

STANDARD BIDDING DOCUMENT

PROCUREMENT OF

CIVIL WORKS

**Name of Work:- Renovation of Satarwada Storage Tank
Sr.No.327 at Satarwada, Ta.Dantiwada, Dist.B.K**



GOVERNMENT OF GUJARAT

Narmada, Water Resources, Water Supply and Kalpsar Department

Gandhinagar Panchayat Irrigation Circle.

Panchayat Irrigation Division, Palanpur, B.K

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**INVITATIONFORBID
(IFB)**

NATIONAL COMPETITIVE BIDDING

1. The **Executive Engineer, Panchayat Irrigation Division, Palanpur, B.K** 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 docu ment/Ten der Fee (Rs)	Period of compl etion	Class of Registrat ion / Category of contracto r if Required
1	2	3	4	5	6	7
1	Renovation of Satarwada Storage Tank Sr. No. 327 at Satarwada, Ta Dantiwada, Dist.B.K	38,53,138.96/-	39,000/-	1500/-	11 Month	"E1" Class & Above

- 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>.
- 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, Palanpur, B.K. and in favour of 'Executive Engineer, Panchayat Irrigation Division, Palanpur, B.K. 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 bidders shall send the same in original through R.P.A.D. so as to reach to # 'Executive Engineer, Panchayat Irrigation Division, Palanpur,
- B.K. within 7 Days from the last day of bid submission.
Penalitive action for not submitting Demand Draft / FDR / Bank Guarantee in original to Executive Engineer / Tender Inviting Authority by bidder shall be initiated. **WRD GR No.PRC-102014-1-MICell-K.1 Dated: 29/10/2014**
- 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.
- A pre bid meeting will be held onathrs. at the office of to

clarify the issues and to answer questions on any matter that may be raised at that stage as stated in clause 9.2 of 'instructions to Bidders' of the bidding documents.

7. #Bid Security (EMD) is equal to 1% of Estimated Amount put to bid / tender and should be rounded off to the next thousand rupees.

8. 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 tenders 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), Rs.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.0.50 crore for Electrical work following documents shall be submitted in electronic format only through online by scanning and the (i) Bid Document Fee /

TenderFee (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) BidDocumentFee/TenderFee
- (ii) BidSecurity/EMDorValid EMDEXemptionCertificateof AppropriateClass of Registration of Approved Contractors
- (iii) RegistrationCertificateofAppropriateClass
- (iv) **Registration Certificate of special category–Road/Buildingand Category I/II/III, if required**
- (v) GST Number
- (vi) Work Experience,if necessary...
- (vii) Other Documents,as required...

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) Subcontractor's 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:

- Achieved a minimum annual financial turnover (defined as billing for works in progress and completed in all classes of civil engineering construction works only) in any one year, over the last five years of the annual value of contract / contracts applied for.
- Experience in successfully completing or substantially completing at least one contract of Similar Civil work like Inlet/outlet/waste weir of at least 40 percent of the value of proposed contract within the last five years.

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

Substantially completed works mean 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 certificates should be signed by the officer not below the rank of EE)

- (a) Contractor should have completed 60% of quantity of principal items of work like concrete, earthwork, etc. within last five financial 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

(ii) **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:~~

~~Madem is leading 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.~~

- (iii) ~~#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 partners 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 of 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:

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

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

B = Value at current price level of the existing commitments and ongoing works to be completed during the next (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.

- (v) **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 submitted in proof of 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 sites shall be at the Bidder's own expense.

B. BIDDING DOCUMENTS

8. Content of Bidding Documents

- 8.1 These 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 bidders shall be required to submit any questions in writing or e-mail to each 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 meetings 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 to 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 forms 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 periods 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 Bidders 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 causes 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 Bidder, if the Bidder fails to do 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. DeadlineforSubmissionoftheBids

- 20.1. CompleteBidsmustbereceivedonlinebytheEmployeratthetenderwebsite 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 Clause10, in which case all right and obligation of the Employer and the bidders previously subject to the original deadline will thenbe subject to the new deadline.

21. Deleted

22. ModificationandWithdrawalofBids

- 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. Nobidshallbemodifiedorwithdrawn afterthedeadlineforsubmissionofBid.
- 22.4. Withdrawalormodificationofabidbetweenthedeadlineforsubmissionofbids andtheexpirationoftheoriginalperiodofbidvalidityspecifiedin Clause15.1 above or as extended pursuant to Clause 15.2 may result in the forfeiture of theBid 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 the representatives who choose to attend at the time, date and the places specified in Appendix in the manners 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. ProcesstobeConfidential

- 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 a 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. Variations 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 into 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 into 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. AwardCriteria

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 the evaluated 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 up to 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 from the stipulated date of completion of the project and the Additional Performance Security shall be valid beyond 28 (twenty-eight) days of Project Completion Date. Performance Security shall become refundable/releasable within 15 days after certified project completion date subject to Fulfillment of contractual obligation and settlement of all dues and claims.
- 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.

(vi) **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, Palanpur, B.K** [Cl.1.1]
2. The last five financial years.
 1. **2024-2025**
 2. **2023-2024**
 3. **2022-2023**
 4. **2021-2020**
 5. **2020-2021**
3. This Annual Financial Turnover Amount is Rs. --- **Not Applicable** --- [Cl.4.5.3(a)]
4. Value of Work is **Rs. 38,53,138.96/-**
5. Deleted
6. The cost of electric work is Rs. 0.00/-
7. The cost of water supply/sanitary work 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 **2024-25** [Cl.4.5.2]
10. The pre-bid meeting will take place at: **NA** [Cl.9.2.1]
11. The technical Bid will be opened at the office of the Superintending **Engineer, Gandhinagar Panchayat Irrigation Circle, Gandhinagar.** on dt.
12. Address of the Employer **Executive Engineer, Dist Panchayat Irrigation Division, B.K. Palanpur** Deleted
13. The bid should be submitted latest by As stated on online NIT [Cl.20.1 & 20.2]
14. The bid will be opened at As stated on online NIT at website <https://www.nprocure.com> [Cl.23.1]
15. The Bank Draft in favor of **“Executive Engineer, Panchayat Irrigation Division, Palanpur, B.K.”**
16. Deleted
17. Escalation factors (for the cost of work executed and financial figure to a common base value) for works completed [Cl.4.5.2]

<u>Year</u>	<u>Financial Year</u>	<u>Multiplying factor</u>
Base year of inviting tender	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 contractor 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 CI-

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.15,000-00 per month per Engineer** will be made from the bills/deposit/dues of the contractor. **Such recovery shall be non-refundable.**

SECTION-2
QUALIFICATION INFORMATION

(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 ~~2018-2019~~
Work performed in the last five years ~~2019-2020~~
(in Rs. Lakhs) ~~2020-2021~~
~~2021-2022~~
~~2022-2023~~

23.1.1 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 issuance of work order	Stipulated period of completion	Actual date of completion*	Remarks 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 recalled (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)	Rubble Pitching	Earth Works		
			ITEM1	ITEM2	ITEM3		
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 Contractor's 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		

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 whomay 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 Bidders 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~~

SAMPLEFORMATFOREVIDENCEOFACCESSTOOR AVAILABILITY OF CREDIT FACILITIES

(CLAUSE 4.5.6 OF ITB) BANK

CERTIFICATE

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

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

(Signature) Name of Bank

Senior Bank Manager

Address of the Bank

AFFIDAVIT

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

(Signed by an Authorized Officer of the Firm)

Title of Officer

Name of Firm

Date

UNDERTAKING

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

(Signed by an Authorized officer of the firm)

Title of officer

Name of firm

DATE

SECTION-3
CONDITIONS OF CONTRACT

ConditionsofContract

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CONDITIONS OF CONTRACT

A. GENERAL.

1. Definitions

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 Compensation 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**

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

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)

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) ContractData
- (5) ConditionsofContractincludingConditionsofContract
- (6) Specifications
- (7) Drawings
- (8) Billsofquantitiesand
- (9) Any other document listed in the Contract Data as forming part of the Contract.

3. LanguageandLaw

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

4. EngineersDecisions

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

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

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

The Contractormaysubcontract 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. Subcontractingshall not alter the Contractor's obligations. **Sub-contracting of supply or specific items of work is not allowed.**

The sub-contractor must be registered in appropriate class and category for the part of work to be subcontracted.

8. OtherContractors

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 theSchedule. The employer may modify the schedule of other contractors and shall notify the contractor of any such modifications.

9. Personnel

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.

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

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

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

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

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.

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.

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.

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

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

14. Site Investigation Report

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

The engineer will clarify queries on the Contract Data

16. Contractor to Construct the Works

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

17. The Work to be completed by the Intended Completion Date

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

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.

The Contractor shall be responsible for design of temporary works.

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

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

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

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

20. Discoveries

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

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.

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

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

The Contractor shall carry out all instructions of the Engineer pertaining to works which comply with the applicable laws where the site is located.

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

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 (Gandhinagar Circle)** 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 (Gandhinagar Circle)**.

- (a) For the work up to Rs.100 Cr., if any of the parties is not satisfied with the decision of the **#Superintending Engineer (Gandhinagar Circle)**, 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 (Gandhinagar Circle)**, 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 Disputes

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

26. Deleted

A. TIME CONTROL

1. Programme

- 1.1 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.
- 1.2 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.
- 1.3 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.
- 1.4 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.

2. Extension of the Intended Completion Date

- 2.1 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.
- 2.2 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.
- 2.3 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

3. Deleted

4. Delays Ordered by the Engineer

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

5. Management Meetings

- 5.1 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.
- 5.2 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.

6. Early Warning

- 6.1 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.
- 6.2 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.

B. QUALITYCONTROL

33. IdentifyingDefects/Defectliabilityperiod

: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. ForworksofWRDExceptBuilding

- (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. ForBuildingworksof WRD:-

ForBuildingworksof WRD,FollowtheR&BCirculardated.03/12/2009

For original building works the defect liabilityperiod 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.

WRDCircularNo.Matas/102013/MICELL(K-1)Dated13/12/2013

ForRoadworks:

FreemaintenanceguaranteeperiodforworksofRoad/Bridgeconstruction

- (a) For resurfacing work of road free maintenance guarantee period one year from the date of completion.
- (b) Incase 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 surfaceduring

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 conform 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.

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

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.

#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

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

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.

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

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.

C. COSTCONTROL

37. Billof Quantities

The billof Quantitiesshall contain itemsforthe constructions, installation, testing and commissioning work to be done by the Contractor.

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. ChangeintheQuantities

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

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

40. PaymentsforVariations

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.

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. CashFlowForecasts

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

42. Payment certificates.

The Contractor shall submit to the Engineer monthly statements of the estimated value of the work completed less the cumulative amount certified previously.

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).

The value of work executed shall be determined by the Engineer.

The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.

The value of work executed shall include the valuation of variations and compensation events.

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

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.

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.

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

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

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

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.

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.

All payments shall be made in Indian Rupees.

47. Price Adjustment

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 the work done during each month
R = Total value of work done during the month. It would include the amount of secured advance granted, if any, during the month less the amount of secured advance recovered, if any during the month. It will exclude value for works executed under variations for which price adjustment will be worked separately based on the terms mutually agreed.

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

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.

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.

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

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.

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.

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 work on from any other of his obligations and liabilities under the contract.

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

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.

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.

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

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

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.

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.

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 certified date of completion of the project 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 of the work. Performance and Additional Performance Security shall become refundable/releasable within 15 days after project certified completion date subject to fulfillment of contractual obligation and settlement of all dues and claims.

Deleted

53. Cost of Repairs.

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.

D.FINISHINGTHECONTRACT

54. Completion

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.

55. TakingOver

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

56. FinalAccount

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.

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.

57. OperatingandMaintenanceManuals

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.

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.

58. Termination

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

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.

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.

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

59. Payment upon Termination

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.

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.

60. Property

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.

61. Release from Performance

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.

E. SPECIALCONDITIONSOFCONTRACT

62. 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.

63. COMPLIANCEWITHLABOURREGULATIONS

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, notificationandbye laws oftheState orcentral Government orlocal 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 employeesoftheContractorandtheSub-Contractorinnocase shallbe treated as the employees of the Employer at any point to time.

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

- A) **Workmen Compensation Act 1923**:- The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- B) **Payment of Gratuity Act. 1972**:- Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years service or more on death, the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.
- C) **Employees P.F. and Miscellaneous Provision Act 1952**:- The Act Provides for monthly contributions by the employer plus workers @ 10% or 8.33% The benefits payable under the Act are :
1. Pension or family pension on retirement or death, as the case may be.
 2. Deposit linked insurance on the death in harness of the worker.
 3. Payment of P.F. accumulation on retirement/death etc.
- D) **Maternity Benefit Act 1951** :- The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- E) **Contract Labour (Regulation & Abolition) Act 1970**: The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by Law. The principal Employer is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer, if they employ 20 or more contract labour.
- F) **Minimum Wages Act 1948** :- The Employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act, if the employment is a scheduled employment. Construction of Building, Roads, 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 thereoffrom time to time shall be applicable.**
1. Water(Preservationandcontrol ofPollution)Act,1974
 2. Air(PreventionandControlofPollutionAct1981
 3. Environmental(Protection)Act1986

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

64. **ARBITRATION (GCCClause24)**

Theprocedureforarbitrationwillbeasfollows:-

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) (Gandhinagar Circle) 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 (..... Circle), 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

ClauseReferenceWith
respect To section 3

Itemmarked “N/A”donotapplytothisContract.

1. TheEmployersis [CL.1.1]

Name:Executive Engineer, PanchayatIrrigationDivision,Palanpur,B.K

Address:JillaPanchayat Bhavan,Palanpur,B.K

Name of authorized Representative(will be intimated later)

2. TheEngineerisExecutiveEngineer,PanchayatIrrigationDivision,
Palanpur, B.K

NameofAuthorizedRepresentative:Executive Engineer

[CL.1.1&33]

3. TheDefects LiabilityPeriod is 1(One)yearsfrom the date of
completion.

[CL.1.1]

4. The Start Date shall be 1stdays for the date of issue of the Notice to
proceed with the work.

5. The Intended Completion Date for the whole of the worksis
11(Eleven) Months after start of work with the following
milestones: Milestone dates:

[CL.1.1,17&2]

PhysicalworkstobecompletedPeriodfromthestartdate

[CL.2.2&49.1]

ProjectMile Stone	CumulativeTime Limit (InDay)	CumulativePercentageof ContractValue(Financial)
Milestone1	85 Days	10%
Milestone2	170 Days	35%
Milestone3	250 Days	70%
Milestone4	330 Days	100%

6. The Site is located at Satarwada Ta.-Dantiwada ,Dist.-Banaskantha.
The name and identification number of the Contract is:
The works consist of of **Renovation of Satarwada Storage Tank
Sr.No.327 at Satarwada, Ta. Dantiwada, Dist.B.K.**

[CL.1.1]

[CL.1.1]

[CL.1.1]

items as per B.O.Q. The works shall ,interalia, include the
following, as Specified or as directed:

(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 Bungalows, checkdams, bandhara, T.R., weir, barrages, Flood Protection & Anti Sea Erosion work, canal lining and structures, CD Works, structure repairing, Jungle 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, busbays, lay-bays; supplying and placing of drainage Channels, flumes, guard posts and guard other related items; construction/ extension of cross drainages works, bridge, approaches and other related stones; protective works for roads/ bridge; all aspects of quality assurance of various components of the works; rectification of The defects in the completed works during the Defects Liability Period; submission of "As-built" drawings and any other related documents; and other item of work as may be required to be carried out for completing the work in accordance with the drawings and the provisions of the contract and to ensure safety.

[CL.1.1]

[CL.2.3(9)]

(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.

10. The following documents also form part of the Contract:
 _____ As per clause 2-3 _____

- | | |
|---|----------|
| 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. TheSitePossessiondatesshallbe [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. Theperiodbetweenprogramupdateswillbedays. [CL.27.3]
21. The amount to be withheld for late submission of an updated programme shall be Rs lakhs
22. ThefollowingeventsshallalsobeCompensationEvents
Substantially adverse ground conditions encountered during the courseofexecutionofworknotprovidedforinthebiddingdocument.
 - (i) Removalofundergroundutilitiesdetectedsubsequently
 - (ii) Significant changes in classification of soil requiring additionalmobilizationbythecontractor,e.g.ordinarysoil to rock excavation,
 - (iii) Removalofunsuitablemateriallikemarsh,debrisdumps, etc. not caused by the contractor.
 - (iv) Artesianconditions
 - (v) Seepage,erosionlandslide
 - (vi) Rivertrainingrequiringprotectionofpermanent 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 militaryauthority

23. The currency of the Contract is Indian Rupees [CL. 46]

24. **The formula(e) for adjustment of prices are as under:** [CL.47]

- If any of the commodities like Cement, Steel or Bitumen are not found applicable in a work, the weight component of that commodities {i.e. 'Cement' (Pc), 'Steel' (Ps) or 'Bitumen' (Pb) as indicated in SBD for the purpose of Price Adjustment} shall be clubbed with the weight component of 'Other Material' (Pm), such that the gross % weight of the components shall remain as 100%.

R = value of work as defined in Clause 47.1 of Conditions of Contract

Adjustment for labour component

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

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

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

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

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

P_l = Percentage of labor component of the work.

Adjustment for cement component.

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

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

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

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

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

P_c = Percentage of cement component of the work

Adjustment for steel component

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

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

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

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

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

P_s = Percentage of steel component of the work

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

Adjustment 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

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.

Adjustment for Construction Machinery

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

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

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

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

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

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

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

Adjustment of other materials Component

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

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

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

M_0 = The All 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 & Industry.**

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

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

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

1. Labour	$-P_l$	23.00%
2. Cement	$-P_c$	24.00%
3. Steel	P_s	09.00%
4. Bitumen	$-P_b$	00.00%
5. POL	$-P_f$	10.00%
6. Plant & Machinery Spares	P_p	22.00%
7. Other Materials	$-P_m$	12.00%

Total 100 %

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

10. 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.
11. 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.

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

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

14. ~~Maximum limit of bonus for early completion of work~~ ~~5 percent of the Contract Price~~ {CL.50} Co

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

(vii) ~~#Nature of Advances~~ ~~Amount (Rs.) Condition 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-~~
~~perishable-~~
~~material~~ **Brou**
~~ghttosite~~

(The advance payment will be paid to the Contractor not later than 28 days after fulfillment of the above conditions).

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

The advance loans shall be repaid with percentage deduction from the interim payments ~~certified by the Engineer under the Contract. Deductions 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 loans shall be completely repaid prior to the expiry of the original time for completion pursuant to Clause 17 and 28.~~

17. Deleted

18. These securities shall be for the following minimum amount 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.

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

20. 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.

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

22. The following events shall also be fundamental breach of contract: {CL.59.2}

"The Contractor has contravened Sub-clause 7.1 and Clause 9 of GCC"

23. 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
PanchayatIrrigationDivision
Palanpur,B.K**

SECTION-5
TECHNICAL SPECIFICATION

1. GENERAL TECHNICAL SPECIFICATION

1.0 The present tender covers the work of **Renovation of Satarwada Storage Tank Sr.No.327 at Satarwada, Ta. Dantiwada, Dist.B.K.**

The work is located near village **Satarwada** of **Dantiwada** Taluka of B.K. District. Nearest Town is Palanpur located around 45 Km from site of work with Railway line, Hospital, Telephone, Internet connectivity etc. The work consists of concrete work, Jungle clearance and earth work etc. as per Drawing.

