm. steel reinforcement for R.C.C. work including bending, binding and placing in position complete up to floor two level.

### **2.0 Workmanship:**

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**2.1** The work shall consist of furnishing and placing reinforcement to the shape and dimensions shown as on the drawings or as directed.

**2.2** Steel shall be clean and free from rust and loose mill scale at the time of fixing in position and subsequent concreting.

**2.3** Reinforcing steel shall conform accurately to the dimensions given in the bar bending schedules shown on relevant drawings. Bars shall be beat cold to specified shape and dimensions or as directed using a proper bar bender, operated by hand or power to attain proper radius of bends. Bars shall not be bent or straightened in a manner that will injure the material. Bars bent during transport or handling shall be straightened before being used on the work. They shall not be heated to facilitate bending. Unless otherwise specified, a 'U' type hook at the end of each bar shall invariably be provided to main reinforcement. The radius of the bend shall not be less than twice the diameter of the round bar. In case of bars which are not round and in case of deformed bars, the diameter shall be taken as the diameter of circle having an equivalent effective area. The hooks shall be suitably encased to prevent any splitting of the concrete.

**2.4** All the reinforcement bars shall be accurately placed in exact position shown on the drawings and shall be securely held in position during placing of concrete by annealed binding wire not less than 1 mm. in size and by using stay blocks or metal chair spacers, metal hangers, supporting wire or other approved devices at sufficiently close intervals. Bars shall not be allowed to sag between supports nor displaced during concreting or any other operations of the work. All devices used for positioning shall be of non - corrodible material. Wooden and metal support shall not extended to the surface of concrete, except where shown on drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not allowed. Pieces of broken stone or brick and wooden blocks shall not be used. Layers of bars shall be separated by spacer bars, precast mortar blocks or other approved devices. Reinforcement after being placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be to prevent any displacement of reinforcement in concrete already placed. To prevent reinforcement from corrosion, concrete cover shall be provided as indicated on drawings. All the bars protruding from concrete and to which other bars are to be spliced and which are likely to be exposed for a period exceeding 10 days shall be protected by a thick coat of neat cement grout.

**2.5** Bars crossing each other where required shall be secured by binding wires (annealed) of size not less than 1 mm. in such manner that they do not slip over each other at the time of fixing and concreting.

**2.6** As far as possible, bars of full length shall be used. In case this is not possible overlapping of bars shall be done as directed. When practicable, overlapping bars shall not touch each other, but be kept apart by 25 mm. or 1.25 times the maximum size of the coarse aggregate whichever is greater by concrete between them. Where not feasible, overlapping bars shall be bound with annealed wires not less than 1 mm. thick twisted tight. The overlaps shall be staggered for different bars and located at points along the span where neither shear nor bending movements is maximum.

**2.7** Whenever indicated on the drawings or desired by the Engineer-in-charge bars shall be joined by couplings which shall have a cross section sufficient to transmit the full stresses of bars. The ends of the bars that are joint by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than normal cross - section of the bar. Threads shall be standard threads. Steel for coupling shall conform to I.S. 226.

**2.8** When permitted or specified on the drawings, joints of reinforcement bars shall be butt-welded so as to transmit their full stresses. Welded joints shall preferably be located at points when steel will not be subject to more than 75 percent of the maximum permissible stresses and welds so staggered that at any one section not more than 20 percent of the rods are welded. Only electric arc welding using a process which excludes air from the molten metal and conform to any or all other special provisions for the work shall be accepted. Suitable means shall be provided for holding bars securely in position during welding. It shall be ensured that no voids are left in welding and when welding is done in two or three stages, previous surface shall be cleaned properly. Ends of the bars shall be cleaned of all loose scale, rust grease, paint and other foreign matter before welding. Only competent welders shall be employed on the work. The M.S. sheet electrodes used for welding shall conform to I.S. 814. Welded pieces of reinforcement shall be tested. Specimen shall be taken from the actual site and their number and frequency of test shall be as directed.

### **3.0 Mode of measurement and payments**

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**3.1** For the purpose of calculating consumption wastage shall not be permitted beyond 5 percent. Excess consumption over 5% will be charges at panel rate.

**3.2** Reinforcement shall be measured in length including overlaps, separately for different diameters as actually used in the work. Where welding or coupling is resorted to in place of lap joints such joints shall be measured for payment as equivalent length of overlap as per design requirement. From the length so measured, the weight of reinforcement shall be calculated in tones on the same basis of as per M.18 even though steel is supplied to the contractor by the department on actual weight. Length shall include hooks at the ends. Wastage and annealed steel wire for binding shall not be measured and the cost of these items shall be deemed to be included in the rate for reinforcement.

**3.3** The rate for reinforcement includes cost of steel binding wires its carting from Departmental store to work site. Cutting bending placing binding and fixing in position as shown on the drawings and as directed. It shall also include all devices for keeping reinforcement in approved position, cost of joining as per approved method and all wastage and spacer bars.

