

PANCHAYAT IRRIGATION DIVISION - BHUJ				
Irrigation Sub Division(P) - Rapar				
Name of work:		Construction of 0.21 Lac. Lit. Cap. ESR at Ekalvandh Village, Tal. Bhachau, Dist. Kutch Under 15th F.C.		
COVERING DETAILS				
1	Last date & time for online downloading of Bid Documant	Date : 00/00/2026 up to 18:00 hours		
2	Last date & time for online Submission of Bid	Date : 00/00/2026 up to 18:00 hours		
3	Bid Price	₹ 820,940.00		
4	Bid Security (EMD)	₹ 9,000.00		
5	Securities		By Contractor	
A	Performance Security 5%		₹ 41,100.00	
B	Retention Money 5%		₹ 41,100.00	
	Total		₹ 82,200.00	
6	Time Limit		6 Months	
7	Additional Performance Security	Section 1: Instructions to Bidders, Clause-34		

A.E./A.A.E.
Irrigation Sub Division(P)
Rapar-Kachchh.

Deputy Executive Engineer
Irrigation Sub Division(P)
Rapar-Kachchh.

A.E./A.A.E. (P.B.)
Panchayat Irrigation Division
Bhuj-Kachchh.

Tender Clerk
Panchayat Irrigation Division
Bhuj-Kachchh.

Divisional Accountant
Panchayat Irrigation Division
Bhuj-Kachchh.

Executive Engineer,
Panchayat Irrigation Division,
Bhuj-Kachchh.

D.T.P. Approved for Rupees Eight Lacs Twenty Thousand Nine Hundred Fourty and Paise Zero Only

Deputy Executive Engineer
Irrigation Sub Division(P)
Rapar-Kachchh.

PANCHAYAT IRRIGATION DIVISION - BHUJ
Irrigation Sub Division(P) - Rapar

**Construction of 0.21 Lac. Lit. Cap. ESR at Ekalvandh Village, Tal. Bhachau, Dist.
Kutch Under 15th F.C.**

ESTIMATED COST : Rs. ₹ 820,940.00

TALUKA : Bhachau

DISTRICT : Kachchh

**EXECUTIVE ENGINEER
PANCHAYAT IRRIGATION DIVISION
BHUJ - KUTCH**

MEMORANDUM OF WORKS IN BRIEF

1)	Name of work	Construction of 0.21 Lac. Lit. Cap. ESR at Ekalvandh Village, Tal. Bhachau, Dist. Kutch Under 15th F.C.
2)	Bid Price	₹ 820,940.00
3)	Bid Security (EMD)	₹ 9,000.00
4)	Bid Validity	120 Days
5)	Bid Security -	
	(i) Performance Security 5%	₹ 41,100.00
	(ii) Retention Money 5%	₹ 41,100.00
	Total	₹ 82,200.00
6)	Bid Document Fee / Tender Fee	₹ 900
7)	Time allowed for completion of the work from the date of written order to commence	6 Months
8)	Other details	
	(i) Date on or before which the tender must be submitted Online.	Date : 00/00/2026 up to 18:00 hours
	(ii) Mode of sending the tender	Electronic format through online
	(iii) Only tenders sent by post will be Out right rejected.	

Tender Consolidated Details

NIT/ Tender Details

[View BOQ Details](#)

Department Name	NARMADA WATER SUPPLY WATER RESOURCES AND KALPSAR PANCHAYAT DEPARTMENT
Circle/ Division	KACHCHH IRRIGATION CIRCLE BHUJ/PANCHAYAT IRRIGATION DIVISION.BHUJ
IFB No.	of 2025-26
Name of Project	Construction of 0.21 Lac. Lit. Cap. ESR at Ekalvindh Village, Tal. Bhachau, Dist. Kutch Under 15th F.C.
Name of Work	Construction of 0.21 Lac. Lit. Cap. ESR at Ekalvindh Village, Tal. Bhachau, Dist. Kutch Under 15th F.C.
Bid Price (INR)	₹ 820,940.00
Period of completion (in Months)	6 Months
Bidding Type	E tendering
Bid Call (Nos)	1
Tender Currency	Indian Rupee (INR)
Joint Venture	Not allowed
Rebate	Not allowed
Amount Details	
Bid Document Fee / Tender Fee (INR):	₹ 900.00
Bid Document Fee Payable To:	Executive Engineer, Panchayat Irrigation Division, Bhuj-Kachchh
Bid Security/ EMD(INR):	₹ 9,000.00
Bid Security/ EMD Drawn in Favour of:	Executive Engineer, Panchayat Irrigation Division, Bhuj-Kachchh
Tender Dates	
Bid Document Downloading End Date	Date : 00/00/2026 up to 18:00 hours
Pre Bid Meeting	Not Applicable
Last Date & Time for Receipt of Bids	Date : 00/00/2026 up to 18:00 hours
Date of opening tender online (If Possible)	Date : 00/00/2026 up to 18:10 hours
Bid Validity Period	120 Days
Remarks:	--
Other Details	
Officer Inviting Bids:	Executive Engineer, Panchayat Irrigation Division, Bhuj-Kachchh
Bid Opening Authority:	Executive Engineer, Panchayat Irrigation Division, Jilla Panchayat, Bhuj-Kutch – 370001
Address:	Executive Engineer, Panchayat Irrigation Division, Jilla Panchayat, Bhuj-Kutch – 370001

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	General Instructions:	a) The cost of tender document will not be refunded under any circumstances.
		b) EMD in the form specified in tender document only shall be accepted.
		c) The offer shall be valid for 120 days from date of opening of online price bid.
		d) Tenders without Tender document fees, Earnest Money Deposit (EMD) and which do not fulfil all or any of the condition or submitted incomplete in any respect will be rejected.
		e) Not more than one tender for single work shall be submitted by a bidder. Bidder can submit the bid for the package individually. No joint venture is allowed. Bidder can apply either as individual or partnership firm or any other corporate body as the case may be.
		f) Conditional tender shall not be accepted.
		g) Employer reserves the right to accept lowest responsive offer based on evaluation of package or reject any or all tenders without assigning any reason.
		h) The notice shall form a part of contract document.
		i) The bid for the work shall remain open for acceptance for a period of 120 days from the date of opening of bid. If any bidder withdraws his bid/ tender before the said period or makes any modifications in the terms and conditions of the bid, the said earnest money shall stand forfeited.
		j) No Engineer of gazetted rank or other Gazetted officer employed in Engineering or Administrative duties in an Engineering Department of the State Government is allowed to work as a Contractor for a period of two years after his retirement from Government service, without Government permission. This contract is liable to be cancelled if either
		k) The Contractor or any of his employees is found any time to be such a person who had not obtained the permission of the Government as aforesaid before submission of the tender or engagement in the Contractor's service
		l) The internet site address for E-Tender is https://tender.nprocure.com/ and State Govt. website www.satetenders.com .

Instruction to Bidders for Online Tender Participation

- 1 All tenders documents can be downloaded free from the website [www.\(n\)procure.com](http://www.(n)procure.com)
- 2 All bids should be submitted online from the website www.rnb.nprocure.com
- 3 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 79 55610585/86, 55216611
Fax: +91 79 55610587.
www.ncodesolutions.com

- 4 The user can get a copy of instructions to online participation from the website www.nprocure.com
- 5 The bidders should register on the website through the "New Supplier" link provided at the home page, the registration on the site should not be taken as registration or empanelment or any other form of registration with the tendering authority
- 6 For all queries regarding use of digital signature certificate should be addressed to personnel in M/s (n) Code Solutions.
- 7 For all queries regarding tender specifications and any other clauses included in tender document should be addressed to personnel in tendering office address provided below

Contact Details

Executive Engineer
Panchayat Irrigation Division,
District Bhuj-Kachchh,
(02832)220240

Key Dates

Due Date and Time of Online Submission : Date : 00/00/2026 up to 18:00 hours
Due Date and Time of Opening of technical bid: Date : 00/00/2026 up to 18:10 hours

Key Value

Document Fee:	₹ 900.00
Earnest Money Deposit (EMD) (Rs. In Lacs):	₹ 0.09
Estimated Value (Rs. in Lacs):	₹ 8.21

STANDARD BIDDING DOCUMENT PROCUREMENT OF CIVIL WORKS

COMPLETE BIDDING DOCUMENT



**GOVERNMENT OF GUJARAT
NARMADA, WATER RESOURCES, WATER SUPPLY & KALPSAR
DEPARTMENT**

**KACHCHH IRRIGATION CIRCLE, BHUJ
PANCHAYAT IRRIGATION DIVISION, BHUJ**

This is a generic SBD to be used for Civil works. Each user / concern department needs to examine and put up their particular bidding requirement like; qualification criteria, contract Data etc., marked at [#] while finalizing their own bidding process.

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**INVITATION FOR BID
(IFB)**

NATIONAL COMPETITIVE BIDDING

1. The **Executive Engineer, Panchayat Irrigation Division, Bhuj-Kachchh** 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

Packag e No.	Name of work	Approximate value of works (Rs.)	Bid security (Rs.)/EMD (Rs)	Cost of docume nt/Ten der Fee (Rs)	Period of complet ion	Class of Registrat ion / Category of contracto r if Required
1	2	3	4	5	6	7
1	Construction of 0.21 Lac. Lit. Cap. ESR at Ekalvindh Village, Tal. Bhachau, Dist. Kutch Under 15th F.C.	8,20,940.00	9,000.00	900/-	6 Month	"E-2" Class & Above and contractors

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 **Panchayat Irrigation Division, Bhuj-Kachchh** and in favour of '**Executive Engineer, Panchayat Irrigation Division, Bhuj-Kachchh**'. Once the Bid is received online, Bid Document / Tender Fee will not be refundable. As Per GoG R&B Department's Circular No. PARACH/102/000/IB/221/(59)/C Dated.24/01/2007

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, Panchayat Irrigation Division, Bhuj-Kachchh**, within 7 Days from the last day of bid submission.

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

WRD GR No. PRC-102014-1-MICell-K.1 Dated: 29/10/2014

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 12:00 PM hrs. at the office of **Executive Engineer, Panchayat Irrigation Division, Bhuj-Kachchh** 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 Rs. 7.5 crore (WRD Works), R s . 7.0 crore (ROAD/ BRIDGE/ BUILDING WORKS), Rs. 0.5 Crore (Electrical Works) kindly refer to GoG NWRWS & K Department's Circular No. Paracha/1097/1397(11)/pa.fa./ MICELL(k-1) dated 18/01/2018 and Dated 30/09/2022

For the works costing under Rs. 7.5 crore for Construction work of Water Resources Department, Rs. 7.0 crore for Roads, Bridges and Building and Rs. 050 crore for Electrical work 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.

- (i) Bid Document Fee / Tender Fee
- (ii) Bid Security / EMD or Valid EMD Exemption Certificate of Appropriate Class of Registration of Approved Contractors
- (iii) Registration Certificate of Appropriate Class
- (iv) ~~Registration Certificate of special category – Road/Building and Category I/II/III, if required~~

- (v) GST Number and Pancard.
- (vi) A solvency certificate of an 20% of the Tender Amount will have to be produced along with tender. It shall be of Scheduled Bank or Nationalized Bank or Bank Approved for Government business. Solvency Certificate shall have validity of same calendar year as that of date in which lender is issued.
- ~~(vii) Work Experience.~~
- (viii) Copy of Partnership Deed or Memorandum as well as Articles of Association in case of the company and intimate permanent addresses of his partners/Directors of the Company. All copies submitted shall be duly attested.
- (ix) Letter of transmittal signed by authorized signatory to be provide after issue of Work Order. (addressed to the office the the Executive Engineer, **Panchayat Irrigation Division, Bhuj-Kachchh, Jilla Panchayat Bhavan, Near Alfraid Highschool, Bhuj-Kachchh - 370001.**
- (x) Power of Attorney - A power of attorney duly authorized by a notary public, if power is delegated for signing the bid persons other than applicant.
- (xi) Supporting documents - Every blank (fields) in the tender documents (Forms, schedules, etc.,) must be filled by the Tenderer / Bidder and submitted Online. Tender forms shall be completed in all respects. Online user of dash (-) is not permitted. Please write "Not applicable" or "Nil" as and where required by Tenderer/ Bidder.
- (xii) Undertaking for Engaging Technical Staff and machineries as per Prescribed Proforma.
- (xiii) Information regarding any current litigation in which the applicant is involved.
- ~~(xiv) The Applicant should give undertaking that he has access to, or has available, liquid assets and / or credit facilities up to 25 percent of the value of the contract / contracts applied. As per Prescribed Proforma.~~
- (xv) Last Five Financial Year IT Return.
- (xvi) Details of Existing commitments and on-going works as per prescribe Performa.
- (xvii) All other required details as per stated in the Tender Documents and as per Section -10 Documents to be furnished by Bidder.

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 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

- (i) **4.5 QUALIFICATION CRITERIA:**
(Applicable for the works which require Pre Qualification) As Per GoG NWRWS & K Department’s Circular No. Paracha/1097/1397(11)/pa.fa./MICELL(k-1) Dated 18/01/2018

- ~~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	2025_-2026_	1.00
-1	2024_-2025_	1.10
-2	2023_-2024_	1.21
-3	2022_-2023_	1.33
-4	2021_-2022_	1.46
-5	2020_-2021_	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 of Rs. ---Crore for works in progress and completed in all classes of civil engineering construction works in any one year, over the last five financial years.~~
- ~~(b) Experience in successfully completing or substantially completing at least one contract of similar work (Irrigation works or Canal Lining works) of at least 40 percent of the value of proposed contract within the last five financial 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 if work executed jointly otherwise as per the scope of work define in Joint Venture agreement.~~

~~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.~~

~~(the experience certificate should be signed by the officer not below the rank of EE)~~

- ~~(c) Contractor should have completed 60% of quantity of principal items of work like concrete, earthwork, pipeline, pumping station etc. within last five finical years. Certificate of competent authority of work done with detail shall be produced.~~

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.

- 4.5.7.** 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.

4.5.8. 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 financial years. A consistent history of awards against the Applicant or any partner of a joint venture may result in failure of the applicant.

4.5.9. 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.

- 4.5.10.** The bidder who have applied for corporate Debt Restructuring (CDR) / facing recovery proceedings from financial institutions / facing winding up processing / those under BIFR in the last 5 financial year shall be considered for bid qualification. However if the bank / financial institution has accepted the proposal of debt restructuring on or before the last date of online submission, the same shall be considered for further evaluation. An affidavit by bidder along with certificate from bank must be produced in such cases. In case of Joint Venture agreement, this provision shall be applicable for both lead partner and JV partner.

#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:

$$\text{Assessed Available Bid Capacity} = (A * N - B), \text{ where}$$

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 (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.

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, 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. 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.
	Invitation for Bids (IFB)	
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 120 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 4 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 120+45 = 165 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/22/2017/639/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.

(ii) **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 Executive Engineer, Panchayat Irrigation Division, Bhuj-Kachchh [Cl.1.1]
2. The last five financial years.
 1. 2024-2025
 2. 2023-2024
 3. 2022-2023
 4. 2021-2022
 5. 2020-2021
3. This Annual Financial Turnover Amount is Rs. ---Not Applicable--- [Cl.4.5.3 (a)]
4. Value of Work is **Rs. 8,20,940.00**
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. Applicable--- [Cl.4.5.6]
9. Price level of the financial year **2025-26** [Cl. 4.5.2]
10. The pre-bid meeting will take place at ---Not Applicable--- [Cl. 9.2.1]
11. The technical Bid will be opened at the office of the Superintending Engineer, Kachchh Irrigation Circle, Sinchai Sadan, Jubilee Ground, Bhuj-Kachchh on dt.....
12. Address of the Employer: Executive Engineer, Panchayat Irrigation Division, Jilla Panchayat Bhavan, Near Alfraid Highschool, Bhuj-Kachchh - 370001.
13. Deleted
14. The bid should be submitted latest by As stated on online NIT [Cl. 20.1 & 20.2]
15. The bid will be opened at As stated on online NIT at website <https://www.nprocure.com> [Cl. 23.1]
16. The Bank Draft in favor of “Executive Engineer, Panchayat Irrigation Division, Bhuj-Kachchh”
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 invitingtender	2025-2026	1.00
-1	2024-2025	1.10
-2	2023-2024	1.21
-3	2022-2023	1.33
-4	2021-2022	1.46
-5	2020-2021	1.61

**(2) #LIST OF KEY PLANT & EQUIPMENT TO BE DEPLOYED ON-
CONTRACT WORK**

[Reference CL. 4.5.5]

**(i) _____ 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 Two Diploma Civil Engineer when the cost of work is less than Rs.15 lakhs but more than Rs.5 lakhs.
4. Minimum One 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, Color 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.30,000-00 per month per Engineer** will be made from the bills/deposit/dues of the contractor. **Such recovery shall be non-refundable.**

**Executive Engineer
Panchayat Irrigation Division
Bhuj-Kachchh**

SECTION - 2

QUALIFICATION INFORMATION

(ii) **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 Work performed in the last five years
(in Rs. Lakhs)–~~**

~~2025-2026~~

~~2024-2025~~

~~2023-2024~~

~~2022-2023~~

~~2021-2022~~

~~2020-2021~~

~~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 contract 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.~~

*To be modified as per the nature and scope of work

Year	Name of the work	Name of the Employer	Quantity of work performed (Cum/MT)				Remarks* (indicate contract Ref)- contract Ref)
			Cement Concrete (Including RCC & PCC) ITEM 1	Rubble Pitching ITEM 2	Earth Works ITEM 3		
20 — 20							
20 — 20							
20 — 20							
20 — 20							
20 — 20							

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
Senior Engineer		BE-Civil		
Site Engineer		BE-Civil		
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~~

~~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

Name of work:

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 Contractors 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 (Kachchh Irrigation Circle, Bhuj-Kachchh)** 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 (**Kachchh Irrigation Circle, Bhuj-Kachchh**).
- 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 (Kachchh Irrigation Circle, Bhuj-Kachchh)**, 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 (Kachchh Irrigation Circle, Bhuj-Kachchh)**, both the parties have to refer to the **#Secretary, Water Resources 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.

C. QUALITY CONTROL

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 works of WRD Except Building

- (a) (1) 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) (1) For WRD works likes Check Dam/ Canal / Drainage / Road Structure tender amount from RS. 50,000 to 10,00,000, the defect liability period shall be 12 months from the certified date of completion.
(2) For WRD work except likes Check Dam/ Canal / Drainage / Road Structure tender amount from RS. 50,000 to 10,00,000, the defect liability period shall be 6 months from the certified date of completion.
- (c) (1) For WRD works likes Check Dam/ Canal / Drainage / Road Structure tender amount more than RS. 10,00,000, the defect liability period shall be 3 Years from the certified date of completion.
(2) For WRD work except likes Check Dam/ Canal / Drainage / Road Structure tender amount from RS. 10,00,000 to 1 Crore, the defect liability period shall be 12 months from the certified date of completion.
- (d) (1) For all WRD works of tender amount more than RS. 1 Crore, the defect liability period shall be 3 Years from the certified date of completion

B. For Building works of WRD:-

For Building works of WRD, Follow the R&B Circular dated.03/12/2009

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.

WRD Circular No. Matas/102013/MICELL(K-1) Dated 13/12/2013

33.2 For Road works :

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. 4 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 #1% of the amount of work done for works upto Rs. 10 crore of estimate cost should be deducted from R.A. Bill of the contractor for testing the quality of material workmanship. Whereas for estimated cost of works more than 10 crore, the charges for testing of quality of material workmanship shall be deducted from R.A. bill of contractor as per actual charges. As Per GoG NWRWS & K Department's Circular No. PARCH/132023/401/MICELL Dated: 05/10/2023

- 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 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.

- (iii) 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 stationed at the same place or the nearest place.

- 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
 $R = \text{Total value of work done during the month. It would include the amount of secured advance granted, if any, during the month less the amount of secured advance recovered, if any during the month. It will exclude value for works executed under variations for which price adjustment will be worked separately based on the terms mutually agreed.}$
- 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 Contactor 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 maybe.
 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, 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** (Higher Authority) (**Kachchh Irrigation Circle, Bhuj-Kachchh**) 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.

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 (**Kachchh Irrigation Circle, Bhuj-Kachchh**), 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, Water Resources 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: Executive Engineer, Panchayat Irrigation Division, Bhuj- Kachchh

Address: Jilla Panchayat Bhavan, Near Alfraid Highschool, Bhuj - Kachchh (370001)

Name of authorized Representative (will be intimated later)

2. The Engineer is Executive Engineer, Panchayat Irrigation Division, Bhuj-Kachchh.

Name of Authorized Representative: Executive Engineer

3. The Defects Liability Period is as per cl no 1.1 & 33 [CL.1.1&33]

4. The Start Date shall be 1st 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 [CL.1.1,17&2]
6 (Six) Months after start of work with the following milestones:

Milestone dates:

[CL.2.2& 49.1]

Physical works to be completed Period from the start date

Project Mile Stone	Cumulative Time Limit (In Day)	Cumulative Percentage of Contract Value (Financial)
Milestone 1	45 Days	25 %
Milestone 2	90 Days	50 %
Milestone 3	135 Days	75 %
Milestone 4	180 Days	100 %

6. The Site is located at Gurukrupa nagar, fatehghadh Village, Di. Kachchh [CL.1.1]

7. The name and identification number of the Contract is: [CL.1.1]

8. The works consist of Construction of 0.21 Lac. Lit. Cap. ESR at Eakalvandh Village, Tal. Bhachau, Dist. Kutch Under 15th F.C. with items as per B.O.Q. The works shall, inter alia, include the following, as Specified or as directed: [CL.1.1]

(A) WRD Works

Site clearance; setting – out and layout; Construction and Maintenance of all types of dams and its component, earthen dam; spillway; installation of gate; excavation and earth work, approach road, Inspection Bunglows, checkdams, bandhara, T.R., weir, barrages, Flood Protection & Anti Sea Erosion work, canal lining and structures, , CD Works, structure repairing, Jungale cutting, Desilting, etc. other WRD works.

(B) 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

(C) Bridge Works

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

(D) Other Items

- Any Other Items as required to fulfill all contractual obligations as per the Bid documents. [CL.1.1]
10. The following documents also form part of the Contract:
_____As per clause 2-3_____ [CL.2.3(9)]
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 From the Date Work order issue. [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 45 days. [CL.27.3]
21. The amount to be withheld for late submission of an updated programme shall be Rs 0.50 lakhs [CL. 27.3]
22. The following events shall also be Compensation Events [CL. 44]
- 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,
 - (iii) Removal of unsuitable material like marsh, debris dumps etc. not cause by the Contractor.

- (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:

$$V_L = 0.85 \times (P_1/100) \times R \times (L_i - L_0)/L_0$$

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_1 = Percentage of labour 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

(iii) **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.

(iv) **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 15th day of the month under consideration.

P_b = Percentage of bitumen component of the work

(v) **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 15th 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.

(vi) **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

(vii) **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 India 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**

(viii) **& 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:

(EPC Tender this clause not applicable)

1. Labour - P_l	00.00 %
2. Cement - P_c	00.00 %
3. Steel - P_s	00.00 %
4. Bitumen - P_b	00.00 %
5. POL & Machinery Spares P_p	00.00 %
6. Other Materials - P_m	00.00 %

Total 00 %

Note :- The price adjustment as per clause-47 will be decided at the time of estimation of actual work.

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 delay in completion of works
- For Whole of work {CL.49}
(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 For delay in completion work	10 percent of the Initial {CL. 49} 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 Completion of work	5 percent of the Contract {CL. 50} Price
-----	--	--

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

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

i	Mobilization 10% of the contract Price	On submission of unconditional- 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 depreciated value for old equipment. Total amount will be subject to a maximum of 5% of the Contract Price	After equipment is brought to site (provided the Engineer is satisfied That the equipment is required for performance of the contract) and on submission of 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 4 Lakhs.

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.

**Executive Engineer
Panchayat Irrigation Division
Bhuj-Kachchh**

SECTION - 5
TECHNICAL SPECIFICATION
(Attached Separately In Annexure - 1)

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 Contact 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 for Road and Bridge works. For building works specifications for building are to be followed.
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.)

Item No	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate In figures	Amount
	Attached Separately In Annexure - 2				

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 /our tender 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 brief 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. NO.: MIS102010/17/K1 Dated:30/07/2018 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.

**Executive Engineer
Panchayat Irrigation Division
Bhuj-Kachchh**

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;

(x) **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 sum 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.

(xi)

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 sum 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 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

UNDERTAKING (For Validity)

I, the undersigned do hereby undertake that our firm M/s
..... agree to abide by this bid for a period 165 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

(Attached Separately In Annexure - 3)

SECTION - 10
DOCUMENTS TO BE FURNISHED BY
BIDDER

Documents Submit By Bidder along with tender documents
(Also Upload along online during Bid Submission)

Sr. No.	Name of Documents.	Reference Clause.	Reference Format Page No.
1	Bid Document Fee/Tender Fee	As per NIT	-
2	Bid Security / EMD or Valid EMD Exemption Certificate or in terms of Bank guarantee (valid 165 days from the date of bid submission) of Appropriate Class of Registration of Approved Contractors	As per Table of IFB Refer clause no. 16 for provision of Bank guarantee	-
3	Registration Certificate of Appropriate Class	As per NIT	-
4	GST Number and Pan card	As per NIT	-
5	A solvency certificate of an 20% of the Tender Amount of Scheduled Bank or Nationalized Bank or Bank Approved for Government business	As per NIT	-
6	Copy of Partnership Deed or Memorandum as well as Articles of Association	As per NIT	-
7	Power of Attorney (Compulsory)	As per NIT	-
8	Last Five Financial Year IT Return.	As per NIT	-
9	Undertaking for Engaging Technical Staff & Machineries	As per NIT	96
10	Information regarding any litigation in which the applicant is involved	As per NIT	97
11	Last 5-Years Turn Over (year wise) for Civil Engineering Works certified by CA (for Bid Capacity Evaluation)	As per ITB Clause no 4.7 Bid Capacity	98
	OR Details of civil engineering works completed in last 5 financial year(submit 3A)		99
12	Details of “works on hand” and “works tendered by bidder, found lowest (11) & works likely to be awarded (for Bid Capacity Evaluation)	As per ITB Clause no 4.7 Bid Capacity	100
13	Undertaking on statement of compliance of clause 3.2	-	101
14	Affidavit (Notarized affidavit on 300 Rs Stamp Paper)	-	102
15	Form of Bid	-	76
16	Undertaking for bid Validity	-	92

UNDERTAKING FOR ENGAGING TECHNICAL STAFF & MACHINERIES

I/We.....

Age.....

Business (Name of Firm)
..... Address

Hereby declare, that if our offer for the work of
.....

.....
would accepted by the competent authority & Awarded to us, I/We will engage & employ the technical staff and machineries on site of work, required to complete the work successfully within time limit.

Signature of Bidder

Place:-

Date:-

INFORMATION ON LITIGATION HISTORY

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

DATE:
BIDDER

SIGNATURE OF

Notes:

1. Describe Company's history of litigation or arbitration from contract executed in the last ten years or currently under execution. Please indicate for each case the year, name of employer, cause of litigation, matter in dispute, disputed amount, and whether the award was for or against the company.
2. Please add any further information that you may consider to be relevant to the evaluation of your application. If you wish to attach other documents, please list below:

DETAILS OF LAST FIVE YEAR'S CIVIL ENGINEERING WORKS TURNOVER

1	Name of Firm		
2	Name of Partner/ Director		
3	Turnover for the Last Five Years, the Contract Receipts of Civil Engineering works.		
Sr. No.	Year	Multiplying Factor	Annual Turnover (Rs in Lakhs)
(1)	2020-2021	1.61	
(2)	2021-2022	1.46	
(3)	2022-2023	1.33	
(4)	2023-2024	1.21	
(5)	2024-2025	1.10	
(6)	2025-2026 (Base year)	1.00	

Signature

(Stamp of Chartered Accountant)

Unique Document Identification
Number: -

DETAILS OF CIVIL ENGINEERING WORKS COMPLETED IN LAST 5 FINANCIAL YEAR

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
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
1								
2								
3								

DATE:

SIGNATURE OF BIDDER

Notes:

1. Bidder shall also attach completion certificate (preferably in form-3A) for all the works listed in above table.

DETAILS OF “WORKS ON HAND” AND “WORKS TENDERED BY BIDDER, FOUND LOWEST (L1) & WORKS LIKELY TO BE AWARDED”

Sr. No.	Name of Work	Place	PART- I Work on Hand					PART-II Works tendered by bidder, found lowest (L1) & Works likely to be awarded				Remarks
			Tendered amount Rs, in Lakh	Date of issue of Work order	Stipulated period of completion (date)	Cost of work remaining to be executed as on the preceding month to the bid invitation month. Rs, in Lakh	Cost of work remaining to be executed During the time limit of an invited bid Rs. In Lakh	Tender Cost Rs. In Lakh	Time limit of work In Months	Date when decision is expected for award of work	Cost of work to be executed during the time limit of the invited bid. Rs, in Lakh	
[1]	[2a]	[2b]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[11]	[12]	[13]
1												
2												
3												

DATE:

SIGNATURE OF BIDDER

Notes:

1. For Part-I, the bidder shall furnish necessary certificates/documents from the concerned department.
2. In Part-II, the bidder shall furnish information for the other tenders wherein bidder's offer is found L1.

UNDERTAKING ON STATEMENT OF COMPLIANCE OF CLAUSE 3.2

I/We.....Age.....
Business (Name of Firm)
Address
Hereby declare, that for the work of
.....

I/We (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.

Signature of Bidder

Place:-.....

Date:-.....

Name of work:

AFFIDAVIT

(Notarized affidavit on 300 Rs Stamp Paper)

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

Letter of transmittal signed by authorized signatory
(MODEL AUTHORISATION LETTER TO BE PROVIDED BY THE AUTHORISED
SIGNATORY OF THE COMPANY/FIRM/OTHER ASSOCIATION OF PERSONS, ETC. ON ITS
LETTER HEAD)

TO BE PROVIDE AFTER ISSUE OF WORK ORDER

I/We..... do hereby authorize
Mr./Ms..... whose signature is set out below,
to represent me/us in connection with obtaining for the work of
..... He/she is duly authorized to sign all necessary
correspondence in this regard on our behalf His/her explanations / statements will be
binding on me/us without exception.

SPECIMEN SIGNATURE OF AUTHORISED
SIGNATORY

(Signature of Authorizing Authority)

Name & Designation (with seal)

Place:

Date:

ANNEXURE - 1

TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS

INDEX

Sr. No.	Particulars
1	Chapter-I: Work and Site Condition
2	Chapter-II: Special Condition
3	Chapter-III: Standard General Technical Specifications
4	Chapter-IV: Specification of Principal Materials
5	Chapter-V: General Specification of Concrete
6	Chapter-VI: General Specification of Reinforcement
7	Chapter-VII: Clearing the site & Excavation for Foundation including blasting
8	Chapter-VIII: General Specification of Back Filling
9	Chapter-IX: General Specification of Earthwork & Envelopes
10	Chapter-X: Care & Diversion of River Including Dewatering
11	Chapter-XI: General Specifications of Structural Steel
12	Chapter-II: Item Wise Detailed Technical Specification

CHAPTER-I
WORK & SITE CONDITION

WORK AND SITE CONDITION

INDEX

Sr. No.	Particulars
1	Introduction
2	Location
3	Communication
4	Brief Description of work
5	Labour
6	Housing
7	Water Supply
8	Drainage
9	Camp Regulations
10	Medical Aid
11	Power Supply
12	Roads
13	Post, Telegraphs & Telephone
14	Bank Facility
15	Supply of Petrol & Diesel
16	Materials

WORK AND SITE CONDITION

1.00 INTRODUCTION: -

I. GENERAL FEATURES OF THE PROJECT

Construction of 0.21 Lac. Lit. Cap. ESR at Ekalvindh Village, Tal. Bhachau, Dist. Kutch Under 15th F.C.

2.00 LOCATION:-

The proposed site of M.I. Scheme is situated as below: -

The proposed project site is situated near village Gurukrupa nagar, fatehgadh The nearest railway station is Adesar.

3.00 COMMUNICATION: -

The nearest city & town is Rapar is the capital place of Kachchh district. Nearest villages are connected through VRB & SH with district and taluka place.

4.00 Deleted

4.1 Proposed work consists of following: -

Construction of 0.21 Lac. Lit. Cap. ESR at Eakalvindh Village, Tal. Bhachau, Dist. Kutch Under 15th F.C.

This work includes

Construction of 0.25Lac. Lit. Cap. ESR work etc.

II. PRINCIPAL DETAILS OF WORK:

Works to be performed for the various items included in Bill of Quantities.

The above information is only a general outline and does not in any way limit, the performance of all work and supply of plant, machinery, all labour and materials necessary for completing the works as shown in the approved working drawing and mentioned in the specification.

No extra payment or claim on account of any additions or alteration in working drawing shall be admissible.

5.00 LABOUR:

Availability is good except showing and harvesting period. However, there may be shortage of skilled labour like masons, carpenters' operators, mechanics etc. However, the contractors shall have to make his own inquiry in this regard and quote his rates.

6.00 HOUSING:

Area being highly rural, there is no local housing arrangement available and contractor will have to make his own arrangements for his staff and labour etc. in the area as may be available on rental basis.

7.00 WATER SUPPLY:

The contractor shall have to make his own arrangements of water supply for this work. Fresh use of available water for work will be allowed free of cost to the contractor from the river length flowing in the construction areas and area transferred to Narmada Water Resources, W.S. & K. Department. Contractor shall have to make his own arrangement for Pumping, purification; storage tanks, pipe line etc. for the said purpose at his own cost.

8.00 DRAINAGE:

Suitable and adequate arrangement shall have to be made by the contractor for drainage of water around his colony and work spots. The contractor shall also have to install and maintain at his own cost suitable drainage system to dispose off sewage & solid waste from his colony. The labour colony layout shall be got approved from the Engineer-in-charge.

9.0 CAMP REGULATIONS:

The contractor shall be responsible for maintaining law and order in his camp and on his work, and shall employ such officers, watchman or other persons as required, unauthorized or undesirable persons shall be excluded from the camp and the work. If in the opinion (which shall not be questioned) of the Engineer-in-charge any employee or agent of the contractor misbehaves and/or causes obstructions in the proper execution or otherwise makes himself undesirable, the contractor shall on receipt of the instruction to do so remove him from the premises.

10.00 MEDICAL AID:

There is no dispensary on Project Site. However, there is a Government Hospital at Taluka Head Quarter. The Services of this Hospital will be available to contractor's staff and labour on payment of requisite charges as may be required to be paid by the agency at his risk & cost.

11.00 POWER SUPPLY:

Power supply shall be arranged by the contractor at their own cost. No power supply is guaranteed by the department.

12.00 ROADS:

The contractor shall construct and maintain the inspection roads and quarries roads for all purposes required during construction at his own cost. There will however be no charge for any reasonable use of any road constructed by Government at site of work. At present site is only approachable during fair weather.

13.00 POST, TELEGRAPHS & TELEPHONE:

Post office is available at taluka head quarter. Contractor shall make their own arrangements for telephone if required.

14.00 BANK FACILITY:

Branches of Nationalized Bank and other Schedule Banks are available at Taluka head quarter.

15.00 SUPPLY OF PETROL & DIESEL:

There is no petrol pump near Dam site. However, Petrol & Diesel will be available from Taluka Head Quarter.

16.00 MATERIALS: - (Quarry details are shown for guidance purpose only)

(a) WATER:

Water is scarily available in Dam vicinity area in summer season. Hence, contractor shall have to make his own arrangement and inquiry regarding this at his own cost.

(b) SAND:

Good quality natural sand will be used. However, sand of required quantity may not be available in reasonable lead. The contractor should arrange to obtain the sand of approved quality from any lead. No extra claim shall be admissible for extra lead.

(c) COARSE AGGREGATE (CRUSHED METAL):

The black stone crushed metal for concrete work should be procured by contractor from surrounded quarries. However coarse aggregate of required size & quantity may not be available in reasonable lead, the contractor should arrange to obtain the coarse aggregate of required size & of approved quality from any lead. No extra claim shall be admissible for extra lead.

(d) STONE:

The good quality black stone hard stone to be used in pitching / Masonry work. The contractor shall have to make his own inquiries regarding availability of above materials and other materials for work and accordingly he should quote the rates. If the materials of required standard are not available from the specified quarries, no extra lead will be payable by the department. Contractor should make his own arrangement to bring all quality materials from any lead without any extra cost to the Department.

Signature of Contractor

**Executive Engineer,
Panchayat Irrigation Dn.
Bhuj-Kachchh.**

CHAPTER-II
SPECIAL CONDITION

SPECIAL CONDITIONS

INDEX

Sr. No.	Particulars
1	Accuracy of Line, Level & Grades
2	Testing of Materials and works
3	Material mentioned in Schedule A –
4	Recovery of hard rock available from excavation
5	Loans of Government's Tools, Plant & Machinery
6	Assistance in Procurement of Properties, Permits, Import License, Exchange Facilities etc.
7	Security Measures
8	Applicability of Specifications
9	Change in Design & Drawings
10	Dewatering & Diversion as and where Required
11	Application of Publication
12	Inspection of work by third party
13	Working Drawing & Final Drawing

SPECIAL CONDITIONS

1.0) ACCURACY OF LINES, LEVELS AND GRADES:

The various works shall be done true to the line, levels, and grade. The periodical checking of these works by the government staff shall not absolve the contractor of his responsibility regarding the accuracy of lines, levels, and grades. In case of any deviation or discrepancy in line, level or grade at the meeting faces, the contractor shall have to make good the discrepancy at his own cost and without any extra compensation for the additional work involved. Whenever such discrepancy is found to arise at the junction of works of different contractors, the responsibility to set right such discrepancy lies with contractors concerned. The engineer in charge shall further have been unquestioned right if need to be rectify the discrepancies and recover the cost from the contractor or contractors according to proportion as he may consider reasonable.

2.0) TESTING OF MATERIALS AND WORKS:

- 2.1 All materials before being incorporated in the work shall be inspected visual & by common field tests according to GERI guidelines for Quality Control & Quality Assistance Vol.1,2002 and if necessary tested before being approved by the Engineer Any work on which such materials are used without prior inspection (and when necessary prior testing) and without approval or written permission of the Engineer- in - charge is liable to be considered as unauthorized, defective and not acceptable. Any additional test required to be carried out at any stage of the work as per instruction of Engineer - in -charge etc./ C.E (Q.C) / E.E (Q.C.) / D.E.E.(Q.C.) shall be carried out at department's cost, however sample test results are failed then retesting charges shall be borne by the contractor, but if sample test results are found ok, the Cost of testing charges of material shall be borne by the department.
- 2.2 The contractor shall, however, supply all material required for tests and also make good at his cost with materials, mixes, core holes and similar for other materials as may be directed by and to the satisfaction of the engineer in charge.

An authorized representative of the contractor shall have to remain present at the time when the sample or cores etc. are taken & shall be authenticated the facts, if so required. When the contractor's agent fails to remain present at aforesaid time, the sample or cores etc., taken by the engineer in charge or his representative shall be considered to be authentic. The contractor will, however, be informed about the details of such sample and cores etc. that have been taken.

2.3 The materials, mixes and cores etc. shall be tested at field laboratory / GERI / other government approved laboratory and the results given by them shall be considered correct and authentic. The contractor shall be given access to all operational tests that may be carried out as aforesaid, so that, he may satisfy himself regarding the procedure and methods adopted. It shall than be contractor's responsibility to carry out the finished item of work to the standard based on the laboratory design and test.

2.4 The method of sampling and testing and procedures and standard shall be as laid by respective IS code of practice and GERI manual / as mentioned in the tender.

2.5 (a) DESIGN MIX (DMC) OF CONCRETE:

Concrete mix design of stipulated or designated grades of concrete shall be carried out only at nearest GERI laboratory e.g., GERI, Vadodara All materials required shall be supplied, loaded, carted and unloaded at GERI Laboratory by contractor at his own cost. For M-10 mix design from Govt. approved laboratory shall be acceptable.

(b). NOMINAL MIX DESIGN (NMC) OF CONCRETE:

No mix design is necessary for nominal mix concrete. Nominal mix shall be carried out as per table mention .

GRADE OF CONCRETE	MSA IN mm	TOTAL QUANTITY OF DRY AGGREGATE (COARSE+FINE) BY MASS PER 50Kg OF CEMENT	WEIGHT OF COARSE AGGREGATE	WEIGHT OF FINE AGGREGATE	Cement	WATER-CEMENT RATIO
1	2	3	4	5	6	7
M-10	20	480Kg	320Kg	160Kg	50Kg	NOT MORE THAN 0.68
	40	480Kg	343Kg	137Kg	50Kg	
	80	480Kg	343Kg	137Kg	50Kg	
M-15	20	330Kg	220Kg	110Kg	50Kg	NOT MORE THAN 0.64
	40	330Kg	235Kg	95Kg	50Kg	
	80	330Kg	235Kg	95Kg	50Kg	
M-20	20	250Kg	166Kg	84Kg	50Kg	NOT MORE THAN 0.60
	40	250Kg	178Kg	72Kg	50Kg	
	80	250Kg	178Kg	72Kg	50Kg	

Preliminary test cubes of size 15x15x15cms shall be casted and tested for 7 days and 28 days, well before starting of actual work at departments own field laboratory / Govt. Approved laboratory at the cost of department.

- 2.6 The materials, mixes, cores etc. shall be tested day to day or periodically at the department's field laboratory set up at the site of work or nearby regional or district level GERI laboratory or Engineering/Polytechnic colleges in Gujarat or government approved (R&B, IRRIGATION Deptts. etc.) private laboratories where facility of testing is available as per BIS rules & regulation or Government approved private institutes and the results given there by shall be considered correct and authentic.

Out of total number of such tests, 80% tests will be carried out in site laboratory,

10% in Government approved laboratories and 10% in GERI laboratories. However minimum one test of all type of tests shall have to be carried out in GERI laboratories only. The choice of testing laboratory where test to be carried out shall on sole discretion of Engineer in charge. If there are any dispute regarding test results, GERI / NSIC / Govt. Engineering College, test results shall be final and binding to all. If test results of sample does not comply relevant BIS code further investigation shall be carried out as per BIS: 456-2000 or relevant BIS code of practice prior to rejection of work. The contractor shall be given access to all operations of tests that may be carried out as aforesaid so that he may satisfy himself regarding the procedure and methods adopted. It shall then be contractor's responsibility to carry out the finished items the standards based on the laboratory design and tests.

Site laboratories tests will be carried out by qualified Engineer of the contractor whom I Card is given by the Executive Engineer and in the presence of Section Office / Dy. Executive Engineer in charge of the work.

80% of site tests will not be carried out at one time but will be related to the progress of work and consumption of materials. Prescribed Registers for recording details and results of tests will be maintained on site of work. The tests which are not done in GERI laboratories e.g. electrometric bearing etc. will be carried out in the laboratory consented by the Executive Engineer.

