

# GUJARAT MARITIME BOARD



## **Tender Papers**

For the work of

**Repairs and widening of 800m R&B road from DMCC fatak to  
Entry gate at port Navlakhi**

**Amount put to tender  
Rs. 4,65,97,001.56/-**

Office of the  
**Executive Engineer (C)**  
**Procurement Cell**  
Gujarat Maritime Board  
Sagar Bhawan, Sector 10 A,  
Opp. Airforce  
Gandhinagar- 382 010

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**INVITATION FOR BID  
(IFB)**

## **NATIONAL COMPETITIVE BIDDING**

1. The Gujarat Maritime Board invites bids for the construction of works detailed in the table. The bidders may submit bids for any or all of the following works.

**TABLE**

Name of work	Approximate value of works (Rs.)	Bid security (Rs.)	Cost of document (Rs.)	Period of completion	#Class of Registration /Category of contractor if required
1	2	3	4		6
Repairs and widening of 800m R&B road from DMCC fatak to Entry gate at port Navlakhi	4,65,97,001.56	5,50,000/- (inclusive of 18% GST)	7080.00 (inclusive Of 18% GST)	12 (Twelve) months including Monsoon	Class - "A" & Special Cat-II (Road) and Above in public works department of Government of Gujarat

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2. Prospective / Interested bidder may download the Bid Documents from website <https://www.nprocure.com> free of cost till the Time and Date as mentioned on online NIT at website <https://www.nprocure.com>.
  3. However, Bidder who is submitting the Bid Online will have to pay the Bid Document Fee/ Tender Fee through Demand Draft only of any Schedule Bank payable at Gandhinagar and in favour of Executive Engineer, Gujarat Maritime Board, Gandhinagar. Once the Bid is received online, Bid Document / Tender Fee will not be refundable.

The Demand Draft for Bid Document / Tender fee and FDR / Bank Guarantee against Bid Security / EMD shall be submitted in electronic format through online (by scanning) while uploading the bid, this submission shall mean that bid document / tender fee and Bid Security / EMD has been received. Accordingly, the offer of only those shall be opened whose Bid Document / Tender Fee and Bid Security / EMD have been received electronically. However, for the purpose of realization of Demand Draft, and FDR / Bank Guarantee bidder shall send the same in original through R.P.A.D. so as to reach to Executive Engineer(C), ~~R & B Division~~, Procurement Cell, Gujarat Maritime Board, Sagar Bhawan, Opp. Air Force, Sector 10 A, Gandhinagar- 382010 within 7 Days from the last day of bid submission.

Penalitive action for not submitting Demand Draft / FDR / Bank Guarantee in original to Executive Engineer / Tender Inviting Authority by bidder shall be initiated.

4. Bids received online, will be opened on the time, date and place as specified in the online NIT at website <https://www.nprocure.com> in the presence of the bidders or their authorized representatives, who wish to remain present. If the office happens to be closed on the day of opening of the bids as specified, the bids will be opened on the next working day at the same time and venue.

- ~~5. A pre bid meeting will be held on .....at .....hrs. at the office of .....to clarify the issues and to answer questions on any Matter that .....may be raised at that stage as stated in clause 9.2 of 'instructions to Bidders' of the bidding documents.~~
6. #Bid Security (EMD) is equal to 1% of Estimated Amount put to bid / tender and should be rounded off to the next thousand rupees.
7. Other Information is as under:
- A. Agencies can prepare and edit their offers a number of times before the end of the tender submission date and time. After the tender submission date and time, the bidder cannot modify / edit / withdraw their submitted offer in any case. No written or online request in this regard shall be granted.
  - B. Offers in physical form will not be accepted in any case.
  - C. Demand Draft purchased by the other than bidder and issued after the last date of submission of Bids, will not be considered or accepted.
  - D. The cost incurred by the contractor for this offer for clarification or attending discussion, conferences or site visits will not be reimbursed by the Employer or Engineer-in-Charge.
  - E. Conditional tender shall not be accepted.
  - F. Any changes, addition, alternation made in the prescribed form attached with tender are liable to be rejected.
  - G. Any change in format or conditional Bank Guarantee will not be accepted and the bidder will be considered non-responsive.
  - H. All the bidders are instructed to fill in information strictly in accordance with the format given in the checklist / qualification document / tender document.
  - I. It is mandatory for the bidders to supply each and every information as asked strictly in electronic format at appropriate places only.
  - J. Blank / insufficient information shall be treated as nil information and shall result in disqualification.
  - K. Even if the bidder has been qualified in a similar or larger size of project in the past, it shall not be deemed to be a ground / reason for not giving required information for this work / bid.
  - L. Information supplied for earlier projects shall not be considered while evaluation of this bid. The Government will not ask for any other information, unless it is found absolutely necessary by the competent authority.
  - M. If found necessary, the contractor will be intimated for negotiation,

# ~~For the works costing up to 7.5 crore BUILDING (ROAD), 7.0 crore (BUILDING & BRIDGE) kindly refer to SSR-10-2015-17-C dated 03-02-2017~~

For the works following documents shall be submitted in electronic format only through online by scanning and the (i) Bid Document Fee / Tender Fee (ii) Bid Security / EMD should be sent in original to the Tender opening authority through RPAD, so as to reach the Executive Engineer within 7 days from last day of submission of Bid.

**The following minimum qualification documents must be submitted by the bidder in their online submitted bids failing which their bid will be treated as non-responsive**

- (i) Bid Document Fee / Tender Fee
- (ii) Bid Security / EMD
- (iii) Registration Certificate of Appropriate Class
- (iv) GST Number

**SECTION - 1**  
**INSTRUCTIONS TO BIDDERS**  
**(ITB)**

## Section 1: Instructions to Bidders

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## **A. GENERAL**

### **1. Scope of Bid**

- 1.1 The Employer (Named in Appendix to ITB) invites bids for the Construction of works (as defined in these documents and referred to as 'the works') detailed in the table given in IFB. The bidders may submit bids for any or all of the works detailed in the table given in IFB.
- 1.2 The successful bidder will be expected to complete the works by the intended completion date specified in the Contract data.
- 1.3 Throughout these bidding documents, the terms 'bid' and 'tender' and their derivatives (bidder/ tenderer, bid / tender, bidding/ tendering, etc.) are synonymous.

### **2. Source of Funds**

- 2.1 The expenditure on this project will be met from the budget of Gujarat Maritime Board. ~~Govt. of Gujarat / Govt. of India for centrally sponsored projects.~~

### **3. Eligible Bidders**

- 3.1 This Invitation for Bids is open to all eligible bidders.
- 3.2 All bidders shall provide in Section 2, Forms of Bid and Qualification Information, a statement that the Bidder is neither associated, nor has been associated, directly or indirectly, with the consultant or any other entity that has prepared the design, specifications, and other documents for the Project or being proposed as Project Manager for the Contract. A firm that has been engaged by the Employer to provide consulting services for the preparation or supervision of the works, and any of its affiliates, shall not be eligible to bid.

### **4. Qualification of the Bidder**

- 4.1 All bidders shall provide in Section 2, Forms of Bid and Qualification Information, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary. The proposed methodology should include a program of construction backed with equipment planning and deployment duly supported with broad calculations and quality assurance procedures proposed to be adopted justifying their capability of execution and completion of work as per technical specifications, within stipulated period of completion.
- 4.2 Deleted
- 4.3 Deleted
- 4.4 Deleted

### **~~#4.5—QUALIFICATION CRITERIA:~~**

#### **~~(Applicable for the works which require Post Qualification)~~**

- 4.5.1 ~~Qualification will be based on Applicant's meeting all the following minimum pass/fail criteria regarding the Applicant's general and particular experience, personnel and equipment capabilities and financial positions, as demonstrated by the applicant's responses in the forms attached to the letter of application ( specified requirement for joint ventures are given under para 4.6 below ) Subcontractors experience and resources shall not be taken in to account in determining the applicants compliance with the qualifying criteria~~

To qualify for more than one contract, the applicant must demonstrate having experience and resources sufficient to meet the aggregate of the qualification criteria for each contract given in paragraphs 4.5.4, 4.5.5 and 4.5.9 below

#### 4.5.2 Base year and Escalation

The base year shall be taken as Current financial year

Following enhancement factors will be used for the costs of works executed and the financial figure to a common base value for works completed in India.

<u>Year</u>	<u>Financial Year</u>	<u>Multiplying factor</u>
Base year of inviting tender	2026-2027	1.00
-1	2025-2026	1.10
-2	2024-2025	1.21
-3	2023-2024	1.33
-4	2022-2023	1.46
-5	2021-2022	1.61

Applicant should indicate actual figures of costs and amount for the works executed by them without accounting for the above mentioned factors.

In case the financial figures and value of completed works are in foreign currency the above enhanced multiplying factors will not be applied. Instead, the current market exchange rate (State Bank of India BC Selling rate as on the last date of submission of the bid) will be applied for the purpose of conversion of the amount in foreign currency into India rupees.

#### 4.5.3. General Experience.

The Applicant shall meet with the following minimum criteria:

- (a) — Achieved a minimum annual financial turnover (defined as billing for works in progress and completed in all classes of civil engineering construction works only) in any one year, over the last five years (2020-21 to 2024-25) of the annual value of contract / contracts applied for.
- (b) — Experience in successfully completing or substantially completing at least one contract of civil engineering construction works of at least 40 percent of the value of proposed contract within the last five years (2020-21 to 2024-25). Experience in successfully completing or substantially completing at least one contract of highway (road and / or bridge works) airport runway of at least 40 percent of the value of proposed contract within the last five years.

The works may have been executed by the applicant as prime contractor or as a member of a joint venture or as a nominated sub-contractor. As subcontractor, he should have acquired the experience of execution of all major items of works under the proposed contract. In case a project has been executed by a joint venture, weight towards experience of the project would be given to each joint venture in proportion to their financial participation in the joint venture.

Substantially completed works means those works which are at least 90 % completed as on the date of submission (i.e. gross value of work done up to the last date of submission is 90 % or more of the original contract price) and continuing satisfactorily.

For these, a certificate from the employers shall be submitted along with the application incorporating clearly the name of the work, contract value, billing amount, date of commencement of works, satisfactory performance of the contractor and any other relevant information.

#### **4.5.4. Personnel Capabilities.**

~~Availability for his work of personnel with adequate experience as required; as per Appendix.~~

#### **4.5.5. Equipment Capabilities**

~~Based on the studies carried out by the Engineer, the minimum suggested major equipment to attain the completion of works in accordance with the prescribed construction schedule are shown in the Appendix.~~

~~The bidders should, however, undertake their own studies and furnish with their bid, a detailed construction planning and methodology supported with layout and necessary drawings and calculations to allow the employer to review their proposals. The numbers, types and capacities of each plant/equipment shall be shown in the proposals along with the cycle time for each operation for the given production capacity to match the requirements.~~

#### **4.5.6. Financial Position**

~~The Applicant should give undertaking that he has access to, or has available, liquid assets (aggregate of working capital, cash in hand and uncommitted bank guarantees) and / or credit facilities up to 25 percent of the value of the contract / contracts applied.~~

~~The audited balance sheets for the last five years should be submitted, which must demonstrate the soundness of the applicant's financial position, showing long term profitability including an estimated financial projection for the next two years, If necessary, the employer will make inquiries with the applicant's bankers.~~

#### **4.5.7. Litigation History**

~~The Applicant should provide accurate information on any litigation or arbitration resulting from contracts completed or under execution by him over the last five years. A consistent history of awards against the Applicant or any partner of a joint venture may result in failure of the applicant.~~

#### **4.5.8. Disqualification**

~~Even though the applicants meet the above criteria, they are subject to be disqualified if they have:~~

~~Made misleading or false representation in the forms, statements submitted, and / or Record of poor performance such as abandoning the work, rescinding of contract for which the reasons are attributable to the non — performance of the contractor; consistent history of litigation awarded against the applicant or financial failure due to bankruptcy. The rescinding of contract of a joint venture on account of reasons other than non — performance, such as Most Experienced partner of joint venture pulling out, court directions leading to breaking up of a joint venture before the start of work, which are not attributable to the poor performance of the contractor will, however, not affect the qualification of the individual partners.~~

**~~#4.6 — JOINT VENTURE: (Maximum 3 Members i.e. 1 Lead & 2 others)  
(Applicable only for estimated project cost of 50 Crore and above)~~**

**~~4.6.1. — Joint ventures must comply with the following requirement:~~**

~~(a) — Following are the minimum qualification requirements:~~

~~(i) — The lead partner shall meet not less than 50 percent of all criteria given in para 4.5.3. & 4.5.6 above. The joint venture must collectively satisfy the criteria of para 4.5.3 & 4.5.6 above. The experience of the other joint venture partners shall be considered if it is not less than 30 percent of the qualifying criteria in para 4.5.3 & 4.5.6 above.~~

~~(ii) — Individually each member must satisfy the requirements of para 4.5.7 & 4.5.8 above.~~

~~(b) — Bid shall be signed so as to legally bind all partners, jointly and severally, and shall be submitted with a copy of the joint venture agreement providing the joint and several liabilities with respect to the contract.~~

**~~4.6.2. — Qualification of a joint venture does not necessarily qualify any of its partners individually or as a partner in any other joint venture. In case dissolution of a joint venture, each one of the constituent firms may qualify if they meet all the qualification requirements, subject to the written approval of the Employer.~~**

**4.7. Bid Capacity.**

Applicants who meet the minimum qualification criteria will be qualified only if their available bid capacity at the expected time of bidding is more than the total estimated cost of the works. The available bid capacity will be calculated as under:

**Assessed Available Bid Capacity =  $(A*N*2-B)$ , where**

A = Maximum value of work executed in any one year during the last five years (updated to the price level of the year indicated in appendix) taking into account the completed as well as works in Progress.

B = Value at current price level of the existing commitments and ongoing works to be completed during the next 4 Months (period of completion of work for which bids are invited); and

N = Number of years prescribed for completion of the works for which the bids are invited. (I.e. 4 Months)

**~~Note: — In Case of joint venture, the available bid capacity will be applied for each partner to the extent of his proposed participation in the execution of the work.~~**

**4.8 Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:**

- Made misleading or false representation in the forms, statements and Attachments the submitted in proof the qualification requirements; and / or

- Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delay in completion, litigation history, or financial failures etc.; and/ or
- Participated in the previous bidding for the same work and had quoted unreasonably high bid prices and could not furnish rational justification to the employer.

**5. One bid per bidder**

- 5.1. Each bidder shall submit only one bid for one package. A bidder who submits or participates in more than one bid (other than as a subcontractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the bidder's participation to be disqualified.

**6. Cost of Bidding**

- 6.1. The bidder shall bear all costs associated with the preparation and submission of his Bid, and the Employer will in no case be responsible and liable for those costs.

**7. Site Visit**

- 7.1. The Bidder, at the Bidder's own responsibility and risk is encouraged to visit and examine the Site of work and its surrounding and obtain all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works.

The costs of visiting the site shall be at the Bidder's own expense.

## B. BIDDING DOCUMENTS

### 8. Content of Bidding Documents

- 8.1 The set of bidding documents comprises the documents listed below and addenda issued in accordance with Clause 10:

Section	Particulars	Volume No.
-	Invitation for Bids	I
1	Instructions to Bidders	
2	Qualification Information, and other forms	
3	Conditions of Contract	
4	Contract Data	
5	Technical Specifications	II
6	Form of Bid	III
7	Bill of Quantities	
8	Securities and other forms	
9	Drawings	IV
10	Documents to be furnished by bidder	V

- 8.2. Volumes I, II, III and IV are available online and documents to be furnished by the bidder in compliance to section 2 will be prepared by him and furnished as Volume-V in two parts (refer clause 12).
- 8.3. The bidder is expected to examine carefully all instructions, conditions of contract, contract data, forms, terms, and technical specifications, bill of quantities, forms, Annexes and drawings in the Bid Document. Failure to comply with the requirements of Bid Documents shall be at the bidder's own risk. **Pursuant to clause 26 hereof** bids which are not substantially responsive to the requirements of the Bid Documents shall be rejected.

### 9. Clarification Bidding Documents

- 9.1 A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing or through E-mail at the Employer's address indicated in the invitation to bid. The Employer will respond to any request for clarification which he received earlier than 15 days prior to the deadline for submission of bids. Employer's response will be published on website including a description of the enquiry but without identifying its source.

#### ~~9.2. Pre-bid meeting~~

- ~~9.2.1. The bidder or his official representative is invited to attend a pre-bid meeting which will take place at the address, venue, time and date as indicated in the appendix.~~

- ~~9.2.2. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.~~
- ~~9.2.3. The bidder shall be required to submit any questions in writing or e-mail to reach the Employer not later than 03 days before the meeting.~~
- ~~9.2.4. Minutes of the meeting, including the question raised (Without identifying the source of enquiry) and the responses given will be published without delay on the tender website i.e. [www.nprocure.com](http://www.nprocure.com). Any modification of the bidding documents listed in sub-Clause 8.1 which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause 10 and not through the minutes of the pre-bid meeting.~~
- ~~9.2.5. Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.~~

## **10. Amendment of Bidding Documents**

- 10.1 Before the deadline for submission of bids, the Employer may modify the bidding documents by issuing addenda.
- 10.2. Any addendum thus issued shall be part of the bidding documents. The Employer will assume no responsibility for the same.
- 10.3. To give prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may, at his discretion, extend as necessary the deadline for submission of bids, in accordance with Sub-Clause 20.2 below.

## C. PREPARATION OF BIDS

### 11. Language of the Bid

11.1 All documents relating to the bid shall be in the English language.

### 12. Documents Comprising the Bid

12.1. The bid be submitted by the bidder as Volume V of the bid document (refer Clause 8.1) shall be in two separate parts:

**Part I shall be named “Technical Bid” and shall comprise**

- (i) Bid Security in the form specified in Section 8
- (ii) Qualification Information and supporting documents as specified in Section 2
- (iii) Certificates, undertakings, affidavits as specified in Section 2
- (iv) Any other information pursuant to Clause 4.5 of these instructions
- (v) Undertaking that the bid shall remain valid for the period specified in Clause 15.1

**Part II shall be named “Financial Bid” and shall comprise**

- (i) Form of Bid as specified in Section 6
- (ii) Priced Bill of Quantities for items specified in Section 7

12.2. The Bidder shall submit the details / information pertaining to each part i.e. technical as well as financial and must be submitted online only.

12.3. Following documents will be deemed to be part of the bid.

Section	Particulars	Volume No.
	<b>Invitation for Bids (IFB)</b>	
1	Instruction to Bidders	Volume I
3	Conditions of Contract	
4	Contract Data	
5	Specifications	Volume II
9	Drawings	Volume IV

### 13. Bid Prices

13.1 The Contract shall be for the whole works as described in Sub-Clause 1.1, based on the priced Bill of Quantities submitted by the Bidder.

13.2 The bidder shall fill in rates and prices and line item total (both in figures and words) for all items of the Works described in the Bill of Quantities along with total bid price

(Both in figures and words). Items for which no rate or price is entered by the bidder will not be paid for by the Bill of Quantities.

- 13.3 All duties, taxes, and other levies except GST payable by the contractor under the contract, or for any other cause shall be included in the rates, prices and total Bid Price submitted by the Bidder. (GST will be paid extra)

13.4 Deleted

- 13.5 The rates and prices quoted by the bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of Clause 47 of the Condition of Contract **(Irrespective of the time limit and Bid Amount)**

#### **14. Currencies of Bid and Payment**

- 14.1 The unit rates and the prices quoted by the bidder shall be entirely in Indian Rupees. All payments shall be made in Indian Rupees.

#### **15. Bid Validity**

- 15.1 Bids shall remain valid for a period of not less than 180 days after the deadline date for bid submission specified in Clause 20.
- 15.2 In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the bidders may extend the period of validity for a specified period. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his security for a period of the extension, and in compliance with Clause 16 in all respects.

#### **#16. Bid Security**

- 16.1. The Bidder shall furnish, as part of his Bid, a Bid security in the amount as shown in column 3 of the table of IFB for this particular work. This Bid security shall be in favor of Employer as named in Appendix and may be in one of the following forms;
- a. Bank Guarantee from any scheduled Indian bank, in the format given in Volume III. (Bank Guarantee is applicable only for Bid Estimated Amount of 01 Crore and above) and Bank Guarantee of Schedule and Private Banks shall be considered as per GoG Finance Department's Circular No. FD/MSM/e-file/4/2023/0057/D.M.O. Date 21/04/2023 or as per their latest amendment.
  - b. Fixed Deposit Receipt issued by any Scheduled Indian Bank or a foreign Bank approved by the Reserve Bank of India.

**OR**

~~# A Valid Bid Security / EMD Exemption Certificate issued by (1) Road & Building Department or (2) Narmada Water Resources, Water Supply and Kalpsar Department of Govt of Gujarat. Exemption Certificate is applicable only when Registration Certificate of Appropriate Class and Category of Approved Contractors is required as eligible criteria of bidder.~~

- 16.2. Bank guarantees (and other instruments having fixed validity) issued as surety for the bid shall be valid for 45 days beyond the validity of the bid i.e. total validity of **180+45 = 225 Days**
- 16.3. Any bid not accompanied by an acceptable Bid Security and not secured as indicated in Sub-Clauses 16.1 and 16.2 above shall be rejected by the Employer as non-responsive.
- 16.4. The Bid Security of unsuccessful bidders will be returned within 28 days of the end of the bid validity period specified in Sub-Clause 15.1
- 16.5. The Bid Security of the successful bidder will be discharged when the bidder has signed the Agreement and furnished the required Performance Security.
- 16.6. The bid Security may be forfeited
  - (a) If the Bidder withdraws the bid after Bid opening during the period of Bid validity.
  - (b) If the Bidder does not accept the correction of the Bid Price, if any or
  - (c) In the case of a successful Bidders, if the Bidder fails the specified time limit to
    - (i) Sign the Agreement; or
    - (ii) Furnish the requirement Performance Security.
  - (d) #If found necessary, the bidder will be intimated for negotiation, He will be intimated maximum three times within the validity period for negotiation, If contractor does not respond in time, his Bid Security (EMD) will be forfeited and his tender will be rejected. Punitive action will be taken on such contractors. (As per GoG R&B Dept's Gr. No. S/22/2017/6369/D, Dt.08/06/2018)

## **17. Alternative Proposals by Bidders.**

- 17.1. Bidders shall submit offers that fully comply with the requirements of the bidding documents, including the conditions of contract (including mobilization advance or time for completion), basic technical design as indicated in the drawing and specifications. Conditional offers or alternative offers will not be considered further in the process of tender evaluation.

## **18. Format and Signing of Bid**

- 18.1. The Bidder shall prepare documents comprising the bid as described in Clause 12 of these Instructions to bidder as the "Technical Bid "and "Financial Bid" in separate parts to be uploaded.

## **D. SUBMISSION OF BIDS**

### **19. Deleted**

### **20. Deadline for Submission of the Bids**

- 20.1. Complete Bids must be received online by the Employer at the tender website specified above not later than the date indicated in appendix.
- 20.2. The Employer may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 10, in which case all right and obligation of the Employer and the bidders previously subject to the original deadline will then be subject to the new deadline.

### **21. Deleted**

### **22. Modification and Withdrawal of Bids**

- 22.1. Bidders may modify or withdraw their bids online before the deadline prescribed in Clause 20 or pursuant to Clause 23.
- 22.2. Deleted
- 22.3. No bid shall be modified or withdrawn after the deadline for submission of Bid.
- 22.4. Withdrawal or modification of a bid between the deadline for submission of bids and the expiration of the original period of bid validity specified in Clause 15.1 above or as extended pursuant to Clause 15.2 may result in the forfeiture of the Bid security pursuant to Clause 16.

## **E. BID OPENING AND EVALUATION**

### **23. Bid Opening**

- 23.1 The Employer will open all the Bids received including modifications made pursuant to Clause 22, in the presence of the Bidders or their representatives who choose to attend at time, date and the place specified in Appendix in the manner specified in Clauses 20 and 23.3, In the event of the specified date of Bid opening being declared a holiday for the Employer, the Bids will be opened at the appointed time and location on the next working day.
- 23.2. Deleted.
- 23.3. The “Technical Bid” shall be opened. The amount, form and validity of the bid security furnished with each bid will be announced. If the bid security furnished does not conform to the amount and validity period as specified in the invitation for bid (ref. Column 4 and paragraph 3), and has not been furnished in the form specified in Clause 16, the technical bid will not be opened.
- 23.4. (i) Subject to confirmation of the bid security by the issuing Bank, the bids accompanied with valid bid security will be taken up for evaluation with respect to the Qualification information and other information furnished in part I of the bid pursuant to Clause 12.1.
- (ii) If required, the bidder will be asked in writing to clarify his Qualification Documents with respect to any required clarification.
- (iii) The bidders will respond in not more than 7 days of issue of the clarification letter.
- (iv) Immediately (usually within 3 or 4 days), on receipt of these clarification the Evaluation Committee will finalize the list of responsive bidders whose financial bids are eligible for consideration.
- 23.5. Deleted
- 23.6 At the time of opening of “Financial Bid”, the names of the bidders were found responsive in accordance with Clause 23.4(iv) will be announced. The bids of only these bidders will be opened. The responsive Bidders’ names, the Bid prices, the total amount of each bid, any discount and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening.
- 23.7 the time of opening of “Financial Bid”, the names of the bidders were found responsive in accordance with Clause 23.4(iv) will be announced. The bids of only these bidders will be opened. The responsive Bidders’ names, the Bid prices, the total amount of each bid, any discount, and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening.
- 23.8 In case bids are invited for more than one package, the order for opening of the “Financial Bid” shall be in order of estimated amount of Bids from highest to lowest.
- 23.9 The Employer shall prepare minutes of the Bid opening, including the information disclosed to those present in accordance with Sub-Clause 23.6.

## **24 Process to be Confidential**

- 24.1 Information relating to the examination, clarification, evaluation, and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced. Any effort by Bidder to influence the Employer's processing of Bids or award decisions may result in the rejection of his Bid.

## **25. Clarification of Financial Bids**

- 25.1. To assist in the examination, evaluation, and comparison of Bids, the Employer may, at his discretion, ask any Bidder for clarification of his Bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by e-mail, but no change in the price or substances of the Bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids.
- 25.2 Subject to sub-clause 25.1, no Bidder shall contact the Employer on any matter relating to his Bid opening to the contract is awarded. If the Bidder wishes to bring additional information to the notice of the Employer, it should do so in writing.
- 25.3. Any effort by the Bidder to influence the Employer in the Employer's bid evaluation, bid comparison or contract award decision may result in the rejection of the Bidders' bid.

## **26. Examinations of Bids and Determination of Responsiveness**

- 26.1 During the detail evaluation of "Technical Bid", the Employer will determine whether each Bid (a) meets the eligibility criteria defined in Clause 3 and 4; (b) has been properly signed; (c) is accompanied by the required securities and; (d) is substantially responsive to the requirements of the Bidding document. During the detailed evaluation of the "Financial Bid", the responsiveness of the bids will be further determined with respect to the remaining bid conditions, i.e., priced bill of quantities, technical specifications, and drawings.
- 26.2 A substantially responsive "Financial Bid" is one which confirms all the terms, conditions and specifications of bidding documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the Bidding documents, the Employer's rights or the Bidder's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other Bidders presenting substantially responsive Bids.
- 26.3 If a "Financial Bid" is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation or reservation.

## **27. Deleted**

**28. Deleted**

**29. Evaluation and Comparison of Financial Bids**

- 29.1. The Employer will evaluate and compare only the Bids determined to be substantially responsive in accordance with Sub-Clause 26.2.
- 29.2. Deleted.
- 29.3. The Employer reserves the right to accept or reject any variation or deviation. Variation and deviations and other factors, which are in excess of the requirements of the Bidding documents or otherwise result in unsolicited benefits for the Employer, shall not be taken in to account in Bid evaluation.
- 29.4. The estimated effect of the price adjustment conditions under Clause 47 of the Conditions of Contract, during the period of implementation of the Contract, will not be taken in to account in Bid evaluation.
- 29.5. If the Bid of the successful Bidder is seriously unbalanced in relation to the Engineer's estimate of the cost of work to be performed under the contract the Employer may require the Bidder to produce detailed consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the performance security set forth in Clause 34 be increased at the expense of the successful /bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.
- 29.6. A bid which contains several items in the bill of Quantities which are unrealistically priced low and which cannot be substantiated satisfactorily by the bidder may be rejected as non-responsive.

**30. Deleted**

## **F. AWARD OF CONTRACT**

### **31. Award Criteria**

31.1. Subject to Clause 32, the Employer will award the contract to the Bidder whose Bid has been determined.

- (i) to be substantially responsive to the Bidding documents and who has offered the lowest evaluated Bid Price; and
- (ii) To be within the available bid capacity adjusted to account for his bid price which is the lowest evaluation in any of the packages opened earlier than the one consideration.

In no case, the contract shall be awarded to any bidder whose available bid capacity is less than the evaluated bid price, even if the said bid is the lowest evaluated bid. The contract will in such cases be awarded to the next lowest bidder at his evaluation bid price.

### **32. Employer's Right to accept any Bid and to reject any or all Bids**

32.1. Notwithstanding Clause 31, the Employer reserves the right to accept or reject any Bid, and to cancel the Bidding process and reject all Bids, at any time prior to the award of contract, without thereby incurring any liability to the affected bidder or Bidder or any obligation to inform the affected Bidder or Bidders of the grounds for the Employer's action.

### **33. Notification of Award and Signing of Agreement**

33.1. The Bidder whose Bid has been accepted will be notified of the award by the Employer prior to expiration of the Bid validity period by cable, telex or facsimile confirmed by registered letter. This letter (hereinafter and in the condition of contract called the "Letter of Acceptance") will state the sum that the Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price").

33.2. The notification of award will constitute the formation of the contract, subject only to the furnishing of a performance security in accordance with the provisions of Clause.

33.3. The Agreement will incorporate all agreements between the Employer and the successful Bidder. It will be signed by the Employer and to the successful Bidder, within 28 days following the notification of award along with the Letter of Acceptance. Within 21 days of receipt, the successful Bidder will sign the Agreement and deliver it to the Employer.

33.4. Upon the furnishing by the successful Bidder of the Performance Security, the Employer will promptly notify the other Bidders that their Bids have been unsuccessful.

### **34. Performance Security**

34.1. (A) Within 10 (Ten) days of receipt of Letter of Acceptance, the successful Bidder shall furnish to the Employer an irrevocable and unconditional guarantee from a Bank in the form set forth in Section 8 (the "Performance Security") for an amount equal to 5% (five percent) of its Contract Price. In case of bids mentioned below, the successful Bidder, along with the Performance Security,

Shall also furnish to the Authority an irrevocable and unconditional guarantee from a Bank in the same form given at Section 8 towards an Additional Performance Security (The “Additional Performance Security”) for an amount calculated as under:

- (a) If the Contract Price offered by the Selected Bidder is lower than 10% but upto 20% of the Estimated Project Cost, then the Additional Performance Security shall be calculated @ 20% of the difference in the (i) Estimated Project Cost (as mentioned in Bid Document) - Minus 10% of the Estimated Project Cost and (ii) Contract Price offered by the selected Bidder.
  - (b) If the Contract Price offered by the Selected Bidder is lower than 20% of the Estimated Project Cost, then the Additional Performance Security shall be calculated @ 30% of the difference in the (i) Estimated Project Cost (as mentioned in Bid Document) - Minus 10% of the Estimated Project Cost and (ii) Contract Price offered by the selected Bidder.
  - (c) This Additional Performance Security shall be treated as part of the Performance Security.
- (B) The Performance Security shall be valid beyond 60(sixty) days of the Defects Liability Period and the Additional Performance Security shall be valid beyond 28 (twenty-eight) days of Project Completion Date.

34.2. If the performance security is provided by the successful Bidder in the form of a Bank Guarantee, it shall be issued either (a) at the Bidder’s option, by a Nationalized/Scheduled Indian bank or (b) by a foreign bank located in India and acceptable to the Employer. As per GoG Finance Department’s Circular No. FD/MSM/e-file/4/2023/0057/D.M.O. Date 21/04/2023 or as per their latest amendment.

34.3. Failure of the successful Bidder to comply with the requirement of Sub-Clause 34.1 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Bid Security.

### **35—Advance Payment and Security**

~~35.1—The Employer will provide an Advance payment on the Contract Price as stipulated in the Conditions of Contract, subject to maximum amount, as stated in the Contract Data.~~

### **36. Deleted**

### **37. Corrupt or Fraudulent Practices**

37.1 The Employer will reject a proposal if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in completing for the contract in question and will declare the firm ineligible, either indefinitely or for a stated period of time, to be awarded a contract with National Highways Authority of India/ State PWD and any other agencies, if it at any time determines that the firm has engaged in corrupt or fraudulent practices in completing for the contractor, or in execution.