**3.4** The rate shall be for a unit of **One Kg.**

**Item No.07: - Brick work using common burnt clay building bricks of II-nd class having crushing strength not less than 35 kg/cm<sup>2</sup> for foundation & plinth and superstructure up to two floor level in C.M. 1:6 (1-cement : 6-coarse sand) incl. racking out joints 20mm deep to expose faces & the joints should be struck flush to expose faces incl. Curing, scaffolding etc. complete.**

**1.0. Materials**

Bricks shall conform to M-15. Cement mortar shall conform to M-11.

**2.0. Workmanship**

**2.1. Proportion:**

**2.1.1.** The proportion of the cement mortar shall be 1:6 (1 cement: 6 sand) by volume.

**2.2. Wetting of bricks:**

**2.2.1.** The bricks required for masonry shall be thoroughly wetted with clean water for about two hours before use or as directed. The cessation of bubbles, when the bricks are wetted with water is as indication of through wetting of bricks.

**2.3. Laying:**

**2.3.1.** Bricks shall be laid in English bond unless directed otherwise. Half or cut bricks shall not be used except when necessary to complete to bond; closures in such case shall be cut to required size and used near the ends of walls.

**2.3.2.** A layer of mortar shall be spread on full width for suitable length of the lower course. Each brick shall first be properly bedded and set home by gently tapping with handle of trowel or wooden mallet. Its inside face shall be flushed with mortar before the next brick is laid and pressed against it. On completion of course, the vertical joints shall be fully filled from the top with mortar.

**2.3.3.** The walls shall be taken up truly in plumb. All courses shall be laid truly horizontal and all vertical joint shall be truly vertical. Vertical joints in alternate course shall generally be directly one over the other. The thickness of brick course shall be kept uniform.

**2.3.4.** The brick shall be laid with frog up wards. A set of tools comprising of wooden straight edges, mason's spirit level, square half meter rub, and pins, string and plumb shall be kept on the site of work for frequent checking during the progress of work.

**2.3.5.** Both the faces of walls of thickness greater than 23 cms. shall be kept in proper place. All the connected brick work shall be kept not more than one meter over the rest of the work. Where this is not possible, the work shall be raked back according to bond (and not left toothed) at an angle not steeper than 45 degrees.

**2.3.6.** All futures, pipes, outlets of water, hold fasts of doors and windows etc. which are required to be built in wall shall be embedded in cement mortar.

**2.4. Joints:**

**2.4.1.** Bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not exposed 12 mm. The face joints shall be raked out as directed by raking tools daily during the progress of work, when the mortar is still green so as to provide key for plaster or pointing to done.

**2.4.2.** The face of brick shall be cleaned the very day on which the work is laid and all mortar dropping removed.

**2.5. Curing:**

**2.5.1.** Green work shall be protected from rain suitably. Masonry work shall be kept moist on all the faces for a period of seven days. The top of masonry work shall be kept well wetted at the close of the day.

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## **2.6. Preparation of foundation bed:**

- 2.6.1.** If the foundation is to be laid directly on the excavated bed, it shall be leveled, cleared of all loose materials, cleaned and wetted before stating masonry, If masonry is to be laid on concrete footing, the top of concrete shall be cleaned and moistened. The contractor shall obtain the engineer's approval for the foundation bed before foundation masonry is started. When pucca flooring is to be provided flush with the top to plinth, the inside plinth offset shall be kept lower than the outside plinth top by the thickness of the flooring.
- 2.7.** The frames of doors, windows, cupboards etc. shall be housed into the brick work at the correct location and level as directed. The heavy steel doors, window frames etc. shall be built in with work, but for ordinary steel doors and windows required opening for frames, hold-fasts, etc., shall be in the wall and frame embedded later on in order to avoid damage to the frames.
- 2.8.** Necessary scaffolding shall be provided. The supports of the scaffolding shall be sound and strong tied, together with horizontal pieces over which the scaffolding plunks shall be fixed. Simple scaffolding shall be allowed normally. In this case scaffolding hole shall rest in hole header horizontal coarse only. Minimum number of holes be left in brick work for supporting horizontal scaffolding poles. The contractor is responsible for providing and maintaining sufficiently strong scaffolding so as to withstand all loads likely to come upon it.
- 2.9.** For the face of brick work, where plastering is to be done, joints shall be racked out to a depth not less than thickness of joints. The face of brick work shall be cleaned and mortar dropping removed on very same day that brick work is laid.