One percentage of estimated cost of work put to tender for this work will be deducted from the Running Bills of contractors for testing of materials and workmanship. (G.R. B&C No. TNC-1085-(4)-C, dated 10-5-85)

- 2.7 The day to day and periodical tests to be carried out on materials, mixes, cores and placed concrete, mortar etc. shall be specified by the Engineer-in-charge from time to time and the contractor shall allow all facilities and co-operation toward collection of samples, transportation up to any laboratories, all labour for collecting samples, casting,

- testing of cubes shall be supplied by contractor without any extra payment.
- 2.8 Contractor shall have to establish the field laboratory at site as per the instruction of engineer in charge. The necessary equipment shall be kept duly calibrated in the field laboratory for the required Field test for concrete, FA, CA and Field soil testing for earth work. Contractor shall have to construct pucca underground curing water tank of minimum size 2.0 x 2.0 x 0.60 mt (or size as directed as per size of the project) at nearby site of work for curing of cubes as per Engineer's instructions. No extra payment shall be made for this to the contractor.
- 2.9 It shall be the responsibility of the contractor to provide clean water to fill the curing tank & maintain full water level in curing tank periodically and also maintenance of leak proof curing tank throughout the work without any extra payment for this.
- 2.10 Contractor shall have to provide sufficient 15 cm cube mould and skilled labours for laboratory and field tests of works and materials for activity such as:
- (i) Cleaning, fitting and unfitting of molds, oiling etc.
 - (ii) Carting of molds and placement in to curing tank.
 - (iii) Transporting the cubes from site of work to field laboratory for testing.
 - (iv) Helping in cube testing on compressive machine etc. All facilities for carrying out field test on various materials, mixes and cores shall be provided by contractor. No extra payment for the above work shall be made to the contractor.
- 2.11 The method of sampling and testing procedures and standard shall be as laid down by the Engineer-in-charge for respective items.

~~3.0 MATERIALS MENTIONED IN SCHEDULE "A":~~

- ~~3.1 It shall be noted that, owing to difficulty in obtaining certain materials in the open market, the government has undertaken to supply materials specified in the SCHEDULE 'A' of the tender form at the rate stated therein, the contractor shall not have right to claim compensation for delay, if any. The contractor is there for required to keep in touch with the day-to-day position of supply of materials and to adjust the progress of the work, so that their labour may not remain idle. No monetary claim what so ever shall be entertained by the government on account of delay in the supply of materials. **Useable hard rock available from dismantling existing pitching at site of work will be issued at rates mentioned in schedule A.**~~

4.0 RECOVERY OF HARD ROCK AVAILABLE FROM EXCAVATION:

- (1) As per Govt. of Gujarat N.W.R.W.S. and Kalpasar Dept. Order No. MI Cell /102010 /17 / (2) K-1, Dt.21/01/2014, for the hard rock, which is excavated from the work will be allotted to the agency. The **amount will be recovered at the rate Rs. 211 per Cum**

excluding GST(As per R&B SOR 2023-24). In addition, necessary royalty for these materials has to be paid by the agency as per prevailing rules and regulation to the Industries & Mines Dept. according to classification of materials. The quantity will be calculated as per instruction of Engineer-In-Charge. This fact should be kept in mind while quoting the tender rates of these items.

Recovery of hard rock shall not be made for excavation in hard rock by boring rigs or any other such special equipment utilized for excavation of diaphragm walls.

(2) OTHER MATERIALS:

Other materials required for the work shall be procured by the contractor. The specifications mentioned in the chapter of MATERIAL SECTION shall be applicable. ***The selected material for required quantity of earth work for respective item of work shall be brought from outside borrow area including all lead and lift, the contractor makes his own arrangement for obtaining materials from outside borrow area required without any extra cost, as borrow area is not available nearby the site of work due to forest land in vicinity. Also, contractor shall have to make his own arrangements for necessary land required for camp and plant & machinery installation without any extra cost.***

5.0 LOAN OF GOVERNMENT FOR TOOLS & PLANTS AND MACHINARIES:

The machinery and tools & plants as and where available with the department shall be supplied on hire as per rules and regulations and as per the provisions contained in Government PWD GR No- MCN / 167 / 97, Part-iv / h, dated 01-10-1980 and as amended from time to time. It must be also noted that the machineries or equipments justified for the use in the work and available with the department will be given on hire. No claim for delay in procurements of such machineries or equipment shall be entertained. At present no machineries or tools and plants are available with the departments.

6.0 ASSISTANCE IN PROCUREMENT OF PROPERTIES, PERMITS, IMPORT LICENCE, EXCHANGE FACILITIES ETC.

Generally, it shall not be realized in the normal course by the department for providing assistance in purchase of Tools & Plants and Machineries required for the execution of work, contracted for. However, the engineer in charge, on request by the contractor shall assist in the procurement of necessary import license, exchange facilities etc. for importing necessary plants & machineries, which is not locally available and engineer in charge deemed it in the interest of work and its progress. The government shall not however, be responsible for non-availability of any of the above facilities or delay. The contractor's application for import license etc. will be scrutinized by the engineer in

charge regarding the responsibility of the government etc. and recommendations will be made as deem fit. The decision of engineer in charge in this regard shall be final and no claim either in cost or delay in time will be admissible.

7.0 SECURITY MEASURES:

In view of the strategic importance of all the project and installations, security restriction may be imposed by the engineer in charge as per directions of the security authorities and the contractor shall abide by, to implement all such instructions scrupulously. In case a system of identity cards with photos is introduced, then the contractor shall have to provide the same to his personal at his cost. The identity cards shall be dully sign by engineer in charge. The contractor shall also keep informed regarding all visitors and obtain permits for their visitors. No unauthorized visitors will be allowed on site of work.

8.0 APPLICABILITY OF SPECIFICATIONS:

Considering the common general item required in executive of irrigation project, general subject wise specifications has been drawn and provide separately with the tender. This provision suitably provides requirements of execution of each component of work in general, consistent with the present practice of the scope of work & more of execution and standards to be observed etc. for the work. To avoid descriptive matter, suitable reference for the relevant IS (BIS) code or otherwise is also specified. The whole idea is to guide the tenderer regarding the execution of work, so as to base his rates accordingly. The general subject wise specifications are further supplemented in separate chapter to cover the item wise specification of work as per the Bill of Quantities of the tender. These item wise specifications shall cover the applicable provision of the general specification, considering the item description as per Bill of Quantities. Over and above this, the specific requirement of each item such as applicable lead and lift, proportion of concrete & mortar mix, description about the execution of the item in detail and other applicable aspects will be covered in detail/item wise specification. Intending tenderers are there for requested to read the tender papers on above lines and quote their rates.

9.0 CHANGE IN DESIGN AND DRAWINGS:

The drawings attached with tender documents are at present available data. However, during execution of work any change in design and drawing that may be warranted on account of strata met with or the materials that may be available or any reasons shall not vitiate the contract and no extra payment shall be made to the contractor. The variation in quantities under the relevant items on account of above changes shall be paid only as per the Clause 38 (Page No. 50) of Section 3 Conditions of Contract of SBD.

10.0 DEWATERING AND DIVERSION AS AND WHERE NEEDED:

If, there is no separately provision for dewatering, diversion of water and construction of temporary diversion road during construction in the fair weather as well as in the monsoon, the rates of respective item of works quoted by the contractor shall be consider inclusive of dewatering and diversion as and where needed with maintaining it during construction. In such condition no extra payment shall be made for dewatering & diversion of water, road diversion etc. Also, no payment shall be made for any part of earth work of materials washed away or damaged during monsoon or other period and it shall have to be made good by the contractor at his own cost. It is the responsibility of the contractor to make good, or repair any government property, materials to be utilized for the work or completed part of present work damaged during the construction period. If there is a separate item for care and diversion in the tender, then general technical specification for "care and diversion "shall be applicable.

11.0 APPLICABLE PUBLICATIONS:

All methods or procedure for execution of different items of work shall confirm to the INDIAN STANDARD (IS) now renamed as BUERO OF INDIAN STANDARD (BIS) Specifications. The latest addition shall be followed. Some of the important IS publications are listed below. The provisions of these IS specifications shall be applicable.

IS OR BIS CODE NO	VERSION	SUBJECT OF CODE
EXCAVATION AND EARTH WORK		
2720 Part-I	Latest	Method of test for soil-particle size and shape
2720 Part-III	Latest	Determination of water contents, dry density relation using light compaction.
2720 Part-IV	Latest	Grain size analysis
2720 Part-5	Latest	Determination of liquid and plastic limit
1498	Latest	Classification and identification of soil for general engineering purposes
2720-Part-III / sec-1&-2	Latest	Determination of Sp. Gravity
9429	Latest	Drainage system for earth and Rock fill dams
3764	Latest	Safety code for excavation work
CONCRETE WORK		
269	Latest	Specification for OPC cement
12269	Latest	Specification for 53 grade OPC cement

1489 Part-1 & 2	Latest	Specification for 53 grade PPC cement
432	Latest	Specification for MS & medium tensile steel bars
1786	Latest	Specification for HYSD bars
280	Latest	Specification for Binding wires
2336 Part I to VIII	Latest	Method of various tests for aggregate
383	Latest	Coarse and fine aggregate from natural sources for concrete
10262	Latest	Concrete mix designs
456	Latest	Plain & Reinforced concrete
457	Latest	Plain & Reinforced concrete for Dams & other massive structures
3873	Latest	Laying in situ cement concrete lining For canal
9556	Latest	Construction of diaphragm walls.
14334	Latest	Cost. Of diaphragms for under-seepage control.
MASONRY WORK		
2116	Latest	Sand for masonry mortar
1121	Latest	Testing for stone-Comp. Strength
1126	Latest	Testing for stone-Soundness
1124	Latest	Testing for stone-Water absorption
1526	Latest	Sand for plastering work.

**IS OR BIS CODE NO
OTHERS:**

VERSION

SUBJECT OF CODE

15068	Latest	PVC Water stop.
4985	Latest	PVC Pipes
2266	Latest	Wire Rope
11855	Latest	Rubber seal

IS OR BIS CODE NO

VERSION

SUBJECT OF CODE

458	Latest	Specification for pre-cast concrete pipes (With and without reinforcement)
3597	Latest	Methods of test for concrete pipes.
5382	Latest	Specification for rubber sealing rings for gas mains, water mains and sewers
516	Latest	Method of test for strength of concrete
783	Latest	Code of practice for laying of concrete pipes

12.0 INSPECTION OF WORK BY (PMC) PROJECT MANAGEMENT CONSULTANCY:

All the conditions and scope of work of Project management consultancy shall apply and shall be binding to the contractor if there is a provision for the same.

13.0 WORKING DRAWING & FINAL DRAWING :-

Initially working drawing shall be prepared & made by contractor at his own cost under instruction of Engineer. Final drawing shall be prepared in Auto CAD computerized drawing with C.D. for which amount of **Rs.3,00,000.00 (Rs. Three Lac only) shall be withheld till finalized the work.**

Signature of Contractor

**Executive Engineer,
Panchayat Irrigation Dn.
Bhuj-Kachchh.**

CHAPTER-III

STANDARD GENERAL TECHNICAL SPECIFICATIONS

CHAPTER-I

: STANDARD GENERAL TECHNICAL SPECIFICATIONS:

- 1.1 All the items occurring in the work and as found necessary during actual execution shall be carried out in workman like manner as per specifications below and as per written orders of the Engineer-in-charge.
- 1.2 A work order book as prescribed by the Engineer-in-charge shall be maintained on the site of work and the contractor shall carryout field compliance properly.
- 1.3 The contractor shall engage authorized representative who shall be responsible and competent for managing the work. He shall take orders from the Engineer-in-charge and shall be responsible for carrying out the same.
- 1.4 Quantities specified in the tender may vary at the time of actual execution and the contractor shall have not to claim for compensation on account such variation.
- 1.5 No trees shall be cut without permission of Engineer-in-charge.
- 1.6 Diversion for roads, if necessary, shall be provided and maintained during the currency of the contract without any extra cost to the Department.
- 1.7 The work shall be executed strictly in accordance with plans & specifications. Only the best materials and sound construction shall be executed in a through workman like manner.
- 1.8 The drawing prepared and trial pits taken are for general guidance and indication and changes either minor or major are likely to take place. No claim for extra payment shall be made by the contractor for such changes.
- 1.9 The quantities in the Bill of Quantities are only estimate quantities and during execution they may increase or decrease. Any claim put forward for this variation in quantity shall not be entertained.
- 1.10 The rejected materials shall be removed from the site within 24 hours. If they are not removed within this period, the same will be removed at the contractor's risk and cost by the Department.
- 1.11 The work is an important work, and this fact shall be constantly borne in mind by the contractors and his workers. Works not specified above shall be carried out according to P.W.D. Handbook or according to instructions of the Executive Engineer.
- 1.12 The work requires constant attention for line, levels, and workmanship and hence the contractor shall have to keep the experienced technical staff on the work. The contractor has to supply the necessary materials and labour for the line and levels work at his own cost.

- 1.13 The contractor unless otherwise specified and providing in the contract shall pay all duties, tolls, quarry fees, royalties and taxes on all materials and articles they may use. The rate quoted by the contractor shall be considered inclusive of all such duties, fees, royalties, taxes etc.
- 1.14 In the specification "as directed / approved" shall be taken to mean "as directed / approved" by the Engineer - in - Charge.
- 1.15 Wherever a reference to any India Standard appears in the specifications, it shall be taken to mean as reference to the latest edition of the same in force on date of agreement.
- 1.16 In "Mode of Measurement " in the specifications, wherever a dispute arises in the absence of specification of a particular point or aspect, the provision on these particular points or aspect in the relevant Indian Standard shall be referred to.
- 1.17 All measurement and computations, unless otherwise specified, shall be carried out nearest to the following limits: -
- | | | |
|-----|----------------------------------|--------------|
| (1) | Length, Width and Depth (Height) | 0.01 Meter. |
| (2) | Areas | 0.01 Sq. Mt. |
| (3) | Cubic Contents (Except Wood) | 0.01 Cumt. |
| (4) | Cubic Contents (Woodwork) | 0.001 Cumt. |
- In recording dimensions of work in measurement book the sequence of length, width and height (depth) or thickness shall be followed.
- 1.18 The distance with constitutes lead shall be determined along the shortest practical route and not necessarily the rout actually taken. The decision of the Engineer - in - Charge in this regard shall be taken as final.
- 1.19 Where no lead is specified, it shall mean "all leads ".
- 1.20 Lift shall be measured as per current practice for relevant item under direction or decision by Engineer-in-charge.
- 1.21 Definite particulars covered in the items of work, though not mentioned or include in it, specifications shall be deemed to be included therein.
- 1.22 Reference to specifications of materials as made in the detailed specification of the items of work is in the form of a designation containing the number of the specification of the material and prefix "M" i.e. "M-1 "etc.
- 1.23 Approval to the samples of various materials given by the Engineer-in-charge shall not absolve the contractor from the responsibility of replacing defective material brought on site or materials used in the work found defective at a later date. The contractor shall have no claim to any payment or compensation whatsoever on account of any such materials being rejected by the Engineer - in - Charge.
- 1.24 The contract rate of the item of work shall be for the work completed in all respects.

- 1.25 No collections of materials shall be made before it is got approved from the Engineer - in - charge.
- 1.26 Collection of approved materials shall be done at site of work in a systematic manner. Materials shall be stored in such a manner as to prevent damage, deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness for the work.
- 1.27 Materials if and when rejected by the Engineer-in-charge, shall be immediately removed from the site of work.
- 1.28 No materials shall be stored prior to, during and after execution of a structure in such a way as to cause or lead to damage or overloading of various components of the structure.
- 1.29 All works shall be carried out in a workman like manner as per the best technique for the particular item.
- 1.30 All tools, templates, machinery and equipment for correct execution of the work as well as for check line, levels, alignment of the works during execution shall be kept in sufficient number and in good working condition on the site of work.
- 1.31 The contractors shall be responsible for observing the rules and regulations imposed under the "Mine and Minerals Act "and such other laws and rules prescribed by Govt. from time to time.
- 1.32 All necessary safety measures and precaution (including these laid down in the various relevant Indian Standards) shall be taken to ensure the safety of men, materials and machinery on the works and also of the work itself.
- 1.33 Approval to any of the executed item for the work does not in any way relieved the contractor of his responsibility for the correctness, soundness, strength of the structure as per the drawings and the specifications.

Signature of Contractor

**Executive Engineer,
Panchayat Irrigation Dn.
Bhuj-Kachhh.**

CHAPTER-IV
MATERIAL SECTION
SPECIFICATION OF PRINCIPAL MATERIALS

CHAPTER-IV

SPECIFICATION OF PRINCIPAL MATERIALS

The following specifications are only for the principal materials of construction which are included in the details specifications of items and indicated the requirements of qualities of materials. They are given as guide and neither includes all the materials of construction nor exhibits all their desirable qualities. This should be supplemented by detailed specifications as per relevant IS Code unless otherwise not mentioned. The rate of all items is inclusive of all materials inclusive of all lifts and leads for the material unless otherwise specified in detailed specifications.

M-1 WATER:

The water to be used shall be potable water, clean & free from objectionable quantities of silt, organic matters alkali, salts and other injurious materials and shall be as per I, S. 456:2000. Water sample shall be tested in Government or Government approved laboratories, once before starting of work and then starting of new working season.

Permissible limit for some of the important parameters are as under.

	TEST	PERMISSIBLE LIMIT AS PER IS-456-2000
1	Organic solids	200 mg. per liters (max.)
2	Inorganic solids	3000 mg. per liters (max.)
3	Sulplates (as So ₂)	400 mg. per liters (max)
4	Chlorides (as Cl)	2000 mg./lit. for PCC. And 500 mg.lit.for RCC
5	Suspended Matter	2000 mg. per liters (max.)
6	Ph Value	Not less than 6

M-2 CEMENT:

Cement shall be ORDINARY PORTLAND CEMENT (OPC) of grade 53 confirming to IS-12269:2015. The cement shall be used OPC 53 grade but any of the above and the type selected should be appropriate for the intended use.

The contractor shall have to make his own arrangement to procure the cement bearing I.S.I. mark directly from the major cement manufacturing plants having installed capacity of one LACS tones per annum or its authorized dealers only. The contractor shall arrange to cart, load and unload the same to the site of work at his own cost. The cement brought to site shall be tested in Government or government approved laboratory as per provision in IS-12269.

The cement bags shall be neatly stacked in a orderly manner so as to afford easy access and count in a damp proof condition. If the consumption of cement exceeds

25.00 MT., then the cement shall be stored in tin shed godown or in a pucca godown, one feet above the ground, so as cement can be prevented from atmospheric effect. Deteriorated cement shall not be allowed to use.

The testing of the cement shall be done for each lot / consignment received on site. The frequency of the test shall be as under.

Quantity of Consignment	No. of Test Specimen
50 M.T.	1
100 M.T.	2
200 M.T.	3
300 M.T.	4
500 M.T.	5
800 M.T.	6
1300 M.T.	7
For each larger consignment	8

All physical tests required as per IS - 4031 (Part 1 to 6) – 1988 shall be carried out as per frequency mentioned in the table above. While the chemical test shall be carried out as per IS-4032-7986 one for ten physical test samples.

Each consignment shall be stacked separately and shall be used on the basis of first cum first used. The cement shall be used after testing only. Cement older than 90 days shall not be allowed to use.

The cement lot failed in testing shall be removed immediately from the site. A day-to-day account of cement received & used on the work together with the particulars of the work and quantity of the work and quantity of the work in which it was used, shall be maintained separately by the representative of the department, and shall be signed at the end of the day's work, both by the department's representative and the contractor.

M-3 SAND (FINE AGGREGATE):

All fine aggregate shall be natural river sand and shall confirm to IS-383 -2016. Sand shall be of natural river sand having F.M. from 2.1 to 3.2 for all concrete works. It shall be clean, well graded, hard, durable and strong and free from injurious amount of dust, clay, silt, kankar nodules, soft or flaky partices, shale, alkali, salts, organic matter, loam, mica or other deleterious materials.

Grading of the fine aggregate (sand) shall be as per Table – A given below. (IS-383- page No. 11 table-4)

TABLE - A

IS Sieve designation	PERCENTAGE PASSING FOR			
	Grading Zone –I	Grading Zone -II	Grading Zone -III	Grading Zone –IV
10 mm.	100	100	100	100
4.75 mm.	90-100	90-100	90-100	90-100
2.36 mm.	60-95	75-100	85-100	95-100
1.18 mm.	30-70	55-90	75-100	90-100
600 microns	15-34	35-59	60-79	80-100
300 microns.	5-20	8-30	12-40	15-50
150 microns.	0-10	0-10	0-10	0-15

Sand of grading zone - iv shall not be used for concrete work.

Limits of various deleterious materials in fine aggregate shall be as per mention below.table-B Sand for masonry mortar and plastering work shall only be used after screening through proper number screen and shall confirm to IS-2116 for masonry mortar and to IS-1526 for plaster work.

TABLE – B

Sr. No.	Deleterious Material	Limit (% by weight)	Remarks
1	Coal and Lignite	1	IS-383-1970-& IS-2386 (part-II)1963
2	Clay lumps	1	IS-383-1970-& IS-2386 (part-II)1963
3	Material finer than 75 micron IS sieve (Silt)	3	IS-383-1970-& IS-2386 (part-I)1963
4	Soft Fragment	-	IS-383-1970-& IS-2386 (part-II)1963
5	Shale	1	IS-383-1970-& IS-2386 (part-II)1963
6	Total % of all deleterious materials (except mica)	5	

STORAGE:

The fine aggregate should be stacked carefully on a clean and hard surface so that it should not be get mixed up with deleterious foreign materials, Segregation of heavier particles by sliding down may be not stacking in high conical heaps.

TEST:

The particulars of tests and frequency shall be as mention below.

TABLE - C

Sr. No.	PARTICULARS OF TEST	FREQUENCY	REMARKS
1	Gradation and F.M.	One test per 150 Cum of concrete/masonry work	IS-383-1970- & IS-2386-1963
2	Sp. Gravity and Water Absorption	Once for new quarry/change in source.	IS-383-1970- & IS-2386-1963
3	Silt Content	One test per 150 Cum of concrete/masonry work	IS-383-1970- & IS-2386-1963
4	Impact Value	Once for new quarry/change in source.	IS-383-1970- & IS-2386-1963

M-4 COARSE AGGREGATE:

The coarse aggregate for the use of making concrete and other purpose shall be of black stone crushed metal. It shall be clean, hard, durable & free from alkalis and other deleterious substance. The coarse aggregate shall be well grade and generally be cubical in shape. The gradation shall give a dense & water tight concrete of specified strength and consistency. The actual gradation shall be as indicated by the laboratory study.

GRADING:

The grading of the coarse aggregate shall be as per Table – A given below (IS-383:1970 Page No. 9 table - 2).

TABLE - A

IS Sieve designation	% Passing for graded aggregate of nominal size.			
	40 mm.	20 mm.	16 mm.	12.5 mm.
80 mm.	100	-	-	-
63 mm.	-	-	-	-
40 mm.	95 to 100	100	-	-
20 mm.	30 to 70	95 to 100	100	100
16 mm.	-	-	90 to 100	-
12.5 mm.	-	---	-	90 to 100
10 mm.	10 to 35	25 to 55	30 to 70	40 to 85
4.75 mm.	0 to 5	0 to 10	0 to 10	0 to 10
2.36 mm.	-	-	-	-

SIZE OF AGGREGATE:

The size of coarse aggregate for mass concrete shall be as Table – B given below (IS-383-Page No.-10 table – 3).

TABLE – B

CLASS	SIZE	IS Sieve Designation	% Passing
Very large	150 to 80 mm.	150 mm.	90 to 100
		80 mm.	0 to 10
Large	80 to 40 mm.	80 mm.	90 to 100
		40 mm.	0 to 10
Medium	40 to 20 mm	40 mm	90 to 100
		20 mm.	0 to 10
Small	20 to 4.75 mm	20 mm.	90 to 100
		4.75 mm.	0 to 10
		2.36 mm.	0 to 2

The nominal maximum size of coarse aggregate shall not be greater than one fourth of the minimum thickness of the member for PCC work, In case of RCC members maximum size of coarse aggregate shall be such so as concrete can easily place in the members without honey combing. It can be determined as follow.

(i) One fourth of the minimum thickness of the members. (ii) The minimum clear distance

between main bars minus 5 mm. (iii) The minimum cover to the reinforcement minus 5 mm. whichever is smaller. The minimum and maximum size of the aggregate shall be between 4.75 mm. to 80 mm.

DELETERIOUS MATERIALS:

Deleterious material as described and its acceptance criteria for coarse aggregate shall be as per IS-383-1970.

TESTING:

The material subjected to tests for gradation, flakiness and elongation, abrasion value, soundness crushing/ impact value, and deleterious materials etc. as per IS-383. Following is the acceptance limit.

- i) Flakiness and elongation : 30 % maximum.
- ii) Abrasion value. : 40 % maximum.
- iii) Soundness. : 12 % loss with Na₂SO₄ and 18 % loss with MgSO₄
- iv) Crushing value. : 45 % for concrete and 30 % for wearing surface.
- v) % of deleterious material. : 5 %
- vi) Sp. Gravity. : 2.5 Minimum.
- vii) Water absorption : 1.5 % maximum.

FREQUENCY OF TESTING:

The particulars of tests and its frequency shall be as mention below.

Sr. No.	PARTICULARS OF TEST	FREQUENCY	REMARKS.
1	Gradation	One test per 150 cum. Of concrete work.	IS-383-1970 & IS-2386-1963
2	Sp. Gravity and Water absorption	Once for new quarry/ change in source.	IS-383-1970 & IS-2386-1963
3	Flakiness and elongation.	Once for new quarry/ change in source.	IS-383-1970 & IS-2386-1963
4	Impact value.	Once for new quarry/ change in source.	IS-383-1970 & IS-2386-1963

STORAGE:

The aggregate of different size shall be stacked or batched or stored separately and handle in such a manner as to prevent intermixing of different size of aggregates. No foreign materials shall be allowed to be mixed up with the aggregates.

M-5 STONE (STONE RUBBLE):

The stone shall be of good quality hard stone. The stone shall be hard, sound, Durable and free from defect like cavities, cracks, sand holes, flaws, injurious veins, patches of loose or soft materials etc. & weathered portion & other structural defects to affect their soundness and strength. The stone with round surface shall not be used. The source of

the stone shall be got approved from the engineer in charges well before carting the same to site, the contractor shall have to arrange to cart, load, unload, stack the same to the site of work at his own cost from specified lead.

Weathered skin maximum up to 2 mm. thickness shall be allowed on one face of the stone only and shall not be more than 33 % of total number of stone used.

Stone to be used for masonry, shall confirm to IS-8605 for quality. Sample of stone from new quarries shall be tested for specific gravity, compressive strength, water absorption and soundness for once to ensure suitability of stones for masonry. The water absorption of stone shall not exceed limit of 5 % of dry weight after being kept in water for 24 hours and shall be in accordance with IS-1124. Compressive strength shall not be less than 200 kg/cm² for stones to be use in masonry.

Stone to be used for pitching, launching apron and such other application, shall be tested for specific gravity, water absorption, soundness/durability and watering test for once. Stone shall be tested in government or government approved laboratories.

FREQUENCY OF TESTING:

The sample of the stone shall be tested once before starting of the work for new quarry or change in source of supply or in case of doubt.

~~M-6 Galvanized Iron Pipes and Fittings~~

~~Galvanized iron pipe shall be of the medium duty type and of required diameter and shall comply with IS: 1239.~~

M-7 Structural Steel

- i. All structural steel shall conform to I.S.226. The steel shall be free from the defects mentioned in I.S. 226 and shall has a smooth finish. The material shall be free from loose mill scale, rust pits or other defects affecting the strength and durability. Rivet bars shall conform to I.S. 1148.
- ii. When the steel is supplied by the contractor, test certificates of them manufacturers shall be obtained according to I.S. 226 and other relevant Indian Standards.

M-8 Paints

- **Oil Paints: -**

Oil paints shall be of the specified colour and shade, and as approved. The ready mixed paints shall only be used.

However, if ready mixed paint or specified shade or tint is not available white ready mixed paint with approved strainer will be allowed. In such a case, the contractor shall

ensure that the shade of the paint so allowed shall be uniform.

All the paints shall need with the following general requirements.

1. Paint shall not show excessive setting in a freshly opened full can and shall easily be re-dispersed with paddle to a smooth homogeneous state. The paint shall show no curdling, livening, caking or colour separation and shall be free from lumps and skins.
2. The paint as received shall brush easily, possess good levelling properties, and show no running or sagging tendencies.
3. The paint shall not skin within 48 hours in three quarters filled closed container.
4. The paint shall dry to a smooth uniform finish free from roughness, grit unevenness and other imperfections.

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

- **Enamel Paints: -**

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

RED OXIDE PRIMER :

The Red oxide primer shall be of standard manufacturing company and approved by Engineer in charge. In case of big job/dispute, primer shall be tested in contractor. The red oxide primer shall confirm to I.S.-35-1975.

~~M-9 Fixtures and fastenings :~~

~~General:~~

~~The fixtures and fastenings, that is, butt hinges, tee and strap hinges, sliding door bolts, tower bolts, door latch, bath room latch, handles, door stoppers, casement window fasteners, casement stays and ventilators catch shall be made of the metal as specified in the item or its specifications.~~

~~They shall be of iron, brags, aluminium, chromium plated iron, chromium plated brass, copper oxidised iron, copper oxidised brass or anodised aluminium 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 anodised aluminium fixtures and fastenings shall be bright finished.~~

~~2. Holdfasts:-~~

~~Holdfasts shall be made from mild steel flat 30 cm. length and one of the holdfasts shall be bent at right angle and two nos. of 6 mm. diameter holes shall be made in it for fixing it to the Frame with screws. At the other end, the holdfast shall be forked and bent at right angles in opposite directions.~~

~~3. Butt hinges:-~~

~~Railway standard heavy type butt hinges shall be used when so specified. Tee and strap hinges shall be manufactured from M.S. Sheet.~~

~~4. Siding door bolts (Aldrops):-~~

~~The aldrops as specified in the item shall be used and shall be got approved.~~

~~5. Tower bolts (Barrel Type):-~~

~~Tower bolts as specified in the item shall be used and shall be got approved.~~

~~6. Door latch :-~~

~~The size of door latch shall be taken as the length of latch.~~

~~7. Bathroom Latch :-~~

~~Bathroom latch shall be similar to tower bolt.~~

~~8. Handle:-~~

~~The size of the handles shall be determined by the inside grip length of the handles. Handles shall have a base plate of length 50 mm. more than the size of the handle.~~

~~9. Door Stoppers:-~~

~~Door stoppers shall be either floor door stopper type or door catch type. Floor stopper shall be of overall size as specified and shall have a rubber cushion.~~

~~10. Door Catch :-~~

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

~~11. Wooden Door Stop with hinges :-~~

~~Wooden door stop of size 100 mm x 60 mm x 40 mm shall be fixed on the door frame with a hinge of 75 mm size and at a height of 900 mm. from the floor level. The wooden door stop shall be provided with 3 coats of approved oil paint.~~

~~12. Casement window Fastener:-~~

~~Casement window fastener for single leaf window shutter shall be left or right handled 14 as directed.~~

~~13. Casement stays (Straight Peg Stay) :~~

~~The stays shall be made from a channel section having three holes at appropriate position so that the window can be opened either fully or partially as directed. Size of the stay shall be 250 mm. to 300 mm. as directed.~~

~~14. Ventilator Catch:-~~

~~The pattern and shape of the catch shall be as approved.~~

~~15. Pivot:-~~

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

~~M-10 Teak wood:-~~

~~The teak wood shall be of good quality as required for the item to be executed. When the kind of wood is not specifically mentioned, good Indian teak wood as approved shall be used.~~

~~Teak wood shall generally be free from large, loose, dead or cluster knots, flaws,~~

~~shakes, warps, twists bends, or any other defects. It shall generally be uniform in substance and of stright fibres as far as possible. It shall be free from rot, decay, harmful fungi and other defects of harmful nature which will affect the strength durability of its usefulness for the purpose for which it is required. The colour shall be uniform as far as possible. Any effort like painting, using any adhesive or resins materials made to hide the defects shall render the pieces liable to rejection by the Engineer in-charge.~~

~~All scantlings; planks etc. shall be sawn in straight lines and planes in the direction of grains and of uniform thickness. The tolerances in the dimensions shall be allowed at the rate of 1.5 mm. per face to be planed.~~

~~First class teak wood:-~~

~~First class teak wood shall have no individual hard and sound knots, more than 6 sq. cm. size and the aggregate area of such knots shall not be more than 1% of area of piece. The timber shall be closed grained.~~

~~Second Class Teak wood:-~~

~~No individual hard and sound knots shall be more than 15 sq. cms. in size and aggregate area of such knots shall not exceed 2% of the area of piece.~~

M.11 Glass:

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

~~Sheet Glass:~~

~~In absence of any specified thickness or weight in the item or detailed specifications of the item of work, sheet glass shall be weighing 73 Kg/Sq.m. for panes upto 600 mm x 600 mm. For panes larger than 600 mm. x 600 mm. and upto 800 mm. x 800 mm. the glass weighing not less than 8.75 Kg/Sq m. shall be used. For bigger panes upto 900 mm. x 900 mm. glass weighing not less than 11.25 Kg/Sq. m. shall be used.~~

~~Sheet glass shall be paten, flattened glass of best quality and for glazing and framing purposes shall conform to I.S.: 1761-1960. Sheet glass of the specified colours shall be used, if so shown on detailed drawings or so specified. For important buildings and for~~

~~panes with any dimension over 900 mm. plate glass of specified thickness shall be used.~~

Plate Glass:

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

Obscured Glass :

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

Wired Glass:

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

M-12 THERMO MECHANICALLY TREATED (TMT) H.Y.S.D. STEEL ::

The thermo mechanically treated, popularly known as TMT H.Y.S.D. steel shall conform to IS-1786. The steel shall be procured by the contractor and grade of steel shall be Fe500D. The contractor shall make suitable arrangement for storage of the steel at site. In any circumstances steel produced by re-rolling mills shall not be allowed to use. The steel shall be free from loose mill scale, rust oil, grease, or any other harmful matter. The contractor shall have to procure steel bars directly from manufacturers having BIS certification or its authorized dealer. The contractor shall have to produce original voucher / bill (Retail invoice or Tax Invoice). For the same along with physical and chemical test report whenever asked by engineer in charge for the same.

The mechanical properties of the steel shall be as mention below.

TABLE – A (IS-1786-2008)

STRENGTH & DESIGN RATIO	MECHANICAL PROPERTIES			BEND TEST		REBEND TEST	
	YIELD STRESS (YS)	TENSILE STRENGTH (TS)	ELONGATION % ON GAUGE LENGTH (EL)	Up to & incl. 20mm. dia.	Over 20mm. Dia	Upto & incl. 10mm. dia	Over 10mm. dia.
	N/mm ²	N/mm ²		☉	☉	☉	☉
1	2	3	4	5	6	7	8
Fe415	415	10 % more than the actual Ys but not less than 485 N/mm ²	14.5	Mandrel Dia=3 mm	Mandrel Dia=4 mm	Mandrel Dia=5 mm	Mandrel Dia=7 mm
Fe500 D	500	10 % more than the actual Ys but not less than 565 N/mm ²	16	Mandrel Dia=3mm	Mandrel Dia=4 mm	Mandrel Dia=4 mm	Mandrel Dia=6 mm

NOTE: The sample shall be considered to have passed in the bend test if there is no transverse crack in the bent portion. The sample shall be considered to have passed in the re-bend test if there is no fracture in the bent portion.

The chemical composition of the steel shall be as mention below.

TABLE-B (IS-1786-2008)				
CONSTITUENT	PERCENTAGE MAXIMUM			PERMISSIBLE VARIATION
	Fe 415	Fe 500D	Fe550	% max
Carbon	0.3	0.3	0.3	0.02
Sulphur	0.06	0.055	0.055	0.005
Phosphorus	0.06	0.055	0.05	0.005
Sulphur & phosphorus	0.11	0.105	0.1	0.01

TESTING:

Testing of steel shall be done for each of bars at the frequency mention in table-C below or less of steel in government or government approved laboratory to known the physical properties of steel bars, like nominal mass, 0.2 percentage proof stress/yield stress, Elongation percentage, Tensile strength, Bend and Re-bend test. And chemical test shall be done one for every ten physical test sample.

TABLE-C (Table-5, Page-17 of IS-1786)			
FREQUENCY FOR NOMINAL MASS, TENSILE BEND AND REBEND TESTS			
NOMINAL SIZE IN mm	QUANTITY		
	FOR CASTS/BEATS BELOW 100 TONNES	FOR CASTS/BEATS OVER 100 TONNES	
Under 10 mm	One sample from each 25 tonnes or part thereof	One sample from each 40 tonnes or part thereof	
10mm to 16 mm inclusive	One sample from each 35 tonnes or part thereof	One sample from each 45 tonnes or part thereof	
Over 16mm	One sample from each 45 tonnes or part thereof	One sample from each 50 tonnes or part thereof	

TESTING CHARGES:

The testing charges shall be recovered from the contractor.

MEASUREMENT:

For the purpose of payment, the bar shall be measured correct up to 10mm in length

Unit weight of bars shall be computed as per weight given in IS-1786-2008.

Specification for Indian steel or at the rate specified below:

TABLE-D (Table-1, Page-11 of IS-1786)			
BAR DIA.	UNIT WEIGHT	BAR DIA.	UNIT WEIGHT
In mm	Kg / Rmt.	In mm	Kg / Rmt.
6	0.222	22	2.98
8	0.365	25	3.85
10	0.617	28	4.83
12	0.888	32	6.31
16	1.58	36	7.99
18	2.00	40	9.85
20	2.47	50	15.42

M-13 BINDING WIRE:

The binding wire for tying reinforcement shall be of soft & annealed TMT steel conforming to IS-280. The diameter of wire shall be of 1.63mm or 1.22mm (16 or 18 gauge). The use of black wire shall be permitted for binding reinforcement bars. It shall be free from rust, oil paint, grease, loose mill scale or any other undesirable coating which may prevent adhesion of cement mortar.

M-14 Bricks

~~14.1. The bricks shall be hand or machine molded and made from suitable soils and kiln burnt. They shall be free from cracks and flaws and nodules of free lime they shall have smooth rectangular faces with sharp corners and shall be of uniform colour.~~

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

~~14.2. The size of modular bricks shall be 190 mm. x 90 mm. x 90 mm.~~

~~14.3. The size of the conventional bricks shall be as under :~~

~~———— (9" x 4.3/8" x 2,3/4") 225 x 110 x 75 mm.~~

~~14.4. Only bricks of one standard size shall be used on one work. The following tolerances shall be permitted in the conventional size adopted in a particular work.~~

~~———— Length + 1/8" (3.0 mm.) Width ± 1/16" (1.50 mm.) Height + 1/16" (1.50 mm.)~~

~~14.5. The crushing strength of the bricks shall not be less than 35 Kg/Sq. Cm. The average water absorption shall not be more than 20 percent by weight necessary tests for crushing strength and water absorption etc. shall be carried out as per I.S. 3495 (Part I to IV) — 1976~~

Signature of Contractor

Executive Engineer,
Panchayat Irrigation Dn.
Bhuj-Kachchh.

CHAPTER – V
GENERAL SPECIFICATION OF CONCRETE

CHAPTER-V

GENERAL SPECIFICATION OF CONCRETE

1.0) MATERIALS:

1.1) CEMENT: Specification m-2 of specification of material section shall apply.

1.2) WATER: Specification m-1 of specification of material section shall apply.

1.3) FINE AGGREGATE (SAND): Specification m-3 of specification of material section shall apply.

1.4) COARSE AGGREGATE: Specification m-4 of specification of material section shall apply.

2.0) SCOPE OF WORK:

The work covered by this chapter consists of furnishing all materials, equipment and labour for the manufacturing, transporting, placing, finishing and curing of concrete in the structure included in these specifications and performing all the functions necessary and ancillary to the work. The item of concrete may be split up into several items according to the grade of concrete to be used and its location and shall be measured and paid for accordingly. The general specifications described hereafter shall; however, be relevantly apply to all concrete items.

3.0) COMPOSITION:

Concrete shall be composed of cement, fine aggregate (natural sand), coarse aggregate, water & admixture (if asked) well mixed in proportion & brought to the proper consistency. The design mix or nominal mix proportions shall be adjusted to produce a durable and workable concrete suitable for specified conditions of placement and design strength.

4.0) PREPARATION FOR PLACING CONCRETE:

Specification laid down in IS-457 shall be applicable. Generally, no concrete shall be placed until all form works, installation to parts to be embedded and preparation of surface involved in the placing have been approved. Method of depositing the concrete shall be subject to approval. All surface of forms and embedded materials that have become encrusted with dried mortar or grout and from the concrete previously place, shall be cleaned. The foundation bed and sides shall be carefully cleaned stiff brooms, picks, jets of water and air applied at high velocity or other effective means, followed by thorough washing. Before placing of concrete, water shall be removed from depositions and foundation surface shall be left uniformly damp. All that surfaces shall then be coated with mortar about 2cms thick in case of rock surface and cement slurry in case of concrete/masonry surface.

5.0) PLACING OF CONCRETE:

Specification laid down in IS-457 shall be applicable. Placing of concrete shall only be undertaken in presence of authorized representative of engineer in charge. Contractor shall

have to inform department well in advance and in writing, so that necessary inspection, before placing concrete can be taken over and only after approval of engineer in charge, placing of concrete can be done. The concrete shall be deposited as nearly as practicable in its final position to avoid rehandling. The concrete shall be placed and compacted before initial setting of concrete commences and should not be subsequently disturbed. Method of placing should be such as to preclude segregation. Care should be taken to avoid displacement of reinforcement or movement of formwork. As a general guidance, the maximum permissible free fall of concrete may be taken as 1.50mt.

6.0) CLASSIFICATION:

For all items of concrete in any portion of the structure or its associated works, shall be of nominal mix or design mix as specified in specification of item or as decided by engineer in charge as per provision made in IS-456 Page No-23 clause-9.3. The cement concrete works to be carried out are classified in grades as mentioned in item of work. Following table is provided for general guidance to the contractor. There may be change in criteria like water cement ratio, slump, aggregate size, and proportion etc., for which contractor is bound to carry outwork without claiming any extra cost. The cement level mention in the Table:- AA, given below are tentative and for general guidance only. The design mix or nominal mix for different grade of concrete to be used will be furnished by the department.