The main item consists in above work shall be as under,

- 1) **Jungle Clearance**
- 2) **Reinforcement work**
- 3) **Earthwork**
- 4) **Concrete work, etc.**
- 5) **Dry Rubble**

2.0 The work area is situated in relatively medium rainfall zone. The rainy season commences normally from the middle of June and lasts up to end of September. It has been observed that works are required to be totally closed in monsoon. If during the monsoon breaks, the works are in progress, it shall be the responsibility of the contractor to preserve and maintain the safe condition of all materials, machinery, tools and work sites from the floods due to seasonal or unseasoned rains, cyclone etc. The damages to the work, plant, Materials, Machinery etc. shall be done good by the contractor without any claims. No payment shall be made for any part of earth work or materials washed away or damaged during the 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, material to be utilized for the present work or completed part of present work damaged during the construction period.

3.0 The Contractor shall make his own survey, arrangement for construction materials such like Cement, Fine aggregate, Coarse aggregate, Water, Steel, Murrum etc. as per tender Specification. Sand is available in **River banas** with average lead of **40 Kms.** however, screening will be necessary to obtain required gradation for all work. Best- crushed aggregate will be available within average **lead of 40 Kms.** Cement / Steel will be available within **average lead of 40 Kms.** at nearby taluka / district place and this is tentative.

The above information is given for general guidance to the contractor and it does not in any way limit the performance of work under this tender. The contractor shall have to make his own arrangement of the quality and the quantity of the construction materials as

also requiring the accessibility to the structures, locations nature of work etc. Department does not bind itself to any conclusion or towards any conclusion that may be made by the contractor in this respect from this information and no claims on this account shall be entertained.

- 4.0 A motorable inspection road shall be maintained by contractor for inspection of the work during construction period. In working period, necessary temporary inspection facilities on site of work shall be also provide for the detailed inspection of the work. Proper diversion roads, for highway road traffic shall be maintained by the contractor with proper sign boards and red lights on entry and exist of the diversion etc. as directed by the Engineer - in - charge in during currency of the contract without any type extra payment.
- 5.0 The work in general shall be carried out in workmen like manner as well as to the correct section, better (side slope) and gradient as per drawing and to the entire satisfaction of the Engineer-in-charge or his authorized any representative. The various works shall be done true to line, level and grade. The periodical checking of these works by Government's staff shall not absolve the contractor of his responsibility regarding the accuracy. In case of any deviation or discrepancy in line, level or grade at the meeting faces, the contractor shall make good the discrepancy at his own cost and without any extra compensation for the additional work involved. Whenever such a discrepancy is found to arise at the junction of works of different contractors, the responsibility to set right such discrepancy lies with the contractors concerned. The Engineer- in -charge shall further have the unquestioned right, if need be, to rectify the discrepancies and recover the costs from the contractor or contractors according to proportion as he may consider reasonable.

All work shall be carried out as per specification given in P.W.D. volume I & II and / or as per relevant latest I.S.I. standard and technical specification of contract document. The list of I.S. code & other publications for earthwork, concrete work, steel work & other misc. work etc. are laid down in this Volume.

The site shall be cleared of all rubbish material and heaps etc. and shall be handed over in neat and good condition after completion of the work.

The proposed methodology and program of construction including Environmental Management plan, backed with equipment planning and deployment, duly supported with broad calculations and quality control procedures proposed to be adopted, justifying their capability of execution and completion of the work as per technical specifications within the stipulated period of completion as per milestones.

6.0 TESTING OF MATERIALS:

- 6.1 All materials before being incorporated in the work shall be inspected and if necessary, tested before being approved by the Engineer-in-charge. 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 may be considered as unauthorized, defective and not acceptable.
- 6.2 The day-to-day / periodical tests to be carried out on materials, mixes and placed concrete, concrete etc. shall be specified by the Engineer- in- charge or as per relevant IS from time to time for ensuring quality and workmanship. The contractor shall allow all facilities and co-operation towards collection of samples & testing procedure etc. The contractor shall supply necessary materials for testing at his own cost. Also, required labour for collecting samples of materials & transport facilities with loading, unloading to samples of materials from work site to field laboratory / Govt. laboratory / Govt. approved laboratory for tests, shall be supplied by contractor free of cost to department. Necessary arrangement for proper curing of cast specimen on work site & transport it from work site to laboratory shall be arranged by the contractor at his own cost.

The contractor shall supply necessary materials at testing laboratory for working out suitable Mix designs at his own cost. The methods of sampling and testing, the procedure and standards shall be as laid down by the Engineer-in-charge for the respective item as per relevant latest I.S.I. standard. ***All TYPES TESTING AS PER NWRWS&KDepartmentcircularMisc/1097/1397/(11)/k-1M.I.celltd.12/1/2013.***

- 6.3 The materials, mixes and placed concrete, concrete cores etc. shall be tested day to day or periodically at the Government Laboratory / set up at the site of work by Q. C. wing of department and the results given thereof shall be considered correct and authentic by the contractor. The contractor shall be given access to all operations / tests that may be carried out as aforesaid so that he may satisfy himself regarding the procedure and methods adopted. Maintaining quality of work shall be the fully responsibility of the contractor under supervision of Q.C. staff & execution staff of the work.

If, department has no adequate arrangement for setup laboratory at site of work, the contractor shall be established a laboratory with necessary required equipment with required facilities of light, water etc. at site of work at his own cost / expenses to carry out field test. The contractor shall be providing a set of sieve, weight batcher, stove, pan, cube moulds, cube testing machine, slump cone with compacting rod, flakiness & elongation gauge etc. at field lab., for field test.

- 6.4 Contractor shall provide all testing equipment's including compressive strength testing machine at site and 10% test shall be carried out in Govt. laboratory. All types TESTING as per **NWR&K Department circular Misc/1097/1397/(11)/k-1 M.I. cell dtd. 12/1/2013.** If any new GR (for testing) has been issued by the department during ongoing work, contractor shall also consider it and testing should be done accordingly.
- 6.5 The schedule showing number and type of lists to be carried out under this contract is attached with this tender. 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/Government Engineering/Diploma College. However minimum one test of all types shall have to be carried out in GERI laboratories only.
- 6.6 The contractor shall submit the monthly schedule in advance for the work to be taken up during that month and which shall be approved by the Engineer –in –charge. The work shall be carried out in accordance with approved work schedule.
- 6.7 If any defect or discrepancy is found in technical specification and IS Code, decision of the engineer in charge is bound to contractor.
- 6.8 Cement register in prescribed format showing day to day receipt, consumption and balance of cement on site of work will be maintained by the department, which shall invariably be signed daily by the contractor or his authorised representative in token of its correctness.
- 6.9 Accuracy of Lines, Level & Grades:

The various works shall be done true to line, level & grades. The periodical checking of this by the Government's staff shall not absolve the contractor of his responsibility regarding the accuracy. In case of any deviation or discrepancy, contractor shall rectify the same at his own cost & without any extra compensation for the additional work involved. Where ever such a discrepancy is found to arise at the junction or works of difference contractors the relative liability to set right their respective discrepancies shall be fixed by the Engineer-in-charge whose decision shall be final & finding on the contractor concerned. The Engineer shall further have the unquestioned right, the Engineer-in-charge may recover the cost from the contractor or contractor according to proportions as he may consider responsible, for rectifying the discrepancies.

**Executive Engineer
BK Panchayat Irrigation Division
Palanpur**

2. List of I.S.Code and other publication

1.0 Applicable Publications.

Generally, Bureau of Indian standard codes (latest version of I. S. code) shall be followed for all items of works, wherever such code does not exist, the reference shall be taken from other technical publications as directed by Engineer- In- Charge.

1.1 Indian Standards and Other Publications: (for Earthwork)

1	IS:1498-1970	Classification and identification of soils for general engineering purposes (first revision) (Amendment Nos. 1 and 2)
2	IS:2809-1972	Glossary of terms and symbols relating to soil engineering (first revision).
3	IS:3764-1966	Safety code for excavation work (Amendment No. 1)
4	IS:7293-1974	Safety code for working with construction machinery.
5	IS:4701-1982	Code of practice for earthwork on canals (first revision)
6	IS:1720-1978 (Part I to XX)	Methods for testing of soils
7	IS:2720-1995 (Part I to X & Part 14)	Methods of test for soils
8	IS:1888-1982	Methods of load test on soil (second revision)
9	IS:2131-1981	Method of standard penetration test for soils (first revision)
10	IS:5529-1985 (Part-I)	Test in overburden (first revision)
11	IS:7894-1975	Code of practice for stability analysis of earth dams (Amendment-No. 1)
12	IS:8237-1985	Code of practice for protection of slopes for reservoir embankments (first revision)
0-1	U.S.B.R. (United States Bureau of Reclamation)	Earth manual (Second edition 1974, reprinted 1985)
0-2	Central Water Commission	Safety manual

1.2 Indian Standards and Other Publications: (for Concrete work)

1	IS:8112	Specification for 43 grade ordinary Portland cement (First revision)
2	IS:12269	Specification for 53 grade ordinary Portland cement.
3	IS:455	Specification for Portland Slag Cement (Fourth Revision.)
4	IS:1489	Specification for Portland pozzolan cement (Third revision) (Part I & II)
5	IS:3535	Method of sampling hydraulic cement (First revision)

6	IS:4845	Definitions and terminology relating to hydraulic cement (Reaffirmed 1987)
7	IS:4031 (part 1-13)	Methods of physical tests for hydraulic cement (First revision)
8	IS:4032	Method of chemical analysis of hydraulic cement (First revision)
9	IS:8041	Specification for rapid hardening Portland cement (Second revision)
10	IS:8043	Specification for Hydrophobic Portland cement (Second revision)
11	IS:5512	Specification for flow table for use in test of hydraulic cement and pozzolanic materials (First revision)
12	IS:2580	Jute sacking bags for packing cement (Second revision) (With Amendment No. 1 to 3)
13	IS:650	Specification for standards and for testing of cement (First revision) (Amendment No. 1, 2 & 3)
14	IS:383	Specification for coarse & fine aggregate from natural sources for concrete (Second revision)
15	IS:460	Specification for test sieves (Part 1 to 3)
16	IS:2430	Methods for sampling of aggregates for concrete (First revision)
17	IS:2386 (Part I-VIII)	Method of test for aggregates for concrete.
18	IS:5640	Method of test for determining aggregated impact value of soft coarse aggregates.
19	IS:456	Code of practice for plain & reinforced concrete (Fourth revision)
20	IS:457	Code of practice for general construction of plain and reinforced concrete for dams & other massive structures.
21	IS:4926	Specification for ready mixed concrete (First revision)
22	IS:1199	Method of sampling and analysis of concrete.
23	IS:516	Method of test for strength of concrete (Amendment No. 1)
24	IS:3085	Method of test for permeability of cement, concrete and concrete.
25	IS:1791	Specification for batch type concrete mixers (Second revision)
26	IS:2722	Specification for portable swing weigh batchers for concrete (Single & double bucket type)
27	IS:4634	Methods for testing performance of batch type concrete mixers.
28	IS:5892	Specification for concrete transit mixer and agitators.
29	IS:7245	Specification for concrete pavers.
30	IS:4925	Specification for concrete batching & mixing plant.
31	IS:6461 (Part I to XII)	Glossary of terms relating to cement concrete vibrators.
32	IS:2505	General requirement for concrete vibrators (immersion type) (Second revision)
33	IS:2506	General requirements for screed board concrete vibrators.
34	IS:4656	Specification for form vibrators for concrete.
35	IS:6923	Method of test for performance of screed board concrete vibrators.
36	IS:5889	Specification for vibratory plate compactor.
37	IS:3558	Code of practice for use of immersion vibrators for consolidating concrete.

38	IS:4558	Code of practice for under drainage of lined canals (First revision)
39	IS:3873	Code of practice for laying in situ cement concrete lining of Canal (Second revision 1993)
40	IS:5256	Code of practice for sealing joints in concrete lining on canals.
41	IS:7861 (part I & II)	Code of practice for extreme weather concreting.
42	IS:5513	Specification for vicat apparatus (First revision) (Amendment No.1)
43	IS:5515	Compacting factor apparatus (First revision)
44	IS:5529 (part I & II)	Code of practice for in-situ permeability test.
45	IS:5816	Method of test for splitting tensile strength of concrete cylinders. (First revision)
46	IS:7320	Specification for concrete slump test apparatus (Amendment No.1)
47	IS:9284	Method of test for abrasion resistance of concrete.
48	IS:8142	Method of test for determining setting time of concrete by penetration resistance.
49	IS:9013	Method of making curing & determining compressive strength of accelerated cured concrete test specimen.
50	IS:9103	Specification for admixtures for concrete. (First revision)
51	IS:6925	Method of test for determination of water soluble chlorides in concrete admixtures.
52	IS:12200	Code of practice for provision of water stops at transverse and construction joints in masonry and concrete dams.
53	IS:8989	Safety code for erection of concrete frame structures.
54	IS:303	Specification for ply wood for general purposes (Second revision) (Amendment No.1 to 4)
55	IS:883	Code of practice for design of structural timber in building (third revision)
56	IS:4990	Specification for ply wood for concrete shuttering work (First revision (Amendment No.1)
57	SP:16 (S&T)	Design aids for reinforced concrete to IS:456.
58	SP:23	Handbook for Concrete Mix.
59	IS:3370	Code of practice for concrete structures for the storage of liquids (part I to IV)
60	IS:3025-1964	Sampling & testing (physical & chemical) for Water
61	IS:2770-1967	Method of testing bond in reinforced concrete
0-1	Indian Road Congress (IRC)	Standards specification and code of practice for Road Bridges. Section – I, Section – II, Section – III
0-2	The United States Bureau of Reclamation (USBR)	Concrete Manual (Eighth Edition) (Revised – 1981)
0-3	American society for Testing of Materials (ASTM)	All relevant codes.
0-4	ACI codes and Manual	All relevant codes.
0-5	CBIP	Manual on canal lining
0-6	MORT & H	Specifications for Road & Bridge works (fourth revision, August 2001, reprinted in January 2002)

1.3 Indian Standards and Other Publications: (for Reinforcement/Steelwork)

1	IS:226	Structural steel (standard quality) (fifth revision) (Amendment No.1 to 5)
2	IS:280	Mild steel wire for general engineering purposes (third revision)
3	IS:432	Mild steel and medium tensile bars and hard drawn steel wires for concrete reinforcement.
4	IS:432(Part-I)	Mild steel and medium tensile steel bars (third revision)
5	IS:432(Part-II)	Hard drawn steel wire (third revision)
6	IS:1566	Specification for hard drawn steel wire fabric for concrete reinforcement. (second revision) (Amendment No.1)
7	IS:1786	Specification for high yield strength deformed steel bars and wires for concrete reinforcement (third revision)
8	IS:1139	Hot rolled mild steel, medium tensile steel and high yield strength steel deformed bars for concrete reinforcement.
9	IS:1481	Metric steel scales for engineers (first revision) (with 2 Amendments)
10	IS:2502	Code of practice for bending and fixing of bars for concrete reinforcement.
11	IS:5525	Recommendations for detailing of reinforcement in reinforced concrete works.
12	IS:1521	Method for tensile testing of steel wire (first revision)
13	IS:1608	Method for tensile of steel products (first revision)
14	IS:9077	Code of practice for corrosion protection of steel reinforcement in RB and RCC construction.
15	IS:2062	Weldable Structural Steel (third revision)
16	IS:2751	Recommended practice for welding of mild steel plain and deformed bars for reinforced construction (first revision)
17	IS:9417	Recommendation for welding cold worked bar for reinforced concrete construction.
18	IS:814	Covered electrodes for metal arc welding of structural steels.
19	IS:814(Part-I)	For welding products other than sheets (fourth revision) (with Amendment No. 1 to 3)
20	IS:814(Part-II)	For welding sheets (fourth revision)
21	IS:1278	Filler rods & wires for gas welding (second revision) (with Amendment No.1)
22	IS:5242	Method of test for determining shear strength of metal (first revision).
23	IS:800	For Structural Steel
24	IS:961	For Structural Steel (high tensile)
25	IS:1977	For Structural Steel
26	IS:2062	For Structural Steel (for general purpose)
27	IS:816	For Welding work on Steel
28	IS:1477	For Paint on Steel

29	IS:1852-1967	ForStructural Steel component
30	IS:7215-1974	ForFabricationofStructuralSteel
31	IS:14589-1999	ForPaintonSteel
32	IS:932	Properties(highquality)ofStructuralSteel
33	IS:2074	ReadymixedPaint,Redoxide,zincchrome&priming
34	BS-EN-499	ForWeldingconsumablesmaterial
35	IS:2339-1963	AluminumPaintforGeneralpurposeindualcontainer
36	IS:822-1978	CodeofProcedureforInspectionofWelds

1.4 Indian Standards and Other Publications: (for other work)

1	IS:458	Specification for Concrete pipes (with and without reinforcement) (third revision)
2	IS:783	Code of practice for laying of concrete pipes (first revision)
3	IS:3597	Methods of test for concrete pipes (first revision)
4	IS:1239	Mild steel tubes, tubular and other wrought steel fittings; Part-I mild steel tubes (fourth revision)
5	IS:3114	Code of practice for laying of cast iron pipes (first revision)
6	IS:1592	Specification for asbestos cement pressure pipe (third revision)
7	IS:1630	Code of practice for laying of asbestos cement pressure pipes.
8	IS:8794	Cast iron detachable joints for use with Asbestos cement pressure pipe (first revision)
9	IS:6163	Centrifugally cast (spume) iron low-pressure pipes for water, gas and sewage (first revision)
10	IS:1838	Preformed filler for expansion rest in concrete pavement and structures (on extruding and resilient type)
11	IS:5382	Rubber sealing rings for gas mains, water mains and sewers (first revision)
12	IS:1542-1977	Specification for sand for plaster (first revision)
13	IS:2116-1980	Specification for sand for masonry concrete (first revision)
14	IS:2250-981	Code of practice for preparation and use of masonry concrete (first revision)
15	IS:1597-1967	Code of practice for construction of stone masonry
16	IS:1597-1967 (Part-I)	Rubble stone masonry
17	IS:4101-1967 (Part-I)	Stone facing
18	IS:7779-1975 (Part-I/Sec.2)	Gujarat state, section 2 Engineering properties of building stones
19	IS:8381-1977	Recommended practice for quarrying stones for construction purposes

20	IS:1127-1970	Recommendationfordimensionsandworkmanshipofnatural buildingstonesformasonrywork(firstrevision)
21	IS:1129-1972	Recommendationofdressingsofnaturalbuildingstone(first revision)
22	IS:1123-1975	Methodsofidentificationofnaturalbuildingstone(firstrevision)
23	IS:4121-1967	Methodsoftestfordeterminationofwatertransmissionrateby capillaryactionthroughnaturalbuildingstones
24	IS:4122-1967	Methodsoftestforsurfacesofteningofnaturalbuildingstones byexposuretoacidic atmosphere
25	IS:5218-1969	Methodoftestfortoughnessofnaturalbuildingstones
26	IS:1706-1972	Methodsoftestfordeterminationofresistancetowearby abrasionofnaturalbuildingstones(firstrevision)Methods
27	IS:4348-1973	Methodsoftestfordeterminationofpermeabilityofnatural buildingstones(firstrevision)
28	IS:1121-1974(Part 1to4)	Methodsoftestfordeterminationofstrengthpropertiesof naturalbuildingstones(firstrevision)
29	IS:1122-1974	Methodsoftestfordeterminationoftruespecificgravityof naturalbuildingstone(firstrevision)
30	IS:1124-1974	Methodsoftestfordeterminationofwaterabsorption,apparent specificgravityandporosityofnaturalbuildingstones(first revision)
31	IS:1125-1974	Methodsoftestfordeterminationofweatheringofnatural buildingstones(firstrevision)
32	IS:1126-1974	Methodsoftestfordeterminationofdurabilityofaturalbuilding stones(firstrevision)(Amendment No.1)buildingstones(first revision) (Amendment No.1)

**ExecutiveEngineer
BK PanchayatIrrigationDivision
Palanpur**

3. TECHNICAL SPECIFICATION FOR MATERIALS

M-1CEMENT:-

- 1.1 Only Ordinary Portland Cement of grade **53 (only major plant)** shall be used conforming to I.S. 8112 - 1989 and I.S. 12269 - 1987 respectively (or it's latest version) for the entire work under the tender in all respects and shall be procured in bag. the contractor shall have to make his own arrangement to procure the cement (bearing I.S.I.mark & which Cementbrand / Company should be approved by department) directly from the manufacturer / authorized Dealer of Cement Company.