## **3.0. Mode of measurements & payment**

- 3.1.** The masonry work of G.F. i.e. above plinth level to floor two level shall be measured and paid under this item rate includes cost of all materials.
- 3.2.** Brick work in parapet shall be included in the corresponding masonry item of floor immediately below the floor above which the parapet is built.
- 3.3.** No deduction shall be made from quantity of brick work nor any extra payment made for embedding in masonry of marking holes in respect of following item.
- (1) Ends of joints, beams, posts, girders, rafters, purlins trusses corbel, steps, etc. where cross sectional area does not exceed 500 sq.cm.
  - (2) Opening not exceed in 1000 sq.cm.
  - (3) Wall plate sand bed plates bearing of slab, chhajjas, and like whose thickness does not exceed 10 cms. and the bearing does not extend the full thickness of wall.
  - (4) Drainage holes and recesses for cement concrete blocks to embed hold fasts for doors, window etc.
  - (5) Iron fixtures, pipes up to 300 mm. dia. hold fasts of doors, and window built into masonry and pipes etc. for concealed wiring.
  - (6) Forming charges of section not exceeding 350 sq.cm. in masonry.
  - (7) Apparatuses for fire places shall not be deducted nor shall extra labour required to make splaying of jumps, throating and making trenches over the aperture be paid for separately.
- 3.4.** The rate shall be before a unit of **one cubic meter**.

**Item No.08:- P/L 20mm thick sand faced plaster on wall upto any height consisting of 12mm thick backing coat of cement mortar 1:3 (1-cement, 3 sand) & 8mm thick finishing coat of cement mortar 1:1 (1-cement, 1-sand) etc. complete.**

## **1.0. Materials:**

- 1.1** Water shall conform to M-1. Cement mortar shall conform to M-11.

## **2.0. Workmanship:**

- The work of sand faced cement plaster shall be carried out after masonry joints are raked out to a depth of 20 mm and the walls are well-watered.
- 2.1.** The work shall be carried out in the coats. The backing coat (base coat) shall be 12 mm. thick in C.M. 1:3. The relevant specification of item shall be followed except that the thickness of back coat shall be 12 mm. average. Before the first coat hardens its surface shall be beaten up by edges of wooden tapers and close shall be made on the surface.
- The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days depending upon the weather conditions. The surface shall not be allowed to dry during this period.

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- 2.2. The second coat shall be completed to 8 mm. thickness in C.M. 1:1 as described above, including raising sand facing by bushing. The sample of sand face shall be got approved before the work is started. The whole work shall be carried out uniformly as per sample approved.
- 2.3. Curing: The curing shall be started overnight after finishing of plaster. The plaster shall be kept wet for a period of 7 days. During this period it shall be protected from all damages.

### **3.0. Mode of measurements & payment:**

- 3.1. The measurement shall be taken on the Sq. Meter basis as per I.S. 1200-XII- 1976 or as revised from time to time so far as applicable.
- 3.2. The contract rate shall be for a unit of **one Sq. Meter of plastering of specified thickness.**

**Item No.09:- Providing & Laying 15 mm thick cement plaster in single coat in CM 1:3 (1-cement : 3-sand) on rough & fair side of stone/brick masonry/concrete surface for interior & exterior plastering at all line incl. drip moulding & finished even and smooth with neat cement slurry incl. racking out joints, cleaning etc complete.**

### **1.0 Materials**

Water shall conform to M-1. The cement mortar of proportion 1:3 shall conform to M-13.

### **2.0 Workmanship**

#### **2.1 Scaffolding:**

Wooden bullies, bamboos, planks, trestles and other scaffolding shall be sound. These shall be properly examined before erection and use. Stage scaffolding shall be provided for ceiling plaster which shall be independent of the walls.

#### **2.2 Preparation of back-ground :**

The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surface shall be toughened by wire brushing if it is not hard and by hacking if it is hard. In case of concrete surface, if a chemical retarded has been applied to the form work, the surface shall be roughened by wire brushing and all the resulting dust and loose particles cleaned off and care shall be taken that none of the readers if left on the surface. Trimming of projections on brick/concrete surfaces where necessary shall be carried out to get an even surface.

Raking of joints in case of masonry where necessary shall be allowed to dry out for sufficient period before carrying out the plaster work.

The work shall not be soaked but only damped evenly before applying the plaster. If the surface becomes dry, such area shall be moistened again.

For external plaster, the plastering operation shall be started from top floor and carried downwards. For internal plaster, the plastering operations may be-started wherever the building frame and cladding work are ready and the temporary supports of the ceiling resting on the wall of the floor have been removed. Ceiling plaster shall be completed before starting plaster to walls.

#### **2.3 Application of plaster:**

The plaster about 15x15 cms. shall be first applied horizontally and vertically at not more than 2 meters intervals over the entire surface to serve as gauge. The surfaces of these gauges shall be truly in plane of the finished plastered surface. The mortar shall then be applied in uniform surface slightly more than the specified thickness, then brought to a true surface by working a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally, the surface shall be finished off true with a trowel or wooden float according as a smooth or a smooth or a sandy granular texture is required Excessive troweling or overworking 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. Hounding or chamfering, corners, arises junctions etc. shall be carried out with proper templates to be size required.

Cement plaster shall be used within half an hour after addition of water. And mortar or plaster which is partially set shall be rejected and removed forthwith from the site.