TABLE: - AA

SR. NO.	GRADE OF CONCRETE	MSA	Min.Avg. Comp. Strength of 3-Specimen AT FIELD ON 15X15X15 cms CUBE	Min.Avg. Comp. Strength Of 3-Specimen AT LAB. ON 15X15X15 CMS. PRELIMINARY TEST CUBE	MIN. CEMENT LEVEL REQ. AS PER IS PCC/RCC	CEMENT LEVEL CONSIDER IN THE RATE PCC/RCC	MAX. W/C RATIO PCC /RCC	REMARKS
1	2	3	4	5	6	7	8	9
		mm	kg/cm ² at 28 days	kg/cm ² at 28 days	kg/cum	kg/cum		
1	M-15	20	150	208	240	300	0.60	
2	M-15	40	150	208	240	280	0.60	
3	M-10 Nominal Design Mix Concrete	40	100	158	Not available	205	0.60	
4	M-20 SPILLWAY SKIN CONCRETE	20	245	266	250	360	0.5	FOR P.C.C SEVERE TO VERY SEVERE & FOR R.C.C MILD EXPOSURE CONDITION FOR
					300	360	0.55	
		40	245	266	220	330	0.5	
					270	330	0.55	
		80	245	266	N.A.	310	-	
5	M-20 TREMMIE CONCRETE FOR DIAPHRAGMW ALL	20	245	266	N.A.	310	-	FOR P.C.C EXTREME & FOR R.C.C MODERATE EXPOSURE CONDITION FOR
					300	440	0.6	
		40	245	266	-	382	-	
					290	382	0.45	
		80	245	266	-	-	-	
6	M-25	20	250	316	300	380	0.5	
7	M-25	40	243	270	270	360	0.55	FOR P.C.C EXTREME & FOR R.C.C MODERATE EXPOSURE CONDITION FOR

NOTES:(Conditions)

- 1 Concrete works classified as above shall be designed with reference to the field strength shown in above table. Other requirements shall have to be adjusted to obtain this strength in each case incl. cement level indicated in above table.
- 2 Compressive strength mention in column no-4 is characteristic compressive strength given in table-2, based on clause No.-6.1.1, Page-15 of IS-456. And it is the average characteristic compressive strength of three specimens.
- 3 Compressive strengths mentioned in column no-5 is based on para-9.2.2 (page no-22) of IS-456-2000 (The target mean strength of conc. Mix should be equal to the characteristic strength plus 1.65 times the std. deviation.). Standard deviation of 3.5 is taken for M-10 & M-15, 4.0 is for M-20 as per IS-456, Page-23, Table-8.
- 4 The test result of the sample shall be the average of the strength of three specimens. The individual variation should not be more than (+) or (-) 15 percentage of the average.
- 5 The characteristic strength compliance requirement mentioned in column No-4 & target mean strength mentioned in column No-5, are based on 'GOOD QUALITY CONTROL' and MODERATE exposure condition.
- 6 For every one kg of cement required to be reduced than that of stated in column No-7 of Table-AA in each case based on approved laboratory design mix / nominal mix, **the recovery shall be made at Rs. 5.445 per kg of cement excluding GST.** And for every one kg of cement required to be added than that of stated in column No-7 of Table-AA, in each case based on approved laboratory design mix / nominal mix, NO EXTRA payment shall be made.
- 7 Curing period shall be 21 days (min.) for O.P.C. /P.P.C. cement.
- 8 Above details are primarily given for the guidance of contractor while quoting their tender rate and is only informative for the general requirement of concrete.

7.0) ACCEPTANCE CRITERIA:

- i) COMPRESSIVE STRENGTH: The concrete shall be deemed to comply with the strength requirements when both the following conditions are met.
 - a) The mean strength determined from any group of four consecutive test results compiles with the appropriate limits in col-2 of Table-11 given on Page No-30 of IS-456-2000.
 - b) Any individual test results comply with the appropriate limits in col-3 of Table-11 given on Page No-30 of IS-456-2000.

8.0) PROPORTIONS FOR NOMINAL MIX CONCRETE:

The proportion of materials for nominal mix concrete shall be in accordance with IS - 456

-2000, Page NO-23, Table-9, given in following table:

GRADE OF CONCRETE	TOTAL QUANTITY OF DRY AGGREGATE BY MASS PER 50Kg OF CEMENT TO BE TAKEN AS THE SUM OF THE INDIVIDUAL MASSES OF FINE AND COARSE AGGREGATE, (IN Kg) Max	PROPORTION OF FINE AGGREGATE TO COARSE AGGREGATE (BY MASS)	QUANTITY OF WATER PER 50Kg OF CEMENT, Max
1	2	3	4
M-10	480	GENERALLY, 1:2 BUT SUBJECT TO AN UPPER LIMIT OF 1:1.5 AND A LOWER OF 1:2.5	34
M-15	330		32
M-20	250		30

NOTE: The proportion of the fine to coarse aggregate should be adjusted from upper limit to lower limit progressively as the grading of fine aggregates becomes finer and the maximum size of coarse aggregate becomes larger. Graded coarse aggregate shall be used.

Example:

For an average grading of fine aggregate (that is Zone-II of Table-4 of IS-383), the proportions shall be 1:1.5, 1:2 and 1:2.5 for maximum size of aggregates 10mm, 20mm and 40mm respectively.

Nominal mix shall be carried out at field laboratory or in government / Govt. Approved laboratory, in case of field laboratory facility not available. ~~In such case, the charges of the same shall be borne by the department.~~

The details are further tabulated in the table below.

GRADE OF CONCRETE	MSA IN mm	TOTAL QUANTITY OF DRY AGGREGATE (COARSE+FINE) BY MASS PER 50Kg OF CEMENT	WEIGHT OF COARSE AGGREGATE	WEIGHT OF FINE AGGREGATE	Cement	WATER-CEMENT RATIO
1	2	3	4	5	6	7
M-10	20	480Kg	320Kg	160Kg	50Kg	NOT MORE THAN 0.68
	40	480Kg	343Kg	137Kg	50Kg	
	80	480Kg	343Kg	137Kg	50Kg	
M-15	20	330Kg	220Kg	110Kg	50Kg	NOT MORE THAN 0.64
	40	330Kg	235Kg	95Kg	50Kg	
	80	330Kg	235Kg	95Kg	50Kg	
M-20	20	250Kg	166Kg	84Kg	50Kg	NOT MORE THAN 0.60
	40	250Kg	178Kg	72Kg	50Kg	
	80	250Kg	178Kg	72Kg	50Kg	

NOTE: 1) FINE AGGREGATE(SAND) SHALL CONFIRM TO ZONE-II OF TABLE-4 OF IS-383(FM :

2) GRADED COARSE AGGREGATE SHALL BE USED. FOLLOWING DATA ARE FOR GENERAL GUIDANCE ONLY.

MSA	PROPORTION OF COARSE AGGREGATE IN %			
in mm	4.75-10mm	10-20mm	20-40mm	40-80mm
1	2	3	4	5
80mm	10	15	35	40
40mm	15	35	50	-
20mm	40	60	-	-

3) PRELIMINARY TEST CUBES OF SIZE 15X15X15cms SHALL BE CASTED AND TESTED FOR 7 DAYS AND 28 DAYS WELL BEFORE STARTING OF ACTUAL WORK.

4) MIX DESIGN IS NOT NECESSARY FOR NOMINAL MIX.

9.0) DESIGN MIX CONCRETE:

The design mix shall be designed to produce the grade of concrete having the required workability and a characteristic strength and target mean strength not less than appropriate values given in table-AA column-4 & 5 respectively. Mix design done earlier not prior to one year may be considered adequate for later work provided there is no change in source and quality of the materials. The design mix shall be carried out in Govt. laboratory (GERI) / Govt. Approved laboratory.

10.0) FORMS FOR CONCRETE:

IS-457 shall be applicable.

i) GENERAL:

The forms for concrete work shall have sufficient strength and rigidity to hold and to withstand the pressure of fresh concrete during compaction, incl. live load and shaped to the required line within the tolerance specified. The tolerances specified are for finished concrete surface and not for the forms. For further details regarding design, details, etc reference may be made to IS-14687. As far as possible; the forms shall be of steel material. The supports shall be so arranged to keep the maximum deflection within $1/360$ of the span. Suitable devices shall be used to hold corners, adjacent ends of panels of other forms together in accurate alignment, during compaction of concrete by vibrator or other means. The forms and their joints shall be tight enough to prevent loss of mortar or water from concrete while vibrating. The contractor shall be responsible and liable to pay all claims and compensation arising from any loss or damage to life and property due to any deficiency, failure of centering or the temporary works.

ii) FORM SHEATHING OR LINING:

In general, forms for permanently exposed surface shall consist of or shall be lined with steel plate metal or with water resistant plywood or wooden sheathing of lining shall be so treated or coated that there will be no chemical deterioration of formed concrete surface. The forms shall be able to withstand restorations caused by placement and vibration of concrete and the workmanship used in the form construction shall be such that formed surface after being treated will conform to the requirement of these

specifications.

iii) ABSORPTIVE FORM LINING:

Absorptive form lining, where directed to be used, shall be of the type and quality approved by the engineer in charge. The form lining shall be highly absorptive to air and water and through its absorptive capacity shall be able to eliminate voids, pits and common defects from concrete and without damage to the surface. The lining itself and treatment employed in its manufacture shall neither discolour the concrete nor interfere with normal chemical reaction of the cement. Specification laid down in IS-457 shall be applicable for absorptive form lining.

iv) FORM TIE:

Embedded metal rods used for holding the forms shall remain embedded and shall terminate not less than 30mm for MSA-40mm and 50mm for MSA-80mm clear of the formed faces of concrete. Embedded wire ties for holding forms shall only be permitted. Specifications laid down in IS-457 shall be applicable.

v) CLEANING AND TREATMENT OF FORMWORK:

Surface of forms shall be kept free from encrustations, mortar, sawdust, chippings etc that would contaminate the concrete. The surface of formwork in contact with the concrete shall be cleaned and treated with form release agent approved by engineer in charge. Release agents should be applied so as to provide a thin uniform coating to the forms without coating the reinforcement.

vi) ERECTION OF FORMS:

Where forms for continuous surface are placed in successive units, the forms shall fit tightly over the complete surface, so as to prevent leakage of mortar from the concrete and to maintain accurate alignment of the surface. Forming of block joints to the concrete portion shall be done carefully to ensure smooth joints and avoid sharp deviation, projections or edges and particular attention shall be paid in setting and tightening the forms to ensure that the contraction joint's surfaces are in accurate alignment & plumbs. Specifications laid down in IS-457 shall be applicable.

vii) REMOVAL OF FORMS:

viii) In general specifications laid down in IS-457 and IS-456-2000 shall be applicable. However stripping time will be decided by engineer in charge based on minimum strength to be attained by the concrete for safe removal of forms.

11.0) COMPACTION:

Concrete shall be thoroughly compacted and fully worked around the reinforcement, around embedded fixtures and into corners of the formwork. Concrete shall be compacted using mechanical vibrators, over vibration and under vibration of concrete should be avoided.

12.0) FINISHES AND FINISHING:

Specification laid down in IS-456 & IS-457 shall be applicable.

13.0) CONCRETING FOR R.C.C.:

Concreting for R.C.C. Shall be applicable as per concern IS code considering amendments there in. It shall also apply general specification of concrete for diaphragm appended here with.

14.0) CURING AND PROTECTION:

Concrete shall be protected against injury until final acceptance. Unhardened concrete shall be protected from heavy rains and flowing water. No fire or excessive load shall be permitted near or indirect contact with the concrete at any time Concrete shall be kept continuously moist for 21 days or as instructed by engineer in charge ~~Curing compound can be utilized for vertical and sloping surface. If curing compound is to be used, it shall be of approved quality and shall be tested in the laboratory, at the cost of the contractor..~~

15.0) REPAIRS TO CONCRETE:

Repairing of concrete shall be carried out at contractors cost by skilled workers. All imperfections of the concrete surface shall be corrected to obtain the surface of concrete that confirm to the Repairs of imperfection in concrete shall be completed with- in 24 hrs. After removal of forms. Concrete with excessive surface depression or suppression, honeycombed, fractured or other- wise defective concrete shall be removed and redone at contractor's cost. Specification laid down in IS-457 shall be applicable.

16.0) BATCHING AND MIXING EQUIPMENTS:

All ingredients of the concrete should be used by mass only except water. Batching shall be done either by automatic computerized/electronic weigh batcher or by mechanical weigh batcher attached with concrete mixer each size of aggregate & sand shall be weighed separately for design mix concrete. The equipment and its operation shall at all times be subject to the approval of the engineer in charge. Calibration of weigh batching shall be done periodically. Steel measuring boxes of adjustable bottom shall only be allowed in special circumstances, for very small quantity of concrete and subjected to prior written permission of engineer in charge.

17.0) MIXING:

Specification laid down in IS-457 shall be applicable. The mixing of concrete shall be done in a batch mixer of such approved type as will ensure the homogeneous mixing of ingredients. The ingredients shall be fed into the mixer simultaneously. A small portion (5 to 10%) of water be fed first and remaining water shall be added uniformly and simultaneously when all other materials are in the mixer. Mixing time shall be generally 2 minutes or as instructed by the engineer in charge.

18.0) HANDLING AND CONVEYING:

Specification laid down in IS-457 shall be applicable. The handling and conveying of concrete from the mixer to the place of final deposit shall be done as rapidly as practicable and without any objectionable separation or loss of ingredients. Whenever the length of haul from the mixing plant to the place of deposit is such that the concrete unduly compacted or segregates, suitable agitator's type conveying system shall be used. Where, concrete is being conveyed on chutes or on belts, the free fall or drop shall be limited to 1.50mt unless otherwise permitted. Concrete shall be placed within 30 minutes after mixing and by method which will prevent segregation and loss of ingredients. The distance between the mixer and place of concreting and also mode of transport of concrete shall be subject to the prior approval.

19.0) DEPOSITING CONCRETE UNDER WATER:

Specification laid down in IS-457 shall be applicable. Concrete shall not be deposited under water, if it is practicable to dewater the area and place the concrete in a regular manner. If it is found necessary to deposit any concrete under water, the method, equipment, materials and mix shall first be approved by the engineer in charge. Concrete shall not be placed in running water.

20.0) QUALITY CONTROL RELATED:

Contractor shall have to provide skilled laborer's, materials and facilities for all type of field and laboratory, quality control tests, transporting materials and c.c. cubes from field to laboratories shall have to be carried out by the contractors. No extra payment shall be made for this. The specifications laid down in relevant IS shall be applicable for method of taking test samples, method of testing and test equipments etc.

i) COMPRESSIVE STRENGTH TEST AND FREQUENCY OF TEST:

The concrete for test specimens for compressive strength shall be collected at random. The compressive strength test of concrete shall be conducted on 150x150x150mm size cubes. The frequency of test sample shall be as per IS-457 for massive structures and components like dams and its related works, canal structures, bridges, and other massive structures. Generally, not less than one set of samples (six cubes) shall be

taken from approximately each 380 cum or part of it per day per shift per mixer for plain concrete and from 190 cum or part of it per day per shift per mixer for R.C. concrete for massive structures as per IS-457. For non-massive structures, building and its related works, canal lining etc, frequency of test shall be as per IS-456-2000.as shown in the table-DD below.

TABLE –DD AS PER IS-456-2000

QTY OF CONC. IN THE WORK	No OF SAMPLE(SET) FOR TEST
1-5 CUM	1
6-15 CUM	2
16-30 CUM	3
31-50 CUM	4
51 AND ABOVE	4+1FOR EACH ADDITIONAL 50CUM OR PART THEREOF

NOTE: At least one sample shall be taken from each shift, where concrete is produced at continuous production unit, such as RMC plant. or as instructed by engineer in charge. The 28 days field and laboratory average compressive strength shall not be less than that mention in table-AA above.

i) SLUMP TEST:

In order to test the consistency of the mixed concrete, slump test shall be taken as per IS-1199-2018

ii) PRELIMINARY TEST:

During the progress of work, preliminary tests shall be conducted periodically by the contractor apart from the field tests, to ascertain the 7 day and 28-day laboratory compressive strength

iii) OTHER TEST:

Additional tests, if deemed necessary for concrete to determining unit weight & air content, will also be carried out by the contractor in government approved lab/GERI. The frequency of all the tests mentioned above shall depend on the nature of job & will be decided by the engineer in charge. The contractor shall have to provide all necessary facilities and materials etc. for these tests. No extra payment shall be made for these.

iv) ACCESS TO TESTING:

The contractor or his representative shall have access to and to associate with sampling and tests of trial mixes, and other field and laboratory tests. It shall be the responsibility of the contractor to associate himself with the work of test in govt. lab. And in the field

and shall have to sign record. It shall be responsibility of the contractor to obtain on work, the concrete of quality density and strength corresponding to laboratory designs.

v) **CHECK TESTS FOR EQUIPMENTS:**

The contractor shall provide standard test, weigh and other necessary equipment required for checking the performance of each scale or other measuring device. The test shall be made in presence of representative of engineer in charge and frequency of such tests shall be in general fortnightly or as decided by the engineer in charge.

vi) **RECORD OF CONCRETING OPERATIONS:**

A systematic joint record in the form approved by the engineer in charge shall be maintained to record the details regarding weighing, number of mixes of concrete, rejected mixes and locations at which concrete is used.

21.0) ANCHOR IN CONCRETE:

Anchor bolts, rods, structural shapes, plate & bearing required in connection with installation of gates etc. and other apparatus of the same shall be supplied free of cost by department and shall be placed, erected and embedded in concrete by the contractor for which no extra shall be made to facilitate first stage and second stage concrete. Due care shall be taken to obtain well finished surface after removal of forms, eliminating the necessity of subsequent repairs. The responsibility to maintain level and position of embedded parts during and after concreting and removal of centering shall rest with contractor. Full co - operation for the embedment of main anchorage for gate, horizontal and vertical girders, bottom and side seal girders, track plants, guide rails etc. and hoisting mechanism inclusive of the shaft arrangement, hoist platform etc. shall be extended by the contractor.

22.0) UNACCEPTABLE WORK:

All defective concreting work including but not limited to defects arising out of honey comb without claiming any extra payment. Acceptance criteria will be in accordance with provisions of IS-456 and IS-457

Signature of Contractor

**Executive Engineer,
Panchayat Irrigation Dn.
Bhuj-Kachhh.**

CHAPTER-VI

GENERAL SPECIFICATION OF REINFORCEMENT

CHAPTER - VI

GENERAL SPECIFICATION FOR REINFORCEMENT WORK

1.0) MATERIALS:

- ~~1.1) M. S. BARS: Specification m-8 of section of materials shall apply.~~
- ~~1.2) HYSD BARS: Specification m-6 of section of materials shall apply.~~
- 1.3) TMT BARS: Specification M-12 of section of materials shall apply.
- 1.4) BINDING WIRES: Specifications of M-13 of section of materials shall apply.

2.0) SCOPE OF WORK:

Scope of work shall include supplying all materials and labour for cutting, bending, binding, reinforcement, dowels, anchor, etc. Required quantity of steel shall be procured by the contractor at his own cost.

3.0) REINFORCEMENT WORK:

Steel reinforcement bars shall be placed in position where concreting is to be done, after cutting & bending as shown in the drawing or as directed. Steel bars shall be cleaned of objectionable foreign substances like rust, scale, dirt, grease, oil, etc. before placing in position by means of bolts in concrete blocks, metallic chairs, rangers, spacers or other suitable devices at sufficient close intervals as directed so they will neither sag between support nor be displaced during the placing of concrete nor by any operations of work. Special care shall be exercised to prevent any disturbance of the reinforcement, after being placed in position and it shall be maintained in clean condition until it is completely embedded in concrete to prevent further damage to the concrete or unsightly rust stain on exposed concrete surface. Reinforcement shall not be straightened or bent in manner that will injure or weaken the material. Bars with kinks or bend not shown in the drawings shall not be used. Bars shall be bent to the shapes and dimensions shown in the drawings or as directed, using a bar bender, operated by hand or power. The radius for bends along the edge of bar shall not be less than 4 times the diameter of the bar. Heating of bars to facilitate bending will not be permitted, except for large diameter of bars. The reinforcement available from rejected concrete shall not be used. Reinforcement may be fixed in position by means of anchor rods, supporting and hanger, rods as approved by the engineer. In difficult locations, tack welding of bars at isolated spots may be permitted to keep these bars in position.

4.0) COVERS:

Concrete cover to the reinforcement shown in drawing or as directed shall be maintained by providing cement mortar (1:2) blocks of same w/c ratio as the concrete to be used in the particular work. Sufficient concrete cover shall be provided to protect reinforcement from erosion and shall be as shown in the drawing or as directed. But it shall not be less than 5cms and more than 10cms, depends upon type of structures and exposure condition.

Cover of concrete shall be as per the detailed drawings. Unless shown otherwise on the drawings, the minimum thickness of concrete cover to any reinforcement material measured from the outside surface of concrete to the bar center line shall be as per IS: 456 – 2000 tabulated below.

Table: Nominal cover to meet durability requirement as per IS: 456 – 2000 (Clause 26.4.2)

Exposer	Nominal concrete cover in mm not less than
Mild	20 mm
Moderate	30 mm
Severe	45 mm
Very severe	50 mm
Extreme	75 mm

Note :For main reinforcement up to 10 mm dia for mild exposure condition nominal cover may be reduced by 5 mm Actual cover should not deviate by more than 10 mm on plus side and zero on minus side.

For longitudinal bars in column, nominal cover shall not be less than 40 mm or dia of bars whichever is more. For column of dimension of 200 mm & under, where rein bar do not exceed 12 mm in dia, nominal cover of 25 mm be used. For footing main cover shall be 50 mm.

5.0) BINDING:

Wire for tying reinforcement shall confirm to specifications of materials. All reinforcement bars shall be tied securely by binding wires, so as to transfer the stresses easily. All main bars and distribution bars shall be tied with each crossing, so that spacing of bars remains accurate and cannot displaced during concreting operation.

6.0) SPLICING / DEVELOPMENT LENGTH.:

Bar splices as indicated in the drawing or as specified by the engineer shall only be allowed. The lapped ends shall be placed to ensure full bond on each bar. The

development length shall be calculated as per clause no-26.2.1 page no-42 & clause no-26.2.5.1 page no-45 of IS-456-2000 for tension bars/main steel. And for distribution bars/temp. reinforcement bars/skin reinforcement bars, it shall be 30 times the diameter of bars. Laps splices shall not be used for bars larger than 36 mm, for larger diameters, bars may be welded in cases where welding is not practicable, lapping of bars larger than 36 mm may be permitted, in which case additional spirals should be provided around the lapped bars. The bars to be spliced shall be lap or butt welded by electric welding in the manner specified without loss of strength. Suitable means shall be provided for holding the bars accurately in position during the welding process. Welded joints shall be provided in terms of length of bar equal to 40 times the diameter of the bars. The welded joints shall be staggered as directed. Three percent of the welded joints shall be tested for the tensile strength. Splicing shall not be done in the region of maximum bending moment & splicing of adjacent bars shall be avoided as far as possible. Also splices shall be suitably staggered.

7.0) INSPECTION BEFORE CONCRETE:

No concreting shall be started unless the reinforcement as laid finally checked and recorded by engineer in charge or by his representative.

8.0) ANCHOR BARS:

Anchor bars and rods are required in connection with installation of gates, etc. shall be supplied by the contractor or by department, as per tender provision, shall be placed in the concrete as shown in the drawing or as directed. No extra payment shall be made for placing of anchor rods.

9.0) DOWEL BARS:

Dowel bars as required for anchoring concrete face to the masonry shall be placed on masonry as shown in the drawing or as directed and included under reinforcement work.

10.0) TESTING:

Testing of steel shall be done for each size of bars as per provision mentioned in specification of materials in government or government approved laboratory.

Signature of Contractor

**Executive Engineer,
Panchayat Irrigation Dn.
Bhuj-Kachhh.**

CHAPTER-VII
GENERAL SPECIFICATION OF EXCAVATION,
CLEARING THE SITE AND
EXCAVATION FOR
FOUNDATION INCLUDING BLASTING

CHAPTER-VII

CLEARING THE SITE AND EXCAVATION FOR FOUNDATION INCLUDING BLASTING

1.0) SCOPE OF WORK:

The work to be done under this specification shall consist of clearing the site, excavation in different type of strata as mentioned in item of works and disposal of excavated material within lead and lift mention in the item of works. The scope of work also incl. of furnishing all tools, plants and labour and materials required to carry out excavation and maintaining the slope of excavated trenches by way of artificial manner (strutting) also, if required so.

2.0) CLEARING THE SITE:

The item of clearing site as given below shall be considered as included in the excavation and shall not be paid for separately, if there is no separate item of work for this in the tender.

REMOVAL OF RUBBISH:

The area to be occupied under the work shall be made free from rubbish and shall be cleared of all rocks, stumps, decayed timbers, bush and all other objectionable materials.

DISPOSAL OF WASTE MATERIAL FROM SITE CLEARANCE:

Waste materials decided as such by the engineer, obtain from clearing the site, shall be burnt or removed as directed by the engineer.

REMOVAL OF LOOSE ROCK ETC.:

Before any work of excavation is taken up, all loose rocks semidetached rock in or close to the area to be excavated, that is liable to fall or otherwise endanger the work or workmen shall be stripped. The methods employed shall be such as will not shatter or render unsuitable and therefore make unsafe the ground that was original sound or safe. Any material not requiring removal as contemplated herein, but which may latter become loosened or unsuitable shall be promptly and satisfactorily removed the cost of

such clearing shall be deemed to have been incl. in the rate of different item of excavation.

3.0) CLASSIFICATIONS:

The work under excavation shall be divided into item as under.

(A) EXCAVATION IN OVERBURDEN:

This shall include all excavation in strata other than soft and hard rocks such as soil, clay sand soft murrum kantar, hard murrum and boulders or mixture of above strata through boring rig for diaphragm. Hard murrum and boulders shall include all kinds of disintegrated rock or shale or indurated sand or conglomerate interspersed with boulders less than 0.70 cubic meter and larger than 0.03 cubic mt. which do not need blasting and can be removed by pick bar and shovel.

(B) EXCAVATION IN SOFT ROCK:

This shall include all excavation in strata soft rocks through boring rig for diaphragm which can removed with a pick bar and shovel by little more force & efforts or with special equipments required but which do not come under the category of hard murrum and boulders.

(C) EXCAVATION IN HARD ROCK:

This shall include all excavation in rock occurring in masses, which can be best removed by blasting but it also includes excavation through boring rig for diaphragm. This shall also include rock required to be removed by chiseling rock breaker etc. when blasting is not permitted.

4.0) PAY LINE:

The pay line shall be sloping as 1:1 (H: V) in overburden, 0.50:1 (H: V) in soft rock and 0.25:1 (H: V) in hard rock as the case as per the item of work.

- a) When actual depth of foundation is taken lower than proposed foundation levels, the pay line shall be the line starting from the limiting lines of structure at actual foundation level & sloping at the rate specified above.
- b) When actual depth of foundation is taken above than proposed foundation levels, the pay line shall be the line confirmed to appropriate slopes excavated on the basis of width required for proposed foundation levels but ending at the level of actual foundation.
- c) No payment shall be made for work done beyond the specified pay line, mentioned above.

- d) The contractor shall, however, be permitted to excavate at flatter slopes in the interest of stability and safety of work without any extra cost if site condition permit so.
- e) In the event of actual line of excavation being steeper than that specified under pay line above, payment shall be made for actual line of excavation only.
- f) Over cut beyond specified pay line of excavation carried out by the contractor for any purpose or reasons, unless at the specified direction of engineer in charge, shall be at the expense of the contractor. Refilling required of such unauthorized excavation with suitable materials, as directed by the engineer shall also be done by the contractor at his expense.

5.0) SHORING AND STRUTTING:

Any shoring and strutting that may be required during excavation and progress of work shall be deemed to be covered in the rate quoted for the respective item of work.

6.0) SLIPS: GOVERNMENT NOT RESPONSIBLE:

The contractor shall be bound to take necessary precautions to avoid any slips. But if any slip occurs on account of any reasons, no claims shall be entertained for such slips and their consequences, and the excavation shall be properly restored to stability for design & drawings of diaphragm.

7.0) DISPOSAL OF EXCAVATED MATERIALS:

The excavated material shall be disposed of within specified lead and lift mentioned in the respective item of work and manner as directed by engineer. Any useful materials what's so ever, shall be stacked separately and in the manner, as directed by engineer-in-charge. The directions of engineer in charge shall be binding in respect of location and manner for disposing off the waste and stack of useful materials within specified lead and lift mentioned in the respective item of work. The contractor shall however, use such of the stones, obtained from excavation in masonry work / pitching / road metal / rock fill etc as engineer in charge deemed fit for the use. The sorting /stacking of useful excavated materials is a must and inclusive in the quoted rates for the item of excavation. After sorting of useful materials is done, the rest of the materials which are declared not useful shall be disposed of in the areas on the downstream. Waste shall be levelled and trimmed to a reasonable regular line and level.

8.0) FINAL FINISHED SURFACE OF FOUNDATION:

After rough excavation through boring rig for diaphragm to the required depth is completed, scaling & trimming of all loosen rock shall be carried out by chisels and wedges or by suitable equipments. All weathered or partly decomposed pieces of rock remaining in foundations, shall be removed. Areas of low bearing capacity, steep, inclined seams, faults & crushed zones in an otherwise good foundation, if permitted to be kept, shall be cleaned off to a stuffiest depth before starting masonry or concrete. Where seams, joints, cavities, or other defect are found in an otherwise satisfactory foundation, such defects shall be corrected by excavation of open trenches to the lines, depth and dimensions as directed by the engineer in charge. The surface shall be rough, free from steps, angle and the edges of benches shall be chamfered approximately at 45 degrees. While preparing the foundation, it will be seen that neither along the length of the dam nor across shall the foundation have slopes exceeding angle of internal friction on rock and masonry. The finally finished foundation surface shall be tested by striking with a 7/8-pound hammer. If any loose portion of foundation is revealed by a hollow sound, the same shall be removed by wedging, chiseling etc. till a good clear ringing sound (for the case of hard rock strata) is obtain from the rock or as decided by engineer in charge.

9.0) ~~BLASTING:~~

~~In conducting blasting operations, proper precautions shall be taken for the protection of persons, the work and property. All prevailing government laws and rules relating to the design and location of magazine, transport and handling of explosives & other measures enacted for prevention of accidents shall be strictly observed. Warning signals shall be prominently displayed on all magazines. Similar proper warning signals shall be given before actual blasting.~~

1) ~~STORING OF EXPLOSIVE:~~

~~Explosives shall be stored in a safe place and at a safe distance from the work and under the special care of watchman as per rules, so that in case of accidents no damage occurs to other part of the work. Explosive detonators and fuses shall be stored separately. No objections certificate from the District Magistrate or Inspector of Explosives, Gujarat, shall be obtained by the contractor as required.~~

2) ~~RESTRICTION ON BLASTING:~~

~~a. No blasting which may disturb or endanger the stability, safety or quality of the~~

~~foundation shall be permitted.~~

~~b. Blasting within 15 mt. of masonry work in progress or a permanent structure, shall not be permitted.~~

~~c. Progressive blasting shall be limited to the one third of the total remaining depth of excavation.~~

~~d. blasting limit shall be 30 mt for heavy blasting & 15 mt for light blasting with shallow holes.~~

~~e. No large scale blasting operation shall be resorted to when the foundation excavation reaches the last 0.75 to 1.0 mt. Only small charges, preferably of small size gelatin/black gun powered may be allowed, so as to prevent shattering of the foundation.~~

~~f. In order to have periodic review, it would be almost necessary to excavate the foundation in limit depth or one meter after three meter excavation from the surface after three meter excavation from the surface use of ammonium nitrate must be dispensed with.~~

10.0) RULES FOR BLASTING OPERATIONS:

a. GENERAL:

~~The contractor shall acquaint himself with all the prevailing laws and rules & regulations concerning storing, handling and the use of explosives All such laws, regulations& rules etc. as in force from time to time shall be binding upon the contractor.~~

b. MATERIALS:

~~i) All materials such as explosives, detonators, fuses, tamping, materials etc. that are proposed to be used in the blasting operations shall have prior approval of the engineer in charge.~~

~~ii) Black powder and safe explosive shall be used wherever possible. Explosive with nitroglycerin shall be used only under exceptional circumstances& where the above explosives are ineffective.~~

~~iii) The use of fuse with only one protective coat is prohibited.~~

c. PERSONAL:

~~i) Excavation by blasting will be permitted only under personal supervision of competent and licensed persons and trained workmen.~~

~~ii) All supervisors and workmen in charge of makeup, handling, storage and blasting work shall be adequately insured by the contractors.~~

~~iii) The storage shall be in charge of very reliable persons. The contractor shall have to produce a security for the person in charge of the explosives if and as required by the civil authorities of the district.~~

~~iv) The contractor shall make sure that his supervisors and workmen are fully conversant with all the rules to be observed in storing, handling, and use of explosives. It shall be ensured that the supervisor in charge is thoroughly acquainted with all the details.~~

~~d. PROCUREMENT:~~

~~i) The contractor will be the sole responsible for procurement of explosive.~~

~~ii) The contractor shall, if required by him, build a magazine or bring portable one for storing the explosive.~~

~~iii) A careful & day to day account of the use of explosive shall be kept by the contractor in an approved register and approved manner.~~

~~iv) The magazine shall at all times be kept scrupulously clean. All the rules and regulations under explosive law for magazine management, maintenance, handling and safety shall be followed.~~

~~v) Notice shall be hung near the store prohibiting entrance of unauthorized persons.~~

~~e. USE OF EXPLOSIVE:~~

~~For the transport of explosives and detonators, closed and strong container made of soft materials such as timber, copper, lather etc. and like materials shall be used confirming the latest provision under handling, transportation and use of explosive rules and regulations. Latest provisions under explosive rules and regulations shall be followed for the use of explosives.~~

~~f. CHARGING OF HOLES:~~

~~i) The work of charging shall not commence before all the drilling work at the site is completed and the supervisor has satisfied himself to that effect by actual inspection.~~

~~ii) While charging open lamps shall be kept away. For charging with powered explosives, naked flame shall not be allowed.~~

~~iii) Only wooden tamping rods without any kind of metal on them shall be allowed to be used.~~

~~iv) Bore holes must be of such a size that the cartridges can easily pass down them.~~

~~v) Only one cartridge shall be inserted at a time and gently pressed into the hole with the tamping rod. The sand, clay or other tamping material used for filling the holes completely shall not be tamped too hard.~~

~~g. BLASTING:~~

~~Blasting shall only be carried out during fixed hours of the daytime after prior written approval of engineer in charge.~~

~~ii) The site of blasting shall be prominently demarcated by red danger flags. A siren with~~

~~a range of one km radius shall be utilized for warning. All the labours work immediately get safe shelters.~~

~~iii) All the roads and footpaths etc. leading to blasting shall be detached.~~

~~vi) Blasting shall be carried out in such a way, so as not to disturbed the banks of the canals & its structures, Dam structures, other surrounding structures etc.~~

~~11.0) ELECTRICAL FIRING:~~

~~i) Only the supervisor in charge shall keep the key of the firing apparatus.~~

~~ii) Special apparatus shall be used as the source of current for blasting.~~

~~iii) All the detonations shall be checked before use.~~

~~iv) For blasting in one series, only detonators of the same manufacture and of the same group of electrical resistance shall be used.~~

~~v) Such of the electric lines, shall be removed from the site.~~

~~vi) The use of earth as a return line shall not be permitted.~~

~~vii) The firing cable shall have a proper insulation cover.~~

~~viii) Before firing, the circuit shall be checked by a suitable apparatus.~~

~~ix) After firing, the source of current shall be cut off before any persons are Allowed to leave the shelter.~~

~~x) During storms, charging with electrical detonators shall be suspended.~~

~~12.0) PRECAUTIONS AFTER BLASTING:~~

~~i) After the blast, the supervisor shall carefully inspect the work and satisfy himself that all charges have exploded.~~

~~ii) For underground work, the workmen shall only be allowed to go to face after toxic gases got evacuated.~~

~~13.0) MISFIRING:~~

~~i) If it is suspected that part of the blast has failed to fire or is delayed, sufficient time shall be allowed to lapse before entering the danger zone.~~

~~ii) Neither drilling near the holes that have misfired, nor redrilling the hole shall be permitted.~~

~~iii) The supervisor of the blasting operation shall have to report to the office regarding all cases of misfire, the cause of misfire and steps taken in connection therewith.~~

~~14.0) LIGHT AND CONTROLLED BLASTING:~~

~~Where heavy or wet blasting operations are prohibited or are not practicable, excavation in hard rock / bhat rock strata shall only be carried out using light and controlled blasting technique under strict supervision of expertise persons and department. All the specifications and precautions mentioned above shall be applicable for here also.~~

~~15.0 EXCAVATION BY USING MECHANICAL HAMMER / ROCK BREAKER/ PNEUMETIC DRILLS:~~

~~Where heavy or wet blasting and light & controlled blasting operations are prohibited or are not practicable, excavation in hard rock/bhat rock strata shall only be carried out by using mechanical hammer / rock breaker or pneumatic drills or by manual chiseling using crowbars, pickaxes etc. for the excavation of diaphragm.~~

~~16.0 RECOVER OF HARD ROCK AVAILABLE FROM EXCAVATION:~~

~~As per Govt. of Gujarat N.W.R.W.S. and Kalpsar Dept. Order No. MI Cell /102010 /17 / (2) K-1, Dt.21/01/2014, for the hard rock, which is excavated from the work will be allotted to the agency. The amount will be recovered at the rate Rs. 211 per Cum excluding GST(AS per r&b sor 2023-24). In addition, necessary royalty for these materials has to be paid by the agency as per prevailing rules and regulation to the Industries & Mines Dept. according to classification of materials.~~

~~The quantity will calculate as per instruction of engineer In Charge. This fact should be kept in mind while quoting the tender rates of these items.~~

~~**No recovery shall be made for hard rock for excavation in hard rock through boring rig for diaphragm wall purpose only.**~~

Signature of Contractor

Executive Engineer,
Panchayat Irrigation Dn.
Bhuj-Kachchh.

CHAPTER - VIII

GENERAL SPECIFICATION OF BACK FILLING

GENERAL SPECIFICATION OF BACK FILLING

1 BACK FILLING THE TRENCHES:

Back fill is defined as excavation refilled upto the ground line by embankment material which is required to be placed in the excavation space after the structure is built up above the normal ground level. All back fill shall be carefully brought to the line and grades as shown or as directed.

All back filling shall be compacted around the structure by means of rollers of mechanical, pneumatic and/or hand tampers including requisite watering. This back fill shall be either of the excavated stuff or from borrow areas of selected soil specified as under :

2 EXCAVATED STUFF:

Back fill, with excavated stuff in the foundation trenches and other works, wing wall, training walls, etc. when not filled up by concrete shall be filled up by heavy rubble or impervious type of soil free from other deleterious materials obtained from excavation as per drawing and as per direction of Engineer-in-charge. It shall be back filled and compacted as shown on the drawing or as directed by the engineer. The rubble shall be used from excavated materials as quantity specified in Schedule-'A' also.

3 FROM BORROW AREA:

In the case, when back fill quantities are not met with which are not available from compulsory excavations of work, shall be obtained from the designated borrow areas.

The depth of cut in all parts of borrow areas shall be limited to designated depth only.

Borrow areas shall be cleaned and stripped by the contractor at his own cost to a depth necessary to obtain materials of desired quality.

All borrow areas shall be operated with certain amount of regularity having regard to convenience of the work during execution and to the safety and appearance of the work after its completion. Decision of engineer in charge will be final.

Temporarily road leading to and from the borrow areas to site of work shall be constructed and maintained by the contractor at his cost for which no payment shall be made.

The contractor is expected to have his own assessment and inquiries carried out before tendering for the work. No claims shall be entertained in future due to lack of conformity between the nature of the materials actually met with during construction and that indicated in borrow area plan. If, suitable is brought from other places by the contractor for his own conveniences, no extra payment shall be made.

Signature of Contractor

**Executive Engineer,
Panchayat Irrigation Dn.
Bhuj-Kachhh.**

CHAPTER - IX

GENERAL SPECIFICATION OF

EARTHWORK & ENVELOPES

CHAPTER - IX

GENERAL TECHNICAL SPECIFICATION FOR EARTH WORK & ENVELOPES

1.0) PREPARATION OF WORK AREA:

- i) **CLEANING THE SITE:** Cleaning and grabbing shall be done in work area & borrow area as directed by engineer in charge. The site should be cleared of all trees, stumps, roots, bush, rubbish and all other objectionable matters. All such materials shall be removed from the site or burnt as directed so as not to interfere with the construction operation and shall be disposed of as directed by engineer in charge. All trees shall be cut down to at least 0.6 mt below ground level. The department will indicate the specific areas which need to be cleared up and decision of the engineer in charge in this connection shall be final and binding to the contractor. The measurements and payment shall be made as mentioned in the detailed technical specification of clearing the site of work. If there is no separate item for clearing the site, then rate of respective items for striping, earth work etc shall be considered inclusive of clearing the site and no extra payment shall be made for clearing the site of work.
- ii) **STRIPPING:** The entire area of embankment from u/s to d/s toe, continuous with the area of embankment as shown in the drawing, shall be stripped to a sufficient depth (max. up to 30 cms) as directed to remove unsuitable materials as mentioned in the detail technical specification of respective item of stripping. The stripping shall be carried out in far enough in advance of the other items of works to ensure that no undesirable materials get mixed up with approved embankment materials and to allow for inspection and measurement. The payment for stripping shall be done as per respective item of work.

2.0) BORROW AREAS:

GENERAL:

- i) Materials required for embankment or C.O.T. or back fill which are not available from compulsory excavations of work, shall be obtained from the designated borrow areas.
- ii) The depth of cut in all parts of borrow areas shall be limited to design depth only. Borrow areas shall be cleaned and stripped by the contractor, at his own cost to a depth necessary to obtain materials of desired quality. As no borrow area available nearby site of work due to forest land, the contractor has to make own arrangement for necessary borrow area for required quantity of selected materials as per items of work including all lead & lift without any extra cost.
- iii) All borrow areas shall be operated with certain amount of regularity having regard to convenience of the work during execution and to the safety and appearance of the work after its completion. Decision of engineer in charge will be final.

- iv) Temporarily road leading to & from the borrow areas to site of work shall be constructed and maintained by the contractor at his own cost for which no payment shall be made
- v) The contractor is expected to have his own assessment and inquiries carried out before tendering for the work. No claims shall be entertained in future due to lack of conformity between the nature of the materials met with during construction and that indicated in area plan. If, suitable is brought from other places by the contractor for his own convenience, no extra payment shall be made.

PREPARATION OF BORROW AREA:

All areas required for borrowing earth for embankment shall be cleaned of all trees and stumps roots, bushes, rubbish, and other objectionable materials. Particular care shall be taken to execute all organic matter from the material to be placed in the embankment. All cleared materials shall completely burn to ashes. The cleared areas shall be maintained free from vegetation growth during the progress of the work.

STRIPPING:

Borrow areas shall be stripped as required (maximum unto 30cms) of top unsuitable soil, clods and any other materials which are unsuitable for the purposes. No extra payment shall made for the clearing and stripping done for the borrow area.

3.0) EMBANKMENT GENERAL:

For the purpose of these specifications the terms "EMBANKMENT" incl. all portions of the embankment as follows.

- i) The earth fills designated as core/heating impervious zone in earth dam. The earth fill designated as shell/casing/semi pervious zone/gravel fill in earth dam.
- ii) The inclined/horizontal sand filter in earth dam.
- iii) Selected surfacing on the dam embankment or elsewhere.
- iv) Canal bank embankment/Road bank embankment.
- v) Backfill behind the structure.

Placement of fill within zones shall be performed in an orderly sequence and in an efficient and workman like manner, so as to produce within each zone, fills having such quality of density, strength and permeability as will ensure the highest practicable degree of stability and performance of the whole dam/canal embankment. No bushes, roots, seeds or other perishable or unsuitable materials shall be placed in embankment.

4.0) PREPARATION OF FOUNDATION:

Foundation preparation shall be performed subsequent to stripping and excavation, if any. No portion of the embankment should be started until the foundation for that section has been suitably prepared and approved. Masonry surface of the back of retaining wall/training wall/ side wall/cut off wall etc. against which the fill is to be placed, shall be

cleaned and coated with bentonite slurry, moisture prior to placing the earth fill.

