

GOVERNMENT OF GUJARAT



सत्यमेव जयते

NARMADA, WATER RESOURCES, WATER SUPPLY & KALPSAR DEPARTMENT

TENDER DOCUMENTS FOR

Name of Work: Construction of new inspection Bungalow at Meshwo reservoir project waste wier at village Venpur, Taluka : Shamlaji, Dist : Arvalli..

Estimated Cost Rs. :-

49,48,108.93

STANDARD BIDDING DOCUMENT PROCUREMENT OF CIVIL WORKS

COMPLETE BIDDING DOCUMENT

=====

Office of The
Superintending Engineer,
Himatnagar Irrigation Project Circle
Sinchai Bhavan, Durga Site,
HIMATNAGAR-383 001
Dist. Sabarkantha
Phone No. 02772-240771

Office of The
Executive Engineer
Aravalli Irrigation Division Modasa
Behind S.T. Stand
Modasa
Dist. Arvalli-383315
Phone No. 02774-243520

Index

<u>Sr No</u>	<u>Section</u>	<u>Description</u>	<u>Page No</u>
1		Invitation for Bid (IFB)	3
2	Section -1	Instructions to Bidders	7
3	Section -2	Qualification Information	28
4	Section -3	Conditions of Contract	36
5	Section -4	Contract Data	64
6	Section -5	Technical Specification	74
7	Section -6	Form of Bid	138
8	Section -7	Bill of Quantities	141
9	Section -8	Securities and Other Forms	146
10	Section -9	Drawings	158
11	Section -10	Documents to be furnished by Bidder	159

INVITATION FOR BID (IFB)

NATIONAL COMPETITIVE BIDDING

1. The Office of Executive Engineer, Aravalli Irrigation Division, Modasa 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

Pack age No.	Name of work	Approximate value of works (Rs.)	Bid security (Rs.)	Cost of docum ent	Period of completion	#Class of Registr ation / Categor y of contract or if required
1	2	3	4	5	6	7
	Construction of new inspection Bungalow at Meshwo resrvoir project waste wier at village Venpur, Taluka : Shamlaji, Dist : Arvalli..	49,48,108.93	50,000s/00	1500/-	11 Months	Class-B and Above And Special Building Category Class-3

2. Prospective / Interested bidder may download the Bid Documents from website <https://www.nprocure.com> free of cost till the Time and Date as mentioned on online NIT at website <https://www.nprocure.com>.

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

The Demand Draft for Bid Document / Tender fee and FDR / Bank Guarantee against Bid Security / EMD shall be submitted in electronic format through online (by scanning) while uploading the bid, this submission shall mean that bid document / tender fee and Bid Security / EMD has been received. Accordingly, the offer of only those shall be opened whose Bid Document / Tender Fee and Bid Security / EMD have been received electronically. However, for the purpose of realization of Demand Draft, and FDR / Bank Guarantee bidder shall send the same in original through R.P.A.D. so as to reach to #Executive Engineer, Aravalli Irrigation Division, Modasa within 7 Days from the last day of bid submission.

Penaltative action for not submitting Demand Draft / FDR / Bank Guarantee in original to Executive Engineer / Tender Inviting Authority by bidder shall be initiated. **WRD GR No. PRC-102014-1-MICell-K.1 Dated: 29/10/2014**