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In suspending the work at the end of the day, the plaster shall be left out clean to the line both horizontally and vertically, when recommencing the plaster, the edges of the old work shall be scraped clean and wetted with cement putty before plaster is applied to the adjacent areas to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of the wall and nearer than 15 cm. to any corners or arises. It shall not be closed on the body of features such as plaster bands and cornices not at the corners or arises. Horizontal joints in plaster work shall not also occur on parapet tops and copings as these invariably lead to leakage. No portion of the surface shall be left out initially to be packed up later on.

Each coat shall be kept damp continuously till the next coat is applied or for a minimum period of 7 days. Moistening shall commence as soon as plaster is hardened sufficiently. Soaking of walls shall be avoided and only as much water as can be readily absorbed shall be used, excessive evaporation on the sunny or windward side of building in hot air or dry weather shall be prevented by hanging matting or gunny bags on the outside of the plaster and keeping them wet.

### **3.0 Mode of measurements & payment**

The rate shall include the cost of all materials, labour and scaffolding etc. involved in the operations described under workmanship.

All plastering shall be measured in square meters unless otherwise specified. Length breadth or height shall be measured correct to a centimetre.

Thickness of the plaster shall be exclusive of the thickness of the key i.e. grooves or open joints in brick work, stone work etc. or space between laths. Thickness of plaster shall be average thickness with minimum 10 mm. at any point on this surface.

This item includes plastering up to floor two level.

The measurement of wall plastering shall be taken between the walls or partition (dimensions before plastering being taken) for length and from the top of floor or skirting to ceiling for height. Depth of cover of cornices if any shall be deducted.

Soffits of stairs shall be measured as plastering on ceilings, following soffits shall be measured separately.

For jambs, soffits, sills etc. for openings not exceeding 0.5 sq. met each in area for ends of joints beams, posts, girders, steps etc. not exceeding 0.5 sq. mt each in area and for openings exceeding 0.5. sq. mt and not exceeding 3.00 sq. mt. in each area deductions and additions shall be made in the following manners.

No deductions shall be made for ends of joints, beams, posts etc. and openings not exceeding 0.5 sq. mt each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings, for finish to plaster around ends of joints, beams posts etc.

Deduction for openings exceeding 0.5 sq. mt but not exceeding 3 sq.mt. each shall be made as follows and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings, (i) When both faces of all wall are plastered with same plaster, deduction shall be made for one face only, (ii) When two faces of wall are plastered with different types of plasters or if one face is plastered and the other pointed, deductions shall be made from the plaster or pointing on the side of frame for door, window etc. on which width of reveals is less than that on the other side but no deductions shall be made on the other side. Where width of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from areas of plaster and / or pointing as the case may be.

Rate shall include raking out joints, surface preparation, hacking of RCC surface wherever required, cleaning, watering, providing drip moulding, neat cement slurry finish, curing, scaffolding/staging at all heights, labour, materials and all incidental works complete as directed by the Engineer-in-Charge.

For openings having door frames equal to or projecting beyond the thickness of wall, full deduction for opening shall be made from each plastered face of the wall.

In case of openings of area above 3 sq. mt. each, deduction shall be made for openings but jambs, soffits and sills shall be measured.

The rate shall be for a unit of **One sq. meter.**

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**Item No.10:- External wall painting (two coats of putty+ priming coat + two coats of paint) with APEX exterior paint of Asian paints or equivalent of required shade or equivalent including a priming coat of primer of approved brand and manufacture on wall & any other surfaces to give an even shade after thoroughly brushing the surface & making the surface free from mortar droppings and other foreign matter and sand papered smooth incl. filling the all small holes, cracks, open joints, undulations and similar other minor defects of every kind with ready made putty of approved brand and manufacture and rubbed smooth with sand paper incl. necessary scaffoldings etc. complete at all floor levels**

**1.Materials:**

The weatherproof acrylic emulsion APEX type or equivalent paint and primer shall be of approved brand and manufacture. The weatherproof acrylic emulsion APEX or equivalent type paint shall be of required colour and shade and the same shall conform to I.S. 427-1965. Writing shall conform to I.S. 63-1964.

**2.Workmanships:**

**Scaffolding:**

Where scaffolding is required it shall be erected in such a way that as far as possible no part of scaffolding shall rest against the surface to be distempered. A properly secured strong and well tied suspended platform (Joolas) may be used for wall painting. Where ladders are used- pieces of old gunny bags shall be tied at top and bottom to prevent scratches to the walls and floors. For wall painting to ceiling, proper stage scaffolding shall be erected where necessary.

**2.2 Preparation of Surface:**

- The undecorated surface to be wall painting shall be thoroughly brushed free from dust, dirt, grease, mortar, droppings and other foreign matter and sand papered smooth. New plaster surface shall be allowed to dry at least 2 months before application of wall painting
- All unnecessary nails shall be removed. Pitting in plaster shall be made good with plaster of Paris mixed with dry distemper of the colour to be used. The surface shall then be rubbed down again with a fine grade and paper and made smooth. The surface affected by moulds, moss, fang, algae lichens; efflorescence etc. shall be treated in accordance with I.S. 2395 (Part-I) 1966 before applying wall painting. Any unevenness shall be made good by applying putty made of plaster of Paris mixed with water on entire surface including filling up the undulations and then sand papering the same after it is dry.