5.0) FOUNDATION ON PERVIOUS LAYERS OF EARTH DAM:

Earth foundation for fills shall be scarified and loosened by means plough, ripper or other methods to the satisfaction of engineer in charge. After removal of roots or other debris turned up, the fill shall be compacted by the required number of passes of compaction equipment. If necessary, as directed by the engineer in charge, the surface shall be allowed to dry or alternatively be moisture prior to the placement of fill to create satisfactory bond between the foundation and fill materials.

6.0) EARTH FILL MATERIALS FOR EARTH DAM:

The materials for respective zones of the embankment shall be obtained from designated borrow area. In general, all materials from a particular borrow area shall be mixture of materials obtained for the full depth of the cut. *The selected material for required quantity of earth work for respective item of work shall be brought from outside borrow area including all lead and lift, the contractor makes his own arrangement for obtaining such borrow area required without any extra cost, as borrow area is not available nearby the site of work due to forest land in vicinity.*

7.0) CHANGE OF ZONING IN EARTH DAM:

There may be modifications in zoning on account of availability of excavated stuff from the foundation. The contractor shall have to carry out the work as per modified zones for locations and situations as directed for which no claim will be entertained.

8.0) PLACING EARTH FILL:

The distribution and gradation of the material throughout earth fill shall be as shown in the drawing or as directed. The fill shall be free from loose pockets, or layers of material differing substantially in texture or gradation from the surrounding material. The combined excavation and placing operations shall be such that the materials, when compacted in the earth fill, will be blended sufficiently to produce the desire degree of compaction for stability. Particular care shall be taken to ensure that materials are not so placed as will be conducive to the formation of intermittent relatively impervious blanket in the shell zones, which will interfere with satisfactory drainage in E. DAM. No stones, cobbles or rock fragments having dimensions of more than 10 cms shall be placed. Such materials shall be removed before rolling and compaction.

9.0) DRESSING OF SLOPES:

The outer slopes of the embankment shall be neatly dressed to line as the placing of fill progresses. Compaction shall extend over the full width of the embankment and the

material in the slopes shall be compacted as far the rest of the structure. For E. DAM, to ensure proper compaction at the outer edge, the fill shall be kept 50 cms wider than true width and the outer edges dressed to true width and slope after compaction. This additional width shall not be measured for payment. Any materials that is lost by weathering, local damages, wash out, rain cuts causing erosion on slopes etc. shall be made good with the same degree of back filling and compaction until final acceptance of work, without extra cost to department.

10.0) FILTER: -

10.1 The filter as approved by competent authorities should be laid horizontally in the dam seat and inclined abutting the hearting core as shown on the drawing. The number of layers in the filter and thickness of each layer shall be as specified. It shall be seen that filter should be raised simultaneously with the other adjacent zones. The filter zone should not be less than 30 cm in depth in any case. Care must be taken to ensure that the filter zone material does not get mixed up with the material of adjacent zones and spoiled. Before rolling it should be clear of objectionable materials.

10.2 — MATERIALS:—

~~The filter materials shall consist of clear, sound and well graded sand and gravel and/or crushed rock. The material shall be free from debris, wood, vegetable matter and other deleterious matter. The gradation of each filter layer shall meet the requirement as directed by the laboratory. The silt content should be restricted up to 3% as per I.S. 383 —1970.~~

11.0) ROCKFILL IN ENVELOPE:

~~**11.1** Rock fill shall consist of sound, durable and well graded broken rocks, obtained from approved excavations for the work and/or from approved quarries. The materials shall range in size from 2.5 cm to 60 cm. However, no truck load shall contain more than 15 P.C. by volume for rock fragment smaller than 7.5-centimeter size and shall not exceed 25 P.C. of the total. All bushes, roots, or other perishable material shall be removed from rock fill during spreading and shall be transported to disposal area.~~

~~**11.2** The placing of rock fill shall be directed to obtain a stable, well graded and free draining fill. The rock fill shall be constructed in such a way that the smaller rock fragment is placed adjacent to the filter or embankment and the large rock fragment near the outer edge of the fill in form of rock toe.~~

~~11.3~~ The rock fill shall be dumped, spread and roughly leveled in layers not greater than 60 cm in thickness (loose) in order to maintain a reasonable uniform surface and ensure that compacted fill will be suitable and will not contain any large voids.

~~11.4~~ Contamination of the rock with finer material from any other zones shall be avoided. Accumulation of soil caused by contamination shall be removed while being placed. The rock fill shall be wetted with water jets on the construction surface with pressure sufficient to penetrate the full thickness of layers and wet all the surfaces of rock pieces. The volume of water used shall be about 40% of the volume of rock or as directed. Each layer of the rock fill as laid shall be compacted with about 6 passes of 5 to 10 tons vibratory roller.

~~11.5~~ Rock fill shall not be dumped directly against any concrete /masonry structure or rock face but shall be dumped a short distance away and pushed in a horizontal direction against the structure by bulldozer or in a similar manner as directed.

~~12.0) ROCK FILL IN TOE OF EMBANKMENT (ROCK TOE):~~

~~—~~ The size, quality of materials and method of carrying out the work shall be as specified in Para 10.20 above, except that necessary hand packing of stones adjacent to the filter materials, and on outer slopes shall be required to be done as shown on drawing. Special precautions shall have to be taken as per the direction of the Engineer in Charge for the construction of contact zones. The work includes hand packing on face work as directed.

~~13.0) GRADED FILTER UNDERNEATH RIPRAP WORK TOE DRAINS AND SLOPING FACE OF ROCK TOE:~~

~~13.1~~ Graded filter shall be constructed underneath the riprap on the upstream slopes of ~~—~~ embankment and in the D/S slope of the rock toe separating it from the earth fill and also between the rock fill and the casing zone, sand filter etc.

~~13.2~~ Filter blankets shall be constructed to specify thickness measured normal to the slope. The filter under the pitching on the upstream riprap and rock toe shall be ~~—~~ constructed in at least two different layers or as directed by the Engineer in Charge. The graded filter between the rock fill and casing zone in the transition between masonry and earth dams and between the core and downstream shell shall closely follow the levels of the embankment in the area. The finest material of the filter shall be placed adjacent to the material to be protected and the coarser layer of filter shall be placed adjacent to the riprap or rock fill. Such base

~~filter material shall be clean, sound, natural or well graded sand, gravel or screened rock fragments, or hand broken metal (100mm to 150mm size) as approved by the Engineer.~~

- ~~**13.3** Filter materials shall consist of layers graded in size from fine to coarse as shown in the drawing or as directed. The fine materials shall be laid next to the earth work to be followed by the layers of progressively coarser materials, so as to form a graded filter. Fine Materials shall consist of coarse sand passing through a 1/8" square mesh sieve. After this, shall be laid fine gravel or crushed rock (in case natural gravel is not available) of approved gradation which is expected to be detailed by screening the material retained on 1/8" mesh but passing through 3/4" to 1" diagonal mesh sieve. Coarser materials shall consist of all the materials retained 3/4" to 1" diagonal mesh sieve, the maximum size being limited to 3" in all. the filter material should satisfy the standard filter criteria. In general, the inclined filter shall consist of 50% coarse sand near the I.P. zone and 50 % sand and gravel or crushed metal (graded) as directed. In case of horizontal filter, it shall consist of pure gravel or crushed metal as directed, followed by transition layers on top and bottom of horizontal filter. The base filter material shall be laid in layers not exceeding 15 cm to 25 cm thickness (loose) saturated with water and shall be lightly rolled by a light roller (weighing about 2 tones) as specified, else manual compaction arrangements shall be done as directed.~~

14.0 RIPRAP WORK ON THE UPSTREAM SLOPES OF EMBANKMENT:

- 14.1** Riprap shall be hand packed on the U/s slope of the dam embankment. The thickness of the riprap layer shall be as indicated in the drawing. The thickness shall be measured normal to the slope of the embankment. To determine the thickness of the riprap, only exposed rock of specified size or largest shall be considered. The tolerance on the nominal thickness of riprap enforced on the performed profile shall be ± 10 percent (I.S. 8237 - 1976).

The riprap material shall consist of the most durable rock fragments of approved quality, selected from excavation for permanent construction or other sources. The individual rock fragment shall be dense, solid and resistant to abrasion and shall be free from cracks, seams, shale particles, conglomerate blend and other defects that would tend to increase unduly their susceptibility to destruction by water and weathering action. The shape of the individual rock fragment shall be angular. The

fragments having thickness less than 50 percent of their maximum dimensions shall not be used as riprap. No stone shall weigh less than 25 kg or as directed by Engineer-in-charge. The stone shall be placed on edge with its broad base down and face normal to the slope with necessary hand-packing in workman like manner. Rock fragments and spauls shall be tightly driven into the interstices to wedge the riprap in place and close direct opening to the underlying surface. The stones shall be laid in a compact manner being at the bottom of the slope. The item of riprap (pitching) works as specified items in different thickness for upstream and down slopes as per approved drawing do not include or provide separate payment for the base graded filter to be provided in each case. Headers shall be provided and fixed normally at the rate shown in drawings or as directed to penetrate fully across the riprap and are also inclusive in the rate of the item. Necessary field dressing and trimming of slopes, removing excess materials on slopes etc. will have to be attended to as directed without any extra charges.

- 14.2** Riprap shall be placed simultaneously with the fill so that a minimum of break down will occur during placing and spreading etc.

15.0 LEADS AND LIFTS:

All work conditions shall be executed as per leads and lifts specified under the different items and detailed specifications. Where the items of earth work specify "Prescribed or specific lead" the same shall be taken as the lead involved in carrying out the earthwork in the various zones from the borrow areas demarcated and annexed to the tender. The lead, provided for all embankment work is up to all lead and all lifts, unless specified otherwise. If due to some reasons it becomes necessary to borrow earth from areas outside the designated boundaries prescribed, the contractor shall be bound to do so. In such cases, the contractor shall have to operate the additional borrow area beyond the leads mentioned in the items as directed by the Engineer-in-charge and he shall not be paid any extra for leads and lift.

In case of other items of embankment like sand filter, Riprap, rock-toe, toe drain, surface drainage work items etc. contractor has to make his own arrangement about lead for the materials. If approved quality of materials is not met within specified lead and lift mentioned in the specification for execute the items of tender, the contractor shall borrow the materials from any lead and lift for complete the items without any extra cost to the Govt. i.e., Rate shall be quoted considering all lead and lift for complete the items.

Signature of Contractor

**Executive Engineer,
Panchayat Irrigation Dn.
Bhuj-Kachhh.**

CHAPTER-X

CARE & DIVERSION OF RIVER INCLUDING DEWATERING

CHAPTER-X

CARE & DIVERSION OF RIVER INCLUDING DEWATERING

1.0 GENERAL:

The care & diversion of river / creek including dewatering shall be considered inclusive in the respective items of work, if there is no separately provision for this (C & D) in the tender and required C&D works are of minor nature.

- 1.1 The area under all permanent and the adjoining areas, if necessary, shall be maintained free from water.
- 1.2 The contractor shall design, construct & maintain necessary diversion & other temporary protective works and make provisions for diversion of the river/creek flows & furnish maintain & operate all necessary pumping and dredging plants, for dewatering the various parts of the works and maintain the foundations and required area of construction site as free from water as required.
- 1.3 The contractor shall pump all water from the site of work and shall keep the foundations free of water while excavation, grouting, concreting or placing of masonry are in progress or as otherwise required for completing the work and shall be entitled to no claims or damages on account of or by reasons of any amount of due to water leaking through, under or around the coffer dam, diversion channel and other diversion works. During the monsoon season / high tide period, the work in the river / creek portion shall be closed & the floods shall be allowed to passed over to the partly constructed concrete/masonry portion only and under no circumstances such flow shall over flank the other parts of the work which liable to damage in such condition.
- 1.4 The care & diversion of river / creek work shall have to be reckoned and provided for any eventualities like unseasonable rains / floods /unprecedented high tide etc.
- 1.5 Preliminary thought has been given to the diversion works and it is visualized that a diversion challenge to gather with the u/s and d/s coffer dams may be required to divert the flow of vonkala/river/creek. The diversion is likely to be required for a period of construction depending upon the progress of work. The above statement is purely for general guidance only and any inference and conclusion reached by the tenderer is solely at his risk and responsibility.
- 1.6 The contractor will be free to suggest alternative arrangement which is considered suitable and safe and not likely to obstruct or delay the progress which may be approved at the discretion of the engineer in charge. The contractor shall not be entitle to any extra claims on this account. In such case contactor should submit his plans with detailed drawing within four month of the work order for approval of engineer in charge.

- 1.7 The contractor shall fully satisfy himself about quantum of flow to be tackled and about the adequacy, efficiency and safety of the care and diversion arrangement to be adopted by him. The engineer in charge shall however, have right to enlarge or strengthen the diversion arrangements if he so consider in the interest of work. All such additions, modifications etc directed by the engineer shall be promptly executed by the contractor and the same shall be deemed to be part of care and diversion arrangement and included in the rate quoted by the contractor.
- 1.8 In case of the diversion arrangement getting washed out or largely damaged, the same shall be immediately repaired and reclaimed by the contractor at his own cost. Necessary pumping of water, removal of silt etc. shall also be attended promptly so as to cause the least delay in the progress of the work. No claim shall be entertained on this account.
- 1.9 The contractor shall construct the diversion arrangement in such a way that no damage is caused to the permanent or temporary structure. If such damage are caused due to the flood water, either during monsoon or in the post monsoon, the same shall be made good at the contractor's cost.
- 1.10 Approval of the plans for the diversion for the diversion works by the engineer shall not relieve the contractor from the responsibility for the adequacy thereof and pumping plant or from furnishing all equipments, layout, materials necessary for dewatering the required area of construction including foundation and keep the work areas free of water and all items necessary within the scope of this contract.
- 1.11 After having served their purpose, the cofferdam/temporary bulk heads etc. shall be removed to the extent directed by the engineer from time to time. The removal of the temporary works, bulkheads, etc. shall be so arranged as not to damage the permanent works. Any damage resulting from these operations shall be made good by the contractor to the satisfaction of the engineer. Any reasonable inflow of water from the works in other reaches shall be diverted by the contractor as part and partial of the item without any extra claim.
- 1.12 In the case of dam construction, the item also includes maintaining, pumping out and keeping the galleries dry from all from the gallery sump accumulated due to seepage drilling or grouting or any other cause during the construction period and till all other works are finally handed over to the government.

2.0 DISPOSAL OF EXCAVATED STUFF:

The materials available from the excavation of diversion channel shall be disposed off as under. Rubble considered as useful by engineer in charge for the work, shall be sorted out, transported and stacked at the locations within the construction area as directed by engineer in charge and shall not be allowed to use for coffer dam. The remaining material of excavation can be used for construction of coffer dam free of charge. Such of the materials in excess over required in the construction of coffer dams, if found suitable, shall be transported and stacked or used for permanent structure as directed by engineer in charge. No separate payment shall, however, be made of the excavation of diversion channel. The material obtained from the dismantling of coffer dam shall be suitably disposed of as under. The material not found useful shall be disposed of in nearby area as directed. The material found suitable by engineer in charge shall be carted and deposited as and were directed in the permanent structure of work and shall be paid under relevant item of deposition of excavated stuff.

Signature of Contractor

**Executive Engineer,
Panchayat Irrigation Dn.
Bhuj-Kachhh.**

CHAPTER - XI

GENERAL SPECIFICATION OF STRUCTURAL STEEL

3.1 Structural Steel Work

3.1.1 Applicable Codes and Specifications

The supply, fabrication, erection and painting of structural steel works shall comply with the following specifications, standards and codes unless otherwise specified herein. All standards, specifications and codes of practices referred to herein shall be the latest editions including all applicable official amendments and revisions.

IS : 808	Dimensions for Hot Rolled Steel sections
IS : 814	Covered Electrodes for Manual Metal Arc Welding of Carbon and Carbon Manganese Steel
IS : 800	Code of Practice for General Construction in Steel
IS : 801	Code of Practice for Use of Cold Formed Light Gauge Steel Structural Members in General Building Construction
IS : 806	Code of Practice for Use of Steel Tubes in General Building Construction
IS : 7205	Safety Code for Erection of Structural Steel Work
IS : 7215	Tolerances for Fabrication of Steel Structures
IS : 4000	High Strength Bolts in Steel Structure — Code of Practice
AISC	Specifications for Design, Fabrication and Erection of Buildings
IS : 1161	Steel Tubes for structural purposes
IS:102	Ready Mixed paint, Brushing, Red Lead, Non-setting, Priming
IS:110	Ready Mixed paint, brushing, grey filler for enamels for use over primers
IS:117	Ready Mixed paint, Brushing, Finishing, Exterior Semi gloss for general purposes, to Indian Standard colours
IS:158	Ready Mixed paint, Brushing, Bituminous, Black, Lead free, Acid, Alkali and heat resisting

IS:159	Ready Mixed paint, Brushing, Acid resisting for protection against acid fumes, colour as required
IS:341	Black Japan, Types A, B and C
IS:2339	Specification for Aluminium paint for general purposes, in Dual container
IS:2932	Enamel, synthetic, exterior, (a) undercoating, (b) finishing – Specification
IS:2933	Specification for enamel, exterior, (a) undercoating, (b) finishing
IS:5905	Sprayed aluminium and zinc coatings on Iron and Steel
IS:6005	Code of practice for phosphating of Iron and Steel
IS:9862	Specification for ready mixed paint, brushing, bituminous, black, lead free, acid, alkali, water & chlorine resisting
IS:13183	Aluminium paint, Heat resistant – Specification
SIS-05-5900	(Swedish Standard)
IS : 1239	Mild steel tubes, tubulars and other Wrought steel fittings Part 1 – Mild steel tubes Part 2 – Mild steel tubulars and other wrought steel pipe fittings
IS : 1363	Hexagon Head Bolts, Screws and Nuts of product Grade C
(Parts 1 to 3)	(Size range M5 to M64)
IS : 1367 (All parts)	Technical Supply Conditions for Threaded Steel Fasteners
IS : 1852	Rolling and Cutting Tolerances for Hot Rolled Steel Products
IS : 1977	Low tensile Structural Steel – Specification
IS : 2062-2011	Hot rolled medium and high tensile structural steel Specification
IS : 2074	Ready Mixed Paint, Air drying, Red Oxide Zinc Chrome and Priming – Specification
IS : 3502	Steel Chequered Plates – Specification
IS : 3757	Specification for High Strength Structural Bolts

IS : 5369	General Requirements for Plain Washers and Lock Washers
IS : 5372	Taper Washers for Channels (ISMC)
IS : 5374	Taper Washers for I Beams (ISMB)
IS : 6610	Specification for Heavy Washers for Steel Structures
IS : 8500	Structural Steel micro alloyed (medium and high strength qualities) — Specification
IS : 803	Code of practice for design, fabrication and erection of vertical mild steel cylindrical welded oil storage tanks
IS : 816	Code of Practice for use of Metal Arc Welding of carbon and manganese steel
IS : 822	Code of Procedure for Inspection of Welds
IS : 1182	Recommended Practice for Radiographic examination of Fusion Welded Butt Joints in Steel Plates
IS : 1200	Method of Measurement of Building and Civil Engineering Works
IS : 1477	Code of Practice for Painting of (Parts 1&2) Ferrous Metals in Buildings
IS : 2595	Code of Practice for Radiographic Testing
IS : 3658	Code of Practice for Liquid Penetrant Flaw Detection
IS : 5334	Code of Practice for Magnetic Particle Flaw Detection of Welds
IS : 9595	Metal Arc Welding of Carbon and Carbon Manganese Steel— Recommendations

3.1.2 Steel Materials

Steel materials shall comply with the referred to in **Sub-Clause 3.1.1**. All materials used shall be new, unused and free from defects.

All steel and other materials used for steelwork and in association with steelwork will conform to appropriate latest Indian standards. Only tested materials will be used.

Unless otherwise specified in the drawings

a) All rolled sections and plate will conform to Grade E250 "A" as per IS: 2062-2011.

~~b) Plated structures subjected to dynamic loading will conform to Grade E250 "BR" as per IS: 2062-2011.~~

~~Steel sheets will conform to IS: 1079.~~

~~Steel tubes for structural purpose will conform to IS: 1161 (of Grade YST 240)~~

~~Aluminium industrial troughed sheets conforming to IS: 1254 will be used as follows:~~

~~i) In roof - 0.91mm thick~~

~~ii) In side walls - 0.71mm thick~~

~~Translucent sheets will be fiberglass reinforced polyester sheets of matching profile as per appropriate standards.~~

~~Gutters will be of copper bearing steel conforming to Grade "A" as per IS: 2062-2011. Crane rail will conform to IS: 3443.~~

Drawings to be prepared by the contractor:

The contractor shall prepare all fabrication and erection drawings for the entire work. All the drawings for the entire work shall be prepared in metric units. The drawings shall preferably be of one standard size and the details shown there in shall be clear and legible.

All fabrication drawings shall be submitted to the Engineer In Charge for approval.

No fabrication drawings will be accepted for Engineer In Charge's approval unless checked and approved by the contractor's qualified structural engineer and accompanied by an erection plan showing the location of all pieces detailed. The contractor shall ensure that connections are detailed to obtain ease in erection of structures and in making field connections.

Fabrication shall be started by the contractor only after Engineer In Charge's approval of fabrication drawings. Approval by the Engineer In Charge of any of the drawings shall not relieve the contractor from the responsibility for correctness of engineering and design of connections, workmanship, fit of parts, details, material, errors or omissions or any and all work shown thereon. The Engineer In Charge's approval shall constitute approval of the size of members, dimensions and general arrangement but shall not constitute approval of the connections between members and other details.

The drawings prepared by the contractor and all subsequent revisions etc. shall be at the cost of the contractor for which no separate payment will be made.

3.1.3 Fabrication

3.1.3.1 General

All workmanship and finish shall be of the best quality and shall conform to the best approved method of fabrication. All materials shall be finished straight and shall be machined/ground smooth true and square where so specified. All holes and edges shall be free of burrs. Shearing and chipping shall be neatly and accurately done and all portions of work exposed to view shall be neatly finished. Unless otherwise approved by the Engineer In Charge, reference may be made to relevant IS codes for providing standard fabrication tolerance. Material at the shops shall be kept clean and protected from weather.

3.1.3.2 Connections

Shop/field connections shall be as per approved fabrication drawings.

In case of bolted connections, taper washers or flat washers or spring washers shall be used with bolts wherever necessary. In case of high strength friction grip bolts, hardened washers be used under the nuts or the bolt heads whichever are turned to tighten the bolts. The length of the bolt shall be such that at-least one thread of the bolt projects beyond the nut, except in case of high strength friction grip bolts where this projection shall be at least three times the pitch of the thread.

Rivets shall be heated uniformly throughout their length, without burning or excessive scaling, and shall be of sufficient length to provide a head of standard dimensions. They shall, when driven, completely fill the holes and, if countersunk, the countersinking shall be fully filled by the rivet, any protrusion of the countersunk head being dressed off flush, if required.

In all cases where bearing is critical, the unthreaded portion of bolt shall bear on the members assembled. A washer of adequate thickness may be provided to exclude the threads from the bearing thickness, if a longer grip bolt has to be used for this purpose.

All connections and splices shall be designed for full strength of members or loads. Column splices shall be designed for the full tensile strength of the

minimum cross section at the splice.

All bolts, nuts, washers, electrodes, screws etc., shall be supplied/brought to site 10% in excess of the requirement in each category and size. Rates shall cover the cost of this extra quantity.

All members likely to collect rain water shall have drain holes provided.

All black hexagonal bolts, nuts and locknuts shall conform to IS – 1363 and IS: 1364 (for precision and semi precision hexagonal bolts) shall conform to IS : 5369.

All HSFG bolts will conform to IS: 3757. Assembly of joints using HSFG bolts will conform to IS:4000.

Covered electrodes for arc welding will conform to IS: 814. Coding of electrodes will be as follows:

- a) ER421 'C' X for mild steel of Grade 'A' and Grade 'B' as per IS : 2062
- b) EB 542 'C' H3X for Mild steel of Grade 'B' as per IS 2062 for dynamically loaded structures (arising out of crane, vibratory screen, equipment's etc.)

'C' is the value of the current as recommended by the electrode manufacturer.

Certified mill test reports of materials used in the work will be made available for inspection by the Owner upon request. All the materials will be straight and if necessary before being worked will be straightened and/or flattened by pressure including de-coiling of plates unless required to be of curvilinear form and will be free from twists.

3.1.3.3 Straightening

All materials shall be straight and, if necessary, before being worked shall be straightened and/or flattened by pressure and shall be free from twists. Heating or forging shall not be resorted to without the prior approval of the Engineer In Charge in writing.

3.1.3.4 Rolling and Forming

Plates, channels, R.S.J. etc., for circular bins, bunkers, hoppers, gantry girders, etc., shall be accurately laid off and rolled or formed to required profile/shape as called for on the drawings. Adjacent sections shall be match-marked to facilitate accurate assembly, welding and erection in the field.

3.1.3.5 High Strength Friction Grip Bolting

Inspection after tightening of bolts shall be carried out as stipulated in the

appropriate standards depending upon the method of tightening and the type of bolt used. The mating surfaces will be absolutely free from grease, lubricant, dust, rust, etc. and will be thoroughly cleaned before assembly. The preparation of the mating surfaces will be done as specified in the design drawings. The nuts will be tightened upto the specified torque with the help of torque wrench or by half turn method with the help of pneumatic wrench lever. Torque value has to be specified in design / fabrication drawings itself. The direction of tightening of the nuts will be from the middle towards the periphery of the joint. The bolt head, nuts and edges of the mating surface will be sealed with a coat of paint to obviate entry of moisture. As far as possible, the diameter of bolts and mating surface preparation will be kept uniform to have specified unique torque.

3.1.3.6 Welding

Welding procedure shall be submitted to the Engineer In Charge for approval. Welding shall be entrusted to qualified and experienced welders who shall be tested periodically and graded as per IS 817, IS : 7310 (Part 1) and IS : 7318 (Part 1).

While fabricating plated beams and built up members, all shop splices in each component part shall be made before such component part is welded to other parts of the members. Wherever weld reinforcement interferes with proper fit-up between components to be assembled off welding, these welds shall be ground flush prior to assembly.

Approval of the welding procedure by the Engineer In Charge shall not relieve the Contractor of his responsibility for correct and sound welding without undue distortion in the finished structure.

No welding shall be done when the surface of the members is wet nor during periods of high wind.

Each layer of a multiple layer weld except root and surfaces runs may be moderately panned with light blows from a blunt tool. Care shall be exercised to prevent scaling or flaking of weld and base metal from over peening.

No welding shall be done on base metal at a temperature below -5°C . Base metal shall be preheated to the temperature as per relevant IS codes.

Electrodes other than low-hydrogen electrodes shall not be permitted for

thicknesses of 32 mm and above.

All welds shall be inspected for flaws by any of the methods described under **Sub-clause 3.1.6.3**. The choice of the method adopted shall be agreed with the Engineer In Charge.

The correction of defective welds shall be carried out in a manner approved by the Engineer In Charge without damaging the parent metal. When a crack in the weld is removed, magnetic particle inspection or any other equally positive means approved by the Engineer In Charge shall be used to ensure that the whole of the crack and material upto 25 mm beyond each end of the crack has been removed. The cost of all such tests and operations incidental to correction shall be borne by the Contractor.

3.1.4 Tolerances

The dimensional and weight tolerances for rolled shapes shall be in accordance with IS:1852 for indigenous steel. The tolerances for fabrication of structural steel shall be as per IS:7215.

Cutting, punching, drilling, welding and fabrication tolerances shall be generally as per relevant IS codes.

3.1.5 End Milling

Where compression joints are specified to be designed for bearing, the bearing surfaces shall be milled true and square to ensure proper bearing and alignment.

3.1.6 Inspection

3.1.6.1 General

The Contractor shall give due notice to the Engineer In Charge in advance of the works being made ready for inspection. All rejected material shall be promptly removed from the shop and replaced with new material for the Engineer In Charge's inspection. The fact that certain material has been accepted at the Contractor's shop shall not invalidate final rejection at site by the Engineer In Charge if it fails to conform to the requirements of these specifications, to be in proper condition or has fabrication inaccuracies which prevent proper assembly

nor shall it invalidate any claim which the Employer may make because of defective or unsatisfactory materials and/or workmanship.

No materials shall be painted or despatched to site without inspection and approval by the Engineer In Charge unless such inspection is waived in writing by the Engineer In Charge.

The Contractor shall provide all the testing and inspection services and facilities for shop work except where otherwise specified.

For fabrication work carried out in the field the same standard of supervision and quality control shall be maintained as in shop fabricated work. Inspection and testing shall be conducted in a manner satisfactory to the Engineer In charge.

Inspection and tests on structural steel members shall be as set forth below.

3.1.6.2 Material Testing

If mill test reports are not available for any steel materials the same shall be tested by the Contractor to the Engineer In-charge's satisfaction to demonstrate conformity with the relevant specification.

3.1.6.3 Tests on Welds

a. Magnetic Particle Test

Where fillet welds are examined by magnetic particle testing, such testing shall be carried out in accordance with relevant IS 5334 random 5% of the weld. Weld shall be accepted as satisfactory the defects are within limits stated in IS7310.

b. Liquid Penetrate Inspection

In the case fillet of welds examined by Liquid Penetrate Inspection, such tests shall be carried out in accordance with relevant IS Code 3658. All defects shown shall be repaired and rechecked.

c. Radiographic Inspection

All full strength butt welds shall be radiography tested in accordance with the recommended practice for radiographic testing as per relevant IS:4260 code

random 10% of the weld length.

3.1.6.4 Dimensions, Workmanship & Cleanliness

Members shall be inspected at all stages of fabrication and assembly to verify that dimensions, tolerances, alignment, surface finish and painting are in accordance with the requirements shown in the Contractor's approved fabrication drawings.

3.1.6.5 Test Failure

In the event of failure of any member to satisfy inspection or test requirement, the Contractor shall notify the Engineer In Charge. The Contractor must obtain permission from the Engineer In Charge before any repair is undertaken. The quality control procedures to be followed to ensure satisfactory repair shall be subject to approval by the Engineer In Charge.

The Engineer In Charge has the right to specify additional testing as he deems necessary, and the additional cost of such testing shall be borne by the Employer, only in case of successful testing.

The Contractor shall maintain records of all inspection and testing which shall be made available to the Engineer In charge.

3.1.7 Shop Matching

For structures like bunkers, tanks, etc. shop assembly is essential. For other steel work, such as columns along with the tie beams/bracings may have to be shop assembled to ensure satisfactory fabrication, obtaining of adequate bearing areas etc., if so desired by the Engineer In Charge.

3.1.8 Drilling Holes for other works

As a part of this Contract, holes in members required for installing equipment or steel furnished by other manufacturers or other contractors shall be drilled by the Contractor at no extra cost. The information for such extra holes will be supplied by the Engineer In Charge.

3.1.9 Marking of Members

After checking and inspection, all members shall be marked for identification

during erection. This mark shall correspond to distinguishing marks on approved erection drawings and shall be legibly painted and stamped on it. The erection mark shall be stamped with a metal dye with figures at least 20 mm high and to such optimum depth as to be clearly visible.

All erection marks shall be on the outer surface of all sections and near one end, but clear of bolt holes. The marking shall be so stamped that they are easily discernible when sorting out members. The stamped marking shall be encircled boldly by a distinguishable paint to facilitate easy location.

Erection marks on like pieces shall be in identical locations. Members having lengths of 7.0 m or more shall have the erection mark at both ends.

3.1.10 Errors

Any error in shop fabrication which prevents proper assembling and fitting up of parts in the field by moderate use of drift pins or moderate amount of reaming will be classified by the Engineer In Charge as defective workmanship. Where the Engineer In Charge rejects such material or defective workmanship, the same shall be replaced by materials and workmanship conforming to the Specifications by the Contractor, at no cost to the Employer.

3.1.11 Painting of Steel Work

All fabricated steel material, except those galvanised shall receive protective paint coating as specified in specification, which is described below.

3.1.11.1 Materials

Zinc chrome primer shall conform to IS: 2074.

Synthetic enamel paint shall conform to IS: 2932.

Aluminium paint shall conform to IS: 2339.

All the materials shall be of the best quality from an approved manufacturer. Contractor shall obtain prior approval of the Engineer In-Charge for the brand of manufacture and the colour / shade. All the materials shall be brought to the site in sealed containers.

3.1.11.2 Workmanship

Painting work shall be carried out only on thoroughly dry surfaces. Painting

shall be applied either by brushing or by spraying. Contractor shall procure the appropriate quality of paint for this purpose as recommended by the manufacturer. The workmanship shall generally conform to the requirement of IS: 1477 (Part 2).

Minimum dry film thickness of each coat of finish paint of synthetic enamel shall be 25 microns. Surfaces inaccessible after assembly shall receive two coats of primer prior to assembly. Surfaces inaccessible after erection, including top surfaces of floor beams supporting grating or chequered plate shall receive one additional coat of finish paint over and above the number of coats specified prior to erection. Primer and finish paint shall be compatible with each other to avoid cracking and wrinkling. Primer and finish paint shall be from the same manufacturer.

All the surfaces shall be thoroughly cleaned of oil, grease, dirt, rust and scale. The methods to be adopted using solvents, wire brushing, power tool cleaning etc., shall be as per IS: 1477 (Part – I) and as indicated in the item of work.

It is essential to ensure that immediately after preparation of the surfaces, the first coat of zinc chrome primer shall be applied by brushing and working it well to ensure a continuous film without holidays. After the first coat becomes hard dry, a second coat of primer shall be applied by brushing to obtain a film free from 'holidays'.

After the second coat of primer is hard dry, the entire surface shall be wet rubbed cutting down to a smooth uniform surface. When the surface becomes dry, the undercoat of synthetic enamel paint of optimum thickness shall be applied by brushing with minimum of brush marks. The coat shall be allowed to hard-dry. The under coat shall then be wet rubbed cutting down to a smooth finish, taking adequate care to ensure that at no place the undercoat is completely removed. The surface shall then be allowed to dry.

The first finishing coat of paint shall be applied by brushing and allowed to hard-dry. The gloss from the entire surface shall then be gently removed and the surface dusted off. The second finishing coat shall then be applied by brushing.

At least 24 hours shall elapse between the applications of successive coats. Each coat shall vary slightly in shade and this shall be got approved by the Engineer In Charge.

3.1.12 Acceptance of Steel, its Handling & Storage

The Contractor shall carefully check the steel to be erected at the time of acceptance. Any fabrication defects observed should be brought to the notice of the Engineer In Charge.

No dragging of steel shall be permitted. All steel shall be stored 300mm above ground on suitable packing to avoid damage. It shall be stored in the order required for erection, with erection marks visible. All storage areas shall be prepared and maintained by the Contractor. Steel shall not be stored in the vicinity of areas where excavation or grading will be done and, if so stored temporarily, this shall be removed by the Contractor well before such excavation and/or grading commences to a safe distance to avoid burial under debris.

Scratched or abraded steel shall be given a coat of primer in accordance with the Specifications for protection after unloading and handling prior to erection. All milled and machined surfaces shall be properly protected from rust/corrosion by suitable coating and also from damage.

3.1.13 Anchor Bolts & Foundations

The Contractor shall carefully check the location and layout of anchor bolts embedded in foundations constructed, to ensure that the structures can be properly erected as per approved drawings.

Levelling of column bases to the required elevation may be done either by providing shims or three nuts on the upper threaded portion of the anchor bolt. All shim stock required for keeping the specified thickness of grout and in connection with erection of structures on foundations, crane brackets or at any other locations shall be of good M.S. plates and shall be supplied by the Contractor at his cost.

A certain amount of cleaning of foundations and preparing the area is considered normal and shall be carried out by the Contractor at no extra cost.

Where beams bear in pockets or on walls, bearing plates shall be set and levelled as part of the work. All grouting under column base plates or beam bearing plates will be carried out by the Contractor.

3.1.14 Assembly & connections

Field connections may be effected either by riveting, bolting, welding or by use of

high strength friction grip bolts as shown on the design and erection drawings.

All field connection work shall be carried as per the drawings. All bolts, nuts, washers, rivets, electrodes required for field connections shall be supplied by the Contractor free of cost.

All assembling shall be carried on a level platform.

Drifts shall be used only for drawing the work to proper position and must not be used to such an extent as to damage the holes. Size of drifts larger than the normal diameter of hole shall not be used. Any damaged holes or burrs must be rectified to the satisfaction of the Engineer In Charge.

Corrections of minor misfits and reasonable amount of reaming and cutting of excess stock from rivets shall be considered as a part of erection. Any error in the shop, which prevents proper fit on a moderate amount of reaming and slight chipping or cutting, shall be immediately reported to the Engineer In charge.

3.1.15 Erection

All structural steel shall be erected as shown on the drawings prepared by the Contractor. Proper size steel cable slings, etc., shall be used for hoisting. Guys shall not be anchored to existing structures, foundations, etc., unless so permitted by the Engineer In Charge in writing. Care shall be taken to see that ropes in use are always in good condition.

Steel columns in the basement, if any, are to be lowered and erected carefully with the help of a crane and/or derrick without damaging the basement walls or floor.

Structural steel frames shall be erected plumb and true. Frames shall be lifted at points such that they are not liable to buckle and deform. Trusses shall be lifted only at node points. In the case of trusses, roof girders, all of the purlins and wind bracing shall be placed simultaneously and the columns shall be erected truly plumb on screed bars over the pedestals. All steel columns and beams shall be checked for plumb and level individually before and after connections are made. Temporary bracings shall be introduced wherever necessary to take care of all loads to which the structure may be subjected, including erection equipment and the operation thereof. Such bracings shall be left in place as long as may be required for safety and stability.

Chequered plates shall be fixed to supporting members by tack welding

or by countersunk bolts as shown / specified in relevant drawings and/or as approved by the Engineer In Charge. The edges shall be made smooth and no burrs or jagged ends shall be left. While splicing, care should be taken so that there is continuity in pattern between the two portions. Care should also be taken to avoid distortion of the plate while welding. The erection of chequered plates shall include:

a. Welding of stiffening angles/vertical stiffening ribs

Cutting to size and making holes to required shape wherever necessary to allow service piping and/or cables to pass through Splicing as shown in relevant drawings

Smoothing of edges Fixing of chequered plates by tack welding or by countersunk bolts Providing lifting hooks for ease of lifting.

As erection progresses, the work shall be securely bolted to take care of all dead load, wind, seismic and erection stresses.

No riveting or welding or final bolting shall be done until the structure has been properly aligned and approved by the Engineer In Charge. No cutting, heating or enlarging of the holes shall be carried out without the prior written approval of the Engineer In Charge. Test certificates shall be furnished by the Contractor.

3.1.16 Inspection

The Engineer In Charge shall have free access to all parts of the job during erection and all erection shall be subjected to his approval. In case of faulty erection, all dismantling and re-erection required will be at the Contractor's cost. No paint shall be applied to rivet heads or field welds or bolts until these have been approved by the Engineer In charge.

3.1.17 Tolerances

3.1.17.1 General

Tolerances mentioned below shall be achieved after the entire structure or part thereof is in line, level and plumb.

3.1.17.2 Columns

Deviation of column axes at foundation top level with respect to true axes:

- | | | |
|-----|---------------------------|--------------------|
| (a) | In longitudinal direction | $\pm 5 \text{ mm}$ |
| (b) | In lateral direction | $\pm 5 \text{ mm}$ |

Deviation in the level of
bearing surface of columns
at foundation

top with respect to true level	$\pm 5 \text{ mm}$
--------------------------------	--------------------

(A)	For columns up to and including 15 metres in height or $\pm 15 \text{ mm}$ whichever is less	$\pm 1/1000$ of column height in mm
(B)	For columns exceeding 15 metres in height or $\pm 20 \text{ mm}$ whichever is less	$\pm 1/1000$ of column height in mm
(C)	Deviation in straightness in longitudinal and transverse planes of column at any	$\pm 1/1000$ of column height in mm or $\pm 10 \text{ mm}$ whichever is less point along the height
(D)	Difference in erected position of adjacent pairs of columns along length or across width of building prior to connecting trusses / beams with respect to true distance	$\pm 10 \text{ mm}$
(E)	Deviation in any bearing or seating level with respect to true level	$\pm 5 \text{ mm}$
(F)	Deviation in differences in bearing level of a member on adjacent pair of columns both across and along the building	$\pm 10 \text{ mm}$

Out of plumpness (verticality) of column axis from true vertical axis, as measured at column top:

3.1.17.3 Trusses and Beams

Shift at the centre of span of top chord member with respect to the vertical plane passing through the centre of bottom chord	$\pm 1/250$ of height of truss in mm or ± 15 mm whichever is less
Lateral shift of top chord of truss at the centre of span from the vertical plane passing through the centre of supports of the truss	$\pm 1/1500$ of span of truss in mm or ± 15 mm whichever is less
Lateral shift in location of truss from its true vertical position	± 10 mm
Lateral shift in location of purlin true position	± 5 mm
Deviation in difference of bearing levels of trusses or beams from the true difference	± 20 mm for trusses For beams : Depth < 1800 mm : ± 6 mm Depth > 1800 mm : ± 10 mm
Deviation in sag in chords and diagonals truss between node points	$1/1500$ of length in mm or of 10 mm whichever is smaller
Deviation in sweep of trusses, beams etc. in the horizontal plane	$1/1000$ of span in mm subject to a maximum of 10 mm

3.1.17.4 Crane Girders & Rails

Shift in the centre line of crane rail with respect to centre line of web of crane girder	± 5 mm
Shift in plan of alignment of crane rail with respect to true axis of crane rail at any point	± 5 mm
Difference in alignment of crane rail in plan measured between any two points 2 metres apart along rail	± 1 mm
Deviation in crane track with respect to Time gauge	

For track gauges upto and Including 15 metres	± 5 mm
For track gauges more than 15 metres	$\pm [5 + 0.25 (S-15)]$ where S in metres is true gauge
Deviation in crane rail level at any Point from true level	$\pm 1/1200$ of the gauge distance or ± 10 mm whichever is less
Difference in the crane rail actual levels between any two points 2 metres apart along the rail length	± 2 mm
Difference in levels between crane track Rails at	± 15 mm ± 20 mm
Supports of crane girders	
Mid span of crane girders	2mm subject to grinding of surfaces for smooth transition
Relative shift of crane rail surfaces at a Joint in plane and elevation	$1/1000$ of track gauge S in mm subject to maximum of 20 mm
Relative shift in the location of crane Stops (end buffers) along the crane tracks With track gauge S in mm	

3.1.18 Painting of bare spots / rivet head

After steel has been erected, all bare and abraded spots, rivet heads, field welds, bolt heads and nuts shall be spot painted with primer. Before paint is applied, the surface shall be dry and free from dust, dirt, scale and grease. All surfaces inaccessible after erection shall receive two coats of the approved paint before erection.

3.1.19 Clean-up of Work site

During erection, the Contractor shall at all times keep the working and storage areas used by him free from accumulation of waste materials or rubbish. Before completion of erection, he shall remove or dispose of in a satisfactory manner all temporary structures, waste and debris and leave the premises in a condition satisfactory to the Engineer In Charge.