37.2 Furthermore, Bidders shall be aware of the provision stated in Sub- Clause 59.2 of the Conditions of Contract.

## APPENDIX TO ITB

### Clause Reference With respect to Section -I

1. The Name of the Employer is Gujarat Maritime Board [ Cl.1.1]
2. The last five years.  
2025 – 2026  
2024 – 2025  
2023– 2024  
2022– 2023  
2021– 2022
3. This Annual Financial Turnover Amount is Rs. [Cl.4.5.3 (a)]  
.....
4. Value of Work is Rs. 4,65,97,001.56 approx
5. Deleted
6. The cost of electric work is Rs.0.00
7. The cost of water supply / sanitary works is Rs.0.00
8. Liquid assets and / or availability of credit facilities is Rs. [Cl.4.5.6 ]
9. Price level of the financial year ..... [Cl. 4.5.2]
10. ~~The pre-bid meeting will take place at .....~~ [Cl. 9.2.1]
11. The technical Bid will be opened at the office of the Executive Engineer (C), Procurement Cell, Gujarat Maritime Board, Gandhinagar on dt.....at.....AM/PM
12. Address of the Employer: Gujarat Maritime Board, Sagar Bhawan, Sector 10 A, Opp. Air Force, Gandhinagar- 382010
13. Deleted
14. The bid should be submitted latest by [Cl. 20.1 & 20.2]  
As stated on online NIT
15. The bid will be opened at Executive Engineer (C), Procurement Cell, Gujarat Maritime Board, Gandhinagar As stated on online NIT [Cl. 23.1 ]
16. The Bank Draft in favor of Gujarat Maritime Board, Gandhinagar
17. Deleted
18. Escalation factors (for the cost of works executed and financial figure to a common base value) for works completed [Cl.4.5.2]

<u>Year</u>	<u>Financial Year</u>	<u>Multiplying factor</u>
Base year of inviting tender	2026-2027_	1.00

-1	2025-2026_	1.10
-2	2024-2025	1.21
-3	2023-2024	1.33
-4	2023-2023	1.46
-5	2021-2022	1.61

## #LIST OF KEY PLANT & EQUIPMENT TO BE DEPLOYED ON CONTRACT WORK

[Reference CL. 4.5.5]

The contractors shall also give a list of machineries in his possession and which they propose to use on the work.

Sr. No.	Plant or Machinery	Location	Age of Machinery (maximum 15 years)	Make	Capacity	Approximate Value	Remark
1	2(a)	2(b)	3	4	5	6	7

## **List of Key Personnel to be deployed on Contract Work**

### **(Reference Cl. 4.5.4)**

#### **# Employment of a qualified site Engineer by the Contractor.**

The Contractor shall employ full-time technically qualified staff during the execution of this work as under: -

1. Two graduate Civil Engineers and three diploma Civil Engineers when cost of the work to be executed is more than Rs.50 lakhs.
2. One graduate & two Diploma, Civil Engineers when the cost of the work to be executed is more than Rs.15 lakhs but less than Rs.50 lakhs.
3. Minimum one Diploma Civil Engineer when the cost of work is less than Rs.15 lakhs but more than Rs.5 lakhs.
4. Minimum two Diploma Civil Engineers for the work when the cost of work to be executed is less than Rs. 5 lakhs. The Engineer so employed for the Government work must have sufficient experience to handle the work independently. Such an Engineer shall have to stay at the site of work and he shall not be entrusted with other duty except this work.

In case the contractor or partner of the contractor firm is a Civil Graduate Engineer, Employment of a separate Engineer will not be necessary provided that the Engineer partner himself attends the execution of the work on the site.

Within 15 days of issue of work-order the Contractor will have to furnish to the Deputy Executive Engineer-in-charge of the work the Name, Qualifications, copy of marksheet, Colour Photograph and the appointment order issued such engineers engaged for this contract work. If 15 days after issue of work order such designated Site Engineers do not resume or do not remain present on site of work, the recovery at the rate of Rs.15,000-00 per month per Engineer will be made from the bills/deposit/dues of the contractor. Such recovery shall be non-refundable.

**SECTION - 2**

**QUALIFICATION INFORMATION**

## **QUALIFICATION INFORMATION**

The information to be filled in by the Bidder in the following pages will be used for the purpose of post qualification as provided for in Clause 4 of the Instruction to Bidders. This information will not be incorporated in the Contract.

### **1. For Individual Bidders**

#### **1.1 Constitution or legal status of Bidder (Attach Copy)**

Place of registration \_\_\_\_\_

Principal place of business \_\_\_\_\_

Power of attorney of signatory of Bid  
(Attach)

- |     |  |           |
|-----|--|-----------|
| 1.2 | Total value of Civil engineering constructions | 2025-2026 |
|     | Work performed in the last five years          | 2024-2025 |
| 1.3 | (in Rs. Lakhs)                                 | 2023-2024 |
|     |  | 2022-2023 |
|     |  | 2021-2022 |

1.3.1 Work performed as prime contractor, work performed in the past as a nominated sub-contractor will also be considered the sub-contract involved execution of all main items of work described in the bid documents, provided further that all other qualification criteria are satisfied (in the same name) on works of a similar nature over the last five years\*\* and in current year before the submission of the bid.

Project Name	Name of the Employer	Description of work	Contract No.	Value of contract (Rs. Crore)	Date of issue of work order	Stipulated period of completion	Actual date of completion*	Remark explaining reasons for delay & work Completed

\*Attach certificate(s) from the Engineer(s) in-charge

\*\* Immediately preceding the financial year in which bids are received.

#1.3.2 Quantities of work executed as prime contractor, work performed, in the past as a nominated sub-contractor, will also be considered provided the sub-contractor involved execution of all main items of work described in the bid document, provided, further that all other qualification criteria are called (in the same name and style) in the last five years\*\* and in current year before the submission of the bid.

Year	Name of the work	Name of the Employer	Quantity of work performed (Cum/MT)				Remarks* (indicate contract Ref)
			Cement Concrete (Including RCC & PCC)	Masonry	Earth Works	Bituminous Work	
2025-2026							
2024-2025							
2023-2024							
2022-2023							
2021-2022							

1.4 Information on Bid Capacity (works for which bids have been submitted and works which are yet to be completed) as on the date of this bid.

(A) Existing commitments and on-going works:

Description of works	Place & State	Contract No.	Name & Address of Employer	Value Contract (Rs. Cr)	Stipulated Period of Completion	Value of Works* remaining to be completed (Rs. Cr)	Anticipated of completion
1	2	3	4	5	6	7	8

\*Attach certificate (s) from the Engineer(s) in-charge

\*\* Immediately preceding the financial year in which bids are received.

1.5 Availability of key items of Contractors Equipment for carrying out the works (Ref. Clause 4.5.5). The Bidder should list all the information requested below.

Item of Equipment	Requirement		Availability Proposals			Remarks (from whom to be purchased)
	NO	Capacity	Owned/ Leased to be procured	Nos/. Capacity	Age/ Conditions	

- 1.6 Qualifications and experience of key personnel required for administration and execution of the contract. Attach biographical data. Refer also to Sub Clause 9.1 of the Conditions of Contract.

Position	Name	Qualification	Year of Experience (General)	Year of experience in the proposed position
Project Manager				
Etc.				

- 1.7 Proposed sub-contract and firms involved

Sections of the works	Value of Sub-Contractor	Sub-Contractor (Name & Address)	Experience in similar work

Attach copies of certificates on possession of valid license for executing water supply/ sanitary work/ building electrification works.

- 1.8 Financial reports for the last five years: balance sheets, profit and loss statements, auditors' reports (in case of companies/corporations), etc. List them below and attach copies.
- 1.9 Evidence of access to financial resources to meet the qualification requirements: cash in hand, lines of credit, etc. List them below and attach copied documents.
- 1.10 Name, address, and telephone, telex, and fax numbers of the Bidders bankers who may provide references if contacted by the Employer.
- 1.11 Information on Litigation history in which the Bidder is involved.

Other Party (ies)	Employer	Cause of Dispute	Amount Involved	Remarks showing Present Status

- 1.12. Statement of compliance under the requirements of Sub Clause 3.2 of the instruction to Bidders. (Name of Consultant engaged for project preparations is \*.....)

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- 1.13 Proposed work method and schedule. The Bidder should attach descriptions, drawings and charts as necessary to comply with the requirements of the Bidding documents. (Refer ITB Clause 4.1)

- 1.14 Programme

## 2. Deleted

## 3. Additional Requirements

- 3.1 Bidders should provide any additional information required to fulfill the requirements of Clause 4 of the Instructions to the Bidders, if applicable.

- (i) Affidavit
- (ii) Undertaking

\* Fill the name of Consultant

**SAMPLE FORMAT FOR EVIDENCE OF ACCESS TO OR  
AVAILABILITY OF CREDIT FACILITIES**

(CLAUSE 4.5.6 OF ITB)

**BANK CERTIFICATE**

This is to certify that M/s. \_\_\_\_\_ is a reputed company with a good financial standing.

If the contract for the work, namely \_\_\_\_\_ is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of Rs. \_\_\_\_\_ to meet their working capital requirements for executing the above during the contract period.

\_\_\_\_\_

(Signature)

Name of Bank

Senior Bank Manager

Address of the Bank

## AFFIDAVIT

1. I, the undersigned, do hereby certify that all the statements made in the required attachments are true and correct.
2. The undersigned also hereby certifies that neither our firm M/s. \_\_\_\_\_  
\_\_\_\_\_ have not abandoned any work of Government of Gujarat/Government of India/any Board or Corporation under Government of Gujarat/Government of India nor any contract awarded to us for such works have been rescinded, during last five years prior to the date of this bid.
3. The undersigned hereby authorize(s) and request (s) any bank, person, firm or corporation to furnish pertinent information deemed necessary and requested by the Department to verify this statement or regarding any (our) competence and general reputation.
4. The Undersigned understands and agrees that further qualifying information may be requested, and agrees to furnish any such information at the request of the Department/ Project implementing agency.

\_\_\_\_\_  
(Signed by an Authorized officer of the firm)

\_\_\_\_\_  
Title of officer

\_\_\_\_\_  
Name of firm

\_\_\_\_\_  
DATE

## UNDERTAKING

I, the undersigned do hereby undertake that our firm  
M/s..... would invest a minimum cash  
up to 25% of the value of the work during implementation of the contract.

\_\_\_\_\_  
(Signed by an Authorized officer of the firm)

\_\_\_\_\_  
Title of officer

\_\_\_\_\_  
Name of firm

\_\_\_\_\_  
DATE

**SECTION - 3**

**CONDITIONS OF CONTRACT**

# Conditions of Contract

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## CONDITIONS OF CONTRACT

### A. GENERAL.

#### 1. Definitions

- 1.1 Terms which are defined in the Contract Data are not also defined in the Conditions of Contract but keep their defined meaning.

**Bill of Quantities** means the priced and completed Bill of Quantities forming part of the Bid

**Compensation Events** are those defined in Clause 44 hereunder

The **Completion Date** is the date of completion of the Works as certified by the Engineer in accordance with Sub Clause 55.1

The Contract is the contract between the Employer and Contractor to execute, complete and maintain the Works **till the completion of Defects Liability Period**. It consists of the documents listed in Clause 2.3 below.

The **Contract data** defines the documents and other information which comprise the Contract.

The **Contractor** is a person or corporate body whose Bid to carry out the Work has been accepted by the Employer.

The **Contractor's Bid** is the completed Bidding document submitted by the Contractor to the Employer and includes Technical and Financial Bids.

The **Contract Price** is the price stated in the Letter of Acceptance and thereafter as adjusted in accordance with the provisions of the Contract.

**Days** are calendar days: **months** are calendar months.

The **Defects Liability Period** is the period named in the Contract Data and calculated from the Completion Date.

The **Employer** is the party who will employ the Contractor to carry out the Works.

The **Engineer** is the person named in the Contract Data (or any other competent person appointed and notified to the contractor to act in replacement of the Engineer) who is responsible for supervising the Contractor, administering the Contract, certifying payments due to the Contractor, issuing and valuing Variations to the Contract, awarding extensions of time, and valuing the Compensations Events.

**Equipment** is Contractor's machinery and vehicles brought temporarily to the site to construct the Works.

The **Initial Contract Price** is the Contract Price listed in the Employer's Letter of Acceptance.

The **Intended Completion Date** is the date on which it is intended that the Contractor shall complete the Works. The Intended Completion Date is specified in the Contract Data. The Intended Completion Date may be revised only by the Engineer by issuing an extension of time.

**Materials** are all supplies, including consumables, used by the contractor for incorporation in the works.

**Plant** is any integral part of the work which is to have mechanical, electrical, electronic or chemical or biological functions.

The **Site** is the area defined as such in the Contract Data.

**Site Investigation Reports** are those which were included in the Bidding documents and are factual interpretive reports about the surface and subsurface conditions at the site.

**Specifications** means the Specifications of the works included in the Contract and any modification or addition made or approved by the Engineer.

The **Start Date** is given in the Contract Data. It is the date when the Contractor shall commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates.

A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract which includes work on the Site.

**Temporary Works** are works designed, constructed, installed, and removed by the Contractor which are needed for construction or installation of the Works.

A **Variation** is an instruction given by the Engineer, which varies the Works.

The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the Contract Data.

## **2. Interpretation**

- 2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter and the other way around. Heading have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Engineer will provide instructions clarifying queries about Conditions of Contract.
- 2.2 If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion date, and Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion date for the whole works)
- 2.3 The documents forming the Contract shall be interpreted in the following order of priority
  - (1) Agreement
  - (2) Letter of Acceptance, notice to proceed with works
  - (3) Contractor's Bid

- (4) Contract Data
- (5) Conditions of Contract including Conditions of Contract
- (6) Specifications
- (7) Drawings
- (8) Bills of quantities and
- (9) Any other document listed in the Contract Data as forming part of the Contract.

### **3. Language and Law**

- 3.1 The language of the Contract and the law governing the Contract are stated in the Contract Data.

### **4. Engineers Decisions**

- 4.1 Except where otherwise specifically stated, the Engineer will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

### **5. Delegation**

- 5.1 The Engineer may delegate any of his duties and responsibilities to other people after notifying the Contractor and may cancel any delegation after notifying the Contractor.

### **6. Communications**

- 6.1 Communications between parties which are referred to in the conditions are effective only when in writing. A notice shall be effective only when it is delivered (in terms of Indian Contract Act).

### **7. Sub-Contracting**

- 7.1 The Contractor may subcontract any portion of work, up to a limit specified in contract data, with the approval of the engineer but may not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations. **Sub-contracting of supply or specific items of work is not allowed.**
- 7.2 The sub-contractor must be registered in appropriate class and category for the part of work to be subcontracted.

### **8. Other Contractors**

- 8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities and the Employer between the dates given in the Schedule of other Contractor. The Contractors shall as refer to in the Contract Data, also provide facilities and services for them as described in the Schedule. The employer may modify the schedule of other contractors and shall notify the contractor of any such modifications.

## **9. Personnel**

- 9.1 The Contractor shall employ the key personnel named in the Schedule of Key Personnel as referred to in the Contract Data to carry out the functions stated in the Schedule or other personnel approved by the Engineer. The Engineer will approve any proposed replacement of key personnel only if their qualifications, abilities, and relevant experience are substantially equal to or better than those of the personnel listed in the Schedule.
- 9.2 If the engineer asks the Contractor to remove a person who is a member of the Contractor Staff or his work force stating the reasons the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

## **10. Employer's and Contractors Risks**

- 10.1 The Employer carries the risk which these Contract states are Employer's risks, and the Contractor carries the risks which these Contracts states are Contractor's risk.

## **11. Employer's Risks**

- 11.1 The employer is responsible for the excepted risks which are (a) in so far as they directly affect the execution of the Works, the risks of war, hostilities, invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, riot commotion or disorder (unless restricted to the Contractor's employees), and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive.

## **12. Contractor's Risks**

- 12.1 All risks of loss of or damages to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

## **13. Insurance**

- 13.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start date to the end of the Defects Liability Period, in the amounts and deductibles stated in the Contract data for the following events which are due to the Contractor's risks:

- (a) Loss of or damage to the works, Plant and materials,
- (b) Loss of or damage to Equipment
- (c) Loss of or damages of property (except the Works, Plant, Materials and Equipment) in connection with the Contract; and
- (d) Personal injury or death.

- 13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

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

13.4 Alterations to the terms of an insurance shall not be made without the approval of the Engineer.

13.5 Both parties shall comply with any conditions of the insurance policies.

#### **14. Site Investigation Report**

14.1 The Contractor in preparing the Bid shall rely on any site Investigation reports referred to in the Contract Data, supplemented by any information available to the Bidder.

#### **15. Queries about the Contract data**

15.1 The engineer will clarify queries on the Contract Data

#### **16. Contractor to Construct the Works**

16.1 The Contractor shall construct and install the works in accordance with the specification and Drawings.

#### **17. The Works to be completed by the Intended Completion Date**

17.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the programme submitted by the Contractor, as updated with the approval of the Engineer, and complete them by the Intended Completion date

#### **18. Approval by the Engineer**

18.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary works to the Engineer, who is to approve them if they comply with the Specifications and drawings.

18.2 The Contractor shall be responsible for design of temporary works.

18.3 The Engineer's approval shall not alter the contractor responsibility for design of the Temporary works.

18.4 The Contractor shall obtain approval of third parties to the design of the Temporary works where required.

18.5 All Drawings prepared by the Contractors for the execution of the temporary or permanent work are subject to prior approval by the Engineer before their use.

#### **19. Safety**

19.1 The Contractor shall be responsible for the safety of all activities on the Site.

## **20. Discoveries**

- 20.1 Anything of historical or other interest or of significant value unexpectedly discovered on the site is the property of the Employer. The contractor is to notify the engineer of such discoveries and carry out the Engineer's instructions for dealing with them.

## **21. Possession of the Site**

- 21.1 The Employer shall give possession of all parts of the site to the Contractor. If possession of a part is not given by the date stated in the Contract Data the Employer is deemed to have delayed the start of the relevant activities and this will be a Compensation Event.
- 21.2 If within 25% of the time limit of the project, 80% of possession of the site is not handed over to the Contractor, then contractor/ Employer may fore-close the contract. Contractor/Employer has to foreclose the work within 30 days after lapse of 25%-time limit and after 30 days foreclosure option will be closed.

## **22. Access to the Site**

- 22.1 The Contractor shall allow the Engineer and any person authorized by the Engineer access to the Site, to any place where work in connection with the Contract is being carried out or is intended to be carried out and to any place where materials or plants are being manufactured/ fabricated/ assembled for the works.

## **23. Instructions**

- 23.1 The Contractor shall carry out all instructions of the Engineer pertaining to works which comply with the applicable laws where the site is located.
- 23.2 The Contractor shall permit the Employer to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the Employer, if so required by the Employer.

## **24. Disputes**

- 24.1 If the Contractor is of the view that a decision taken by the Engineer was either outside the authority given to the Engineer by the Contract or that the decision was wrongly taken, the decision shall be referred to **#Superintending Engineer of concerned Project Implementation Unit** (Higher Authority) within 14 days of the notification of the Engineer's decision. If the issue is not resolved, any party can refer the matter for conciliation within 15 days from the decision given by the **#Superintending Engineer of concerned Project Implementation Unit**.
- 24.2
- (a) For the work up to Rs.100 Cr., if any of the parties is not satisfied with the decision of the **#Superintending Engineer of concerned Project Implementation Unit**, both the parties have to refer to the Chief Engineer concern for the conciliation process.
  - (b) For the work more than Rs.100 Cr., if any of the parties is not satisfied with the decision of the **#Superintending Engineer of concerned Project Implementation Unit**, both the parties have to refer to the **#Secretary, Roads & Building Department, Government of Gujarat** for the conciliation process.

If the dispute is not resolved through the conciliation process, he may refer the dispute to Gujarat Public Works Contract Dispute Arbitration Tribunal. If the Contractor fails to refer a claim / dispute to the Higher Authority within 14 days of the notification of the Engineer's decision, the Contractor shall not be entitled to any additional payment/claim if he doesn't follow the above sequence in stipulated time and he should not stop the work.

**25. Procedure for Disputers**

25.1 The arbitration shall be conducted in accordance with the arbitration procedure stated in the Special Conditions of Contract.

**26. Deleted**

## **B. TIME CONTROL**

### **27. Programme**

- 27.1 Within the time stated in the Contract Data the Contractor shall submit to the Engineer for approval a Programme showing the general methods, arrangements orders, and timing for all the activities in the works along with monthly cash flow forecast.
- 27.2 An update of the Programme shall be a programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.
- 27.3 The Contractor shall submit to the Engineer, for approval an updated programme at intervals no longer than the period stated in the Contract data. If the Contractor does not submit an updated programme within this period, the Engineer may withhold the amount stated in the Contract data from the next payment after the date on which the overdue programme has been submitted.
- 27.4 The Engineer's approval of the programme shall not alter the Contractor's obligations. The Contractor may revise the programme and submit it to the Engineer again at any time. A revised programme is to show the effect of Variations and Compensations events.

### **28. Extension of the Intended Completion Date**

- 28.1 The Engineer shall extend the Intended Completion Date if a compensation Event occurs or a Variation is issued which makes it impossible for completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work and which would cause the Contractor to incur additional cost.
- 28.2 The Engineer shall decide whether and by how much to extend the Intended Completion Date within 35 days of the Contractor asking the Engineer for a decision upon the effect of a compensation event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.
- 28.3 The Engineer shall within 14 days of receiving full justification from the contractor for extension of Intended Completion Date refer to the Employer his decision. The employer shall in not more than 21 days communicate to the engineer the acceptance or otherwise of the Engineer's decision. If the employer fails to give his acceptance, the Engineer shall not grant the extension and the contractor may refer the matter under Clause 24.1

### **29. Deleted**

### **30. Delays Ordered by the Engineer**

- 30.1 The Engineer may instruct the Contractor to delay the start or progress of any activity within the works.

### **31. Management Meetings**

- 31.1 Either the Engineer or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.
- 31.2 The Engineer shall record the business of management meetings and is to provide copies of his record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken is to be decided by the Engineer either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

### **32. Early Warning**

- 32.1 The Contractor is to warn the Engineer at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract price or delay the execution of works. The Engineer may require the contractor to provide an estimate of the expected effect of the future event or circumstance on the contract price and completion date. The estimate is to be provided by the Contractor as soon as reasonably possible.
- 32.2 The Contractor shall cooperate with the Engineer in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Engineer.

**# 33. Identifying Defects/ Defect liability period**

33.1 : Defect liability period: The contractor shall be responsible to make good and remedy at his own expense any defect which may develop or may be noticed before the period mentioned hereunder from the certified date of completion. The Engineer in charge shall give the contractor a notice in writing about the defects and the contractor shall make good the same within 15 days of receipt of the notice. In the case of failure on the part of the contractor, the Engineer-in-charge may rectify or remove or re-execute the work at the risk & cost of the contractor. The Engineer-in-charge shall be entitled to appropriate the whole or any part of the amount of security deposit towards the expenses, if any, Incurred by him in rectification, removal or re-execution. The Defects Liability period shall be as under....

- (a) For all works costing up to Rs. 50,000 (amount put to tender), the period shall be 3 Months from the certified date of completion.
- (b) For all works costing more than Rs. 50,000 and up to Rs. 1 crore (amount put tender), the period shall be 12 (Twelve) months from the certified date of completion or one monsoon, whichever is later.
- (c) For major projects costing more than Rs. 1 crore, the period shall be 36Months from the certified date of completion which should include three monsoons.
- (d) For original building works the defect liability period will be 4 years or elapse of 4 monsoon period following date of possession of building taken over by user agency following the certified date of completion, whichever is later. For the purpose of deciding the monsoon period, the 30th September shall be treated as the last date.

Modified vide R & B D Circular No. PAC-11-102008-2076-N dated 31/8/2009, PRCH/102013(2976) 2759-N, dated 27/05/2013 and Circular No.TNC/10/2016/Clause 17A (Correction/ (1)C Dated 12/05/2016]

**33.2 Free maintenance guarantee period for works of Road/Bridge construction**

~~(a) For resurfacing work of road free maintenance guarantee period one year from the date of completion.~~

(b) In case of widening of the road/strengthening of the road/bridge, the contractor shall have to give four years free maintenance guarantee from the certified date of completion. During this period the contractor shall visit the site every six months along with the concerned Section Officer / Deputy Executive Engineer and will examine the work already carried out in this contract like road work, jungle cutting, side shoulders, side gutter, road furniture, patta etc. and will prepare Km. wise inspection report duly signed by all concerned and any defect observed shall be done within 15 days by the contractor at his risk and cost as per the direction of Engineer in charge. The contractor needs to do videography of these visits and require to submit at the time of release of FMG. ~~If B.T. the surface during the maintenance period of 4 years is worn out then agency shall have to provide renewal coating as per tender item as directed by the Engineer-in-charge.~~ The amount equivalent to 5% of each running bill shall be withheld and will be released after the free maintenance guarantee period (i.e. 3 years) is over.

However, this amount shall be released against fixed deposit or bank

guarantee pledged in the name of Executive Engineer after completion certificate of work is issued.

(1) The flakiness and elongation index (combined) for coarse aggregates under no circumstances shall exceed the allowable limit set forth in the relevant clause for the material in question.

(2) 2% of the amount eligible for the payment of bituminous items shall be withheld till the miscellaneous items like earthwork in embankment / cutting for side shoulders, side gutters, kilometer / indicator / guard stones, sign boards etc. are completed in all respect by the contractor. After completion of the miscellaneous items, the above said 2% withheld amount shall be released.

(Govt. of Gujarat's G.R. No.: TNC-10-2013-3(Part-3)/C, Dtd. 13/12/2013).

~~(3) Videography for the surface under Maintenance Guarantee is to be done as per Govt. letter No.: SSR/10/2015-16/26/C, Dtd. 26/11/15 for the work costing more than Rs. 5.00 Crore.~~

(4) Setting up of adequate laboratory & deployment of quality engineers.

The contractor shall have to set up the laboratory with adequate equipment. Till the setting up of adequate laboratory is completed & reported of this to the engineer (subject to due verification by engineer's representative) by contractor in writing, Rs.2,00,000/- shall be withheld. The qualified quality Engineer shall be deployed exclusively for this contract by the contractors. If quality Engineer is not deployed by contractor within one month after the date of work order, the amount equivalent to Rs.20,000 per month shall be recovered till the actual deployment of quality engineer. The amount so recovered towards the deployment of quality engineers shall not be refunded.

~~(5) Asphalt work will have to be cross checked as per G.R. No.: RGN/60/2006/35/C, dtd.31/05/07 before final bill is paid.~~

(6) Maintenance during Construction Period

During the Construction Period, the Contractor shall maintain, at his own risk and cost, the existing lane(s) of the road so that the traffic worthiness and safety thereof are at no time materially inferior as compared to their condition 10 (ten) days prior to the date of the Agreement, and shall undertake the necessary repair and maintenance works for this purpose; provided that the Contractor may, at his cost, interrupt and divert the flow of traffic if such interruption and diversion is necessary for the efficient progress of works and conforms to Good Industry Practice; provided further that such interruption and diversion shall be undertaken by the Contractor only with the prior written approval of the Executive Engineer which approval shall not be unreasonably withheld. For the avoidance of doubt, it is agreed that the Contractor shall at all times be responsible for ensuring safe operation of the road.

33.3 The Engineer shall check the Contractor's work and notify the Contractor of

any defects that are found. Such checking shall not affect the Contractor's responsibilities the Engineer may instruct the Contractor to search for a Defect and to uncover and test any work that the Engineer considers may have a Defect.

#### **34. Tests**

- 34.1 If the engineer instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no defect the test shall be a Compensation Event.
- 34.2 All the testing of materials and all periodical quality control tests at site and in Govt. or recognized laboratory required to be carried out as per the specifications at the contractor's cost. The testing charges shall also include all transportation of the specimen to the laboratory from the site of the work and vice-a-versa as directed by the Engineer-In-Charge.
- 34.3 Agency has to establish testing laboratory on site for the various test to be carried out in the work for this purpose agency shall construct a pukka laboratory building with all facility on site at location specified by the engineer in charge.

#### **35. Correction of defects**

- 35.1 The engineer shall give notice to the Contractor of any defects before the end of the defects Liability Period, which begins at Completion and is defined in the contract data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.
- 35.2 Every time notice of a Defect is given, the Contractor shall correct the notified defect within the length of time specified by the Engineer's notice.

#### **36. Uncorrected Defects**

- 36.1 If the Contractor has not corrected a defect within the time specified in the Engineer's notice, the Engineer will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

## **D. COST CONTROL**

### **37. Bill of Quantities**

- 37.1 The bill of Quantities shall contain items for the constructions, installation, testing and commissioning work to be done by the Contractor.
- 37.2 The bill of Quantities is used to calculate the Contract price. The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities for each item.

### **38. Change in the Quantities**

- 38.1 The Engineer shall have power to make any alterations in or addition to the original specifications , drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work and the contractor shall be bound to carry out the work in accordance with any instruction in this connection which may be given to him in writing signed by the Engineer and such alteration shall not invalidate the contract and any additional work which the contractor may be directed to do in the manner above specified as part of the work shall be carried out by the contractor on the same conditions in all respects on which he agreed to do the main work and at the same rate as are specified in the tender for the main work.

Except that when the quantity of any item exceeds the quantity as in the tender by more than 130%, the contractor will be paid for the quantity in excess of 130%, at the rate entered in the SOR of the year during which the excess in quantity is first executed.

### **39. Variations**

- 39.1 All Variations shall be included in updated programmes produced by the Contractor.

### **40. Payments for Variations**

- 40.1 If the additional or altered work includes any class of work for which no rate is specified in this contract, then such class of work shall be carried out as under.
- (i) At the rate derived from the item within the contract which is comparable to the one involving additional or altered class of work; where there are more than one comparable items, the item of the contract which is nearest in comparison with regard to class or classes of the work involved shall be selected and the decision of the Superintending Engineer of concerned Project Implementation Unit as to the nearest comparable item shall be final and binding on the contractor.

(ii) If the rate cannot be derived in accordance with (i) above, such class of works

shall be carried out at the rate entered in the Schedule of Rates of the division

for the year in which the tender was received, increased or decreased by the percentage by which the tender amount is more or less as compared to the amount arrived at the rates in the “Schedule of Rates” of the Division in the year in which the tender was received. If the Schedule of rates of the Division does not contain all the items, the percentage increase or decrease of the tender shall be calculated considering such items which were included in the “Scheduled Rates” of the division for the year and for materials consumed on such item the rate to be charged would be the basic rate taken into account for fixing the rate in S.O.R. referred to above.

If it is not possible to arrive at the rate from (i) and (ii) above, such class of work shall be carried out at the rate decided by the competent authorities on the basis of detailed rate analysis after hearing the contractor before a committee of two Superintending Engineers- Superintending Engineer (Civil)- Head Quarter circle and Superintending Engineer (Civil)- Project Implementation Unit.

- 40.2 If the additional or altered work, for which no rate is entered in the “Schedule of Rates” of the Division is ordered to be carried out before the rate is agreed upon, then the contractor shall within seven days of the date of receipt by him of the order to carry out the work, inform the Engineer-in-charge of the rate, which it is his intention to charge for such class of work and if the Engineer in charge does not agree to this rates, he shall by notice in writing be at liberty to cancel his order to carry out such class of work and arrange to carry it out in such manner as he may consider it advisable, provided always that if the contractor shall commence work or incur any expenditure in regard thereof before the rates shall have been determined as lastly herein before mentioned, then in such cases he shall only be entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of the determination of the rate as aforesaid according to such rate or rates as shall be fixed by the Engineer-in-charge. In the event of the dispute, the decision of the Superintending Engineer of the Circle shall be final.

Where, however, the work is to be executed according to the designs, drawings and specifications recommended by the contractor and accepted by the competent authority, the alternation above referred to shall be within the scope of such designs, drawings and specifications appended to the tenders.

The time limit for the completion of the work shall be extended in the proportion that the increase in the cost occasioned by alterations bears to the cost of the original work and the certificate of the Engineer-in-charge as to such proportion shall be final and conclusive.

#### **41. Cash Flow Forecasts**

- 41.1 When the programme is updated, the contractor is to provide the engineer with an updated cash flow forecast.

## **42. Payment certificates.**

- 42.1 The Contractor shall submit to the Engineer monthly statements of the estimated value of the work completed less the cumulative amount certified previously.
- ~~42.2 The Engineer shall check the Contractor's monthly statement within 14 days and certify the amount to be paid to the Contractor after taking in to account any credit or debit for the month in question in respect of materials for the works in the relevant amounts and under conditions set forth in sub-clause 32.3 of the Contract Data (secured Advance).~~
- 42.3 The value of work executed shall be determined by the Engineer.
- 42.4 The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.
- 42.5 The value of work executed shall include the valuation of variations and compensation events.
- 42.6 The Engineer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information

## **43. Payments**

- ~~43.1 Payments shall be adjusted for deductions for advance payments, retention, other recoveries in terms of the contract and taxes at source, as applicable under the law. The Employer shall pay the Contractor the amounts certified by the Engineer within 28 days of the date of each certificate.~~
- 43.2 Payment of GST (prevailing rates) on the amount payable under the contract to the Contractor will be made by the Employer. Hence, it is the responsibility of the contractor to pay the GST to the concerned Authority.
- 43.3 Items of the works for which no rate or price has been entered in will not be paid by the Employer and shall be deemed covered by other rates and prices in the Contract.