The contractor shall arrange a suitable & adequate infrastructure for procuring, conveying with loading & unloading and proper storing the same to the site of work at his own cost with sufficient quantity for advance planning of work to be done in next fifteen days as approved by the Engineer-in-charge of the work, so that Dept. shall be conduct minimum required test to ascertain its quality. For verification of such purchase, the contractor shall have to produce all the bills of manufacturer / authorized dealer's along with testing details (i.e. manufacturer's test result conducted in the it's Q.C. laboratory for each batch of cement which is brought to the work site) to the Engineer-in-charge of the work, so that works can be allowed if manufacturer's lab. result is found OK till the receiving of test results from approved laboratory of Department.

- 1.2 All cement shall be stored in dry, water tight stored shade, facilities to protect cement from dampness & properly ventilated structure. In case of storage of cement bag, the floor on which cement is to be stored shall be raised at least 30cm. above ground level & the bags shall not be piled more than 10 bags height and shall be arranged in headers & stretches fashion as close as possible. The Contractor shall be responsible for proper storage of cement and if any damage or deterioration there in, shall be responsible for the change or removed at his own cost.

Cement should be used in the work, in order of receipt to the store/site, for this purpose, such consignment it arrives should be stacked separately and play card barring the date of arrival should be pinned to the pile. The arrangement of storage and utilization shall be such that to ensure the utilization of the cement in order of its arrival at the storage and the contractor shall maintain updated record which would at any time show the date of receipt and proposed utilization of cement laying in the store at the site.

The contractor shall provide a double locking arrangement for the store and the key of one lock will remain with the Engineer-in-charge of the work or his authorized. The Engineer-in-charge shall any time have an easy access to the store and the site of the work for checking. The Engineer-in-charge or his authorized shall have authority to check and examine the method of storage, records, accounting and security provided by the contractor. The Contractor shall produce the proof by way of record, books, return, Performa etc. maintain by his staff on site, on demand from Engineer-in-charge of the work or his authorized and the contractor shall at all time keep this records update to enable to Engineer-in-charge of the work or his authorized to apply the check may desire to impose.

- 1.4 The cement brought by the contractor at the site, department shall be sampled as per I.S. 3535 (or latest version of I.S.) & sent it in approved lab. of Dept. for testing as per I.S. 4031, 4032 (or latest version of I.S.). The contractor shall made arrangement for sampling work & it's submitted to the Government Laboratory or Govt. approved laboratory at his own cost.

TESTING AS PER NWR&K Department circular Misc/1097/1397/(11)/k-1 M.I.cell dtd. 12/1/2013. The testing shall be done for each consignment received at the site. The cement consignment shall be more than 50 tons or part thereof; each consignment shall be stacked separately.

- 1.5 The cement not satisfying the criteria as per I.S. 12269 for grade 53 shall be rejected and such stack of cement shall be removed immediately from the site of work. No extra cost either for testing or for rejected cement shall not paid to the contractor. No cement shall be used for the work without being tested and such work shall not be paid by the Engineer-in-charge and shall be removed at contractor's own cost. The results of the cement should be submitted by the contractor as and when required by the Engineer-in-charge or his authorized.
- 1.6 The samples of cement older than 90 days shall be tested by the Quality Control Unit of GERI at Gandhinagar or Baroda at the contractor's cost. If the test results are in accordance with I. S. specification then and only then the Engineer-in-charge will permit to use of such cement, & such cement shall be used within a prescribed period. The cement older than 180 days shall not be permitted to be used for the work.
- 1.7 A regular day to day account of cement received and consumed / used in the work, together with the particulars tender item & quantity of each of the work shall be maintained in ink by the responsible representative of the department and shall be signed both i.e. by the departmental representative as well as the contractor, after proper verification at the end of the day's work. The accounting shall be shown to the inspecting officer when asked for. The Engineer-in-charge of the work or his authorized shall have the authority to verify the stock and check on the consumption in any manner he thinks proper. The volume of one bag cement weight 50kg. shall be considered as 0.0342 cum. for mixing in concrete / concrete.

- 1.7 **Frequency for Cement testing** (physical/chemical properties) is as under, as per IS: 3535- 1986.

Weight of lot/ batch (in tonne)	No. of Sample to be taken	Remarks
Upto 50	1	(1) For sample (15Kg. of cement) taken from 2% bag out of total bag of consignment. (2) The frequency for chemical testing for cement to be decided by the Engineer-in-charge of the work as per requirement, or shall be twice in a each working Season, per brand, per grade of cement.
51 to 100	2	
101 to 200	3	
201 to 300	4	
301 to 500	5	
501 to 1000	6	
1000 to 1300	7	

1.8 The following Test with required results are required for Physical/Chemical properties of Cement.

Requirements of Test		Requirements for Test Results
		53 Grade Cement (IS 12269)
Specific Surface area (in m^2/Kg)	Fineness	Min. 225
Standard Consistency (in %)		Above 30
Setting Time (in minutes)	Initial	Not less than 30
	Final	Not more than 600
Soundness	(a) By Le-Chatelier (in mm)	Not more than 10
	b) By autoclave (in %)	Not more than 0.8%
Compressive strength (in N/mm^2)	03 days	Not less than 27
	07 days	Not less than 37
	28 days	Not less than 53
(i) Ratio of % of	$\{\text{Cao} - (0.7\text{SO}_3 / 2.8\text{SiO}_2) + 1.2\text{Al}_2\text{O}_3 + 0.65\text{Fe}_2\text{O}_3\}$	Not Greater than 1.02 & Not less than 0.66
(ii) Ratio of % of Alumina (C_3A) to that of Iron Oxide		Not less than 0.66
(ii) Insoluble residue (% by mass)		Not more than 2
(iv) Magnesia (% by mass)		Not more than 6
(v) Total sulphur content... calculated as sulphuric anhydride (SO_3) (% by mass)		Not more than 2.50 & 3.0 when tricalcium aluminates % by mass is 5 or less & greater than 7 respectively
(vi) Total loss on ignition (% by mass)		Not more than 5

: - Cement shall be rejected if it does not comply with any of the requirements of the above specification.

M-2 Admixture:

- Accelerating, retarding, water-reducing and air entraining admixtures shall conform to IS 9103 and integral water proofing admixtures to IS 2645.
- Admixture may be used in concrete as per manufacturer's instructions only with the approval of Engineer based upon evidence that with the passage of time neither the compressive strength nor its durability is reduced. An admixture's suitability and effectiveness shall be verified by trial mixes with the other material 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.

M-3 FINE AGGREGATE:(Sand):-

- All the fine aggregates shall conform to IS: 383-1970 or its latest version and as directed by the Engineer-in-Charge. Sand to be used shall be natural as obtained from the river bed and the maximum size shall be limited to 4.75mm. The Sand shall be obtained from Sabarmati river bed or from any other suitable sources as approved by Engineer -in - charge.

- 3.1 The sand shall consist of hard, dense, durable, uncoated siliceous gritty materials. It shall be free from injurious materials of dust, lumps, soft and flaky particles, shale, alkali-organic matter, loam, mica, earth, clay and other deleterious substances. The maximum size of sand particle shall be limited to 4.75mm. The F.M of the sand to be used in concrete / masonry shall be ranging between **2.00 to 3.50**. The maximum percentage of each of the deleterious substances in sand as delivered to the mixer for use in concrete, concrete etc. shall not exceed the following values.

- (a) Limit of deleterious materials.

Limit of Deleterious materials for Uncrushed Fine Aggregate (As per IS 383):

Sr. No.	Deleterious Substance	Fine Aggregate percentage by Weight, Max.
1	Coal and Lignite	1.0
2	Clay lumps	1.0
3	Materials finer than 75 micron IS Sieve	3.0
4	Soft Fragment	-
5	Shale	1.0
6	Total percentage of all deleterious materials	5.0

- (b) Sand shall be free from injurious amount of organic impurities. Sand that are producing a colour (obtained by dissolving 9 grams of chemically pure (c.p.) ferric chloride and 1 gram of c.p. cobalt chloride in 100 ml of water to which one-third ml of hydro-chloric acid has been added) darker than the standard in the test (organic test) for organic impurities shall be rejected.

3.2 Fine aggregates shall be tested for their gradation, fineness modulus, specific gravity, water absorption, soundness, deleterious constituents, petrographic analysis and alkali aggregate reactivity.

The following testing frequencies shall be maintained for the same source of fine aggregates.

Sr.No.	Name of test	Minimum number of tests specified
1	Gradation for Fineness Modulus (F.M.)	1/150m ³ for concrete or as per specification or Daily one Test If the variation of daily F.M. value is more than 0.1, then frequencies may be increased.
2	Silt Content	Daily one test
3	Moisture Content	Daily one test
4	Sp. gravity, water absorption, Soundness, Alkali-Aggregate Reactivity, Petrographic examination.	Twice in a concreting working season.

3.3 Due allowance shall be made if; the sand is wet at the time of mixing, the exact extent of such allowance or bulkage shall be depend upon the quantity of moisture in sand and it shall be decided by the Engineer-in-Charge.

3.4 Gradation:-

(a) Sand shall be well graded so as to impart good workability and good finishing. Sieve analysis of natural sand shall confirm to the following limits of gradation.

IS Sieve Designation	Percentage passing for			
	Grading Zone-I	Grading Zone-II	Grading Zone-III	Grading Zone-IV
10mm	100	100	100	100
4.75mm	90-100	90-100	90-100	95-100
2.36mm	60-95	75-100	85-100	95-100
1.18mm	30-70	55-90	75-100	90-100
600micron	15-34	35-59	60-79	80-100
300micron	5-20	8-30	12-40	15-50
150micron	0-10	0-10	0-10	0-15

(b) Deviations from the prescribed limits of cumulative percentage retained on 10mm, 4.75

mm, 2.36 mm, 1.18 mm, 600 micron, 300micron and 150 micron IS sieves shall be permitted provided total of such deviations do not exceed 5%.

(c) No deviation from the prescribed limit shall be permitted for cumulative percentage passing through 600 micron IS Sieve.

FinenessModules:-

(a) The sand shall have a fineness modules ranging between **2.00 to 3.50** subject to the gradation specified in the preceding paragraph.

(b) The modules shall be computed by adding cumulative percentage of the sand retained on the standard screen from 4.75 mm, 2.36mm, 1.18 mm, 600micron, 300 micron, 150 micron IS sieves (as M.T. standard screen from 3/16" and no. 480, 120, 60, 30, 15 sieve) and dividing the sum by 100. Gradation of sand shall be so controlled that the FM of at least 9 out of 10 consecutive test samples of finished and shall not vary more than 0.10 from the average 10 tests samples.

(c) Any deviation from the specified range of gradation and fineness modules shall not be permitted to be used in work, without the written permission of the Engineer-in-charge. Any deviation from the specified range of the fineness modules will not be tested for clay, organic impurities and other deleterious substances as laid down in I.S. 383.

(d) Details regarding Fineness Modulus for sand available at different locations in river bed can be seen in the office of the **Executive Engineer , District Panchayat Irrigation Division, B.K. Palanpur**. It may be pointed out in particular that the large quantity of sand is available in river Sabarmati. The Contractor shall procure approved quality of sand from any other source if required at their own cost. The contractor shall procure approved quality of aggregates from any other sources for which no extra claim shall be entertained.

3.5 Frequency of test shall be as per table of para 3.2 / at change of source of fine aggregate / one test for each **150** cumt. of sand or part there of.

3.6 Storage:-All sand shall be stored on the site of work in such a manner as to prevent intrusion of foreign matter.

M-4COARSEAGGREGATE/GRIT/KAPACHI/CRUSHEDMETAL

- Crushed Coarse aggregates are available in sample quantities from the quarries near **Panthawada in B.K. District**. These are indicative only. The contractor shall procure approved quality of aggregates from any other sources for which no extra claim shall be entertained.
- 5.1 Coarse aggregate shall be of machine crushed stone locally available shall be hard, strong, dense, durable, clean, and free from thin elongated soft flake pieces, vegetable matter, organic or other deleterious matter i.e. such as to reduce the strength & durability of the concrete or harmful to steel reinforcement. Predominantly flaky aggregates shall not be used. It shall have no adherent

coating of clay, silt, mud or any other adherent-coating likely to prevent proper adhesion of concrete. Aggregates shall have no deleterious reaction with cement. It shall be capable of developing good bond with cement paste and weather resisting and unaffected by water. Coarse aggregate shall be well graded and gradation shall give a dense concrete of the specified strength and consistency that will work readily into position without segregation and without the use of excessive water content.

- 5.2 Contractor shall remove all vegetation's and other perishable substances and objectionable amounts of other foreign matter. All Coarse aggregates shall be washed and/or screened by the Contractor, if required, at the source approved by the Engineer- in -charge. In case the coarse aggregate brought to the site of work is not washed and screened at the source the contractor shall make necessary arrangements for washing and screening at the work site / B&M plant. The cost of washing & screening shall be borne by the Contractor.
- 5.3 The size of the coarse aggregate for plain cement and ordinary reinforced cement concrete shall generally be as per the table given below and shall have a maximum size of 40mm. Following shall be maximum size of coarse aggregate for the different items of work. However, depending on the technical requirement various size of aggregate may be required to be used in various components of

Sr. No.	Item of work	Maximum nominal Size of Coarse Aggregate (MSA)
1	CC 1:2:4	20 mm

For heavily reinforced concrete members, as in the case of ribs of main beams, maximum size of aggregate shall usually be restricted to 5mm less than the minimum lateral clear distance between the main bars or 5mm less than the minimum cover to the reinforcement, whichever is smaller. However, if required under special circumstances, the Engineer- in - charge may permit an aggregate of maximum size 25% more than this critical spacing / cover provided that proper vibration is ensured.

- 5.4 Coarse aggregates will be tested for their gradation, specific gravity, water absorption, impact and abrasion values, soundness, flakiness and elongation indices, deleterious constituents, petrographic analysis and alkali aggregate reactivity. The necessary test indicated in I.S.383-1970 and 456-1970 shall have to be carried out to ensure the acceptability of aggregate. The following testing frequencies shall be maintained for the same source of coarse aggregate. The below test shall be carried out at the starting of the work, and at the change of source of materials or / and directed by the Engineer- in -charge as required.

Sr.No.	Particulars of Test	Frequency of test for coarse aggregate as per IS:2386-1963(Part-1 to 8), IS:383-1970
1	Gradation	1/150m ³ for concrete or as per specification or Daily one Test
2	Sp.Gravity & Water Absorption	1/season
3	Flakiness & Elongation Indices	1/season
4	Impact value	1/season
5	Abrasion value	1/season

6	Soundness	1/season
7	Alkali Aggregate Reactivity	1/season
8	Petrographic examination	1/season

5.5 Coarse aggregates shall be either in single size or graded, in both cases the gradings shall be within the following limits (IS 383):

IS Sieve Size (mm)	Percentage passing for single sized aggregates of Normal size.						Percentage passing for graded aggregates of Normal size.			
	63 mm	40 mm	20 mm	16 mm	12.5 mm	10 mm	40 mm	20 mm	16 mm	12.5 mm
80	100	-	-	-	-	-	100	-	-	-
63	85-100	100	-	-	-	-	-	-	-	-
40	0-30	85-100	100	-	-	-	95-100	100	-	-
20	0-5	0-20	85-100	100	-	-	30-70	95-100	100	100
16	-	-	-	85-100	100	-	-	-	90-100	-
12.5	-	-	-	-	85-100	100	-	-	-	90-100
10	-	0-5	0-20	0-30	0-45	85-100	10-35	25-55	30-70	40-85
4.75	-	-	0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
2.36	-	-	-	-	-	0-5	-	-	-	-

Note:- (a) In concrete for canallining the percentage at 4.75 to 10 mm fractions shall be reduced to about 5 to 10 percent of the total coarse aggregate.

(b) However above % may be varied by the exact gradation required to obtaining a dense concrete of specified strength and desired workability shall be decided by the Engineer-in-Charge.

(c) The grading between the limits specified above shall be such as shall produce a dense concrete of the specified proportion and consistency that will work readily into without segregation and without the use of excessive water content. The material passing through the screen shall be in gradation ranging from 40mm to 4.75 mm.

(d) Coarse aggregate of a maximum size of 20mm shall be used where the minimum clear distance between reinforcing bars is 25mm.

5.6 The percentage of deleterious substance in coarse aggregates shall not exceed the following values.

Material passing 150 micron IS Sieve screen	1 Percent by weight
Shale	1 Percent by weight
Coal and lignite	1 Percent by weight
Soft fragments	3 Percent by weight

Other deleterious substances	1 Percent by weight
Clay lumps	1 Percent by weight

The sum of the percentage of all the deleterious substances shall however, not exceed 5 percent by weight.

5.7 The coarse aggregates shall satisfy abrasion, soundness, crushing and alkali aggregate reactivity tests and water absorption results as laid down in IS: 383-1970 and other relevant Indian Standard Specifications.

Sr.No.	Name of Test	Criteria as per IS 383, 2386	
		For other than Wearing surface	For Wearing surface
1	Impact value (max.)	45%	30%
2	Abrasion value (max.)	45%	30%
3	Soundness (after 5 Cycle)		
	(a) with Sodium Sulphate (max.)	12%	12%
	(b) With Magnesium Sulphate (max)	18%	18%
4	Flakiness Index (max.)	25%	15%
5	Elongation Index (max.)	15%	15%
6	Specific Gravity (max.)	3%	3%
7	Water Absorption in 24 hrs. (max.)	1%	1%

5.8 Frequency of test shall be as per table of para 4.4 / at change of source of coarse aggregate / one test for each 150 cum. of Concrete work or part thereof.

5.9 Storage (Stockpiles):-

- Aggregate shall be stacked in such a way as to prevent the admixture of foreign materials such as soil, vegetable matter etc. The aggregates shall be kept free of dirt, rubbish papers, vegetable matter, bidi, etc. on the stock piles by the collection of people.
- Heaps of fine and - procured separately they shall be stored in separate stockpiles, sufficiently away from each other to prevent the materials at the edge of the piles from getting intermixed. Each grade of materials shall be stacked 40mm to 20mm, 20mm to 10mm, & 10mm to 4.75mm.
- The aggregates shall be stockpiled adjacent to the mixer site so as to require minimum re-handling and labour when conveyed to the mixer.
- The aggregates shall be placed on a dry hard patch of ground if available otherwise a platform of planks or plain galvanized iron sheets or alternatively on a floor of dry bricks or a thin layer of lean concrete.
- To minimize moisture variations, the stockpile shall be spread over as large in area as possible but kept low and fairly uniform in height preferably 1.25 to 1.50 metre and the lowest layer of about 30 cm height shall be allowed to act as drainage layer and not used till the end.