Signature of Contractor

**Executive Engineer,
Panchayat Irrigation Dn.
Bhuj-Kachchh.**

CHAPTER - XII

ITEM WISE DETAILED TECHNICAL SPECIFICATION

ITEM NO : 1

"Designing structurally (and aesthetically) complying provisions of relevant Indian standards and constructing RCC Elevated service Reservoir of the following capacity and height , using latest Soil Investigation Report of proposed site ,Seismic zone, Wind speed Zone. Including

- (1) Container shape any suitable type(or as specified),**
- (2) Staging consisting of column brace trestle / shaft / combination column- brace trestle and shaft as appropriate(or as specified) and**
- (3) Appropriate foundation system. This includes excavation in all types of soil strata(including hard rock),casting 100 mm thick P.C.C. levelling course in M-10 , Refilling the pit with proper soil and disposing of the surplus stuff at all required lead.**
- (4) This will also include cement plaster in CM 1:2 with approved water proofing compound all over inside container (i.e. walls, base, top slab/dome bottom etc. all)."**
- "(5) All types of labour and material charges of lowering , laying, erecting / hoisting and joining of pipe assembly of Inlet, Outlet, overflow, washout and bye pass arrangement as per hydraulic design are including.**
- (6) Providing and fixing of any accessories(specified), CI Manhole frame and covers, water level indicator , lightening conductor, GI Pipe railing around walk way, at roof level, at gallery and around landing of inside shaft, Adequate cowl type ventilators or lantern type ventilator with stainless steel jali.**
- (7) Scope of work includes constructing RCC spiral staircase with adequate tie beams, staircase footing ,Rcc chambers for valves. ventilating shaft and ventilators as well as door in shaft, SS grating to be provided to outlet pipe (inside container) for safety.**
- (8) including providing and applying three coats of cement paint/snowcem (as specified) to the whole structure.**
- (9) It also includes satisfactory water tightness test as per relevant I.S. Code and painting name of scheme and capacity on the tank as per direction of engineer in charge.**

Construction of 0.25 Lac. Lit. Cap. ESR at Gurukrupa nagar Village- Fatehgadh , Tal. Rapar, Dist. Kutch Under 15th F.C.

As Per GWSSB Specification Attached Separately.

Measurement and Payment:

- Unit of Measurements is Percentage.**

Item	Description of Items	Percentage Payment to be released
Construction of RCC ESR		
1.	On completion of excavation and Concreting up to G.L.	10 %
2.	On completion of Full shaft and braces including staircase up to bottom slab/ dome level	20 %
3.	Completion of bottom slab or dome vertical wall or slant wall of container without top slab or dome	20 %
4.	Top slab or dome, staircase with RCC cabin and door	10 %
5.	Completion of Plaster and hydraulic test	15 %
6.	Procurement and fixing of inlet, outlet, washout, overflow pipe valves specials chambers, lighting arrester conductor and specials at site	10 %
7.	Fixing above pipes, specials as directed	5 %
8.	Water level indictor, painting of letters M.S ladder pipe, railing and all miscellaneous items such as paint in three coats etc (Completed with all respect) including water tightness test, including commissioning	10 %

**Signature of
Contractor**

**Deputy Executive Engineer
Irrigation Sub Division (P)
Rapar-Kachchh**

**Executive Engineer
Panchayat Irrigation Division
Bhuj – Kachchh**

ITEM NO : 2

SBC CHARGES FOR SOIL EXPOLARATION

As Per GWSSB Specification Attached Separately.

Measurement and Payment:

- **Measured in Report Submitted and Unit of measurement is Nos.**

Bill of Quantity

Bill of Quantity

Memorandum showing items of works to be carried out

Name of work: **Construction of 0.21 Lac. Lit. Cap. ESR at Ekalvandh Village, Tal. Bhachau, Dist. Kutch Under 15th F.C.**

Item No.	Quantities estimated but may be more or less	Item of works	Rates without GST		Unit	Total Amount according to estimated quantity (Without GST)
			In figures	In words		
1	2	3	4	5	6	7
		<u>Item No : 1</u>				
		<p>Designing structurally (and aesthetically) complying provisions of relevant Indian standards and constructing RCC Elevated service Reservoir of the following capacity and height , using latest Soil Investigation Report of proposed site ,Seismic zone, Wind speed Zone. Including</p> <p>(1)Container shape any suitable type(or as specified),</p> <p>(2) Staging consisting of column brace trestle / shaft / combination column- brace trestle and shaft as appropriate(or as specified) and</p> <p>(3) Appropriate foundation system. This includes excavation in all types of soil strata(including hard rock),casting100 mm thick P.C.C. levelling course in M-10 , Refilling the pit with proper soil and disposing of the surplus stuff at all required lead.</p> <p>(4)This will also include cement plaster in CM 1:2 with approved water proofing compound all over inside container (i.e. walls, base, top slab/domebottom etc. all).</p>				

Item No.	Quantities estimated but may be more or less	Item of works	Rates without GST		Unit	Total Amount according to estimated quantity (Without GST)
			In figures	In words		
1	2	3	4	5	6	7
1	1.00	<p>(5) All types of labour and material charges of lowering , laying, erecting / hoisting and joining of pipe assembly of Inlet, Outlet,overflow, washout and bye pass arrangement as per hydraulic design are including.</p> <p>(6) Providing and fixing of any accessories(specified), CI Manhole frame and covers, water level indicator , lightening conductor, GI Pipe railing around walk way, at roof level, at gallery and around landing of inside shaft, Adequate cowl type ventilators or lantern type ventilator with stainless steel jali.</p> <p>(7) Scope of work includes constructingRCC spiral staircase with adequate tie beams,staircase footing ,Rcc chambers for valves. ventilating shaft and ventilators as well as door in shaft,SS grating to be provided to outlet pipe (inside container) for safety.</p> <p>(8) including providing and applying three coats of cement paint/snowcem (as specified) to the whole structure.</p> <p>(9) It also includes satisfactory water tightness test as per relevant I.S. Code and painting name of scheme and capacity on the tank as per direction of engineer in charge.</p> <p>For ESR 25,000 litre Capacity 12 mt height At Gurukrupa nagar Fatehgadh Village Ta: Bhachau.</p>	800,940.00	Eight Lac. Nine Hundread Forty Only	NOS.	800,940.00
		Item No : 2				
2	1.00	SBC CHARGES FOR SOIL EXPOLARATION	20,000.00	Twenty Thousand Only	NOS.	20,000.00
					Total Rs.:	820,940.00

Item No.	Quantities estimated but may be more or less	Item of works	Rates without GST		Unit	Total Amount according to estimated quantity (Without GST)
			In figures	In words		
1	2	3	4	5	6	7

I/We am/are willing to carry out the work at.....% above/below percent (should be written in figures and words) of the estimated rates mentioned above. Amount of my/our tender works out as under :

* Estimated Amount put to tender Rs.....

Deduct.....% below Rs.....

Add.....% above Rs.....

Net Rs.....

Total Rs.....

In Words.....

In Words.....

Note :-

(1) All works shall be carried out as per Public Works Department Hand Book and other specifications of the Division or as directed.

(2) All the columns in Schedule should be filled in during E-Tendering and the total of the entries in the last column should be struck by the contractor.

(3) Rates quoted includes clearance of site (Prior commencement of work and its close) in all respects and hold good for work under all conditions, site, moisture, weather etc.

(4) To be continued on additional sheets if found necessary.

Signature of the contractor:

**Deputy Executive Engineer
Irrigation Sub Division(P)
Rapar- Kachchh**

**Executive Engineer,
Panchayat Irrigation Division
Bhuj-Kachchh**

VOLUME – III

TECHNICAL SPECIFICATION

GENERAL SPECIFICATION**R.C.C. ESR/ Sump/ HGLR /PH /Cattle Through**

All the works of construction of RCC ESR/ RCC Sump/ HGLR, Pump House , Cattle Trough and other civil works shall be carried out as per the relevant specification mentioned hereunder:-

1.0 EXCAVATION FOR FOUNDATION:

- 1.0 When the rates are to be quoted for a work based on " contractors own design" the word excavation for foundation shall mean excavation for foundation in all types strata such as soil soft murrum as well as hard rocks up to the designed depth at which foundation is to rest. No extra payment will be given for any change in strata at the same place. The rate shall also include dewatering and shoring strengthen if and where found necessary.*
- 1.1 Excavation shall be carried out as per approved drawing. The excavation made deeper or wider than that required as per drawing shall not paid, but such deeper excavation if carried out shall have to be filled up using C.C. 1:3:6 by the contractor without extra cost. If the type of strata require wider excavation at top (GL) Then contractor shall excavate the trench accordingly but no extra payment for such wider excavation shall be made.*
- 1.2 The rate shall include providing cured warnings lights during night time providing barricading consisting of metal ropes and bamboo for which no extra payment will be made.*
- 1.3 The contractor shall make his own arrangements to obtain prior permission directly from relevant authorities for staking of excavated stuff near work side. If he fails to obtain such permission, then he will have to make his own arrangement with out claiming extra cost to transport and stack the excavated stuff at a suitable place approved by the Engineer-in-charge of work.*
- 1.4 The excavated stuff shall be stacked at least 3.0 meter away from the edge of excavated trench, If enough space is not available at work site then the excavated stuff shall be stacked at suitable place situated away from site. Similarly the surplus stuff shall have to be disposed off at a suitable place for which contractor shall have to obtain permission directly from relevant authorities. No extra payment for transportation of excavated stuff or surplus stuff shall be made.*
- 1.5 No excavated stuff shall be disposed off or used for any purpose other than refilling without prior permission of Engineer-in-charge of work.*
- 1.6 Details shown in the data sheet regarding water table are approximate. The contractor should make his own arrangements for taking trial pots at his own cost more quoting his rates for as certain type of strata water table, quantity of seepage water etc.*
- 1.7 Work at nighttime shall be carried out only with written permission of Engineer-in-charge.*
- 1.8 Bottom of the excavated foundation trench shall be sprinkles with water (If water table is not above foundation level) and wall rammed to obtain a reasonably firm and level bedding.*
- 1.9 The rates shall include continuous dewatering of seepage water or rainwater from, trenches to keep the trench dry particularly during casting of base concrete, Concrete for footing and columns of shaft etc. till concrete fully cures etc.*
- 1.10 Whenever collapsible types of strata are encountered pucca shoring and strutting shall be invariably claim shall be entertained.*

2.0 C.C. M 100 BASE CONCRETE FOR LEVELLING COARSE:

2.1 For all practical purpose and in absence of proportioning of concrete on base of preliminarily tests, C.C. 1:3:6 may be provided as a leveling course i.e. one part of cement three parts of sand and six parts of black trap kapachi. Specification for various ingredients of concrete such as sand, cement, kapachi, water shall be as these given in specification for C.C.M. 15.

2.2 While laying base concrete for leveling course the concrete shall not be dumped from above but shall be carried out to the bottom and gently placed from a height not exceeding 1.5 meter. If concrete is transported by chutes, then the same shall be remixed at bottom of chutes to overcome any segregation that might have occurred.

3.0 C.C. M 150:

3.1 As far as possible the preparation of various ingredients of concrete shall be determined on the bases of preliminary tests as per ISS using the actual materials to be used on site. However in absence of such preliminary tests the volumetric proportion of 1:2:4 may be adopted i.e. one part of cement, two parts of sand and four parts of kapachi, water just sufficient to attain desired workability may be added. However the aim while proportioning should be to fix the proportion of aggregation and water cement ratio shall be always sufficiently low enough to get desired strength.

3.2 Materials:

3.2.1 Coarse aggregate shall consist of tough angular black trap kapachi. The kapachi shall be obtained from approved source only. Normally at least two stock piles of different size of 12 to 20 mm and 25 mm to 40 mm shall be maintained. It will however, be preferably to maintain third stock pile of 6 mm to 12 mm also for better control on mix of concrete.

3.2.2 The maximum size of coarse aggregate to be used shall be as large as possible within the limits of requirements, based on size of member and spacing of reinforcement. But aggregate exceeding 40 mm shall not be used in concrete for ESR.

3.2.3 Depending up on the size of member, spacing of reinforcement and degree of workability desired, the coarse aggregates from different stockpiles may be mixed in a suitable proportion to get a uniform mix that does not segregate.

3.2.4 The coarse aggregate shall not contain dust, clay or other such harmful material. If directed by the Engineer the same shall be washed with water and dried before being used.

3.3.0 Fine Aggregates:

Fine aggregates shall consist of coarse, angular river sand free dirt and other harmful organic materials. If directed the same shall be screened and washed before being used. Sand brought from approved source shall only be used.

3.4.0 Cement:

Contractor shall provide a temporary store with double lock arrangement for storage of this cement on work site without extra cost. Cement shall be stored in such a way that it is not affected by moisture.

3.5.0 Water:

Water to be used in concrete work shall be potable, free from injurious elements such as chloride or sulphate etc. and shall be obtained from approved source only. Contractor shall make his own arrangements to obtain and store sufficient quantity of water at all times.

3.6.0 Reinforcement Steel:

The reinforcing bars to be provided with TMT Steel Fe-415 and shall confirm to the Tender specifications and relevant IS specifications.

4.0 FORM WORK:

Form work shall consist of steel plates or smooth timber planks to be joined by nuts, bolts, nails or pegs so as to have a reasonably water tight joints. Sufficient number of vertical and horizontal supports shall be provide when completed. Formwork shall be sufficiently sturdy & strong to absorb all stresses and movements. Before concrete is placed in position the formwork and steel shall be got checked through Engineer-in-charge of work. Advance intimation shall be given to the Engineer-in-charge for this purpose. The ultimate responsibility for safety and of lives of workmen and that of forms etc. from beginning of work till its completions shall always rest with the contractor proper ladders and plant forms for easy access shall be provided by the contractor without extra cost.

The faces of formwork coming in contact with concrete shall be cleaned and two coats of approved mould oil applied before fixing reinforcement. All rubbish, particularly chippings, shavings, sawdust, wire pieces dust etc. shall be removed from the interior of the forms before the concrete is placed. Where directed, cleaning of forms shall be done by blasting with a jet of compressed air at no extra cost.

Forms intended for reuse shall be treated with care. Forms that have deteriorated shall not be used. Before reuse, all forms shall be thoroughly scraped, cleaned, nails removed, holes suitably plugged, joints repaired and warped lumber replaced to the satisfaction of the Engineer In charge. The Contractor shall equip himself with enough shuttering to allow for wastage so as to complete the job in time.

Permanent formwork shall be checked for its durability and compatibility with adjoining concrete before it is used in the structure. It shall be properly anchored to the concrete.

Wire ties passing through beams, columns and walls shall not be allowed. In their place bolts passing through sleeves shall be used. Formwork spacers left in situ shall not impair the desired appearance or durability of the structure by causing swelling, rust staining or allowing the passage of moisture.

For liquid retaining structures, sleeves shall not be provided for through bolts nor shall through bolts be removed if provided. The bolts, in the latter case, shall be cut at 25 mm depth from the surface and the hole made good by cement mortar of the same proportion as the concrete just after striking the formwork.

The striking time for formwork shall be determined based on the following requirements:

- (a) Development of adequate concrete strength;*
- (b) Permissible deflection at time of striking form work;*
- (c) Curing procedure employed - its efficiency and effectiveness;*
- (d) Subsequent surface treatment to be done;*
- (e) Prevention of thermal cracking at re-entrant angles;*
- (f) Ambient temperatures; and*
- (g) Aggressiveness of the environment (unless immediate adequate steps are taken to prevent damage to the concrete).*

Under normal circumstances (generally where temperatures are above 20°C) forms may be struck after expiry of the time period given in IS:456 unless approved otherwise by the Engineer In charge. For Portland Pozzolana/slag cement the stripping time shall be suitably modified as approved by the Engineer In charge. It is the Contractor's responsibility to ensure that forms are not struck until the concrete has developed sufficient strength to support itself, does not undergo

excessive deformation and resist surface damage and any stresses arising during the construction period.

5.0 MIXING, TRANSPORTATION AND LAYING:

5.1 For important works like ESR and sumps mixing of concrete shall be invariably done in approved machine mixer only. The mix obtained from the mixer shall be a uniform mass consisting of all aggregates coated with cement paste.

5.2 Fresh concrete shall be transported horizontally in ghamellas or wheelbarrows. Vertical transportation shall be done either by manual labour or using mechanical vertical lifts. When chutes are used for transportation, care should be exercised to avoid segregation and concrete may be remixed at bottom of chutes to get uniform mix. Before any concrete is placed in position all loose materials such as dirt, chips of stones, wood, steel etc. should be removed. Inner side of forms should be coated with thin layer of oil to get a good finished surface. Concrete should not be dumped from above in which case aggregate will segregates, but placed gently from a height not exceeding 1.5 meter. Compaction of concrete shall be done by vibrators till cream appears at top. Over vibration shall be avoided to avoid segregation.

6.0 CURING:

After concrete is set in position it shall be kept continuously wet with water for 7 days either by using gunny bags (column and walls) by ponding (slab) or as directed by spraying of water. Unless otherwise specified the rate shall include finishing the exposed surface to get good finished surface.

The forms shall be kept in position for period given below:-

<i>1) Vertical sides of walls, beams, columns</i>	<i>2</i>	<i>Days</i>
<i>2) Slabs (props left under.)</i>	<i>4</i>	<i>"</i>
<i>3) Bottom of beam (props left under)</i>	<i>7</i>	<i>"</i>
<i>4) Removal of prop to slab spanning up to 4.5 spurious over 4.5 m.</i>	<i>7</i>	<i>"</i>
<i>5) Removal of props to for spanning up to 6.0 m.</i>	<i>14</i>	<i>"</i>
<i>6) Spanning over 6.0 m.</i>	<i>21</i>	<i>"</i>

C.C. M 250 :

Specification for C.C.M. 250 shall be same as those for C.C.M 200 except that grade of concrete to be produced shall be M250. Contractor shall have to design the Mix of M250 grade concrete by govt. laboratory or any govt. approved laboratory(approval certificate should be produced) as per instruction of Engineer in Charge. Trial of Mix design test is taken in laboratory & site for conforming the test results of Mix of concrete of grade M250 & same is to be tested in the presence of representative of the GWSSB. If arbitrary volumetric proportioning is to be followed then the proportion of cement, sand and kapachi shall be 1:1:2 respectively. Since M - 250 mix is normally used in water retaining parts of container where the aim is to get dense, strong and watertight concrete, special care shall be exercised in controlling proportion of aggregate, water cement ratio, compaction and curing.

7.0 PROVIDING AND PLACING IN POSITION STEEL REINFORCEMENT:

- 7.1 Reinforcement bars to be used in RCC work shall have to be supplied by the contractor. The rates include providing, cutting, bending, binding, hooking and placing in position including cost of binding wire. The bars shall be fusion bonded and epoxy coated.
- 7.2 Depending upon the type of reinforcement steel proposed in design (i.e. M.S. or deformed etc.) the steel shall confirm to relevant ISS codes in practice. Contractor shall produce necessary test certificate in absence of which the steel bars shall be get tested by the Department at the contractor's cost.
- 7.3 Steel bars shall be cut, bent up, hooked bound with wires and then placed in position as per approved drawing. The steel shall be got checked through Engineer-in-charge. Before any concrete is placed in formwork advance intimation shall be given to the Engineer-in-charge for this purpose. The steel shall be cleared of any dust or rust that might have been deposited on bars.
- 7.4 Reinforcement shall be accurately fixed and maintained firmly in the correct position by the use of blocks, spacers, chairs, binding wire etc. to prevent displacement during placing and compaction of concrete. The tied in place reinforcement shall be approved by the Executive Engineer prior to concrete placement. Spacers shall be of such materials and designs as will be durable, not lead to corrosion of the reinforcement and not cause scaling of the concrete cover. Binding wire shall be 16 gauge soft annealed wires. Ends of the binding wire shall be bent away from the concrete surface and in no case encroach into the concrete cover. Substitution of reinforcement, laps/splices not shown on drawing shall be subject to Executive Engineer's approval.

8.0 **WOODEN WATER LEVEL INDICATOR:**

- 8.1 A wooden water level indicator of approved size and type shall be provided and fixed by the contractor. It shall consist of wooden plank of 250 mm x 40 mm.
- 8.2 The divisions on water level indicators shall show distance of 10 cm. clearly. A copper or PVC float of 500-mm dia and 50 mm height shall be provided along with steel wires pulleys etc. The entire arrangement shall be first got approved by the Engineer-in-charge of work. Letter and marking shall be painted with approved enamel paint.
- 9.0 Providing and fixing CI flanged pipes and special such as duck foot bends, crippling flanges bell mouthpiece etc. for inlet outlet overflow and wash out.
- 9.1 Diameter and length of above pipes shall be as given in Appendix - A. CI flanged pipes shall be vertically cast double flanges and shall be confirm to relevant ISS. They shall be first get approved by the Engineer-in-charge of work.
- 9.2 Item shall include providing all specials such as crippling flanges, and duck feet bends etc. as may be required on site.
- 9.3 The Item shall also include cost of all jointing materials such as nuts, bolts, rubber packing, white zinc or pig lead or lead wool if required.
- 9.4 Pipes shall be fixed perfectly vertical and straight.
- 9.5 Before fixing in position pipes shall be coated with two coats of anticorrosive paint.
- 9.6 The pipes and specials shall be tested hydraulically. Leakage if found shall be repaired without extra cost.

10.0 **PROVIDING AND FIXING CI SLUICE VALVE:**

- 10.1 Diameter of CI sluice valve shall be as shown in Appendix - A. CI sluice valve shall be of class - I confirming to IS - 780-1980.

- 10.2 *The rate includes providing and fixing CI sluice valves with tailpieces including jointing materials such as nuts, bolts, rubber packing zinc etc.*
- 10.3 *The rate includes giving hydraulic test to the satisfaction of Engineer-in-charge of work.with necessary connection to existing line*
- 10.4 *Sluice valve shall be supplied with necessary spindle or wheel for operating the same.*

11.0 PROVIDING AND FIXING C I M H FRAME AND COVER:

One number of C I M H frame and cover shall be provide and fixed in top slab of container. The dimensions and weight shall be as shown in Appendix - A. The C I M H frame and cover shall be first got approved by the Engineer-in-charge. Two coats of anticorrosive paints shall be applied before fixing them in position.

12.0 C I COWL TYPE VENTILATORS:

The C I Cowl type ventilator should be of 100 mm dia shape with flanged and roughing screen shall be as per Appendix - A. The rate includes providing and fixing C I Cowl type ventilator as per Appendix - A including cost of all jointing materials such as nuts, bolts, white zinc rubber packing etc. Two coats of anticorrosive paints shall be applied to the surface before they are fixed in position. They shall be first for approved by the Engineer-in-charge.

13.0 PROVIDING & FIXING M.S. LADDER INSIDE CONTAINER:

Contractor shall have to fabricate and fixed M.S. ladder. The ladder to be fixed shall be fabricated from M.S. flat of 10 mm x 65 mm or M.S. angle having equivalent modular of selection 20 mm dia. Bars shall be fixed at 30 mm c/c. to act as steps. The ladder shall be 45 cm. wide if length of ladder is more than 8.0 m. Three coats of approved anticorrosive paint shall be applied to the ladder. The design of M.S. ladder shall be got approved by the Engineer-in-charge before it is fabricated and fixed in position. Rate includes providing and fabricating, painting and fixing in position of M.S. ladder as above.

- 14.0 **CONSTRUCTION OF VALVE CHAMBER:** *Number and size of valve chamber shall be as per Appendix - A. Specification of various items such as B.B. masonry cement plaster, C.M. (1:3) and C.C. (1:3:6) at bottom. RCC 1:2:4 etc. shall be as these given in column of specification published by G W S & S Board and as those prevailing in Division.*

15.0 PAINTING LETTER:

Following words shall be painted on the container 100,000 liters capacity."GWSSB" The letters shall be 45 cm high and the black ground of suitable color shall be provided. Approved enameled paint shall only be used for painting letters and background. Entire work shall be carried out as per instruction of Engineer-in-charge.

16.0 PROVIDING & FIXING GI PIPE RAILING AROUND TOP SLAB:

Railing shall consist of 3 raw of 25 mm dia GI pipes fixed in M.S. angles of 60 mm x 60 mm x 6 mm 0.9 m. height fixed at 2 m c/c. The materials shall be got approved by Engineer-in-charge before fabrication. Three coats of approved anticorrosive paint shall be applied to M.S. angle before they are fixed in position.

17.0 CEMENT PAINT:

The work shall be carried out as per instruction of the Engineer-in-charge. The snowcem paint shall be waterproof cement paint and best quality shall be got approved before use.

The surface shall be prepared by removing all mortar dropping and foreign matter and thoroughly cleaned with wire or fiber brush or and suitable means and washing the surface. All loose pieces shall be scrapped out and hole shall be stopped with mortar. After cleaning the surface the watering hole surface and applied snowcem paint in three coats.

18.0 **WATERPROOF CEMENT PLASTER:**

The cement mortar shall consist of two parts of fine river sand free from any dust and other organic matter and one part of approved quality of cement. The mortar shall be properly mixed on watertight platform. The mortar shall be used within half an hour after mixing. The water proofing materials weighting 1.5 kg of powder in one bag of cement shall be added.

- 19 *The plaster shall be applied in uniform thickness of 20 mm and shall be properly smoothened with wooden & finished with cement finishing of required. The curing shall be done at least for week by sprinkling the water over the wall. The wall shall be tested for waterproofness. The rate includes the cost of waterproofing materials. The test for waterproofness shall be carried out by the contractor at his own cost by filling the contractor with water and it shall be checked out that there is no percolation of water from the wall. Payment shall be made per sq. m. of plaster done.*

After completion & testing of work the contractor shall have provide & fix the Marble 'Takti' of required size with necessary writings, as directed by the Engineer-in-charge.

RCC work of shaft, container and staircase should be of well finished condition if the same is not satisfactory than contractor since have to finish the surface with 12 mm thick plaster C.M. without any extra cost.

- 20 *The contractor shall have to make arrangement for testing of steel bars brought on site and concrete cubes, for different mix at different stage like foundation, shaft, column, cube should be cast on site and send Govt. or Govt, approved laboratory for compressive strength at 28 days. Results must be produced in office before taking payment of work done. Testing charge must bear by contractor.*

- 21.0 **Conditions:** *The paint is supplied in two packs, fine zinc dust mixed with epoxy resin as base and liquid hardener. They are to be mixed in following ratio.*

	By Volume	By Weight
Base	1.5	4.0
Hardener	1.0	1.0

22.0 **Mixed Paint Properties**

i)	Viscosity	20+3% seconds by flow
		Cup No.4 @ 30 °C
ii)	Specific Gravity	1.70+3%
iii)	Post life of mixture	6-8 hrs.
iv)	Zinc dust content on DFT basis	92+/-3%
v)	Finish	Smooth and Matt.
vi)	Drying time	

	<i>Surface dry</i>	<i>5 minutes</i>
	<i>Hard Dry</i>	<i>Less than 1 hr.</i>
<i>vii)</i>	<i>Over coating after</i>	<i>Minimum 24 hrs.</i>
		<i>Maximum No limit</i>
<i>viii)</i>	<i>Flash point</i>	<i>Above 23 o C</i>
<i>ix)</i>	<i>D.F.T.</i>	<i>20-25 microns depending on blasting profile</i>
<i>x)</i>	<i>Compatibility</i>	<i>Compatible with all systems of paints like Bituminous, conventional, chlorubber vinyl and epoxy paints.</i>
<i>xi)</i>	<i>Toxicity</i>	<i>Non toxic</i>

- 23) *Application: By Brush/Spray (Air and Airless)*
 24) *Thinner: Epoxy thinner shall be used if required.*
 25) *Coverage: 10 Sq. m./liter at 25 microns.*
 26) *High build black paint.*

<i>1)</i>	<i>Dry time</i>	<i>Surface dry not more than 4 hours Hard dry not more than 18 hours Film thickness per coat 75 micron.</i>
<i>2)</i>	<i>Consistency</i>	<i>Thixotropic liquid</i>
<i>3)</i>	<i>Covering Capacity</i>	<i>5 Sq.m./liter</i>
<i>4)</i>	<i>Color</i>	<i>Black/Brown/Black in alternative layer</i>

27.0 **Characteristics:**

The coating shall be non-phenolic, non-toxic. It shall afford a highly durable protective air tight coating to prevent corrosion or rusting of iron and steel against air moisture/water and shall be of sufficient elasticity to prevent racing, blistering or peeling. It shall retain its consistency at the ordinary atmospheric temperatures when packed in suitable containers. After application of drying, the coating shall not show any surface cracks due to drying, weathering action or expansion and contraction. Its resistance to water must be perfect. It shall also be resistant to weak acid and alkalis, natural salts and to dry heat up to 150 centigrade. It should have good brush ability. The primer as well as paint shall have to be applied as per the manufacturer's specification. The paints shall be tested in the laboratory by the owner at the cost of the contractor if found necessary. The manufacturer shall accompany each lot of primer and paint supplied. The entire procedure of applying the coating as specified shall be rigidly inspected right from cleaning stage to application of final coat.

28.0 **Mode of measurement and payments:** *Payment will be as per payment schedule.*

CONCRETE

Applicable Codes

Materials

1. IS:269 Specification for 33 grade ordinary Portland cement.
2. IS:455 Specification for Portland slag cement.
3. IS:1489 Specification for Portland-Pozzolana cement (Part 1&2).
4. IS: 8112 Specification for 43 grade ordinary Portland cement.
5. IS: 12269 Specification for 53 grade ordinary Portland cement.
6. IS: 12330 Specification for sulphate resisting Portland cement.
7. IS: 383 Specification for coarse and fine aggregates from natural sources for concrete.
8. IS: 432 Specification for mild steel and medium (tensile steel bars and hard-drawn steel) wires for concrete reinforcement. (Part 1&2)
9. IS: 1786 Specification for high strength deformed steel bars and wires for concrete reinforcement.
10. IS: 1566 Specification for hard-drawn steel wire fabric for concrete reinforcement.
11. IS: 9103 Specification for admixtures for concrete.
12. IS: 2645 Specification for integral cement water- proofing compounds
13. IS: 4990 Specification for plywood for concrete shuttering work.

Material Testing

- 1) IS:4031 Methods of physical tests for hydraulic cement (Parts 1 to 15)
- 2) IS: 4032 Method chemical analysis of hydraulic cement.
- 3) IS: 650 Specification for standard sand for testing of cement.
- 4) IS: 2430 Methods for sampling of aggregates for concrete.
- 5) IS:2386 Methods of test for aggregates for concrete (Parts 1 to 8)
- 6) IS: 3025 Methods of sampling and test (physical and chemical) for water used in industry.
- 7) IS: 6925 Methods of test for determination of water-soluble chlorides in concrete admixtures.

Material Storage

- 1) IS: 4082 Recommendations on stacking and storing of construction materials at site.

Concrete Mix Design

- 1) IS: 10262 Recommended guidelines for concrete mix design.
- 2) SP: 23 (S&T) Handbook on Concrete Mixes

Concrete Testing

- 1) IS:1199 Method of sampling and analysis of concrete.
- 2) IS: 516 Method of test for strength of concrete.
- 3) IS: 9013 Method of making, curing and determining compressive Strength of accelerated cured concrete test specimens.
- 4) IS: 8142 Method of test for determining setting time of concrete by penetration resistance.
- 5) IS: 9284 Method of test for abrasion resistance of concrete.
- 6) IS: 2770 Methods of testing bond in reinforced concrete.

Equipments

- 1) IS: 1791 Specification for batch type concrete mixers.
- 2) IS: 2438 Specification for roller pan mixer.

- 3) IS: 4925 Specification for concrete batching and mixing plant.
- 4) IS: 5892 Specification for concrete transit mixer and agitator.
- 5) IS: 7242 Specification for concrete spreaders.
- 6) IS: 2505 General Requirements for concrete vibrators: Immersion type.
- 7) IS: 2506 General Requirements for screed board concrete vibrators.
- 8) IS: 2514 Specification for concrete vibrating tables.
- 9) IS: 3366 Specification for pan vibrators.
- 10) IS: 4656 Specification for form vibrators for concrete.
- 11) IS: 11993 Code of practice for use of screed board concrete vibrators.
- 12) IS: 7251 Specification for concrete finishers.
- 13) IS: 2722 Specification for portable swing weighs batchers for concrete (single and double bucket type).
- 14) IS: 2750 Specification for steel scaffoldings.

Codes Of Practice

- 1) IS: 456 Code of practice for plain and reinforced concrete.
- 2) IS: 457 Code of practice for general construction of plain and reinforced concrete for dams and other massive structures.
- 3) IS: 3370 Code of practice for concrete structures for storage of liquids (Parts 1 to 4)
- 4) IS: 3935 Code of practice for composite construction.
- 5) IS: 2204 Code of practice for construction of reinforced concrete shell roof.
- 6) IS: 2210 Criteria for the design of reinforced concrete shell structures and folded plates.
- 7) IS: 2502 Code of practice for bending and fixing of bars for concrete reinforcement.
- 8) IS: 5525 Recommendation for detailing of reinforcement in reinforced concrete works.
- 9) IS: 2751 Code of practice for welding of mild steel plain and deformed bars used for reinforced concrete construction.
- 10) IS: 9417 Specification for welding cold worked bars for reinforced concrete construction.
- 11) IS: 3558 Code of practice for use of immersion vibrators for consolidating concrete.
- 12) IS: 3414 Code of practice for design and installation of joints in buildings.
- 13) IS: 4326 Code of practice for earthquake resistant design and construction of building.
- 14) IS: 4014 Code of practice for steel tubular scaffolding (Parts 1 & 2)
- 15) IS: 2571 Code of practice for laying inset cement concrete flooring.
- 16) IS: 7861 Code of practice for extreme weather concreting: Part 1
Recommended practice for hot weather concreting.

Construction Safety

- 1) IS:3696 Safety code for scaffolds and ladders. (Parts 1 &
- 2) IS: 7969 Safety code for handling and storage of building materials.
- 3) IS: 8989 Safety code for erection of concrete framed structures.

General

The ENGINEER INCHARGE shall have the right at all times to inspect all operations including the sources of materials, procurement, layout and storage of materials, the concrete batching and mixing equipment and the quality control system. Such an inspection shall be arranged and the ENGINEER INCHARGE's approval obtained, prior to starting of concrete work. This shall, however, not relieve the Contractor of any of his responsibilities. All materials, which do not conform to the Specifications, shall be rejected.

Materials should be selected so that they can satisfy the design requirements of strength, serviceability, safety, durability and finish with due regards to the functional requirements and the environmental conditions to which the structure will be subjected. Materials complying with codes/standards shall generally be used. Other materials may be used after approval of the ENGINEER INCHARGE and after establishing their performance suitability based on previous data, experience or tests.

Materials

Cement:

Unless otherwise called for by the ENGINEER INCHARGE, cement shall be ordinary Portland cement conforming to IS: 269, IS: 8112 or IS: 12269.

Only one type of cement shall be used in any one mix. The source of supply, type or brand of cement within the same structure or portion thereof shall not be changed without approval from the ENGINEER INCHARGE.

Cement, which is not used within 90 days from its date of manufacture, shall be tested at a laboratory approved by the ENGINEER INCHARGE and until the results of such tests are found satisfactory, it shall not be used in any work.

Aggregates (General):

Aggregates shall consist of naturally occurring stones (crushed or uncrushed), gravel and sand. They shall be chemically inert, strong, hard, clean, durable against weathering, of limited porosity, free from dust/silt/ organic impurities/deleterious materials and conform to IS: 383. Aggregates such as slag, crushed over burnt bricks, bloated clay ash, sintered fly ash and tiles shall not be used.

Aggregates shall be washed and screened before use where necessary or if directed by the ENGINEER INCHARGE.

Aggregates containing reactive materials shall be used only after tests conclusively prove that there will be no adverse effect on strength, durability and finish, including long-term effects, on the concrete.

The fineness modulus of sand shall neither be less than 2.2 nor more than 3.2.

The maximum size of coarse aggregate shall be as stated on the drawings but in no case greater than 1/4 of the minimum thickness of the member.

Plums 160 mm and above of a reasonable size may be used in mass concrete fill where directed. Plums shall not constitute more than 20% by volume of the concrete.

Water

Water used for both mixing and curing shall conform to IS: 456. Potable waters are generally satisfactory. Water containing any excess of acid, alkali, sugar or salt shall not be used.

Reinforcement

All reinforcement steel shall be TMT steel grade – Fe415 conforming to relevant I.S. for water retaining structure

All reinforcement shall be clean, free from pitting, oil, grease, paint, loose mill scales, rust, dirt, dust, or any other substance that will destroy or reduce bond.

Admixtures

Accelerating, retarding, water reducing and air entraining admixtures shall conform to IS: 9103 and integral water proofing admixtures to IS: 2645.

Admixtures may be used in concrete as per manufacturer's instructions only with the approval of the ENGINEER INCHARGE. An admixture's suitability and effectiveness shall be verified by trial mixes with the other materials used in the works. If two or more admixtures are to be used simultaneously in the same concrete mix, their interaction shall be checked and trial mixes done to ensure their compatibility. There should also be no increase in risk of corrosion of the reinforcement or other embedment.

Calcium chloride shall not be used for accelerating set of the cement for any concrete containing reinforcement or embedded steel parts. When calcium chloride is permitted such as in mass concrete works, it shall be dissolved in water and added to the mixing water by an amount not exceeding 1.5 percent of the weight of the cement in each batch of concrete. The designed concrete mix shall be corrected accordingly.

Wastage

Wastage allowance for cement and steel shall be considered in the item rate and no extra payment shall become payable to the Contractor on any account.

Samples and Tests

All materials used for the works shall be tested before use.

Manufacturer's test certificate shall be furnished for each batch of cement/steel and when directed by the ENGINEER INCHARGE samples shall also be got tested by the Contractor in Govt, or Govt approved or a laboratory approved by the ENGINEER INCHARGE at no extra cost to Employer. ENGINEER INCHARGE may appoint separate third party inspection for the material testing to ensure the quality of the work. The Contractor shall replace the defective material as an outcome of these tests. Sampling and testing shall be as per IS: 2386 under the supervision of the ENGINEER INCHARGE.

Water to be used shall be tested to comply with requirements of IS: 456.

The Contractor shall furnish manufacturer's test certificates and technical literature for the admixture proposed to be used. If directed, the admixture shall be got tested at an approved laboratory at no extra cost.

Storing of Materials

All materials shall be stored in a manner so as to prevent its deterioration and contamination, which would preclude its use in the works. Requirements of IS: 4082 shall be complied with.

The Contractor will have to make his own arrangements for the storage of adequate quantity of cement. If such cement is not stored properly and has deteriorated, the material shall be rejected. Cement bags shall be stored in dry weatherproof shed with a raised floor, well away from the outer walls and insulated from the floor to avoid moisture from ground. Not more than 15 bags shall be stacked in any tier. Storage arrangement shall be approved by the ENGINEER INCHARGE. Storage under tarpaulins shall not be permitted. Each consignment of cement shall be stored separately and consumed in its order of receipt.

Each size of coarse and fine aggregates shall be stacked separately and shall be protected from leaves and contamination with foreign material. The stacks shall be on hard, clean, free draining bases, draining away from the concrete mixing area.

The Contractor shall make his own arrangements for storing water at site in tanks to prevent contamination.

The reinforcement shall be stacked on top of timber sleepers to avoid contact with ground/water. Each type and size shall be stacked separately.

Concrete General

Concrete grade shall be as designated on drawings. In concrete grade M15, M25 etc. the number represents the specified characteristic compressive strength of 150 mm cube at 28 days, expressed in N/sq.mm as per IS: 456. Concrete in the works shall be "DESIGN MIX CONCRETE" or "NOMINAL MIX CONCRETE". All concrete works of grade M5, M7.5 and M10 shall be NOMINAL MIX CONCRETE whereas all other grades, M15 and above, shall be DESIGN MIX CONCRETE.

Design Mix Concrete

(a) Mix Design & Testing

For Design Mix Concrete, the mix shall be designed according to IS: 10262 and SP: 23 to provide the grade of concrete having the required workability and characteristic strength not less than appropriate values given in IS: 456. The design mix shall be cohesive and does not segregate and should result in a dense and durable concrete and also capable of giving the finish as specified. For liquid retaining structures, the mix shall also result in watertight concrete. The Contractor shall exercise great care while designing the concrete mix and executing the works to achieve the desired result.

The minimum cement content for Design Mix Concrete shall be as per Appendix-A of IS: 456 or as given below, whichever is higher.

<i>Grade of Concrete</i>	<i>Minimum Cement Content in Kg/Cu. m of Concrete</i>
<i>M15</i>	<i>260</i>
<i>M20</i>	<i>315</i>
<i>M25</i>	<i>360</i>

The minimum cement content stipulated above should be adopted irrespective of whether the Contractor achieves the desired strength with less quantity of cement. The Contractor's quoted rates for concrete shall provide for the above eventuality and nothing extra shall become payable to the CONTRACTOR in this account. Even in the case where the quantity of cement required is higher than that specified above to achieve desired strength based on an approved mix design, nothing extra shall become payable to the CONTRACTOR.

It shall be the Contractor's sole responsibility to carry out the mix designs at his own cost. He shall furnish to the ENGINEER INCHARGE at least 30 days before concreting operations, a statement of proportions proposed to be used for the various concrete mixes and the strength results obtained. The strength requirements of the concrete mixes ascertained on 150 mm cubes as per IS: 516 shall comply with the requirements of IS: 456.

<i>Grade of Concrete</i>	<i>Minimum Compressive Strength N/sq.mm at 7</i>	<i>Specified Characteristic Compressive Strength N/sq.mm</i>
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	days	at 28 days
M 15	10.0	15.0
M 20	13.5	20.0
M 25	17.0	25.0
M 30	20.0	30.0
M 35	23.5	35.0
M 40	27.0	40.0

A range of slumps which shall generally be used for various types of construction unless otherwise instructed by the ENGINEER INCHARGE is given below:

Structure/Member	Slump in millimeters	
	Maximum	Minimum
Reinforced foundation walls and footings	75	25
Plain footings, caissons and substructure walls		
Slabs, Beams and reinforced walls	100	25
Pump & miscellaneous Equipment Foundations	75	25
Building columns	100	25
Pavements	50	25
Heavy mass construction	50	25
	50	25

(b) Batching & Mixing of Concrete:

Proportions of aggregates and cement, as decided by the concrete mix design, shall be by weight. These proportions shall be maintained during subsequent concrete batching by means of weigh batchers capable of controlling the weights within one percent of the desired value.

Amount of water added shall be such as to produce dense concrete of required consistency, specified strength and satisfactory workability and shall be so adjusted to account for moisture content in the aggregates. Water- cement ratio specified for use by the ENGINEER INCHARGE shall be maintained. Each time the work stops, the mixer shall be cleaned out, and while recommencing; the first batch shall have 10% additional cement to allow for sticking in the drum.

Arrangement should be made by the Contractor to have the cubes tested in an approved laboratory or in field with prior consent of the ENGINEER INCHARGE. Sampling and testing of strength and workability of concrete shall be as per IS: 1199, IS: 516 and IS: 456, IS 3370.