## **44. Compensation events**

- 44.1 The following are compensation Events unless they are caused by the Contractor:
- (a) The Employer does not give access to a part of the Site by the site Possession date stated in Contract data to the Contractor
- 44.2 In case of compensation event occurs and it prevents the work being completed beyond the Intended Completion Date then Authority will approve EOT with eligible contractual price escalation.

## **45. Tax**

- 45.1 The rates quoted by the Contractor must be inclusive of all taxes prevailing on due date of bid submission except GST. However, any subsequent changes in the tax structure by Government after due date of bid submission will be compensated (+/-) on availability or submission of actual documentation. Contractor will have to intimate Engineer regarding changes occurred in the tax structure after bid submission. If the contractor fails to provide such information and if any financial obligation may arise due to change in tax structure, same will be recovered from the contractor.
- 45.2 GST will be paid separately on the bills. Hence, it is the responsibility of the contractor to pay the GST to the concerned Authority.

## **46. Currencies.**

- 46.1 All payment shall be made in Indian Rupees.

## **47. Price Adjustment**

- 47.1 Contract price shall be adjusted for increase or decrease in rates and price of labour, materials, fuels and lubricants in accordance with the following principles and procedures and as per formula given in the contract data:
- (a) The price adjustment shall apply for the work done from the start date given in the contract data up to end of the initial intended completion date or extensions granted by the Engineer and shall not apply to the work carried out beyond the stipulated time for reasons attributable to the contractor.
  - (b) The price adjustment shall be determined during each month from the formula given in the contract data.
  - (c) Following expressions and meanings during to the work done during each month  
R = Total value of work done during the month. It would include the amount of secured advance granted, if any, during the month less the amount of secured advance recovered, if any during the month. It will exclude value for works executed under variations for which price adjustment will be worked separately based on the terms mutually agreed.
- 47.2 To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other clause in the contract, the unit rates and prices included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs.

## **48. Retention**

- 48.1 The Employer shall retain from each payment due to Contractor the proportion stated in the Contract Data until Completion of the whole of the Works.

- 48.2 On Completion of the whole of the Works half the total amount retained is repaid to the Contractor and half when the Defects Liability Period has passed and the Engineer has certified that all Defects notified by the Engineer to the Contractor before the end of this period have been corrected.
- 48.3 On completion of the whole works, the contractor may substitute retention money with an “on demand” Bank guarantee.

In case, Contractor requests for refund of the Retention Money deducted by the Employer under the provision of this clause, Employer shall consider the said request of the Contractor provided that the refund hereunder shall be made in tranches of not less than 1% (One Percent) of the Contract Price and Contractor furnishes an irrevocable and unconditional Bank guarantee for an equal amount substantially in the format of Bank Guarantee for Performance Guarantee enclosed with SBD and valid up to 60 day beyond the scheduled / extended Defects Liability Period. On completion of the whole works, the contractor has however an option to submit a fresh irrevocable and unconditional Bank Guarantee for an amount equal to 5% of the total value of work executed substantially in the format of Bank Guarantee for Performance Guarantee enclosed with SBD and valid up to 60 days beyond the Defect Liability Period and yet refund the Retention Money Bank Guarantee submitted for refund of Retention Money.

#### **49. Liquidated Damages**

- 49.1 The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date (for the whole works or the milestone as stated in the contract data). The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Employer may deduct liquidated damages from payment due to the Contractor. Payment of liquidated damages does not affect the Contractor’s liabilities.
- 49.2 If the Intended Completion Date is extended after liquidated damages have been paid, the Engineer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall not be entitled for any interest on the over payment calculated from the date of payment to the date of repayment.
- 49.3 If the contractor fails to comply with the time for completion as stipulated in the tender, then the contractor shall pay to the employer the relevant sum stated in the Contract Data as Liquidated damages for such default and not as penalty for everyday or part of day which shall elapse between relevant time for completion and the date stated in the taking over certificate of the whole of the works on the relevant section, subject to the limit stated in the contract data.

The employer may, without prejudice to any other method of recovery deduct the amount of such damages from any monies due or to become due to the contractor. The payment or deduction of such damages shall not relieve

the contractor from his obligation to complete the works on from any other of his obligations and liabilities under the contract.

- 49.4 If, before the Time for Completion of the whole of the Works or, if applicable any Section, a Taking Over Certificate has been issued for any part of the Works or of a Section, the liquidated damages for delay in completion of the remainder of the Works or of that Section shall, for any period of delay after the date stated in such Taking-Over-Certificate, and in the absence of alternative provisions in the Contract, be reduced in the proportion which the value of the part so certified bears to the value of the whole of the Works or Section, as applicable. The provisions of this Sub-clause shall only apply to the rate of liquidated damages and shall not affect the limit thereof.

## **50 — Bonus**

- ~~50.1 If the contractor achieves completion of the whole of the works prior to the intended Completion Date prescribed in Contract Data the Employer shall pay to the contractor a sum stated in Contract Data as bonus for every completed month but subjected to maximum amount as stated in Contract Data; which shall elapse between the date of completion of all items of works as stipulated in the contract, including variations ordered by the Engineer and the time prescribed in Clause 17.~~
- 50.2 Bonus shall be paid only to works amounting to above INR 5 crore with time limit of the works is equal or more than 6 months. The bonus would be paid as under

% of Time Saved	% of Initial Contract Price entitled for Bonus
50 %	5%
40 %	4%
30 %	3%
20 %	2%
10 %	1%
Less than 10%	0%

## **51. — Advance Payment.**

- ~~51.1 The Employer shall make advance payment (not to be paid less than two installments except in special circumstances for which the reason to be Recorded in writing) to the Contractor of the amounts stated in the Contract Date by the date stated in the Contract Date, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts and currencies equal to be at least 110% of the advance payment. The guarantee shall remain effective until the~~

~~Advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor. The Mobilization advance would be deemed as interest bearing advance at an interest rate of 10 % to be compounded, quarterly.~~

~~51.2 The Contractor is to use the advance payment only to pay for Equipment, plant and Mobilization expenses required specifically for execution of the Works. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the engineer.~~

~~51.3 The advance payment shall be repaid by deduction proportionate amount from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, variations, price adjustments, Compensation Events, or Liquidated damages.~~

51.4 Deleted

## **52. Securities**

52.1 The performance Security (including additional security for unbalanced bids) shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a bank or surety acceptable to the Employer, and denominated in Indian Rupees. The performance Security shall be valid until a date 60 days from the date of expiry of Defects Liability Period and the additional security for unbalanced bids shall be valid until a date 28 days from the date of issue of the certificate of completion.

## **53. Deleted**

## **54. Cost of Repairs.**

54.1 Loss or damage to the Works or Materials to be incorporated in the Works between the Start date and the end of Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damages arises from the Contractor's acts or omissions.

## **E. FINISHING THE CONTRACT**

### **55. Completion**

- 55.1 The Contractor shall request the Engineer to issue a Certificate of Completion of the works and the Engineer will do so upon deciding that the work is completed.

### **56. Taking Over**

- 56.1 The Employer shall take over the Site and the Works within seven days of the Engineer issuing a certificate of Completion.

### **57. Final Account**

- 57.1 The Contractor shall supply to the Engineer a detailed final account of the total amount that the Contractor considers payable as full and final settlement of all claims under the Contract for items before the end of the Defects Liability Period. The Engineer shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Engineer shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Engineer shall decide on the amount payable to the Contractor and issue a payment certificate, within 56 days of receiving the Contractor's revised account.
- 57.2 If reversal in characteristic of tender (L1 becoming L2) on account of excesses and savings in final account is observed, the Engineer/Employer shall be at liberty to restrict the final payment of BOQ items to the lowest amount evaluated of the bids considering the final quantities and the rates quoted including the rebates if any. Payment of variation items shall however be made at the rates approved by the Employer, within 90 days from the physical completion of work.

### **58. Operating and Maintenance Manuals**

- 58.1 If "as built" drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract data.
- 58.2 If the Contractor does not supply the Drawings and/or manuals by the dates stated in the Contract data, or they do not receive the Engineer's approval, the Engineer shall withhold the amount stated in the Contract Data from payments due to the Contractor.

### **59. Termination**

- 59.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.

59.2 Fundamental breaches of Contract include, but shall not be limited to the following:

1. The contractor stops work for 28 days when no stoppage of work is shown on the current programme and the stoppage has not been authorized by the Engineer
2. The Engineer instructs the Contractor to delay the progress of the Works and the instructions is not withdrawn within 28 days;
3. The Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstructions or amalgamation
4. A payment certified by the Engineer is not paid by the Employer to the Contractor within 56 days of the date of the Engineer's certificate
5. The Engineer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer;
6. The Contractor does not maintain a security which is required;
7. The Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined in the Contract data; and
8. If the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.

For the purpose of this paragraph: "corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution. "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the borrower, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition.

59.3 When either party to the Contract gives notice of a breach of contract to the Engineer for a cause other than those listed under Sub Clause 59.2 above, the Engineer shall decide whether the breach is fundamental or not.

59.4 Notwithstanding the above, the employer may terminate the Contract for convenience.

## **60. Payment upon Termination**

60.1 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer shall issue a Certificate for the value of the work done less advance payments received up to the date of the issue of the

Certificate, less other recoveries due in terms of the contract, less taxes due to deducted at source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract data. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor the difference shall be a debt payable to the Employer.

- 60.2 If the Contract is terminated at the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Engineer shall issue a certificate for the value of the work done, the cost of balance material brought by the contractor and available at site, the reasonable cost of removal of equipment, repatriation of the Contractor's personnel employed solely on the works, and the Contractor's cost of protecting and securing the Works and less advance payment received up to the date of the certificate, less other recoveries due in terms of the contract and less taxes due to deducted at source as per applicable law.

**61. Property**

- 61.1 All materials on the Site, Plant Equipments, Temporary Works and Works are deemed to be property of the Employer, if the Contract is terminated because of a Contractor's default.

**62. Release from Performance**

- 62.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor the Engineer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made.

## **F. SPECIAL CONDITIONS OF CONTRACT**

### **63. LABOUR**

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment of housing, feeding and transport.

The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the numbers of the several classes of labour from time to time employed by the Contractor on the site and such other information as the Engineer may require.

### **64. COMPLIANCE WITH LABOUR REGULATIONS**

During continuance of the contract, the Contractor and his sub-contractor shall abide at all times by all existing labour enactments and rules made thereunder, regulations, notification and bye laws of the State or central Government or local authority and any other labour law (including rules), regulations, bye laws that may be passed or notifications that may be issued under any labour law in future either by the State or the Central Government or the local authority. Salient features of some of the major labour laws that are applicable to the construction industry are given below. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made thereunder, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Engineer/employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer/Engineer shall also have the right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.

The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point to time.

SALIENT FEATURES OF SOME MAJOR LABOUR AND OTHER LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN BUILDING AND OTHER CONSTRUCTIONS WORK

- A) **Workmen Compensation Act 1923:** - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- B) **Payment of Gratuity Act. 1972:** - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years service or more on death, the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.
- C) **Employees P.F. and Miscellaneous Provision Act 1952:** - The Act Provides for monthly contributions by the employer plus workers @ 10% or 8.33% The benefits payable under the Act are:
1. Pension or family pension on retirement or death, as the case may be.
  2. Deposit linked insurance on the death in harness of the worker.
  3. Payment of P.F. accumulation on retirement/death etc.
- D) **Maternity Benefit Act 1951:** - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- E) **Contract Labour (Regulation & Abolition) Act 1970:** The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by Law. The principal Employer is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer, if they employ 20 or more contract labour.
- F) **Minimum Wages Act 1948:** - The Employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act, if the employment is a scheduled employment. Construction of Building, Roads, and Runways are scheduled employment.
- G) **Payments of wages Act 1936:** - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
- H) **Equal remunerations Act 1979:** - The Act provides for payment of equal wages for work of equal nature to Male and Female workers and for not making discrimination against female employees in the matter of transfer, training and promotions etc.
- I) **Payments of Bonus Act 1965:** - The Act is applicable to all establishments employing 20 or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of wages and maximum of 20 % of wages to employees drawing Rs. 3500/- per month or less. The bonus to be paid to employees getting Rs. 2500/- per month or above Rs. 3500/- per month shall be worked out by taking wages as Rs. 2500/- per month only. The Act does not

apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.

- J) **Industrial Disputes Act 1947:-** The Act lays down the machinery and procedure for resolutions of Industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.
- K) **Industrial employment (standing Orders) Act 1946:-** It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the State and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get the same certified by the designated Authority.
- L) **Trade Unions Act 1926:-** The Act lays the procedure for registration of trade unions of workmen and employers. The Trade Unions registered under the Act have given certain immunities from civil and criminal liabilities.
- M) **Child Labour (Prohibition & Regulation Act 1986:-** The Act prohibits employment of children below 14 years of age in certain occupations and process and provides for regulation of employment of children in all other occupations and processes. Employment of Child labour is prohibited in Building and Construction Industry.
- N) **Inter – State Migrant workmen’s (Regulation of Employment & Conditions of service) Act 1979:-** The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state).The inter-state migrant workmen, is an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home upto the establishment and back, etc.
- O) **The Building and Other Construction workers (Regulation of employment and Conditions of Service) Act 1996 and the Cess Act of 1996:-** All the establishments who carry on any building or other constructions work and employ 10 or more workers are covered under this Act.

All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the government. The Employer of the establishment is required to provide safety measures at the Building or construction work and other welfare measures, such as canteens, First Aid facilities, Ambulance, Housing accommodations for workers near the workplace etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officers appointed by the Government.

P) **Factories Act 1948:** - The Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in the manufacturing process.

Q) **Royalty charges**-The contractor shall pay the royalty to the competent authority as per rule. The **royalty** charges paid shall be borne by the contractor and shall not be reimbursed by the Employer.

R) **Following Pollution control Acts and amendments made thereof from time to time shall be applicable.**

1. Water (Preservation and control of Pollution) Act, 1974
2. Air (Prevention and Control of Pollution Act 1981
3. Environmental (Protection) Act 1986

The contractor must commit to adopting Environmental management plan for best energy use, waste management, the reduction of pollution as in EMS (Environmental Management system) ISO-14001- 2015

#### 65. **ARBITRATION (GCC Clause 24)**

The procedure for arbitration will be as follows: -

24.1 If the Contractor is of the view that a decision taken by the Engineer was either outside the authority given to the Engineer by the Contract or that the decision was wrongly taken, the decision shall be referred to **Superintending Engineer of concerned Project Implementation Unit** (Higher Authority) within 14 days of the notification of the Engineer's decision. If the issue is not resolved, any party can refer the matter for conciliation within 15 days from the decision given by the **Superintending Engineer of concerned Project Implementation Unit**.

24.2

(a) For the work up to Rs.100 Cr., if any of the parties is not satisfied with the decision of the **Superintending Engineer of concerned Project Implementation Unit**, both the parties have to refer to the **Chief Engineer** concerned for the conciliation process.

~~(b) For the work more than Rs.100 Cr., if any of the parties is not satisfied with the decision of the Superintending Engineer, both parties have to refer to the #Secretary, Roads & Building Department, Government of Gujarat for the conciliation process.~~

If the dispute is not resolved through the conciliation process, contractor may refer the dispute to Gujarat Public Works Contract Dispute Arbitration Tribunal. If the Contractor fails to refer a claim / dispute to the Higher Authority within 14 days of the notification of the Engineer's decision, the Contractor shall not be entitled to any additional payment/claim if he doesn't follow the above sequence in stipulated time. However, during such period, he would not stop the work in any case.

**SECTION - 4**  
**CONTRACT DATA**

## #CONTRACT DATA

### Clause Reference With respect To section 3

**Item marked "N/A" do not apply to this Contract.**

1. The Employers is [CL.1.1]  
Name: Gujarat Maritime Board, Gandhinagar  
Address: Sagar Bhawan, Opp. Air Force, Sector 10 A, Gandhinagar-382010  
Name of authorized Representative (will be intimated later)
2. The Engineer is Executive Engineer (Civil)- PIU, MORBI .....  
Name of Authorized Representative: .....
3. The Defects Liability Period is **36 Months from the certified date of completion which should include three monsoons.** [CL.1.1&33]
4. The Start Date shall be **1<sup>st</sup>** days for the date of issue of the Notice to proceed with the work. [CL.1.1]
5. The Intended Completion Date for the whole of the works is **12 ( Twelve Months) Including Monsoon)** after start of work with the following milestones: [CL.1.1,17&2]  
Milestone dates: [CL.2.2& 49.1]  
Physical works to be completed Period from the start date  
Milestone 1 i.e. 25 % 91 days.  
Milestone 2 i.e. 50 % 182 days.  
Milestone 3 i.e. 75 % 273 days.  
Milestone 4 i.e. 100 % 365 days
6. The Site is located at Navlakhi Port. [CL.1.1]
7. The name and identification number of the Contract is: [CL.1.1]
8. The works consist of Repairs and widening of 800m R&B road from DMCC fatak to Entry gate at port Navlakhi with items as per B.O.Q. The works shall, inter alia, include the following, as Specified or as directed: [CL.1.1]

#### **(A) Road Works**

Site clearance; setting – out and layout; widening of existing carriageway and strengthening including camber corrections; construction of new road/ Parallel service road; bituminous pavements remodeling/construction of Junctions, intersections, bus bays, lay-bays; supplying and placing of drainage Channels, flumes, guard posts and guard other related items; construction/extension of cross drainage works, bridge, approaches and other related stones; protective works for roads/bridge; all aspects of quality assurance of various components of the works; rectification of The defects in the completed works during the Defects Liability Period; submission of "As- built" drawings and any other related documents; and other item of work as may be required to be carried out for completing the work in accordance with the drawings and the provisions of the contract and to ensure safety.

## **(B) Bridge Works**

~~Site clearance; setting out, provision of foundations, piers abutments and bearing; prestressed/reinforced cement concrete superstructure; wearing coat, hand railings, expansion joints, approach slabs, drainages spouts/ downtake pipes, arrangements for fixing light posts, water mains, utilities etc; provision of suitably designed protective works; providing wing/return walls; provision of road markings, road signs etc; all aspects of quality assurance; clearing the site and handing over the works on completion; rectification of the defects during the Defects Liability Period and submission of "As built" drawings and other related documents; and other items of work as may be required to be carried out for completing the works in accordance with the drawings and the provisions of the contract and to Insure safety~~

## **(C) Other Items**

[CL.1.1]

Any Other Items as required to fulfill all contractual obligations as per the Bid documents.

10. The following documents also form part of the Contract: [CL.2.3(9)]  
\_\_\_\_\_As per clause 2-3 - Addendum/ Corrigendum/ undertaking given by contractor, if any
11. The law which applies to the Contract is the law of Union of India [CL.3.1]
12. The language of the Contract documents is English [CL.3.1]
13. Limit of subcontracting 25% of the Initial Contract Price [CL.7.1]
14. The Schedule of Other Contractors [CL.8]
15. The Schedule of Key Personnel As per Annex – II to Section I [CL.9]
16. The minimum insurance cover for physical property, injury and death is Rs. 5 lakhs per occurrence with the number of occurrences limited to four. After each occurrence, the contractor will pay an additional premium necessary to make insurance valid for four occurrences always. [CL.13]
17. Site Investigation report [CL.14]
18. The Site Possession dates shall be the date of the issuance of work order [CL.21]
19. The period for submission of programme for approval of the engineer shall be 21 days from the issue of Letter of Acceptance. [CL. 27.1]
20. The period between program updates will be 30 days. [CL.27.3]
21. The amount to be withheld for late submission of an updated programme shall be Rs. 1lakhs (iii)
22. The following events shall also be Compensation Events  
Substantially adverse ground conditions encountered during the course of execution of work not provided for in the bidding document.
  - (i) Removal of underground utilities detected subsequently
  - (ii) Significant changes in classification of soil requiring additional mobilization by the contractor, e.g. ordinary soil to rock excavation,

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unsuitable material like marsh, debris dumps, etc. not [CL. 27.3]  
caused by the contractor.

[CL. 44]

- (iv) Artesian conditions
  - (v) Seepage, erosion landslide
  - (vi) River training requiring protection of permanent work
  - (vii) Presence of historical, archeological or religious structures, monuments interfering with the works
  - (viii) Restriction of access to ground imposed by civil, judicial, or military authority
23. The currency of the Contract is Indian Rupees [CL. 46]
24. **The formula (e) for adjustment of prices are as under:** [CL.47]
- If any of the commodities like Cement, Steel or Bitumen are not found applicable in a work, the weight component of that commodities {i.e. 'Cement' (Pc), 'Steel' (Ps) or 'Bitumen' (Pb) as indicated in SBD for the purpose of Price Adjustment} shall be clubbed with the weight component of 'Other Material' (Pm), such that the gross % weight of the components shall remain as 100% .
- R = value of work as defined in Clause 47.1 of Conditions of Contract

#### **Adjustment for labour component**

- (i) Price adjustment for increase or decrease in the cost due to labour shall be paid in accordance with the following formula:

$$V_L = 0.85 \times (P_l/100) \times R \times (L_i - L_0)/L_0$$

$V_L$  = Increase or decrease in the cost of work during the month under consideration due to changes in rates for local labour

$L_0$  = The consumer price index for industrial workers for the State on 28 days preceding the scheduled date of opening of technical Bids as published by Labour Bureau, Ministry of Labour, Government of India

$L_i$  = The consumer price index for industrial workers for the State for the month under consideration as published by the Labour Bureau, Ministry of Labour, Government of India.

$P_l$  = Percentage of labor component of the work.

#### **Adjustment for cement component.**

- (ii) Prices adjustment for increase or decrease in the cost of cement procured by the contractor

$$V_c = 0.85 \times (P_c/100) \times R \times (C_i - C_0)/C_0$$

$V_c$  = Increase or decrease in the cost of work during the month under consideration due to changes in rates for cement.

$C_0$  = The all India wholesale price index for Ordinary Portland Cement on 28 days preceding the scheduled date of opening of technical bid as published by the **Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.**

$C_i$  = The all India average wholesale price index for Ordinary Portland Cement for the month under consideration as published by **Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.**

$P_c$  = Percentage of cement component of the work

### **Adjustment for steel component**

- (iii) Price adjustment for increase or decrease in the cost of steel procured by the contractor shall be paid in accordance with the following formula

$$V_s = 0.85 \times (P_s/100) \times R \times (S_i - S_0)/S_0$$

$V_s$  = Increase or decrease in the cost of work during the month under consideration due to changes in the rates for steel

$S_0$  = The all India wholesale price index for steel (**Mild Steel - Long Products Rebars**) on 28 days preceding the date of opening of Bids as published by the **Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.**

$S_i$  = The all India average wholesale price index for steel (**Mild Steel - Long Products Rebars**) for the month under consideration as published by **Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.**

$P_s$  = Percentage of steel component of the work

Note : For the application of this clause, the index of **Mild Steel- Long products Rebars** has been chosen to represent the steel group.

### **Adjustments of bitumen component**

- (iv) Price adjustment for increase in the cost of bitumen shall be paid in accordance with the following formula

$$V_b = 0.85 \times (P_b/100) \times R \times (B_i - B_0)/B_0$$

$V_b$  = Increase or decrease in the cost of work during the month under consideration due to changes in rates for bitumen.

$B_0$  = The official retail price of bitumen at the IOC depot at the nearest centre on the day 28 days prior to the scheduled date of opening of technical bid.

$B_i$  = The official retail price of bitumen of IOC depot at the nearest centre for the 15<sup>th</sup> day of the month under consideration.

$P_b$  = Percentage of bitumen component of the work

### **Adjustment of POL (fuel and lubricant) component**

- (v) Price adjustment for increase or decrease in cost of POL (fuel and lubricant) shall be paid in accordance with the following formula

$$V_f = 0.85 \times (P_f/100) \times R \times (F_i - F_0)/F_0$$

$V_f$  = Increase or decrease in the cost of work during the month under consideration due to changes in rates for fuel and lubricants.

$F_0$  = The official retail price of High Speed Diesel (HSD) at the existing consumer pumps of IOC at the nearest centre on the day 28 prior to the date of opening of Bids.

$F_i$  = The official retail price of HSD at the existing consumer pumps of IOC at the nearest centre for the 15<sup>th</sup> day of the month of the under consideration.

$P_f$  = Percentage of fuel and lubricants component of the work

Note: For the application of this clause, the price of High-Speed diesel Oil has been chosen to represent the fuel and lubricants group.

### **Adjustment for Construction Machinery**

- (vi) Price adjustment for increase or decrease in the cost of plant and Machinery spare procured by the Contractor shall be paid in accordance with the following formula

$$V_p = 0.85 \times (P_p/100) \times R \times (P_i - P_0)/P_0$$

$V_p$  = Increase or decrease in the cost of work during the month under consideration due to changes in rates for plant and machinery spares

$P_0$  = The all India wholesale price index for **manufacturer of machinery for mining, quarrying and Construction** for the month under consideration as published **Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.**

$P_i$  = The all India average wholesale price index for **manufacturer of machinery for mining, quarrying and Construction** for the month under consideration as published **Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.**

$P_p$  = Percentage of plant and machinery spares component of the work.

Note: For the application of this clause, index of Heavy Machinery and parts has been chosen to represent the Plant and Machinery Spares group

## Adjustment of other materials Component

- (vii) Price adjustment for increase or decrease in cost of local materials other than cement, steel, bitumen and POL procured by the contractor shall be paid in accordance with the following formula

$$V_m = 0.85 \times (P_m/100) \times R \times (M_i - M_0)/M_0$$

$V_m$  = Increase or decrease in the cost of work during the month under consideration due to change in rates for local materials other than cement, steel, bitumen and POL.

$M_0$  = The All Indian wholesale price index (all commodities) on 28 days preceding the scheduled date of opening of technical Bids, as published by the **Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.**

$M_i$  = The All India wholesale price index (all commodities) for the month under consideration as published by the **Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.**

$P_m$  = Percentage of local material components (other than cement, steel, bitumen and POL) of the work.

The following percentage will govern the price adjustment for the entire contract:

1. Labour - $P_l$ .....	26.02 %
2. Cement - $P_c$ .....	25.86 %
3. Steel - $P_s$ .....	5.4 %
4. Bitumen - $P_b$ .....	0.00 %
5. POL - $P_f$ .....	9.15 %
6. Plant & Machinery Spares $P_p$ .....	7.32 %
7. Other Materials - $P_m$ .....	26.25 %
	-----
Total	100.000%

25. The proportion of payments retained (retention money) shall be 6% {CL. 48} from each bill subject to a maximum of 5% of final contract price.

26. Amount of Liquidated damages for in completion of works
- For Whole of work {CL.49} delay  $(1/2000)^{th}$  of the Initial contract price, rounded off to the nearest Thousand, per day. For sectional Completion (wherever specified In item 6 of Contract data)  $(1/2000)^{th}$  of initial contract price for #5 km Section, rounded off to the nearest thousand per day.

27. Maximum limit of liquidated damages 10 percent of the Initial {CL. 49}  
For delay in completion work Contract Price rounded off to  
the nearest thousand

28. ~~Amount of Bonus for early completion~~ ~~Amount of bonus for early~~  
~~completion of work shall be given as~~  
~~per CL.50 of Section-3~~

29. ~~Maximum limit of bonus for early~~ **5 percent** of the Contract {CL. 50}  
~~Completion of work~~ ~~Price~~

30. ~~The amount of the advance payment are: {CL. 51 & 52}~~

**#Nature of Advances** **Amount (Rs.) Conditions to**  
**Be fulfilled**

i ~~Mobilization 10% of the contract~~ ~~On submission of unconditional~~  
~~Price~~ ~~Bank Guarantee. (to be drawn~~  
~~before the end of 20% of the contract~~  
~~period). The contractor may furnish~~  
~~four bank guarantees of 2.5 % of each~~  
~~valid for the full period.~~

ii ~~Equipment 90% for new and 50% of~~ ~~After equipment is brought to site~~  
~~depreciated value for old~~ ~~(provided the Engineer is~~  
~~equipment. Total amount~~ ~~satisfied That the equipment is~~  
~~will be subject to a~~ ~~required for performance of the~~  
~~maximum of 5% of the~~ ~~contract) and on submission of~~  
~~Contract Price~~ ~~unconditional Bank Guarantee for~~  
~~amount of advance~~

iii ~~Secured~~ **Deleted**  
~~Advance for~~  
~~Non-persish-~~  
~~able material~~  
~~Brought to site~~

~~(The advance payment will be paid to the Contractor no later than 28 days after fulfillment of the above conditions).~~

31. **Repayment of advance payment for mobilization and equipment** {CL. 51.3}

~~The advance loan shall be repaid with percentage deduction from the interim payments certified by the Engineer under the Contract. Deduction shall commence in the next Interim Payment Certificate following that in which the~~

~~total of all such payments to the Contractor has reached not less than 20 percent of the Contract Price or 6 (six) months from the date of payment of first installment of advance, whichever period concludes earlier, and shall be made at the rate of 20 percent (collectively for both Mobilization Advance and Equipment Advance) of the amounts of all Interim Payment Certificate until such time as the loan has been repaid, always provided that the loan shall be completely repaid prior to the expiry of the original time for completion pursuant to Clause 17 and 28.~~

32. Deleted

33. The securities shall be for the following minimum amounts equivalent {CL. 52}

As a percentage of the Contract Price:

Performance Security for 5 percent of contract price plus Rs. .... (to be decided after evaluation of the bid) as additional security in terms of ITB Clause 29.5

The standard form of Performance security acceptable to the Employer shall be an unconditional Bank Guarantee of the type as presented in Section 8 of the Bidding Documents.

34. The Schedule of Operating and maintenance Manuals.....N/A. {CL. 58}

35. The date by which "as-built" drawings (in scale as directed) in 2 sets {CL. 58} are required within 28 days of the issue of certificate of completion of the whole or section of the work, as the case may be.

36. The amount to be withheld for failing to supply "as built" drawings {CL. 58} by the Date required is Rs..... Lakhs. N/A

37. The following events shall also be fundamentals breach of contract: {CL.59.2} "The Contractor has contravened Sub- clause 7.1 and Clause 9 of GCC"

38. The percentage to apply the value of the work not completed representing {Cl 60} the Employer's additional cost for completing the Works shall be 20 per cent.

**SECTION - 5**

**TECHNICAL SPECIFICATION**

**Material Specifications**

**General Specifications**

**Item Specifications**

**Test Schedule**

**Cement & Steel consumption sheet**

## Material Specifications

### M-1. Water

- 1.1** Water quality for building construction shall conform to IS 456, Clause 5.4. It specifies the requirements for water used in concrete mixing and curing to ensure structural integrity and durability.
- 1.2** General Requirement: Water used for mixing and curing must be clean and free from harmful amounts of oils, acids, alkalis, salts, sugar, organic materials, or other substances that may be deleterious to concrete or steel.
- 1.3** Potability Benchmark: Water suitable for drinking is generally considered acceptable for concrete.
- 1.4** Limits on Solids:
- Suspended matter:  $\leq 2000$  mg/l
  - Inorganic solids:  $\leq 3000$  mg/l
  - Organic solids:  $\leq 200$  mg/l
- 1.5** pH Value: Should not be less than 6.
- 1.6** Permissible Limits for Specific Substances:
- Sulphates (as  $\text{SO}_4$ ):  $\leq 400$  mg/l
  - Chlorides (as Cl):
    - $\leq 2000$  mg/l for plain concrete
    - $\leq 500$  mg/l for reinforced concrete
  - Alkalinity:  $\leq 120$  mg/l (as  $\text{CaCO}_3$ )
- 1.7** Field Test (Optional but Recommended)  
A simple field test involves casting cubes with the proposed water and comparing their 28-day strength to cubes made with distilled water. The strength should not be less than 90% of the reference.
- 1.8** IS Codes to be adhered
- IS 456 – Code of Practice for Plain and Reinforced Concrete
  - IS 3025 series – Methods of Sampling and Test (Physical and Chemical) for Water and Wastewater
  - IS 10500 – Drinking Water Specification (used as a benchmark)

### M-2. Building Lime.

- 2.1** Specification for Building Limes shall conform to IS 712. This standard covers the classification, physical and chemical requirements, and methods of testing for building limes used in construction works such as masonry, plastering, whitewashing, and soil stabilization.
- 2.2** Classification of Lime

Class	Description
A	Eminently hydraulic lime used for structural purposes
B	Semi-hydraulic lime used for masonry mortars, lime concrete and plaster undercoat.
C	Fatlime used for finishing coat in plastering, whitewashing, composite mortars, etc, and with addition of pozzolanic materials for masonry mortar
D	Magnesium/dolomitic lime used for finishing coat in plastering, white washing, etc.
E	Kankarlime used for masonry mortars.