3. 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.
4. ~~A pre bid meeting will be held onat
.....hrs. at the office ofto 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.~~
5. #Bid Security (EMD) is equal to 1% of Estimated Amount put to bid / tender and should be rounded off to the next thousand rupees.
6. 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 then bidder and issued after the last date of submission of Bids, will not be considered or accepted.
 - D. The cost incurred by the contractor for this offer for clarification or attending discussion, conferences or site visits will not be reimbursed by the Employer or Engineer-in-Charge.
 - E. Conditional tender shall not be accepted.
 - F. Any changes, addition, alternation made in the prescribed form attached with tender are liable to be rejected.
 - G. Any change in format or conditional Bank Guarantee will not be accepted and the bidder will be considered non-responsive.
 - H. All the bidders are instructed to fill in information strictly in accordance with the format given in the checklist /qualification document / tender document.
 - I. It is mandatory for the bidders to supply each and every information as asked strictly in electronic format at appropriate places only.
 - J. Blank / insufficient information shall be treated as nil information and shall result in disqualification.
 - K. Even if the bidder has been qualified in a similar or larger size of project in the past, it shall not be deemed to be a ground / reason for not giving required information for this work / bid.
 - L. Information supplied for earlier projects shall not be considered while evaluation of this bid. The Government will not ask for any other information, unless it is found absolutely necessary by the competent authority.
 - M. If found necessary, the contractor will be intimated for negotiation,

For the works costing up to Rs. 7.5 crore (WRD Works), R s . 7.0 crore (ROAD/ BRIDGE/ BUILDING WORKS), Rs. 0.5 Crore (Electrical Works) kindly refer to GoG NWRWS & K Department's Circular No. Paracha/1097/1397(11)/pa.fa./

MICELL(k-1) dated 18/01/2018 and Dated 30/09/2022

For the works costing under Rs. 7.5 crore for Construction work of Water Resources Department, Rs. 7.0 crore for Roads, Bridges and Building and Rs. 050 crore for Electrical work following documents shall be submitted in electronic format only through online by scanning and the (i) Bid Document Fee / Tender Fee (ii) Bid Security / EMD should be sent in original to the Tender opening authority through RPAD, so as to reach the Executive Engineer within 7 days from last day of submission of Bid.

- (1) Bid Document Fee/Tender Fee
- (2) Bid Security/EMD 180 days or Valid EMD Exemption Certificate of Appropriate Class of Registration of Approved Contractors
- (3) Registration Certificate of AS per Notice
- (4) Registration Certificate of special category–Building Category III
- (5) GST Number
- (6) Pan Card
- (7) Current Calendar Year 2026 Solvency Certificate 20 percent of Approximate value
- (8) Format for site visit certificate dually sign by Self attested and with Latitude and Longitude photographs

SECTION - 1
INSTRUCTIONS TO
BIDDERS (ITB)

Section 1: Instructions to Bidders

Table of Contents

	Page No.		Page No.
A. General		D. Submission of Bids	
1. Scope of Bid	9	19. Sealing & Marking of Bids	19
2. Source of Funds	9	20. Deadline for Submission of Bids	19
3. Eligible Bidders	9	21. Late Bids	19
4. Qualification of the Bidder	9	22. Modification and Withdrawal of Bids	19
5. One Bid per Bidder	13		
6. Cost of Bidding	13	E. Bid Opening and Evaluation	
7. Site Visit	13	23. Bid Opening	20
		24. Process to be Confidential	21
B. Bidding Documents		25. Clarification of Financial Bids	21
8. Content of Bidding Documents	14	26. Examination of Bids and Determination of Responsiveness	21
9. Clarification of Bidding Documents	14	27. Correction of Errors	21
10. Amendment of Bidding Documents	15	28. Deleted	22
		29. Evaluation and Comparison of Financial Bids	22
C. Preparation of Bids		30. Deleted	22
11. Language of Bid	16		
12. Documents Comprising the Bid	16	F. Award of Contract	
13. Bid Prices	16	31. Award Criteria	23
14. Currencies of Bid and Payment	17	32. Employer's Right to Accept any Bid and to Reject any or all Bids	23
15. Bid Validity	17	33. Notification of Award and Signing of Agreement	23
16. Bid Security	17	34. Performance Security	23
17. Alternative Proposals By Bidders	18	35. Advance Payment and Security	24
18. Format and Signing of Bid	18	36. Dispute Review Expert	24
		37. Correct or Fraudulent Practices	24

A. GENERAL

1. Scope of Bid

- 1.1 The Employer Executive Engineer, Aravalli Irrigation Division, Modasa invites bids for the Construction of works (as defined in these documents and referred to as '**Construction of new inspection Bungalow at Meshwo reservoir project waste wier at village Venpur, Taluka : Shamlaji, Dist : Arvalli**') 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