**2.3 Priming coat:**

- A priming coat of alkali resistance primer of approved brand shall be applied as per item No. 18.11 of general technical specification attached over the prepared surface in case of new work on undecorated surface. No coat of white washing with lime shall be used as a priming coat for wall painting.
- Application of priming coat shall be done as under:

**2.3.1civil Works Specifications:**

The primer shall be applied with a brush on the clean dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The Surface shall be finished as uniformly as possible leaving no brush marks. It shall be allowed to dry for at least 48 hours before oil bound priming coat of paint is applied.

- Wall painting is not recommended to be applied within six months of the completion of wall plaster. Proportion of wall painting: The weather proof acrylic emulsion Apex type or equivalent paint shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturers only. Sufficient quantity of paint required for one day's work shall be prepared. Application of weather proof acrylic emulsion APEX type paint coat:• For undecorated surfaces after the primer coat is dried for at least 48 hours, the surfaces shall be lightly sand papered to make them smooth for receiving the weather proof wall paint, taking care not to rub out the priming coat. All loose particles shall be dusted off after rubbing.
- Minimum two coats of weather proof wall paint shall be applied with brushes in horizontal strokes followed immediately by vertical strokes which together shall constitute one coat. The Subsequent coats shall be applied after a time interval strokes which together shall constitute one coat. The subsequent coats shall be applied after a time interval of at least 24 hours between consecutive coats to permit proper drying of the proceeding coat. The finished surface shall be even and uniform without patches, brush marks, weather proof wall paint drops etc. • Sufficient quantity of weather proof wall paint shall be mixed to finish on 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, on the same day.

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### 3. MODE OF MEASUREMENT AND PAYMENT:

- 1) Priming coat of wall paint primer, scraping of surface spoiled by smoke soot, removal of oil and grease spots, treatment for infraction of effloresces, moulds moss, fungi, algae and lichens and patch repairs to plaster shall be included in this item for which nothing extra shall be paid. All the work shall be measured net in the decimal system as in places subject to the following limits unless otherwise stated here in after 1) Dimensions shall be measured to the nearest 0.01 m.
- 2) Area in individual items shall be worked out to the nearest 0.01 sq. mt. All work shall be measured in sq. meter. No deductions shall be made for ends of joints, beams, posts, etc. of these openings, or for finish around the ends of joints, beams, posts etc.
- 3) Deductions of openings exceeding 0.5 Sq. mt. But not exceeding 3 sq. mt. each shall be made as follows and no addition shall be made for reveal, jambs, soffits etc. of these openings:
  - I. When both the faces of wails are provided with the same finish deductions shall be made for one face only.
  - II. When each face of wail is provided with different finish, deduction shall be made for that of frame for door, windows etc. on which width of reveal is less than that of the other side but no deductions shall be made on the other side. Where the width of reveals on the both the faces of wall are equal, deduction of 50% of area of opening on each face shall be made from area of finish.
  - III. When only one face of wall is treated and the other face is not treated, full deductions shall be made if the width of the reveal on treated side is less than that on untreated side but if the width of the reveals is equal or more than that of untreated side neither deductions nor additions to be made for reveals, jambs, sills and soffits shall be measured
- 4) In case of openings of area exceeding 3 Sq.mt. Each, deduction shall be made for openings, but jambs, sills and soffits shall be measured.
- 5) No deductions shall be made for attachments such as casing, conduits, pipes, electric wiring and the like.
- 6) Item includes removing nails, making good holes, cracks, patches with materials similar in composition to the weather proof wall paint
- 7) The rate includes cost of all materials, labour, scaffolding; protective measures etc. involved in all the operations described above this shall also include conveyance, delivery, bundling, unloading storing etc.
- 8) The rate shall be for a unit of **one sq. meter**

**Item No.11:- Providing and fixing iron compound gate as per design and given drawing with bolts nuts, locking arrangements, stoppers, holdfasts, handles, aldrops etc. incl. cost of welding, cutting etc. using the M.S. pipes (Heavy duty), angles, flats etc. as per drawing incl. fixing in RCC. column etc. incl. applying a priming coat of red lead paint and three coats of approved synthetic enamel paint etc. complete.**

#### 1.0. Materials:

The structured steel work shall conform to M-22. Red lead paint shall conform to I.S : 102-1962.