- 2.3** Lime shall be available either in hydrated or quick form, except that of Classes A and E which shall be supplied in hydrated form.
- 2.4** Physical Requirements as per table 2 of IS 712
- 2.5** Chemical Requirements table 1 of IS 712.
- Available Lime Content: Measured as the sum of CaO and MgO.
  - Insoluble Residue: Indicates the presence of non-reactive materials.

- Magnesium Oxide (MgO): Should be within permissible limits to avoid unsoundness.

## 2.6 Slaking and Storage

- Quicklime must be slaked before use.
- Slaking should be done on impervious platforms or in tanks.
- Lime must be stored in dry, weatherproof conditions to prevent premature setting.

## 2.7 Testing Standards: Testing shall be conducted as per IS 6932 (Parts 1 to 11), which covers:

- Fineness
- Volume yield
- Setting time
- Soundness
- Chemical composition

## 2.8 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 colour, lime in form of porous lumps of dirty white colour indicates quick lime, and solid lumps are the unburnt lime stone.
- (2) Acid tests for determining the carbonate content in lime. Excessive number of impurities and rough determination of class of lime.

## 2.9 Storage shall comply with I.S. 712. The slaked lime shall be stored in such a manner as to permit easy access for proper inspection and in a suitable building to protect the lime from the dampness and to minimize warehouse deterioration. Quicklime deteriorates rapidly and, therefore should be used as quickly as possible. 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.

## M-3. Cement

### 3.1 The cement specifications shall conform to IS 269 – Ordinary Portland Cement (OPC) in 33, 43, and 53 grades.

### 3.2 Chemical Requirements

Property	33 Grade	43 Grade	53 Grade
Ratio of percentage of Alumina to that of iron oxide	Min 0.66	Min 0.66	Min 0.66
Insoluble Residue, percent by mass, Max	Max 5.0	Max 5.0	Max 5.0
Magnesia (MgO)	Max 6.0	Max 6.0	Max 6.0
Sulphuric Anhydride (SO <sub>3</sub> )	Max 3.5	Max 3.5	Max 3.5
Loss on Ignition	Max 5.0	Max 5.0	Max 4.0
Ratio of percentage of lime to percentage of silica, alumina and iron oxide	0.66 – 1.02	0.66 – 1.02	0.80 – 1.02
Total Alkalies (Na <sub>2</sub> O + 0.658K <sub>2</sub> O)	Max 0.6	Max 0.6	Max 0.6

### 3.3 Physical Requirements

Property	33 Grade	43 Grade	53 Grade
Fineness (m <sup>2</sup> /kg)	Min 225	Min 225	Min 225
Setting Time (Initial)	Min 30 min	Min 30 min	Min 30 min
Setting Time (Final)	Max 600 min	Max 600 min	Max 600 min
Compressive	33 Grade: 33 MPa at	43 Grade: 43 MPa	53 Grade: 53 MPa

Strength (MPa)	28 days	at 28 days	at 28 days
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### 3.4 Sampling & Testing

- Sampling shall be carried out as per IS 269
- Tests shall conform to methods prescribed in relevant IS codes (IS 4031 series).

### 3.5 Packaging & Marking

- Cement shall be packed in PP woven laminated block bottom valve sacks conforming to IS 16709.
- Each bag shall be marked with:
- Grade designation (33/43/53)
- Manufacturer's name and trademark
- Net quantity
- BIS Standard Mark (ISI certification)

### 3.6 Compliance

- Cement supplied shall conform to IS 269:2015 and bear the BIS Certification Mark.
- Non-conforming material shall be rejected

### 3.7 Alternatively, as per the direction of Engineer Incharge the cement shall conform to IS 455 – Portland Slag Cement

Portland Slag Cement (PSC) shall be manufactured either by:

- Inter-grinding Portland cement clinker, granulated blast furnace slag, and gypsum, or
- Blending Portland cement and finely ground granulated slag.

Slag content shall be not less than 25% and not more than 65% by mass of PSC.

### 3.8 Chemical Requirements

Property	Limit (%)
Insoluble Residue	Max 2.0
Magnesia (MgO)	Max 8.0
Sulphur trioxide (SO <sub>3</sub> )	Max 2.5–3.0 depending on C3A content
Loss on Ignition	Max 5.0 %
Chloride Content	Max 0.05%
Slag Homogeneity	: ±3% of declared slag addition

### 3.9 Physical Requirements

Property	Requirement (IS 455:2015)
Fineness (m <sup>2</sup> /kg)	Min 225 m <sup>2</sup> /Kg
Setting Time (Initial)	Min 30 min
Setting Time (Final)	Max 600 min
Compressive Strength (MPa)	>= 16 MPa at 3days, ≥22 at 7 days, ≥33 at 28 days
Soundness (Le Chatelier)	When tested by 'Le-Chatelier' method and autoclave test described in IS 4031 (Part 3) :, unaerated Portland slag cement shall not have an expansion of more than 10 mm and 0.8 percent respectively.
Autoclave Expansion	Max 0.6%

### 3.10 Sampling & Testing

- Sampling shall be carried out as per IS 455:2015, Clause 5.1.1.
- Tests shall conform to methods prescribed in IS 4031 series.
- Optional transverse strength test may be agreed between purchaser and supplier.

### 3.11 Packaging & Marking

- Cement shall be packed in PP woven laminated block bottom valve sacks conforming to IS 16709.
- Each bag shall be marked with:
- PSC designation
- Manufacturer's name and trademark
- Net quantity
- BIS Standard Mark (ISI certification)

### 3.12 Compliance

- Cement supplied shall conform to IS 455:2015 and bear the BIS Certification Mark.
- Non-conforming material shall be rejected.

## M-4. White Portland Cement

**4.1** White Portland Cement used in the works shall conform to IS 8042. The cement shall be supplied in factory-sealed bags bearing the BIS Standard Mark. The contractor shall produce manufacturer's test certificates and, if required, samples shall be tested as per IS 4031 series. Any cement not conforming to the above requirements shall be rejected

## M-5. Coloured Cement

**5.1** While IS 8042 governs White Portland Cement, which serves as the base for most coloured cements, coloured cement is typically produced by adding inorganic pigments (e.g., iron oxides, chromium oxide, cobalt compounds) to white cement. The following IS codes are relevant:

IS code	Title	Relevance to Coloured Cement
IS 8042	Specification for White Portland Cement	Base material for coloured cement
IS 2116	Specification for Sand for Masonry Mortars	Relevant for coloured mortar applications
IS 15477	Specification for Cementitious Grouts	Applicable for coloured grouts in tiling and repair
IS 13801	Specification for Checkered Cement Concrete Tiles	Covers coloured concrete tiles used in paving
IS 12330	Specification for Sulphate Resisting Portland Cement	Used when coloured cement is needed in aggressive environments
IS 269	Specification for Ordinary Portland Cement	May be used as base in non-white coloured cement formulations

### 5.2 The pigments Pigment Requirements

- Shall be inorganic, alkali-resistant, UV-stable, and non-reactive with cement hydration products.
- Common pigments include:
- Iron oxide (red, yellow, black)
- Chromium oxide (green)

- Cobalt compounds (blue)

**5.3** Pigments shall conform to relevant chemical and physical standards and be free from deleterious materials.

**5.4** Coloured cement shall be with white or gray Portland cement as specified in the item of the work.

**5.5** 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 colour and shade. The pigments shall have such properties to provide for durability under exposure to sunlight and weather.

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

## **M-6. Fine Aggregate**

**6.1** Fine Aggregate shall conform to IS 383.

- shall be natural sand, crushed stone sand, and manufactured sand used as fine aggregates in concrete.
- shall be ensured aggregates are free from deleterious materials such as clay, silt, organic impurities, and harmful chemicals.

All fine aggregates (coarse sand) used in concrete shall conform to IS 383. Sand shall be clean, hard, durable, and free from deleterious materials. Grading shall conform to Zone I or Zone II as specified. The contractor shall provide test certificates and, if required, samples shall be tested as per IS 2386 series. Non-conforming material shall be rejected

**6.2** Grading Requirements for Fine Aggregates: Fine aggregates are classified into four grading zones (Zone I to Zone IV) based on particle size distribution. (Table 9 of IS 383)

<b>IS Sieve Size</b>	<b>Zone I (%)</b>	<b>Zone II (%)</b>	<b>Zone III (%)</b>	<b>Zone IV (%)</b>
10 mm	100	100	100	100
4.75 mm	90-100	90-100	90-100	95-100
2.36 mm	60-95	75-100	85-100	95-100
1.18 mm	30-70	55-90	75-100	90-100
600 µm	15-50	35-59	60-79	80-100
300 µm	5-20	8-30	12-40	15-50
150 µm	0-10	0-10	0-10	0-15

## **6.3 Physical Requirements**

- Silt Content: Not more than 3% by weight (natural sand). IS 2386 (Part 1)
- Clay Lumps: Max 1% by weight. IS 2386 (Part 2)
- Organic Impurities: Sand should not contain harmful organic matter.
- Specific Gravity: Typically, 2.1-3.2
- Moisture Content: To be controlled during batching < 5%

## **6.4 Deleterious Materials (Limits)**

- Coal, lignite: Max 1%
- Clay lumps: Max 1%
- Material finer than 75 µm IS sieve: Max 3% (natural sand), Max 15% (manufactured sand)
- Chlorides and sulphates: Within permissible limits to avoid corrosion of reinforcement.

## **6.5 Sampling & Testing**

- Sampling as per IS 2430.
- Tests as per IS 2386 (Parts I–VIII) for particle size, deleterious substances, and strength

#### **M-7. Stone Dust or Crushed stone sand**

**7.1** Crushed stone sand shall conform to IS 383. It shall be obtained by crushing durable rocks and shall meet the grading requirements for fine aggregates as specified in Table 9 of the standard. The material shall be free from deleterious substances and tested as per IS 2386 series. Use of crushed stone sand is permitted subject to approval by the Engineer-in-Charge.

#### **7.2 Technical specifications**

<b>Parameter</b>	<b>Requirement</b>
Source	Crushed hard stone
Grading Zones	Must conform to Zones I–IV as per Table 9 of IS 383
Fineness Modulus	Typically, between 2.2 and 3.2
Silt Content	≤ 3% by mass
Clay Content	Should be minimal; excessive clay is not permitted
Organic Impurities	Must be within permissible limits
Soundness	Must pass sodium/magnesium sulfate soundness tests (IS 2386 Part V)
Water Absorption	As per IS 2386 Part III
Specific Gravity	As per IS 2386 Part III
Bulk Density	As per IS 2386 Part III
Moisture Content	To be determined before batching <5%

#### **M-8. Stone Grit (Coarse Aggregate upto 10 mm size)**

**8.1** The specifications shall conform to IS 383 – Stone Grit (Coarse Aggregate upto 10 mm size as per table 7 of IS 383)

- Shall Covers crushed stone grit, gravel, and other coarse aggregates used in concrete.
- Shall have nominal sizes: 12.5 mm, 4.75 mm, 2.36 mm.
- Shall Ensures aggregates are clean, hard, durable, and free from deleterious materials.

#### **8.2 Grading Requirements (Nominal Sizes) (Table 7 of IS 383)**

IS Sieve Size	12.5 mm Aggregate (%) percent passing
12.50 mm	90-100
10 mm	40-85
4.75 mm	0-20
2.36mm	0-5

#### **8.3 Physical Requirements**

- Aggregate Impact Value: ≤ 30% (general concrete), ≤ 45% (non-wearing surfaces)
- Aggregate Crushing Value: ≤ 30%
- Flakiness Index: ≤ 25%
- Specific Gravity: 2.6–2.8 typical (Min-Max: 2.1 to 3.2)
- Water Absorption: ≤ 2%.

#### **8.4 Deleterious Materials (Limits)**

- Coal/lignite: Max 1%
- Clay lumps: Max 1%
- Material finer than 75 µm IS sieve: Max 3% (natural), Max 15% (manufactured)
- Chlorides & sulphates: Within permissible limits to prevent reinforcement corrosion

#### **8.5 Sampling & Testing**

- Sampling as per IS 2430.
- Testing as per IS 2386 (Parts I–VIII) for particle size, strength, and deleterious substances.

**8.6** All stone grit (coarse aggregate) used in concrete shall conform to IS 383:2016. Aggregates shall be clean, hard, durable, and free from deleterious materials. Grading shall conform to the nominal sizes specified. The contractor shall provide test certificates and, if required, samples shall be tested as per IS 2386 series. Non-conforming material shall be rejected

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

**9.1** Cinder used as fill material or aggregate shall conform to IS 9142 and be free from harmful organic matter, excessive ash, or unburnt particles. It shall be tested as per IS 2386 series and approved by the Engineer-in-Charge prior to use. Cinder is well burnt furnace residue which has been fused or sintered into lumps of varying sizes.

**9.2** Cinder used as fine aggregate in lime concrete shall conform to IS 2686. It shall be classified as Class A, B, or C based on intended use, and tested for grading, sulphate content, and loss on ignition. The material shall be free from deleterious substances and approved by the Engineer-in-Charge

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

**9.4** Cinder before usage shall conform to the below listed Indian Standards (IS).

- IS 2686: Specifies requirements for cinder to be used as a fine aggregate in lime concrete.
- IS 9142: Covers artificial lightweight aggregates, including cinder, intended for manufacturing concrete masonry units

#### **9.5 Sampling & Testing**

- Sampling as per IS 2430.
- Testing as per IS 2386 series for particle size distribution, deleterious substances, and physical properties

#### **9.6 Usage Note**

- Suitable for non-load-bearing walls, partition blocks, and insulating layers.
- Not recommended for structural concrete unless specifically approved and tested.

#### **M-10. Lime Mortar**

**10.1** Lime mortar shall be prepared as per IS 2250 using lime conforming to IS 712 and sand conforming to IS 2116.

**10.2** The mortar shall be mixed in the ratio as specified in the tender item specifications

**10.3** Lime mortar shall be mixed mechanically to ensure uniformity. the prepared lime mortar shall be kept damp and may be used for upto 24 hours if protected from drying. Workability and consistency shall conform to IS 2250 requirements.

**10.4** Mortar shall always be kept damp, protected from sun and rain till used up, covering it by tarpaulin or open sheds. Material Storage shall be in accordance with IS: 4082.

#### **M-11. Cement Mortar:**

**11.1** Cement mortar shall be prepared as per IS 2250 using cement conforming to IS 269/1489 and sand conforming to IS 2116

- 11.2** The mortar shall be mixed in the ratio as specified in the tender item specifications.
- 11.3** The mortar shall be mixed mechanically to ensure uniformity. The workability and consistency of mortar shall be adhered as per standard industry practice. Mortar shall be mixed mechanically and used within 4 hours of preparation. Proper curing shall be ensured for a minimum of 7 days.

**11.4** Mortar shall always be kept damp, protected from sun and rain till used up, covering it by tarpaulin or open sheds. Material Storage shall be in accordance with IS: 4082.

**M-12. Stone Coarse Aggregate for Nominal Mix Concrete**

**12.1** The specifications shall conform to IS 383 (Coarse Aggregate grading as per table 7)

- Shall Covers crushed stone and other coarse aggregates used in concrete.
- Shall have nominal sizes: 12.5 mm, 16 mm, 20 mm and 40 mm.
- Shall Ensures aggregates are clean, hard, durable, and free from deleterious materials.

**12.2** Grading Requirements (Nominal Sizes) (Table 7 of IS 383)

IS Sieve Size	40 mm Aggregate (%)	20 mm Aggregate (%)	16 mm Aggregate (%)	12.5 mm Aggregate (%)
40 mm	90-100	100		
20 mm	30-70	90-100	100	100
16 mm			90-100	
12.50 mm				90-100
10 mm	10-35	25-55	30-70	40-85
4.75 mm	0-5	0-10	0-20	0-10

**12.3** Physical Requirements

- Aggregate Impact Value:  $\leq 30\%$  (general concrete),  $\leq 45\%$  (non-wearing surfaces)
- Aggregate Crushing Value:  $\leq 30\%$
- Combined Elongation & Flakiness Index:  $\leq 40\%$
- Specific Gravity: 2.6-2.8 typical (Min-Max: 2.1 to 3.2)
- Water Absorption:  $\leq 2\%$ .

**12.4** Deleterious Materials (Limits)

- Coal/lignite: Max 1%
- Clay lumps: Max 1%
- Material finer than 75  $\mu\text{m}$  IS sieve: Max 3% (natural), Max 15% (manufactured)
- Chlorides & sulphates: Within permissible limits to prevent reinforcement corrosion

**Note:** Prefreably igneous rocks such as granite rocks with acceptable properties as per IS 383 shall be used as coarse aggregate.

**12.5** Sampling & Testing

- Sampling as per IS 2430.
- Testing as per IS 2386 (Parts I-VIII) for particle size, strength, and deleterious substances.

**12.6** All stone coarse aggregate used in concrete shall conform to IS 383. Aggregates shall be clean, hard, durable, and free from deleterious materials. Grading shall conform to the nominal sizes specified. The contractor shall provide test certificates and, if required, samples shall be tested as per IS 2386 series. Non-conforming material shall be rejected.

**M-13. Balk 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 as specified in I.S. 383 and I.S. 456 & IS 2386 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** The Material shall conform to IS 3068, Coarse Aggregate for Use in Lime Concrete. It defines quality parameters for using brick bats as aggregate in lime-based construction.

**14.2** The broken brick coarse aggregate shall be prepared from the wellfired burnt bricks conforming of IS: 1077: to class designation 50 and above It shall be free from underburnt clay particles, soluble salt and adherent coating of soil or silt.

**14.3** Brick aggregate should be handled least number of times before being used in concrete, as repeated handling could result in breaking up and production of finer material passing 475 mm IS Sieve. Allowable limit of such material passing 4.75 mm IS Sieve shall not be more than 5 percent.

**14.4** Requirement of Grading for broken brick coarse aggregate.

IS Sieve Designation	Percent Passing by mass
75	100
37.5	95-100
19.0	45-75
4.75	0-5

**14.5** Broken brick coarse aggregate shall also conform to the requirements given in Table 2.

IS Sieve Designation	Percent Passing by mass	Reference of method of Test
Bulk density, kg/m <sup>3</sup>	1100-1350	IS 2386
Aggregate impact value, percent, Max	50	IS 2386
Water absorption, percent, Max	20	Appendix A - IS 3068
Water soluble matter, percent, Max	1	Appendix B- IS 3068

**M-15. Bricks (Common burnt clay bricks):** Common burnt clay bricks must conform to IS 1077 which specifies their dimensions, physical properties, and quality standards for use in masonry construction

**15.1** Classification: Bricks shall be used based on compressive strength into the following classes:

- 3.5, 5.0, 7.5, 10.0, 12.5, 15.0, 17.5, 20.0 N/mm<sup>2</sup>
- The class designation corresponds to the minimum compressive strength of

individual bricks.

### 15.2 Dimensions and Tolerances

- Dimensions

Type	Length (mm)	Width (mm)	Height (mm)
Modular Brick	190	90	90/40
Non-Modular	230	110	70/30

- Tolerance:  $\pm 3$  mm in length,  $\pm 1.5$  mm in width and height.

### 15.3 Physical Requirements

- Compressive Strength: Must meet the minimum value for the designated class.
- Water Absorption: Should not exceed 20% by weight after 24-hour immersion.
- Efflorescence: Should be moderate or negligible.
- Warping and Cracks: Bricks must be free from visible defects such as cracks, lime nodules, or warping.

### 15.4 Workmanship

- Bricks shall be uniform in shape, with smooth rectangular faces and sharp corners.
- Surface should be clean, free from flaws, and uniform in color.

### 15.5 Sampling and Testing: Testing shall be done as per IS 3495 Parts 1 to 6, covering:

- Compressive strength
- Water absorption
- Efflorescence
- Dimensional tolerance

## M-16. Stone

**16.1** The stone shall be of the specified variety such as Granite or any other type of good hard stones complying the IS 1123.

**16.2** 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.

**16.3** Various test on the natural stone shall be conducted for determination of compressive strength, transverse strength, shear strength, specific gravity, water absorption, durability etc. requirements specified in IS 1121 (part 1 to 5) IS 1122, IS 1123, IS 1124, IS 1125, IS 1126 shall be followed.

**16.4** The edges of the block shall be rough and chisel dressed as prescribed in IS 1129

## M-17. Laterite stone

**17.1** The laterite stone must conform to IS 3620 which lays down the requirements for dimensions, physical properties, workmanship, marking, sampling, and criteria for conformity of rectangular laterite stone blocks used in the construction of walls and partitions.

### 17.2 General Requirements:

- Blocks must be made from natural laterite stone, properly dressed and shaped.
- Intended for use in load-bearing and non-load-bearing masonry.

**17.3 Dimensions and Tolerances:**

- Standard sizes are specified in Table 1 of IS 3620
- Tolerances in length, width, and height must be within permissible limits.

**17.4 Physical Properties:**

- Compressive strength, density, and water absorption must meet minimum standards.
- Blocks should be free from defects like cracks, honeycombing, or laminations.

**17.5 Workmanship:**

- Blocks must be cleanly dressed, with smooth faces and right-angled edges.
- Uniformity in shape and size is essential for proper bonding and alignment.
- Marking:
- Each block or batch must be marked with the manufacturer's identification and date of manufacture.

**17.6 Sampling and Conformity:**

- Sampling procedures and acceptance criteria are defined to ensure compliance with the standard.

**17.7 Testing**

- Method of test for determination of water absorption, apparent specific gravity and porosity of natural building stones as per IS 1124
- Method of tests for determination of strength properties of natural building stones: Part I Compressive strength as per IS 1121
- Method of test for abrasion.
- IS 1123- Method of Identification of Natural Building Stones

**M-18. Mild Steel Bars**

**18.1** Mild steel bars reinforcement for R.C.C. work shall conform to I.S. 432 (Part-1) and shall be of tested quality. It shall also comply with relevant part of I.S. 456.

**18.2 Mechanical Properties**

Parameters	Values
Yield Stress (N/mm <sup>2</sup> )	Min 250
Ultimate Tensile Strength (N/mm <sup>2</sup> )	Min 410
Elongation (%)	Min 20
Bend Test	No fracture at 180° bend

**18.3 Dimensions & Tolerances**

- Nominal diameters: 6 mm to 50 mm.
- Tolerances on diameter, weight, and length as per IS 432.
- Bars supplied in straight lengths or coils.

**18.4 Sampling & Testing**

- Sampling as per IS 432 Annex A.

- Tests include tensile test, bend test, and chemical analysis.
- Testing methods conform to IS 1608 (tensile test) and IS 1599 (bend test).

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

**18.6 Marking & Certification**

- Each bundle shall be tagged with:
- Manufacturer's name/trademark
- Bar size and grade
- BIS Standard Mark (ISI certification)
- Only bars bearing the BIS Certification Mark shall be accepted

**M-19. Thermo mechanically treated steel (TMT Bars)**

Thermo-Mechanically Treated (TMT) bars shall be used for reinforcing concrete structures in accordance with IS 1786.

**19.1 Grades and Designation**

Grade	Yield Strength (N/mm <sup>2</sup> )	Ductility Variant
Fe 500	500	Fe 500D
Fe 550	550	Fe 550D
Fe 600	600	Fe 600D

The suffix 'D' denotes enhanced ductility, suitable for seismic and dynamic load conditions.

**19.2 Chemical composition -carbon content (Maximum %) indicated in table below.**

Element	Fe Grades	Fe-D Grades
Fe 500	0.30	0.25
Fe 550	0.30	0.25
Fe 600	0.30	0.25

The other constituents such as phosphorus & sulphur shall be limited to percentage as per chemical composition mentioned in IS 1786.

**19.3 Mechanical Properties**

- Yield Strength: As per grade designation.
- Ultimate Tensile Strength: Must exceed yield strength by a prescribed margin.
- Elongation: Varies by grade and diameter; higher for ductile variants.
- Bend and Rebend Tests: Bars must pass without cracking or rupture.

**19.4 Surface Characteristics**

- Bars shall have uniform transverse ribs/lugs for effective bonding with concrete.
- Surface must be free from rust, cracks, seams, and other harmful defects.

**19.5 Dimensional Tolerances**

- Mass per meter and nominal diameter shall conform to tolerances specified in IS 1786

**19.6 Marking: Each bar or bundle shall be legibly marked with:**

- Manufacturer's identification
- Valid BIS certifications
- Grade designation
- Batch number or heat number

**19.7 Sampling and Testing:** Sampling shall be conducted as per IS 1786.

- Tests include:
- Tensile strength
- Bend and rebend
- Chemical analysis

#### **M-20. High Tensile Steel Wires**

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

**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 relevant provision of I.S 1785. 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: Shall conform to IS 280**

**21.1** Wire shall be supplied in coils or straightened and cut lengths.

**21.2** Chemical Composition (Typical Limits)

- Carbon (C): 0.06 – 0.35%
- Manganese (Mn): 0.35 – 0.90%
- Sulphur (S): Max 0.055%
- Phosphorus (P): Max 0.055%
- Copper (Cu): Max 0.30%

**21.3** Mechanical Properties

<b>Property</b>	<b>Requirement (IS 280)</b>
Tensile Strength (MPa)	320 – 550 (depending on grade)
Yield Stress (MPa)	Min 250
Elongation (%)	Min 20
Bend Test	Wire shall withstand bending through 180° without fracture

**21.4** Dimensions & Tolerances

- Nominal diameters: As per IS 280 generally ranges from 0.2 mm to 10 mm.
- Tolerances on diameter:  $\pm 0.02$  mm to  $\pm 0.10$  mm depending on size.
- Wire shall be uniform, smooth, and free from harmful defects.

**21.5** Sampling & Testing

- Sampling as per IS 1387.
- Tests include tensile test, bend test, chemical analysis.
- Testing methods conform to IS 1608 (tensile test) and IS 1599 (bend test).

## 21.6 Marking & Certification

- Each coil or bundle shall be marked with:
- Manufacturer's name/trademark
- Wire size and grade
- BIS Standard Mark (ISI certification)
- Only wire bearing the BIS Certification Mark shall be accepted.

## M-22. Structural Steel

### 22.1 The structural steel shall conform to IS 2062 Hot Rolled Medium and High Tensile Structural Steel

- Material Shall be supplied as Covers plates, sections, flats, bars, and rolled products.
- Material Shall be supplied as hot rolled structural steel used in welded, bolted, or riveted structures.

### 22.2 Grades & Designations

- Grades: E250, E300, E350, E410, E450 (based on minimum yield strength in MPa).
- Quality Categories:
  - A – General quality
  - B – Weldable quality
  - C – Fire-resistant quality
- Delivery Conditions: As rolled, normalized, or thermomechanically treated (TMT).

### 22.3 Chemical Composition (Typical Limits)

- Carbon: Max 0.23–0.25% (depending on grade)
- Manganese: 0.30–1.50%
- Sulphur: Max 0.040%
- Phosphorus: Max 0.040%
- Carbon Equivalent (CE):  $\leq 0.42\%$  for weldable grades

### 22.4 Mechanical Properties

Property	E250 Grade	E350 Grade	E450 Grade
Yield Stress (MPa)	Min 250	Min 350	Min 450
Ultimate Tensile Strength (MPa)	410–540	490–630	590–770
Elongation (%)	Min 23	Min 21	Min 20
Bend Test	Shall withstand 180° bend without fracture	Same	Same

### 22.5 Dimensions & Tolerances

- Rolled sections, plates, and bars shall conform to IS 1852 for dimensional tolerances.
- Straightness, thickness, and sectional tolerances must be within permissible limits.

### 22.6 Sampling & Testing

- Sampling as per IS 2062 Annexure.
- Tests include tensile test, bend test, and chemical analysis.
- Testing methods conform to IS 1608 (tensile test) and IS 1599 (bend test).

#### **22.7 Marking & Certification**

- Each lot shall be accompanied by a manufacturer's test certificate.
- Steel shall bear the BIS Standard Mark (ISI certification).

#### **M-23. Galvanised Iron Sheets**

**23.1** The galvanised iron sheets shall be plain or corrugated sheets of specified in item. The G.I. Sheets shall conform to I.S. 277-Galvanized Steel Sheets (Plain and Corrugated). 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 per tender item specifications.

**23.3** Material shall be tested for coating mass, adhesion, and uniformity as per IS 277 Approval of Engineer-in-Charge is mandatory prior to installation.

#### **M-24. Asbestos Cement Sheets**

**24.1** Asbestos cement sheets plain, corrugated or semi corrugated shall conform to IS 2096 & I.S. 459- Corrugated and Semi-Corrugated Asbestos Cement Sheets. The thickness of the sheets shall be as specified in the item. The sheets shall be free from all defects such as cracks, holes deformities, chipped edges or otherwise damaged.

**24.2** Sheets shall be of specified type and thickness, free from cracks, warping, or delamination. Installation shall follow IS 3007, with proper overlaps, pre-drilled holes, and secure fixing. All materials shall be tested in accordance with relevant codes and standard and shall be approved by the Engineer-in-Charge prior to use.

#### **M-25. Mangalore Pattern Roof Tiles**

**25.1** The Mangalore pattern tiles, shall conform to **I.S. 654- Clay Roofing Tiles, Mangalore Pattern** for Class AA or 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 tested in accordance with relevant codes and standards and shall be approved as directed.

#### **M-26. Shuttering**

**26.1** Shuttering shall conform to IS 14687 - Guidelines for Falsework for Concrete Structures.

**26.2** Additionally, IS 456 - Code of Practice for Plain and Reinforced Concrete provide guidance on formwork removal (deshuttering periods).

**26.3** 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 ballies properly cross braced together so as to make the centering rigid. In places of ballies props, steel props/ jacks may be used.

**26.4** 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.

**26.5** If at any stage of work during or a after placing concrete in the structure, the form work sags or bulges out beyond the required shape of the structure that compromises structural integrity then 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.

- 26.6** The props shall consist of bullies having 100 mm. minimum diameter measured at mix 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 laid on sufficiently hard base or pcc concrete layer if SBC is not available.
- 26.7** Double wedges shall be provided between the sole plate and the wooden props so as to facilitate tightening and easing of shuttering without jerking the concrete.
- 26.8** 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.
- 26.9** As far as practicable, clamps shall be used to hold the forms together and use of nails and spikes avoided.
- 26.10** 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.
- 26.11** 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, 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 moulded filler:**

- 27.1** Polymer-Based, Non-Extruding and Resilient Type Pre-moulded fillers for expansion joints in buildings shall be provided conforming to IS 1838 (Part 3)
- 27.2** Shall be polymer-based preformed fillers used in expansion joints for concrete structures, including buildings.
- Thickness shall be typically 10 mm to 25 mm.
  - Water absorption  $\leq 1\%$  by mass
  - Be capable of recovering to at least 70% of their original thickness after compression to 50% of their thickness for 22 hours at  $70 \pm 1^\circ\text{C}$ .
  - Exhibit no extrusion or cracking under specified compressive loads.
  - Be chemically inert, resistant to water absorption, and durable under exposure to weathering and construction conditions.
  - Be supplied in standard thicknesses and widths as per project requirements, with factory-finished edges and surfaces.
  - The material shall be free from bitumen, tar, or any volatile matter, and shall not stain or leach into adjacent concrete.

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

- 28.1** The item provides for expansion joints in R.C.C. frame structure for internal joint as well as for exposed joints with the use of necessary copper strip and holdfasts.
- 28.2** Copper strips used in expansion joints shall be of commercially pure copper, conforming to IS 191 or equivalent. The strips shall be:
- Rolled, annealed, and free from cracks, splits, or other surface defects.

- Supplied in standard lengths and widths as per approved drawings, typically minimum 1.25 mm thick unless otherwise specified.
- Smooth, clean, and free from oil, grease, or oxidation before installation.

**28.3** Holdfasts for anchoring copper strips shall be:

- Fabricated from galvanized mild steel (MS) flats or rods, conforming to IS 2062.
- Minimum dimensions: 25 mm × 3 mm MS flats or 6 mm diameter MS rods, bent to shape as per approved detail.
- Spaced at intervals not exceeding 300 mm c/c along the length of the copper strip.
- Fixed securely into the concrete or masonry using epoxy grout or mechanical anchoring, ensuring firm embedment and alignment

**M-29. Teak Wood:** Teakwood for building works shall conform to IS 883 and IS 287, ensuring durability, dimensional stability, and suitability for structural and joinery applications.

**29.1** Applicable Standards:

- IS 883– Design of Structural Timber in Buildings – Code of Practice
- IS 287 – Recommendation for Maximum Permissible Moisture Content in Timber
- IS 4021: Timber Door, Window and Ventilator Frames
- IS 1003: Timber Panelled and Glazed Shutters

**29.2** Quality and Classification:

- Timber shall be of *Tectona grandis* species (Teak), classified as Grade I or II as per IS 883.
- Only heartwood shall be used; sapwood is strictly prohibited.
- Timber shall be free from knots, cracks, warping, insect damage, and fungal decay.

**29.3** Seasoning and Moisture Content:

- Teakwood shall be kiln-seasoned or air-seasoned to achieve moisture content not exceeding:
- 12% for joinery and furniture
- 15% for general structural use (As per IS 287)

**29.4** Dimensions and Tolerances:

- Timber shall be sawn to required dimensions with tolerances of:
- ±2 mm in thickness and width
- All surfaces shall be planed smooth, edges chamfered or rounded as specified.