#4.5 QUALIFICATION CRITERIA:

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

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

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

4.5.2 Base year and Escalation

~~The base year shall be taken as Current financial year~~

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

<u>Year</u>	<u>Financial Year</u>	<u>Multiplying factor</u>
Base year of inviting tender	20__20__	1.00
-1	20__20__	1.10
-2	20__20__	1.21
-3	20__20__	1.33
-4	20__20__	1.46
-5	20__20__	1.61

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

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

4.5.3. General Experience.

~~The Applicant shall meet with the following minimum criteria:~~

- ~~(a) Achieved a minimum annual financial turnover of Rs. ____ Crore for works in progress and completed in all classes of civil engineering construction works in any one year, over the last five financial years.~~
- ~~(b) Experience in successfully completing or substantially completing at least one contract of similar work (.....) of at least 40 percent of the value of proposed contract within the last five financial years.~~

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

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

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

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

- ~~(c) Contractor should have completed 60% of quantity of principal items of work like concrete, earthwork, pipeline, pumping station etc. within last five 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 Appendix.

4.5.5. Equipment Capabilities

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

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

4.5.6. Financial Position

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

- ~~4.5.7. The audited balance sheets for the last five years should be submitted, which must demonstrate the soundness of the applicant's financial position, showing long term profitability including an estimated financial projection for the next two years. If necessary, the employer will make inquiries with the applicant's bankers.~~

4.5.8. Litigation History

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

4.5.9. Disqualification

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

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

- ~~4.5.10. The bidder who have applied for corporate Debt Restructuring (CDR) / facing recovery proceedings from financial institutions / facing winding up processing / those under BIFR in the last 5 financial year shall be considered for bid qualification. However if the bank / financial institution has accepted the proposal of debt restructuring on or before the last date of online submission, the same shall be considered for further evaluation. An affidavit by bidder along with certificate~~

from bank must be produced in such cases. In case of Joint Venture agreement, this provision shall be applicable for both lead partner and JV partner.

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

4.6.1. Joint ventures must comply with the following requirement:

(a) Following are the minimum qualification requirements:

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

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

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

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

4.7. Bid Capacity.

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

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.

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

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

- ~~— Made misleading or false representation in the forms, statements and Attachments the submitted in proof the qualification requirements; and / or~~
- ~~— Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delay in completion, litigation history, or financial failures etc.; and/ or~~
- ~~— Participated in the previous bidding for the same work and had quoted unreasonably high bid prices and could not furnish rational justification to the employer.~~

5. One bid per bidder

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

6. Cost of Bidding

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

7. Site Visit

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

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

B. BIDDING DOCUMENTS

8. Content of Bidding Documents

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

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

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

9. Clarification Bidding Documents

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

~~9.2. Pre-bid meeting~~

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

~~9.2.2. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.~~

~~9.2.3. The bidder shall be required to submit any questions in writing or e-mail to reach the Employer not later than 03 days before the meeting.~~

~~9.2.4. Minutes of the meeting, including the question raised (Without identifying the source of enquiry) and the responses given will be published without delay on the tender website i.e. www.nprocure.com. Any modification of the bidding documents listed in sub-Clause 8.1 which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause 10 and not through the minutes of the pre-bid meeting.~~

~~9.2.5. Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.~~

10. Amendment of Bidding Documents

10.1 Before the deadline for submission of bids, the Employer may modify the bidding documents by issuing addendum or corrigendum.

10.2. Any addendum thus issued shall be part of the bidding documents. The Employer will assume no responsibility for the same.

10.3. To give prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may, at his discretion, extend as necessary the deadline for submission of bids, in accordance with Sub-Clause 20.2 below.

C. PREPARATION OF BIDS

11. Language of the Bid

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

12. Documents Comprising the Bid

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

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

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

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

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

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

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

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

13. Bid Prices

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

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

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

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

- 13.4 Deleted

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

14. Currencies of Bid and Payment

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

15. Bid Validity

- 15.1 Bids shall remain valid for a period of not less than 120 days after the deadline date for bid submission specified in Clause 20.