5.10 **Grit**:- It shall consist of crushed or broken stone and shall be hard, strong dense,

durable, clean, proper gradation and free from skin or coating likely to prevent adhesion of concrete. The grit shall have no deleterious reaction with cement. Grit shall generally be cubical in shape and as far as possible flaky elongated pieces shall be avoided. It shall generally comply with the provision of I.S. 383. Grit shall be obtained from the best black trap or equivalent hard stone approved by Engineer-in-charge.

M-5 Gravel:-

- The Gravel for filter shall consist clean, hard, dense, durable natural gravel of approved quality. Predominately flaky aggregate shall not be used. The percentage of deleterious substances in any size of gravel shall not exceed the following values by weight.

Material, passing I.S. Sieve No. 8	3%
Clay Lumps	1%
Soft fragments	2%
Shale	1%
Other deleterious substances	1%

- The sum of percentages of all the deleterious substances shall however not exceed 5% by weight. The Gravel shall satisfy the abrasion, soundness and water absorption test and any other general requirement as laid down in IS 383.
- Gravel shall be stored at site in such a manner so as to prevent intrusion of foreign matter.

M-6 WATER:-

- Water used for mixing of concrete and concrete shall be clean and free from injurious amounts of deleterious materials, objectional quantity of silt and tracks of oil and injurious alkalis, salts, organic metals and other deleterious metals, which will either weaken the concrete or cause effloresces or attached the steel in R.C.C. It shall be free from elements which significantly effect hydration, reaction or other unsightly deposits on concrete or concrete surface. Water shall not be salty. Water should not be too acidic or too alkaline (if tested by litmus paper, repaid change of the litmus papers indicates dangerous amount of acid or alkali present).

6.1 The sample of water taken for testing shall represent the water proposed to be used for concreting, due account being paid to seasonal variation. The sample shall not receive any treatment before testing other than that envisaged in the regular supply of water proposed for use in concrete. The sample shall be stored in a clean container previously rinsed out with similar water. Frequency of test shall be one test per working season / at change of source of water / as directed by Engineer-in-charge as required.

Container for transport and storage of the water shall be reasonable clean.

In case of doubt regarding development of strength of concrete / concrete, the suitability of water for making concrete shall be ascertained by the compressive strength of concrete and initial setting time of cement, which is compared by making concrete with distilled water.

6.2 Potable water is generally considered satisfactory for mixing and curing. The PH value of water should be between 6.0 to 8.0. The turbidity in the water shall not exceed 2000 ppm and shall be preferably as low as possible. The water shall be odourless & colourless. Hard and bitter water shall not be used for curing of work.

6.3 Where water is found to contain any sugar or an excess of acid, alkali or salt, the Engineer-in-charge will refuse to permit its use.

As a guidance, the following table represents the maximum permissible values.

	Permissible limit (maximum) (mg/l=ppm)
Organic	200mg/l
Inorganic	3000mg/l
Sulphate (as SO ₃)	400mg/l
Chlorides (as CL)	2000 mg/l for concrete not containing embedded steel (P.C.C.) & 500 mg/l for reinforced concrete work. (R.C.C.)
Suspended matter	2000mg/l
Fluoride	1mg/l

M-7 RUBBLE/STONE:-

1. The stone shall be Granite, Quartzite, Black trap or locally available stone of approved quality type as approved by Engineer-in-charge.
2. The stone shall be obtained only from the approved quarry by the Engineer-in-Charge.
3. Stone shall be hard, dense, sound, resistant to abrasion, durable and of uniform texture & free from defects like cavities, cracks, sand holes, flaws, injurious veins, patches of loose or soft materials etc. and weathered portions and other structural defects or imperfections tending to affect their soundness and strength. The stones with round surface shall not be used.
4. Flaky and elongated stone shall not be used.
5. Two sets of test of representative rubble stone shall be carried by contractor at approved laboratory to confirm specifications laid in every season. The test shall be carried out to ascertain following test:
 - a. Specific Gravity: As per IS 1124 using specific gravity bottle (50ml), value generally shall not be less than 2.5
 - b. Water Absorption Test: As per IS 1124, stone shall not absorb water more than 5 (Five) percent of its weight after 24 hours immersion in water.

M-8SELECTEDEARTH:

- a. Theselectedearthshallbethatobtainedexcavatedmaterialorshallhavetobroughtfromoutside as indicated in the item. If item does not indicate anything, the selected earth shall have to be brought from outside.
- b. Innocaseblackcottonsoilorsimilarexpansiveandshrinkablesoilshallbeused.Itshallbeclean andfreefromallrubbishandperishablematerials,stonesorbrickbats.Theclodsshallbeproken to a size of 50 mm or less. The stacking of material shall be done as directed by the Engineer in charge in such a way as not to interface with any constructional activities and in proper stacks.
- c. When excavated material is tobe used, only selected stuff got approved from the Engineerin charge shall be used. It shall be stacked separately and shall comply with all requirements of selected earthmentioned above.

**ExecutiveEngineer
BKPanchayatIrrigationDivision
Palanpur**

TECHNICAL SPECIFICATION

CONTENT

SECTION	PARTICULARS
1	PLAINANDREINFORCEDCONCRETE
2	GENERALTECHNICALSPECIFICATIONFOR EARTHWORK&ENVELOPES

1. PLAIN AND REINFORCED CONCRETE

1.1 Scope of work:

- This section covers specifications for Item No:-3.
- This specification covers the requirement of plain and reinforced concrete for use in structures, such as RCC work of Toe wall. The work covered under this section consists of furnishing all materials including formwork, equipment's, labour for the manufacture, transport, placing, vibrating, finishing and curing of the concrete for the structures and performing all the operations necessary and ancillary there to, including dewatering and desilting as required.

1.2 Description of items:

- Providing and laying in position concrete 1:2:4 with MSA 20.

1.3 Applicable Publications:

- All items of concrete works, concrete, its constituents, methods & procedures of manufacture shall conform to the latest Indian Standard Specifications & other technical publications listed below unless otherwise specified.

1.3.1 Indian Standards

1	IS:303	Specification for plywood for general purposes (Second revision) (Amendment No.1 to 4)
2	IS:432	Specification for mild steel and medium (Part-1-1982) tensile steel bars and hard drawn steel wire for concrete reinforcement (3rd revision)
3	IS-516	Method of test for strength of concrete (Amendment No.1)
4	IS:883	Code of practice for design of structural timber in building (third revision)
5.	IS:2505	General requirements for concrete vibrators: immersion type.
6	IS:2506	General requirements for screed board concrete vibrators.
7	IS:3370	Code of practice for concrete structures for the storage of liquids (part I to IV)
8	IS:3535	Method of sampling hydraulic cement (First revision)
9	IS:3558	Code of practice for use of immersion vibrators for consolidating concrete.
10	IS:4656	Specification for form vibrators for concrete.
11	IS:4925	Specification for concrete batching & mixing plant.
12	IS:4990	Specification for plywood for concrete shuttering work

		(First revision (Amendment No.1))
13	IS:5242	Method of test for determining shear strength of metal (1st revision).
14	IS:8112	Specification for 43 grade ordinary Portland cement
15	IS:8989	Safety code for erection of concrete frame structures.
16	IS:9077	Code of practice for corrosion protection of steel reinforcement in R/B and RCC construction.
17	IS:12269	Specification for 53 grade ordinary Portland cement.
18	SP:16 (S & T)	Design aids for reinforced concrete to IS:456.

- Only latest version of I.S. shall be followed. In addition to above relevant Indian standards referred to section 3 shall also apply.

1.3.2 Other Technical Publications.

1	Indian Road Congress (IRC)	Standards specification and code of practice for Road Bridges. Section-I Section-II Section-III
2	The United States Bureau of Reclamation (USBR)	Concrete Manual (Eighth Edition) (Revised-1981)
3	American society for Testing Materials (ASTM)	All relevant codes.

- Note: Generally the Bureau of Indian Standards code will be followed for all items of works wherever this code does not exist the reference will be taken to other technical publications.

1.4 Composition

- Concrete shall be composed of cement, fine aggregates (natural sand or manufactured sand or both), coarse aggregates (manufactured), admixtures and water, well mixed in proportion and brought to the proper consistency. The design mix proportions shall be adjusted to produce a durable and workable and cohesive concrete, suitable for specified conditions of placement & design strength.
- For all items of concrete in any portion of the structure or its associated works, concrete manufactured by batching and mixing plant which shall be termed by controlled concrete shall be used where specified.

1.5 Materials:-

1.5.1 CEMENT

- Cement shall be procured in bags by the contractor from market at his own risk and cost. It shall confirm the qualitative provisions made in I.S 269-1989 and the specification shall be as specified in General technical specification at **Para M-1** for cement shall be apply.

1.5.2 SAND

- The sand to be used in concrete shall be of well graded, hard, durable and as inert materials. It shall conform to specification specified in the **Para M-3** of General Technical specification. The specification specified in I.S 383-1999 shall also apply to sand.

1.5.3. WATER

- The mixing water shall be potable confirming to specification prescribed in **Para M-6** of General Technical Specification.

1.5.4. COARSE AGGREGATE

- The coarse aggregate shall conform to the specification specified in **Para M-4** of General Technical Specification. Specification specified I.S. 383-1999 shall also apply to coarse aggregate.
- 1.5.5. The coarse crushed metal, aggregate for concrete shall consist of clean, hard dense, durable, crushed metal predominately. Flaky crushed aggregate shall not be used. The percentage of deleterious substance in any size of coarse aggregate as delivered to the mixers shall not exceed the following

value. It shall be as per I.S 383-1999.	
<u>MATERIALS</u>	<u>% BY WT.</u>
Materials finer than 75 micron I.S. Sieve.	3.0
Shale.	-
Coal & lignite.	1.0
Soft fragments.	-
Clay lumps & other.	1.0
TOTAL...	5.0

1.5.6. The sum of the percentages of all the deleterious substances shall however not exceed 5 percent by weight. The coarse aggregate shall satisfy the abrasion, soundness and water absorption test as laid down in I.S. 383-1999.

ii) Source

Natural aggregates are not available in enough quantity nearby, and will not be allowed to be used in any concreting. Crushed aggregates are available in ample quantities from the quarries near village **Panthawada** in B.K. District. These are indicative only. The Contractor shall procure approved quality of aggregates and rubble from any other sources for which no extra claim shall be entertained.

iii) Grading

- a) Coarse aggregates shall be well graded and shall have a maximum size of 40 mm and 20 mm as per requirement.
- b) The gradations shall give a dense concrete of the specified strength and consistency that will work readily in position without segregation and without the use of excessive water content.

c) Coarse aggregate shall be either in single size or graded, in both cases the grading shall be within the following limits (IS 383):

Table-II of IS:383-1970.

IS Sieve Size (mm)	Percentage passing for single sized aggregates of Normal size.						Percentage passing for graded aggregates of Normal size.			
	63 mm	40 Mm	20 mm	16mm	12.5 mm	10mm	40 mm	20 mm	16 mm	12.5 mm
80	100	-	-	-	-	-	100	-	-	-
63	85-100	100	-	-	-	-	-	-	-	-
40	0-30	85-100	100	-	-	-	95-100	100	-	-
20	0-5	0-20	85-100	100	-	-	30-70	95-100	100	100
16	-	-	-	85-100	100	-	-	-	90-100	-
12.5	-	-	-	-	85-100	100	-	-	-	90-100
10	-	0-5	0-20	0-30	0-45	85-100	10-35	25-55	30-70	40-85
4.75	-	-	0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
2.36	-	-	-	-	-	0-5	-	-	-	-

(In concrete for canal lining the percentage at 4.75 to 10mm fraction shall be reduced to about 5 to 10 percent of the total coarse aggregate). However the exact gradation required to produce a dense concrete of specified strength and desired workability shall be decided by the Engineer-in-Charge.

- d) The material passing through the screen shall be in gradation ranging from 40mm to 4.75 mm. Each grade of material shall be stacked 40 mm to 20 mm , 20 mm to 10 mm and 10 mm to 4.75mm.
- e) Coarse aggregates shall consist of inert, clear, hard, strong durable and structurally sound particles of crushed stone and shall be free from thin elongated soft pieces, organic or other deleterious matter capable of developing good bond with cement paste and weathering, be unaffected by water. It shall have no adherent coating of clay silts, mud or any other adherent coating. It shall be from a source approved by the Engineer-in-Charge. Coarse aggregates shall conform to IS: 383-1970 and IS: 515-1959.
- f) Coarse aggregates shall be washed and screened at the source approved by the Engineer in charge. If necessary contractor shall remove all vegetations and other perishable substances and objectionable amounts of other foreign matter. The cost of washing & screening shall be borne by the Contractor. In case the coarse aggregate brought to the site of work is not washed and screened at the source the contractor shall make necessary arrangements for washing and screening at the B&M plant and its cost shall be borne by the contractor.
- g) Following shall be maximum size of coarse aggregate for the different items of work.

Sr.No.	Item of work	Maximum nominal Size of Coarse Aggregate (MSA)
1	CC 1:2:4 work	20mm

4) For heavily reinforced concrete members, as in the case of ribs of main beams, maximum size of aggregate shall usually be restricted to 5 mm less than the minimum lateral clear distance between the main bars or 5 mm less than the minimum cover to the reinforcement, whichever is smaller. However, if required under special circumstances, the Engineer-in-Charge may permit an aggregate of maximum size 25 % more than this critical spacing/ cover provided that proper vibration is ensured.

iv) Testing:

The following testing frequencies shall be maintained for the same source of coarse aggregate.

Sr.No.	Particulars of Test	Frequency of test for coarse aggregate as per IS:2386-1963 (Part-1 to 8), IS:383-1970
1	Gradation	1/150 m ³ for concrete or as per specification or Daily one Test
2	Sp. Gravity & Water Absorption	1/season
3	Flakiness & Elongation Indices	1/season
4	Impact value	1/season
5	Abrasion value	1/season
6	Soundness	1/season
7	Alkali Aggregate Reactivity	1/season
8	Petrographic examination	1/season

v) Storage

a) Aggregate shall be stacked in such a way as to prevent the admixture of foreign materials such as soil, vegetable matter etc. Heaps of fine and coarse aggregates shall be kept separate. When different sizes of fine or coarse aggregate are procured separately they shall be stored in separate stockpiles, sufficiently away from each other to prevent the materials at the edge of the piles from getting intermixed.

b) The aggregates shall be stockpiled adjacent to the mixer site so as to require minimum re handling and labour when conveyed to the mixer.

c) The aggregates shall be placed on a dry hard patch of ground if available otherwise a platform of planks or plain galvanized iron sheets or alternatively on a floor of dry bricks or a thin layer of lean concrete.

d) The aggregates shall be kept free of dirt, rubbish papers, vegetable matter, bidi, etc. by the people.

e) To minimize moisture variations, the stockpile shall be spread over as large in area as possible but kept low and fairly uniform in height preferably 1.25 to 1.50 meter and the lowest layer of about 30 cm height shall be allowed to act as drainage layer and not used till the end.

1.5.7. Water

The mixing water shall be potable confirming to specification prescribed in Para M-6 of General Technical Specification shall apply.

1.5.8 Epoxy

Use of epoxy for bonding fresh concrete for repairs shall be permitted on written approval of the Engineer-in-Charge. Epoxy shall be applied in accordance with the instructions of the manufacturer. The cost of such repair shall be borne by the Contractor.

1.12 Formwork:

1.12.1 General

- a) Form shall be used wherever necessary to confine the concrete and shape it to the required lines or to ensure against contamination of the concrete by material caving in or sloughing from adjacent surface left by excavation or other features of the work. All exposed concrete surface having slope steeper than two horizontal to one vertical shall be formed.
- b) Formwork may be of plywood, timber, steel or precast concrete panels or of such other suitable materials or combination of such materials. Formwork shall be substantially and rigidly constructed to the shapes, lines and dimensions required, efficiently propped and braced to prevent deformation due to placing, vibrating and compacting, other incidental loads or the effect of weather. If settlement or deflection of forms under the load of fresh concrete is to be expected, allowance should be made in the original construction of the forms so that the finished lines and dimensions of the structures are in accordance with those specified on the drawings. The bamboos for formwork shall be straight and in one piece.
- c) The surface of formwork shall be made such as to produce surface finishes as specified and formwork joints space be tight enough to prevent loss of liquid or bleeding from concrete. Joints between the form work and existing concrete structures shall also be grout tight. Formwork shall be arranged to facilitate easing and removing of the various parts in correct sequence, without jarring or damaging the concrete. Fixing blocks, or bolts similar devices may be embedded in the concrete, provided they do not reduce the strength or effective cover of any part of the structure below the required standard. But the use of through bolt shall be avoided as far as possible. Temporary opening shall be provided at all points necessary in the forms to facilitate cleaning and inspection immediately before placing of the concrete.
- d) Form shall overlap the hardened concrete in the lift previously placed by not less than 75 mm and shall be tightened snugly against the hardened concrete. Particular attention shall be paid in setting and tightening the forms for construction joints so as to get a smooth joint free from sharp deviations or projections.
- e) Moulding strips shall be placed in the corners of forms so as to produce chamfered edges as required on permanently exposed concrete surface.
- f) The formwork for various types of vertical R.C.C. members i.e. retaining walls, counter forts, bridge piers side walls, abutment walls or any vertical wall shall be carried out as per drawing or any equivalent arrangement approved by Engineer-in-Charge shall be used. Formwork shall not allow any exposure of corrosive material after removal of formwork. The shuttering arrangement for that consisting of through bolts (either replaceable or non

replaceable) or reinforcing bolts, washer which shall be confirming to IS: 1786-1985. It will come in direct contact with water, soil or any aggressive atmosphere which will ingress on corrosion of reinforcement and ultimately lead to the deterioration of concrete which is not permitted. It shall be consisting of projecting cores H.D.P.E (High Density Polyethylene Extrusion) which shall be confirming to IS:7328-1974 and P.V.C.IS:10515-1982 or any latest published code. After concreting work is completed the bolt shall be removed and the hole left in concrete shall be filled in accordance with the provision of repair of concrete as per Para 4.16.

Note:- Steel sheathing denotes steel sheets not supported by a backing of timber boards; steel lining denotes steel sheets supported by a back of timber boards.

b) Timber sheathing or lining shall be of such kind and quality or shall be so treated or coated that there will be no chemical deterioration or discoloration of the formed concrete surfaces. The type and condition of form sheathing and lining and the ability of forms to withstand distortion caused by placement and vibration of the concrete, and the workmanship used in the

form construction shall be such that the formed surface will conform to applicable requirements of this specification pertaining to finish of formed surfaces.

c) Forms for concrete surface required to receive F2 and F3 finishes shall be constructed so as to produce uniform and consistent texture and pattern on the concrete faces. Metal patches on forms for these faces shall not be permitted. The form sheathing or lining shall be so placed that all horizontal form marks are continuous across the entire surface. Where finish F2 is specified the sheathing or lining shall be placed so that the joint marks on the concrete surface shall be in general alignment both horizontally and vertically and the form sheathing material used for such surfaces shall be restricted to one type in any one major feature of the work.

d) Forms for surfaces required to receive F4 finish shall be constructed so as to conform accurately to the required curvature of the section. Where necessary to meet requirements for curvature, the form sheathing shall be built up of laminated splices cut to make right, smooth form surface. The forms shall be so constructed that the joint marks on the concrete surface shall in general, follow the line of water flow. After the forms have been constructed, all surface imperfections shall be corrected, all the nails shall be hidden and any roughness and all angles on the surface of the forms caused by matching the form materials shall be dressed to curvature.