**29.5** Preservation and Treatment:

- Concealed or embedded portions shall be treated with non-leachable preservatives such as:
- Copper Chrome Arsenate (CCA)
- Boric acid–borax solution
- Exposed surfaces shall be primed, polished, or painted as per architectural finish requirements.

**29.6** Workability and Finish:

- Teakwood shall be uniform in grain and texture, capable of taking a high-quality polish.
- It shall be dimensionally stable, suitable for machining, carving, and intricate joinery.

#### **29.7 Storage and Handling:**

- Timber shall be stored in a dry, shaded, and ventilated area, stacked on raised platforms.
- Care shall be taken to prevent mechanical damage, moisture absorption, or fungal growth.

### **M-30. Wooden flush door shutters (Solid core)**

**30.1** Wooden flush door shutters (solid core type) shall conform to IS 2202 (Part 1) which specify their construction, materials, dimensions, and performance requirements.

#### **30.2 Construction Requirements**

- Core Type: Solid core made from blockboard or particleboard
- Face Panels: Plywood or similar approved material
- Stiles and Rails: Hardwood or other suitable timber, properly seasoned
- Bonding: Synthetic resin adhesive conforming to IS 848
- Thickness: Commonly 25 mm, 30 mm, or 35 mm (Thickness required Shall confirm to Item Specifications in tender)

#### **30.3 Dimensional Tolerances**

- Thickness:  $\pm 1$  mm
- Width and Height:  $\pm 3$  mm
- Squareness: Diagonal difference  $\leq 3$  mm

#### **30.4 Performance Tests (as per IS 2202)**

- End Immersion Test: Resistance to water absorption
- Knife Test: Adhesion of face panel
- Screw Withdrawal Test: Strength of core and bonding
- Impact Indentation Test: Surface durability
- Edge Loading Test: Structural integrity under load

#### **30.5 Marking and Certification**

- Marking: Each shutter must bear manufacturer's name, ISI mark, and size
- Certification: Valid BIS certification

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

**31.1** The Material shall conform to IS 1948 - Specification for aluminium doors, windows and ventilators.

**31.2** Aluminum alloy used in the manufacture of extruded window sections shall conform to I.S. designation HEA-WP of I.S.733- Wrought Aluminium and Aluminium Alloy Bars, Rods and Sections (for General Engineering Purposes) and also to I.S. Designation WVG-WP of I.S. 1285- Indian Standard for Wrought Aluminium and Aluminium Alloys – Extruded Round Tube and Hollow Sections for General Engineering Purposes. The Section shall be as specified in the drawing and design. The fabrication shall be done as directed by Engineer In charge.

**31.3** The hinges shall be cast or extruded aluminum hinge of same type as in window but of large size.

**31.4** 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:** Rolling shutters and grills shall conform to IS 6248, ensuring standardized design, materials, fabrication, and installation for secure and durable closures.

**M-33. Collapsible Steel Gate:** Collapsible steel gates shall be fabricated and installed in accordance with IS 10521. Gates shall be made from mild steel channels and flats, with interlaced cross members, top and bottom guide rails, and smooth-operating rollers or pulleys. All fittings including locking arrangements, stoppers, and handles shall be of approved design. The entire assembly shall be corrosion-protected by painting or galvanizing, as specified in the item specification of tender document.

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

**34.1** Material shall conform to IS 4948– Welded Steel Wire Fabric for General Use.

**34.2** Material shall be welded steel wire fabric manufactured from mild steel or medium tensile steel wires.

**34.3** Materials: Wires shall conform to:

- IS 432 (Part 1) Mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement.
- IS 6528 Stainless steel wire (included in this revision).
- Wire diameter range: 2 mm to 10 mm.

**34.4** Fabric Construction

- Wires arranged in rectangular or square grids.
- Welded at all intersections by electric resistance welding.
- Mesh sizes typically range from 25 mm × 25 mm to 150 mm × 150 mm.
- Supplied in rolls or flat panels.

**34.5** Mechanical Properties

- Tensile Strength: As per IS 432 requirements.
- Weld Shear Strength: Each welded joint must withstand specified shear load without failure.
- Elongation: Minimum 8–12% depending on wire diameter.

**34.6** Dimensions & Tolerances

- Wire Diameter Tolerance:  $\pm 0.05$  mm to  $\pm 0.10$  mm.
- Mesh Size Tolerance:  $\pm 2$  mm.
- Overall Length/Width Tolerance:  $\pm 10$  mm.

**34.7** Sampling & Testing

- Sampling procedure defined in IS 4948 Annexure.
- Tests include:
- Wire tensile test (IS 1608)
- Weld shear test
- Bend test (IS 1599)
- Dimensional checks

**34.8** Marking & Certification

- Each roll/panel shall be marked with:
- Manufacturer's name/trademark
- Wire diameter and mesh size
- BIS Standard Mark (ISI certification)
- Only products bearing the BIS Certification Mark shall be accepted

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

**35.1** The Material shall conform to IS 412:1975 with following properties:

- Material: MS, GI, or Aluminum
- Mesh Type: Regular or flattened
- Dimensions: Mesh 10×25 mm to 25×50 mm; Sheet 2.5×1.2 m
- Thickness: 1–3 mm unless otherwise specified
- Finish: Uncoated, galvanized (IS 4759), or painted
- Use: Plaster reinforcement, fencing, walkways
- Fixing: Clamps, bolts, or welding
- Inspection: Visual, dimensional, coating thickness

**35.2** The expanded metal sheets shall be free from flaws, joints, broken strands, laminations and other harmful surface.

**35.3** 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** Wire mesh/jali specifications shall conform to IS 1566 (Hard-Drawn Steel Wire Fabric for Concrete Reinforcement) and IS 16011 (Welded Steel Wire Fabric for Fencing). These standards define wire gauge (diameter), mesh size, tensile strength, coating, and permissible tolerances for jali/fencing applications. Other relevant codes shall be referred for mild steel material and coating. IS 280 – Mild steel wire for general engineering purposes. IS 4826 – Hot-dip galvanized coatings on round steel wires

**36.2**

**36.3** Wire Gauge / Diameter

- Common gauges: 8 to 14 gauge ( $\approx$  4.0 mm to 2.0 mm diameter)
- Example: GI chain link jali often uses 10-gauge wire ( $\approx$  3.0 mm)
- Tolerance:  $\pm 0.05$  mm on diameter depending on wire size

**36.4** Mesh Size

- Chain link / welded jali: 25 mm × 25 mm to 75 mm × 75 mm
- Reinforcement mesh: 50 mm × 50 mm to 150 mm × 150 mm

**36.5** Material & Finish

- Mild Steel (MS), Galvanized Iron (GI), or Stainless Steel
- Galvanization as per IS 4826 or IS 4759 (minimum coating thickness 40–70 microns depending on exposure)
- Painted or PVC-coated options for fencing

**36.6** Mechanical Properties

- Tensile strength: 350–550 MPa (depending on wire grade)
- Elongation: Minimum 8–12%

**36.7** Inspection & Testing

- Visual inspection for uniform mesh and coating
- Dimensional checks for wire diameter and mesh size
- Coating thickness test (galvanized or PVC-coated)
- Tensile test on sample wires

**M-37. Plywood:**

**37.1** plywood specifications must conform with relevant IS codes such as IS 303 (for MR and BWR grades) and IS 710 (for marine grade). Structural plywood should conform IS 10701.

**37.2 IS Codes and Grades of Plywood**

Grade	IS Code	Application
MR (Moisture Resistant)	IS 303	Interior furniture, dry areas
BWR (Boiling Water Resistant)	IS 303	Kitchen cabinets, semi-moist areas
Marine Grade	IS 710	Exterior, high humidity, marine use
Structural Grade	IS 10701	Load-bearing construction applications
Fire Retardant	IS 5509	Public buildings, fire-sensitive zones
Decorative Veneered	IS 1328	Interior paneling, furniture finishes

**37.3 Technical Specifications**

**37.3.1 General Requirements:**

- Size: 2440 mm × 1220 mm (8' × 4') standard; tolerance ±6 mm length, ±3 mm width
- Thickness: 6 mm to 25 mm;
- Tolerance shall be typically +0.2mm to +0.60.
- Moisture Content: 5–12%
- Face Veneer: Uniform, free from splits, knots, overlaps
- Core Veneer: Evenly distributed, bonded with appropriate adhesive

**37.3.2 Adhesive Type: IS 848**

- MR Grade: Urea Formaldehyde
- BWR/Marine Grade: Phenol Formaldehyde (PF resin)

**37.4 Testing Requirements (as per IS 303/710/10701)**

- Modulus of Rupture (MOR)
- Modulus of Elasticity (MOE)
- Water resistance (72 hours boiling for marine grade)
- Adhesion of plies
- Preservative treatment (IS 12120 if specified)
- Dimensional Stability

**37.5 Marking**

- Manufacturer's name or trademark
- IS code and grade
- Batch number and year of manufacture

**M-38. Glass:**

**38.1** General purpose glass used in architectural and building applications must comply with IS 2553 (Part 1) It specifies safety glass standards including toughened and laminated types.

**38.2 IS Code Reference**

Glass Type	IS Code	Application
Toughened (Tempered)	IS 2553 (Part 1)	Doors, windows, partitions, facades
Laminated Safety Glass	IS 2553 (Part 1)	Skylights, overhead glazing, railings
Float Glass	IS 14900	General glazing, mirrors, furniture
Wired Glass	IS 5437	Fire-resistant glazing

**38.3 Technical Specifications (IS 2553 Part 1)****38.3.1 General Requirements:**

- Thickness Range: 4 mm to 12 mm (nominal)
- Size Tolerances:  $\pm 1$  mm in thickness;  $\pm 2$  mm in length/width
- Edge Finish: Smooth, arrised or polished edges
- Optical Quality: Free from bubbles, scratches, distortions

**38.3.2 Toughened Glass:**

- Heat-treated to increase strength (4–5× stronger than annealed)
- Breaks into small blunt fragments for safety
- Minimum fragmentation count: 40 pieces in 50 mm × 50 mm area

**38.3.3 Laminated Glass**

- Two or more layers bonded with PVB interlayer
- Retains integrity upon breakage
- Impact resistance and sound insulation properties

**38.4 Testing Requirements:**

- Fragmentation test (for toughened)
- Impact resistance (for laminated)
- Light transmission and distortion
- Thermal shock resistance

**38.5** Sampling: One test per glass as directed by Engineer Incharge.

**38.6 Marking:**

- Manufacturer's name or trademark
- IS code and type of glass
- Date or batch number
- Safety symbol (if applicable)

**38.7** Sheet glass shall conform to 2835 Specification for Flat Transparent Sheet Glass,

which outlines its physical properties, tolerances, and quality standards for general glazing applications.

#### **38.7.1 Technical specifications**

<b>Attribute</b>	<b>Specification</b>
Applicable IS Code	IS 2835
Thickness Range	2 mm to 6 mm (nominal)
Standard Sizes	610 × 610 mm to 2440 × 1220 mm (custom sizes allowed)
Tolerance	±0.2 mm in thickness; ±2 mm in length/width
Surface Quality	Free from bubbles, scratches, waviness, and other visual defects
Edge Finish	Clean cut, arrised or ground edges
Optical Clarity	Uniform transparency, no distortion
Packing & Marking	Manufacturer's name, IS code, batch number

#### **38.7.2 Key Technical Requirements**

- **Flatness:** Must conform to specified deviation limits to ensure proper glazing.
- **Light Transmission:** Should meet minimum luminous transmittance values for clarity.
- **Workability:** Suitable for cutting, edging, and installation in frames or sashes.
- **Applications:** Windows, doors, partitions, showcases, and general architectural use.

**38.8** 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.

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

**39.1** The material shall conform to IS 14753

**39.2** Acrylic sheet shall be of thickness as specified in the item and of a specified shape and size as the case may be. Panels may be flat or curved. It should be light in weight. It shall be colourless or coloured or opaque as specified in the item. Colourless 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 colours. 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:**

Medium-density particle boards shall conform to IS 3087. Boards shall be manufactured from wood-based lignocellulosic material bonded with synthetic resin. Physical and mechanical properties including density, moisture content, water absorption, and strength shall meet the prescribed limits for Grade I/II as specified. Each board shall bear manufacturer's marking indicating IS code, grade, batch number, and date of manufacture.

Installation shall follow standard carpentry practices ensuring proper edge support and surface finish

#### **40.1 Dimensions and Tolerances**

- Thickness Range: Typically, 6 mm to 25 mm
- Length and Width: Standard sizes like 2440 mm × 1220 mm
- Tolerance:
- Thickness:  $\pm 0.5$  mm
- Length/Width:  $\pm 5$  mm

#### **40.2 Physical Properties**

- Density: Medium density range, typically 600–800 kg/m<sup>3</sup>
- Moisture Content: Should be within 5–13%
- Screw Withdrawal Strength: Minimum values specified for face and edge
- Water Absorption and Swelling: Limits defined for 2-hour and 24-hour immersion tests

#### **40.3 Adhesive Requirements**

- Adhesives used must conform to IS 848 (Synthetic Resin Adhesives for Plywood)

#### **40.4 Testing and Inspection**

- Tests Include:
- Moisture content
- Density
- Thickness swelling
- Screw withdrawal strength
- Sample Size: As per Annex A of the BIS product manual
- Inspection Scheme: Defined under Scheme-I of BIS Conformity Assessment Regulations

#### **40.5 Marking and Labeling**

- Boards must be marked with:
- Manufacturer's name or trademark
- Thickness and grade
- IS 3087 references
- BIS Standard Mark (if certified)

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

**41.1** Expanded polystyrene (EPS) slabs for framed construction applications shall conform with IS 4671– Specification for Expanded Polystyrene for Thermal Insulation Purposes. This standard defines the physical, thermal, and mechanical properties of EPS used in building envelopes, insulation, and prefabricated panels

**41.2** Expanded polystyrene slabs shall conform to IS 4671. Slabs shall be of nominal density 20–30 kg/m<sup>3</sup>, with minimum compressive strength of 0.9–1.4 kg/cm<sup>2</sup> at 10% deformation. Thermal conductivity shall not exceed 0.035 W/m·K. Moisture absorption shall be  $\leq 1\%$  by volume. Slabs shall be uniform, free from cracks, voids, and foreign matter. Each slab shall bear manufacturer's marking indicating IS code, density, batch number, and date of manufacture. Installation shall follow standard framed panel procedures ensuring proper edge support and thermal continuity.

**M-42. Resin Bonded Fiberglass (Glass Wool)**

**42.1** IS 8183 specifies the requirements for resin bonded mineral wool (including fiberglass) used for thermal and acoustic insulation. It covers physical properties, performance criteria, and marking requirements

**42.2** Resin bonded mineral wool slabs shall conform to IS 8183. Material shall be non-combustible, moisture resistant, and suitable for thermal and acoustic insulation. Nominal density shall be 24–48 kg/m<sup>3</sup>, with thermal conductivity not exceeding 0.037 W/m·K. Slabs shall be uniform, free from voids, and optionally faced with aluminum foil or glass tissue as specified. Each slab shall bear manufacturer's marking indicating IS code, density, batch number, and date of manufacture. Installation shall follow standard framed panel procedures ensuring proper edge support and insulation continuity.

**42.3** IS 3144 1 specifies the methods of test for mineral wool thermal insulation materials,

**42.4** Insulation wool blanket shall be with following coverings on one or both sides as indicated.

(1) Bituminised 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:**

- The fixtures and fastenings, that is, butt hinges, tee and strap hinges, sliding door bolts, tower bolts, door latch, bathroom 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.
- They shall be of iron, brass, aluminum, chromium plated iron, chromium plated brass, copper oxidized iron, copper oxidize brass or anodized aluminum as specified.
- 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.
- The samples of fixtures and fastenings shall be got approved as regards quality and shape before providing them in position.
- Brass and anodized aluminum fixtures and fastenings shall be bright finished.

**43.2 Holdfasts:** Holdfasts shall conform to IS 7196. Each holdfast shall be fabricated from mild steel flats of size 30 mm × 6 mm, bent into Z-shape or L-shape as specified. Minimum length shall be 250 mm, with anchoring end embedded in masonry or concrete. Each door frame shall be fixed using not less than three holdfasts per side, and each window frame with two per side. Surface finish shall be black or galvanized as per site exposure. Installation shall ensure firm anchorage and alignment.

**43.3 Butt hinges:** Butt hinges shall conform to IS 12817 Hinges shall be made of stainless-steel grade AISI 304 or 316 as per IS 6911. Each hinge shall be of size specified in the BOQ, with fixed or removable pin as required. Hinges shall be corrosion-resistant, capable of withstanding 50,000 operational cycles, and free from burrs or surface defects. Each hinge shall bear manufacturer's marking indicating IS code, grade, size, and batch number.

**43.4 Sliding door bolts (Aldrops):** Sliding door bolts (aldrops) shall conform to IS 2681 for non-ferrous types and IS 15834 for stainless steel types. Each aldrip shall be of size and material as specified in the BOQ, with provision for padlocking. Finish shall be polished or satin as per site requirements. Aldrops shall be corrosion-resistant, mechanically robust, and capable of enduring 50,000 operational cycles. Each unit shall bear manufacturer's marking indicating IS code, grade, and batch number.

**43.5 Tower bolts (Barrel Type):** Tower bolts (barrel type) shall conform to IS 15833

Each bolt shall be made of stainless-steel grade AISI 304 or 316, with size and finish as specified in the BOQ. Bolt diameter and base plate thickness shall meet dimensional requirements of the standard. Bolts shall be corrosion-resistant and capable of enduring a minimum of 50,000 operational cycles. Each unit shall bear manufacturer's marking indicating IS code, grade, size, and batch number.

**43.6 Door latch:** Door latches shall conform to IS 16015. Latches shall be of mortise type, mechanically operated, and made from stainless steel, brass, or zinc alloy as specified. Each latch shall be capable of withstanding a minimum of 200,000 operating cycles and shall pass a 96-hour salt spray test for corrosion resistance. Latch bolts shall be spring-loaded and operable by lever handle or knob. Each unit shall bear manufacturer's marking indicating IS code, grade, and batch number

**43.7 Bathroom Latch:** Bathroom latches shall conform to IS 16015 Each latch shall be of mortise type, mechanically operated, and made from stainless steel, brass, or zinc alloy as specified. Latch shall include privacy thumb turn and emergency release. It shall withstand a minimum of 200,000 operating cycles and pass a 96-hour salt spray test. Each unit shall bear manufacturer's marking indicating IS code, grade, and batch number.

**43.8 Handle:** Door handles shall conform to IS 208. Handles shall be made of stainless steel, brass, or aluminum alloy as specified, with finish suitable for the intended application. Each handle shall be of size and type as per BOQ, and capable of withstanding a minimum of 50,000 operating cycles. Handles shall be corrosion-resistant and mechanically robust. Each unit shall bear manufacturer's marking indicating IS code, grade, size, and batch number.

**43.9 Door Stoppers:** Door stopper shall conform to IS 1823 : Door stoppers shall be of floor-mounted or wall-mounted type as specified, fabricated from stainless steel, brass, or aluminum alloy with rubber tip. Each stopper shall be corrosion-resistant and capable of absorbing door impact without deformation. Finish shall be satin, polished, or chrome-plated as per BOQ. Mounting shall be secure using appropriate fasteners. Manufacturer's identification and batch number shall be provided where applicable

**43.10 Door Catch:** Door catches shall be of magnetic, roller, or ball type as specified in the BOQ. They shall be made from brass, stainless steel, or aluminum alloy conforming to IS 410, IS 6911, or IS 617 respectively. Finish shall be satin, polished, or chrome-plated. Each catch shall be corrosion-resistant and capable of withstanding a minimum of 50,000 operational cycles. Mounting shall be secure using appropriate fasteners. Manufacturer's identification and batch number shall be provided where applicable

**43.11 Wooden Door Stop with hinges:** Wooden door stops with hinges shall be fabricated from seasoned hardwood conforming to IS 4021 and installed in accordance with IS 4913. Each stop shall be of appropriate dimensions to suit door width and shall be hinged using stainless steel butt hinges conforming to IS 12817. Finish shall be painted, varnished, or polished as specified. Installation shall ensure smooth operation and effective door restraint without obstruction

**43.12 Casement window fastener:** Casement window fasteners shall be of handle-operated type suitable for inward or outward opening windows. Material shall be brass, aluminum alloy, or mild steel conforming to IS 410, IS 617, or IS 2062 respectively. Finish shall be anodized, powder-coated, or chrome-plated as specified. Fasteners shall be corrosion-resistant and capable of withstanding a minimum of 25,000 operating cycles. Installation shall follow IS 1081 guidelines. Manufacturer's identification and batch number shall be provided where applicable.

**43.13 Casement stays (Straight Peg Stay):** Casement stays (straight peg type) shall conform to IS 1038. Each stay shall be fabricated from mild steel or aluminum alloy, with a minimum length of 250 mm and provided with multiple locating holes for staged opening. Finish shall be painted, powder-coated, or anodized as specified. Stays shall be corrosion-resistant and securely fixed to the window frame and shutter using appropriate fasteners. Manufacturer's identification may be provided where applicable.

**43.14 Ventilator Catch:** Ventilator catches shall be of hook, spring, or gravity type as specified in the BOQ. Material shall be brass, aluminum alloy, or mild steel conforming to IS 410, IS 617, or IS 2062 respectively. Finish shall be anodized, powder-coated, or chrome-plated. Catches shall be corrosion-resistant and securely fixed to the ventilator frame and shutter using appropriate fasteners. Installation shall follow IS 1081:1960 guidelines. Manufacturer's identification may be provided where applicable.

**43.15 Pivot:** Door pivots shall conform to IS 1038:1983 and be suitable for steel or aluminum doors as specified. Each pivot set shall be made from mild steel, stainless steel, or brass, with finish appropriate for site conditions. Pivots shall be capable of supporting the specified door weight and allow smooth swing operation. Installation shall ensure secure anchorage to floor and head frame. Where required, pivots shall comply with fire rating standards as per IS 3614. Manufacturer's identification and batch number shall be provided where applicable

**M-44. Paints:**

**44.1 Oil paints:** All oil-based synthetic enamel paints shall conform to IS 2932. Paint shall be of exterior grade, alkyd-based, and supplied in the specified color and finish as per IS 5. It shall have a minimum covering capacity of 12 m<sup>2</sup>/litre per coat and shall be free from lead content exceeding 90 ppm. Paint shall be applied over a compatible primer in two or more coats as directed. Each container shall be clearly marked with manufacturer's name, batch number, IS code, color code, and date of manufacture.

**44.2 Enamel Paints:** Synthetic enamel paint for exterior use shall conform to IS 2933 Part 1 & interior use shall conform to IS 133. Paint shall be alkyd-based, suitable for domestic and decorative applications, and supplied in specified color and finish as per IS 5. It shall have a minimum covering capacity of 10–12 m<sup>2</sup>/litre per coat and shall be free from lead content exceeding 90 ppm. Paint shall be applied over compatible primer in two or more coats. Each container shall be clearly marked with manufacturer's name, IS code, batch number, color code, and date of manufacture

**M-45. French polish:** French polish shall conform to IS 348. It shall be composed of shellac dissolved in rectified or denatured spirit, producing a clear, brownish liquid suitable for wood finishing. The polish shall dry within 2 hours and yield a hard, glossy film free from tackiness. Coverage shall be minimum 8 m<sup>2</sup>/litre per coat. Each container shall bear manufacturer's name, IS code, batch number, and date of manufacture.

**M-46. Marble chips for marble mosaic terrazzo:** Marble chips for marble mosaic terrazzo flooring shall conform to IS 2114. Chips shall be of natural marble, angular or cubical in shape, and free from deleterious substances. Grading shall be uniform, typically 6 mm to 12 mm, and color shall be consistent as specified. Chips shall be dry, clean, and compatible with the binder used. The proportion of marble chips in the terrazzo mix shall be 70–75% by weight. Material shall be supplied in clean bags or bulk and stored in dry conditions

**M-47. Flooring Tiles:**

**47.1** Cement concrete flooring tiles shall conform to IS 1237:2012.

**47.2** IS 1237:2012 – Technical Specifications

Attribute	Specification
Tile Types	Plain, chequered, terrazzo
Sizes	200×200 mm, 250×250 mm, 300×300 mm, 400×400 mm
Thickness	Minimum 20 mm; tolerance ±2 mm
Material Composition	Cement, fine aggregates, coarse aggregates, pigments (optional)
Water Absorption	≤ 10% by mass

Flexural Strength	≥ 3.5 MPa (plain); ≥ 4.0 MPa (chequered/terrazzo)
Abrasion Resistance	≤ 3.5 mm wear under standard test
Surface Finish	Smooth, uniform; terrazzo tiles polished
Edge Quality	Straight, true to shape, free from chips
Marking	Manufacturer's name, IS code, batch number, and date of manufacture

**47.3** Tiles shall be of plain, chequered, or terrazzo type as specified, manufactured using cement conforming and graded aggregates. Tile dimensions shall be 300×300 mm or as per BOQ, with minimum thickness of 20 mm. Water absorption shall not exceed 10% by mass, and flexural strength shall be ≥ 3.5 MPa. Surface shall be smooth and free from defects. Each tile shall bear manufacturer's name, IS code, batch number, and date of manufacture.

**47.4 Marble mosaic tiles:** Marble mosaic tiles shall conform to IS 1130. Tiles shall be fabricated from sound, uniform natural marble and machine-cut to specified dimensions. Finish shall be rubbed, polished, or mirror-finished as per BOQ. Water absorption shall not exceed 0.5% by mass, and hardness shall be minimum 3 on Mohs scale. Each tile shall be free from cracks, fissures, and edge chipping. Manufacturer's name, IS code, batch number, and date of manufacture shall be marked on each batch

**47.5 Chequered Tiles:** Chequered cement concrete tiles must conform to IS 13801, which outlines material, dimensional, physical, and performance requirements. Chequered cement concrete tiles shall be factory-made, non-slip, and conform to IS 13801. They shall be suitable for use in pavements, footpaths, courtyards, and similar applications. Tiles shall have raised chequered patterns, uniform color and texture, and be free from visible defects. Dimensions shall be as specified, with a minimum wearing layer of 6 mm. Physical properties shall include compressive strength ≥ 35 MPa and water absorption ≤ 10%. Installation shall be over a prepared base with tight joints, proper alignment, and curing for a minimum of 7 days. Measurement shall be in square meters, inclusive of supply, laying, jointing, and finishing

**47.6 Chequered Tiles for Stair cases:** The requirements of these tiles shall be the same as Chequered as per (D) above except in following respects;

- The length of a tile shall include the additional nosing length of 30 mm.
- The minimum thickness shall be 28 mm unless specified otherwise.
- The nosing shall have also the same wearing layer as at the top.
- The nosing edge shall be rounded.

#### **M-48. Rough Kotah Stone:**

**48.1** Kotah stone material specifications shall conform to IS 1128 which includes Kotah stone. This IS code outlines the physical, chemical, and dimensional requirements for Kotah stone used in flooring and cladding.

#### **48.2 Material Description**

- Kotah stone shall be flaggy limestone, typically greenish-blue or grey in color.
- Must be hard, dense, homogeneous, and free from cracks, decay, weathering, soft veins, and flaws.
- Stones shall be machine-cut or hand-dressed to specified dimensions

#### **48.3 Physical Properties (As per IS 1128 & IS 1121 series)**

Property	Requirement
Compressive Strength	≥ 55 MPa (IS 1121 Part 1)

Water Absorption	≤ 1% by weight (IS 1121 Part 2)
Specific Gravity	≥ 2.5
Hardness (Moh's Scale)	2.5 to 3
Abrasion Resistance	High (as per BS 812 or equivalent)

#### 48.4 Dimensions and Finish

- Thickness: 20–25 mm (±2 mm tolerance)
- Surface: Natural cleft (rough) or polished, as specified
- Edges: True, square, and free from chipping

#### 48.5 Sampling and Testing, testing methods as per IS 1121 (Parts 1–4)

- Compressive strength
- Water absorption
- Weathering resistance

#### M-49. Polished Kotah Stones

**49.1** Polished kotah stone shall have the same specifications as per rough kotah 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, steps, etc. where machine polishing after the stones are fixed in situ is not possible, shall be double polished.

#### M-50. Dholpur Stone Slab:

**50.1** Dholpur 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 colour.

**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 Kotah stone shall apply to polished Dholpur 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 shall conform to IS 1130.

- It shall be natural, sound, dense, and homogeneous, free from cracks, decay, and deleterious veins.
- Only approved varieties (e.g., Makrana, Ambaji, Banswara) shall be used, as per sample approved by the Engineer-in-Charge.
- Marble slab shall be white or of other colour and of best quality as approved by the Engineer-in-charge.

#### 51.2 Physical Properties

Property	Requirement
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Compressive Strength	≥ 52 MPa (IS 1121 Part 1)
Water Absorption	≤ 0.4% by weight (IS 1124)
Specific Gravity	≥ 2.5 (IS 1122)
Hardness (Moh's Scale)	≥ 3

### 51.3 Dimensions and Finish

- Thickness: 18 mm to 25 mm (±2 mm tolerance)
- Surface: Machine-polished to mirror finish
- Edges: Machine-cut, square and true
- Color and veining: Uniform and as per approved sample

### 51.4 Testing of Marble Slabs (As per IS 1130 and IS 1121 Series)

- IS 1130 – Marble (Blocks, Slabs and Tiles)
- IS 1121 (Part 1 to 5) - Methods of test for natural building stones
- IS 1122 - Determination of specific gravity
- IS 1124 -Determination of water absorption

### M-52. Granite Stone Slab:

**52.1** Granite Stone Slab specifications, shall confirm with IS 3316 & IS 14223 and IS 1121 series. These slabs are used for flooring, wall cladding, and architectural finishes

**52.2** Granite shall be of approved colour and quality. The stone shall be hard, even, sound regular in shape and generally uniform in colour. It shall be without any soft veins, cracks or flaws.

**52.3** The thickness of the stone shall be as specified in the items.

**52.4** 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.

### 52.5 Physical Properties

Property	Requirement
Compressive Strength	≥ 100 MPa (IS 1121 Part 1)
Water Absorption	≤ 0.5% by weight (IS 1124)
Specific Gravity	≥ 2.6 (IS 1122)
Hardness (Moh's Scale)	≥ 6

### 52.6 Dimensions and Finish

- Thickness: 18 mm to 25 mm (±2 mm tolerance)
- Surface: Machine-polished to mirror finish
- Edges: Machine-cut, square and true
- Color and grain: Uniform and as per approved sample

### 52.7 Testing of Granite (As per IS 14223 and IS 1121 Series)

- IS 14223:1995 – Polished building stones – Granite
- IS 1121 (Part 1 to 5) – Methods of test for natural building stones
- IS 1122:1974 – Determination of specific gravity

- IS 1124:1974 – Determination of water absorption

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

**53.1** PVC flooring shall conform with IS 5318 : Code of Practice for Laying of Flexible PVC Sheet and Tile Flooring.

#### **53.2** Material Requirements

- PVC flooring shall be made from polyvinyl chloride resin, compounded with plasticizers, stabilizers, fillers, and pigments.
- Must be homogeneous, non-toxic, and free from cracks, blisters, or foreign inclusions.
- Shall be Available in tiles or rolls, with smooth or textured finish.

#### **53.3** Physical Properties

Property	Requirement
Thickness	1.5 mm to 3.0 mm ( $\pm 0.2$ mm tolerance)
Specific Gravity	1.3–1.45
Tensile Strength	$\geq 15$ MPa
Elongation at Break	$\geq 200\%$
Dimensional Stability	$\leq 0.2\%$ change
Water Absorption	Nil
Flammability	Self-extinguishing

#### **53.4** Subfloor Preparation

- Subfloor shall be dry, level, and free from dust, grease, or cracks.
- Moisture content must be  $< 5\%$  before laying.
- Uneven surfaces must be corrected using cement mortar or leveling compound.

#### **53.5** Adhesives

- Use rubber-based or synthetic resin adhesives compatible with PVC.
- Apply uniformly to avoid air pockets.

#### **53.6** Laying Procedure

- Sheets/tiles shall be laid with tight joints, aligned properly.
- Rolling with a heavy roller (45–70 kg) after laying ensures adhesion.
- Joints may be heat welded or chemically sealed, depending on application.

#### **53.7** Curing and Finishing

- Allow 24 hours for adhesive curing before use.
- Final cleaning with mild detergent and water; avoid harsh chemicals.

**M-54. Facing tiles:** Facing tiles shall conform to IS 4101 (Part 1) for stone facings / IS 1443 for cement concrete tiles, and other relevant IS codes depending on material type. Tiles shall be fixed as per manufacturer's instructions and BIS specifications, ensuring compliance with tolerances and durability requirements.