Nominal Mix Concrete

(a) Mix Design & Testing

Mix design and preliminary tests are not necessary for Nominal Mix Concrete. However works tests shall be carried out as per IS: 456. Proportions for Nominal Mix Concrete and w/c ratio may be adopted as per Table 3 of IS: 456. However it will be the Contractor's sole responsibility to adopt appropriate nominal mix proportions to yield the specified strength.

(b) Batching & Mixing of Concrete

Based on the adopted nominal mixes, aggregates shall be measured by volume. However cement

shall be by weight only.

Formwork

Formwork shall be all inclusive and shall consist of but not be limited to shores, bracings, sides of footings, walls, beams and columns, bottom of slabs etc. including ties, anchors, hangers, inserts, false work, wedges etc.

The design and engineering of the formwork as well as its construction shall be the responsibility of the Contractor. However, if so desired by the ENGINEER INCHARGE, the drawings and calculations for the design of the formwork shall be submitted to the ENGINEER INCHARGE for approval.

Formwork shall be designed to fulfill the following requirements:

- (a) Sufficiently rigid and tight to prevent loss of grout or mortar from the concrete at all stages and appropriate to the methods of placing and compacting.*
- (b) Made of suitable materials.*
- (c) Capable of providing concrete of the correct shape and surface finishes within the specified tolerance limits.*
- (d) Capable of withstanding without deflection the worst combination of self weight, reinforcement and concrete weight, all loads and dynamic effects arising from construction and compacting activities, wind and weather forces.*
- (e) Capable of easy striking out without shock, disturbance or damage to the concrete.*
- (f) Soffit forms capable of imparting a camber if required.*
- (g) Soffit forms and supports capable of being left in position if required.*
- (h) Capable of being cleaned and/or coated if necessary immediately prior to casting the concrete; design temporary openings where necessary for these purposes and to facilitate the preparation of construction joints.*

The formwork may be of timber, plywood, steel, plastic or concrete depending upon the type of finish specified. Sliding forms and slip form may be used with the approval of the ENGINEER INCHARGE. Timber for formwork shall be well seasoned, free from sap, shakes, loose knots, worm holes, warps and other surface defects. Joints between formwork and formwork and between formwork and structures shall be sufficiently tight to prevent loss of slurry from concrete, using seals if necessary.

The faces of formwork coming in contact with concrete shall be cleaned and two coats of approved mould oil applied before fixing reinforcement. All rubbish, particularly chippings, shavings, sawdust, wire pieces dust etc. shall be removed from the interior of the forms before the concrete is placed. Where directed, cleaning of forms shall be done by blasting with a jet of compressed air at no extra cost.

Forms intended for reuse shall be treated with care. Forms that have deteriorated shall not be used. Before reuse, all forms shall be thoroughly scraped, cleaned, nails removed, holes suitably plugged, joints repaired and warped lumber replaced to the satisfaction of the ENGINEER INCHARGE. The Contractor shall equip himself with enough shuttering to allow for wastage so as to complete the job in time.

Permanent formwork shall be checked for its durability and compatibility with adjoining concrete before it is used in the structure. It shall be properly anchored to the concrete.

Wire ties passing through beams, columns and walls shall not be allowed. In their place bolts passing through sleeves shall be used. Formwork spacers left insitu shall not impair the desired appearance or durability of the structure by causing spalling, rust staining or allowing the passage of moisture.

For liquid retaining structures, sleeves shall not be provided for through bolts nor shall through bolts be

removed if provided. The bolts, in the latter case, shall be cut at 25 mm depth from the surface and the hole made good by cement mortar of the same proportion as the concrete just after striking the formwork.

Where specified all corners and angles exposed in the finished structure shall have chamfers or fillets of 20 mm x 20 mm size.

Forms for substructure may be omitted when, in the opinion of the ENGINEER INCHARGE, the open excavation is firm enough (in hard non-porous soils) to act as a form. Such excavations shall be larger, as approved by the ENGINEER INCHARGE, than that required as per drawing to compensate for irregularities in excavation.

The Contractor shall provide adequate props carried down to a firm bearing without overloading any of the structures.

The shuttering for beams and slabs shall be so erected that the side shuttering of beams can be removed without disturbing the bottom shuttering. If the shuttering for a column is erected for the full height of the column, one side shall be built up in sections as placing of concrete proceeds or windows left for placing concrete from the side to limit the drop of concrete to 1.0m or as approved by the ENGINEER INCHARGE. The Contractor shall temporarily and securely fix items to be cast (embedment/ inserts) in a manner that will not hinder the striking of forms or permit loss of grout.

Formwork showing excessive distortion, during any stage of construction, shall be repositioned and strengthened. Placed concrete affected by faulty formwork, shall be entirely removed and formwork corrected prior to placement of new concrete at Contractor's cost.

The striking time for formwork shall be determined based on the following requirements:

- (h) Development of adequate concrete strength;
- (i) Permissible deflection at time of striking form work;
- (j) Curing procedure employed - its efficiency and effectiveness;
- (k) Subsequent surface treatment to be done;
- (l) Prevention of thermal cracking at re-entrant angles;
- (m) Ambient temperatures; and
- (n) Aggressiveness of the environment (unless immediate adequate steps are taken to prevent damage to the concrete).

Under normal circumstances (generally where temperatures are above 20°C) forms may be struck after expiry of the time period given in IS: 456 unless approved otherwise by the ENGINEER INCHARGE. For Portland Pozzolana/slag cement the stripping time shall be suitably modified as approved by the ENGINEER INCHARGE. It is the Contractor's responsibility to ensure that forms are not struck until the concrete has developed sufficient strength to support itself, does not undergo excessive deformation and resist surface damage and any stresses arising during the construction period.

Reinforcement Workmanship:

Reinforcing bars supplied bent or in coils shall be straightened cold without damage. No bending shall be done when ambient temperature is below 5°C. Local warming may be permitted if steel is kept below 10° C.

All bars shall be accurately bent gradually and according to the sizes and shapes shown on the drawings/ schedules or as directed by ENGINEER INCHARGE.

Re-bending or straightening incorrectly bent bars shall not be done without the approval of the ENGINEER INCHARGE.

Reinforcement shall be accurately fixed and maintained firmly in the correct position by the use of blocks, spacers, chairs, binding wire etc. to prevent displacement during placing and compaction of

concrete. The tied in place reinforcement shall be approved by the ENGINEER INCHARGE prior to concrete placement. Spacers shall be of such materials and designs as will be durable, not lead to corrosion of the reinforcement and not cause spalling of the concrete cover.

Binding wire shall be 16-gauge soft annealed wire. Ends of the binding wire shall be bent away from the concrete surface and in no case encroach into the concrete cover.

Substitution of reinforcement, laps/splices not shown on drawing shall be subject to ENGINEER INCHARGE's approval.

Tolerances

Tolerance for formwork and concrete dimensions shall be as per IS: 456 unless specified otherwise.

Tolerances specified for horizontal or vertical building lines or footings shall not be construed to permit encroachment beyond the legal boundaries.

The formwork shall be designed and constructed to the shapes, lines and dimensions shown on the drawings within the tolerances given below:

(a) Deviation from specified dimensions of cross section of columns and beams	- 6 mm + 12 mm
(b) Deviations from dimensions of footings (Tolerances apply to concrete dimensions only, not to positioning of vertical reinforcing steel or dowels)	
1) Dimension in plan	- 12 mm
2) Eccentricity	+ 50 mm
	0.02 times the width of the footing in the direction of deviation but not more than 50 mm
3) Thickness	± 0.05 times the specified thickness

Preparation Prior to Concrete Placement

Before concrete is actually placed in position, the inside of the formwork shall be cleaned and mould oil applied, inserts and reinforcement shall be correctly positioned and securely held, necessary openings, pockets, etc. provided.

All arrangements-formwork, equipment and proposed procedure, shall be approved by the ENGINEER INCHARGE. Contractor shall maintain separate Pour Card for each pour as per the format enclosed.

Transporting, Placing and Compacting Concrete

Concrete shall be transported from the mixing plant to the formwork with minimum time lapse by methods that shall maintain the required workability and will prevent segregation, loss of any ingredients or ingress of foreign matter or water.

In all cases concrete shall be deposited as nearly as practicable directly in its final position. To avoid segregation, concrete shall not be rehandled or caused to flow. For locations where direct placement is not possible and in narrow forms the Contractor shall provide suitable drops and "Elephant Trunks". Concrete shall not be dropped from a height of more than 1.0m.

Concrete shall not be placed in flowing water. Under water, concrete shall be placed in position by
DISTRICT WATER & SANITATION UNIT

tremies or by pipeline from the mixer and shall never be allowed to fall freely through the water.

While placing concrete the Contractor shall proceed as specified below and also ensure the following:

- (a) Continuously between construction joints and pre- determined abutments.*
- (b) Without disturbance to forms or reinforcement.*
- (c) Without disturbance to pipes, ducts, fixings and the like to be cast in; ensure that such items are securely fixed. Ensure that concrete cannot enter open ends of pipes and conduits etc.*
- (d) Without dropping in a manner that could cause segregation or shock.*
- (e) In deep pours only when the concrete and formwork designed for this purpose and by using suitable chutes or pipes.*
- (f) Do not place if the workability is such that full compaction cannot be achieved.*
- (g) Without disturbing the unsupported sides of excavations; prevent contamination of concrete with earth. Provide sheeting if necessary. In supported excavations, withdraw the linings progressively as concrete is placed.*
- (h) If placed directly onto hardcore or any other porous material, dampen the surface to reduce loss of water from the concrete.*
- (i) Ensure that there is no damage or displacement to sheet membranes.*
- (j) Record the time and location of placing structural concrete.*

Concrete shall normally be compacted in its final position within thirty minutes of leaving the mixer. Concrete shall be compacted during placing with approved vibrating equipment without causing segregation until it forms a solid mass free from voids thoroughly worked around reinforcement and embedded fixtures and into all corners of the formwork. Immersion vibrators shall be inserted vertically at points not more than 450 mm apart and withdrawn slowly till air bubbles cease to come to the surface, leaving no voids. When placing concrete in layers advancing horizontally, care shall be taken to ensure adequate vibration, blending and melding of the concrete between successive layers. Vibrators shall not be allowed to come in contact with reinforcement, formwork and finished surfaces after start of initial set. Over-vibration shall be avoided.

Concrete may be conveyed and placed by mechanically operated equipment after getting the complete procedure approved by the ENGINEER INCHARGE. The slump shall be held to the minimum necessary for conveying concrete by this method. When concrete is to be pumped, the concrete mix shall be specially designed to suit pumping. Care shall be taken to avoid stoppages in work once pumping has started.

Except when placing with slip forms, each placement of concrete in multiple lift work, shall be allowed to set for at least 24 hours after the final set of concrete before the start of subsequent placement. Placing shall stop when concrete reaches the top of the opening in walls or bottom surface of slab, in slab and beam construction, and it shall be resumed before concrete takes initial set but not until it has had time to settle as approved by the ENGINEER INCHARGE. Concrete shall be protected against damage until final acceptance.

Mass Concrete Works

Sequence of pouring for mass concrete works shall be as approved by the ENGINEER INCHARGE. The Contractor shall exercise great care to prevent shrinkage cracks and shall monitor the temperature of the placed concrete if directed.

Curing

Curing and protection shall start immediately after the compaction of the concrete to protect it from:

- (a) Premature drying out, particularly by solar radiation and wind;*
- (b) Leaching out by rain and flowing water;*
- (c) Rapid cooling during the first few days after placing;*
- (d) High internal thermal gradients;*
- (e) Low temperature or frost;*
- (f) Vibration and impact which may disrupt the concrete and interfere with its bond to the reinforcement.*

All concrete, unless approved otherwise by the ENGINEER INCHARGE, shall be cured by use of continuous sprays or ponded water or continuously saturated coverings of sacking, canvas, hessian or other absorbent material for the period of complete hydration with a minimum of 7 days. The quality of curing water shall be the same as that used for mixing.

Where a curing membrane is approved to be used by the ENGINEER INCHARGE, the same shall be of a non-wax base and shall not impair the concrete finish in any manner. The curing compound to be used shall be approved by the ENGINEER INCHARGE before use and shall be applied with spraying equipment capable of a smooth, even textured coat.

Curing may also be done by covering the surface with an impermeable material such as polyethylene, which shall be well sealed and fastened.

Construction Joints and Keys

Construction joints will be as shown on the drawing or as approved by the ENGINEER INCHARGE. Concrete shall be placed without interruption until completion of work between construction joints. If stopping of concreting becomes unavoidable anywhere, a properly formed construction joint shall be made with the approval of the ENGINEER INCHARGE.

Dowels for concrete work, not likely to be taken up in the near future, shall be coated with cement slurry and encased in lean concrete as indicated on the drawings or as approved by the ENGINEER INCHARGE. Before resuming concreting on a surface, which has hardened all laitance and loose stone, shall be thoroughly removed by wire brushing/hacking and surface washed with high pressure water jet and treated with thin layer of cement slurry for vertical joints and horizontal layers.

When concreting is to be resumed on a surface, which has not fully hardened, all laitance shall be removed by wire brushing, the surface wetted, free water removed and a coat of cement slurry applied. On this, a layer of concrete not exceeding 150 mm thickness shall be placed and well rammed against the old work. Thereafter work shall proceed in the normal way.

Foundation Bedding
All earth surfaces upon which or against which concrete is to be placed, shall be well compacted and free from standing water, mud or debris. Soft or spongy areas shall be cleaned out and back filled with either soil-cement mixture, lean concrete or clean sand compacted as approved by the ENGINEER INCHARGE. The surfaces of absorptive soils shall be moistened.

Concrete shall not be deposited on large sloping rock surfaces. The rock shall be cut to form rough steps or benches by picking, barring or wedging. The rock surface shall be kept wet for 2 to 4 hours before concreting.

Finishes

General

The formwork for concrete works shall be such as to give the finish as specified. The Contractor shall

make good any unavoidable defects as approved consistent with the type of concrete and finish specified; defects due to bad workmanship (e.g. damaged or misaligned forms, defective or poorly compacted concrete) will not be accepted. The Contractor shall construct the formwork using the correct materials and to meet the requirements of the design and to produce finished concrete to required dimensions, plumbs, planes and finishes.

Surface Finish Type F1

The main requirement is that of dense, well-compacted concrete. No treatment is required except repair of defective areas, filling all form tie holes and cleaning up of loose or adhering debris. For surfaces below grade, which will receive waterproofing treatment, the concrete shall be free of surface irregularities, which would interfere with proper and effective application of waterproofing material specified for use.

Surface Finish Type F2

The appearance shall be that of a smooth dense, well-compacted concrete showing the slight marks of well fitted shuttering joints. The Contractor shall make good any blemishes.

Surface Finish Type F3

This finish shall give an appearance of smooth, dense, well-compacted concrete with no shutter marks, stain free and with no discolouration, blemishes, arises, air holes etc. Only lined or coated plywood with very tight joints shall be used to achieve this finish. The panel size shall be uniform and as large as practicable. Any minor blemishes that might occur shall be made good by the Contractor.

Integral Cement Finish on Concrete Floor

In all cases where integral cement finish on a concrete floor has been specified, the top layer of concrete shall be screeded off to proper level and tamped with tamper having conical projections so that the aggregate shall be forced below the surface. The surface shall be finished with a wooden float and a trowel with pressure. The finish shall be continued till the concrete reaches its initial set. No cement or cement mortar finish shall be provided on the surface. Where specified, a floor hardener as approved by the ENGINEER INCHARGE shall be supplied and used as recommended by the manufacturer.

Repair and Replacement of Unsatisfactory Concrete

Immediately after the shuttering is removed, all the defective areas such as honey-combed surfaces, rough patches, holes left by form bolts etc. shall be inspected by the ENGINEER INCHARGE who may permit patching of the defective areas or reject the concrete work.

All through holes for shuttering shall be filled for full depth and neatly plugged flush with surface.

Rejected concrete shall be removed and replaced by the Contractor at no additional cost to the Employer.

For patching of defective areas all loose materials shall be removed and the surface shall be prepared as approved by the ENGINEER INCHARGE.

Bonding between hardened and fresh concrete shall be done either by placing cement mortar or by applying epoxy. The decision of the ENGINEER INCHARGE as to the method of repairs to be adopted shall be final and binding on the Contractor. The surface shall be saturated with water for 24 hours before patching is done with 1:5 cement sand mortar. The use of epoxy for bonding fresh concrete shall be carried out as approved by the ENGINEER INCHARGE.

Vacuum Dewatering of Slabs

Where specified floor slabs, either grade or suspended, shall be finished by vacuum dewatering

including all operations such as poker vibration, surface vibration, vacuum processing, floating and trowelling as per equipment manufacturers recommendation. The equipment to be used shall be subject to the ENGINEER INCHARGE's approval.

Hot Weather Requirements

Concreting during hot weather shall be carried out as per IS: 7861 (Part I).

Adequate provisions shall be made to lower concrete temperatures, which shall not exceed 40° C at the time of placement of fresh concrete.

Where directed by the ENGINEER INCHARGE, the Contractor shall spray non-wax based curing compound on unformed concrete surfaces at no extra costs.

Cold Weather Requirements

Concreting during cold weather shall be carried out as per is: 7861 (Part II).

The ambient temperature during placement and up to final set shall not fall below 5 Deg.C. Approved antifreeze/accelerating additives shall be used where directed.

For major and large scale concreting works the temperature of concrete at times of mixing and placing, the thermal conductivity of the formwork and its insulation and stripping period shall be closely monitored.

Liquid Retaining Structures

The Contractor shall take special care for concrete for liquid retaining structures, underground structures and those others specifically called for to guarantee the finish and water tightness.

The minimum level of surface finish for liquid retaining structures shall be Type F2. All such structures shall be hydro-tested.

The Contractor shall make all arrangements for hydro-testing of structure, all arrangements for testing such as temporary bulk heads, pressure gauges, pumps, pipe lines etc.

The Contractor shall also make all temporary arrangements that may have to be made to ensure stability of the structures during construction.

Any leakage that may occur during the hydro-test or subsequently during the defects liability period or the period for which the structure is guaranteed shall be effectively stopped either by cement/epoxy pressure grouting, guniting or such other methods as may be approved by the ENGINEER INCHARGE. All such rectification shall be done by the CONTRACTOR to the entire satisfaction of the ENGINEER INCHARGE at no extra cost to the EMPLOYER.

Testing Concrete Structures for Leakage

Hydrostatic test for water tightness shall be done at full storage level or soffit of cover slab, as may be directed by the ENGINEER INCHARGE, as described below:

In case of structures whose external faces are exposed, such as elevated tanks, the requirements of the test shall be deemed to be satisfied if the external faces show no sign of leakage or sweating and remain completely dry during the period of observation of seven days after allowing a seven day period for

absorption after filling with water.

In the case of structures whose external faces are buried and are not accessible for inspection, such as underground tanks, the structures shall be filled with water and after the expiry of seven days after the filling, the level of the surface of the water shall be recorded. The level of water shall be recorded again at subsequent intervals of 24 hrs. Over a period of seven days. Backfilling shall be withheld till the tanks are tested. The total drop in surface level over a period for seven days shall be taken as an indication of the water tightness of the structure. The ENGINEER INCHARGE shall decide on the actual permissible nature of this drop in the surface level, taking into account whether the structures are open or closed and the corresponding effect it has on evaporation losses. Unless specified otherwise, a structure whose top is covered shall be deemed to be water tight if the total drop in the surface level over a period of seven days does not exceed 40 mm.

Each compartment/segment of the structure shall be tested individually and then all together.

For structures such as pipes, tunnels etc. the hydrostatic test shall be carried out by filling with water, after curing as specified, and subjecting to the specified test pressure for specified period. If during this period the loss of water does not exceed the equivalent of the specified rate, the structure shall be considered to have successfully passed the test.

Optional Tests

If the ENGINEER INCHARGE feels that the materials i.e. cement, sand, coarse aggregates, reinforcement and water are not in accordance with the Specifications or if specified concrete strengths are not obtained, he may order tests to be carried out on these materials in laboratory, to be approved by the ENGINEER INCHARGE, as per relevant IS Codes. Contractor shall have to pay for these tests.

In the event of any work being suspected of faulty material or workmanship requiring its removal or if the works cubes do not give the stipulated strengths, the ENGINEER INCHARGE reserves the right to order the Contractor to take out cores and conduct tests on them or do ultrasonic testing or load testing of structure, etc. The ENGINEER INCHARGE also reserves the right to ask the Contractor to dismantle and re-do such unacceptable work, at no cost to the Employer. Alternately ENGINEER INCHARGE also reserves the right to ask the CONTRACTOR to dismantle and re-do such unacceptable work at the cost of CONTRACTOR.

Grouting Standard Grout

Grout shall be provided as specified on the drawings.

The proportion of Standard Grout shall be such as to produce a flowable mixture consistent with minimum water content and shrinkage. Surfaces to be grouted shall be thoroughly roughened and cleaned. All structural steel elements to be grouted, shall be cleaned of oil, grease, dirt etc. The use of hot, strong caustic solution for this purpose will be permitted. Prior to grouting, the hardened concrete shall be saturated with water and just before grouting, water in all pockets shall be removed. Grouting once started shall be done quickly and continuously. Variation in grout mixes and procedures shall be permitted if approved by the ENGINEER INCHARGE. The grout proportions shall be limited as follows:

<i>Use</i>	<i>Grout Thickness</i>	<i>Mix Proportions</i>	<i>W/C Ratio (max)</i>
<i>a) Fluid mix</i>	<i>Under 25mm</i>	<i>One part Portland Cement</i>	<i>0.44</i>

		to one part sand	
b) General mix	25mm and over but less than 50mm	One part Portland Cement to 2 parts of sand	0.53
c) Stiff mix	50mm and over	One part Portland Cement to 3 parts of sand	0.53

Non-Shrink Grout: Non –shrink grout where required shall be provided in strict accordance with the manufacturer’s instructions / specifications on the drawings

General

Inspection: All materials, workmanship and finished construction shall be subject to continuous inspection and approval of ENGINEER INCHARGE. Materials rejected by ENGINEER INCHARGE shall be expressly removed from site and shall be replaced by Contractor immediately.

Clean-Up: Upon the completion of concrete work, all forms, equipment, construction tools, protective coverings and any debris, scraps of wood, etc. resulting from the work shall be removed and the premises left clean.

Acceptance Criteria: *Any concrete work shall satisfy the requirements given below individually and collectively for it to be acceptable.*

- a) *properties of constituent materials;*
- b) *characteristic compressive strength;*
- c) *specified mix proportions;*
- d) *minimum cement content;*
- e) *maximum free-water/cement ratio;*
- f) *workability;*
- g) *temperature of fresh concrete;*
- h) *density of fully compacted concrete;*
- i) *cover to embedded steel;*
- j) *Curing;*
- k) *tolerances in dimensions;*
- l) *tolerances in levels;*
- m) *durability;*
- n) *surface finishes;*
- o) *special requirements such as;*
 - i) *water tightness*
 - ii) *resistance to aggressive chemicals*
 - iii) *resistance to freezing and thawing*
 - iv) *very high strength*
 - v) *improved fire resistance*
 - vi) *wear resistance*
 - vii) *resistance to early thermal cracking*

The ENGINEER INCHARGE's decision as to the acceptability or otherwise of any concrete work shall be final and binding on the Contractor.

For work not accepted, the ENGINEER INCHARGE may review and decide whether remedial measures are feasible so as to render the work acceptable. The ENGINEER INCHARGE shall in that case direct the

Contractor to undertake and execute the remedial measures. These shall be expeditiously and effectively implemented by the Contractor. Nothing extra shall become payable to the Contractor by the Employer for executing the remedial measures.

Preformed Fillers and Joint Sealing Compound

Materials: Preformed filler for expansion/isolation joints shall be non-extruding and resilient type of bitumen impregnated fibres conforming to IS:1838 (Part I).

Bitumen coat to concrete/masonry surfaces for fixing the preformed bitumen filler strip shall conform to IS:702. Bitumen primer shall conform to IS:3384. Sealing compound for filling the joints above the preformed bitumen filler shall conform to Grade 'A' as per IS:1834.

Workmanship

The thickness of the preformed bitumen filler shall be 25mm for expansion joints and 50mm for isolation joints around foundation supporting rotatory equipment's. Contractor shall procure the strips of the desired thickness and width in lengths as manufactured. Assembly of small pieces/thicknesses of strips to make up the specified size shall not be permitted.

The concrete/masonry surface shall be cleaned free from dust and any loose particles. When the surface is dry, one coat of industrial blown type bitumen of grade 85/25 conforming to IS:702 shall be applied hot by brushing at the rate of 1.20 kg/sq.m. When the bitumen is still hot the preformed bitumen filler shall be pressed and held in position till it completely adheres. The surface of the filler against which further concreting/masonry work is to be done shall similarly be applied with one coat of hot bitumen at the rate of 1.20 kg/sq.m.

Sealing compound shall be heated to a pouring consistency for enabling it to run molten in a uniform manner into the joint. Before pouring the sealing compound, the vertical faces of the concrete joint shall be applied hot with a coat of bitumen primer conforming to IS: 3384 in order to improve the adhesive quality of the sealing compound.

Expansion joints between beams/slabs shall be provided with 100mm wide x 4mm thick mild steel plate at the soffit of RCC beams/slabs to support and prevent the preformed joint filler from dislodging. This plate shall be welded to an edge angle of ISA 50 x 50 x 6mm provided at the bottom corner, adjacent to the expansion joint of one of the beams/slabs, by intermittent fillet welding. Steel surfaces shall be provided with 2 coats of red oxide zinc chrome primer and 3 coats of synthetic enamel paint finish.

GENERAL

1. Employer's Drawings

1.1. *The drawings listed in the Tender document are the Employer's drawings and are provided by the Employer as illustrative of the Specification.*

1.2. *All data and information furnished in the drawings by the Employer is given in good faith but the Employer does not accept the responsibility for the completeness and accuracy thereof. The same shall be verified by the Contractor promptly pointing out errors or discrepancies thereof to the Engineer.*

2. Drawing Sheet Format

- 2.1. All drawings provided by the Contractor shall be on standard size sheets, prepared on computer with AutoCAD 14 and shall show the following particulars in a title block located in the lower right hand corner, in addition to the name of Contractor and equipment manufacturer, date, scale, drawing number, revision number (R0 for drawings submitted initially, R1, R2, etc. for drawings submitted subsequently) and title.

Executive Engineer Gujarat Water Supply & Sewerage Board Jalbhavan Opp.R.T.O.Office Mahesana

Project Name:- Dharoi Regional W.S Scheme

A blank space of 90 mm x 100 mm shall be provided for the Engineer's approval stamp and provision shall be made for details of revisions to be recorded.

- 2.2. All drawings submitted by the Tenderer/Contractor shall use the English language and SI units. All drawings shall be clearly and fully cross-referenced to the other drawings as relevant.

3. Tender / Contract Drawings

- 3.1. Drawings submitted by the Tenderer shall show all the essential items of the Plant offered together with sufficient details to enable the general arrangement of the Plant to be determined.
- 3.2. The drawings and documents to be provided by the Tenderer / Contractor shall be as per the schedules of price but shall not be limited to those listed:

4. Submissions and Approval of Drawings

- 4.1. The following shall be the procedure for submission and approval of drawings:

4.1.1. The Contractor shall submit 4 copies of the drawings to the Employer. All the drawings are to be signed by the Contractor or his authorized representatives

4.1.2. The Engineer's Representative will review the drawings and, if found fit for approval, the Employer will return 2 copies to the Contractor duly approved.

4.1.3. In case the drawings/documents are not fit for approval but worth for review, the Engineer's Representative will mark the comments on the drawings and return 2 copies to the Contractor. In such case, the Contractor shall resubmit the revised drawings within two weeks as per sub-clause 5.1.1 above and the same shall be repeated till the drawings are finally approved as per sub-clause 5.1.2 above.

4.1.4. If the submitted drawings/documents are not worth for review, the Contractor will be informed accordingly.

4.1.5. On receipt of the approved drawings as per sub-clause 5.1.2 above, the Contractor shall submit floppy and documents to the employer.

4.1.6. After tests on completion, the Contractor shall submit, within 15 days of the conclusion of the tests, floppies of the "As Built Drawings" to the Employer.

4.2. When the drawings are received by the Engineer's Representative after revision by the Contractor, he will only review the revision made and hence the Contractor shall carefully identify all the revised details / dimensions and also describe the revisions in the revision block.

4.3. No drawings, with corrections made after taking the prints, will be accepted.

4.4. Approval of drawings by the Engineer shall not relieve the Contractor of his responsibility in terms of the Contract.

5. Delivery, Unloading and Storing at Site

- 5.1. The Contractor shall be responsible for checking all materials delivered to Site and shall keep the Engineer's Representative fully informed of the state of deliveries. The Contractor shall carry out, at his cost, all instructions of Engineer or his Representative for proper unloading, preservation, maintenance, storage and security of materials delivered to Site until he fulfills all his

obligations under the Contract.

- 5.2. *The Contractor shall erect and maintain on the Site any temporary storage facility as required and approved by the Engineer.*
- 5.3. *Multiple handling and movement of materials during storage and retrieval shall be avoided.*
6. *Spare Parts:*
 - 6.1. *Spare Parts required after the taking over the Plant shall be filled up by the bidder in the price schedule.*
 - 6.2. *Spares during pre-commissioning trials, commissioning tests/ maintenance, guarantee etc. shall be provided by the Contractor. The necessary spares shall be brought by the Contractor prior to the pre-commissioning test so as to avoid the downtime of equipment due to non-availability of them. All these spares have to be provided as required, by Contractor free of cost.*
 - 6.3. *All spare parts shall be new, unused and strictly interchangeable with the parts for which they are intended to be replacements and shall be treated and packed for long storage under the climatic conditions prevailing at the Site. Each spare part shall be clearly marked or labeled on the outside of its packing with its description, number and purpose. When more than one spare is packed in a single case or other container, a general description of its contents shall be shown on the outside of such case or container and a detailed list enclosed. All cases, containers and other packages shall be marked and numbered in an approved manner for the purpose of identification. Spares shall be delivered to Site after the completion of erection but before start of commissioning of Plant along with technical leaflets and details. Spare parts shall be indicated in the assembly drawing showing clearly the part numbers.*
 - 6.4. *All cases, containers or other packages are liable to be opened for such examination as the Engineer's Representative may require and packing shall be designed to facilitate opening and thereafter re-packing. In the event of the some specific spares offered in the Contract being withdrawn from manufacture owing to changes in design of equipment or similar reasons viz., model being obsolete etc., the Contractor shall inform the Employer before such withdrawal so that the Employer can take timely alternative steps.*
7. *Tools:*
 - 7.1. *Tools shall be delivered to site just prior to Tests on Completion.*
 - 7.2. *The specified tools shall not be used for the erection of the Plant being supplied and except that the Engineer may call upon the Contractor to demonstrate their use or effectiveness, they must be handed over to the Employer in a completely new and unused condition. Should the Contractor require any such tools at site for erection, he shall provide his own.*

MATERIALS AND WORKMANSHIP

1. Introduction

- 1.1. *This part of the Specification sets out the general standards of materials to be supplied and the workmanship required to be ensured by the Contractor. All component parts of the Works shall, unless otherwise specified, comply with the provisions of employer's requirement or be subject to the approval of the Employer. Particular attention shall be paid to a neat, orderly and well-arranged installation carried out in a methodical competent manner.*
2. **Reference Specifications and Standards**
 - 2.1. *Where reference is made in the Specification to a British Standard Specification (hereinafter abbreviated to 'B.S') issued by the British Standards Institution of 2, Park street, London W.I., or to an Indian Standard Specification (I.S.) issued by the Bureau of Indian Standards, (earlier*

known as Indian Standard Institution), Manak Bhavan, 9 Bahadur shah Zafar Marg, New Delhi 110 002, or American Society for Testing and materials (ASTM) issued by ASTM 1916 Race Street, Philadelphia, P.A., 19103, U.S.A. or American national Standards Institute (ANSI) issued by ANSI 1430, Broadway, New York, N.Y., 10018, U.S.A. or Japanese Industrial Standards (JIS) issued by Japanese Standards Association, 4-1-24, Akasaka, Minato-Ku, Tokyo 107, Japan or to any other equivalent Standard it shall be to the latest revision of that Standard at the Tender opening date.

2.2. The Contractor may propose at no extra cost to the Employer, the use of any relevant authoritative Internationally recognised Reference Standard.

2.3. All details, materials and equipment supplied and workmanship performed shall comply with the specified Standards. If Tenderer offers equipment to other Standards, the equipment/material should be equal or superior to those specified and full details of the difference shall be supplied.

2.4. In the event of conflict between this Specification and the Codes for equipment, provisions of this Specification shall govern. Certain specifications issued by national or other widely recognised bodies are referred to in this Specification. In referring to the Standard Specifications the following abbreviations are used:

IS	:	Indian Standard
ANSI	:	American National Standards Institute
API	:	American Petroleum Institute
ASME	:	American Society of Mechanical Engineers
ASTM	:	American Society of Testing and Materials
AWS	:	American Welding Society
AWWA	:	American Water Works Association
ISO	:	International Organization for Standardization
DIN	:	Detaches Institute fur Normans
BS	:	British Standard
IEC	:	International Electro technical Commission
IEE	:	Institution of Electrical Engineers
IEEE	:	Institute of Electrical and Electronic Engineers
NEMA	:	National Electrical Manufacturers Association
AGMA	:	American Gear Manufacturer's Association

3. Materials - General

3.1. All materials incorporated in the Works shall be the most suitable for the duty concerned and shall be new and of reputed make/approved quality, free from imperfections and selected for long life and minimum maintenance. Non-destructive tests, if called for in the Specification, shall be carried out. All submerged moving parts of the Plant, or shafts and spindles or faces etc. in contact with them shall be of corrosion resistant materials. All parts in direct contact with various chemicals, shall be completely resistant to corrosion, or abrasion by these chemicals, and shall maintain their properties without aging due to the passages of time, exposure to light or any other cause.

4. Workmanship - General

- 4.1. *Workmanship and general finish shall be of first class quality and in accordance with best workshop practice.*
- 4.2. *All similar items of the Plant and their component parts shall be completely interchangeable. Spare parts shall be manufactured from the same materials as the originals and shall fit all similar items.*
- 4.3. *All parts, which can be worn or damaged by dust, shall be totally enclosed in dust proof housings. All materials incorporated in the Works shall be the most suitable for the duty concerned, free from imperfections and selected for long life and minimum maintenance. All necessary accessories required for satisfactory and safe operation of the Plant shall be supplied by the Contractor unless it is specifically excluded from his scope. Suitable provision by means of eyebolts or other means are to be provided to facilitate handling of all items that are too heavy or bulky for lifting and carrying by two men.*

5. Welding

- 5.1. *Welding shall comply with the latest revision of the BS 5135 Code.*
- 5.2. *Welders shall be qualified in accordance with the requirement of the appropriate section of BS 4871. The Engineer shall have the right to call for further qualification from time to time from any welder who in the opinion of the Engineer does not produce weld in accordance with the qualification. Each welder shall be assigned a number and letter. Each weldments shall clearly be identified as to its welder marking the welder's Code adjacent to the welds. A record chart shall be maintained for each welder showing the procedures for which he has qualified, the date of such qualification, the type of defects produced and their frequency. The Engineer shall disqualify the welder whose Work requires a disproportionate amount of repairs. All procedures where required shall be qualified as per BS EN 283-3.*
- 5.3. *Inspection and quality of surveillance shall not be limited to the examination of finished welds. The techniques employed shall be based on methods which are known to produce good results and which have been verified at Site by actual demonstration.*
- 5.4. *Haphazard striking of the electrodes for establishing an arc shall not be permitted. The arc shall be struck either on the joint or on a starting tag. The starting tag shall be of the same material or a material compatible with the base metal being welded. In case of any inadvertent strike on place other than the welding, the area affected shall be ground flushed and examined by liquid penetration method.*
- 5.5. *Generally, a stringer bead technique shall be used with a slight oscillation of necessary to avoid slag and to minimize the number of beads needed to fill exceed 3 times the wire diameter. Vertical welds shall be made in upward direction. For all pipes above 300 mm dia., welding shall be done whenever possible, by 2 welders working simultaneously along both sides of the pipe.*
- 5.6. *The root pass shall have less than 1.5 mm internal reinforcement. Defects like icicles, burn through and excessive "such back", etc. shall be cause for rejection of welds.*
- 5.7. *Final welds shall be suitable for appropriate fabrication of the non-destructive examination of the weld. If grinding is necessary, the weld shall be blended into the parent metal without gouging or thinning of the parent metal in any way. Uneven and excessive grinding may be a cause for rejection. Fillet weld shall preferably be convex and free from undercutting and overlap at the toe of weld. Convexity and concavity shall not exceed 1.5 mm. The leg lengths shall not exceed the specified size by more than 1.5 mm.*
- 5.8. *All attachments such as lugs, brackets and other non-pressure parts shall also be done by*

qualified welders in accordance with the design details and materials specifications. Temporary attachments shall be removed in a manner that will not damage the parent metal. Areas of temporary attachments shall be dressed smooth and examined by ultrasonic or liquid penetration methods.

- 5.9. *All tack welds shall be made using qualified procedure and welders, the number of size of tack welds shall be kept as small as to consist of adequate strength and joint alignments. All tack welds shall be examined visually for defects and if found defective shall be completely removed. As welding proceeds, tack welds shall be either removed completely or shall be properly prepared by grinding or filling their starting ends so that they may be satisfactorily incorporated in the welds. Unacceptable defects shall be removed by grinding machine or chipping or gouging. Flame gouging may be permitted provided gouged surfaces are ground at least by 1.0 mm below the deepest indentation.*
- 5.10. *All weld repairs shall be carried out using the approved welding procedures and welders. Re-welded areas shall be re-examined by the methods specified for the original welds and the Engineer's Representative shall duly qualify repair procedures.*

6. Castings

- 6.1. *Cast iron shall be of standard grey close-grained quality. The structure of the castings shall be homogeneous and free from non-metallic inclusions and other injurious defects. All surfaces of castings, which are not machined, shall be smooth and shall be carefully fettled to remove all foundry irregularities.*
- 6.2. *Minor defects in depth not exceeding 12.5 percent of total metal thickness and which will not ultimately affect the strength and serviceability of the casting may be repaired by approved welding techniques. The Engineer shall be notified of large defects and no repair welding of such defects shall be carried out without prior approval of the Engineer. If the removal of metal for repair should reduce the stress resisting cross section of the casting by more than 25 percent, or to such an extent that the computed stress in the remaining metal exceeds the allowable stress by more than 25 percent, then casting shall be rejected. Test coupons cast simultaneously with the main castings shall be identified to check physical, chemical analysis of casting. Major defects on casting are not acceptable. Castings repaired by welding for minor defects shall be stress-relieved after such welding. Non-destructive tests as directed by the Engineer will be required for any casting containing defects whose extent cannot otherwise be judged, or to determine where repair welds have been properly made.*

7. Forging

- 7.1. *All major stress-bearing forging shall be made to a Standard Specification. Forging shall be subjected to magnetic particle testing or dye penetration test at the areas of fillets and change in section. The testing shall be conducted after rough machining (10 microns). Any defect, which will not machine out during the final machining, will be gouged out fully, inspected by dye penetration or magnetic particle inspection to ensure that the defect is fully removed and repaired using an approved repair procedure. Any indication, which proves to penetrate deeper than 2.5% of the finished thickness of the component, shall be reported to the Engineer giving the details like location, length, width and depth. For the magnetic particle inspection the choice of wet or dry particles shall be at the Contractor's discretion.*
- 7.2. *All forging shall be demagnetized after test and shall be heat-treated for the relief of residual stresses.*

8. Design Life

- 8.1. *The Works as a whole shall be new, of sound workmanship, robustly designed for a long reliable operating life and shall be capable of 24 hours per day continuous operation for prolonged period in the climatic and working conditions prevailing at the Site, and with the minimum of maintenance. Particular attention shall be given to temperature changes, the stability of paint finish for high temperatures, the rating of engines, electrical machinery, thermal overload services, cooling systems and the choice of lubricants for possible high and prolonged operating temperatures. The Contractor shall be called upon to demonstrate this for any component part either by service records, or evidence of similar equipment already installed elsewhere or relevant type tests. Routine maintenance and repair shall as far as possible not requires the services of highly skilled personnel.*
- 8.2. *The Plant shall be designed to provide easy access to and replacement of component parts, which are subject to wear, without the need to replace whole units. No parts in contact with water shall have a life from new to replacement or repair of less than five years.*
- 8.3. *Design features shall include the protection of Plant against damage caused by vermin, dirt, dust and dampness and to reduce risk of fire. Plant shall operate without undue vibration, and parts shall be designed to withstand the maximum stresses under the most severe condition of normal service. Materials shall have a high resistance to change in their properties due to the passage of time, exposure to light, temperature and any other cause, which may have a detrimental effect upon the performance or life of the Works.*
- 8.4. *Plant located outside lockable areas/building shall have additional features to prevent unauthorized operation.*

9. Name Plate

- 9.1. *Each item of the Plant shall have permanently attached to it in a conspicuous position, a nameplate and rating plate. Upon these shall be engraved or stamped, the manufacturer's name, type and serial number of Plant, details of the loading and duty at which the item of Plant has been designed to operate, and such diagrams as may be required by the Engineer. All indicating and operating devices shall have securely attached to them or marked upon them designations as to their function and proper manner of use.*
- 9.2. *Nameplates, rating plates and labels shall be of a non-flame propagating materials, either on-hygroscopic or transparent plastic with engraved lettering of a contrasting colour. Fixing shall be by means of non-corrosive screws; drive rivets or adhesives shall not be used.*
- 9.3. *Warning labels shall be provided where necessary to warn of dangerous circumstances or substances. Inscriptions or graphic symbols shall be black on a yellow background.*
- 9.4. *Instruction labels shall be provided where safety procedures such as wearing of protective clothing are essential to protect personnel from hazardous or potentially hazardous conditions. These labels shall have inscriptions or graphic symbols in white on a blue background.*

10. Nuts, Bolts, Studs and Washers

- 10.1. *Nuts, bolts, studs and washers for incorporation in the Plant shall conform to the requirements of the appropriate standard. Nuts and bolts shall be of the best quality of specified grade, machined on the shank and under the head and nut*
- 10.2. *Fitted bolts shall be a light driving fit in the reamed holes they occupy, shall have the screwed portion of such a diameter that it will not be damaged in driving and shall be marked in a conspicuous position to ensure correct assembly at Site.*

- 10.3. *Washers, locking devices and anti-vibration arrangements shall be provided where necessary. Jointing hardware for the entire Plant shall be provided with sufficient spares to cater for site losses.*
- 10.4. *Where bolts pass through structural members taper washers shall be fitted, where necessary, to ensure that no bending stress is caused in the bolt. Where there is a risk of corrosion, bolts, nuts and studs shall be designed so that the maximum stress does not exceed half the yield stress of the material under any conditions. All bolts, nuts and washers that are subject to frequent adjustment or removal in the course of maintenance and repair shall be made of nickel-bearing stainless steel.*
- 10.5. *The Contractor shall supply all holding down, alignment and leveling bolts complete with anchorages, nuts, washers and packing required to attach the Plant to its foundations, and all bed plates, frames and other structural parts necessary to spread the loads transmitted by the Plant to concrete foundations without exceeding the design stresses.*

11. Allowances for Wastage

- 11.1. *The Contractor shall supply reasonable excess quantities to cover wastage of those consumable, which will be normally subject to waste during erection, commissioning and setting to Work.*

12. Painting – General

- 12.1. *The Contractor shall be responsible for the cleaning, preparation for painting, and priming or otherwise protecting, as specified, all parts of the Plant at the place of manufacture prior to packing.*
- 12.2. *Parts may be cleaned but surface defects may not be filled in before testing at the manufacturer's works. Parts subject to hydraulic test shall be tested before any surface treatment. After test, all surfaces shall be thoroughly cleaned and dried out, if necessary by washing with an approved de-watering fluid prior to surface treatment. Except where the specification provides to the contrary all painting materials shall be applied in strict accordance with the paint manufacturer's instructions.*
- 12.3. *All protective coatings shall be suitable for use in warm humid climates. All primers, under coats and finishes shall be applied by brush or airless spray, except where otherwise specified. Consecutive coats shall be in distinct but appropriate shades. All paints shall be supplied from the store to the painters, ready for application, and addition of thinners or any other material shall be prohibited.*

13. Painting at Place of Manufacture

- 13.1. *Steel and cast iron parts shall be sand blasted to near white cleaning before painting. Edges, sharp covers etc. shall be ground to a curve before sand blasting. A primer coat of a zinc rich epoxy resin based coating with at least 75 microns dry film thickness is to be provided. In addition the parts are to be provided with adequate number of coats of coal tar epoxy polyamine coating to a dry film thickness of 175 microns including primer coating.*

14. Painting at Site

- 14.1. *Immediately on arrival at the site, all items of Plant shall be examined for damage to the paint coat applied at the manufacturer's works, and any damaged portions shall be cleaned down*

to the bare metal, all rust removed, and the paint coat made good with similar paint.