(e) If temperate hard wood is used as form lining, it shall be continuously supported with timber or plywood.

(f) Embedded ties for holding forms shall remain embedded and except where F1 finish is permitted they shall terminate not less than two diameters or twice the minimum dimension of the tie or ten millimeters whichever is greater, from the formed faces of the concrete. Where F1 finish is permitted, ties may be cut off flush with formed surface.

(g) The ties shall be constructed so that removal of the ends or end of fasteners can be accomplished without causing appreciable spalling at the faces of the concrete. Recesses resulting from removal of the ends of the form ties shall be filled in accordance with the provision for repair of concrete as per relevant para.

1.12.3 Form, Centering and Temporary works.

(a) The basic requirements of good formwork are strength, rigidity and conformity to design

and geometrical shapes. The formwork shall be properly designed to withstand the loads coming over it. The formwork shall also be firm and rigid. It shall be so strong that at the time of vibration of concrete it does not get out of alignment and does not allow any concrete or water to leak from the gaps. It should be so designed that it can be finely adjusted in lines and levels and can be removed gradually by wedging action. Form oil shall be applied to facilitate easy removal of formwork without damaging the concrete surface. In short, formwork shall be given due importance in the concrete work. As far as possible only steel formwork shall be used.

(b) Timber formwork can be used where special shapes are to be formed and where repetitive use is not feasible. Plywood of good quality should be used or wood should be lined with G.I. sheeting. Green or wet timber shall not be used. If, the formwork has been in use for sometime, its surfaces shall be checked for geometrical shape. Defect if any, shall be corrected before use.

(c) All centering, formwork and temporary works shall be constructed according to the approved drawings and specifications. The IS:883-1970 "Code of practice for design of structural timber in building" shall be applicable for this work.

(d) As soon as practicable, after the acceptance of his tender, the Contractor shall submit a scheme showing the order of precedence and method by which he proposes to carry out work, together with such details as are necessary to demonstrate the adequacy, stability and safety of the methods.

(e) The approval to the general scheme of centering as well as design criteria and loading shall be obtained in good time to facilitate all preparatory works. Any delay on this account shall be the responsibility of the Contractor.

(f) After approval of the general scheme, the Contractor shall prepare detailed design and drawings for execution of the formwork, centering and temporary work. These shall be forwarded to the Engineer-in-Charge for approval. No work shall be carried without prior approval of the Engineer-in-Charge.

(g) Notwithstanding to the approval given to the design criteria and loading and the general scheme for the centering, the entire responsibility for the satisfactory execution of centering and all temporary works shall rest with the Contractor and he shall be liable to pay all claims and compensation arising from any loss or damage to life and property due to deficiency, failure or malfunctioning of the centering or the temporary works.

(h) Forms required to be used more than once shall be maintained in serviceable condition and shall be thoroughly cleaned and repaired before reuse. Where metal sheets are used for lining forms, the sheets shall be placed and maintained in the forms without lumps or other imperfections. All forms shall be checked for shape and strength before reuse.

(i) The Contractor shall procure minimum two sets of the formwork for walls and slabs.

1.12.4 Cleaning and Treatment of Forms

At the time the concrete is placed in the forms, the surfaces of the forms shall be free from encrustations of concrete, grout or other foreign materials. Before concrete is placed, the surfaces of the forms designated to produce F1, F2, F3, and F4, finishes shall be oiled with commercial form oil that will effectively prevent sticking and will not stain the concrete surface. For timber forms, form oil shall consist of pure refined pale paraffin mineral oil or other approved form oil. For steel forms, form oil shall consist of refined mineral oil suitably compounded with one or more ingredients which are appropriate for the purpose. Care shall be taken

to keep form oil out of contact with reinforcement.

1.12.5 Removal of Forms

(a) Except or otherwise, provided in this sub clause forms shall be removed as soon as the concrete has hardened sufficiently, thus facilitating satisfactory specified curing and earliest practicable repair of surface imperfections.

Forms on upper sloping surface of concrete, such as forms on the water sides of warped transition, shall be removed as soon as the concrete has attained sufficient stiffness to prevent sagging. Any needed repair or treatment required on such sloping surfaces shall be performed at once and be followed immediately by the specified curing.

(b) In order to avoid excessive stresses in the concrete that might result from swelling of the forms, timber forms for wall openings shall be loosened as soon as this can be accomplished without damage to the concrete.

(c) Subject to approval, forms on concrete surface close to excavated rock surface may be left in place provided that the distance between the concrete surface and the rock is less than 400mm and that the forms are not exposed to view after completion of the works.

(d) Forms shall be removed with care so as to avoid damage to the concrete. Concrete damaged if any in form removal shall be repaired in accordance with the provisions for repair of concrete as per Para 5.16.

(e) The following minimum intervals of time as per specifications in IS:456-2000 will generally be allowed when using ordinary Portland cement, between placing concrete and striking form work but the period shall be modified in case of wet weather and also as per direction of the Engineer-in-Charge.

(f) Minimum strength to be attained by concrete for safer removal of forms.

(B) Concrete not subject to appreciable bending or direct stress and nor reliant on form for vertical support not liable to injury from removal or other construction activities, vertical or approximately vertical surface of thick section.

(C) Concrete subjected to appreciable bending and for direct stress and partially reliant on forms for vertical support.

i Subject to dead load only vertical, surface unloaded, columns, walls, beams and other thin section (750 PSI at 3 days).

ii Subject to dead and live load, galleries, loaded columns and walls (1500 PSI at 10 days).

iii Concrete subject to high bending wholly or most reliant on forms for vertical supports.

(i) Roof for floors, slabs, walkways, platforms etc., press and not on boards (2000 PSI at 20 days).

(ii) Heavily reinforced beams, bridges, lock and girders and other heavily reinforced thick section wholly reliant on forms for vertical support (2500 PSI at 20 days).

The period given above in brackets are approximate and for rough guidance. The removal of forms should entirely be based on the minimum strength specified varies widely under different job conditions of temperature, materials and curing etc.

1.13 SPECIALIZED FORM WORK:-

Specialized form work may be required in the case of slip form work under water concreting, segmental construction etc. Such specialized form work shall be designed and detailed by competent agencies and design shall be certified by qualified Structural Engineer under his Signature and Seal and a set of complete work drawing and installation instruction shall be

supplied to the Engineer. The site personnel shall be trained in the erection and dismantling as well as operation of such specialized form work. In case proprietary equipment is used the suppliers shall supply drawing details, installation instructions, etc. in the form of manuals along with the formwork. Where specialized form work is used close co-ordination with the design of permanent structure is necessary.

For slip form the rate of slipping the form work shall be designed for each individual case taking into account various parameters including in the grade of concrete, concrete strength, concrete temperature, ambient temperature, concrete admixtures etc. In the case of segmental construction the concrete mix shall be normally designed for developing high early strength so that the form work is released as early as possible.

In order to verify the time and sequence of striking/removal specialized form work, routine field tests for the consistency of concrete and strength development are mandatory and shall be carried out before adoption.

For specialized formwork, the form lining material may be either plywood or steel sheet of appropriate thickness. Plywood is preferably where superior quality of surface is desired, whereas steel sheeting normally used where large number of repetitions are involved.

1.14 TESTS AND STANDARDS OF ACCEPTANCE.

The materials shall be tested in accordance with these specification and shall meet the prescribed criteria.

The work shall conform to these specifications and shall meet the prescribed standard of acceptance.

1	Walls, columns and vertical faces of all structural members	16 to 48 hours or as may be decided by the Engineer-in-Charge
2	Slabs (Props left under)	3 days
3	Beam soffits (Props left under)	7 days
4	Removal of props under slabs 1 Spanning up to 4.5 m 2 Spanning over 4.5 m	
		7 days
		14 days
5	Removal of props under beams & arches Spanning Up to 6 m Spanning over 6 m	
		14 days
		21 days

Note: In normal circumstances and where ordinary Portland cement is used, forms may generally be removed on expiry of the above period. For other cement, the stripping time recommended for Ordinary Portland Cement may be suitably modified.

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

1.15 Finishes and Finishing of Concrete Surfaces.

1.15.1 Formed Surfaces

a) Allowable deviation from plumb or level and from the alignment profile, grades and dimensions shown on the drawings is defined as "tolerance" and is to be distinguished from the irregularities in finishes as described herein. The tolerance in concrete construction shall be as specified in tender or I.S.

c) The classes of finish and requirements for finishing of concrete surface shall be as shown on the

drawing or as hereinafter specified. In the event of finishing not being definitely specified here in or on the drawing the finishes to be used shall be as directed by the Engineer-in-Charge or his representative. Finishing of concrete surfaces shall be performed only by skilled workmen without claiming for extra payment.

- d) Completed concrete surfaces will be tested where necessary to determine whether surface irregularities are within the limits hereinafter specified.
- e) Surface irregularities are classified as “abrupt” or “gradual”. Offsets caused by displaced or misplaced form sheathing or lining or form sections or by loose knots or otherwise defective timber form will be considered as abrupt irregularities and shall be tested by direct measurements. All other irregularities shall be considered as gradual irregularities and will be tested by use of template, consisting of a straight edge or the equivalent thereof for curved surfaces. The length of the template shall be 150cm for testing of formed surfaces and 300 cm for testing unformed surfaces.
- f) The classes of finish for formed concrete surface are designated by one of the symbol, F1, F2, F3, and F4. Jute bags rubbing or sand blasting will not be required on formed surfaces. Grinding will not be required on formed surfaces other than that necessary for the repair of surface imperfections. Unless otherwise specified or indicated on the drawings, the classes of finish which will apply are as follows.

(i) Finish F-1

This finish applies to surfaces where roughness is not objectionable, such as those upon or against which fill material, masonry or concrete will be placed, the upstream face of the structure that will permanently be under water or surface that will otherwise be permanently concealed. The surface treatment shall be the repair of defective concrete, correction of surface depressions deeper than 25mm and filling of the tie rod holes. Form sheathing will not leak concrete when the concrete is vibrated. Forms may be built with a minimum of requirements.

(ii) Finish F-2.

This finish is required on all permanently exposed surfaces for which other finishes are not specified, such as R.C.C. Crash barrier, abutment, column, pier, approach slab Road Bridges and Retaining wall not prominently exposed to public view except wherein F1 finishes are permitted. Forms shall be built in a workmanlike manner to the required dimensions and alignment, without conspicuous offsets or bulge. Surface irregularities shall not exceed 5 mm for abrupt irregularities and 10mm for gradual irregularities measured with a 1.5m template.

(iii) Finish F-3

This finish is designated for surface of structures prominently exposed to public view where appearance is also of special importance. This shall include inside of barrels, piers of bridges and cross regulators, syphons, aqueducts, parapets, railings and decorative features on the structures and on the bridges. To meet with the requirements for the F3 finish, forms shall be built in skillful, workmanlike manner, accurately to dimensions. There should be no visible offsets, bulges or misalignment of the concrete. At construction joints the forms shall be tightly set and securely anchored close to the joint. Abrupt irregularities shall not exceed 5 mm for irregularities parallel to the directions of flow and 2.5mm for irregularities in the direction normal to the flow. Gradual irregularities shall not exceed 5 mm.

(iv) Finish F-4

This finish is required for formed concrete surface at the cut and ease waters of the piers and where evenness of surface is essential. The forms must be strong and held rigidly and accurately to the prescribed alignment. For warped surfaces, the forms shall be built up in

section cut to make tight smooth form surfaces after which the form surfaces are dressed and banded to the required curvature. Gradual irregularities shall not exceed 5 mm. Abrupt irregularities shall not be permitted. Formations of air holes on the surface of the concrete designated to receive finish shall be minimized and where such air holes are found, they shall be repaired in accordance with the provision of relevant paragraph.

1.15.2 Unformed Surfaces

The classes for unformed concrete surfaces are designated by the symbols U1, U2, U3, and U4. Unless otherwise specified or indicated on the drawings, these classes of finish shall apply as follows:

(i) Finish U1

This finish applies to unformed surfaces that will be covered by fill material, masonry or concrete, or where a screeded surface finish meets the functional requirements. Finish U1 is also used as the first stage of finishes for U2 and U3. Finishing operations shall consist of sufficient leveling and screeding to produce an even uniform surface. Surface irregularities measured as described in this section shall not exceed 10mm.

(ii) Finish U2

- (a) This is a floated finish and used on all outdoor unformed surface not specified to receive finishes U1 or U3. It may be used for such surfaces as apron and floors of Cross Regulators and Head Regulators, Drainage Barrels, Aqueducts, Escapes and inside of barrels/ troughs.
- (b) Finish U2 is also used as the second stage of finish for U3. Floating may be performed by hand or power driven equipment. Floating shall be started as soon as the screeded surface has stiffened sufficiently to prevent the formation of laitance and shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. If finish U3 is to be applied floating shall be continued until a small amount of concrete without excess water is brought to the surface, so as to permit effective trowelling. Surface irregularities measured as described in this section shall be removed as directed.

(iii) Finish U3

This is a trowelled finish and may be specified for tops of parapets prominently exposed to view and conduit invert immediately downstream of regulating gates and valves, when the floated surface has hardened sufficiently to prevent excess of fine material from being drawn to the surface, steel trowelling shall be started. Steel trowelling shall be performed with firm pressure that will flatten the sandy texture of the floated surface and produce a dense uniform surface free from blemishes and trowel marks. Surface irregularities, measured as described in relevant parts of this section, shall not exceed 5 mm where a hard steel trowelled finish is specified, the regular U3 finish shall be trowelled again after the surface has nearly hardened using firm pressure and trowelling until the surface is hard and has a slightly glossy appearance.

(iv) Finish U4

- (a) This is a steel trowelled finish similar to finish U3 except that light surface pitting and light trowel marks such as obtained from the use of machine trowelling of lining machines will be acceptable, provided the surface irregularities do not exceed the limits specified for finish U3.
- (b) Unformed surfaces which are nominally level shall be sloped for drainage as shown on the drawing or as directed unless the use of other slopes or level surface is indicated on the drawings, narrow surface such as top of parapets, top of walls and Krebs shall be sloped approximately one cm per 30cm of width, broader surface such as roadways, platform and decks, shall be sloped approximately half centimeter per 30 cm of width.

1.16 Repair of Concrete

1.16.1 General

- (a) Repair of concrete shall be performed by skilled workers and in the presence and as directed by and experienced Engineer of Contractor without claiming any extra payment. The Contractor shall correct all imperfections on the concrete surface as necessary to produce surfaces that confirm with requirement of the paragraph "Finishes and Finishing of concrete surface." Repairs on formed concrete shall be completed as soon as practicable after removal of forms and within 24 hours after removal of forms, Concrete that is damage from any cause and concrete that is honeycombed, fractured or otherwise defective and concrete which because of excessive surface depressions must be excavated and built up to bring the surface to the prescribed lines, shall be removed and replaced by dry pack concrete or concrete as hereinafter specified. Where bulges and abrupt irregularities protrude outside the limits Specified in the paragraph "Finishes and of Concrete Surface" the protrusions shall be reduced by bush hammering and grinding so that the surfaces are within the specified limits.
- (b) Before repair to commence, the methods proposed for the repair shall be approved by the Engineer-in-Charge. Routine curing should be interrupted only in the area of repair operations.

1.16.2 Methods of Repairs

For new works four methods are used as under:-

i) Dry pack Method

This method should be used for holes having a depth nearly equal to, or greater than the least surface dimensions, (for cone bolt, she bolt and grout insert holes and narrow bolts cut for the repair of cracks). Dry pack should not be used for relatively shallow depressions where lateral restraint cannot be obtained (for filling in back of considerable lengths of exposed reinforcement; or for filling holes which extend entirely through the wall, beam etc).

(ii) Concrete Replacement Method

Concrete replacement should be used when holes extend entirely through the concrete section (when holes in unreinforced concrete are more than 1000 sq.cm. in area and 100 mm or more in depths and when holes in reinforced concrete are more than 500 sq. cm in area and deeper than the reinforcement steel).

(iii) Concrete Replacement Method

This should be used for holes too wide to dry pack and too shallow for concrete replacement and for all comparatively shallow depressions, large or small, which extend no deeper than for side of the reinforcement bars nearest to surface.

(iv) Epoxies method

A thermosetting plastic known as epoxy can be used as a bonding medium whenever long time curing of conventional concrete can not be assured. Also epoxy concretes of fine sand as well as plain epoxy are suitable for concrete repair work and should be used whenever very thin patches are to be placed or immediate reuse of the area is required or where moist curing can not be effectively accomplished. Preparation for epoxy bonded repairs should in general be identical to that for other concrete repairs except that every effort should be made to provide surfaces thoroughly dry. Drying of the immediate surface for at least 24 hours and warming to temperature between 18° to 27° are essential for application of epoxy bonded repairs. Preparation for the use of epoxy concretes should include thorough cleaning and drying of the areas to be repaired. A wash of dilute 1:4 muriatic acid, rinsing with clean water and subsequent drying is desirable, where feasible. If acid wash is not feasible, preparation may be accomplished as for other concrete repairs with final cleanup being by means of sand blast

method, followed by air water jet washing and thorough drying. Epoxy repairs shall be carried out only by trained personnel.

1.16.3 Preparation of Concrete for Repairs

All concrete of questionable quality should be removed. It is better to remove too much concrete than too little because affected concrete generally continues to disintegrate and while the work is being done it costs but little more to excavate to ample depth. Moistening, cleaning, surface drying and complete curing are of utmost importance when making repairs which must be thoroughly bonded, watertight and permanent. Surfaces within trimmed holes should be kept continuously wet for several hours, preferably overnight prior to placing new concrete. Immediately before placement of the filling, the holes should be cleaned so as to leave a surface completely free from chipping dust, dried grout and all other foreign materials. Preliminary washing as soon as the chipping and trimming are completed is desirable to remove loose material. Final cleaning of the surfaces to which the new concrete is to be bonded should be done by wet sand blasting followed by washing with air water jet for thorough cleaning and drying with an air jet. Care should be taken to remove any loose materials embedded in the surface by chisels during the trimming and to eliminate all shiny spots indicating free surface moisture. Cleaning of the steel if necessary should be accomplished by sand blasting. The prepared surface shall be approved by the Engineer-in-Charge.

i) Dry Pack of Concrete

For this method of repair, the holes should be sharp and square at the surface edges, but the corners within the holes should be rounded, especially when water tightness is required. The interior surfaces of holes left by cone bolts, she bolts etc. should be roughened to develop an effective bond. Other holes should be undercut slightly in several places. Holes for dry pack should have a minimum depth of 25 mm.

ii) Concrete Replacement

Preparation for this method should be as follows:

- (a) Holes should have a minimum depth of 100 mm in new concrete and the minimum area of repair should be 500 cm² for reinforced and 1000 cm² for unreinforced concrete.
- (b) Reinforcement bars should not be left partially embedded. There should be a clearance of at least 25 mm around each exposed bar.
- (c) The top edge of the face of the structure should cut to a fairly horizontal line. If the shape of the defect makes it advisable, the top of the cut may be steeped down and continued on horizontal line. The top of the hole should be cut to 1 to 3 upward slope from the back towards the face of the wall or beam. It may be necessary to fill the hole from both sides, in which case the slope of the top of the cut should be modified accordingly.
- (d) The bottom and sides of the holes should be cut sharp and approximately square with the face of the wall when the hole goes entirely through concrete section. Spelling or feather edges shall be avoided by having chippers worked from both faces. All interior corners should be rounded to minimum radius of 25 mm.

iii) Concrete Replacement

This method is adopted for cavities/holes which are too wide for dry pack filling and too shallow for concrete filling.