**M-55. White glazed tiles:** White glazed ceramic tiles shall conform to IS 15622. Tiles shall

be of approved size (e.g., 150×150 mm, 200×300 mm, etc), uniformly glazed, free from cracks, crazing, and surface defects. Water absorption shall not exceed 10% by mass, and the minimum modulus of rupture shall be 15 MPa. Tiles shall be fixed on a prepared plastered surface using cement slurry or approved tile adhesive, with joints not exceeding 2 mm, filled with white cement or grout. The finished surface shall be true, level, and neatly aligned. Measurement shall be in square meters of finished work, inclusive of all materials, labor, curing, and finishing. Testing: As per IS 13630 series (water absorption, strength, crazing, frost resistance, thermal resistance, chemical resistance, abrasion resistance).

**M-56. Galvanised iron pipes and fittings:** Galvanised iron pipes shall conform to IS 1239 (Part 1), medium class (Class B), and fittings to IS 1879. Pipes shall be mild steel, hot-dip galvanised, seamless or ERW, with threaded ends and sockets. Fittings shall be malleable cast iron, galvanised, and compatible with pipe threads. Installation shall include proper jointing with PTFE tape or white lead, alignment, and support. Measurement shall be in running meters for pipes and number for fittings, inclusive of supply, laying, jointing, and testing.

**M-56-A. PVC Pipes:** Unplasticized PVC (UPVC) pipes shall conform to IS 4985, suitable for potable water supply and pressure applications. Pipes shall be made from virgin, non-toxic UPVC resin, with smooth bore and corrosion resistance. Pipes shall withstand hydrostatic pressure tests and have a Vicat softening point  $\geq 80^{\circ}\text{C}$ . Jointing shall be done using solvent cement or rubber ring sockets. Measurement shall be in running meters, inclusive of supply, transport, jointing, and testing

**M-57. Bib cock and stop cock:** Bib cocks and stop cocks shall conform to IS 781, made from cast brass (IS 292), heavy pattern, screw-down type. Sizes shall be 15 mm, 20 mm, or 25 mm with BSP threads as per IS 554. Fittings shall be leak-proof, corrosion-resistant, and capable of withstanding hydraulic pressure depending on class as per mentioned IS code. Finish shall be polished or chrome-plated. Measurement shall be in number of units, inclusive of supply, installation, jointing, and testing

**M-58. Gun metal wheel valve:** Gun metal wheel valves shall conform to IS 778, made from copper alloy (gun metal) as per IS 318. Valves shall be of screw-down type, globe or gate pattern, with wheel-operated spindle and BSP threaded or flanged ends. Suitable for waterworks applications, they shall withstand hydraulic pressure depending on class as per mentioned IS code and be leak-proof, corrosion-resistant, and durable. Sizes range from 15 mm to 100 mm. Measurement shall be in number of units, inclusive of supply, installation, jointing, and testing.

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

**59.1** Wash basin shall be of white porcelain first quality best Indian make and it shall conform to I.S. 2556 (Part-IV) . The size of the wash basin shall be as specified in the item. Wash basin shall be of one-piece construction with continued over-flow arrangements. All internal angles shall be designed so as to facilitate cleaning. Wash basin shall have single tap hole or two holes as specified. Each basin shall have a circular waste hole which is either rebated or beveled 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 colour 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** European type water closet (EWC) shall conform to IS 2556 (Part 2 or Part 8), made

from white vitreous china, with smooth, impervious glaze and free from defects. The closet shall be of S or P trap type, with 100 mm outlet and integral footrest (if specified). It shall be paired with a low-level flushing cistern (PVC or ceramic), with a 10-liter capacity, complete with fittings, flush pipe, and brackets. The unit shall be installed on a firm base with proper alignment, jointing, and leak-proof connection to the soil pipe. Measurement shall be in number of units, inclusive of supply, installation, jointing, testing, and all accessories

- 60.2** The solid plastic seat and cover shall be of the best Indian make conforming to I.S. 2548. 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:** The specification of Orissa type white glazed water closet of first quality shall conform to I.S. 2556 (Part-III) 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:** Indian type water closet shall conform to IS 2556 (Part 3), made from white glazed vitreous china, with smooth, impervious finish and integral footrests. The pan shall be of squatting type, with a 100 mm outlet suitable for S or P trap connection. It shall be free from cracks, glazing defects, and have water absorption  $\leq 0.5\%$ . Installation shall be on a cement concrete base, properly aligned and jointed to the soil pipe. Measurement shall be in number of units, inclusive of supply, transport, installation, jointing, and testing

**M-62-A. Foot Rests:** A pair of white glazed earthen ware rectangular foot rests of minimum size 310 mm. x 130 mm. & 20 mm thickness shall be provided with water closet.

**M-63. Stainless Steel Kitchen Sink:**

- 63.1** Stainless steel kitchen sinks shall conform to IS 13983, made from austenitic stainless steel of grade conforming to IS 6911. The sink shall be of sit-on or inset type, with smooth, polished finish, free from sharp edges, dents, or welding defects. Thickness of steel shall be not less than 1.0 mm, and the sink shall include a waste outlet hole (40 mm dia) with provision for overflow. Sizes typically range from 600×450 mm to 1050×525 mm, with depth between 150 mm to 250 mm. Installation shall be on a firm platform with proper sealing and connection to waste pipe. Measurement shall be in number of units, inclusive of supply, transport, installation, jointing, and testing.

- 63.2** The pipes shall be PVC or UPVC conforming to IS 13592 or IS 4985 as applicable. Part-I and 32 mm. brass waste coupling of standard pattern with brass chain and rubber plug shall be provided with sink.

**M-64. Glazed Lipped type flat back urinal/corner type urinal:** Glazed urinals shall conform to IS 2556 (Part 6), made from white vitreous china with smooth, impervious glaze. Urinals shall be of flat back lipped type or corner type, with integral flushing rim and outlet waste pipe. Each unit shall be free from cracks, glazing defects. Installation shall include CI/PVC flush pipe, spreader, brackets, and connection to waste line. Measurement shall be in number of units, inclusive of supply, transport, installation, jointing, and testing.

**M-65. Low flushing tank:** Low-level Plastic Flushing Cisterns shall conform with IS 7231. Capacity shall be 12.5 litres, complete with internal fittings, flush pipe, operating lever, and wall-mounting brackets. The cistern shall be leak-proof, corrosion-resistant, and capable of delivering effective flush. Installation shall ensure proper alignment, secure fixing, and connection to the water closet with PVC flush pipe. Measurement shall be in number of units, inclusive of supply, transport, installation, jointing, and testing

**M-66. Cast iron flushing cistern:** Cast iron flushing cistern shall be made from cast iron

conforming to IS 774:2004, with a capacity of 10 litres, suitable for low-level or high-level installation. The cistern shall be internally and externally enamelled or painted to resist corrosion, and fitted with a brass or gunmetal flushing mechanism, CI/PVC flush pipe, operating lever, and wall-mounting brackets. It shall be leak-proof, durable, and capable of delivering effective flush. Installation shall ensure proper alignment, secure fixing, and connection to the water closet. Measurement shall be in number of units, inclusive of supply, transport, installation, jointing, and testing

**M-67. Flush cock:** Flush cocks shall be made from brass or gunmetal, conforming to relevant IS standards (e.g., IS 9758), and shall be of screw-down type with chrome-plated finish. Sizes commonly used are 25 mm or 32 mm, with BSP threads as per IS 554. The cock shall be capable of delivering a quick and effective flush, operated manually or automatically. It shall be leak-proof, corrosion-resistant, and suitable for high-pressure water supply. Measurement shall be in number of units, inclusive of supply, installation, jointing, and testing

**M-68. Cast iron pipes and fittings:** Cast Iron Pipes and Fittings shall conform to IS 1536 and IS 1538 for pressure and non-pressure applications in water supply, drainage, and sewage systems.

#### **68.1 Applicable Standards**

- IS 1536 – Cast Iron Pipes for Pressure Applications
- IS 1538 – Cast Iron Fittings for Pressure Pipes
- IS 1729 – Cast Iron/Ductile Iron Drainage Pipes and Pipe Fittings for Over-Ground Non-Pressure Pipeline (Socket and Spigot Series)

#### **68.2 Cast Iron Pipes for Pressure Applications (IS 1536)**

- All cast iron pipes shall conform to IS 1536.
- Pipes shall be of socket and spigot type, suitable for jointing with lead caulked joints or mechanical joints.
- Pipes shall be designed for pressure applications such as water supply and pumping mains.
- Each pipe shall be subjected to hydrostatic pressure testing as per IS requirements.
- Dimensions, tolerances, and mechanical properties shall strictly comply with the standard.
- Pipes shall be supplied with manufacturer's test certificates confirming compliance

#### **68.3 Cast Iron Fittings for Pressure Pipes (IS 1538)**

- All fittings (bends, tees, reducers, collars, etc.) shall conform to IS 1538.
- Fittings shall be compatible with IS 1536 pipes and suitable for pressure applications.
- Fittings shall be free from casting defects, blow holes, or surface irregularities.
- Each fitting shall be tested for dimensional accuracy and pressure performance.
- Manufacturer's test certificates shall be furnished with each consignment

#### **68.4 Cast Iron / Ductile Iron Drainage Pipes and Fittings (IS 1729)**

- Drainage pipes and fittings shall conform to IS 1729.
- Pipes shall be of socket and spigot series, suitable for over-ground, non-pressure applications (soil, waste, and drainage lines).
- Both Cast Iron (CI) and Ductile Iron (DI) materials are acceptable, provided they meet IS requirements.
- Pipes shall be internally and externally coated with bituminous or other approved protective coatings.
- Fittings shall be smooth, free from defects, and dimensionally accurate.

- Pipes shall be supplied with manufacturer's test certificates confirming compliance

#### 68.5 Material and Type

- Made from **cast iron of Grade FG 150 or FG 200** as per IS 210
- Pipes: **Socket and spigot type**, centrifugally cast or sand cast
- Fittings: **Bends, tees, reducers, flanges**, etc., matching pipe dimensions

#### 68.6 Sizes and Pressure Ratings

- Nominal bore: 80 mm to 1000 mm
- Pressure class: Class A (0.7 MPa) or Class B (1.0 MPa)

#### 68.7 Physical and Dimensional Requirements

Property	Requirement
Tensile strength	$\geq 150$ MPa (FG 150)
Hydrostatic test	1.5× rated pressure
Wall thickness	As per IS 1536 Table 1
Coating	<b>Bituminous or epoxy coating</b> internally and externally

#### 68.8 Jointing

- Lead caulked joints, rubber ring joints, or mechanical joints
- Must ensure leak-proof and pressure-tight connections

#### 68.9 Marking

- Pipes and fittings shall bear:
- Manufacturer's name or trademark
- Nominal size and pressure class
- IS code reference

### M-69. Nahni Trap:

**69.1** Nahni traps shall conform to IS 14735, The material shall conform to relevant BIS standard for UPVC, or other approved material, with integral water seal of minimum 50 mm depth. The trap shall be of floor-mounted type, with removable grating and vertical or horizontal outlet as specified. It shall be corrosion-resistant, leak-proof, and capable of preventing foul gases from entering the building. The unit shall be securely fixed in the floor with proper slope and connection to the waste pipe. Measurement shall be in number of units, inclusive of supply, installation, jointing, and testing.

**69.2** 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 cracks 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.

**69.3** The nahni trap shall be of quality approved by the Engineer-in-charge and shall generally conform to the relevant Indian Standards.

**69.4** The Nahni trap provided shall be with deep seal, minimum 50 mm. except at places where trap with deep seal cannot 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 traps shall conform to IS 14735, made from UPVC, with integral water seal of minimum 50 mm depth. The trap shall be of P-type or S-type, with grating on top and horizontal outlet for connection to the drain. It shall be corrosion-resistant, leak-proof, and capable of preventing foul gases from entering the building. Installation shall

include proper bedding, alignment, and connection to the waste pipe. Measurement shall be in number of units, inclusive of supply, installation, jointing, and testing.

**70.2** It shall be sound, free from defects such as fire cracks. They shall give a sharp clear note when struck with light hammer. There shall be no broken blisters.

**70.3** The size of the gully trap shall be as specified in the item specifications.

**M-71. SN8 Structured wall PVC pipes:** The material shall conform to IS 16098 (Part 1) Structured-Wall Plastics Piping Systems for Non-Pressure Drainage and Sewerage

#### **71.1** General

- All structured-wall PVC pipes and fittings shall conform to IS 16098 (Part 1)
- Pipes shall be of smooth external surface, Type A, suitable for underground non-pressure drainage and sewerage applications.
- Pipes shall be supplied in stiffness class SN8 (8 kN/m<sup>2</sup>) unless otherwise specified.

#### **71.2** Material

- Pipes shall be manufactured from unplasticized polyvinyl chloride (PVC-U) resin, free from defects, voids, or inclusions.
- Additives, stabilizers, and pigments shall comply with IS requirements and shall not impair performance.

#### **71.3** Dimensions & Tolerances

- Nominal diameters, wall thickness, and tolerances shall conform to IS 16098 tables.
- Pipes shall be supplied in standard lengths with socket ends suitable for rubber ring joints.

#### **71.4** Mechanical Properties

- Pipes shall meet the following performance requirements:
- Ring stiffness: Minimum SN8 (8 kN/m<sup>2</sup>).
- Impact resistance: As per IS 16098 test methods.
- Water tightness: Joints shall withstand specified test pressures without leakage.

#### **71.5** Marking

- Each pipe shall bear permanent marking with:
- Manufacturer's name/trade mark
- Nominal diameter and stiffness class (SN8)
- IS 16098 (Part 1): 2013
- Batch number and date of manufacture

#### **71.6** Testing & Certification

- Pipes shall be tested for ring stiffness, impact resistance, water tightness, and dimensional accuracy.
- Manufacturer's test certificates shall be furnished with each consignment.
- Pipes shall bear the ISI certification mark

**M-72. Wall Peg Rail:** The aluminium wall peg rail shall have three aluminium 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** G.I. water spot shall consist of a galvanized iron pipe outlet conforming to IS 1239 (Part 1 & Part 2), with appropriate fittings such as elbows, tees, nipples, and a brass or CP tap. The pipe shall be medium class, securely fixed to wall or floor with clamps, and

connected to the main water supply line. The outlet shall be leak-proof, corrosion-resistant, and suitable for domestic or utility water draw-off. Installation shall include proper alignment, threading, jointing with white lead or PTFE tape, and testing. Measurement shall be in number of units, inclusive of supply, installation, jointing, and all accessories.

**73.2** 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.

**73.3** 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):** Asbestos Cement (A.C.) pipes shall conform to IS 1592 for pressure applications and IS 6908 for sewerage and drainage. Pipes shall be manufactured from Portland cement and asbestos fibre, with socket and spigot ends suitable for rubber ring or cement mortar jointing. Available in nominal bores from 80 mm to 600 mm, classified by pressure or drainage class. Pipes shall be straight, leak-proof, and corrosion-resistant. Installation shall include proper bedding, alignment, jointing, and testing. Measurement shall be in running meters, inclusive of supply, transport, jointing, and all accessories.

**M-75. Ball Valve:** Corydon or equivalent ball valve shall conform to IS 9890, suitable for general-purpose pipeline applications. The valve shall be of full bore, two-way type, made from brass, stainless steel, or gunmetal, with chrome-plated ball and PTFE seals. It shall be operated by a quarter-turn lever, ensuring zero leakage under pressure. Available in sizes from 15 mm to 32 mm, with threaded or flanged ends. Installation shall include proper alignment, jointing, and testing. Measurement shall be in number of units, inclusive of supply, transport, installation, and all accessories.

**M-76. Bitumen Felt for Water Proofing and Damp Proofing:** Bitumen felt shall conform to IS 1322, made from hessian or fibre base impregnated and coated with bitumen. It shall be used for waterproofing roofs and damp-proofing walls and floors. The felt shall be supplied in rolls of standard width 1 m and length 10 m, with heat resistance up to 80°C. Installation shall be done using hot bitumen bonding with specified overlaps and protective layers. Measurement shall be in square meters, inclusive of supply, surface preparation, laying, bonding, and protection.

**M-77. Selected Earth:**

**77.1** The selected earth shall be that obtained from excavated material or shall be as per item specifications mentioned under the items list of tender.

**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 material 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** Barbed wire shall conform to IS 278, made from galvanized mild steel wire of diameter 2.5 mm (main strand) and 2.0 mm (barbs). The wire shall be formed with two twisted strands and barbs spaced at 75 mm  $\pm$  12 mm or as directed by engineer incharge on the basis of design requirement. Zinc coating shall be uniform and as per IS 4826 for corrosion resistance. The wire shall be supplied in coils and installed over fencing posts

with proper tension and anchorage. Measurement shall be in running meters, inclusive of supply, transport, stretching, fixing, and all accessories

**78.2** The permissible deviation from the nominal diameter of the line wire and point wire shall not exceed + 0.08 mm.

**78.3** The barbs shall carry four points shall be formed by twisting two-point wires, each two turns, lightly round one line wire, making altogether four complete turns. The barbs shall be so finished that the four points are set and looked 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 an angle not greater than 35 degrees of the axis of the wire forming the barbs.

**78.4** The line and point wire shall be circular section free from scale and other defects and shall be uniformly galvanised. 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 two successive splices shall not be less than 15 meters.

**M-79. Flyash Bricks:** Fly ash brick shall conform to IS 13757– Burnt Clay Fly Ash Building Bricks

**79.1** General specifications.

- Bricks shall be manufactured by blending fly ash with clay and burning in kilns.
- Bricks shall be of below indicated size unless otherwise specified.

Type		Length (mm)	Width (mm)	Height (mm)
Modular Brick		190	90	90/40
Non-Modular		230	110	70/30

**79.2** Physical Requirements

- Compressive Strength:
- Minimum crushing strength shall not be less than 50 kg/cm<sup>2</sup> (or as specified in BOQ/class designation).
- Water Absorption:
- Shall not exceed 20% by mass after immersion in cold water for 24 hours.
- Efflorescence:
- Shall not be more than moderate as per IS test.
- Dimensions & Tolerances:
- Length, width, and height shall conform to IS 13757 with permissible variation of ±3 mm in length and ±1.5 mm in width/height.

**79.3** Workmanship

- Bricks shall be of uniform shape, size, and colour, free from cracks, flaws, and nodules of lime.
- Bricks shall be soaked in water for minimum 2 hours before use.
- Brickwork shall be laid with frog facing upward, joints not exceeding 10 mm thickness, fully filled with mortar.
- Mortar shall be C.M. 1:6 (1 cement: 6 fine sand) unless otherwise specified.
- Brickwork shall be cured for minimum 7 days.

**79.4** Testing & Quality Control

- Bricks shall be tested for compressive strength, water absorption, and efflorescence as per IS 3495.
- Test certificates from the manufacturer shall be furnished with each consignment.
- Random sampling shall be carried out at site to verify compliance.

#### **79.5 Marking**

- Each batch of bricks shall be marked with class designation and manufacturer's identification.
- Bricks shall bear the ISI certification mark wherever applicable.

#### **79.6 Measurement & Payment**

- Brickwork shall be measured in cubic metres.
- Rate shall include cost of materials, labour, mortar preparation, soaking, laying, curing, scaffolding, and all incidental works.

## **GENERAL SPECIFICATIONS**

### **G-1 GENERAL**

#### **1.1 Indian Standard**

All materials used in the works shall be of the best quality of their respective kinds and as specified herein, obtained from sources and suppliers approved by the Engineer-in-Charge (EIC) or his authorized representative and shall conform to the latest edition of Indian Standard issued by the Bureau of Indian Standards. All materials shall comply strictly with the tests prescribed hereinafter or where with the requirements of the latest issues of the relevant Indian Standards. Standards issued elsewhere may be used only when appropriate Indian Standards are not available and are subject to approval of EIC.

## **1.2 Inspection, Sampling and Testing**

All materials used in the works shall be subjected to inspection and tests. Samples of all materials proposed to be employed in the permanent works shall be submitted to the EIC for approval before they are brought to the site.

Samples provided to the EIC or his AR for their retention are to be in labeled boxes suitable for storage. Materials or workmanship not corresponding in character and quality with approved samples will be rejected by the EIC.

Samples required for approval and testing must be supplied in sufficient time to allow for testing and approval, due to allowance being made for the fact that if the first samples are rejected, works arising from the late submission of samples will not be acceptable as reason for delay in the completion of the works.

Materials shall be tested leaving the manufacture's premises, quarry or sources where possible. Materials shall also be tested on the site and they may be rejected if found not suitable or not in accordance with the specifications notwithstanding the results of tests at the manufacturer's works or elsewhere or of test certificates or of any approval given earlier. The contractors shall provide all assistance, instruments, machinery, labour and materials as are normally required for examining, measuring and testing any work.

## **1.3 Dispatch of Materials**

No materials shall be used in the works unless they have first been approved by EIC. Materials shall not be dispatched from the manufacturer's works to the site without written authority from the EIC or his AR.

## **1.4 Test Certificate**

All manufacturer's certificate of test, proof sheets, mill sheets etc. showing that the materials have been tested in accordance with the requirement of this specification, the appropriate Indian Standard or other relevant standard specifications are to be supplied free of charge, on request to the EIC or his AR.

## **1.5 Source of materials**

The contractor shall indicate to the EIC the source of all materials to be used in the work with relevant test data sufficiently in advance, and the approval of the EIC for the same shall be obtained at least 45 days before the scheduled commencement of the work. If the contractor proposes to obtain materials from a different source, he shall notify the EIC for his approval, at least 45 days before such materials are to be used with relevant test data.

## **1.6 Name of Manufacturers and Copies of Orders**

Before ordering any materials or any description for the works, the Contractor shall submit for the approval of the EIC, the names of the makers and suppliers proposed and any other detail required by the EIC and shall afterwards send to the EIC copies in quadruplicate of the orders given by the Contractor for the materials.

### **1.7 Storage of Materials**

All materials used in the work shall be stored on racks, supports, in bins, under cover, etc. as appropriate to prevent deterioration or damage from any cause whatsoever to the entire satisfaction of the EIC or his AR and as amplified in the succeeding clauses.

### **1.8 Record and Usage of Materials**

The contractor shall maintain a detailed record of all materials received on the site or in his stores or storage and working areas in the vicinity of the site and shall make such records available to the EIC at such time as the letter may reasonably require.

Materials shall wherever possible and practicable be used on the order in which they arrive on the site and in the stores on storage and working areas in the vicinity of the site.

### **1.9 Notice for Inspection of Materials**

Where the EIC or his AR shall give notice to the contractor that materials are to be inspected off the site, the contractor shall, having regard to the location of the materials and the nature of the inspection, test or examination required, give to the EIC or his AR when such materials are ready for inspection, test or examination either during manufacture, fabrication etc. or on completion, such notice as the EIC may reasonably require to enable the inspection, test or examination to be made. Delay to the works arising from the late submission of such notice will not be acceptable as reason for delay to the completion of works.

### **1.10 Use of Permanent Materials for Temporary works**

Materials for the permanent works shall not be used for temporary works unless otherwise approved in writing by the EIC. Granting of such permission shall not prejudice the right of the EIC to reject materials so used which have become unfit for use in the permanent works.

### **1.11 Cost of Sampling and Testing**

Sampling of materials for approval and testing as called for under the appropriate Indian Standard or other relevant standard specification is to be done without charge to G.M.B, the cost of all such tests and sampling shall be deemed to be included in the rates and prices quoted in the Bill of Quantities.

### **1.12 Standard of Workmanship**

A high standard of workmanship in all trades will be required. The contractor shall ensure that only skilled and experience persons are employed.

### **1.13 Plant**

The contractor shall be responsible for supply, use and maintenance of all construction plant and equipment and he shall ensure that it is suitable for the work and is maintained in such a manner as to ensure its efficient working.

The EIC may direct that plant, which is not efficient and is prejudicial to the quality of the work be removed from the site and replaced by plant to his satisfaction.

#### **1.14. Contractor's Supervision**

The Contractor's supervisory staff shall be men/women fully experienced in the type of work being carried out under their supervision and capable of ensuring that it is done well and efficiently.

#### **1.15 Temporary Works**

Where required, the Contractor shall furnish such details of his temporary works as may be called for by the EIC and the Contractor shall satisfy the EIC as to their safety and efficiency. The EIC may direct that temporary works which he considers unsafe or inefficient shall be removed and replaced in satisfactory manner.

#### **1.16 Materials Not Specified**

All materials not herein fully specified and which may be offered for use in the works shall be subject to the approval of the EIC without which they shall not be used anywhere in the permanent works.

### **G- 1.2 Arrangement of traffic**

The Contractor shall at all time carry out work on the highway in a manner creating least interference to the flow of traffic while consistent with the satisfactory execution of the same. For all works involving improvements to the existing highway, the Contractor shall, in accordance with the directives of the Engineer, provide and maintain, during execution of the work, a passage for traffic either along a part of the existing carriageway under improvement, or along a temporary diversion constructed close to the highway. The Contractor shall take prior approval of the Engineer regarding traffic arrangements during construction.

#### **1.2.1 Passage of Traffic along a part of the Existing Carriageway under Improvement.**

For widening /strengthening existing carriageway where part width of the existing carriageway is proposed to be used for passage of traffic, treated shoulders shall be provided on the side on which work is not in progress. The treatment to the shoulder shall consist of providing at least 150 mm thick granular base course covered with bituminous surface dressing in a width of at least 1.5 m and the surface shall be maintained throughout the period during which traffic uses the same to the satisfaction of the Engineer. The continuous length, in which such work shall be carried out, would be limited normally to 500 m at a place. However, where work is allowed by the Engineer in longer stretches passing places at least 20m long with additional paved width of 2.5 m shall be provided at every 0.5 km interval.

In case of widening existing two-lane to four-lane, the additional two lanes would be constructed first and the traffic diverted to it and only thereafter the

required treatment to the existing carriageway would be carried out. However, in case where on the request to the Contractor, work on existing two-lane carriageway is allowed by the Engineer with traffic using part of the existing carriageway, stipulations as in para above shall apply.

After obtaining permission of the Engineer, the treated shoulder shall be dismantled, the debris disposed of and the area cleared as per the direction of the Engineer.

### **1.2.2 Passage of Traffic along a Temporary Diversion**

In stretches where it is not possible to pass the traffic on part width of the carriageway, a temporary diversion shall be constructed with 7 m carriageway and 2.5 m earthen shoulders on each side (total width of roadway 12 m) with the following provision for road crust in the 7 m width:

- (i) 200 mm (compacted) granular sub base;
- (ii) 225 mm (compacted) granular base course; and
- (iii) Premix carpet with Seal Coat/Mix Seal Surfacing.

The alignment and longitudinal section of diversion including junctions and temporary cross drainage provision shall be as approved by the Engineer.

### **1.2.3 Traffic Safety and Control**

The Contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as may be required by the Engineer for the information and protection of traffic approaching or passing through the section of the highway under improvement. Before taking up any construction, and agreed phased programmed for the diversion of traffic on the highway shall be drawn up in consultation with the Engineer.

The barricades erected on either side of the carriageway/portion of the carriageway closed to traffic, shall be of strong design to resist violation, and painted with alternate black and white stripes. Red lanterns or warning lights of similar type shall be mounted on the barricades at night and kept lit through from sunset to sunrise.

At the points where traffic is to deviate from its normal path (whether on temporary diversion or part width of the carriageway) the channel for traffic shall be clearly marked with the aid of pavement markings, painted drums or a similar device to the directions of the Engineer. At night, the passage shall be delineated with lanterns or other suitable light source.

One-way traffic operation shall be established whenever the traffic is to be passed over part of the carriageway inadequate for two-lane traffic. This shall be done with the help of temporary traffic signals or flagmen kept positioned on opposite sides during all hours. For regulation of traffic, the flagmen shall be equipped with red and green flags and lanterns/lights.

On both sides, suitable regulatory/warning signs as approved by the Engineer shall be installed for the guidance of road users. On each approach, at least two signs shall be put up, one close to the point where transition of carriageway begins and the other 120 m away. The signs shall be of approved design and of

reflectory type, if so directed by the Engineer.

#### **1.2.4 Maintenance of Diversions and Traffic Control Devices**

Signs, lights, barriers and other traffic control devices, as well as the riding surface of diversions shall be maintained in a satisfactory condition till such time they are required as directed by the Engineer. The temporary traveled way will be kept free of dust by frequent applications of water, if necessary.

### **G-1.3 EXCAVATION**

#### **1.3.1 General**

Excavation for the foundation works shall be carried out to the widths, lengths and depths and within the lines and levels indicated on the drawings or as directed by the EIC. Any excavation beyond such limits or instructions shall be made good by filling with approved earth to the required compaction by the contractor at his own expense to the satisfaction of the EIC.

#### **1.3.2 Record Survey**

Before beginning excavation or filling the EIC and the contractor shall jointly survey and record all ground levels and surroundings on the site.

#### **1.3.3 Disposal of Excess Excavation**

Excavated material not required for filling is to be disposed of as directed by the EIC as a contingency of the contract. The site must at all times be kept free from surplus material.

### **G-1.4 ADMIXTURES FOR CONCRETE**

#### **1.4.1 Approval**

Admixture to the concrete shall not be used without the written consent of the EIC. When permitted the contractor shall furnish full details from the manufacturer and shall carry out such tests as the EIC may require before any admixture is used in the work.

### **G-1.5 CONCRETE**

#### **1.5.1 Codes**

All design and construction shall be performed in accordance with the Indian Standard Code of Practice for plain and reinforced concrete IS:456(Latest) and other relevant codes mentioned therein.

#### **1.5.2 Qualified Personnel**

A fully qualified and experienced concrete quality control engineer shall be employed by the Contractor and shall be available on site at all times when concreting is taking place. Prior to commencement of the works, Contractor shall submit for the approval of the EIC details of qualifications and experience of the personnel to be engaged in the work of concrete and quality control. Operators of mechanical vibrators and mixers and foreman in-charge of placing of concrete shall be fully trained and experienced for their class of work and they shall be named to the EIC for approval.

### 1.5.3 Concrete Grades

The grade of concrete shall be in accordance with the following table:

Grade	Maximum size of aggregate (mm)	Min. crushing Strength (N/Sq.mm)				Min.mix.time (Minutes)
		Preliminary tests	works	Tests		
		7 Days	28 Days	7 days	28 days	
1:2:4	20	-	-	10.5	15	2

### 1.5.4 Designed Proportion

When concrete is specified the Contractor shall make calculations and carry out all the necessary tests to determine for each concrete grade the proportion by weight of cement, aggregate and water necessary to produce concrete prior to commencement of works. The contractor shall submit to the EIC for approval.

1. The proportion of cement, coarse aggregate, fine aggregate and water so determined.
2. The sieve analysis of aggregates, which he proposes to use in the works.
3. Full details of preliminary tests on each class of concrete, and on the ingredients of each class of concrete.
4. For each trial mix, the mix strength - determined as the average of 10 test specimens - shall exceed the specified strength under the heading "Preliminary Tests".
5. All calculations relevant to the design of each grade of concrete mix.

For under water concreting (including Tremie concreting), the Contractor shall confirm to Clause 14 of IS: 456. Minimum cement content required for cement concrete to ensure durability under severe exposure condition shall be as per Table 5 of IS: 456. The maximum cement concrete in the concrete mixes shall be subject to the approval of the EIC. However, minimum cement contents for M 40 grade concrete shall be 405 kg/Cum respectively, or quantity of cement required to produce concrete grade specified for work, whichever is more

### 1.5.5 Declared Proportions

When the proportions are submitted to the EIC which the contractor considers will produce concrete having the properties required by the foregoing table and elsewhere in the specifications, such properties shall be known as the declared proportions, but no agreement by the EIC to such declared proportions shall relieve the Contractor of any of his AR.

### 1.5.6 Proportion Specified as Ratio of Cement to Fine/Coarse Aggregate

Wherever nominal mix is specifically required, the contractor shall use the ratio of cement, fine aggregates and coarse aggregates as per design drawings and Bill of Quantities.

### 1.5.7 No Deviation from Declared proportions

No deviation from declared proportions will be allowed unless and until the EIC gives his written authorization for the adoption of revised proportions for any grade of concrete. This provision shall also apply to any revised proportions so authorized.

### **1.5.8 Inspection and Testing**

As the work progresses, inspection of cement, aggregates, reinforcing steel and testing of concrete strength will be done by the EIC. The contractor's concrete plants and material stores shall be made accessible to the EIC at all times for inspection and taking samples. The contractor shall facilitate in all possible ways the inspection and testing of samples by the EIC. Labour shall be provided by the contractor for testing.

### **1.5.9 Test Cubes**

Test cubes of size 150 mm shall be made in accordance with IS-516 "Methods for tests for strength of concrete", except that all test cubes unless otherwise ordered by the EIC shall provide suitable portable vibration tables for compaction of cubes. Test cubes shall be cured and stored as provision in IS- 516. Test cubes shall be stored under the same conditions as the units to which they relate.

### **1.5.10 Work Tests**

Not less than six cubes shall be taken at each section of the work and/or each day's work on each class of concrete. For the purpose of these specifications "section" of the work shall be defined by the EIC.

When in a continuous operation the concrete pour exceeds 100 cum. six test cubes shall be taken for every 100 cum. and proportionately for part thereof.