- 15.2 In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the bidders may extend the period of validity for a specified period. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his security for a period of the extension, and in compliance with Clause 16 in all respects.

#16. Bid Security

- 16.1. The Bidder shall furnish, as part of his Bid, a Bid security in the amount as shown in column 4 of the table of IFB for this particular work. This Bid security shall be in favor of Employer as named in Appendix and may be in one of the following forms;

- a. Bank Guarantee from any scheduled Indian bank, in the format given in Volume III. **(Bank Guarantee is applicable only for Bid Estimated Amount of 01 Crore and above) and Bank** Guarantee of Schedule and Private Banks shall be considered as per GoG Finance Department's Circular No. FD/MSM/e-file/4/2023/0057/D.M.O. Date 21/04/2023 or as per their latest amendment.
- b. Fixed Deposit Receipt issued by any Scheduled Indian Bank or a foreign Bank approved by the Reserve Bank of India.

OR

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

- 16.2. Bank guarantees (and other instruments having fixed validity) issued as surety for the bid shall be valid for 45 days beyond the validity of the bid i.e. total validity of 120+45 = 165 Days
- 16.3. Any bid not accompanied by an acceptable Bid Security and not secured as indicated in Sub-Clauses 16.1 and 16.2 above shall be rejected by the Employer as non-responsive.
- 16.4. The Bid Security of unsuccessful bidders will be returned within 28 days of the end of the bid validity period specified in Sub-Clause 15.1
- 16.5 The Bid Security of the successful bidder will be discharged when the bidder has signed the Agreement and furnished the required Performance Security.
- 16.6. The bid Security may be forfeited
- (a) If the Bidder withdraws the bid after Bid opening during the period of Bid validity.
 - (b) If the Bidder does not accept the correction of the Bid Price, if any or
 - (c) In the case of a successful Bidders, if the Bidder fails the specified time limit to
 - (i) Sign the Agreement; or
 - (ii) Furnish the requirement Performance Security.
 - (d) #If found necessary, the bidder will be intimated for negotiation, He will be intimated maximum three times within the validity period for negotiation, If contractor does not respond in time, his Bid Security (EMD) will be forfeited and his tender will be rejected. Punitive action will be taken on such contractors. (As per GoG R&B Dept's Gr. No. S/22/2017/639/D, Dt.08/06/2018)

17. Alternative Proposals by Bidders.

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

18. Format and Signing of Bid

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

D. SUBMISSION OF BIDS

19. Deleted

20. Deadline for Submission of the Bids

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

21. Deleted

22. Modification and Withdrawal of Bids

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

E. BID OPENING AND EVALUATION

23. Bid Opening

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

24 Process to be Confidential

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

25. Clarification of Financial Bids

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

26. Examinations of Bids and Determination of Responsiveness

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

27. Deleted

28. Deleted

29. Evaluation and Comparison of Financial Bids

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

30. Deleted

F. AWARD OF CONTRACT

31. Award Criteria

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

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

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

32. Employer's Right to accept any Bid and to Reject any or all Bids

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

33. Notification of Award and Signing of Agreement

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

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

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

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

34. Performance Security

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

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

- (a) If the Contract Price offered by the Selected Bidder is lower than 10% but 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.