When concrete gun is used with this method, comparatively shallow holes should be flared outwardly at about 1 to 1 slope to avoid inclusion of rebound. Corners within the holes should be rounded. Shallow imperfections in new concrete may be repaired by concrete replacement if the

work is done promptly after removal of the forms and while the concrete is still green, for instance, when it is considered necessary to repair the peeled areas resulting from surface material sticking to steel forms the surfaces may be filled using concrete gun without further trimming or cutting. Whenever hand placed concrete replacement is used, edges of chipped out areas should be squared with the surface leaving no feather edges.

Concrete mix of 1 part of cement and 4.5 parts of sand passing through No. 16 sieve is used. It is injected on the surface already cleaned with air water jet or sand blasting. The area is built up with concrete placed in a layer about 9.5 mm thick at 30 minutes interval. Each layer is cross scratched to provide a good bonding surface for the next layer. White cement as explained above is used for the last layers. The surface after partial setting is trimmed to proper grade and then sack rubbed.

For repairing a honey combed surface it is cut to a depth at least 25mm by cutting the edges at right angle to the surface. The surface is cleaned and washed and repair undertaken thereafter by placing new concrete.

iv) Use of Dry pack Concrete.

The surface after preparing for repair should be thoroughly brushed with a stiff concrete or grout barely wet enough to thoroughly wet the surface after which the dry pack material should be immediately packed into place before the bonding grout has dried. The mix of bonding grout shall be 1 to 1 cement and fine sand mixed to a consistency like thick cream. Under no circumstances should bonding coat be wet enough or applied heavily enough to make the dry pack material more than very slightly rubbery. Dry pack is usually a mix (by dry volume or weight) of one part of cement 1.5 parts of sand that will pass No. 16 ASTM screen.

1.16.4 Procedure of Replacement of Concrete, Curing of Repairs etc.

All procedures for replacement of concrete, concrete replacement, use of epoxies and curing of repairs shall be according to the provision laid down in chapter-VII. "Repairs and Maintenance of concrete" Concrete Manual, United States Bureau of Reclamation, Eighth Edition, Revised 1981 vide Para 130 (b), (c), (e), 133, 134, & 136 of the Concrete Manual as may be applicable to these repairs.

1.17 Curing of Concrete

1.17.1 General

All equipment material etc. needed for curing and protection of concrete shall be at hand and ready for installing before actual concreting begins. Detailed plans, methods and procedures whereby the various phases of curing and protection shall be firmly established, shall be settled and got approved in writing from the Engineer-in-Charge sufficiently in advance of the actual concreting. The equipment and method proposed to be utilized shall provide for adequate control and avoid interruption or damage to the work of other agencies. On each structure water tank of sufficient and approved capacity shall be provided. All concrete shall be cured by water in accordance with the requirement of sub-clause 3.9.8 of this clause or membrane

curing in accordance with the requirements of sub-clause 3.9.8.2 of this clause. Concrete surfaces to be painted shall not be cured by membrane curing.

1.17.2 Water Curing

- a) Unformed top surface of wall and pier shall be moistened by covering with water saturated material or by other effective means as soon as the concrete has hardened sufficiently to prevent damage by water. These surfaces and steeply sloping and vertical formed surfaces shall be kept completely and continuously moist, prior to and during form removal, by water applied on the unformed top surfaces and allowed to pass down between the forms and the formed concrete faces. This procedure shall be followed by the specified water curing and membrane curing.

- b) Concrete cured with water shall be kept wet for at least 28 days immediately following placement of the concrete or until covered with fresh concrete by covering with water saturated material or by a system of perforated pipes or mechanical sprinklers or porous hoses or by any other suitable method which will keep all surface continuously (not periodically) wet.

1.18 Requirement of Concrete Construction.

1.18.1 General

All concrete constructions shall conform to the permissible tolerance and technical provisions as described in this section and to the detailed requirements of the lines grades and dimension shown in the drawing or as prescribed by the Engineer-in-Charge. The location of all the construction joints shall be subject to the approval of the Engineer-in-Charge. The dimension of each structure shown on the drawings shall be subject to such changes as may be found necessary by the Engineer-in-Charge to adopt for the structure to the conditions disclosed by the excavation.

1.18.2 Concrete in various components of Canal Syphon, Drainage Syphon, Cross Regulators, Head Regulators, and other structures.

- a) The item of the schedule for concrete in aforesaid structure includes all concrete in the various components of the structure and block outs.
- b) Expansion joints shall be constructed as shown on the drawing or as directed. Premoulded bituminous fiber type expansion joint material shall be placed in the expansion joints. Lighting recesses shall be constructed in the parapets as directed by the Engineer-in-Charge. Open joints or false joints shall be constructed as shown on the drawings or as directed by the Engineer-in-Charge. Preformed expansion joint filler shall be placed in the roadway and side walls where shown on the drawings or as directed by the Engineer-in-Charge.

1.18.3 Concrete in Blockouts

- a) All concrete required to be placed in block outs to permit the installation and adjustment of mechanical and other equipments shall be included in the respective concrete as described above. The concrete surface of the block outs shall be chipped and roughened as described hereinafter before the concrete is placed in block outs.
- b) Exceptional care shall be taken in placing the concrete in block out in order to ensure satisfactory bond with the concrete previously placed and to secure complete contact with all metal work in the block outs.
- c) The roughening of the concrete surface of the block outs shall be performed by chipping or sand blasting as approved by the Engineer-in-Charge and in such a manner as not to loosen, crack or shatter any part of the concrete beyond the roughened surface. After being roughened the surface of the concrete shall be cleaned thoroughly of loose fragments, dirt and other objectionable substances and shall be sound and hard to ensure good mechanical bond between the existing and new concrete. All concrete which is not hard, dense and durable shall be removed to the depth required to the satisfaction of the Engineer-in-Charge. While placement of concrete, care shall be taken so as not to dislocate or disturb installation

1.18.4 Embedment in Concrete

In some of the locations of structures as shown on the relevant drawings a few conduits or openings shall have to be provided through RCC/ PCC/ Masonry work. Construction of the surface for either placement of concrete or for laying of masonry shall have to be suitably carried out so as to meet with the placement to such conduits or openings. No extra claim for such improvidence in construction shall be entertained.

1.19 Construction Joints

- a) Concreting shall be carried out continuously up to the construction joints, the position and details of which shall be as shown on approved drawings or as directed by the Engineer-in-Charge.
- b) For vertical construction joints stopping boards shall be fixed previously at a predetermined position and shall be properly stayed for sufficient lateral rigidity to prevent its displacement or bulging when concreting is completed against it. Concreting shall be continued right up to the board. The board shall not be removed before expiry of the specified period for removal of vertical forms.
- c) Before resuming work at any construction joints when concrete has not yet fully hardened, all laitance shall be removed thoroughly, care shall be taken to avoid dislodgement of coarse aggregates.
- d) When work has to be resumed on a surface which has hardened, it shall be thoroughly raked, swept, cleaned, wetted and covered with a layer of neat cement grout. The neat cement grout shall be followed by a 15 mm thick layer of concrete mixed in the same proportion as in concrete and concreting resumed immediately thereafter. The batch of concrete shall be rammed against the old work to avoid formation of any stone pockets, particular attention being paid to corners and close spots.
- e) In all cases, the position and detailed arrangement of all construction joints shall be predetermined and got approved from the Engineer-in-Charge.
- f) The contractor shall construct the concrete steps near the structure. The steps shall be constructed in M-15 grade as shown in drawing or as directed by the Engineer in Charge for inspection.

1.20 Tests and Standards of Acceptance

- (a) For controlled concrete tests shall be carried out consist of casting concrete cubes of size 15cm x 15cm x 15cm, in three separate sets and in each set, tests shall be conducted on six specimens. Not more than one set of six specimens, shall be made on any particular day. Out of the six specimens in each set, three shall be tested at seven days and the remaining three at 28 days. The preliminary tests at 7 days are intended only to indicate the strength likely to be attained at 28 days. In all cases, the 28 days compressive strengths shall alone be the criterion for acceptance or rejection of the concrete.
- (b) The provision under para 4.5.1(c) for sampling procedures and frequency of test specimen, test strength of samples and acceptance criteria shall apply.

1.22 Tolerances in Concrete Construction

1.22.1 General

- (a) Permissible surface irregularities for the various classes of concrete surface finishes specified in the relevant portion of the paragraph of "Finishes and Finishing of Concrete Surfaces" are defined as finishes and are to be distinguished from "Tolerance" as described in it this section. Deviation from the established lines, grades and dimensions shall be permitted to the extent set forth in this clause, provided that lesser tolerance than that set forth in this clause may be prescribed at site if such tolerances are considered to impair the structural action or operational action or operational function of the structure.
- (b) Where tolerances are not stated in the specifications or drawings for any individual structure or feature there-of, permissible deviations shall be interpreted in conformity with the provision of this clause.

- (c) Concrete work that exceeds the tolerance limits specified in this section shall be either remedied as directed by Engineer-in-Charge or removed.

1.22.2 Concrete Surface Irregularities

a) General:

Bulges, depressions and offsets are defined as concrete surface irregularities. Concrete surface irregularities are classified "abrupt" or "gradual" and are measured relative to the actual concrete surface.

b) Abrupt Surface Irregularities.

Abrupt surface irregularities are defined herein as offsets such as those caused by misplaced or loose forms, loose knots in form timber or other similar forming faults. Abrupt surface irregularities are measured using a short straight edge, at least 150cm. long held firmly against the concrete surface over the irregularity and the magnitude of the offset is determined by direct measurement. Straight edge shall be provided by the Contractor free of cost and made available for use by the Dept. at all times.

c) Gradual surface irregularities:

Gradual surface irregularities are defined herein as bulges and depressions resulting in gradual changes on the concrete surface. Gradual surface irregularities are measured using a template conforming to the design profile of the concrete surface being examined. Templates for measuring gradual surface irregularities shall be provided by the Contractor without any extra cost. Templates shall be at least 2.50 m in length. The magnitude of gradual surface irregularities is defined herein as a measure of the rate of change in slope of the concrete surface.

- d)** The magnitude of gradual surface irregularities on concrete surface shall be checked by the Contractor to ensure that the surfaces are within specified tolerances. The department will also make such checks of hardened concrete surface as determined necessary to ensure compliance with these specifications. Templates for these surfaces shall be furnished by the Contractor free of charge and shall be available for use by the department at all times.

1.23 Centering and Scaffolding

1.23.1 The scaffolding method must take into account of all construction materials loads and live loads as well as speed of erection. Scaffolding may be bolted on the sleeves embedded in the concrete wall (initially used for fixing shuttering). After concreting, the scaffold will have to remain in position near stressing points till all the stressing is completed. Complete drawings of false work, accompanied where necessary by calculations shall be got approved from structural consultant appointed by contractor and approved drawing shall be submitted for record, 3 months prior to commencement of erection.

1.23.2 Any modification that the Engineer-in-Charge may require shall be made by the Contractor. The Contractor shall remain wholly, and entirely responsible for safety of temporary staging and scaffolding work. The efficiency, security and maintenance and for all obligation and risks, in regard to such work specified or implied in the contract. He shall reinstate the same at his own cost, should any mishap or accident occur causing damage or injury thereto, subject however, to such provisions of the conditions of contract as may be applicable in the case of such damage or injury.

1.23.3 Scaffolding/centering shall not be released before the period as specified in Para 4.14.5 as per the convenience of the work. Centering shall be lowered only with the approval of the Engineer-

in-Charge and in a manner which shall prevent damage to the same. Scaffolding shall rest on wedges or sand boxes or on screw jacks in order to permit controlled deshuttering. After initial lowering, centering shall be kept in place till all finishing, repairing work is completed on the underside of the structure. All damages to structures during removal must be made good at no extra cost.

1.23.4 A suitably designed flight of stairs giving temporary access to the top shall be provided by the Contractor at his own cost as a part of the false work scheme.

1.24 Measurement & Payment

- a) Except or otherwise especially provided for in the specifications, measurement of concrete for payment shall be made on the basis of the volume of concrete calculated as being contained within the concrete outlines shown on the relevant drawings and constructed accordingly
- b) Measurement for payment for the concrete laid in pockets in the foundation shall be made on the basis of the volume of the pockets filled.
- c) No measurements shall be made for the concrete backfill beyond the minimum lines of excavation shown on the drawings except such payment is specifically authorized. Measurement of concrete shall be made after deducting the volume of all recesses, passageways, chambers, opening cavities and depressions, but without deductions for round or leveled edges or space occupied by electrical conduits and reinforcement.
- d) The rate for concrete shall include the cost of all materials, labour, tools and plant required for mixing, transporting placing in position, vibrating and compacting finishing as per directions of the Engineer-in-Charge, curing and all other incidental expenses for producing concrete of specified strength to complete the structure or its components as shown on the drawings and according to these specifications. The rate shall also include the cost of providing, fixing and removing of all centering and formwork required for the work unless otherwise specified in the contract. For R.C.C. work reinforcement steel shall be paid separately.
- e) The rate shall include the cost of diversion of drain/river/road side gutter, dewatering and its protection work, as may be necessary during and after concreting work.
- f) All expenses likely to be incurred by the Contractor in transporting materials supplied to him to the site of work, the expenses incurred in improving the quality of materials to acceptable levels (such as screening, washing etc.) and the expenses incurred in proper storage of materials as directed by the Engineer-in-Charge etc. are deemed to be included in the unit rate.
- g) Payment for the various classes of concrete shall be made on the basis of unit rate per cubic meter entered in respect of items in the Schedule-B.
- h) The rate quoted by the bidder for the respective item shall be deemed to have included the requirement of cement for miscellaneous operations like priming of mixer, laying of cement slurry for successive layers, finishing of concrete etc.
- i) The rate for precast concrete blocks shall include concreting as well as placing as directed.

1.25 Unacceptable works

All defective concreting work including but not limited to defects arising out of honey-combing, undersizing, under strength etc. are liable to be demolished and rebuilt by the Contractor at his cost. In the event of such work being accepted by carrying out repairs etc. as specified by the Engineer-in-Charge, the cost of repairs shall be borne by the Contractor. Acceptance of such works will be in accordance with the provisions of IS: 456-2000. In the event of the work being accepted by giving a design concession arising out of but not limited to under sizing and

strength by accepting higher design stresses in member and accepting materials not fully meeting the specifications etc. the Contractor shall be paid for the work actually carried out by him at a reduced rate derived from the tendered rate as approved by the Engineer-in-Charge.

**ExecutiveEngineer
BKPanchayatIrrigationDivision
Palanpur**

2. GENERAL TECHNICAL SPECIFICATION FOR EARTHWORK & ENVELOPES

1.0) PREPARATION OF WORK AREA:

i) CLEANING THE SITE:

Cleaning and grubbing 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 off as directed by engineer in charge. All trees shall be cut down to at least 0.6 m below ground level. The department will indicate the specific areas which need to be cleared and decision of the engineer in charge in this connection shall be final and binding to the contractor. The measurement 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. No extra payment for stripping shall be done.

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.
- iii) 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.
- iv) 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.
- v) 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.
- vi) 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 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 be completely burnt 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 upto 30cms) of top unsuitable soil, clods and any other materials which are unsuitable for the purposes. No extra payment shall be made for the clearing and stripping done for the borrow area.

BORROW AREA WATERING:

The initial moisture content of material in the borrow areas as well as the optimum moisture content for the materials in the particular borrow areas shall be determined from the laboratory tests. The required additional moisture when advantageous shall be introduced into the borrow area by suitable means of watering in advance of the excavation to ensure uniformity of moisture contents. No extra payment shall be made for watering in the borrow areas.

3.0) EMBANKMENT GENERAL:

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

- i) The earth fills designated as core/hearting impervious zone in earth dam.
- ii) The earth fill designated as shell/casing/semi pervious zone/gravel fill in earth dam.
- iii) The inclined/horizontal sand filter in earth dam.
- iv) Selected surfacing on the dam embankment or elsewhere.
- v) Canal bank embankment/Road bank embankment.
- vi) 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, moistured prior to placing the earth fill.

5.0 FOUNDATION ON IMPERVIOUS 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. If necessary as directed by the engineer in charge, the surface shall be allowed to dry or alternatively be moistured 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. Where it is not practicable to obtain a mixture of materials, finest and most clayey materials shall be placed in COT and in the central portion of the core zone. The intermediate materials shall be placed between the centre and the coarser material shall be placed near the slopes of the embankment. 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 desired 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.

9.0 WEATHER CONDITION:

Embankment materials shall be placed only when the weather conditions are satisfactory to permit accurate control of the moisture content in the embankment materials. During monsoon, before stopping embankment work, for any continuous spell, the top surface shall be graded and rolled with a smooth wheeled roller to facilitate run off. Prior to resuming work, the top surface shall be scarified & moisture or allowed to dry as necessary without any extra charge.

10.0 SPREADING IN LAYERS:

Spreading can be performed either by manually or by machinery in the specified thickness of layer after stacking the selected materials received from borrow area at site of work.

11.0 DRESSING OF SLOPES:

The outer slopes of the embankment shall be neatly dressed to line as the placing of fill progresses. 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 levelling until final acceptance of work, without extra cost to department.

12.0 MODE OF MEASUREMENT AND PAYMENT:

- i) The completed work will be measured in cubic meter basis. The quantities shall be computed from the cross section areas of the levelled surface and on levels basis.
- ii) For the purpose of measurement, initial levels of dam seat area shall be taken on the grid of size not more than 10 x 5 mt. in the presence of representative of contractor. The quantities shall be computed from the cross section by the trapezoidal formula only. The contractor should sign initial and final levels of the work in the token of the acceptance and correctness of the levels taken of the work as executed. Any failure to do so will be at the risk & cost of the contractor. The engineer in charge's records shall be binding for all purpose of deciding admissible

payments etc. in such case. It is expected that sizeable usable quantity of overburden excavation and rock excavation would be available for the use in the dam embankment. As such, the dam embankment may be constructed partly from excavated materials and partly with borrow area materials. In order to facilitate measurement of different source of materials, it shall be ensured that at these materials are not mixed up and that they shall always be laid on different reaches as demarcated on the work, by the engineer in charge. The contractor shall always notify the field staff well in advance as well as during construction regarding the source of materials, its purpose to use in different reaches in order to enable the field staff to check the quantity so used.

Failure on the part of the contractor to do so would make him to accept payment, for the cheaper item. As a cross check, the number of trips made for carting shall be counted and recorded.

13.0 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 **one K.M. 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 are 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.