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### **1.5.11 Concrete Testing**

All sampling and testing of concrete shall be carried out in accordance with IS- 199 "Methods of sampling and analysis of concrete" unless otherwise specifically provided in the specification.

Three out of each batch of six cubes will be tested by the EIC for crushing strength and weight at seven days and the remainder at 28 days or at such other time as the EIC may determine.

### **1.5.12 Field Testing Laboratory**

The contractor shall provide a material testing laboratory including such assistance as may be necessary. The laboratory shall be equipped to carry out all routine tests on concrete as per relevant Indian Standard. The material testing laboratory shall be maintained in a clean and efficient manner throughout the operation of the contract.

### **1.5.13 Cost of testing**

The cost of providing field testing laboratory, all sampling materials, test cubes and all preliminary testing and work tests including transportation whatsoever shall be borne by the contractor.

### **1.5.14 Test Conducted Outside**

Whenever required by EIC, the contractor shall cast and supply the required number of 150 mm size cubes to be tested by Govt laboratory or an independent laboratory approved by the EIC. The contractor shall be responsible for transportation and delivering the cubes. Notice shall be given to the EIC in advance so that he may arrange his representative to be present during transportation and testing.

All costs concerning the casting, transporting and testing of such cubes shall be borne by the contractor.

#### **1.5.15 Measurements of ingredients**

Cement and aggregates shall be measured by weight, while weighing the fine aggregates (sand). Due allowances shall be made for moisture content. The method adopted for weighing the concrete materials shall be as approved by the EIC or his AR. All aggregates shall be batched by weight. The batching plant shall be of the requisite capacity to maintain the required progress on different item of work. The equipment shall be capable of determining accurately by direct weighing of the prescribed quantities of various ingredients including water, cement, admixtures etc. and each individual size of aggregates making up the concrete and combination of them to give a uniform mix within the prescribed time and discharging the mix without segregation. The equipment, type and its operation shall at all times, be subject to the approval of the EIC.

All controlled concrete covered in this contract shall be permitted to be done by equivalent volume batching as against weigh batching as specified above and in the item specifications, subject to checking by weighment for concreting of every 500 cum. of concreting. However, this is the upper limit and EIC may at his discretion check by weighment during any stage of work.

#### **1.5.16 Check Tests for Equipments**

The contractor shall provide standard tests, weights and other auxiliary equipment required for checking the operating performance of each scale or other measuring device and shall make periodic tests over the range of measurement involved in the batching operation.

The test shall be made in the presence of AR of EIC and shall be adequate to prove the accuracy of the device, the frequency of such tests shall be determined by the EIC.

#### **1.5.17 Gauging Water**

The general arrangement for the supply of water for mixing concrete shall be to the satisfaction of the EIC or his AR. The quantity of water to be used in the mix shall be as per water cement ratio determined while designing the mix and according to the degree of moisture in the aggregates. The quantity of water thus determined shall be accurately measured for each separate mixing in a suitable tank provided with means for adjusting the flow of water with gauge clearly marked in liters. Only required quantity of water shall be used for mixing concrete.

#### **1.5.18 Mixing**

Before beginning a run of concrete all head-on concrete and foreign materials shall be removed from inner surface of mixing conveying equipments. All conveyance, buggies, barrows shall be thoroughly cleaned at frequent intervals during place of concrete. Concrete shall thoroughly mixed to uniform consistency in approved type of pan or drum mixer. The use of continuous mixer will not be allowed. If the contractor should find it expedient to use small type of mixers for special or outlying portions of the work rather than to supply from the main batching plant or plants, he may, subject to the approval of the EIC, use smaller approved concrete producing units of the weigh batch type. In such a case the mix shall be adjusted to whole bags of cement and no splitting of bags will be allowed. The time allowed for the mixing shall be as laid down in the relevant IS code or as directed by the EIC.

Normally, hand mixing of concrete shall not be allowed, but where the total quantity of concrete is small the mixing may be done by hand subject to the approval and

entirely at the discretion of the EIC OR his AR. In such a case, an extra 10 % of cement shall be added to the mix without any extra cost. Where permitted, hand mixing of concrete shall be done on a close boarded, even and impervious surface of adequate size. The materials shall be turned over not less than three times dry. A measured quantity of water shall be added while the materials are being turned over not less than three times in wet state and worked together until a mixture of uniform consistency is obtained.

The concrete shall have a consistency such that it will be workable in the required position. It shall be of such consistency that when properly vibrated it will flow around reinforcement, and all embedded parts.

Under normal conditions slumps of not more than 50 mm for R.C.C. and pre-cast R.C.C. units will be insisted upon. However, EIC shall be at liberty to vary the slumps.

#### **1.5.19 Discharge from Mixer**

The concrete shall be discharged from the mixer on to a level, clean, watertight platform or floor and carried in watertight containers. The area surrounding the mixer shall be paved and kept clean.

#### **1.5.20 Transportation of Concrete**

The concrete shall be transported from the mixer to its place in the works as rapidly as possible and in such manner that there shall be no separation or loss of its ingredients. In no circumstance shall more than half an hour elapse between the time water is added to the mix and the time when the concrete is finally compacted in position. No concrete shall be permitted to be used in the works after initial set has taken place. The use of concrete distributing chutes at an angle of more than 45 degree from the horizontal will not be permitted without the sanction of the EIC.

#### **1.5.21 Authorization to pour 106**

Notice for each concrete pour shall be given by contractor to the EIC at least one day in advance. Concreting shall be undertaken only after receiving due authorization from the EIC.

Concrete shall not be started unless the electrical conduits or any other piping wherever required are laid by the concerned agency. The civil contractor shall afford all the facilities and maintain coordination of work with other agencies engaged in electrical and such other works as directed by the EIC.

Before concreting, the contractor shall provide, fabricate and lay in proper position all metal inserts, anchor bolts, pipes etc. (which are required to be embedded in concrete members) as per relevant drawings and direction of EIC.

#### **1.5.22 Deposition of Concrete**

The arrangements for depositing concrete shall be subject to the approval of the EIC. In no case shall concrete be dropped or thrown from a height of more than 1.5 meters. Concreting of beams, slabs and similar members shall be carried out in one continuous operation to the full depth of the member and the sequence of placing shall be arranged as to avoid disturbance of partially set concrete. The concrete shall be deposited as close to its final position as practicable in order to prevent segregation. Freshly laid concrete shall not be wheeled over or otherwise disturbed. When depositing concrete adjacent to the constructional joint special care shall be taken not to disturb the dowels or other reinforcing steel bars projecting from the existing concrete.

### **1.5.23 Compaction of Concrete**

The Contractor shall agitate the placed concrete thoroughly into place by means of a sufficient number of approved needle type mechanical vibrators / surface vibrator of adequate power and having frequency of not less than 6000 impulses per minute. The vibrator shall be allowed to sink freely of its own weight until it enters the previous lift. It shall be withdrawn immediately at the same rate and used at a new location. Concrete once vibrated shall not be vibrated again. The Contractor shall ensure that the concrete is thoroughly worked around the reinforcement and entrained air is expelled and the concrete surface when exposed is found good and free from air packets, honeycombing or other defects. Retampering of concrete, which has partially hardened, shall not be permitted.

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### **1.5.24 Concreting in Inclement Weather**

In the event of rain, storm or any other severe conditions arising, concreting shall be stopped and appropriate temporary top ends, V grooves, etc., placed as may be adequately protected as soon as put into position. The Contractor shall always have in readiness approved framed sheeting, tarpaulin etc. for the protection of newly placed concrete during inclement weather. Should any concrete be damaged due to rainstorms or other weather conditions, the EIC may order the cutting out and replacement of the damaged concrete, all at the expense of the contractor.

### **1.5.25 Concreting Under Water**

Where the concrete is to be deposited under water greatest care shall be taken to prevent the cement being washed out. The concrete may be placed under water using bottom-opening skips or may be continuously fed through a tremie pipe provided with a suitable hopper. Great care shall be taken that no segregation of concrete takes place and the method of placing shall be approved by the EIC who may direct which method is to be used. The tremie concrete for piling works shall be carried out; as per clause no 14.2.4 of IS 456:2000

### **1.5.26 Curing**

Curing of concrete shall be in accordance with IS: 456. Concrete shall be cured by keeping it moist for the period of time specified herein to ensure that complete hydration and hardening takes place. All concrete shall be cured by use of water, which shall be continuously (not periodically) maintained on all exposed surfaces. Curing shall be assured by use of an ample water supply under pressure in pipes, with all necessary appliances of hose, sprinklers and spraying devices. Continuous fine-mist spraying or sprinkling shall be used unless otherwise specified or approved by the EIC. Wherever, in the judgment of the EIC it may be necessary, the continuous spray method may be omitted and a covering of sand or other approved material such as burlap which will hold moisture for long periods and prevent loss of moisture from the concrete shall be used. Type of covering, which would stain, disfigure, or damage the concrete during and after the curing period, will not be approved. Approved covering shall be kept continuously wet during the specified curing period. Concrete shall be maintained in moist condition for at least the first 7 days after placing except that high early strength concrete shall be so maintained for at least the first 3 days. Other curing period may be used with the permission of the EIC, if the specified strengths are obtained.

The contractor shall have all equipment and materials required for curing on hand and ready to use before concrete is placed. For curing of concrete in pavements, sidewalls, floors, flat roofs or other level surfaces the pounding method of curing is

preferred. The method of containing of containing pounded water shall be approved by the EIC. Special attention shall be given to edges and corners of the slabs to ensure complete and proper protection to these areas. The pounded area shall be kept continuously filled with water and shall be promptly repaired.

Curing of concrete shall start after 8 hours of placement and in hot weather within 4 hours of placement for exposed faces. During the first 24 hours, the concrete shall be cured by use of wet burlap or such other means to cover the concrete surfaces. In very hot weather precaution shall be taken to see that the temperature of wet concrete does not exceed 38 degree C while placing.

Newly placed concrete shall be protected by approved means from rain, sun and wind. Concrete placed below the ground level shall be protected from falling earth during and after placing, surface shall be kept free from with such ground or with water draining from such ground during placing of concrete and for a period of at least 3 days unless otherwise directed by EIC. The ground water around newly poured concrete shall be kept to an approved level by pumping or other approved means of drainage and adequate steps shall be taken to prevent floatation and flooding. Steps shall be taken to protect immature concrete from damage by debris, loading, vibration, abrasion, mixing with deleterious materials that may in the opinion of the EIC impair the strength and / or durability of the concrete.

Approved curing compound may be used in lieu of moist curing with the permission of EIC. Such compounds shall be applied to all exposed surfaces of the concrete as soon as possible after the concrete has set.

Besides, seawater /saline water, hard and bitter water shall not be used for curing. Potable water will generally found suitable for curing mortar or concrete.

#### **1.5.27 Concrete Below Specified Strength**

Should the test cubes fail to meet the minimum specified crushing strength for each class of concrete; the EIC may take one of the following decisions:

- Instruct the contractor to carry out such additional tests and / or works to ensure the soundness of the structure at the contractor's expense.
- The EIC may accept the work. Any decision to accept the work shall be entirely at the discretion of the EIC who may make a reduction in the rate of the appropriate item.
- Reject the work and instruct that the Section of the works to which the failed cubes relate to be cut out and replaced at the Contractor's expense.

#### **1.5.28 Faulty Work**

Care will be taken that no shock or vibrations reach the concrete during the process of setting and preliminary hardening. Concrete defective from any cause whatsoever shall if so directed by the EIC be cut out and the work reconstructed at the contractor's cost. Concrete thus cut out shall not be used again. If before or after or during cutting operations, any reinforcement bars are exposed, the cutting out shall continue right round the bars to form a key. Where reinforcement bars exposed, care will be taken to ensure that they are not damaged by the tools used for cutting out the concrete. Reconstruction or repairs to faulty work shall be done with contractor's own expense only with the permission of EIC and in such a manner as he shall direct or approve.

### **G- 1.6 SHUTTERING**

#### **1.6.1 General**

The contractor and relevant drawings together with calculations for strength shall

design all shuttering and supports included under the contract and deflection shall be submitted to the EIC for approval before commencement of the work.

#### **1.6.2 Fixing**

Form shall be true to shape, lines and dimensions of the concrete work as shown on the drawing. The contractor shall fix all the formwork in perfect alignment. The formwork shall be securely braced so as to be able to withstand, without appreciable displacement, deflection or movement of any kind, the weight of the construction or movement of persons material and plant. All the joints should be water tight to prevent leakage of cement slurry from the concrete. Wedges and clamps are to be used wherever practicable.

#### **1.6.3 Removing**

Forms or shutters shall not be disturbed until the concrete has sufficiently hardened. The proper time should be determined by the EIC.

#### **1.6.4 Wrought Shuttering**

Wrought shuttering shall be such as to produce a first class fair on the concrete and free from board marks or any other disfigurements and shall be used for exposed surface where specified or directed by the EIC. Wrought shuttering is to be aligned within a tolerance of 3 mm.

#### **1.6.5 Special Provision**

Wherever the concreting of narrow members is required to be carried out within shutters of considerable depth, temporary opening in the sides of the shutters shall, if so directed by the EIC, be provided to facilitate the pouring and consolidation of the concrete. Small temporary openings shall be provided as necessary at the bottom of shutters of columns, walls and deep beams to permit the expulsions of rubbish etc. All arises and return to beam, columns and slabs shall unless otherwise shown on the drawings be provided with chamfers of 20 x 20 mm or as directed by the EIC.

#### **1.6.6 Preparation of Concreting**

Before concreting is commenced shuttering and centering shall be carefully examined and the space to be occupied by the thoroughly cleaned out. The inside of shutters shall be treated with a coating of an approved substance to obviate adhesion and, where necessary to prevent absorption from the concrete, the shutters shall be thoroughly wetted shortly before concreting is commenced.

#### **1.6.7 Contractor's Responsibility**

The contractor at his own expense shall make any damage resulting from premature removal of shutters or from any other cause good

### **G-1.7 WELDING OF REINFORCEMENT**

#### **1.7.1 Standards**

Normally welding of reinforcement will not be permitted. Only when permitted in exceptional circumstances, welding of reinforcement shall be carried out in accordance with IS:2751 for mild steel bars and IS:9417 for TMT steel bars.

#### **1.7.2 Inspection of Welds**

All welding shall be subject to inspection and testing as specified by the EIC.

### **1.7.3 Electrodes**

Electrodes for metal arc welding of mild steel shall be of best heavy coated type and shall be in accordance with IS: 814 " Covered Electrodes for Metal Arc Welding of Structural Steel". Welding of reinforcement shall not be permitted except in exceptional cases.

### **1.7.4 Butt Welding of Reinforcement**

Butt welding of reinforcement steel bars shall only be used where specified or shown on the drawings unless permission in writing has previously been given by the EIC. Where butt-welding is carried out, the ends of the bars shall be prepared with single 45 degree V and a backing plate shall be used. The minimum root face will be one quarter of the bar diameter.

## **G-1.8 REINFORCED CONCRETE**

### **1.8.1 General**

The following clauses shall be read in conjunction with the section pertaining to concrete. All RCC works shall comply with IS: 456.

### **1.8.2 Bar Bending Schedule**

Bar bending schedule will be prepared by the contractor as per IS:2502 and shall be submitted to the EIC in triplicate for approval at least two weeks before the bars are to be bent. The EIC will check and return one copy for the contractor's use, with amendments if any. The cost of preparing schedules will be deemed to be included in the rates for reinforcement in the Schedule of Quantities. Any approval given by the EIC shall, in no case, relieve the contractor from being responsible for the accuracy and correctness of bar bending schedule.

### **1.8.3 Bending Reinforcement**

Bends, cracks or other labour on reinforcement shall be carefully formed in exact accordance with the drawing or bar bending schedule; otherwise all bars shall be truly straight. Bends shall be made cold round a former having a diameter four times the diameter of the bars. Stirrups and binding shall be bent to the radius of the bars against they are to be bent. Bending shall be in accordance with IS: 2502 "Code of Practice for Bending and Fixing of Bars for Concrete Reinforcement". Heating of bars will not be allowed. Bars incorrectly bent shall be used only if means for straightening and rebinding have been approved by the EIC. No reinforcing bar shall be bent when in position without the EIC's approval whether or not it is partly embedded in hard concrete.

### **1.8.4 Binding Wire**

All bars shall be bound tightly together, where they cross, with black annealed steel wire of 1.5 mm in diameter. The free ends binding wire shall be bent inwards.

### **1.8.5 Placing Fixing**

The number, size and form of all reinforcement shall be in exact accordance with the drawings. The reinforcement shall be placed, fixed and maintained in the forms within a tolerance of 5mm during the placing and compaction of the concrete. Horizontal bars shall be suspended or supported with concrete blocks to prevent from sagging. Such spacer blocks shall have no dimensions exceeding 50mm and shall be pre cast from concrete of the same class as the concrete in which they are to be embedded except that the largest size of aggregate shall be 10mm. Each block shall

be cured for 10 days or more. Each block shall be secured to the reinforcement with wire or spring clip embedded on the center of the block so that it shall not be in contact with the shuttering or subsequently cause rust marks on the concrete. Where necessary, spacer bars, supporting stools and distance pieces shall be supplied and fixed by the contractor to maintain the reinforcement rigidly in the correct position and to the satisfaction of the EIC. Any ties or stirrups connecting the bars shall be taut so that the bars properly braced, inside of their curved parts in actual contact with the bars round which they are intended to fit. The cost of providing tying wire as well as stools and chairs and concrete blocks shall be deemed to be covered in the reinforcing steel.

#### **1.8.6 Splicing Reinforcement**

Where splicing and / or overlapping in reinforcement are required, the bars shall be provided with such splices or overlaps as are shown on the drawings are directed by the EIC.

#### **1.8.7 Cover to Reinforcement**

Minimum cover to reinforcement shall be equal to that specified or shown on the drawings. Where two bars cross ~~the~~ <sup>the</sup> outer one shall have the minimum cover.

#### **1.8.8 Reinforcement to be cleaned**

All steel reinforcement before the concrete is deposited shall be cleaned, free from dust, loose, scales, oil rust, grease or any other deleterious materials. Particular care shall be taken to avoid contamination of reinforcement with mould oil.

#### **1.8.9 Depositing concrete**

No concrete shall be deposited until all concrete and reinforcement have been inspected and approved by EIC. There shall be in attendance on each concreting gang a competent steel fixer who shall ensure that the reinforcement and other embedded fittings are kept in position during placing and compacting of the concrete.

### **G- 1.9 FABRICATION OF STEEL WORK**

The contractor shall prepare detailed drawings giving complete information necessary for the fabrication of the structures. All information should be clearly given and the drawings shall be in conformity with the best modern practice. A marking diagram allotting distinct identification marks to each separate piece of steel work shall be prepared in sufficient detail to ensure convenient assembly and erection. A symbol for welding used on the drawings shall be in accordance with IS: 813 "Scheme of symbols for welding".

The contractor shall prepare comprehensive bill of material sheets for each shop drawing giving therein all the items shown on the drawings together with their weight, mark numbers, cutting length etc.

Four copies of all working drawings and bill of material sheets shall be submitted for the EIC's approval. Fabrication shall not commence until approval of the relevant drawings has been obtained from the EIC. While the shop drawings prepared by the contractor and approved by the EIC are deemed to represent the correct interpretation of the work to be done, the contractor is not relieved of the responsibility for accuracy of detailed dimensions own therein.

All fabrication shall be in accordance with IS: 800 "Code of Practice for use of

structural Steel in General Building Construction".

#### **G-1.10 WELDING**

Metal arc process shall be used for welding in all cases, unless otherwise specified by the EIC. The welding procedure shall be in accordance with the requirements of IS: 816 "Code of Practice for the use of Metal Arc Welding for General Construction in Mild Steel". The symbols of welding as shown on the drawing shall be interpreted in accordance with IS:813.

Electrodes used for hand welding or for automatic welding machine shall conform to IS: 814 "Covered Electrodes for Metal Arc welding of Structural Steel".

All main butt welds shall be full penetration butt welds, unless otherwise specified. The ends of the welds shall have full throat thickness.

#### **G-1.11 SPECIAL FEATURES-CONCRETE**

##### **11.1 Anchor Bolts, Bollards & Miscellaneous steel set in Concrete.**

Wherever possible, anchor bolts or anchor bolt-fixing sockets, bollards, mooring rings, etc. and other item shall be set in from before concrete is poured.

All anchor bolts or bolt fixing sockets shall be provided with suitable nuts and washers, whether has been expressly specified in the Bill of Quantities or not.

The location and projection of anchor bolts, bollard, etc. and miscellaneous steel shall be checked by the Contractor.

Immediately before the concrete is poured and again when concrete has set sufficiently to permit access, the threaded projected part of the anchor bolt

shall be projected by means of grease wrapped clean rag.

All items, which have been displaced while pouring concrete, shall be removed and replaced at Contractor's expense and to the satisfaction of the EIC.

## **SPECIFICATIONS FOR READY MIX CONCRETE**

### **1. Batching of Concrete ingredients :**

For all structural concreting, only Ready Mixed Concrete (RMC) manufactured at site is mandatory, weigh batching plant or obtained from approved R.M.C. supplying agencies or produced at site using fully automatic mechanical mixers and weigh batchers shall be used. Feeding of all ingredients shall be done mechanically and manual feeding shall not be allowed. The R.M.C. supplying agency will supply mix design details in advance before start of delivery. All charges in this regard shall be paid by the agency.

### **2. Transporting, placing, compacting, finishing and curing :**

Transporting, placing, compacting, finishing and curing of concrete shall be in accordance with IS:456-2000.

#### **2.1 Transporting:**

For all RMC concreting, the concrete after discharge from batching plant will be loaded in transit mixers and kept continuously agitated while mix is in transit. At destination the mix will be unloaded in to the hoppers of concrete pump. For site made concrete suitable prescribed methods shall be adopted.

#### **Placing:**

The concrete produced in RMC plant/batching plant, when discharged from transit mixer in pump hopper shall be kept continuously agitated and pumped to destination placing point. Site made concrete shall be placed by approved method of placing. The

height of any single lift of concrete shall not exceed 1.5 m for walls and 2.0 m for columns. For columns where the height of pour is more than 2.0 m, suitable arrangement in formwork should be made.

So that the vertical drop of concrete is restricted to less than 2.0 m. Any such arrangement should be approved from the Engineer In Charge in advance before execution.

High velocity discharge of concrete causing segregation of mix shall be avoided. The concrete shall be placed in the forms gently and not dropped from the height exceeding 1.5 m except in columns where the maximum allowed will be 2.0 m. Each batch of concrete will be placed in layer. Each layer of concrete shall be compacted fully before the succeeding layer is placed and separate batches shall be placed and fully compacted before the layer immediately below has taken initial set. The layers should be sufficiently shallow, to permit stitching of two layers together by vibration.

Concreting of any portion or section of the work shall be carried out in one continuous operation and no interruption of concreting work will be allowed without approval of the Engineer In Charge.

Plain concrete in foundations shall be placed, in direct contact, with the bottom of excavation, the concrete being deposited in such a manner, as not to get mixed with the earth. The concrete placed below the ground level shall be protected from falling earth during and after placing. Concrete placed in ground containing deleterious substances, shall be kept free from contact, with such ground and with water draining there from during placing and for a period of 7 days or otherwise instructed thereafter. Approved means shall be taken to protect immature concrete from damage by debris, excessive loading, abrasion, vibrations, deleterious ground water, mixing with earth and other materials and other influences, that may impair strength and durability of concrete.

Before starting of work contractor will get the concrete pouring programme and its sequence approved by Engineer In Charge to avoid cold joints.

### **Compaction:**

External, Internal (needle) and surface (screed board) vibrators of approved make shall be used for compaction of concrete

(a) External/internal vibrators shall be used for compaction of concrete in foundations, columns etc. For sections such as slabs, the concrete shall be compacted by external, internal and surface type vibrators, depending on the thickness of layer to be compacted. 25mm, 40mm and 60mm dia. internal vibrators may be used. The concrete shall be compacted by use of appropriate diameter vibrator by holding the vibrator in position until:

- (i) Air bubbles cease to come to surface
- (ii) Resumption of steady frequency of vibrator after short period of dropping the frequency, when the vibrator is first inserted.
- (iii) The tone of the vibrator becomes uniform
- (iv) Flattened, glistening surface, with coarse aggregates particles blended into it, appears on the surface.

After the compaction is completed, the vibrator should be withdrawn slowly from

concrete so that concrete can flow in to the space previously occupied by the vibrator. To avoid segregation during vibration, the vibrator shall not be dragged through the concrete nor used to spread the concrete. The vibrator shall be made to penetrate into layer of fresh concrete below if any, for a depth about 150mm. The vibrator shall be made to operate at regular pattern of spacing. The effective radii of action will overlap, approximately half a radius to ensure complete compaction.

(v) To secure even and dense surfaces free from aggregate pockets, vibration shall be supplemented by tamping or rodding by hand in the corners of forms and along the form surfaces while the concrete is plastic.

(vi) A sufficient number of spare vibrators shall be kept readily accessible to the place of deposition of concrete to assure adequate vibration in case of breakdown of those in use. 25mm diameter immersion vibrators shall be used in thin sections upto 125mm, 40mm diameter immersion vibrators in fairly wide sections like beams, slabs, columns etc. and 60mm diameter vibrators in foundations, pile caps or such large section members. Screed vibrators shall also be used for slab concreting.

vii) Plain concrete also shall be vibrated whenever and wherever directed by EIC to achieve full compaction, using needle and screed vibrators as necessary.

## **2.4 Curing:**

2.4 Curing shall be started at the earliest by spreading wet jute cloth (hessian) and cover top with impervious sheet and subsequently cured with spraying water. In inaccessible area to start with, curing be started by spraying curing compound before starting membrane curing.

## **3. Placing temperatures:**

During extreme hot weather, the concreting shall be done as per procedures set out in IS:7861, Parts I & II.

Fine and coarse aggregates for concreting shall be kept shaded and the concrete aggregates sprinkled with water for a sufficient time before concreting, in order to ensure that the temperature of these ingredients is as low as possible prior to batching. The mixer and batching equipment shall be also shaded and if necessary painted white in order to keep their temperatures as low as possible. The placing temperature of concrete shall be as low as possible in warm weather and care shall be taken to protect freshly placed concrete from overheating by sunlight in the first few hours of its laying. The time of day selected for concreting shall also be chosen so as to minimize placing temperatures. In case of concreting in exceptionally hot weather the Engineer In Charge may in his discretion specify the use of ice either flaked and used directly in the mix, or blocks, used for chilling the mixing water. In either case no extra payment shall be made to the contractor on this account.

## **4. Construction joints:**

Construction joints in all concrete work shall be made as directed by the Engineer in Charge. Where vertical joints are required, these shall be shuttered as directed and not allowed to take the natural slope of the concrete.

Before fresh concrete is placed against a vertical joint, the old concrete shall be chipped/sand blasted, cleaned and moistened 25 hours before placing the concrete.

All standing water should be removed and dried with compressed air. Neat cement slurry shall be applied on the chipped/sand blasted surface and mortar of the same water cement ratio as the concrete and 10mm thick applied. Where required suitable expansion joints shall also be provided as directed by the Engineer In Charge.

The time of day selected for concreting shall also be chosen so as to minimize placing temperatures. In case of concreting in exceptionally hot weather the Engineer In Charge may in his discretion specify the use of ice either flaked and used directly in the mix or blocks used for chilling the mixing water. In either case the cost of ice either flaked and used directly in the mix or blocks used for chilling the mixing water. In either case the cost of ice and additional labour involved in weighing and mixing etc. shall be borne by the contractor and nothing will be paid on this account.

#### **5. Defective Concrete:**

Should any concrete be found honeycombed or in any way defective, such concrete shall on the instruction of the Engineer In Charge be cut out by the Contractor and made good at his own expenses.

#### **6. Exposed Faces, Holes and Fixtures:**

On no account shall concrete surfaces be patched or covered up or damaged concrete rectified or replaced until the Engineer In Charge or his representative has inspected the works and issued written instructions for rectification. Failure to observe this procedure will render that portion of the works liable to rejection; in which case it will be treated as a work which has failed to meet specified strength requirements and dealt with according to Clause 1.11.

Holes for foundation or other bolts or for any other purposes shall be moulded, and steel angles, holdfasts or other fixtures shall be embedded, according to the drawing or as instructed by the Engineer In Charge.

#### **7. Cracks:**

7.1 If cracks develop in concrete construction which in the opinion of the Engineer In Charge may be detrimental to the strength of the construction, the contractor at his own expense shall test the slab or other construction as specified in Special Conditions. If under such test loads the cracks develop further, the Contractor shall dismantle the construction, carry away the debris, replace the construction and carry out all consequential work thereto, without any extra payment.

7.2 If any cracks develop in the concrete construction, which in the opinion of the Engineer In Charge, are not detrimental to the strength of the construction, the contractor at his own expense shall grout the cracks with polymer cement grout of approved quality at his own expense and risk and shall make good to the satisfaction of the Engineer In Charge the surface finish which in the opinion of the Engineer In Charge has suffered damage either in appearance or stability owing to such cracks. The Engineer In Charge's decision as to the extent of the liability of the Contractor in the above matter shall be final and binding.

#### **8. Finishes:**

Unless otherwise instructed the face of exposed concrete placed against formwork shall be rubbed down immediately on removal of the formwork to remove

irregularities. The face of concrete for which formwork is not provided other than slabs shall be smoothed with a float to give a finish equal to that of the rubbed down face, where formwork is provided. The top face of a slab which is not intended to be covered with other materials shall be leveled and floated to a smooth finish at the levels or falls shown on the drawings or as directed. The floating shall be done so as not to bring an excess of mortar to the surface of the concrete. The top face of a slab intended to be surfaced with other materials shall be left with a spaded finish. Face of concrete intended to be plastered shall be roughened by approved means to form a key.

When at site, concrete cube testing machine is used 10% of the cubes should be tested at independent recognized laboratories approved by Engineer In Charge at their cost.

#### **9. Scope of work & item to include:**

1. The item refers to ready mix concrete required for R.C.C./P.C.C. works as mentioned in item description under Price-Bid procured from reputed manufacturer approved by Engineer In Charge. The relevant materials to be used in RMC shall conform to as per provisions of chapter 7 of this tender (Standard Specifications of PWD, Vol-I)

2. The item includes manufacturer with ingredients, control temperature, transportation, pumping, placing, vibration and curing of Ready Mix Concrete and all taxes, excise duty, sales tax, octroi, insurance etc, levied by Govt./Semi-Govt./local authority and cost of ready mix concrete and any penalty, additional charges for controlling temperature up to casting or any other charges levied by the manufacturer.

3. Proportioning of the mix/mix design shall be decided by the contractor/RMC manufacturer to achieve strength specified in item and shall be got approved by Engineer in Charge. The proportioning of ingredients, use of ingredients and mix design parameters for various slumps shall be got approved by Engineer in Charge prior to mix design.

4. Scaffolding shall conform to relevant Indian standards and got approved by the Engineer in Charge.

5. Forms shall conform to specifications as per respective item.

6. The concrete shall be pumped to the final positions as quickly as possible by methods which will prevent segregation and loss of ingredients.

7. The concrete shall be placed into its final position, compacted and finished within 30 minutes of mixing the water and before initial setting commences. The method of placing shall be such as to avoid segregation. Placing shall be done in a balanced manner to avoid eccentric loads on the form work. As far as possible the concreting shall be done continuously and construction joints avoided.

If the area to be concreted is under water, the water shall be removed by bailing out or using pumps and other devices.

8. Compaction shall be done by mechanical vibrators and also by rods so that a dense concrete is obtained.

9. The concrete shall be adequately cured.

10. Immediately after the removal of forms, any undulations, depressions, cavities, honey combing broken edges or corners height spots defects shall be made good and finished with cement mortar 1:2. But necessity of such finishing must be exceptional and the total not exceed 1% on an average.

11. Concrete which is partially hardened shall not be tempered or re-mixed but shall be disposed off as desirable.

12. Sampling and testing shall be done as per 1.S.456 (latest version).

13. All labour, materials use of equipment, tools and plant, installing and removal of scaffolding, false work and forms and branching necessary for the satisfactory completion of item,

14. Compensation for injury to persons and damage to work or property.

15. Establishment of site laboratory.

### **10. Testing:**

Cubes of 15 cm x 15 cm x 15 cm size shall be cast on the first day and tested for compression at 7 and 28 days. Later on, if the Engineer in Charge so directs, 6 cubes shall be tested for every 50 cubic meters or part thereof of the concrete casted.

### **11. Measurement:**

Concrete and reinforcement shall be paid separately unless otherwise specified. The contract rate shall be for a unit of one cubic meter of concrete. The concrete shall be measured for its length, breadth and depth Limiting dimensions to those specified on the drawings or as ordered by the Engineer in Charge. The volume of concrete measured shall include that occupied by Reinforcement and other metal sections.

11.1 In order to exercise the required degree of constant control over the concrete materials and their proportions, the contractor shall set up and maintain at his own expense a testing laboratory at site. He shall provide all apparatus required for sensitive testing of concrete and concrete materials. In particular he must have the following equipment set up in the site laboratory.