14.2. *After erection, such items, which are not finish painted, shall be done so and, items that have been finish painted at the manufacturer's works shall be touched up for any damaged paintwork. For finish painting, two coats of synthetic enamel conforming to IS: 2932 shall be applied. Dry film thickness of each coat shall be at least 25 microns.*

14.3. *The dry paint film thickness shall be measured by Electrometer or other instruments approved by the Employer. In order to obtain the dry film thickness specified the Contractor should ensure that the coverage rate given by the paint manufacturer would enable this thickness to be obtained. Strength of adhesion shall be measured with an adhesion tester and this value shall not be less than 10 kg/cm². Painted fabricated steel work which is to be stored prior to erection shall be kept clear of the ground and shall be laid out or stacked in an orderly manner that will ensure that no water or dirt can accumulate on the surface. Suitable packing shall be laid between the stacked materials. Where cover is provided, it shall be ventilated.*

15. Galvanizing

15.1. *Wherever galvanizing has been specified the hot dip process shall be used. The galvanized coating shall be of uniform thickness. Weight of zinc coatings for various applications shall not be less than those indicated below:*

a) *Fabricated steel*

Thickness less than 2 mm but not less than 1.2 mm 340 gms/sq.m

Thickness 2 mm and above 460 gms/sq.m

b) *Fasteners*

Up to nominal size M10 270 gms/sq.m

Over M10 300 gms/sq.m

15.2 *Galvanizing shall be carried out after all drilling; punching, cutting, bending and welding operations have been carried out. Burrs shall be removed before galvanizing. Any Site modification of galvanized parts should be covered well by zinc rich primer and aluminum paint.*

16. *Support for Pipe work & Valves*

All necessary supports, saddles, sling, fixing bolts & foundation bolts shall be supplied to support the pipe work. Valve and other facilities mounted in the pipe work shall be supported independent of the pipes to which they connect.

INSPECTION AND TESTING

1. *Inspection and Tests*

1.1. *Valve*

1.1.1. *During testing there shall be no visible evidence of structural damage to any of the valve component.*

1.1.2. *Motorized valves shall be tested with their actuators, with a differential head equivalent to their maximum working pressure, to prove that the actuators are capable of opening and closing the valves under maximum unbalanced head condition within the specified opening or closing period.*

1.1.3. *The Required Test Certificate shall be produced before fixing of valves:*

1.2. *Pipe work*

1.2.1. *Testing of pipes and fitting shall be carried out in accordance with relevant Indian Standard and internationally approved standard. Pipes, fittings and expansion*

bellows shall be hydrostatically tested for 1.5 times the rated pressure.

Note - 1) Post card size five photographs of civil works shall be supplied by the contractor at his own cost

2) *Contractor shall have tested the materials to be used in this Work at his own cost*

3)

- **Providing and laying cement concrete 1:4:8 (1Cement 4Coarse sand & 8 graded & aggregate 40 mm Nominal Size) and Curing Complete excluding cost of form work in foundation and plinth.:-
As per general specifications of the concrete work**

3.0. Mode of Measurement & Payment

3.1. *The concrete shall be measured for it's length, breadth and depth, limiting dimensions to those specified on plans or as directed.*

3.2. *The rate shall be for a unit of one cubic meter.*

- **Brick work using common burnt clay building bricks having crushing strength not less than 35 Kg/cm² in foundation and plinth cement mortar in 1:6 (1 cement 6fine sand) Conventional**

1.0. Materials

1. Water

1.1. *Water shall not be salty brackish and shall be clean, reasonably clear and free objectionable quantities of silt and traces of oil and injurious alkalis, salts, organic matter and other deleterious material which will either weaken the mortar of concrete or cause efflorescence or attack the steel in R.C.C. Container for transport, storage and handling of*

water shall be clean. Water shall conform to the standard specified in I.S. 456-1978.

1.2. *If required by the Engineer-in-Charge it shall be tested by comparison with distilled water Comparison shall be made by means of standard cement tests for soundness time of setting and mortar strength as specified in I.S. 269- 1976. Any indication of unsoundness charge in time of setting by 30 minutes or more or decrease of more than 10 percent in strength, of mortar prepared with water sample when compared with the results obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.*

1.3. *Water for curing mortar, concrete or masonry should not be too acidic or too alkaline .*

It shall be free of elements which significantly affect the hydration reaction or otherwise interfere with the hardening of mortar or concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces

1.4. *Hard and bitter water shall not be used for curing*

1.5. *Potable water will generally found suitable for curing mortar or concrete.*

2 . Cement

2.1 *Cement snail be ordinary Portland slag cement as per I.S.269-1976 or Portland slag cement as per I.S. 455-1976*

3. Bricks

3.1. *The bricks shall be hand or machine molded and made from suitable soils and kiln burnt. They shall be free from cracks and flaws and nodules of free lime they shall have smooth rectangular faces with sharp corners and shall be of uniform colour.*

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

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

3.3. *The size of the conventional bricks shall be as under :*

(9" x 4.3/8" x 2,3/4") 225 x 110 x 75 mm.

3.4. *Only bricks of one standard size shall be used on one work. The following tolerances shall be permitted in the conventional size adopted in a particular work. Length + 1/8" (3.0 mm.) Width ± 1/16" (1.50 mm.) Height + 1/16" (1.50 mm.)*

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

2.0. Workmanship

2.1. Proportion:

2.1.1. *The proportion of the cement mortar shall be 1:6 (1 cement: 6 fine sand) by volume.*

2.2. Wetting of bricks:

2.2.1. *The bricks required for masonry shall be thoroughly wetted with clean water for about two hours before use or as directed. The cessation of bubbles, when the bricks are wetted with water is as indication of through wetting of bricks.*

2.3. Laying:

2.3.1. *Bricks shall be laid in English bond unless directed otherwise. Half or cut bricks shall not be used except when necessary to complete to bond; closures in such case shall be cut to required size and used near the ends of walls.*

2.3.2. *A layer of mortar shall be spread on full width for suitable length of the lower course. Each brick shall first be property bedded and set home by gently tapping with handle of trowel or wooden mallet. Its inside face shall be flushed with mortar before the next brick is laid and pressed against it. On completion of course, the vertical joints shall be fully filled from the top with mortar.*

2.3.3. *The walls shall be taken up truly in plumb. All courses shall be laid truly horizontal and all vertical joint shall be truly vertical. Vertical joints in alternate course shall generally be directly one over the other. The thickness of brick course shall be kept uniform.*

2.3.4. *The brick shall be laid with frog up wards. A set of tools comprising of wooden straight edges, man son's spirit level, square half meter rub, and pins, string and plumb shall be kept on the site of work for frequent checking during the progress of work.*

2.3.5. *Both the faces of walls of thickness greater than 23 cms. shall be kept in proper place. All the connected brick work shall be kept not more than one meter over the rest of the work. Where this is not possible, the work shall be raked back according to bond (and not left toothed) at an angle not steeper than 45 degrees.*

2.3.6. *All futures, pipes, outlets of water, hold fasts of doors and windows etc. which are required to be built in wall shall be embedded in cement mortar*

2.4. Joints:

2.4.1. *Bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not exposed 12 mm.*

The face joints shall be raked out as directed by raking tools daily during the progress of work, when the mortar is still green so as to provide key for plaster or pointing to done.

2.4.2. *The face of brick shall be cleaned the very day on which the work is laid and all mortar dropping removed.*

2.5. Curing:

2.5.1. *Green work shall be protected from rain suitably. Masonry work shall be kept moist on all the faces for a period of seven days. The top of masonry work shall be kept well wetted at the close of the day.*

2.6. Preparation of foundation bed:

2.6.1. *If the foundation is to be laid directly on the excavated bed, the shall be leveled, cleared of all loose materials, cleaned and wetted before stating masonry, If masonry is to be laid on concrete footing, the top of concrete shall be cleaned and moistened. The contractor shall obtain the engineer's approval for the foundation bed before foundation masonry is started. When pucca flooring is to be provided flush with the top to plinth, the inside plinth offset shall be kept lower than the outside plinth top by the thickness of the flooring.*

3.0. Mode measurements & payment

3.1. *The measurements of this item shall be taken for the brick masonry fully completed in foundation up to plinth.*

The limiting dimensions not exceeding those shown on the plinths or as directed shall be final. Battered tapered and curved portions shall be measured net.

3.2. *No deduction shall be made from the quantity of brick work, for any extra payment made for embedding in masonry or making holes in respect of following items:*

(1) Ends of joists, beams, posts, girders, purlins, trusses, corbel, steps etc. where cross sectional area does not exceed 500 Sq.Cm.

(2) Openings not exceeding 1000 Sq.Cm.

(3) Wall plates and bed plates, bearing of slabs, chajjas and the like whose thickness does not exceed 10 Cms. and the bearing does not extend to the full thickness of wall.

(4) Drainage holes, and recesses for cement concrete blocks to embed hold fasts for doors, windows etc.

(5) Iron fixtures, pipes up to 300 mm. dia hold fasts, and doors and windows built into masonry and pipes etc. for concealed wiring.

(6) Forming chases of section not exceeding 350 -Sq. Cm. in masonry.

3.3. *Apertures for fire places shall not be deducted nor shall be paid for separately.*

3.4. *The rate shall be for a unit of one cubic meter.*

➤ **Steel work welded in built up sections. frame work including cutting hosting fixing in position and applying priming coat of red lead paint for door, window & cupboard.**

1.0.Material**1 Structural Steel**

1.1 *All structural Steel! shall conform to I S. 226-1985: The steel shall be free from the defects mentioned in I.S 226-1975 and shall have a smooth finish. The material shall be free from loose mill scale, rust pits or other defects affecting the strength and durability. River bars shall conform to I.S. 1148-1973.*

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

2.0. Workmanship

2.1 *Welding shall generally be done by electric process. Gas welding shall be resorted to, using oxyacetylene flame with specific prior approval. Gas welding shall not be permitted for structural steel work.*

2.2 The work shall be done as shown in the shop drawings which should clearly indicate various details of the joints to be welded, shop and site welded as well as type of electrodes to be used, symbol for welding on plans and

shop drawings shall be according to I.S. 813-1961. As far as possible every effort shall be made to limit the welding that must be done after improper welding that is likely to be done due to heights and difficult positions on scaffoldings etc. The welding work shall conform to I.S. 816-1969.

2.3 Preparation of surfaces : Surfaces which are to be welded together shall be free from loose mill scale, rust, paint, grease or other foreign matter. A coating of boiled linseed oil shall be permitted.

2.4 Assembly for welding : Before welding is commenced, the plates shall first be brought together and firmly clamped or spot welded at specified distance. This temporary connection has to be strong enough to hold the plates accurately in place without displacement.

2.5 Precautions : All operations connected with welding and cutting equipment shall conform to safety requirement given in I.S. 818-1968.

The following points shall be borne in mind during the process of welding:

(b) Arc length, voltage and amperage shall be suited to the thickness of material, type of groove and other circumstances of the work.

(c) The segments of welding shall be such that where possible the members which offer the greatest resistance to compression are welded first.

2.6 The defective welds which shall be considered harmful to the structural strength shall be cut out and reworked.

2.7 Finished welds and adjacent parts shall be protected with clean boiled linseed oil and after all slag has been removed. Welds and adjacent parts shall be painted after the same are approved.

2.8 All the members shall be thoroughly cleaned of rust-scales, dust etc. and given a priming coat of red lead paint before fixing them in position.

3.0. Mode of measurements & payment

Item No:-11 The payment rate shall be for a unit of One sq. meter. and Item No-12 as per Door & window Nos. Base.

- **Painting two coats (excluding priming coat) on new steel and other metal surfaces with enamel paint, brushing, interior to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.**

1.0. Materials

1.0. Enamel paints:

1.1 The enamel paint shall satisfy in general requirements in specification of oil paints, Enamel paint shall conform to I.S. 2933-1975.

2.0. Workmanship

2.1. General : The materials required for work of painting work shall be obtained directly from approved manufacturers or approved dealer and brought to the site in maker's drums; kegs. etc. with seal unbroken.

2.1.2. All materials not in actual use shall be kept properly protected, lids of containers shall be kept closed and surface of paint in open or partially open containers covered with a thin layer of turpentine to prevent formation of skin. The materials which have become stale or flat due to improper and long

storage shall not be used. The paint shall be stirred thoroughly in its container before pouring into small containers. While applying also, the paint shall be continuously stirred in smaller container. No left over paint shall be put back into stock tins. When not in use the containers shall be kept properly closed.

2.1.3. *If for any reasons, things is necessary, the brand of thinner recommended by the manufacturer shall be used.*

2.1.4. *The surface to be painted shall be thoroughly cleaned and dusted. All rust, dirt and grease shall be thoroughly removed before painting is started. No painting on exterior or other exposed part o the work shall be carried out in wet, damp or otherwise unfavorable weather and all the surfaces shall be thoroughly dry before painting work is started.*

2.2. Application of paint:

2.2.1. *Brushing operations are to be adjusted to the spreading capacity advised by the manufacture of particular paint. The paint shall be applied evenly and smoothly by means of crossing and laying off. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing alternately in opposite directions two or three times and then finally brushing lightly in a direction at right angles to the same. In this process, no brush marks shall be left after the -laying off is finished. The full process of crossing and laying off will constitute one coat.*

2.2.2. *Each coat shall be allowed to dry completely and lightly rubbed with very fine grade of sand-paper and loose particles brushed off before next coat is applied. Each coat shall vary slightly in shade and shall be got approved from Engineer-in-charge before next coat is started.*

2.2.3. *Each coat the last shall be lightly rubbed down with sand paper of fine pumice stone and cleaned of dust before the next coat is applied. No hair marks from the brush of clogging of paint puddles in the corners of panels, angles of moldings etc. shall be left on the work.*

2.2.4. *Special care shall be taken while painting over bolts, nuts, rivets, overlaps etc. Approved best quality brushes shall be used.*

- **Providing 10 mm thick cement plaster in single coat on fair side brick/concrete wall for interior plastering up to floor two level finished even and smooth in 1:3 (1 cement : 3 sand)**

1.0. Materials

1.0. Water

1.1. *Water shall not be salty brackish and shall be clean, reasonably clear and free objectionable quantities of silt and traces of oil and injurious alkalis, salts, organic matter and other deleterious material which will either weaken the mortar of concrete or cause efflorescence or attack the steel in R.C.C. Container for transport, storage and handling of water shall be clean. Water shall conform to the standard specified in I.S. 456-1978.*

1.2. *If required by the Engineer-in-Charge it shall be tested by comparison with distilled water Comparison shall be made by means of standard cement tests for soundness time of setting and mortar strength as specified in I.S. 269-1976. Any indication of unsoundness charge in time of setting by 30 minutes or more or decrease of more than 10 percent in strength, of mortar prepared with water sample when compared with the results obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.*

1.3. *Water for curing mortar, concrete or masonry should not be too acidic or too alkaline . It shall be free of elements which significantly affect the hydration reaction or otherwise interfere with the hardening of mortar or concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces*

1.4. *Hard and bitter water shall not be used for curing*

1.5. *Potable water will generally found suitable for curing mortar or concrete.*

2.0.Cement Mortar

2.1. Proportion of Mix

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

2.3. Proportion of Mortar :

2.4. *In hand mixed mortar, cement and sand in the specified proportions shall be thoroughly mixed dry on a clean impervious platform by turning over at least 3 times or more till a homogeneous mixture of uniform colour is obtained. Mixing platform shall be so arranged that no deleterious extraneous material shall get mixed with mortar or mortar shall*

flow out. While mixing, the water shall be gradually added and thoroughly mixed to form a stiff plastic mass of uniform colour so that each particle of sand shall be completely covered with a film of wet cement. The water cement ratio shall be adopted as directed

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

2.0. Workmanship

2.1. Scaffolding:

Wooden bullies, bamboos, planks, trestles and other scaffolding shall be sound. These shall be properly examined before erection and use. Stage scaffolding shall be provided for ceiling plaster which shall be independent of the walls.

2.2. Preparation of back-ground :

2.2.1. *The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surface shall be toughened by wire brushing if it is not hard and by hacking if it is hard. In case of concrete surface, if a chemical retarded has been applied to the form work, the surface shall be roughened by wire brushing and all the resulting dust and loose particles cleaned off and care*

shall be taken that none of the readers if left on the surface. Trimming of projections on brick/concrete surfaces where necessary shall be carried out to get an even surface.

2.2.2. *Raking of joints in case of masonry where necessary shall be allowed to dry out for sufficient period before carrying out the plaster work.*

2.2.3. *The work shall not be soaked but only damped evenly before applying the plaster. If the surface becomes dry, such area shall be moistened again.*

2.2.4. *For external plaster, the plastering operation shall be started from top floor and carried downwards. For internal plaster, the plastering operations may be started wherever the building frame and cladding work are ready and the temporary supports of the ceiling resting on the wall of the floor have been removed. Ceiling plaster shall be completed before starting plaster to walls.*

2:3. Application of plaster:

2.3.1. *The plaster about 10x10 cms. shall be first applied horizontally and vertically at not more than 2 meters intervals over the entire surface to serve as gauge. The surfaces of these gauges shall be truly in*

plane of the finished plastered surface. The mortar shall then be applied in uniform surface slightly more than the specified thickness, then brought to a true surface by working a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally, the surface shall be finished off true with a trowel or wooden float according as a smooth or a smooth or a sandy granular texture is required. Excessive troweling or overworking the float shall be avoided. All corners, arises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Hounding or chamfering, corners, arises junctions etc. shall be carried out with proper templates to be size required.

2.3.2. Cement plaster shall be used within half an hour after addition of water. And mortar or plaster which is partially set shall be rejected and removed forthwith from the site.

2.3.3. In suspending the work at the end of the day, the plaster shall be left out clean to the line both horizontally and vertically, when recommencing the plaster, the edges of the old work shall be scraped clean and wetted with cement putty before plaster is applied to the adjacent areas to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of the wall and nearer than 15 cm. to any corners or arises.

It shall not be closed on the body of features such as plaster bands and cornices not at the corners or arises.

Horizontal joints in plaster work shall not also occur on parapet tops and copings as these invariably lead to leakage. No portion of the surface shall be left out initially to be packed up later on.

2.3.4. Each coat shall be kept damp continuously till the next coat is applied or for a minimum period of 7 days. Moistening shall commence as soon as plaster is hardened sufficiently. Soaking of walls shall be avoided and only as much water as can be readily absorbed shall be used, excessive evaporation on the sunny or windward side of building in hot air or dry weather shall be prevented by hanging matting or gunny bags oh the outside of the plaster and keeping them wet.

3.0. Mode of measurements & payment

3.1. The rate shall include the cost of all materials, labour and scaffolding etc. involved in the operations described under workmanship.

3.2. All plastering shall be measured in square meters unless otherwise specified. Length breadth or height shall be measured correct to a centimeter.

3.3. Thickness of the plaster shall be exclusive of he thickness of the key i.e. grooves or open joints in brick work, stone work etc. or space between laths. Thickness of plaster shall be average thickness with minimum 10 mm. at any point on this surface.

3.4. This item includes plastering up to floor two level.

3.5. The measurement of wall plastering shall be taken between the walls or partition (dimensions before plastering being taken) for length and from the top of floor or skirting to ceiling for height. Depth of cover of cornices if any shall be deducted.

3.6. Soffits of stairs shall be measured as plastering on ceilings, following soffits shall be measured separately.

3.7. For jambs, soffits, sills etc. for openings not exceeding 0.5 sq. met each in area for ends of joints beams, posts, girders, steps etc. not exceeding 0.5 sq. mt each in area and for openings exceeding 0.5. sq. mt and not exceeding 3.00 sq. mt. in each area deductions and additions shall be made in the following manners.

(a) No deductions shall be made for ends of joints, beams, posts etc. and openings not exceeding 0.5 sq. mt each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings, for finish to plaster around ends of joints, beams posts etc.

(b) Deduction for openings exceeding 0.5 sq. mt but not exceeding 3 sq.mt. each shall be made as follows and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings, (i) When both faces of all wall are plastered with same plaster, deduction shall be made for one face only, (ii) When two faces of wall are plastered with different types of plasters or if one face is plastered and the other pointed, deductions shall be made from the plaster or pointing on the side of frame for door, window etc. on which width of reveals is less than that on the other side but no deductions shall be made on the other side. Where width of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from areas of plaster and / or pointing as the case may be.

3.8. For openings having door frames equal to or projecting beyond the thickness of wall, full deduction for opening shall be made from each plastered face of the wall.

3.9. In case of openings of area above 3 sq. mt. each, deduction shall be made for openings but jambs, soffits and sills shall be measured.

3.10. The rate shall be for a unit of One sq. meter.

➤ **Providing and fixing PVC take pipe with necessary bends etc. complete 75 mm dia PVC Pipe 6 KG/Cm2**

- 1 The rain water pipe of 60 cm length 2 Nos shall be provided by the contractor shall be got approved before fixing.
- 2 The rain water pipe shall be fixed In to out side slope On top slab face with in side plaster vatta as per direction of Engineer In Charge.
- 3 The dia. of pipe shall be 75 mm dia. PVC Pipe 6Kg/cm2 and length 60 cmx 2 Nos. prepared from pipe of standard quality. Measurement in Running meter PVC pipe in the length.

➤ **Finishing wall with water proofing cement paint on wall surfaces (Two coats) to given an even shade including thoroughly booming the surface to remove all dirt. dust, mortar drops and other foreign matter.**

1.1. Materials

1.1. The clear Cole shall be made from glue and boiling water by mixing 1 Kg. mixture shall be suitably tinted where required for use under coloured distemper it directed. Glue shall conform to I.S. 352-1959 (Specifications for animal glue)

1.2. water proofing cement paint used shall be Freshly and white in colour conforming to I S. 712-1973.

Water shall conform to I.S. Best quality of gum shall be used in (he preparations of oil paint wash. Ultramarine blue or Indigo : This shall conform to I.S. 55-1970 for points, and shall be used for preparation of white was, Pigments. Mineral colours, not affected by shall be used in preparing colour wash.

2.0. Workmanship

2.1. Preparation of white wash solution Surface already white or colour. The fat lime shall be slaked as site and shall be mixed and stirred with about five liters of water for 1 kg. of unslaked lime to made a trim cream This shall be allowed to stand for d period of 24 hours and then shall be screened through a clean coarse cloth, 4 Kg. of gum dissolves in hot water shall be added to

each cubic meter of lime cream Small quantity of ultramarine blue (Up to 3 gins, per kg. of lime) shall also-be added to the last two coats of white wash solution and the whole solution shall be stirred thoroughly before use.

2.2. Preparation of surface:

2.2.1. The surface shall be thoroughly cleaned of all dust, dirt, mortar cropping and other foreign matter before white wash is to be applied.

2.2.2. The surface spoiled by smoke soot shall be scrapped with steel wire brushes or steel scrapers 01 shall be rubbed with over-burnt surkhi or brick bats. The surface shall be then broomed to remove all dust dirt and shall he washed with clean water.

2.2.3. Oil or grease spots shall be removed by suitable chemical and smooth surface shall be rubber with wire Crushes.

2.2.4. All unsound portion of the surface plaster shall be removed to full depth of plaster in rectangular patches and plastered again after raking the masonry joints properly. Such portion shall he wetted and allowed to dry. They shall then be given one coat of white wash

2.2.5. All unnecessary nails shall be removed the holes, cracks, patches etc. shall be made good with material similar in composition to the surface to be prepared

2.3. Scaffolding :

Wherever scaffolding is necessary it shall be erected in such a way that as far as possible on part of scaffolding shall rest against the surface to be white or colour washed A properly secured strong and well tied suspended platform (Zoola) may be used for white washing. Where ladders are used pieces of old gunny bags shall be tied at top and bottom to prevent scratches to the floors and walls. For white washing of ceilings, proper stage scaffolding shall be erected where necessary.

2.4. Application of water proofing cement paint :

2.4.1. On the surface so prepared the white wash shall be applied with 'Moon' brush. The first stroke of the brush shall be from top downwards, another from bottom pwards over the first stroke and similarly one stoke from the right another from the left, over the first stroke brush before it dries. This will form one coat each coat shall be allowed to dry before and uniform finish free from brush marks and it should not come oft easily when rubbed with finger

2.4.2. Splashing and dropping if any on the doors and windows, ventilators etc shall be removed and the surface cleaned.

2.4.3. Priming and Alkali resistant treatments, scraping of surface washing etc. surface spoiled by smoke soot removed of oil and grease spots, treatment for infection with efflorescence moulds moos, fungi, algae and lichen and patch repairs to plaster wherever done shall not be paid extra.

Pipeline work

MATERIALS SECTION

- **Providing and supplying in standard length ISI mark rigid unplasticised PVC pipes suitable for potable water with ring fit joint including cost of rings, as per IS specification no. 4985/1988 or its latest revision including all local and central taxes, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to the departmental stores and including cost of jointing material etc. complete.**

(A) For Various diameter from 75 mm to 315 mm dia.**UNPLASTICIZED PVC PIPES Test pressure 6 /10 Kg / cm²**

For Indian manufacturers a valid license issued by the Bureau of Indian Standards for marking the PVC pipes with ISI mark is a mandatory requirement both for PVC pipes & rings

The Pipes must be purchased from the approved vendor of GWSSB, existing at the last submission date of the tender.

STANDARDS:

- *The UPVC Pipes to be manufactured, supplied and delivered under the scope of this contract shall be manufactured in accordance and confirming to IS:4985-2000 or its latest revision or amendments or other authoritative standard that ensure at least a substantially equal quality to the IS:4985-2000 or its latest revision or amendments*
- *Electrometric sealing ring shall be as per specification of IS – 5382-1985, and ISO: 4633-1996 or it shall be EPDM rubber ring.*
- *The dimensions, material compositions, tests etc. shall be as per IS:4985-2000 or with its latest revision or amendments.*
- *The minimum wall thickness weight shall be as per Appendix I of the tender.*
- *The colour of pipes shall be as per IS 4985-2000*
- *Bureau of Indian Specifications (BIS) / Indian Standard (IS) shall mean the Latest version issued by BIS.*

The material from which the pipes are made shall consist substantially of unplasticized polyvinyl chloride conforming to IS: 10151, to which may be added only those additives that are absolutely needed to facilitate the manufacture of the polymer, and the production of sound, durable pipes of good surface, finish, mechanical strength and opacity.

The bulk density of the UPVC compound shall be 0.50 to 0.53 and the density of UPVC pipe shall be 1.40 to 1.46 g / cm³.

The additional of the manufactures own rework material shall comply to clause 4.2 of IS: 4985.

PVC resin of suspension grade K-66/K-67 shall be used for extrusion of UPVC pipe.

- *In line with BIS 4985-2000 the tolerance on outside diameter of the pipe shall be as per IS Standard:*
- *“The pipes shall be transported to the store by flat floored trucks in pre packed wooden crate. The height of crate should not be exceeding more than 2 meters. The both ends of packaging unit (crate) shall be covered with plastic sheet to ensure adequate protection during transport. At the time of packing and stacking of pipes, the sockets shall be alternated within the pipe of pipes and shall project sufficiently for the pipes to be correctly supported along their whole length. The pipes shall rest uniformly on the vehicle bed over their whole length during transport to avoid sagging or deformation.*

The packing material like wooden crate, plastic sheet etc. shall be the property of tenderer and he is permitted to reuse the packing material for transporting next batch of pipes”.

- *The pressure rating of pipes shall be in accordance with IS 4985 with a maximum continuous working pressure at 27⁰ C. of 6 & 10 kg/cm². This working pressure shall be down graded for ambient underground soil temperature of 45⁰ C. as per the figure given in IS 4985 for design purposes.*
- *The pipes when subjected to internal hydrostatic pressure in accordance with IS: 12235-1986 (part – 8) shall not burst during the prescribed test duration. The temperature, duration and test and induced internal stress shall conform to the parameters given below:*

	Test	Temp. (°C)	Min. duration (h)	Induced Stress (Mpa)	Requirements
	Type test	60	1000	10	No failure
	Acceptance Test	27	1	36	No failure

- The integral socket of the pipe shall be tested for internal hydrostatic pressure in accordance with ISO: 3603 and ISO 1167.
- The UPVC pipe shall not contain vinyl chloride monomer (VCM) exceeding 1 ppm when determined by means of gas phase chromatography using the "headspace" method according to IS: 10151.
- The wall of the socket and the wall of the plain pipe shall not transmit more than 0.2% of visible light falling on them when tested in accordance with IS:12235 (part -3).

The pipes shall be supplied in straight length of 6 mtrs with tolerance of +20mm and -0mm. The effective length of socket pipe shall be considered as shown in figure 2 of IS 4985.

All plastic and non plastic material for components of the UPVC piping system e.g. Elastomeric sealing ring, lubricants, when in permanent or in temporary contact with water which is intended for human consumption, shall not adversely affect the quality of the drinking water.

Concentrations of chemicals, biological agents or other substance leached from pipe materials in contact with drinking water and the values of the relevant physical parameters, shall not exceed the maximum values recommended by IS: 10500.

The pipe material shall be in accordance with IS 4985, clause 6.3.

- The quality control system and sampling model shall be as under :

Quality Control System and Sampling Model				
Order of Tests to be conducted	By Manufacturer	By Third Party Inspection / PMC representative	Codes/Standards to be followed	Remark
Raw Material Resin K-valve Particle size dis. Bulk density PVC compound density	Labouratory test certificates from the original manufacturer of resin and confirmation of the same by the pipe manufacturer in their laboratory. Both test certificates have to be presented during inspection	Verification of test certificates and witness of sample test at pipe manufacture's laboratory at discretion	IS: 4669	For every batch of PVC resin used prior to formulation of compound
Process Check Degree of fusion of extruded UPVC pipe by	Minimum one specimen per extrusion condition or moulding	May witness test during inspection	ASTM D 2152	Test shall be conducted on samples form each machine

Quality Control System and Sampling Model				
Order of Tests to be conducted	By Manufacturer	By Third Party Inspection / PMC representative	Codes/Standards to be followed	Remark
<i>Acetone immersion test.</i>	<i>condition per day</i>			
<i>On line Check Quality Outside diameter Wall thickness Length of pipe surface finish Socket dimensions</i>	<i>Each & every pipe shall be checked by the manufacturer during extrusion of pipe</i>	<i>Sample testing shall be done for acceptance of the lot as per sampling procedure given Appendix - A, Table -5 of IS 4985</i>	<i>IS: 4985 ISO: 2045 Specification</i>	<i>Wall thickness shall also be checked by cutting the pipe at any place by the inspector</i>
<i>Finished product check. Reversion test Stress relief test</i>	<i>Min. 2 samples per machine per shift shall be tested</i>	<i>Sample testing shall be done as per IS 4985, Table 6&7</i>	<i>IS: 4985 IS: 12235 Part 5&6</i>	<i>Test records shall be submitted to PMC on request</i>
<i>Drop impact test Internal Hydrostatic pressure test. Pressure test for integral joint</i>	<i>Min. 1 samples per machine per shift</i>	<i>Sample testing shall be done as per IS 4985, Table-8</i>	<i>IS: 4985 IS: 12235 Part 8&9 ISO 3603 ISO 1167</i>	<i>Whenever the pipe is cut for hydrostatic test, the inspector will also verify the pipe thickness</i>
<i>Capacity Effect on water</i>	<i>Min. one sample for every change in compound formulation</i>	<i>One sample per 100 km of length of supply at the discretion of inspector</i>	<i>IS: 4985 IS: 12235 Part 3,4&10</i>	<i>Test records shall be submitted to PMC on request</i>
<i>Long term hydrostatic test</i>	<i>Min. 3 samples of different diameter from the regular production lot.</i>	<i>May witness test during inspection</i>	<i>Is: 4985 IS: 12235</i>	<i>Test records shall be submitted to PMC on request</i>
<i>Density</i>	<i>Min. one sample per machine per shift</i>	<i>Min 5 samples per lot</i>	<i>IS: 8543 part 1/sec 2</i>	<i>Reconfirmation may be done at store by checking the samples at the approved laboratory</i>

Quality Control System and Sampling Model				
Order of Tests to be conducted	By Manufacturer	By Third Party Inspection / PMC representative	Codes/Standards to be followed	Remark
Ash content	Min. one sample per machine per shift	Min 5 samples per lot	MTNL Standard/ ISO: 3451-5	Reconfirmation may be done at store by checking the samples at the approved labouratory
Vicat softening temp.	Min. one sample per machine per shift	Min. one sample per lot.	ISO : 2507	

Temperature variations:

All the pipes to be manufactured, supplied and delivered shall be subjected to weather conditions like sun, dust, rain, wind as available in State of Gujarat. They shall be also subjected to carry and convey drinking water under variable temperature conditions ranging from 4 C⁰ to 45 C⁰.

MARKING :

The methods of marking all the pipes to be delivered under scope of contract shall ensure that all the information will remain legible even after transportation, storage in open space etc. In general the legible and indelible marking upon the goods shall indicate the followings;

I. Certification mark on each pipe.

II. Manufacturers brand name and/or trade mark.

III. Purchasers mark as "WASMO" be inscribed.

IV. Purchasers mark as concern Name of district, and concern Name of village be inscribed at each and every 2 mt. interval of pipe, if quantity of same diameter is more than one(1) Kilometer.

V. The outside diameter and pressure rating.

VI. Batch number or lot number.

VII. Inspector's mark on each pipe

VIII. Any other important matter that the manufacturer or purchaser deems fit to be inscribed.

Elastomeric sealing ring

THE SEALING RING SHALL BE STURINE BUTADIN IN RED COLOR AS SPECIFIED IN IS. THE LUBRICANT APPLIED FOR JOINTING OF ELASTOMERIC RUBBER RING SHALL BE OF GOOD QUALITY AND COMPLY THE FOLLOWING SPECIFICATIONS:MUST HAVE PASTE LIKE CONSISTENCY AND BE READY FOR USE, PREFERABLY SOAP JELLY.

- A) HAS TO ADHERE WET AND DRY SURFACES OF UPVC PIPES AND RUBBER RING.
- B) MUST BE NON-TOXIC.
- C) MUST BE WATER-SOLUBLE.
- D) MUST NON-AFFECTING PHYSIO-CHEMICAL AND ORGANOLEPTIC PROPERTIES OF DRINKING WATER CARRIED IN THE PIPE.
- E) MUST NOT HAVE AN OBJECTIONABLE ODOUR.
- F) MUST NOT HARMFUL TO THE SKIN.

Elastomeric sealing ring shall be in accordance with one of the types (Type - 1 to Type – 6) as per ISS 5382. These sealing rings shall be EPDM rubber ring. The sealing ring shall be with ISI mark.

In case of imported EPDM Ring, such rings shall conform to relevant International Standards or the Standards of country of origin, which are equivalent or higher than the Bureau of Indian Standard Specifications. In case of manufacturers who have applied for getting a BIS certification mark, it would be mandatory for such bidders to produce the BIS certification license on or before the date of opening of the price bids. An undertaking in this regard shall have to be provided along with the technical bid.

The rubber sealing rings shall be vulcanized from Ethylene Propylene (EPDM) with strengths as per table 2 of IS 5382-1985.

Type test:

- a) *Type test capacity, test for effect on water, test for resistance to Sulfuric Acid, internal Hydrostatic pressure test for 1000 Hrs. shall be carried out at least once at any time during the contract. Or shall be taken at least once during every six months irrespective of the ordered quantity.*

- *The color of the pipes shall be as per IS 4985-2000.*

- *The pipes shall bear ISI mark confirming to IS:4985-2000 or its latest amendment/revision if any.*

test for pvc resin & pipe:

Test For PVC Resin

It shall be sufficient to show the certificate of chemical test (in accordance with IS 4669) to the inspecting authority to confirm the 'K' value to be 64 to 67 as per clause No. 6.1.2. of IS 4985-2000

Specific Gravity and Ash Content Tests:

a) Density:

These tests shall be carried out by the inspection agency as per the IS:4985-2000 OR its latest revision OR amendments. The value shall be between 1.40 and 1.46 as per the ISS clause No. 10.6

b) Sulphate Ash content:

When tested as per Annex B, of IS 4985-2000, the sulphated ash content in the pipe shall not exceed 10 percent.

- c) *Other test shall be carried out as per ISS 4985-2000 or its latest revision or amendment tolerance in weight of pipes:*

(-) 1% tolerance in actual weight of pipes shall be allowed but in overall weight there should not be any minus tolerance i.e. minus tolerance may be compensated in overall weight. If the tolerance is in minus, the consignment shall be outright rejected. The weight of pipes as given in Appendix-I shall be considered. If required the consignee can weight the whole lot of supply for verification.

Quality Assurance

The manufacturer shall have a laid down Quality Assurance Plan for the manufacture of the products offered which shall be submitted along with the tenders.

Unit weight and minimum wall thickness of unplasticized ring fit type PVC pipes are as per IS 4985-2000.

The bidder shall have to arrange for random testing of pipes brought on site, in CIPET/GIRDA in the presence of WASMO'S OR Gram Pani samittee. representative and on satisfactorily report from the CIPET/GIRDA the payment of pipes will be made.

Mode of measurement and payments

a. Price variation clause is applicable as per Volume 1B GCC Clause No.59

b. Payment will be as per payment schedule as Below

Item	PIPE LINE	Percentage Payment to be released
1	<i>On receipt of materials on site (Maximum un laid length up to 5 KM including all dia. meter)</i>	<i>65 % of Quoted rate</i>
2	<i>Lowering, laying and Jointing</i>	<i>20 % of Quoted rate</i>
3	<i>On Hydraulic testing</i>	<i>5 % of Quoted rate</i>
4	<i>On refilling and disposal of surplus stuff</i>	<i>5 % of Quoted rate</i>
5	<i>After commissioning</i>	<i>5 % of Quoted rate</i>

Providing and supplying specials including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores or site of works as directed by engineer-in-charge etc. complete.

➤ PVC Specials

As per required size and diameter of specials including bend, Tees, Reducers, couplers, elbow, Tail piece, Flange, Service saddles, End caps, etc. as per IS standard Moulded with heavy duty class

The PVC Specials *shall be of the same material used for PVC pipes and should be best quality approved by Engineer-in-charge.*

It shall be of best quality as per IS specification and rate shall be including loading, unloading, carting, insurance and labour charge etc. complete.

The PVC Specials as per requirement at the time of execution of work shall be supplied by the contractor. The PVC specials should be as per standard and shall be got approved by the Engineer in charge before being used. The specials should be perfectly in working condition and having necessary threads holes etc. as per standard.

PVC specials should be as per IS standard specification and should be price make. All the specials should be suitable for PVC pipes, specials should be got checked before being used. Ends and threads of the specials should be in good working condition.

The rates are inclusive of all taxes such as freight, GST and octroi etc. incl. Loading and unloading etc complete.

The payment shall be made per No. basis of Specials.

- **Providing, supplying ISI mark D/F Sluice Valves, butterfly valves & Reflux valves of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc comp.PN-1 with hand / wheel cap operated (PD type short Body)**

(A) SLUICE VALVE**(A) Size as per shown in Schedule-B**

Sluice valve as per I.S: 780 & 2906/1984

1.0 GENERAL

The contractor shall be covering manufacturing, supplying and delivery of:

Sluice valve conforming to IS: 2906-1984 & IS: 780-1984 or its latest revision (Specification for sluice valves (50 to 900 mm size) with ISI certification

The material must be purchased from the approved vendor of GWSSB, existing at the last submission date of the tender.

2.0 STANDARDS

The C.I. sluice valves to be manufactured, supplied and delivered under the scope of this contract shall be manufactured in accordance with and conforming to Indian standard specifications as given below: with ISI certification mark on each sluice valves.

3.0 TEMPERATURE VARIATION

All sluice valves manufactured, supplied and delivered shall be subjected to drinking water under variable temperature condition ranging from 4° to 45° C.

4.0 MARKING

The legible and in deniable marking upon each valve shall indicate the following:

- (1) ISI certification mark on each sluice valve only.*
- (2) Manufacture's brand name and/or trade mark.*
- (3) Size of valve and nominal pressure of valve.*
- (4) Serial number of cast.*
- (5) Serial number in punch*
- (6) Where a valve has been tested for only open and test, it should be marked '0' distinctly and permanently.*
- (7) Any other important matter that the manufacturer deems fit to be inscribed embossed.*

5.0 TEST CERTIFICATE

- 5.1 The contractor shall always provide manufacture's test certificate in accordance with every batch/ lot as valves so manufactured and supplied.*
- 5.2 The contractor shall also produce; in addition to manufacture's test certificate the inspection certificate issued by the authorized person /agency appointed by WASMO. The inspection charges of the authorized person/agency as fixed by WASMO shall have to be borne by the contractor and the necessary payment to the inspecting agency shall be paid by the contractor as per the terms and condition of WASMO*

6.0 NOMINAL PRESSURE

- 6.1 Sluice valves shall be designed by nominal pressure (PN) defined as the maximum permissible gauge working pressure in Mpa as "PN-II" (Mpa= 10 kgf/m² approx)*
- 6.2 The nominal size shall refer to the nominal bore at any point, shall not be less than the nominal size required.*

- **Providing and supplying C. I. Air valves with GI raiser pipes of approved make & quality of following class and diameter including all taxes, insurance, transportation, freight charges,**

octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete including cost of concrete block and column with steel as per drawing.

Air Valve Single acting (S1)

1.0 SCOPE OF CONTRACT:

The contract shall be covering manufacturing, supplying and delivering of;

Air valve double ball flanged

Air cushion valve with C.I. body as per item of tender

GENERAL

The contractor shall be covering manufacturing, supplying and delivery of:

Air valve conforming to IS: 14846 or its latest revision (Specification for Air valves with ISI certification

2.0 CLASSIFICATION

2.1 Air valve shall be of two types

(a) Single Air valve

2.1.1 Single air valve shall have single small or large orifice for releasing air during pipe filling and ventilating the pipe during emptying. Air valves up to 40 mm dia directly shall be screwed on the main.