#### 2.0 Workmanship:

- 2.1. Welding shall generally be done by electric process. Gas welding shall be resorted to, using oxyacetylene flame with specific prior approval. Gas welding shall not be permitted for structural steel work.
- 2.2. The work shall be done as shown in the shop drawings which should clearly indicate various details of the joints to be welded, shop and site welded as well as type of electrodes to be used, symbol for welding on plans and shop drawings shall be according to I.S. 813-1961. As far as possible every effort shall be made to limit the welding that must be done after improper welding that is likely to be done due to heights and difficult positions on scaffoldings etc. The welding work shall conform to I.S. 816-1969.
- 2.3. Preparation of surfaces : Surfaces which are to be welled together shall be free from loose mill scale, rust, paint, grease or other foreign matter. A coating of boiled linseed oil shall be permitted.
- 2.4. Assembly for welding : Before welding is commenced, the plates shall first be brought together and firmly clamped or spot welded at specified distance. This temporary connection has to be strong enough to hold the plates accurately in place without displacement.
- 2.5. Precautions : All operations connected with welding and cutting equipment shall conform to safety requirement given in I.S. 818-1968. The following points shall be borne in mind during the process of welding:

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(b) Are length voltage and amperage shall be suited to the thickness of material type of groove and other circumstances of the work.

(c) The segments of welding shall be such that where possible the members which offer the greatest resistance to compression are welded first.

**2.6** The defective welds which shall be considered harmful to the structural strength shall cut out and rewarded.

**2.7** Finished welds and adjacent parts shall be protected with clean boiled linseed oil and after all slag has been removed. Welds and adjacent parts shall be painted after the same are approved.

**2.8** All the members shall be thoroughly cleaned of rust-scales, dust etc. and given a priming coat of red lead paint before fixing them in position. Testing of welding to be added in the specification I.N. 12.2.2.12-(i) to (viii).

**2.9 Painting:** After fabrication and prior to fixing, all steel members shall be thoroughly cleaned of rust, mill scale, dust, oil, grease, welding slag and other foreign matter by wire brushing, scraping and rubbing with emery paper as required.

One coat of approved red oxide/red lead metal primer shall be applied uniformly over the entire exposed surface of steel work. After the primer coat has dried, three coats of approved synthetic enamel paint of approved shade and make shall be applied to obtain a smooth, uniform and durable finish. Each coat shall be allowed to dry properly before application of the subsequent coat.

The rate shall include all materials, labour, surface preparation, primer coat, three coats of synthetic enamel paint, tools and tackles required for completing the painting work as directed by the Engineer-in-Charge.

### **3.0 Mode of measurements & payment**

3.1. The steel work shall be measured in general as under:

- (a) All work shall be measured on the basis of finished dimensions as fixed at site and measured net unless specified otherwise.
- (b) The weight of steel sections, steel rods, and steel strips in finished work shall be calculated Hum standard weight on the same basis on which steel is supplied to Contractor by department or those given in relevant I.S. if steel is arranged by the contractor.
- (c) The weight of steel plates and strips shall be taken from relevant I.S. based on 7.35 kg./ sq. meter for every millimetre sheet thickness if steel is supplied to the contractor by department.
- (d) Unless otherwise specified, weight of cleats, brackets, packing pieces, bolts, nuts, washer, distance pieces, separators, diaphragm gusset (taking overall square dimensions) fish plates etc. shall be added to the weight of respective items.
- (e) In riveted work allowance is to be made for weight of rivet hands. No deductions shall be made for rivet or bolts holes excluding holes for anchor or holding down bolts.
- (f) For forged steel and steel castings, weight shall be calculated on the basis of 7850 kg./cum.
- (g) Unless otherwise specified, no allowance shall be made for the weld metal in case of welded steel structure.
- (h) Dimensions other than cross sections and thickness of plates shall be measured to nearest 0.001m
- (i) Mill tolerance shall be ignored when weight is determined by calculation.

**3.2** The rate includes cost of all material, labour, erection, hoisting scaffolding, protective measures, required for proper completion of the item of work. This shall also include conveyance and delivery handling, loading, unloading and storing etc. required for completing the item described above including necessary wastage involved.

The rate shall also include surface preparation, cleaning of steel surfaces, one coat of approved red oxide/red lead primer and three coats of approved synthetic enamel paint of approved shade, complete as directed by the Engineer-in-Charge.

**3.3** The rate shall be for a unit of **per KG.**

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**Item No.12:- Demolition of Brick work and stone masonry including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift.(ii) In Cement Mortar.**

**1.0 Workmanship:-**

The demolition shall consist of demolition of one or more parts of the building as specified or shown in the drawings. Demolition implies taking up or down or breaking up. This shall consist of demolishing whole or part of work including all relevant items as specified or shown in the drawings.

The demolition shall always be planned beforehand shall be done in reverse order to the one in which the structure was constructed. This scheme shall be got approved from the Engineer-in-charge before starting the work. This however will not absolve the contractor from the responsibility of proper and safe demolition.

Necessary propping, shoring and under pinning shall be provided for the safety of the adjoining work or property, which is to be left intact, before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining property.

Wherever required, temporary enclosures or partitions shall also be provided. Necessary precautions shall be taken to keep the dust nuisance down as and where necessary.