~~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, Aravalli Irrigation Division Modasa	[Cl.1.1]
2.	The last five financial years.	
	2025—2026	
	2024—2025	
	2023—2024	
	2022—2023	
	2021—2022	
3.	This Annual Financial Turnover Amount is Rs. 14067249.17	[Cl.4.5.3 (a)]
4.	Value of Work is 49,48,108.93	
5.	Deleted	
6.	The cost of electric work is Rs. 0	
7.	The cost of water supply / sanitary works is Rs.	
8.	Liquid assets and / or availability of credit facilities is Rs. 12,37,100.00	[Cl.4.5.6]
9.	Price level of the financial year 2026-27	[Cl. 4.5.2]
10.	The pre-bid meeting will take place at	[Cl. 9.2.1]
11.	The technical Bid will be opened at the office of the on dt at AM/PM	
12.	Address of the Employer: Executive Engineer, Aravalli Irrigation Division Modasa	
13.	Deleted	
14.	The bid should be submitted latest by As stated on online NIT	[Cl. 20.1 & 20.2]
15.	The bid will be opened at As stated on online NIT	[Cl. 23.1]
16.	The Bank Draft in favor of	
17.	Deleted	
18.	Escalation factors (for the cost of works executed and financial figure to a common base value) for works completed	[Cl.4.5.2]

<u>Year</u>	<u>Financial Year</u>	<u>Multiplying factor</u>
Base year of inviting tender	20__-20__	1.00
-1	20__-20__	1.10
-2	20__-20__	1.21
-3	20__-20__	1.33
-4	20__-20__	1.46
-5	20__-20__	1.61

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

[Reference CL. 4.5.5]

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

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

List of Key Personnel to be deployed on Contract Work

(Reference Cl. 4.5.4)

Employment of a qualified site Engineer by the Contractor.

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

1. Two graduate Civil Engineers and three diploma Civil Engineers when cost of the work to be executed is more than Rs.50 lakhs.
2. One graduate & two Diploma, Civil Engineers when the cost of the work to be executed is more than Rs.15 lakhs but less than Rs.50 lakhs.
3. Minimum 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 mark sheet, 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

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 20____20
Work performed in the last five years 20____20
(in Rs. Lakhs) 20____20____
20____20____
20____20____

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

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

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

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

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

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

Year	Name of the work	Name of the Employer	Quantity of work performed (Cum/MT)				Remarks * (indicate contract Ref)
			Cement Concrete (Including RCC & PCC) ITEM 1	Masonry ITEM 2	Earth Works ITEM 3	Bituminous Work ITEM 4	
20__-20__							
20__-20__							
20__-20__							
20__-20__							
20__-20__							

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

(A) Existing commitments and on-going works:

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

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

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

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

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

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

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

- 1.7 Proposed sub-contract and firms involved

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

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

- 1.8 Financial reports for the last five years: balance sheets, profit and loss statements, auditors' reports (in case of companies/corporations), etc. List them below and attach copies.
- 1.9 Evidence of access to financial resources to meet the qualification requirements: cash in hand, lines of credit, etc. List them below and attach copied documents.

1.10 Name, address, and telephone, telex, and fax numbers of the Bidders bankers who may provide references if contacted by the Employer.

1.11 Information on Litigation history in which the Bidder is involved.

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

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

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

1.14 Programme

2. Deleted

3. Additional Requirements

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

- (i) Affidavit
- (ii) Undertaking

* Fill the name of Consultant

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

~~(CLAUSE 4.5.6 OF~~

~~ITB) BANK~~

CERTIFICATE

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

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

~~(Signature)~~

~~Name of Bank~~

~~Senior Bank Manager~~

~~Address of the~~

~~Bank~~

AFFIDAVIT

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

(Signed by an Authorized Officer of the Firm)

Title of Officer

Name of Firm

Date

UNDERTAKING

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

(Signed by an Authorized officer of the firm)