- (i) A set of Standard Sieves.
- (ii) Sieve shaker
- (iii) Measuring Cylinders
- (iv) Slump cones
- (v) Adequate number of Standard moulds
- (vi) Weighing balance
- (vii) Curing tank for cubes

Any other apparatus deemed necessary by the Engineer in Charge for proper control shall be provided by the Contractor at his own expense. The laboratory shall be staffed by qualified technicians.

When at site, concrete cube testing machine is used 10% of the cubes should be tested in GERI/Government laboratory or approved by Engineer In Charge at contractor's cost.

### **12. Ready-Mixed Concrete and Pumping Concrete**

12.1 Ready-mixed concrete may be manufactured in a central automatic weight Batching plant and transported to the job in agitating transit mixer.

The maximum size of coarse aggregate shall be limited to one-third of the smallest inside diameter of the hose or pipes used for pumping. Provision shall be made for elimination of over-sized particles by screening or by careful selection of aggregates. To obtain proper gradation it may be necessary to combine and blend certain fractional sizes to aggregates. Uniformity of gradation throughout the entire job shall be maintained.

The quantity of coarse aggregate shall be such that the concrete can be pumped, compacted and finished without difficulty.

#### **12.2 Fine aggregates:**

The gradation of fine aggregate shall be such that 15 to 30 percent should pass the 0.30 mm screen and 5 to 10 percent should pass 0.15mm screen so as to obtain a pumpable concrete. Sands that are deficient in either of these two sizes should be blended with selected finer sands to produce these desired percentages. With this gradation, sands having a fineness modulus between 2.4 and 2.8 are generally satisfactory. However, for uniformity, the fineness modulus of the sand should not vary more than 0.2 from the average value used in proportioning.

#### **12.3 Water, Admixtures and slump:**

The amount of water required for proper concrete consistency shall take into account the rate of mixing, length of haul, time of unloading and ambient temperature conditions.

Additions of water to compensate for slump loss should not be resorted to nor should the design maximum water-cement ratio be exceeded. Additional dose of retarder/plasticizer/superplasticizer shall be used with prior approval of Engineer In Charge to compensate the loss of setting time and slump at contractor's cost. Retempering water shall not be allowed to be added to mixed batches to obtain desired slump.

#### **12.4 Transportation:**

The method of transportation used should efficiently deliver the concrete to the point of placement without significantly altering its desired properties with regard to water-cement ratio, slump, and homogeneity.

The revolving-drum truck bodies of approved make shall be used for transporting the concrete. The number of revolutions at mixing speed, during transportation, and prior to discharge shall be specified and agreed upon. Reliable counters shall be used on revolving-drum truck units. Standard mixer uniformity tests, conforming to ASTM standards C 94-69 "Standard Specifications for Ready Mix Concrete", shall be carried out if desired by Engineer In Charge to determine whether mixing is being accomplished satisfactorily.

#### **12.5 Pumping of concrete:**

Only approved pumping equipment, in good working condition, shall be used for

pumping of concrete. Concrete shall be pumped through a combination of rigid pipe and heavy-duty flexible hose of approved size and make. The couplings used to connect both rigid and flexible pipe sections shall be adequate in strength to withstand handling loads during erection of pipe system, misalignment, and poor support along the lines. They should be nominally rated for at least 3.5 Mpa pressure and greater for rising runs over 30 m. Couplings should be designed to allow replacement of any section without moving other pipe sections, and should provide full cross section with no construction or crevices to disrupt and smooth flow of concrete.

All necessary accessories such as curved sections of rigid pipe, swivel joints and rotary distributors, pin and gate valves to prevent backflow in the pipe line, switch valves to direct the flow into another pipe line, connection devices to fill forms from the bottom up, extra strong couplings for vertical runs, transitions for connecting different sizes of pipe, air vent for downhill pumping, clean-out equipment etc. shall be provided as and where required. Suitable power controlled booms or specialized crane shall be used for supporting the pipe line.

#### **12.6 Field control:**

Sampling at both truck discharge and point of final placement shall be employed to determine if any changes in the slump and other significant mix characteristics occur. However, for determining strength of concrete, cubes shall be taken from the placement end of line. The RMC supplier should nominate a technically qualified representative at site for sampling, testing and placing of concrete or Contractor shall arrange his Technical personal.

#### **13. Planning:**

Proper planning of concrete supply, pump locations, line layout, placing sequence and the entire pumping operation shall be made. The concrete production, transportation and placing shall be planned in such a manner that duration between addition of water during mixing and placing of concrete in desired location is well within time limits prescribed by the RMC manufacturer, however, this is subjected to fulfillment of slump and other properties of concrete as specified in tender. On failure to adhere to the time schedule by the supplier the Engineer In Charge may reject the concrete.

The pump wherever used should be as near the placing area as practicable, and the entire surrounding area shall have adequate bearing strength to support concrete delivery pipes. Lines from pump to the placing area should be laid out with a minimum of bends. For large placing areas alternate lines should be installed for rapid connection when required. Standby power and pumping equipment should be provided to replace initial equipment, should breakdown occur.

The placing rate should be estimated so that concrete can be ordered at an appropriate delivery rate.

As a final check, the pump should be started and operated without concrete to be certain that all moving parts are operating properly. A grout mortar should be pumped in to the lines to provide lubrication for the concrete, but this mortar shall not be used in the placement.

When the form is nearly full and there is enough concrete in the line to complete the placement, the pump shall be stopped and a go-devil inserted and shall be forced through the line by water under pressure to clean it out. The go-devil should be stopped at a safe distance from the end of the line so that the water in the line will not spill into the placement area. At the end of placing operation, the line shall be cleaned in the reverse direction.

#### **SUBMISSION OF DOCUMENTS FOR RMC**

Following document shall be submitted by the contractor to Gujarat Maritime Board along with checklist for RMC specified in the tender document.

1. Design Mix
2. Manufacturer's Test Certificate for cement and plasticizer
3. Lab test certificates for all ingredient of concrete
4. Delivery docket sheet mentioning the grade of concrete, quality of ingredient used, slump, transit mixer vehicle no. placement, location, time of concrete production and placing etc.

#### **14.Reinforcement:**

Relevant specifications of Item no 19 to 19 C of Item specification shall be Followed.

#### **15. Formwork**

Relevant specifications in Item specification shall be followed.

##### **15.1 Definition:**

The term "Formwork" or "Shuttering" shall include all forms, moulds, sheeting, shuttering planks, walers, poles, posts, shores, struts and strutting, ties, uprights, wallings, steel rods, bolts, wedges and all other temporary supports to the concrete during the process of setting. In this work for all corresponding items, form work only with sheeting of steel sheets is to be used so as to give a fair finish as described in following para no 15.4.1.General details for formwork are as follows.

##### **15.2 Materials**

15.2.1 All facing formwork to come in contact with concrete in different elements of the structure shall be of such material and size as specified on drawings or as instructed by the Engineer in Charge.

15.2.2 Timber facing formwork to come in contact with concrete for "Exposed Concrete Surfaces" shall consist of lab-jointed or tongue and grooved planks as directed by the Engineer in Charge and no joints shall permit leakage of mortar at all from cast-in-situ concrete.

15.2.3 The materials for other backing and supporting formwork and their sizes shall be selected by the contractor and shall be subject to the approval of the Engineer in Charge.

##### **15.3 Design:**

The formwork shall be designed and constructed so that the concrete can be properly

placed and thoroughly compacted to obtain the required shape, position and level subject to specified tolerances. It is the responsibility of the contractor to obtain the results required by the Engineer In Charge, whether or not some of the work is sub-contracted. Approval of the proposed formwork by the Engineer In Charge will not diminish the Contractors responsibility for the satisfactory performance of the formwork, nor for the safety and co-ordination of all operations.

#### **15.4 Formwork for Exposed Concrete Surfaces:**

The facing formwork, unless indicated otherwise on drawings, or specifically approved by the Engineer in Charge in writing, shall generally be made with materials not less than the thickness mentioned below for different elements of the structure.

15.4.1 Plain slab soffits, and sides of beams, girders, joists and ribs and side of walls, fins, parapets, pardis, sub-breakers etc. shall be made with:

a) Steel plates not less than 3mm thick of specified sizes stiffened with a suitable structural frame work, fabricated true to plane with a tolerance of +/- 2mm within the plate.

b) Plywood plates not less than 12mm thick (IS:4990-Specification for plywood for Concrete Shuttering Work) or 3mm thick with a 20mm timber plank backing, of specified sizes stiffened with a suitable timber framework.

15.4.2 Bottom of beams, girders and ribs, sides of columns shall be made with:

a) Steel plates not less than 5mm thick of specified size stiffened with a suitable structural frame, fabricated true to plane with a tolerance of +/- 2 mm within the plate.

b) Timber planks of 35mm actual thickness and of specified surface finish, width and reasonable length.

c) Plywood plates not less than 12mm thick, of specified sizes stiffened with a suitable timber framework.

#### **15.5 Erection of Formwork:**

The following shall apply to all formwork:

15.5.1 To avoid delay and possible erection of the formwork, the Contractor shall obtain sufficiently in advance, the approval of the Engineer In Charge for the design of forms and the type of materials used before fabricating the forms.

15.5.2 All shutter planks and plates shall be adequately backed to the satisfaction of the Engineer In Charge by a sufficient number and size of walers or framework to ensure rigidity during concreting. All shutters shall be adequately struted, braced and propped to the satisfaction of the Engineer In Charge to prevent deflection under deadweight of concrete and superimposed live load of workmen, materials and plant, and to withstand vibration. No joints in proper shall be allowed.

15.6 Vertical props shall be supported on wedges or other measures shall be taken where the props can be gently lowered vertically during removal of the formwork. Props for an upper story shall be placed directly over those in the storey immediately

below, and the lower props shall bear on a sufficiently strong area.

1) Care shall be taken that all formwork is set plumb and true to line and level or camber or batter where required and as specified by the Engineer In Charge.

2) Provisions shall be made for adjustment of supporting struts where necessary. When reinforcement passes through the formwork care should be taken to ensure close fitting joints against the steel bars so as to avoid loss of fines during the compaction of concrete.

3) If the formwork is held together by bolts or wires, these shall be so fixed that no iron will be exposed on surface against which concrete is to be laid. In any case wires shall not be used with exposed concrete formwork. The Engineer in Charge may at his discretion allow the Contractor to use tie-bolts running through the concrete and the Contractor shall decide the location and size of such tie-bolts in consultation with the Engineer In Charge.

Holes Left in the concrete by these tie-bolts shall be filled as specified by the Engineer in Charge at no extra cost.

4) Formwork shall be so arranged as to permit removal of forms without jarring the Concrete. Wedges, clamps and bolts shall be used wherever practicable instead of nails.

The formwork for beams and slabs shall be so erected so that forms on the sides of the beams and the soffit of slabs can be removed without disturbing the beam bottoms or props under beams.

5) Surface of forms in contact with concrete shall be oiled with a mould oil of approved quality or clean diesel oil. If required by the Engineer in Charge the contractor shall execute different parts of the work with different mould oils to enable the Engineer In Charge to select the most suitable. The use of oil which results in blemishes of the surface of the concrete shall not be allowed. Oil shall be applied before reinforcement has been placed and care shall be taken that no oil comes in contact with the reinforcement while it is being placed in position. The formwork shall be kept thoroughly wet during concreting and for all the whole time that it is left in place.

6) Immediately before concreting is commenced, the formwork shall be carefully examined to ensure that following:

a) Removal of all dirt, shavings, sawdust and other refuse by brushing and washing

b) The tightness of joints between panels of sheathing and between these and any hardened core.

c) The correct location of tie bars, bracing and spacers, and especially connection or bracing.

d) That all wedges are secured and firm in position.

e) That provision is made for traffic on formwork not to bear directly on reinforcing steel.

7) Formwork shall be continuously watched during the process of concreting. If during concreting any weakness develops and formwork shows any distress the work shall be stopped and remedial action shall be taken.

### **15.7 Exposed Concrete Work:**

Exposed concrete surfaces shall be smooth and even originally as stripped without any finishing or rendering. Where directed by the Engineer In Charge, the surface shall be rubbed with carborundum stone immediately on striking the forms. The Contractor shall exercise special care and supervision of formwork and concreting to ensure that the cast members are made true to their sizes, shapes and positions and to produce the surface patterns desired. No honeycombing shall be allowed. Honeycombed parts of the concrete shall be removed by the Contractor as directed by the Engineer In Charge and fresh concrete placed without extra cost, as instructed by the Engineer In Charge. All materials, sizes and layout of formwork including the locations for their joints shall have prior approval of the Engineer In Charge or the Architect.

**Camber:** Forms and falsework shall be generally cambered as indicated in the drawings or as instructed by the Engineer In Charge. However, for beams up to 5m span and slabs up to 4m span camber is not normally required to be provided.

### **15.8 Tolerances**

In accordance with IS:456 2000 and MORT & H section 1500.

**15.9 Age of Concrete at Removal of Formwork:** In accordance with IS:456 2000 and MORT & H section 1500. The Engineer In Charge may vary the periods specified in IS: 456-2000 if he considers it necessary. Immediately after the forms are removed, they shall be cleaned with a jet of water and a soft brush.

### **15.10 Stripping of Formwork**

Formwork shall be removed carefully without jarring the concrete, and curing of the concrete shall be commenced immediately. Concrete surfaces to be exposed shall, where required by the Engineer In Charge, be rubbed down with carborundum stone to obtain a smooth and even finish. Where the concrete requires plastering or other finish later the concrete surface shall be immediately hacked lightly all over as directed by the Engineer In Charge. No extra charge will be allowed to the Contractor for such work on concrete surfaces after removal of forms.

### **15.12 Repropping**

For multi-storeyed buildings the floors may need Repropping to support the loads of the upper floors under construction. The extent of such Repropping shall be as directed by the Engineer In Charge (this does not normally exceed one fourth of the props provided above). Such Repropping shall not be paid for separately and the cost of such Repropping shall be deemed to have been included in the rates.

### **15.13 Reuse of Forms**

The Contractor shall not be permitted reuse of timber facing formwork brought new on the works more than 5 times for exposed Concrete formwork and 8 times for

ordinary formwork. 5 or 8 uses shall be permitted only if forms are properly cared for, stored and repaired after each use. The Engineer In Charge may in his absolute discretion order rejection of any forms he considers unfit for use for a particular item, and order removal from the site of any forms he considers unfit for use in the works. Used forms brought on the site will be allowed proportionately fewer uses as decided by the Engineer In Charge.

Use of different quality boards or the use of old and new boards in the same formwork shall not be allowed.

#### **15.14 Hacking-Out**

1. Immediately after removal of forms, the concrete surfaces to be plastered shall be roughened with a bush-hammer or with chisel and hammer as directed by the Engineer In Charge to make the surface sufficiently coarse and rough to provide a key for plaster.

2. At all construction joints in the beams, slabs and columns etc. laitance and any other loose concrete shall be chipped off immediately after striking the formwork. The chipped surface shall then be thoroughly cleaned with a jet of water.

## ITEM SPECIFICATIONS

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*As par attached Sheet*

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### TEST SCHEDULE

Sr. No .	MATERIALS TO BE TESTED	NAME OF LABORATORY TEST	FREQUENCY OF TESTS
1	Cement	1. Consistency test 2. Setting time 3. Compressive strength 4. Soundness 5. Specific gravity 6. Fineness	Up to 50 MT: - 1 test 100 MT: - 2 test 200 MT: - 3 test 300 MT: - 4 test 500 MT: - 5 test
2	Sand	1. Fineness Modular 2. Specific Gravity 3. Water absorption 4. Alkali reaction 5. Specific gravity 6. Gradation 7. Silt content	1 Test per working seasons. 1 test per 200 cum -----do----- -----do----- -----do----- 1 test per 150 cum 1 test per 150 cum
3	Crushed Metal Kapachi	1. Gradation 2. Water absorption 3. Impact value 4. Absorption 5. Specific Gravity 6. Soundness 7. Flakinees	1 Test per for seasons. Up to 100 cum 1 test 101 to 500 cum 3 test 501 to 1500 cum 5 test
4	Water	1. Portability test 2. Chemical analysis 3. Salinity	1 Test during execution & as required 1 Test Source of water

		4.	
5	Stone	1. Water absorption 2. Impact Value 3. Specific Gravity 4. Soundness 5. Compressive strength 6. Flakiness & Elongation	As per the directive of EIC.
6	Steel	1.Tensile Strength 2.Yield stress 3.Elongation 4.Size	As per the directive of EIC.
7	Materials not specified above	As per the directives of EIC	As per the directive of EIC.

### **CEMENT CONSUMPTION**

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*As par attached Sheet*

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### **STEEL CONSUMPTION**

---

*As par attached Sheet*

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**SECTION - 6**  
**FORM OF BID**

## FORM OF BID

Description of the Works:

-----

-----

----- BID

To :

Address :

1. We offer to execute the Works described above and remedy any defects therein in conformity with the conditions of Contract, specification, drawings, Bill of Quantities and Addenda for the sum (s) of

-----

-----

(-----)

2. We undertake, if our Bid is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Engineer's notice to commence, and to complete the whole of the Works in the Contract within the time stated in the document.
3. We agree to abide by this Bid for the period of 120 Days from the date fixed for receiving the same, and it shall remain binding upon it and may be accepted at any time before the expiration of that period.
4. Unless and until a formal Agreement is prepared and executed this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.
5. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this ----- day of ----- 20

Signature ----- in the capacity of -----

----- duly authorized to sign bids for and on behalf of -----

-----

-----  
(in block capitals or typed)

Address

---

---

Witness

---

---

Address

---

---

Occupation

---

---

**SECTION - 7**  
**BILL OF QUANTITIES**

## BILL OF QUANTITIES

### Preamble

1. The bill of Quantities shall be read in conjunction with the Instructions to Bidder, Conditions of Contract, Technical Specifications and Drawings.
2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Engineer and valued at the rates and prices tendered in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix within the terms of the Contract.
3. The rates and prices tendered in the priced Bill of Quantities shall, except in so far as it is otherwise provided under the Contract, include all constructional plant, layout, supervision, materials, erection, maintenance, insurance, profit, taxes and duties, together with all general risks, liabilities and obligations set out or implied in the Contract.
4. The rates and prices shall be quoted entirely in Indian Currency.
5. A rate or prices shall be entered against each item in the Bill Quantities, whether quantities are stated or not. The cost of Items against which Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities (in case of Item rate contract).
6. The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Bill of Quantities, and where no Items are provided the cost shall be deemed to be distributed among the rates and prices entered for the related items of Work.
7. General direction and descriptions of work and materials are not necessarily repeated or summarized in the Bill of Quantities. References to the relevant sections of the contract documentation shall be made before entering rates or prices against each item in the Bill of Quantities.
8. The method of completed work of payment shall be in accordance with the specification mentioned in this contract.
9. Errors will be corrected by the Employer for any arithmetic errors pursuant to **Clause 29** of the Instructions to Bidder.
10. Rock is defined as all materials which, in the opinion of the Engineer, required blasting, or the use of metal wedges and sledgehammers, or the use of compressed air drilling for its removal, and which cannot be extracted by ripping with a tractor of at least 150 kw with a single rear mounted heavy duty ripper.

## BILL OF QUANTITIES

### (A) Percentage Rate Tender (Up to INR 50 Cr. )

*As par attached Sheet*

I/We am/are willing to carry out the work at... % above/below percent(Should be written in figures and words) of the estimated rate mentioned above. Amount of my /ourtender works out as under.

Estimated amount put to tender

Estimated amount put to tender

Deduct.....% below

Add.....% Above

Net

Net

In words

In words

### (B) For Item Rate Tender (For above INR 50 Cr.):

Item No	Description of Item- (with brief specification and reference to book of specifications)	Quantity	Unit	Rate		Amount
				In-figures	In-Words	

(A) Total Tendered Amount

(B) Rebate on above tendered amount (if any) % (in figure) .....  
(in words).....

(C) Net Tendered Amount (A-B) (in figure) .....  
(in words).....

#

1	The Contractor shall exhibit a board with detailed specification and details of work as directed by the Engineer-In-Charge for which no extra payment shall be made.
2	The labour cess will be deducted as per prevailing rules i.e. 1% of the work done.
3	GST and Income tax TDS will be deducted at a source while making payments of bills
4	In all R.C.C. Items in Rate Analysis Standard Cement Consumption has been taken as per Govt. G.R.: PRC-10/2017 Cement Consumption/16/C Date:11/05/2017 as stated in S.O.R. therefore in R.C.C. items where there is a change as per actual mix design the cost of difference of cement consumption have been deducted from the rate of original item at the rate of input rate mentioned in all the tender.

**SECTION - 8**

**SECURITIES AND OTHER FORMS**

## **BID SECURITY (BANK GUARANTEE)**

WHEREAS, ----- (name of Bidder) (hereinafter called the "The Bidder") has submitted his bid Dated ----- (Date) for the construction of -----  
----- (Name of Contractor hereinafter called "the Bid")

KNOW ALL PEOPLE by these presents that We -----  
(name of Bank) of ----- (name of country) having our  
registered office at ----- (hereinafter called  
"the bank") are bound unto ----- (name of Employer)  
(hereinafter called "The Employer") in the sum of ----- \*  
for which payment well and truly to be made to the said Employer the Bank itself, his successors  
and assigns by these presents.

SEALED with the Common Seal of the said Bank this ----- day of ----- 20

THE CONDITIONS of these obligations are:

(1) If after Bid opening the Bidder withdraws his bid during the period of Bid validity  
specified in the Form of Bid;

**Or**

(2) If the Bidder has been notified of the acceptance of his bid by the Employer  
during the period of Bid Validity:

A Fails or refuses to execute the Form of Agreement in accordance with the  
Instructions to Bidders, if required; or

B. Fails or refuse to furnish the Performance Security, in accordance with the  
Instructions to Bidders; or

C. does not accept the correction of the Bid Price pursuant to Clause 27 (Correction of  
Errors)

We undertake to pay to the Employer up to the above amount upon receipt of  
his first written demand, without the employer having to substantiate his demand,  
provided that in his demand the Employer will note that the amount claimed by him is  
due to him owing to the occurrence of one or any of the three conditions, specifying the  
occurred conditions or conditions.

This Guarantee will remain in force up to and including the date-----\*\*  
days after the deadline for submission of Bids as such the deadline is stated in the  
Instructions to Bidders or as it may be extended by the Employer, notice of which  
extension (s) to the Bank is hereby waived. Any demand in respect of this guarantee  
should reach the Bank not later than the above date

DATE -----SIGNATURE-----

WITNESS -----SEAL -----

---

(Signature, name and address)

\* The Bidder should insert the amount of the guarantee in words and figures denominated  
in Indian Rupees. This figure should be the same as shown in Clause 16.1(Bid Security)  
of the Instructions to Bidders.

**\*\*45 days** after the **end of the validity period** of the Bid. Date should be inserted  
by the Employer before the Bidding documents are issued.

## PERFORMANCE SECURITY

TO,

----- (Name of Employer)  
----- (Address of Employer)  
-----

WHEREAS ----- (name and address of contractor) (hereafter called "the Contractor") has undertaken, in pursuance of Contracts No. ----- dates ----- to execute -----  
----- (name of Contract and brief description of Works) (hereinafter called "The Contract")

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sums specified therein as security for compliance with his obligation in accordance with the Contract.

AND WHEREAS we have agreed to give the Contractors such a bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor, up to a total of -----  
(amount of guarantee)\* ----- (in words), such sum being payable in types and proportions of currencies in which the Contract prices is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of -----  
(amount of guarantee) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the contractor before presenting is with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract to of the Works to be performed thereunder or of any of the Contract documents which may be made between your and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such charge, addition or modifications.

This guarantee shall be valid until 60 days from the date of expiring of the Defect Liabilities period.

Signature and Seal of the guarantor -----

Name of Bank -----

Address -----

Date -----

---

\*An amount shall be inserted by the Guarantor, representing the percentage the Contract price specified in the Contract denominated in Indian Rupees.

## ADDITIONAL PERFORMANCE SECURITY

[Clause 34.1. (A)]

TO,

----- (Name of Employer)

----- (Address of Employer)

-----

WHEREAS ----- (Name and address of contractor) (hereafter called "The Contractor") has undertaken, in pursuance of Contracts No. ----- dates ----- to execute -----  
----- (Name of Contract and brief description of Works) (hereinafter called "The Contract")

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sums specified therein as security for compliance with his obligation in accordance with the Contract.

AND WHEREAS we have agreed to give the Contractors such a bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor, up to a total of -----  
(amount of guarantee)----- (in words), such sum being payable in types and proportions of currencies in which the Contract prices is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of -----  
(amount of guarantee) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the contractor before presenting is with the demand

We further agree that no change or addition to or other modification of the terms of the Contract to of the Works to be performed thereunder or of any of the Contract documents which may be made between your and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such charge, addition or modifications.

This guarantee shall be valid until **28 days** from the project completion date.

Signature and Seal of the guarantor -----

Name of Bank -----

Address -----

Date -----

## BANK GUARANTEE FOR ADVANCE PAYMENT

TO,

----- (Name of Employer)

----- (Address of Employer)

----- (Name of Contractor)

Gentlemen:

In accordance with the provisions of the Conditions of Contract, sub-clause 51.1 ("Advance Payment") of the above mentioned Contract, -----  
----- (name and address of Contractor) (hereinafter called "the Contractor") shall deposit with (name of Employer) a bank guarantee his proper and faithful performance under the said Clause of the Contract in an amount of ----- (amount of Guarantee)\* -  
----- in words).

We, the ----- (bank of financial institution), as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to -----  
(name of Employer) on his first demand without whatsoever right of obligation on our part and without his first claim to the Contractor, in the amount not exceeding ---  
----- (amount of guarantee)\* ----- (in words)

We further agree that no change or addition to or other modifications of the terms of the Contractor or Works to be performed thereunder or of any of the Contract documents which may be made between ----- (name of Employer) and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modifications.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until ----- (name of employer) receives full repayment of the same amount from the contractor.

YOUR'S TRULY

Signature and Seal \_\_\_\_\_ Name  
of Bank/ Financial Institution \_\_\_\_\_  
Address \_\_\_\_\_  
Date \_\_\_\_\_

\* An amount shall be inserted by that Bank or Financial Institution representing the amount of the Advance Payment, and denominated in Indian Rupees.

## Letter of Acceptance

(Letter head paper of the Employer)

\_\_\_\_\_, (date)  
To,  
\_\_\_\_\_, (Name and address of the Contractor)  
\_\_\_\_\_  
\_\_\_\_\_

Dear Sirs,

This is to notify you that your Bid dated \_\_\_\_\_ for execution of the \_\_\_\_\_ (Name of the contract and identification number, as given in the Instructions to Bidders) for the Contract Price of Rupees \_\_\_\_\_ (\_\_\_\_\_) (amount in words and figures) as corrected and modified in accordance with the Instructions to Bidders\* is hereby accepted by our agency.

You are requested to furnish performance security, in the form detailed in para 34.1 of ITB for an amount equivalent to Rs. \_\_\_\_\_ within **10 days** of the receipt of this letter of acceptance up to beyond **60 days** from the date of expiry of defects Liability period i.e. up to \_\_\_\_\_ and the Additional Performance Security for an amount equivalent to Rs. \_\_\_\_\_ shall be valid beyond 28 (twenty-eight) days of Project Completion Date i.e. up to \_\_\_\_\_ and sign the contract, failing which action as stated in Para 34.3 of ITB will be taken.

Yours Faithfully

Authorized Signature Name  
and title of Signatory Name of  
Employer

---

\* Delete "Corrected and" or and modified if only one of these actions applies. Delete as corrected and modified in accordance with the Instructions to Bidders, if corrections or modifications have not been affected.

**Issue of Notice to proceed with the work**

(Letterhead of the Employer)

----- (date)

To,

\_\_\_\_\_ (Name and address of the Contractor)

\_\_\_\_\_

\_\_\_\_\_

Dear Sirs,

Pursuant to your furnishing the requisite security in ITB Clause 34.1 and signing of the Contract for the construction of \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ at a bid Price of Rs.

\_\_\_\_\_.

You are hereby instructed to proceed with the execution of the said works in accordance with the contract documents.

Yours faithfully

(Signature, name and title of signatory authorized  
To sign on behalf of Employer)

## AGREEMENT FORM

This agreement, made on the \_\_\_\_\_ day of \_\_\_\_\_ between  
\_ (name and address of Employer) (Hereinafter called "the  
Employer) and \_\_\_\_\_ (name and address of  
contractor) hereinafter called "the Contractor" of the other part.

Whereas the Employer is desirous that the Contractor execute

\_\_\_\_\_  
Name and identification number of contract (hereinafter called "the works") and the  
employer has accepted the Bid by the Contractor for the execution and completion of such  
works and the remedying of any defects therein, at a cost of Rs.

\_\_\_\_\_  
NOW THIS AGREEMENT WITNESSETH AS FOLLOWS

1. In this Agreement, words and expression shall have the same meanings as are  
respectively assigned to them in the conditions of contract hereinafter referred to  
and they shall be deemed to form and be read construed as part of this Agreement.
2. In Consideration of the payment to be made by the Employer to the contractor as  
hereinafter mentioned, the Contractor hereby covenants with the Employer to  
executive and complete the works and remedy any defects therein in conformity  
in all aspects with the provisions of the contracts.
3. The employer hereby covenants to pay the Contractor in consideration of the  
execution and completion of the works and the remedying the defects wherein  
contract price or such other sum as may become payable under the provisions of  
the Contract at the times and in the manner prescribed by the contract.
4. The Following documents shall be deemed to form and be ready and construed as  
part of this Agreement viz
  - i ) letter of Acceptance
  - ii ) Notice to proceed with the works:
  - iii ) Contractor's Bid

- iv ) Conditions of contract: General and Special
- v ) Contract Data
- vi) Additional conditions
- vii ) Drawings
- viii ) Bill of Quantities and
- ix ) Any other documents listed in the Contract  
data as forming part of the Contract.

In witness whereof the parties there to have caused this Agreement to be executed the day and year first before written

The Common seal of \_\_\_\_\_  
Was hereunto affixed in the presence of :

Signed, sealed and Delivered by the said \_\_\_\_\_

\_\_\_\_\_

In the presence of

Binding signature of Employer \_\_\_\_\_

Binding Signature of Contractor \_\_\_\_\_

## **UNDERTAKING**

**(For Investment)**

I, the undersigned do hereby undertake that our firm M/s  
..... would invest a minimum cash upto **25%**  
of the value of the work during implementation of the contract.

\_\_\_\_\_  
(Signed by an Authorized officer of the firm)

\_\_\_\_\_  
Title of officer

\_\_\_\_\_  
Name of firm

\_\_\_\_\_  
DATE

## **UNDERTAKING**

**(For Validity)**

I, the undersigned do hereby undertake that our firm M/s .....  
..... agree to abide by this bid for a period .....days  
for date fixed for receiving the same and it shall be binding on us and may be accepted at any time  
before the expiration of that period.

\_\_\_\_\_  
(Signed by an Authorized officer of the firm)

\_\_\_\_\_  
Title of officer

\_\_\_\_\_  
Name of firm

\_\_\_\_\_  
DATE

**SECTION - 9**  
**DRAWINGS**

## **DRAWINGS**

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*As par attached Sheet*

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## **SECTION - 10**

### **DOCUMENTS TO BE FURNISHED BY BIDDER**

**As added below**

Bidders are required to submit the following documents:

- 1 Certificate of registration of Class – “A” & Special Cat-III (Road) and Above in public works department of Government of Gujarat
- 2 Bidders wishing to participate in this tender will have to register on web site <https://gmb.nprocure.com>
- 3 **Digital Certificate:**
  - 3.1 Bidders who wish to participate in online tenders will have to procure / should have legally valid Digital Certificate (Class III) as per Information Technology Act-2000 using which they can sign their electronic bids. Bidders can procure the same from any of the license certifying Authority of India or can contact (n)code solutions- a division of GNFC Ltd, who are licensed Certifying Authority by Govt. of India.
  - 3.2 All bids should be digitally signed, for details regarding digital signature certificate and related training involved the below mentioned address should be contacted:  
**(n)Code solutions**  
**A division of GNFC**  
301, GNFC Infotower, Bodakdev,  
Ahmedabad- 380 054 ( India )  
Tel : +91 26857316/17/18  
Fax: +91 79 26857321  
E-mail: nprocure@gnvfc.net  
Mobile: 9327084190, 9925117079
- 4 Bidders who already have a valid Digital certificate need not procure a new Digital certificate.
- 4 Bid Security and other fees as mentioned in this contract are required to be submitted within stipulated time:
- 5 Other Documents required to be submitted:  
PAN issued by Income-Tax Department  
GST Registration
- 6 Documents received earlier or later than the time specified will not be accepted in any case and the bid of that bidder shall be considered non-responsive and GMB is not responsible for postal delay.
- 7 Bidder has to submit the documents as mentioned in this contract in electronic format as well as in physical format and any other document(s) that is asked to be submitted subsequently. If required for detail verification, the bidder shall have to submit the same physical.  
The bidder shall have to submit unconditional offer without differing from any of the tender condition.