Dismantling shall be commenced in a systematic manner. All materials which are likely to be damaged by dropping from a height or demolishing roof, masonry etc. shall be carefully dismantled first. The dismantled articles shall be properly stacked as directed. All materials obtained from demolition shall be the property of Government unless otherwise specified and shall be kept in safe custody until handed over to the Engineer-in-charge.

Any serviceable materials obtained during dismantling or demolition shall be separated out and stacked properly as directed with all lead and lift. All unserviceable materials, rubbish etc., shall be stacked as directed by the Engineer-in-charge. On completion of work, the site shall be cleared of all debris rubbish and cleaned as directed.

**2.0 Mode of measurement & payment:**

Measurements of all work except hidden work shall be taken before demolition or dismantling and no allowance for increase in bulk shall be allowed. The demolition of lime concrete shall be measured under this item. Specification for deduction for voids, openings etc. shall be on same basis as that employed for construction of work, All work shall be measured in decimal system as fixed in its place subject to the following limits; unless otherwise stated hereinafter:

- (a) Dimensions shall be measured to the nearest 0.01 mt.
- (b) Area shall be worked out to the nearest 0.01 sq.mt.
- (c) Cubical contents shall be worked out to the nearest 0.01 Cum.

The rate shall include cost of all labour involved and tools used in demolishing and dismantling including scaffolding. The rate shall also include the charges for separating out and stacking the serviceable materials properly and disposing the unserviceable materials with all lead and lift. The rate also includes for temporary shoring for the safety of the portion not required to be pulled down or of adjoining property and providing temporary enclosures or portions where considered necessary.

The rate excludes scraping straightening of reinforcement but includes cutting of reinforcement. The rate shall be for a unit of **one cubic meter**.

**Item No.13:- Demolition including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift. (i) R.C.C. work**

**1.0 Scope of Work & Workmanship:**

Demolition of Existing structures including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift complete.

- 1.1** The work shall consist of dismantling and demolition of existing structures, drain, curb, foundation, median, concrete structure and allied works by mechanical breaker / excavator with breaker attachment only, complete as directed by the Engineer-in-Charge.
- 1.2** The demolition operation shall be carried out systematically and in a manner ensuring safety of adjoining structures, underground utilities, services, traffic movement and public property. The contractor shall submit methodology of demolition, if required, before commencement of work.

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- 1.3 Necessary barricading, caution boards, diversion arrangements, safety measures, shoring and protection works shall be provided during execution of work as per IRC / MoRTH guidelines and directions of Engineer-in-Charge.
- 1.4 The contractor shall take all precautions to minimize dust nuisance, vibration and inconvenience to public and traffic. Water sprinkling shall be carried out wherever required during demolition operation.
- 1.5 All serviceable materials obtained during demolition shall remain the property of the Department / GIDC and shall be carefully dismantled, cleaned and stacked at locations as directed by Engineer-in-Charge with all lead and lift complete.
- 1.6 All unserviceable materials, debris, rubbish and dismantled waste shall be removed and disposed off outside the working area within GIDC estate or at approved dumping location as directed by Engineer-in-Charge with all lead, lift, loading, unloading and transportation complete.
- 1.7 The scope of work shall include cutting of RCC, breaking, dismantling, excavation if required, loading, unloading, stacking, disposal, site cleaning, dewatering, traffic protection arrangements and all incidental works necessary for completion of item.
- 1.8 The contractor shall ensure that all dismantled materials are removed from site within 24 hours or as directed by Engineer-in-Charge.
- 1.9 The work shall be executed in accordance with relevant provisions of MoRTH Specifications for Road & Bridge Works (5th Revision), IRC guidelines and sound engineering practices.
- 2.0 Mode of Measurement & Payment:**
- 2.1 Measurements shall be taken in original position before demolition and no allowance for increase in bulk after dismantling shall be considered.
- 2.2 All measurements shall be recorded in metric system as under:  
Linear dimensions : nearest 0.01 Meter  
Area : nearest 0.01 Sq.Mt.  
Cubic contents : nearest 0.01 Cu.Mt.
- 2.3 The rate shall include cost of all labour, machinery, tools & plants, breaker machine, fuel, barricading, traffic safety arrangements, water sprinkling, scaffolding if required, cutting, breaking, dismantling, loading, unloading, stacking of serviceable materials and disposal of unserviceable materials with all lead and lift complete.
- 2.5 The rate shall be for completed work measured in **Cubic Meter**.