**Executive Engineer
BK Panchayat Irrigation Division
Palanpur**

ITEM WISE
TECHNICAL SPECIFICATION

Name of Work:- Renovation of Satarwada Storage Tank Sr.No.327 at Satarwada, Ta. Dantiwada, Dist.B.K

ITEMWISE SPECIFICATIONS

Item No:-1 Jungle clearance of specified category and bushes for canal work as directed with disposing materials etc. Complete (excluding tree of girth above 0.5Mt.)(A) For medium Dense

- [1] Cleaningsites shall be applicable
- [2] Items shall be operating so as not to damage to whole Structure.
- [3] Cleaned material shall be removed destroyed & out of boundary lead upto 50Mt. or as directed by Engineer- in-charge.
- [4] Items shall include as removing & burning of akadas, weeds & other objectionable material.
- [5] Objectionable material as akadas, weeds from Area shall be removed in minimum 50cm girth as directed.
- [6] Clearing the sites shall be done totally or partially work shall be taken.
- [7] Payment & Measurements shall be on Hectare basis of completed item.

Item No:-2 Excavation in all sorts of soil strata & formations including depositing the unuseful excavated stuff as & where directed including sorting & stacking useful materials as required & upto lead of 200mt. & all lifts etc. complete for head regulator including dewatering (a) In overburden including hard murrum

- Item shall include in all kinds of hard and soft soils, such as clay, silt, gravelly, sandy, soft & hard Murrum, stiff clay, kankar or other materials which can be excavated by pick and shovel, loose stones less than 0.03 cm. which do not require breaking shall be treated as soils as per section IV
- The site be cleared of all obstruction loose stones and materials rubbish of all kind and leveled properly. Contractor shall provide pegs, nails string labours skilled or unskilled and necessary equipment required for line out.
- All foundation pits and trenches shall be taken down to such steps as shown in drawing or as directed by the Engineer-in-charge. The bottom of the foundation trenches shall be dressed perfectly leveled & water removed before foundation concrete is laid. The site of trenches shall be vertical. Before any filling in foundation with concrete commenced the foundation shall get approved.
- Such excavation below design foundation level shall be filled in with foundation concrete as per item no. without any extra payment.
- The rates include site clearance such as clearing of shrubs, wood under growth & small trees and providing necessary shoring and strutting for maintaining the profile of foundation true to the section.

If required the contractor shall also take care to see that the steps of excavation are stable, so that no accident or slip would occur. However if the contractor carries out the excavation of steps for the conveyances and safety with the permission of Engineer - in - Charge. No extra payment shall be made for such extra excavation. The extra excavation thus done on site shall have to be refilled with excavated materials as directed by the Engineer in charge for which no extra payment shall be made.

- The foundation pits and trenches, after completion of masonry up to ground level, shall be backfilled to the original surface with excavated materials well watered and rammed in the manner as directed by the engineer-in-charge. The excavated stuff shall be laid within distance of 50 m. from the foundation edge leaving 2m space from the edge of foundation excavation. However there will be no objection in laying the excavated materials if suitable in plinth, if adjoining block in layers as required the masonry work is completed up to plinth level and foundation trenches are back filled. However if the material is used as specified above the plinth filling the measurement of such materials are as under item. The line out pegs fixed for foundation excavation shall be maintained till the foundation concreted & plinth masonry area laid.
- No deduction will be made for materials being excavated are dry, moist or not. Measurement shall be taken by a steel tape and shall be paid on cubic meter basis of excavation done and full rates for the work done shall be payable only after the items completed in all respect including back filling the pits or trenches with excavated stuff. Till the back filling is completed, payment shall be made at a part rate equal to 80% of the tendered rate. No extra payment shall be made for back filling.
- The measurements shall be taken on CMT basis.

Item No:-3 Providing & laying foundation concrete of proportion as under by using cement, sand and machine crushed coarse aggregate laid in situ including necessary tamping, smooth finishing, watering and curing as directed with all leads and lifts etc complete. (A) PCC 1:3:6

- 1.1 Cement, sand coarse aggregate, water and concrete shall conform to the relevant general technical specification. Provision of workmanship shall be as per relevant general technical specification of concrete work.
- 1.2 The cement concrete shall be in C.C. Normal concrete for waste weir for including necessary form work, centering, mixing, laying, vibrating, finishing, curing scaffolding etc. comp incl. cost of all other material tools, plants, equipment's, transportation of all materials labour etc. execution of this item for all lifts and leads. The foundation bed shall be watered before laying concrete. The concrete shall be compacted by tamping the concrete & shall be finished smooth by float to the exact lines and levels shown in the drawings or as directed.
- 1.3 The max. size of aggregate shall be 40 mm. No patch repair to the surface by plaster shall be permitted. The concrete shall be laid true to the profile specified or shown on the drawing. Special care shall have to be taken in providing aligning and fixing centering and in laying and vibrating the concrete. So as to

have correct geometrical shape of the structure.

1.1 Mixing

- 1.1.1 The concrete shall be mixed in a mechanical mixer at the site of work. Hand mixing may however be allowed for smaller quantity of work if approved by the Engineer-in-charge.

In this case of the work, it shall be carried out on a watertight platform and care shall be taken to ensure that mixing is continued until the mix is uniform in colour and consistency. If the mix is not found proper in colour & consistency 10% more cement than otherwise required shall have to be used without any extra cost. The mixing in mechanical mixers shall be done for a period 1 to 2 minutes. The quantity of water shall be optimum to produce a dense concrete of required workability for the purpose.

1.2 Curing

- 1.2.1 After the final set the concrete shall be kept continuously wet, if required by ponding for a period of not less than 28 days from the date of placement.

1.3 Mode of Measurement and Payment

Measurement and payment of concrete shall be made on the basis of the actual volume of the concrete in cubic meter.

Item No:-4 Providing & laying cc 1:2:4 grade using cement, sand & crushed metal including, providing & erecting necessary form work, centering, vibrating, smooth finishing, watering & curing as directed with all leads & lifts etc complete. (a) sub structure.

- **Material**

- The cement concrete shall be of one part of cement, two parts of sand and four parts of 12 mm to 20mm size machine crushed kapachi measured by volume, cement shall be port-land. cement shall be stacked in dry and strong room Water shall conform to 1.0 Cement shall conform to 2.0 Sand shall conform to 3.0 Machine crushed coarse aggregate 20mm to 40mm size confirm to 7.3

- **Sand**

- The sand shall be clean coarse grain in and approved quality. Internal perfectly free from admixtures alkaline, organic and vegetable materials and other impurities.

- **Coarse aggregate**

- The coarse aggregate shall be free from all impurities and harmful materials. The aggregates shall be got approved from Engineer in charge. Water shall be clean potable and free from admixtures and alkaline salts. All the materials shall be stacked in such a manner there shall no admixture of dirt, dust to which effect the strength of the concrete

- **Centering**

- Centering shall be sufficiently strong of good quality of steel plate or timber The centering shall be got approved in such a fashion that while receiving from work, the surface of concrete shall be not damaged

- **Preparation of Mix**

- The preparation of cement and coarse aggregate shall be one part of cement, 2 parts of sand, 4 parts of stone aggregate and shall so measured by volume.

- **Mixing**

- Concrete shall be mixed in a mechanical mixer of approved type which will ensure a uniform distribution of the materials throughout the mass. Work mixing may however be allowed for

smaller quantity of work. Hand mixing is permitted by the Engineer in charge in case of break down of machineries of mixer. It shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. No batch of hand mixing shall be of more than two bags of cement. The quantity of water shall be sufficient to produce a dense concrete of required workability for the purpose.

- **Transporting and placing of concrete**

- The concreting shall be laid within ten minutes after mixing in uniform, width and thickness as shall be taken place gently in position and to down a height to avoid aggregation.
- The work of converting shall be done continuously in one operation up to constructional joints the position and location of which shall be predetermined by the Engineer. Next day concrete shall be done for racking out joints of roughening the surface clearing the surface/in roughly and setting the some cement slurry.
- The work of converting shall be done continuously in one operation up to constructional joints the position and location of which shall be predetermined by the Engineer. Next day concrete shall be done for racking out joints or the some cement slurry.

- **Compaction**

- The concrete shall be rammed with gravity iron rammers and to get the required compaction and to allow the interstices to be filled of with mortar

- **Curing**

- Curing shall be done for 21 days. It shall be done by a special method by means of gunny bags forming pool on top of slab as directed. Form work shall be removed after permission of the Engineer in charge. All centering shall be removed without shorted or vibrated.

- **Finishing**

- All exposed faces of the concrete work shall be finished smooth with plaster C:M 1:2 with near cement as directed without any extra payments.

- **Mode of measurements & Payment**

- The concrete shall be measured for its length, breadth and depth. Limiting dimension to those specified in plan of as directed. The rate shall be for a unit of one Cubic meter

Item No:-5 Providing & laying TMT Fe-500 steel bar reinforcement for R.C.C. works and anchor bars with providing binding wires including cutting, bending, welding, binding in position, hooking, placing in position with all leads & lifts etc, complete.

1.0 General

This work shall consist of furnishing and placing coated, or uncoated TMT or high strength deformed reinforcement, bars (intentioned) of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer in charge.

1.1. MATERIAL

1.2 TMT Bars

Reinforcements may be either TMT/medium tensile steel or high strength deformed bars. They may be uncoated or coated 'with epoxy or with approved protective coatings.

1.3. TMT bars reinforcement for RCC work shall conform to IS 1786 FE-500 and shall be of tested quality. It shall also comply with relevant part of IS 456-1966

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

1.5. All steel shall be procured from original producers or re-rolled steel shall be incorporated in the work

1.6. Only new steel shall be delivered to the site every bar shall be inspected before placing to its position and defective brittle or burnt bar shall be discarded cracked ends of bars shall be discarded

2.0.Pitch

2.1. Distance between bars shall be as specified in drawings and as directed by the Engineer in Charge. all bars shall be placed at an accurate distance from each other and shall be bind tightly to maintain the desired pitch Suitable means shall be provided for holding bars securely in position

3.0.Bindingwire

3.1.Mild steel binding wire shall be of 1.63mm or 1.22mm (16 to 18 gauge diameter and shall conform IS 280- 1972
3.2 The use of black wire will be permitted for binding reinforcement bars. It shall be free from dirt, paint, grease or oil. oil scale or loose or thick rust and any other undesirable coating which may prevent adhesion of cement mortar at the time of binding
3.3 Only new binding wire shall be delivered to the site all binding wire shall be inspected before binding to its position and defective brittle, rusted, used wire, shall be discarded

5.0.PROTECTION OF REINFORCEMENT

5.1 Uncoated reinforcing steel shall be protected from rusting or chloride contamination rebarments shall be free from rust, mortar, loose mill scale, grease, oil or paints. This may be ensured either by using reinforcement fresh from the factory or thoroughly cleaning all reinforcement to remove rust using any suitable method such as sand blasting, mechanical wire brushing, etc as directed by the Engineer. Reinforcements shall be stored on bricks, racks or platforms and above the ground in a clean and dry condition and shall be suitably marked to facilitate inspection and identification.
5.2 Portions of uncoated reinforcing steel and dowels projecting from concrete shall be protected within one week after initial placing of concrete with a brush coat of neat cement mixed with water to a consistency, of thick paint. This coating shall be removed by lightly tapping with a hammer or other tool not more than one week before placing of the adjacent pour of concrete Coated reinforcing steel shall be protected against damage to the coating. If the coating on the bars is damaged during transportation or handling and cannot be repaired, the same shall be rejected.

6.0. Workmanship

6.1. The work shall consist of furnishing and placing reinforcement to the shape and dimensions shown as on the drawings or as directed by The Engineer in charge.
6.2. Reinforcing steel shall conform accurate to the dimensions given in the bar bending schedules shown on relevant drawing

7.0. BENDING OF REINFORCEMENT

7.1. Bar bending schedule shall be furnished by the Contractor and got approved by the Engineer before start of work.
7.2. Reinforcing steel shall conform to the dimensions and shapes given in the approved Bar bending Schedules.
7.3. Bars shall be bent cold to the specified shape and dimensions or directed by the Engineer using a proper bar bender operated by hand power to obtain the correct radius of bends and shape. Bars, shall not be bent or straightened in a manner that will damage parent material or the coating bars bent during transport or handling shall, be straightened before being used on work and shall not be heated to facilitate straightening.

8.0.PLACING OF REINFORCEMENT

8.1. The reinforcement cage should generally be fabricated in the yard at ground level, and then shifted and placed in position. The reinforcement shall be placed strictly, in accordance with drawings and shall be assembled in position, only when structure is otherwise ready for pouring of concrete. Prolonged time gap, between assembling of reinforcements and casting in concrete, which may result in rust formation on the surface, shall not be permitted.

- 8.2 Reinforcement bars shall be placed accurately in position as shown on the drawings. The bars, crossing one another shall be tied together at every intersection with binding wire (annealed), conforming to IS:280 to make the skeleton of the reinforcement rigid such that the reinforcement does not get displaced during placing of concrete, or any other operation. The diameter of binding wire shall not be less than 1 mm.
- 8.3 Bars shall be kept in position usually by the following methods
in case of beam and slab construction, industrially produced polymer cover blocks of thickness equal to the specified cover shall be placed between the bars and form work subject to satisfactory evidence that the polymer composition is not harmful to concrete and reinforcement. Cover blocks made of concrete may be permitted by the Engineer, provided they have the same strength and specification as those of the member.
- 8.4 In case of dowels for Columns and walls the vertical reinforcement shall be kept in position by means of timber templates with slots in them accurately, or with cover blocks tied to the Reinforcement. Timber templates shall be removed after the concreting has progressed up to a level just below their location.
- 8.5 Layers of reinforcements shall be separated by spacer bars at approximately one meter intervals. The minimum diameter of spacer bars shall be 12 mm or: equal to maximum size of main reinforcement or maximum size of coarse aggregate, whichever is greater. Horizontal reinforcement shall not be allowed to sag between supports.
- 8.6 Necessary stays, blocks, metal chairs, spacers, metal hangers, supporting wires etc, or other subsidiary reinforcement shall be provided to fix the reinforcements firmly in its correct position.
- 8.7 Use of pebbles, broken stone, metal pipe, brick; mortar or wooden blocks etc as devices for positioning reinforcement shall not be permitted.
- 8.8 Bars coated with epoxy or any other approved protective coating shall be placed on supports that do not damage the coating. Supports shall be installed in a manner such that planes of weakness are not created in hardened concrete. The coated reinforcing steel shall be held in place by use of plastic or plastic coated binding wires especially manufactured for the purpose.
- 8.9 Placing and fixing of reinforcement shall be inspected and approved by the Engineer before concrete is deposited.
- 9.0 Lapping
- 9.1 All reinforcement shall be furnished in full lengths as indicated on the drawing. No splicing of bars, except where shown on the drawing will be permitted without approval of the Engineer. The lengths of the splice shall be as indicated on drawing or as approved by the Engineer. Where practicable, overlapping bars shall not touch each other, and shall be kept apart by 25 mm or $1\frac{1}{4}$ times the maximum size of coarse aggregate, whichever is greater. If this is not feasible overlapping bars shall be bound with annealed steel binding wire, not less than 1 mm diameter and twisted tight in such a manner as to maintain minimum clear cover to the reinforcement to the concrete surface. Lapped splices shall be staggered or located at points, along the span where stresses are low.
- 10.0 Welding
- 10.1 Splicing by welding of reinforcement will be permitted only if detailed on the drawing or approved by the Engineer. Weld shall develop an ultimate strength equal to or greater than that of the bars connected.
- 10.2 While welding may be permitted for TMT reinforcing bars conforming to IS: 432, welding of deformed bars conforming to IS: 1786 shall in general be prohibited. Welding may be permitted in case of bars of other than S 240 grade including special. Welding grade of S 500 grade bars conforming to IS: 1786, for which necessary chemical analysis has been secured and the carbon equivalent (CE) calculated from the chemical composition using the formula: $CE = C + Mn + Cr + Mg + V + Ni + Cu \div 100$ is 0.4 or less.
- 10.3 The method of welding shall conform to IS: 2751 and IS: 9417 and to any supplemental specifications to the satisfaction of the Engineer.
- 10.4 Bars shall be bent cold to the specified shape and dimensions or as directed by Engineer in charge using the proper bender tool, operated by hand or power to attain proper radius of bends. Bars shall not be

bend or straightened in a manner that will injure the material. Bars bent during transport or handling shall be straightened before being used in the work. Bars shall not be heated to facilitate bending. Unless otherwise specified a 'U' type hook at the end of each bar shall invariably be provided to main reinforcement. The radius of the bar shall not be less than twice the diameter of the round bar and the length of the straight part of the bar beyond the end of the curve shall be at least four times of the diameter of the round bar. In case of bars which are not round and in case of deformed bars, the diameter shall be taken as the diameter of circle having an equivalent effective area the hooks shall be suitably encased to prevent any spilling of the concrete.

- 10.5. All reinforcement bars shall be accurately placed in exact position shown on the drawings and shall be securely held in position during placing of concrete by annealed binding wire not less than 1 mm in size and by using say blocks or metal chairs spacers, metal hangers, support wires or other approved devices at sufficiently close intervals, Bars shall not be allowed to sag between supports not displaced during concreting or any other operations of the work devices used for positioning shall be of non-corrodible material wooden and metal supports shall not extend to the surface of the concrete, except where shown in drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not be allowed. Pieces of broken stone or brick and wooden blocks shall not be used. Layers of bars shall be separated by spacers pre-cast mortar blocks or other approved devices. Reinforcement after bending placed in position shall be maintained in a clean condition until completely embedded in concrete, Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed. To prevent reinforcement from corrosion, concrete cover shall be provided as indicated on drawings, All bars protruding from concrete and to which other bars are to be lapped and which are likely to be exposed for a period exceeding 10 days shall be protected by a thick coat of neat cement grout.
- 10.7 Bars crossing each other where required shall be secured by binding wire (annealed) of size not less than 1 mm in such a manner that they do not slip over at the time of fixing and concreting.
- 10.7 As far as possible bars of full length shall be used in case this is not possible, overlapping of bars shall be done as directed by the Engineer in charge. When practicable overlapping bars shall not touch each other, but be kept apart by 25 mm. Where no feasible overlapping bars shall be bound with annealed wires not less than 1 mm thick twisted tight. The overlaps shall be staggered for different bars and located at points along the span where neither shear nor bending moments is maximum.
- 10.8. Whenever indicated on drawing as desired the Engineer in charge bars shall be jointed by Coupling which shall have a cross section sufficient to transmit the full stresses of bars. The end of the bars that are jointed by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than the normal cross section of the bar. Threads shall be standard threads. Steel for coupling shall conform to IS 226.
- 10.8. When permitted or specified on the drawings joints of reinforcement bars shall be butt-welded so as to transmit their full stresses. Welded joints shall preferably be located at points when steel will not be subject to more than 75 percent of the maximum permissible stresses and welds so staggered that at any one section not more than 20 percent of the rods are welded. Only electric arc welding using a process which excludes air from the molten metal and conforms to any or other special provisions for the work shall be accepted. Suitable means shall be provided for holding bars securely in position during welding. It shall be ensured that no voids are left in welding and when welding is done in two or three stages previous surface shall be cleaned properly. Ends of bars shall be cleaned of all loose scale, rust, scale, paint and other foreign matter before welding. Only competent welders shall be employed on the work. The M S electrodes used for welding shall conform IS 814. Welded pieces of reinforcement shall be tested. Specimen shall be taken from the actual site and their number and frequency shall be as directed by the Engineer in charge.