2.1.2 Double air valve shall have two ball chambers, on outlet of large capacity shall be provided for admission and release of bulk volume of air during emptying and filling of the main, another of small outlet type for the escape of smaller quantities of air accumulating under pressure. They shall be of flanged type.

3.0 MATERIALS

3.1 CAST IRON

Cast Iron for bodies' pressure covers, splash covers, glands, caps, joints support rings shall be best gray iron of selected grade, 20 of I-S-210-1978 specification for grey iron castings.

3.2 GUN METAL

Gunmetal shall be of mixture of 88% copper, 10% tin 2% Zinc having excellent hard wearing qualities, Ball guides of small orifice units and outlet bushes of large orifice valves shall be of gunmetal.

3.3 FOREGED BROZNE

Nipples, spindles shall be machined from rolled, extruded or forged high tensile brass or aluminum bronze. The produce shall possess much greater strength than ordinary cast product.

3.4 MILD STEEL

Bolts, nuts, flanges etc. shall be of mild steel unless otherwise specified and shall confirm to I.S. 226-1975 specification for structural steel.

3.5 MATERIALS FOR BALLS

The balls shall be of rubber covered and vulcanite covered. The rubber shall have a smooth and hard surface. It shall be as per I.S. 638-1965 specification for rubber and insertion jointing.

3.6 FLANGE JOINTING MATERIALS

The jointing material used between the flanges of components part of the valve shall be compressed fiberboard or rubber of thickness between 1.5 mm to 3 mm. The rubber shall be as per I.S. 683:1965 specifications for rubber and Insertion jointing. The fiberboard shall be impregnated with chemically natural mineral oil and shall have a smooth and hard surface.

4.0 DIMENSION

Dimension of the Air valves shall be as per relative item mentioned in schedule B of the tender.

5.0 CHARACTERISTICS

- 5.1 Small orifice valves shall have rubber covered balls and nipples of forged bronze or special alloy in to brass plug.*
- 5.2 Large orifice valve shall have vulcanite-covered ball closing on rubber sealing backed with leather and gunmetal outlet bushes. They shall be screwed or flanged. The flanged shall be faces and drilled to I.S.S.*
- 5.3 For sewage mains, the air valves shall be actuated by mild steel floats bronze spindles and shall be fitted with synthetic rubber seals.*
- 5.4 Air valves shall be sound in all respect and uniformly forged so as to have uniform bore. They shall be free from any defects such as unwanted projection, holes or roughness and shall have inner and outer surface perfectly smooth.*

10.0 TENDER PRICE:

The tender price shall include all material and machinery cost necessitated to be utilized for;

- a) Proper manufacturing of the valves.*
- b) All tests required to be undertaken at manufacturer's premises.*
- c) Transportation of the valves either by Rail and/or Road services with all the covers duly and appropriately insured.*
- d) Delivery of specials with proper loading, unloading, stacking at GWSSB or WASMO or Gram Panchayat/Pani Samiti store as indicated by Engineer-in-charge.*
- e) Further towards proper discharge of all contractual obligations. The storage of all specials to be manufactured, supplied and delivered under the scope of contracts shall be in general be made as described in Technical specification document.*

11.0 DELIVERY SCHEDULE:

The delivery schedule shall be governed by the Unit Manager of WASMO

Excavation:-

Excavation for pipe line trenches incl. all safety provisions using site rails and stacking excavated stuff up to a lead of 90 mts. cleaning the site etc. complete for lifts and strata as specified.

(A)0.0 to 1.50 Mt. Depth

(a) In all sorts of soil and soft murrum

(b) In hard murrum, boulders incl. Macadam road

(c) In soft rock and/or masonry in CM or LM or lime concrete.

(d) In hard rock incl. blasting & chiselling or by chiselling only

1.0 GENERAL

1.1 *The excavation for trenches will generally, refers to open excavation for trenches in wet / dry conditions for pipe laying work.*

2.0 CLEARING OF SITES:

2.1 *The site on which the pipelines are to be laid and shown on plan and the area required for setting out and other operations shall be cleared and all obstruction loose stones and materials, rubbish of all kinds, stumps, brushwood as trees shall be removed as directed the roots shall be entirely grubbed up.*

2.2 *The products of the clearing to restocked in such a place and in such a manner, as directed by the engineer in charge.*

2.3 *In jungle clearings, all trees not specially marked for preservation, bamboo's jungle wood and brushwood shall be cut down their roots grubbed up. All wood and materials from the clearing shall be the property of the VWSC shall be arranged as directed by the Engineer-in-charge or his authorized agent; the material pronounced as useful by the Engineer will be conveyed and properly stacked as directed within the specified limit. Unless materials will be burnt or otherwise disposed off as directed.*

2.4 *All holes or hollows whether originally existing or produced by digging up roots, shall be carefully filled up with earth, well earth, well rammed leveled off, as may be directed.*

3.0 SETTING OUT:

The center lines of all pipe trenches etc. shall be given by the Engineer-in-charge and it will be the responsibility of the contractor to install substantial reference marks, bench marks, etc. and maintain then as long as required true to line, level curve and slopes. The contractor shall assure full responsibility for alignment, and dimension of trench.

The labour materials etc. required for setting out and establishing benchmarks and other reference marks shall be arranged by the contractor at his own cost.

4 EXCAVATION

4.1 *The excavation incl. Bailing out of water for the pipe trenches shall also incl. Removal of all materials of whatever nature and whether wet or dry condition necessary for laying of pipelines exactly in accordance with alignment, levels grades and curves shown on the plans or as directed by the Engineer-in-charge. Trenches shall be excavated to the exact width and depth according to the size of pipe and the sides shall be left vertical as far as possible or according to the angle of repose various soils. Unless there is a specific extra provision in the contract for shoring and strutting or for cutting side slopes the contractor shall at his own cost do the necessary shoring and strutting or cutting of slopes to a safe of repose or both approved by the Engineer-in-charge. The contractor shall notify the Engineer before starting excavation to enable him to take cross sectional levels for purpose of measurements before the ground is disturbed. The bottom of the trenches shall be leveled both longitudinally and transversely or slopped as directed by the Engineer. The contractor shall at his own cost to remove such portions of boulders or rocks, as are rectified to make the bottom of the trench level. No filling shall be allowed to bring the trench to level. If by contractor's mistake excavation is made deeper than shown on the plans and if ordered by the Engineer the extra depth shall have to be made with selected excavated stuff only with watering, remedying etc. as directed, by the Engineer and at the cost of the contractor. Other hard excavation shall be cleared of all sorts and loose materials and cut to firm surface, either level, stepped as directed by the Engineer. The Engineer may order such charges*

in the dimensions and alignment of pipe trench as may be deemed necessary to secure satisfactory cover over pipeline. The contractor shall, at his own expense, make provision for bailing out of draining water and the trenches shall be kept free of water, during laying work.

After each excavation is completed, the contractor shall notify the Engineer to that effect and no lying of pipeline will be allowed to lie until Engineer has approved the depth and dimensions of trenches level and measurements.

5.0 SHORING AND STRUTTING:

5.1 *Shoring & strutting and dewatering if required shall have to be carried out by the contractor, for which any extra charge will not be paid*

5.2 *During excavation if water connections, sewage connections, telephone lines khalkuva (soak pits) etc. are damaged by the contractor, the same shall have to be restored by the contractor without any extra payment.*

6.0 PROTECTION

6.1 *The trenches shall be strongly fenced and red light signal shall be kept at night and arrangement of watchman to prevent accidents should be done, sufficient care protective measure shall be taken to see that the excavation shall not affect or damage the adjoining structure. The contractor shall be entirely responsible for any injury to life and damage to the properties etc. Necessary protection work such as guide ropes, crossing places, barricades, caution boards etc. shall be provided by the contractor.*

7.0 *The excavation in all sorts of soil, hard murram, soft rock or hard rock or any type of soil shall have to be carried out up to the required depth by the agency*

8 DISPOSAL OF EXCAVATED STUFF

8.1 *No excavated stuff from trench are to be placed even temporarily nearer than 1.5 meter or greater distance up to 90 meter or as prescribed by the Engineer from the outer edge of trench. All excavated material will be the property of the board. The rate of excavated includes sorting out of useful materials and stacking then separately as directed within specified lead. The excavated stuff suitable and useful for refilling or for other use shall be stacked at convenient places. The materials not useful in any wet shall be disposal off as directed by the Engineer from the outer edge of trench.*

8.2 *The site should be cleared off on completion of work.*

10.1 *The payment of excavation shall be made at the unit rate per cubic meter for the quantity actually excavated and accepted by the Engineer in charge limited to dimensions shown in the sanctioned plans or as directed by the Engineer. Excavation in excess of the sanctioned dimensions shall not be measured not paid for and if an ordered by the Engineer the contractor shall have to fill up the excess depth with excavated stuff with watering ramming etc. (Completed as specified) for trench without any extra payment to the contractor.*

10.2 *Dimension shall be correct to two places of decimals of a meter and individual quantity shall of decimals of a meter and individual quantity shall be calculated to two places of decimals of a cubic meter.*

10.3 *The rate for the item of excavation shall include unless and otherwise mentioned.*

(a) *Clearing of site*

(b) *Setting out work including all materials and labour.*

(c) *Providing and subsequently removing, shoring and strutting outing*

Slopes etc.

- (d) *Excavation and removal and stacking of all excavated stuff as directed.*
- (e) *Necessary protection including labour materials equipment etc. to ensure safety and protection against risk or accident.*
- (f) *Providing facilities for inspection and damage to property if caused during progress of work.*
- (g) *Compensation for injury to life and damage to property if caused during Progress of work.*
- (h) *Restoring of water supply connections, sewer connections, telephone Lines, Internet lines, OFC lines, khalkuva soakpit etc. if damaged by contractor without extra Payment.*
- (i) *Dewatering of excavated pit trench during the progress of work.*
- (j) *Clearing the site on completion of works directed by the Engineer.*

➤ **Lowering and laying of PVC pipelines**

Lowering, laying and jointing PVC pipes and specials of following class & diameter including cost of conveyance from store to site of work, including cost of labour, material except cement solvent giving satisfactory hydraulic testing as per IS code etc. comp.

Size as shown in Schedule

- 1) *The excavation for trenches shall be done before laying of the pipes as per required depth and width so that adequate space can be made available for joint.*
- 2) *The pipes & joints shall be procured, supplied by the Contractor at work site at his own cost. Every care shall be taken in carting them to site. During transportation any damage shall be occurring to pipes for fittings the replacement of pipes given by the contractor at his own cost.*
- 3) *Before laying the pipes it shall be brushed through out length so that the dust and soil can be removed.*
- 4) *Reducer bends tees, and adopter etc. to be supplied by the contractor as per requirement.*
- 5) *All the specials such as bends, tees, reducer, etc. shall be fixed as per instruction of engineer-in-charge in the pipeline.*
- 6) *The pipe shall be hydraulically tested during the testing no leakage shall be observed. If, leakage observed, it shall be set rightly by the contractor at his own cost as per the instruction of engineer-in-charge. The payment shall be as per payment schedule.*

THE SCOPE FOR THE ITEM COVER

Cost of additional excavation required for jointing clearing the site of all scrubs, bushes, and trees and dewatering where necessary.

Labour for laying pipes in trenches to correct alignment at required depth with tools, including cutting of pipes and specials if required for laying of pipes including connecting pipes to specials and appurtenances. Cost of the scaffolding, tools and plants, ropes etc.

Protection of existing works from damage and cost of repair to the damages carried out to the existing structure, sewer line telephone/electricity cables, electric cables, electric lines, gas pipe line, irrigation pipe line etc.

The pipe laying across the state highways, national highways etc. will have to be done either through open cut method or through push through method depending upon the requirement to be prescribed by the sanctioning authority. However, mostly it would be push through method.

WASMO will not be able to provide water for testing of the pipelines & water containers of the project. This shall have to be managed by the contractor at his costs and risk.

Labour for making joints including jointing material for joints, tools as well as tests. Testing of pipes for leakage under water pressure and flushing the pipes after testing and construction work shall have to be arranged by the contractor at his own cost.

Lowering / Laying of Sluice Valves:

- **Lowering, laying and jointing in position following C.I./D.F. Reflux Valves, Butterfly Valves, Sluice Valve and Air Valve including cost of labour, joining material, including nut bolts and giving satisfactory hydraulic testing etc. Complete. PN-1 With hand/wheel cap operated (PD - type Short Body)**

SLUICE VALVES

1.0 SUPPLY OF MATERIAL

- 1.1 *Cast iron double-flanged sluice valve/butterfly valves with two tailpieces suitable to pipe shall be supplied and carted by the contractor as per latest IS. The rate shall include loading, unloading and stacking at site.*
- 1.2 *The sluice valve/butterfly valves and tailpieces shall be examined before laying for cracks and other flows. They shall be undamaged in all respect.*
- 1.3 *The sluice valves/butterfly valves shall be operated before laying.*
- 1.4 *All grits and foreign materials shall be removed from the inside of the valves before placing.*
- 1.5 *All the four faces shall be thoroughly cleaned and coated with a thin layer of mineral grease.*
- 1.6 *The tightening of gland shall be checked with a pair of inside-calipers. Clearance between the top of stuffing box and the underside of the gland shall be uniform all the sides.*

2.0 JOINTING MATERIAL

- 2.1 *The contractor shall provide all necessary jointing materials such as nuts bolts, rubber packing white zinc jute lead wool etc.*
- 2.2 *All tools and plant required for installation of sluice valve shall be provided by the contractor.*
- 2.3 *All jointing materials shall be not approved from the engineer-in-charge before use*
- 2.4 *The nut and bolts shall conform to Item No MSP-19 of specification of materials.*
- 2.5 *The rubber packing shall conform all specifications as narrated in Item No MSP-20 of specifications of materials.*

3.0 INSTALLATION

- 3.1 *The sluice valve/butterfly valve shall be lowered in to the trench carefully, so that no part is damaged during lowering operation.*

- 3.2 *If necessary tailpieces shall be fitted with sluice valve first outside the trench and then lowered in to the trench.*
- 3.3 *The rubber packing shall be three ply and of approved thickness. The packing shall be of full diameter of the flange with necessary holes and the sluice/butterfly valve bore. It shall be even at both the inner and outer edges.*
- 3.4 *The flange faces thoroughly greased.*
- 3.5 *If flange faces are not free, the contractor shall use thin fibers of lead wool.*
- 3.6 *After placing the packing, nuts and bolts shall be inserted and tightened to make the joint.*
- 3.7 *The valve shall be tightly closed when being installed to prevent any foreign materials from getting in between the working parts of the valve.*
- 3.8 *Each flange bolt shall be tightened a little at a time taking care to tighten diametrically opposite bolts alternatively.*
- 3.9 *The sluice valve/butterfly valve shall be installed in such a way that its Spindle shall remain in truly vertical position.*
- 3.10 *The other end of tailpiece shall be fitted with pipes so that continuous lines can work.*
- 3.11 *Extra excavation required for facility of lowering and fixing sluice valve shall not be paid for.*

4.0 TESTING

- 4.1 *After installation of sluice valve/butterfly valve the same is tested to 1 1/2 times of its test pressure.*
- 4.2 *The joints sluice valve/butterfly valve shall withstand the test pressure of pipelines.*
- 4.3 *Defects noticed during test and operation of sluice valve shall be rectified by the contractor at his own cost without any extra claim to the entire satisfaction of the Engineer-in-charge.*

The payment shall be made as per payment Schedule.

(A) AIR VALVE SINGLE ACTING (S1) -

- 1.1 *The single acting air valve shall be supplied and carted by the contractor as per latest IS. The rate shall include loading, unloading and stacking at site.*
- 1.2 *The materials shall be carted to store or site of work including all freight, loading, unloading including all taxes, insurance, including necessary jointing materials such as G.I Nipple saddle pieces shall be brought by the contractor for fixing of air valve.*
- 1.3 *A suitable hole shall be drilled on the pipeline. The pipeline shall be of any type such as AC, HDPE or CI pipes. A clamp shall be got prepared with a nipple welded on it. The clamp shall be fixed on pipe with bolts and nuts in such a way that the part of nipple fixed in the clamp shall remain in the hole drilled in pipe. The rubber packing shall be provided between the clamps and the pipe. White zinc spun yarn shall be used for fixing the nipple of air valve.*
- 1.4 *Bolt holes shall be drilled according to center- lines. Bolt heads and nuts shall be hexagonal and shall conform to IS: 1363 (specification for black hexagonal bolts, nuts and lock nuts and black hexagonal screws).*

- 1.5 *The neoprene seat ring shall be held security in place under the low pressure cover by jointing support ring to prevent it from sagging when the ball is not soaking the orifice.*

2.0 JOINTING MATERIAL

- 2.1 *Jointing material shall be brought by contractor with all necessary joint rings, nuts, bolts and washers for completing the joints on all the flanges of valve supplied under this contract including*

these flanges which will be jointed to pipe system. The lengths of bolts shall be assumed to be suitable for jointing material supported under the contract shall be inclusive of rates.

- 2.2 *Joint rings shall be of flat section at least 3 mm thick. They shall be of rubber in accordance with Is: 638-1965 or its latest edition (specifications for rubber and insertion jointing) of hardness proven in practice so as form a water tight joint and use of jointing paste shall not be allowed.*

AIR VALVES SINGLE ACTING FLANGED

1.0 GENERAL

- 1.1 *The single acting air valves shall have to two ball chambers having one outlet of large capacity for admission and release of bulk volume of air during emptying and filling of the main and another having small outlet for escape of smallest quantities of entrapped air, This type of air valves shall be of flanged type with full conformation with IS: 1538 same valve shall be supplied and carted by the contractor as per latest IS. The rate shall include loading, unloading and stacking at site.*

- 1.2 *The ball sealed orifice always remains open while air is exhausting and is immediately closed when water rises in the chamber, lifts the ball and seals the orifice. It shall also ensure that there are no recesses or pockets, sheltering, escaping air for the large orifice (low pressure) ball to drop into when the valve is open. Turbulent air at the time of filling of pipe shall not circulate in such cavities and cause the ball to blown in to.*

Single acting Air valve shall be bolt up evenly on all sides after providing necessary rubber packing etc. on the flange of the Tees. Where facing of the flange is not true a line, fiber or lead wood or rubber packing shall be used. It shall be rubber insertion cloth of two plays and of approved quality. Any defects in jointing observed during the test shall be made good by the contractor till there is no further leakages are there.

➤ Construction of Valve Chamber

Construction of valves chambers in brick or bela stone masonry, locally available in C. M.1:6. Foundation concrete 150 mm thick in C. C. 1:4:8 of trap metal size 25 mm to 40 mm thick, inside cement plaster in C. M. 1:3 and cement pointing outside in C. M. 1:3 and top cover of precast RCC slab 100 mm thick (with key hole in two parts, each with handles or MS Bar etc. complete as given size) Up to 1 Mt. depth from G. L. to pipe invert level incl. complete civil works but excl. cost of excavation and refilling. With cast in situ RCC slab in one single piece with 230 mm thick brick masonry wall in C.M.1:6

- (a) Inside size of chamber shall be 0.60 x 0.60m up to 1.00 m. depth.**

Additional excavation required to be done shall be carried out as per instruction of Engineer-in-charge. For foundation chamber 15 cm. thick 1:3:6 PCC shall be provided and 230 mm. up to 1.5 m. depth and beyond 1.5 m. depth 35 cm thick BB masonry walls in CM 1:6 shall be constructed.

Second Class bricks of Standard size shall be brought by the Contractor & shall get approval before use in the work from the Engineer-in-charge. Brick Masonry wall in CM1:6 & thickness of wall 23cm. Inside plaster 20mm thick inside plaster in CM1:3.

12 mm thick cement plaster in CM 1:3 shall be provided on inside and outside of walls up to 20 cm below from G.L. Cement pointing in CM 1:3 shall be provided for outside below G.L. from 20 cm.

20 mm dia MS bar steps shall be provided and fixed in wall at 30 cm c/c for facilitating access into the chamber. First step should be at a depth of 0.5 m from top and last step should be 0.5 m above bottom.

Chamber shall be covered with 150 mm thick RCC 1:2:4 pre cast or cast in situ slab in four parts with key hole to insert key for operation.

Reinforcement for the cover slab shall be provided considering heavy traffic load. Curing of concrete, BB masonry, RCC etc. shall be done using chemical or water for 14 days.

12 mm dia MS bar handles minimum two nos. shall be provided to each piece of slab during the time of casting of slab.

Sides of chamber shall be refilled properly with selected excavated earth.

All the above items shall be carried out in workman like manner as per prevalent sound engineering practice and instruction of Engineer-in-charge.

➤ **Refilling of pipeline trenches**

Refilling the pipe line trenches incl. ramming, watering, consolidating disposal of surplus stuff as directed within a radius of 3.0 km.

General:*All fill material shall be subject to the Employer's Representative's approval. If any material is rejected by Employer's Representative, the Contractor shall remove the same forthwith from the site. Surplus fill material shall be deposited/disposed off as directed by Employer's Representative after the fill work is completed. No earth fill shall commence until surface water discharges and streams have been properly intercepted or otherwise dealt with to the approval of the Employer's Representative.*

Material

To the extent available, selected surplus spoil from excavations shall be used as backfill. Backfill material shall be free from lumps, organic or other foreign material. All lumps of earth shall be broken or removed. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size, mixed with properly graded fine material consisting of murrum or earth to fill the voids and the mixture used for filling.

If fill material is required to be imported, the Contractor shall make arrangements to bring such material from outside borrow pits. The material and source shall be subject to the prior approval of the Employer's Representative. The approved borrow pit areas shall be cleared of all bushes, roots of trees, plants, rubbish, etc. Topsoil containing foreign material shall be removed. The materials so removed shall be disposed of as directed by Employer's Representative. The Contractor shall provide the necessary access roads to borrow areas and maintain the same if such roads do not exist.

Filling in Trenches

Filling in trenches for pipes and drains shall be commenced as soon as the joints of pipe and drains have been tested and passed. The backfilling material shall be properly consolidated taking due care so that no damage is caused to the pipes.

Where the trenches are excavated in soil, the filling from the bottom of the trench to the level of the center line of the pipe shall be done by hand compaction with selected approved earth in layers not exceeding 8 cm; backfilling above the level of the center line of the pipes shall be done with selected earth by hand compaction, or other approved means in layers not exceeding 15 cm.

In case of excavation of trenches in rock, the filling up to a level 30 cm above the top of the pipe shall be done with fine materials such as earth, murrum, etc. The filling up to the level of the centerline of the pipe shall be done by hand compaction in layers not exceeding 8 cm whereas the filling above the centerline of the pipe shall be done by hand compaction or approved means in layers not exceeding 15 cm.

The filling from a level 30 cm above the top of the pipe to the top of the trench shall be done by hand or other approved mechanical methods with broken rock filling of size not exceeding 15 cm mixed with fine material as available to fill up the voids.

Filling of the trenches shall be carried out simultaneously on both sides of the pipe to avoid unequal pressure on the pipe.

➤ **GI pipeline:-**

Providing and supplying G.I. Header/valvestand made from ISI mark G.I pipe with couplings including cutting/welding, all necessary materials such as flange, tailpiece, rubber packing, nut bolts, washers etc with hydraulic testing; including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc complete.

MATERIALS

G.I.Pipes.

Providing supplying lowering laying & Jointing extending 15 mm outside dia. ISI mark Galvanized iron Medium duty pipeline for vertical pipe from end of UPVC connection line to above G.L. up to Tap of house connection.

standard make and quality and shall be got approved prior to use by Engineer in charge. The rate includes all local and central taxes, octroi, transportation charges, loading, unloading and stacking the pipe at proper place to prevent from direct sunlight.

G.I./C.I Specials.

The molded PVC / G.I. fitting shall be manufactured as per relevant IS specification for various specials of relevant ISO/Manufacture's own standard specification. The fitting shall be suitable to resist 6 kg/cm² as per close of PVC pipes used in this work for working pressure.

The sizes of fitting shall be designated by the nominal diameter of the pipes given in IS 4985-1981/ relevant ISO.

The PVC/G.I. specials includes Bends, Tees, saddle piece, end cap, Elbow, couplings having size mention as per requirement. Specials shall be suitable to required dia of PVC / G.I. pipe should bare same pressure while testing. No fabricated specials shall be allowed to use in this works only shall be reported or rectified by the contractor without any extra claim.

Specials brought by the contractor shall have to be got checked from Engineer in charge before fitting. In absence of satisfactory hydraulic testing. 30% rate shall be withheld from running bills.

MODE OF MEASUREMENT AND PAYMENT :

Payment shall be made on the basis of per number of brick masonry valve chamber constructed with all constructing materials, labour, curing finishing etc complete in all respect of whatever kind and size as per schedule – B.

The measurement shall be for such numbers of Valve chamber constructed of whatever kind & Size as per schedule – B.

➤ **House Connection Specification****UPVC pipes :**

Providing & supplying UPVC pipe (SCH-40) including all taxes of specified dia and class. 15 mm dia. Providing supplying lowering laying & Jointing extending 15 mm outside dia. ISI mark UPVC 20 kg/cm² pipeline from mainline to house connection. UPVC Pipe (SCH-40) of standard make and quality and shall be got approved prior to use by Engineer in charge. The rate includes all local and central taxes, octroi, transportation charges, loading, unloading and stacking the pipe at proper place to prevent from direct sunlight.

G.I. Pipes

Providing & supplying Galvanized iron Medium duty pipe including all taxes of specified dia and class. 15 mm dia.

Providing supplying lowering laying & Jointing extending 15 mm outside dia. ISI mark Galvanized iron Medium duty pipeline for vertical pipe from end of UPVC connection line to above G.L. up to Tap of house connection.

standard make and quality and shall be got approved prior to use by Engineer in charge. The rate includes all local and central taxes, octroi, transportation charges, loading, unloading and stacking the pipe at proper place to prevent from direct sunlight.

PVC/GI specials :

Purchasing and supplying at site of work G.I./P.V.C. specials as per requirement incl. Railway freight, loading, unloading and carting from store to site. Sales tax, insurance, octroi etc. complete.

(a) PVC Coupling 15 mm dia. (b) PVC Elbow 15 mm dia.

(c) 63/50 mm X 15 mm dia. Service Saddle. (d) G.I. Elbow 15 mm dia (e) G.I. Couplings 15 mm dia. (f) G.I. Nipple 15 mm dia.

The molded PVC / G.I. fitting shall be manufactured as per relevant IS specification for various specials of relevant ISO/Manufacture's own standard specification. The fitting shall be suitable to resist 6 kg/cm² as per close of PVC pipes used in this work for working pressure.

The sizes of fitting shall be designated by the nominal diameter of the pipes given in IS 4985-1981/ relevant ISO.

The PVC/G.I. specials includes Bends, Tees, saddle piece, end cap, Elbow, couplings having size mention as per requirement. Specials shall be suitable to required dia of PVC / G.I. pipe should

bare same pressure while testing. No fabricated specials shall be allowed to use in this works only shall be reported or rectified by the contractor without any extra claim. Specials brought by the contractor shall have to be got checked from Engineer in charge before fitting. In absence of satisfactory hydraulic testing. 30% rate shall be withheld from running bills.

➤ **Laying of UPVC pipe :**

Lowering, laying and jointing PVCpipes and specials of following class and diameter including cost of conveyance from store to site of works including cost of labour, material, except cement solvent, giving satisfactory hydraulic testing as per ISI code..

15 mm dia UPVCpipe.

The pipes shall be laid out along the trenches in its proper position. Before lowering of PVCpipes, in excavation trenches, the trenches shall be well inspected and shall be in proper level. It any materials such as kapchi, pointed pieces of rocks, toots of trees etc. trenches shall be excavated intrue line.

The pipes after clearing shall be jointed outside the trenches by glossed/spigot and they shall be carefully lowered and laid freely in the UPVC pipe lines shall be done in the following manner.

- (a) Clean carefully male and female ends of pipes.*
- (b) If the grease, oil, etc. is found on the end of pipes shall be removed.*
- (c) The solvent solution be applied after the ends are made rough by emery cloth.*
- (d) The uniform coat of solvent cement solution shall be smoothly applied on surface of spigot and inner side of socket.*
- (e) Apply solvent cement relatively thick the socket end of the pipe all sothe first coat to dry and then apply the second coat.*
- (e) Wipe off excess solvent with a piece of cloth.*
- (f) The spigot ends shall then be immediately inserted so that the solvent cement can spread uniformly.*
- (g) The Jointing work of pipes shall be completed within the period of one minute otherwise the drying time of solvent cement shall be effected by the temperature. As far as possible the pipes to be laid shall be stored under cool temperature.*

The pipe line shall be tested to the purpose of one and half times of the working pressure in the particulars sections leaking if any shall be made good and test pressure reapplied till no further leak-ages are noticed. The line shall be tested in sections as specials shall be subjected to maximum steady pressure then the required pressure is reached on the gauge. The testing pump shall be stopped and the pressure shall be maintained with out any drop to the satisfactions of the engineer in charges.

In the absence of satisfactory hydraulic test given by the contractor 30 % of payment will be with held from the bill.

➤ **Laying of G.I. pipe :**

Lowering, laying and jointing G.I. pipes and specials of following class and diameter including cost of conveyance from store to site of works including cost of labour, material, except cement solvent, giving satisfactory hydraulic testing as per ISI code..

The pipes shall be laid out along the trenches in its proper position. Before lowering of G.I. pipes, in excavation trenches, the trenches shall be well inspected and shall be in proper level. It any materials such as kapchi, pointed pieces of rocks, toots of trees etc. trenches shall be excavated in true line.

The pipes after clearing shall be jointed outside the trenches by G.I. threaded Couplings and it shall be carefully lowered and laid freely in the lines shall be done in the following manner.

- a. *Clean carefully both ends of pipes and make thread as per standard practice.*
- b. *Wrap the standard seal tap on the threaded ends after proper cleaning.*
- c. *Attached necessary G.I. specials like Tee, bends, elbow, nipple etc. or Tap with G.I. coupling.*
- d. *Each and every joints shall be tighten by wrench till the end of the thread made in the specials.*

The pipe line shall be tested to the purpose of one and half times of the working pressure in the particulars sections leaking if any shall be made good and test pressure reapplied till no further leak-ages are noticed. The line shall be tested in sections as specials shall be subjected to maximum steady pressure then the required pressure is reached on the gauge. The testing pump shall be stopped and the pressure shall be maintained with out any drop to the satisfactions of the engineer in charges.

In the absence of satisfactory hydraulic test given by the contractor 30 % of payment will be withheld from the bill.

➤ **Display Board**

Making Transparent Scheme Information Display Board Of Village With all Information Of Scheme As per Attached Photo Copy Of Display Board In Village With Approved Quality Blue Oil Paint Colour With Specification given In Tender - (6 Foot x 6 Foot Size)

Making Transperent Water Quality Display Board Of Village With all Information Of Water Quality Perameter As per Attached Photo Copy Of Display Board In Village With Approved Quality Blue Oil Paint Colour With Specification given In Tender. - (3 Foot x 3.5 Foot Size)

Making Slogan Writing Work In Village With all Information Of Slogan As per Attached Photo Copy With Approved Quality Blue Oil Paint Colour With Specification given In Tender -

Materials:-

- a. *Providing , supplying at site of work White colour and Firozi blue colour Oil paint of ISI standard of reputed brand approved by the Engineer in charge with loading, unloading, transportation all taxes etc. comp.*
- b. *Providing , supplying at site of work colour primer for Oil paint of ISI standard of reputed brand approved by the Engineer in charge with loading, unloading, transportation all taxes etc. comp.*

Equipments:-

- a. *Providing required size and nos, of paint brush*
- b. *Providing and fixing required type of ladder , / scaffolding etc. for making painting on wall as per site requirements.*
- c. *Providing all required equipment for writing the information on wall as per sample given*

Labour/workmanship:-

- a. *As given location by the Gram panchayat / DWSU, agency has to first clear the surface by washing or rubbing the wall surface and make it suitable for painting primer coat as direction given by the manufacture.*
- b. *After applying primer coat final coat of White shed oil paint shall be made for writing the informations.*
- c. *After dry the white base oil paint , information shall be written by Firozi oil paint as per given sample by Gram panchayat / DWSU,*
- d. *Boarder shall be made for each and every board with Firozi oil paint.*
- e. *Logo of the WASMO shall be made as per actual design shown in the sample.*

f. Size and thickness of the font shall be made as per standard sample and as per proportionate of area.

g.

- **Fabricating, supplying, Providing and fixing in position the chemicalized Ferroconcrete cabin to fit Mini switch board confirming to following specifications including all taxes, loading, unloading, carting, erecting as requirement at site etc. comp.**

Materials:-

- a. Prefabricated 4 cm. thick R.C.C. Ferro concrete portable cabin Fabricated at workshop of manufacturer with using standard materials like, reinforcement, cement, fine aggregate, coarse aggregate as per design standards. Size 190 cm x 110 cm. x 50 cm. (Height x Length X width)*
- b. Fabricated M.S. Door with frame by 15 gauge M.S. sheet, on M.S. angle frame size 25.4x25.4 mm and frame by M.S. angle size 90x80 mm support,*
- c. M.S. Hinges, Lock arrangements, aldraf etc.*
- d. One Lock with Two keys.*
- e. Material for foundation as per requirements.*

Equipments:-

- a. As per requirements of site conditions.*

Labour/workmanship:-

- a. All material shall be transported at site of work with necessary care*
 - b. Excavation up to 45 cm. in all strata for making 23 cm wide brick masonry surrounding foundation wall up to 30 cm height above G.L.*
 - c. Filling the excavated selected soil for foundation and plinth with ramming, watering etc.*
 - d. Providing 2.5 cm thick cement concrete flooring in C,C,1:2:4 with neat cement slurry finishing on top.*
 - e. Erection of Prefabricated RCC cabin as per standard practice suggested by the manufacturer.*
 - f. Fixing the M.S. door with M.S. hinges minimum 3 nos. on each shutter., Fixing 12 inch. M.S. aldraf for locking arrangement.*
 - g. Necessary hole shall be made with standard tools as and where required for cable without any damage.*
 - h. Paint the cabin and foundation with primer, two coat oil paint*
- **Providing and Supplying Pumping Machinery HP-, HEAD- Mtr.LPM-, DOL Panel Board and Cable with Installation, All Accessories, with Delivery Pipe connection, all Jointing Material and Commissioning of working condition For Existing & Proposed sump Set No-,At Village : level mentioned in Schedule Under Nal Se Jal(Jal Jivan Mission).2020-2021**

Providing and supplying three phase Horizontal mono set submersible pump having discharge and head as per given in the Schedule-B of the tender of approved make out of GWSSB vendor list given in the specification including cable of suitable size and panel board with all electrical equipment and required all other materials as per detailed specification etc. complete.

(I) LPM discharge & mt. Head HP Set- Nos mention in schedule.

The pump set should be of sturdy construction to facilitate manual loading and unloading requirements. It should be repairable in workshop with minimum cost and should have fast wearing parts of replaceable. Feature and easy rewind ability of electric motors and of economy in repairs are over riding consideration after meeting the basic Hydraulic, Electrical and Mechanical performance needs, Pumps should generally confirm to IS-8034 and motors should confirm to IS-9283 revised up to date.

The duty point of the set should be located at the optimum efficiency point of the pump rating curves and there should not be steep fall in efficiency in the range of + 10% and -25% in head variation. The verification of the pump sets performance will be as per relevant latest IS at rated voltage. The pump with lesser number of stages will be preferred.

The minimum overall (Pump and motor combined) efficiency without any minus tolerance. Minimum motor House Power rating, cable size, starting system and delivery pipe size shall be as per technical requirement.

The Gujarat Water Supply and Sewerage Board, Gandhinagar reserves the right to ask the tendering firm to give test check of the product ask tender consideration stage it self.

PUMP :-

The pump should confirm to IS-8034. Bowls should be free from Blow holes,slag inclusion and other detrimental defects.

Bowls should be provided with renewable wearing rings except in radial flow pump set.

Bowls provided with wearing rings should be suitable for lubricating by watering and shall be of superior quality.

IMPELLER :

Impeller should be of closed type, ensuring required performance and free of cavitations.

The material of impeller will be Cast iron.

SHAFT :

The pump shall be guided by bush bearings provided in bowl wherever required.below the impeller shaft assembly. Shaft protection sleeve shall be provided. It shall have surface finishing of 0.75 Microns. The materials of shaft shall be stainless steel.

Bearing sleeve :

The material for this will be as per technical requirement. The fitment of wearing ring with interface fit and locking compound is to be done.

MOTOR :-

The motor shall confirm to IS-9283. It should be designed for 400+10% and-15% volts, 3 phase, 50 cycles. It should be totally enclosed squirrel cage induction type water cooled and water lubricated sealed against entry from outside water.

The windings shall be of wet type. The thrust bearings should be of wet type water lubricated and provided with metal fitting thrust pads, designed to take all load at most unfavorable running conditions.

The ball used in the thrust Assembly should be as per technical requirement. Upper and lower bearing housings and thrust bearing housing should preferably be fixed separate replaceable bolts/studs and (not threaded connections) to the starter to facilitate easy dismantling inspection Agency will open the motor base and check the thrust bearing & fitting pad type and mark the identification & the word GWSSB with hard punch or with indelible ink, if the fiber thrust bearing is provided then it shall be marked with indelible ink.

Starter and motor should be impregnated with a superior varnish Class-B thermal insulation properties by vacuum pressure or epoxy paints on starter when cold rolled stamping used and rotor shall be painted with Polyurethane paint & backed for at least ½ hour under controlled temperature condition and not by manual or gravity flow to remove air pocket so that these are

thoroughly filled up by varnish. Motor rotor should be preferably lead shot blasted. Subsequently, rotor body should be backed repeatedly under controlled conditions to ensure long life of paint and hard finish to the surface to avoid corrosion before powder coating. The rotor shall be as per technical requirement and provided with shelves having materials as per technical requirement in the bearing portion. The windings should be accessible to facilitate checking and locating any faults without disturbing all the coils and also to enable replacement of any defective coils. It should be possible to rewind the starter with readymade pre tested coils in order to save time during the repair. Kelvin bridge/digital resistance meter shall be treated preferable for measurement of hot and cold resistance of winding for evaluated temperature rise. Any deviation above should be indicated clearly. Full proof arrangement should be made for stopping the rotating of shifting of stampings inside the starter body due to operation of pump sets. Earth leakage current should not be more than 50 m.a. at rated voltage.

The quoted H.P. of motor should meet both the following conditions.

1. The minimum power margin over and above the duty points shall be 15% and tendered has to supply motor of minimum HP mentioned in the technical requirement. However the motor shall not get overloaded during the specified range.
2. The motor should not get overloaded in the range of + 10% & (-) 25% of the specified pump head. The meaning of overload will be as per IS8034.

The motor shall have the name plate giving following information's.:

- a. name of the manufacturer in listing company Corrent GWSSB Vender listing.
- b. Motor make/model..
- c. Mfg's No and frame reference.
- d. Numbers of phase.
- e. Numbers of phase.
- f. Rated output in KW/HP and current in Amperes.
- g. Rated voltage.
- h. Winding connection
- i. Rated RPM.
- j. Year of manufacture.

Note :- Starting method : D.O.L. starter, vendors to submit cross sectional drawing of Pumping motor and non return valve with clear indication of material specification for the major components covered under specification. **And standard ISI mark GWSSB Current Vender listing company made.**

SPECIFICATION FOR CONTROL PANEL BOARD.

The panel board should include the following equipment.

D.O.L. Starter.

Switch.

Volt Meter: 4" round projection type moving iron type 0 to 600 v.

A Meter: 4 " round projection type moving iron type suitable range ammeter up to H.P. direct operated.

Indication Lamp.3. Nos. Button holder with 0 Watt lamp clear colour. Single phasing preventor : Negative sequence voltage sensing type single phasing preventor with by pass switch.

Wooden Board :

12mm thick waterproof plywood with necessary painting should be provided of 600x450 mm size and size of power shall be 2.5 to 6.0 sq.m.

All the above items are fitted on wooden board duly wired and wooden board fitted on angle frame suitable for wall mounting with 2 Mt. incoming flat power cable.

All component after fitting on wooden board, the top of the Nut and bolt or screw should be colored insuring that their should not be any scope of replacement after testing and before delivery.

Testing and inspection :

1. Tests shall be carried out at manufacture's works under his care and expenses.
2. Following tests as per applicable standard code shall be conducted during inspection.
3. H.V. and I.R. (all panels) 2.5 K.V. for power circuit for 1 Min- 1.5 K.V. for control circuit.
4. Megger (all panels) test as per relevant I.S.
5. Functional test (all panels.)
6. The payment shall be made on number basis.

- **G.I. Specials :-**As per G.I. Pipeline section pipeline diameter for fitting with mono block requirement G.I. specials materials ISI standard company GI elbow, bend, Tee, coupling, Reducer, Nipple, M.S./C.I. flanges. Nut bolt and rubber packing fitting materials used as per site incharge instruction.

CABLE :-

Motor shall be provided with three core flat PVC water proof and flexible copper Flat cable 3 core size MM² of Mt. length and suitable size. The cross sectional areas should be sufficient so as not to cause voltage drop of more than 2.5% of nominal voltage i.e. 10 volts at 400 volts through out the length of the cable size of the flat cable will be as per technical requirement as per GWSSB current vender listing company made ISI mark used cable.

- **Earthing all work as per specification and Erection, testing, commissioning of three phase horizontal mono sets submersible pump having discharge and head as above including, fixing of panel board jointing material, electrical equipment, packing materials etc. complete including all tools and plants, required for the job including labour charge fixing suction pipe / delivery pipe / valves specials etc. complete.**

1. Horizontal mono set submersible pump set shall be lowered in the under ground sump at bottom with suction and delivery pipefitting.
2. Pump set should be in leveled and on well finished surface at bottom of the sump.
3. Top of suction pipe should be 100mm above body of the pump set i.e. pump set should be always be remain fully submerge in water and to be protected from jerk.
4. Water proof cable joint should be done.
5. Electrical control panel board shall be fixed on wooden board on 12mm thick and fixed in the frame structure as details given in the item No.25.
6. All the Electrical works for the erection of the pump sets should be done with the help of qualified electrician who hold the electrical license issued from electrical inspector of state Government.
7. Cable to be used for connection of panel board to pump set should be underground and well protected in PVC pips.
8. Proper earthing should be provided as per instruction of Engineer in charge.
9. All the G.I. Pipe connection should be watertight.
10. For passing G.I. pipe through RCC work hole should be done without any extra cost and it should be filled with cement mortar 1:2.
11. Necessary test report shall have to be prepared and produced by the contractor at his own cost.

12. *All activities related for getting new power connection/ transferring the old power connection etc. to be dealt with the G.E. board should be perform by the contractor including obtaining, application from the village panchayat etc.*
13. *For getting new power connection / transferring of the connection the GWSSB shall paid only the official charges of GEB.*

Payment of all items of the work: Shall be done as per unit of measurement as mentioned in BOQ, and as per payment schedule of this tender.