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## SCHEDULE – B

**Name Of Work :-**Construction of Compound Wall Around PCC Office Building Plot No. 08 under PCC Notified Area

Item No	Description of item	Qty	Unit	Rate incl. 1% L.C	Amount
1	Excavation for foundation up-to 1.5 m depth including sorting out and stacking of useful materials and disposing off the excavated stuff up-to 3.00 km lead.(A) Loose or soft soil	330.00	M3	120.01	39,603.30
2	Excavation for foundation for depth from 1.5 m to 3.0 m including sorting out and stacking of useful materials and disposing off the excavated stuff up-to 3.00 km lead.(A) Loose or soft soil	70.00	M3	133.05	9,313.50
3	Providing & laying CC 1:3:6 (1- cement: 3 -coarse sand: 6- M/c stone aggregate 20 mm nominal size) in foundation concrete incl. machine mixing, ramming, consolidation & curing etc. complete incl. cost of form work if required etc.	50.00	M3	3252.03	1,62,601.50
4	Providing & laying controlled cement concrete M-200 exposed work for RCC works incl. machine mixing, vibrating, scaffolding, curing incl. cost of form work but excluding cost of reinforcement etc. complete at all levels for				
	<b>(A) : FOOTING</b>	60.00	M3	4113.40	2,46,804.00
	<b>(B) : GROUND BEAM</b>	19.00	M3	5808.74	1,10,366.06
	<b>(C) : COLUMNS</b>	18.00	M3	9049.89	1,62,898.02
	<b>(D) : RCC TIE BEAMS</b>	13.00	M3	5808.74	75,513.62
	<b>(E) : COPPING</b>	11.00	M3	4665.40	51,319.40
5	Filling available excavated earth (excluding rock) in trenches. plinth, sides of foundations etc. in layers not exceeding 20 cm. in depth consolidating each deposited layer by ramming and watering	270.00	M3	133.65	36,085.50
6	Providing Thermo Mechanically Treated bars (TMT bars) FE - 500 D for RCC work including cutting, bending, binding, hooking, tying and placing in position as per detailed drawings incl. cost of binding wire etc. complete at all levels.	14060.00	Kg	77.29	10,86,697.40
7	Brick work using common burnt clay building bricks of IInd class having crushing strength not less than 35 kg/cm <sup>2</sup> for foundation & plinth and superstructure up to two floor level in C.M. 1:6 (1-cement: 6-coarse sand) incl. racking out joints 20mm deep to expose faces & the joints should be struck flush to expose faces incl. Curing, scaffolding etc. complete.	86.00	M3	4396.56	3,78,104.16
8	P/L 20mm thick sand faced plaster on wall up-to any height consisting of 12mm thick backing coat of cement mortar 1:3 (1-cement, 3 sand) & 8mm thick finishing coat of cement mortar 1:1 (1-cement, 1-sand) etc. complete.	400.00	M2	337.52	1,35,008.00

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9	Providing & Laying 15 mm thick cement plaster in single coat in CM 1:3 (1-cement : 3-sand) on rough & fair side of stone/brick masonry/concrete surface for interior & exterior plastering at all line incl. drip moulding & finished even and smooth with neat cement slurry incl. racking out joints, cleaning etc complete.	460.00	M2	241.81	1,11,232.60
10	External wall painting (two coats of putty+ priming coat + two coats of paint) with APEX exterior paint of Asian paints or equivalent of required shade or equivalent including a priming coat of primer of approved brand and manufacture on wall & any other surfaces to give an even shade after thoroughly brushing the surface & making the surface free from mortar droppings and other foreign matter and sand papered smooth incl. filling the all small holes, cracks, open joints, undulations and similar other minor defects of every kind with ready made putty of approved brand and manufacture and rubbed smooth with sand paper incl. nece. scaffoldings etc. complete at all floor levels	860.00	M2	137.70	1,18,422.00
11	Providing and fixing iron compound gate as per design and given drawing with bolts nuts, locking arrangements, stoppers, holdfasts, handles, aldrops etc. incl. cost of welding, cutting etc. using the M.S. pipes (Heavy duty), angles, flats etc. as per drawing incl. fixing in RCC. column etc. incl. applying a priming coat of red lead paint and three coats of approved synthetic enamel paint etc. complete.	1040.00	Kg	91.95	95,628.00
12	Demolition of Brick work and stone masonry including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift.(ii) In Cement Mortar.	20.00	M3	549.49	10,989.80
13	Demolition including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift. (i)R.C.C. work	10.00	M3	1056.58	10,565.80
			<b>Rs.</b>	<b>Total</b>	<b>28,41,152.66</b>

I/We agree to carry out the work at \_\_\_\_\_ % above the estimated tender rates  
\_\_\_\_\_ should be written in figures and words.

I/We agree to carry out the work at \_\_\_\_\_ % below the estimated tender rates  
\_\_\_\_\_ should be written in figures and words.

ADD	DEDUCT
% _____ above Rs. (+) _____	% _____ below Rs. (-) _____
Net Rs. _____	Net Rs. _____
Rupees in Words :-	Rupees in Words :-

I / We have read the Condition mentioned in this tender and agree to abide by the same.

Signature of Contractor

Chief Officer,  
PCC Notified Area



**Signature of Contractor**

**Chief Officer,  
PCC Notified Area**

Signature of Contractor

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# **Form “B1” (Attached)**

Signature of Contractor

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