Mode of Measurement and Payment

11.1 For the purpose of payment the bar shall be measured correct up to 10mm length and weight payable works out at the rate specified below

1.	6mm	0.22 K.g./Rmt
2.	8mm	0.39 K.g./Rmt
3.	10mm	0.62 K.g./Rmt.
4.	12mm	0.89 K.g./Rmt
5.	14mm	1.21 K.g./Rmt
6.	16mm	1.58 K.g./Rmt
7.	18mm	2.00 K.g./RMT
8.	20mm	2.47 K.g./RMT
9.	22mm	2.98 K.g./RMT
10.	25mm	3.85 K.g./RMT
11.	28mm	4.83 K.G.RMT
12.	32mm	6.31 K.G.RMT
13.	36mm	7.99 K.G.RMT
14.	40mm	9.86 K.G.RMT

11.1 Excess consumption over 5% will be charged at penal rate.

11.2 Reinforcement shall be measured in length including overlaps, separately for different diameters as actually used in the work. Where welding or coupling is resorted to, in place lap joints, such joints shall be measured for payment as equivalent length of overlap as per design requirement. From the length so measured, the weight of reinforcement shall be calculated in tones on the same basis of as per table given above even though steel is supplied to the contractor by the department on actual weight. Length shall include hooks at the ends. Wastage and annealed steel wire for binding shall not be measured and the cost of these items shall be deemed to be included in the rate for reinforcement.

11.3 The rate for reinforcement includes cost of steel binding wires, its carting from Department Store to work site with all leads and lifts (in case of it is supplied by department), cutting, bending, placing in position, binding and fixing in position as shown on the drawings and as directed. It shall also include all devices for keeping reinforcement in approved position, cost of joining as per approved method and all wastage and spacer bars.

The Rates shall be for unit of One M.T.

Item No:-6 Providing and laying dry rubble pitching of various thickness to required grade including trimming of earth work, hand packing the interstices with spalls, filling earth in interstices panelling complete for all leads and lifts (a) 230 MM thick

Detailed Technical Specification*

MATERIAL:

Rubble (STONE): The pitching material shall consist of the most durable rock fragments of approved quality selected for the purpose. Stones shall be hard, sound, free from cracks, decay and weathering. Stone shall be used from surplus usable excavated rubble or from the approved quarries

if required and shall be subject to thorough inspection. The quality of individual stones shall be hard, dense, sound and resistant to abrasion and shall be free from cracks, seams, shale partings, conglomerate, bands and other defects that would tend to increase unduly their susceptibility to destruction by water and weathering action. The shape of the individual stones shall be angular. Stones having thickness less than 33% of their maximum dimensions shall not be used for pitching. Stones with round surface shall not be used. Stones when immersed in water for 24 hours shall not absorb water by more than 5 percent of their dry weight when tested in accordance with IS: 1124-1974. or Specification M-5 of material section shall apply.

GENERAL:

First, the slope of earth work shall be properly dress to design slope with filling the minor pits with same material incl. tamping, watering etc.

Stone to be used for pitching shall of dense, durable, solid, free from cracks, seams, sale particles and other defects. The shape of individual stone shall be of angular. No stone weighing less than 25 kg (average) and weighing more than 40 kg shall be used. Maximum 10% (of quantity of stone) spauls for filling the interstices and tight packing the pitching stone shall be used. The stone having thickness less than 50% of their maximum dimension shall not be used. The stone shall be placed on edge with its broad base down and face normal to the slope with necessary hand packing like manner. Stones and spauls shall be tightly driven into the interstices to wedge the riprap in place and close direct opening to the underlying surface. The stone shall be laid in a compact manner being at the bottom of the slope. Relevant specification of item shall be applied.

SCOPE OF WORK:

The scope of the work includes dressing the slope of earth work, Providing and laying dry rubble stone pitching without base but with including hand packing and trimming & dressing slopes etc complete 23 cms thick stone pitching.

WORKMANSHIP:

The layer of specified thickness dry rubble stones shall be laid on the prepared slope to work as a stone layer as specified in the drawing. The laying of the pitching stone shall be from the lowest elevations to upwards. While laying the stone, care shall be taken to have minimum of joints space. Joints should be break in all directions, so that they are well keyed together. Job shall be completed with best workmanship like manner.

MODE OF MEASUREMENT AND PAYMENT:

The Measurement of this item shall be made on square meter basis of pitching laid dry rubble stone pitching without base but with hand packing and trimming & dressing slopes along with 23 cms thick stone pitching etc. complete.

No deduction for any voids shall be made.

The rate includes quarrying the materials, transporting the same to the site, loading unloading with all lead and lift. The payment of the item shall be made on the square meter basis for the completed item in all aspects.

Item No:-7 Excavation for deepening of pond/checkdam including transporting and spreading the excavated material for raising of embankment in uniform layer or as directed including dressing breaking clods etc for lead upto 1 km and all lift without rolling and watering etc. complete

- This shall include soil silt, sand, gravel, soft murrum stuffy clay, kankar and other soft materials, which can be easily excavated by means of picks and shovel loose stones not exceeding 0.03 CUM which dose not required breaking up shall be treated as soil.
- Lead is 1000 mt. from the borrow area from which earth is obtained and item includes all lift for conveying the earth from borrow area to its deposited places. The land required for earth work i.e. for cutting shall be cleared of all trees having a growth of 20cms. And less, Loose stones, vegetable, bushes, stumps and all other objectionable materials. All materials cleared will be property of the Government.
- After clearing the site, the center line will be given by the Engineer-in-charge. The contractor shall provide all labour and materials such like as strings, pegs, nails, bamboos, and stones etc, required for setting out the bench mark. Initial levels for existing ground shall be taken and recorded in the presence of the contractor. The contractor shall sign in level books for acceptances of the level etc. The line out shall be clearly marked and profiles of embankment where excavated materials area to be used shall be set up.
- All excavated materials shall be deposited for embankments away from the excavated borrow area as and where directed by the Engineer-in-charge. It should not be deposited nearer to the borrow area. The excavated stuff shall be deposited by means of trolleys equipment with required Lead and all lift. It shall be directly deposited at required location in specified layer. No extra conveyance charges shall be paid for shifting of temporary deposited elsewhere.
- After completion of excavated portion, final levels shall be taken up in presence of the contractor. The contractor shall be paid for a unit one cubic meter. Excavations shall be measured in original position by taking cross-section before the work start and after it is entirely completed. The quality shall be work out by the average area method. The measurement shall be made on 'CMT' basis.
- The contractor shall hire to prepare the excavated tank bed in required slope as directed by the Engineer-in-charge. The bottom of excavated area shall be leveled both longitudinally and transversely.
- The excavated stuff shall be used in filling the trenches or used in bund. The balance of excavated quantity shall be removed by the contractor from the site of work to a place as directed within 1000mt lead.
- The payment shall be made on cubic meter basis.

**Item No.8 Excavation in all sorts of soil (including wet and slushy condition of soil) with yellow, sandy, gravelly soil including soft murrum, & H.M including sorting & stacking and depositing the excavated stuff in uniform layers as and where directed upto lead of 30m and lift as shown below including clearing the site etc. compute (including dewatering)
(A) For canal capacity (a) 0 to 3 mt depth**

1. Scope of Work

The work includes:

Excavation in all types of soil such as:

Yellow soil, Sandy soil, Gravelly soil, Soft murrum, Hard murrum (H.M.), Wet and slushy soil conditions, Excavation for canal section up to 3.00 m depth, Sorting and stacking of useful materials, Depositing excavated material in uniform layers, Lead up to 30 meters, All lifts Site clearing, Dewatering wherever required, Dressing to required bed level and gradient

2. Site Preparation

Clearing of site including removal of: Bushes, Vegetation, Roots, Rubbish, Setting out of canal alignment, bed width, side slopes and levels, Reference benchmarks to be established

3. Method of Excavation

Excavation shall be carried out: Manually or

By mechanical means (Excavator/JCB/Poclaim) as directed by Engineer-in-Charge,

Excavation shall conform to: Required bed level, Designed side slopes, Specified canal capacity section

Side slopes shall be maintained true to design, Over-excavation shall be made good at contractor's cost.

4. Depth Classification

Depth: 0.00 m to 3.00 m, Measurement shall be taken from: Natural ground level (NGL) to

Final excavated bed level

5. Handling of Excavated Material

Useful soil shall be:

Sorted, Stacked separately, Deposited in spoil bank or, Spread in uniform layers for bund formation as directed

Lead: Up to 30 meters

Lift: As required (included in rate)

6. Dewatering

Dewatering shall be carried out:

By pumps, By bailing out, By diversion channels

Work must be executed in dry condition

Cost of dewatering included in item rate

No extra payment shall be made

7. Dressing & Finishing

Canal bed shall be: Properly dressed, Leveled to required gradient, Free from loose soil

Side slopes neatly trimmed

8. Safety & Protection

Proper slope cutting to avoid collapse, Barricading if required, Precautions in slushy/wet soil areas.

9. Measurement

Measurement shall be in Cubic Meter (m^3)

Based on:

Designed canal section, Approved drawings, No payment for Over excavation and Collapse due to contractor negligence

10. Rate Includes

The rate shall include:

Labour, Machinery, Fuel, Lead & lift up to 30m, Dewatering, Site clearance, Sorting & stacking, All incidental charges, Complete execution as per specification

Item No.9 Providing and Laying 7.5 cms thick cast in situ cement concrete 1:3:6 grade with the use of crushed aggregate for canal lining works including use of all equipment, scaffolding, centering form works etc, including dressing the slopes and bed in earth and murrum to correct profile with finishing as required to the exposed surface, making asphalt joints as directed watering & curing incl. providing & laying a pair of horizontal sleeper & transverse sleepers at every 3.0 mt interval of CC 1:3:6 grade and 7.5 cm x 15 cm cms in section with all leads and lifts etc.

Scope of Work

The work includes: Providing and laying 75 mm thick cast-in-situ cement concrete of mix 1:3:6 (Cement : Sand : Coarse Aggregate), Use of machine-crushed aggregate, Dressing and preparation of canal bed and slopes, Providing horizontal and transverse sleepers at 3.0 m interval, Formwork, scaffolding, tools and plants Making asphalt joints, Watering and curing, All leads and lifts complete. The work shall be executed as per relevant clauses of: Bureau of Indian Standards Indian Roads Congress guidelines (where applicable)

2. Materials

2.1 Cement

Ordinary Portland Cement (OPC) conforming to:
Bureau of Indian Standards (OPC 33 Grade), Fresh, free from lumps.

2.2 Fine Aggregate

Clean river sand or crushed sand
Conforming to IS 383
Free from silt, clay, organic impurities

2.3 Coarse Aggregate

Machine crushed hard stone aggregate
Graded as per IS 383
Maximum size: 20 mm (unless specified otherwise)
Clean, angular, durable

2.4 Water

Clean and potable, Free from harmful salts, oils, acids, As per IS 456

2.5 Asphalt for Joints

Hot blown bitumen VG grade as approved
Applied as per design thickness

3. Preparation of Subgrade

Canal bed and slopes shall be:
Excavated to correct line, level and gradient
Dressed properly, Compacted to required density, Surface shall be: Free from loose soil
Properly watered and rammed, Approved by Engineer before concreting
Any soft spots shall be removed and refilled with approved material.

4. Concrete Mix

Nominal mix proportion: 1 : 3 : 6
Mixing by mechanical concrete mixer only
Water-cement ratio: As required for workable mix (generally 0.5–0.6)
Slump: 25–50 mm (low slump for lining work), No hand mixing shall be permitted unless approved.

5. Laying of Concrete

Thickness: 7.5 cm (75 mm), Concrete shall be laid in panels between sleepers.
Proper formwork/side shutters shall be fixed firmly.
Concrete shall be: Spread uniformly, Compacted using needle vibrator or screed vibrator
Finished with wooden float, Surface shall be smooth, even and true to line and slope.

6. Sleepers

Providing & laying a pair of sleepers at every 3.0 m interval:
Type: Cast in situ CC 1:3:6, Section size: 7.5 cm × 15 cm
Includes: One horizontal sleeper, One transverse sleeper
Proper alignment and compaction required.
These sleepers divide lining into panels of 3 m length.

7. Joints

Asphalt joints shall be provided as directed.

Joints shall be Cleaned, Filled with hot bitumen/asphalt, Properly sealed, Expansion joints to be provided where specified.

8. Curing

Curing shall start after 24 hours of laying.

Continuous curing for minimum 14 days.

By ponding or wet gunny bags.

No traffic allowed during curing period.

9. Finishing

Surface shall be: Smooth, Free from cracks, Uniform thickness, Proper slope maintained, Permissible tolerance: Thickness ± 5 mm, Line & level ± 10 mm,

10. Scaffolding, Centering & Formwork

Strong and rigid formwork

Proper alignment

Removed after sufficient setting

No extra payment for formwork

11. Measurement

Measured in Square Meter (Sq.m)

Thickness considered: 7.5 cm

No separate payment for: Formwork, Sleepers, Joints, Curing, Leads & lifts, All inclusive rate.

12. Rate Includes

Materials (cement, sand, aggregate, bitumen)

Labour, Machinery & equipment, Surface preparation, Sleepers, Asphalt joints, Curing

All leads and lifts, Complete in all respects

Signature of Contractor

Signature of Executive Engineer

SECTION-6
FORM OF BID

FORM OF BID

Description of the Works:

BID

To :

Address :

1. We offer to execute the Works described above and remedy any defects therein in conformity with the conditions of Contract, specification, drawings, Bill of Quantities and Addenda for the sum (s) of

(-----)

2. We undertake, if our Bid is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Engineer's notice to commence, and to complete the whole of the Works in the Contract within the time stated in the document.
3. We agree to abide by this Bid for the period of 120 Days from the date fixed for receiving the same, and it shall remain binding upon it and may be accepted at any time before the expiration of that period.
4. Unless and until a formal Agreement is prepared and executed this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.
5. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this ----- day of ----- 20

Signature ----- in the capacity of -----

----- duly authorized to sign bids for and on behalf of -----

(in block capitals or typed)

Address

Witness

Address

Occupation

SECTION-7
BILL OF QUANTITIES

BILLOFQUANTITIES

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 price 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 sledge hammers, 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 (UptoINR50Cr.)

Item No	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Amount
1	Item No:-1 Jungle clearance of specified category and bushes for canal / dam work as directed with disposing materials etc. complete. (Excluding tree of girth above 0.5Mt.)(a) Medium dense. [SSC-2 S.O.R 2024-25 chapter No.6 It.No.-5(b)]	1.78	Ha.	20708.00	36860.24
2	Item No:-2 Excavation in all sorts of strata and formations incl. depositing the unusefulexavated stuff as and where directed including sorting and stacking useful material as required and upto200 mts. and all lifts etc. complete incl. dewatering (a)Inoverburden incl.hardmurrum. [SSC-2 S.O.R 2024-25chapter No.2 It.No.-2(a)]	509.00	Cu.M.	89.00	45301.00
3	Item No:-3 Providing and laying foundation concrete of proportion as under by using cement, sand and machine crushed coarseaggregatelaidinsituincludingnecessarytemping,smoothfinishing,watering and curing as directed with all leads and lifts etc complete. [SSC-2 S.O.R 2024-25 chapter No.5 It.No.-2 (a)]	101.00	Cu.M.	3424.30	345854.30
4	Item No:-4 Providing and laying CC 1:2:4 grade using cement, sand and crushed metal including providing and erecting necessaryformwork, centering, vibrating ,smoothfinishing,wateing and curing as directed with all leads and lifts etcvcomplete. (a) Sub structure [SSC-2 S.O.R 2024-25 chapter No.5 It.No.-3 (a)]	340.00	Cu.M.	4873.40	1656956.00
5	ItemNo:-5 Providing & laying TMT Fe-500 steel bar reinforcement for R.C.C. works and anchor bars with providing bindingwiresincludingcutting,bending,welding,binding inposition, hooking, placing in position with all leads & lifts etc, complete. [SSC-2 S.O.R. Irrigation 2024-25 Chapter 4 It.No. 18(c)]	2.37	M.T.	71366.00	169137.42
6	Item No:-6 Providing and laying dry rubble pitching of various thickness to required grade including trimming of earth work, hand packing the interstices with spauls, filling earth in interstices panelling complete for all leads and lifts (a) 230 MM thick (As per Irri. Central Gujarat S.O.R., I.No.-S-21(a) for year 2023-24)	2250.00	Sq.M t	339.80	764550.00
7	Item No:-7 Excavation for deepening of pond/checkdam including transporting and spreading the excavated material for raising of embankment in uniform layer or as directed including dressing breaking clods etc for lead upto 1 km and all lift without rolling and watering etc. complete [SSC-2 S.O.R. Irrigation 2024-25 Chapter 4 It.No. 21]	2700.00	Cum	71.00	191700.00

8	Item No.8 Excavation in all sorts of soil (including wet and slushy condition of soil) with yellow, sandy,gravelly soil including soft murrum, & H.M including sorting & stacking and depositing the excavated stuff in uniform layers as and where directed upto lead of 30m and lift as shown below including clearing the site etc. compute (including dewatering) (A)For canal capacity (a) 0 to 3 mt depth [SSC-2 S.O.R.2024-25 Chapter 5 It.No. 1]	360.00	Cum	79.00	28440.00
9	Item No.9 Providing and Laying 7.5 cms thick cast in situ cement concrete 1:3:6 grade with the use of crushed aggregate for canal lining works including use of all equipment, scaffolding, centering form works etc, including dressing the slopes and bed in earth and murrum to correct profile with finishing as required to the exposed surface, making asphalt joints as directed watering & curing incl. providing & laying a pair of horizonatal sleeper & transverse sleepers at every 3.0 mt interval of CC 1:3:6 grade and 7.5 cm x 15 cm cms in section with all leads and lifts etc.[SSC-2 S.O.R.2024-25 Chapter 5 D It.No. 1A]	1800.00	Sq.Mt	341.30	614340.00
TotalAmount					38,53,138.96
Total Rupees Thirty Eight Lakh Fifty ThreeThousand One Hundred Thirty Eight and Ninety six Paisa Only					

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 as 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.

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 refuses 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 not state 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 Contractor 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 or of the Work to be performed thereunder or of any of the Contract documents which may be made between you 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 Contractor 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 or of the Work to be performed thereunder or of any of the Contract documents which may be made between you 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 or 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 Work 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 STRULY

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
(Letterhead 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 execute 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 thereto 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

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 amount of 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 (if Applicable)	As per NIT	-
8	Last Five Financial Year IT Return.	As per NIT	-
9	Undertaking for Engaging Technical Staff & Machineries	As per NIT	
10	Information regarding any litigation in which the applicant is involved	As per NIT	
11	Last 5-Years Turn Over (year wise) for Civil Engineering Works certified by CA (for Bid Capacity Evaluation) OR Details of civil engineering works completed in last 5 financial year	As per ITB Clause no 4.7 Bid Capacity	
12	Details of "works on hand" and "works tendered by bidder, found lowest (l1) & works likely to be awarded (for Bid Capacity Evaluation)	As per ITB Clause no 4.7 Bid Capacity	
13	Undertaking on statement of compliance of clause 3.2	-	
14	Affidavit (Notarized affidavit on 300 Rs Stamp Paper)	-	
15	Form of Bid	-	
16	Undertaking for bid Validity	-	

UNDERTAKINGFORENGAGINGTECHNICALSTAFF&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)	2019-2020	1.61	
(2)	2020-2021	1.46	
(3)	2021-2022	1.33	
(4)	2022-2023	1.21	
(5)	2023-2024	1.10	
(6)	2024-2025 (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. Bidders 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 Work 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

.....

Here by 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:-.....

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 or any contract awarded to us for
such work has 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 agree 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 PROVIDED 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