Title of officer

Name of firm

DATE

SECTION - 3

CONDITIONS OF CONTRACT

Conditions of Contract

Table of Contents

A	General	Page No.	D.	Cost Control	
1	Definitions	38	37	Bill of Quantities	50
2	Interpretation	39	38	Changes in the Quantities	50
3	Language and Law	40	39	Variations	50
4	Engineer's Decisions	40	40	Payments for Variations	50
5	Delegations	40	41	Cash Flow Forecasts	51
6	Communications	40	42	Payment Certificates	52
7	Sub-Contractors	40	43	Payments	52
8	Other Contractors	40	44	Compensations Events	52
9	Personnel	41	45	Tax	53
10	Employer's & Contractor Risk	41	46	Currencies	53
11	Employers Risks	41	47	Price Adjustment	53
12	Contractor's Risk	41	48	Retention	53
13	Insurance	41	49	Liquidated damages	54
14	Site Investigations Reports	42	50	Bonus	55
15	Queries about the Contract	42	51	Advance Payment	55
16	Contractors to Construct the works	42	52	Securities	56
17	The Works to be Completed By the Intended Completion Date	42	53	Deleted	56
18	Approval by the Engineer	42	54	Cost of Repair	56
19	Safety	42			
20	Discoveries	43	E. Finishing the Contract		
21	Possession of the Site	43	55	Completion	57
22	Access to the Site	43	56	Taking Over	57
23	Instructions	43	57	Final Account	57
24	Disputes	43	58	Operating and Maintenance manuals	57
25	Procedure for Disputes	44			
26	Deleted	44	59	Terminations	57
			60	Payment upon Terminations	58
			61	Property	59
			62	Release from Performance	59
B. Time Control			F. Special Conditions of Contract		
27	Programme	45			
28	Extensions of the Intended completion date	45			
29	Deleted	45			
30	Delays Ordered by The Engineer	45	63	Labour	60
			64	Compliance with labour regulations	60
31	Management Meetings	46	65	Arbitration	63
32	Early Warning	46			
C. Quality Control					
33	Identifying Defects	47			
34	Tests	49			
35	Correction of Defects	49			
36	Uncorrected Defects	49			

CONDITIONS OF CONTRACT

A. GENERAL.

1. Definitions

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

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

Compensation Events are those defined in Clause 44 hereunder

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

A **Variation** is an instruction given by the Engineer, which varies the Works. The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the Contract Data.

2. Interpretation

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

2.2 If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion date, and Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion date for the whole works)

2.3 The documents forming the Contract shall be interpreted in the following order of priority

- (1) Agreement
- (2) Letter of Acceptance, notice to proceed with works

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

3. Language and Law

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

4. Engineers Decisions

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

5. Delegation

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

6. Communications

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

7. Sub-Contracting

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

8. Other Contractors

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

9. Personnel

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

10. Employer's and Contractors Risks

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

11. Employer's Risks

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

12. Contractor's Risks

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

13. Insurance

- 13.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start date to the end of the Defects Liability Period, in the amounts and deductibles stated in the Contract data for the following events which are due to the Contractor's risks:
- (a) Loss of or damage to the works, Plant and materials,
 - (b) Loss of or damage to Equipment
 - (c) Loss of or damages of property (except the Works, Plant, Materials and Equipment) in connection with the Contract; and
 - (d) Personal injury or death.
- 13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

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

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

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

14. Site Investigation Report

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

15. Queries about the Contract data

15.1 The engineer will clarify queries on the Contract Data

16. Contractor to Construct the Works

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

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

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

18. Approval by the Engineer

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

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

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

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

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

19. Safety

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

20. Discoveries

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

21. Possession of the Site

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

22. Access to the Site

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

23. Instructions

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

24. Disputes

- 24.1 If the Contractor is of the view that a decision taken by the Engineer was either outside the authority given to the Engineer by the Contract or that the decision was wrongly taken, the decision shall be referred to **#Superintending Engineer** (Himatnagar Irrigation Project Circle, Himatnagar) 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** (Himatnagar Irrigation Project Circle, Himatnagar).
- 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** (Himatnagar Irrigation Project Circle, Himatnagar), both the parties have to refer to the Chief Engineer concern for the conciliation process.
 - (b) For the work more than Rs.100 Cr., if any of the parties is not satisfied with the decision of the **#Superintending Engineer** (Himatnagar Irrigation Project Circle, Himatnagar), both the parties have to refer to the **#Secretary, Water Resources Department, Government of Gujarat** for the conciliation process.

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

25. Procedure for Disputers

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

26. Deleted

B. TIME CONTROL

27. Programme

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

28. Extension of the Intended Completion Date

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

29. Deleted

30. Delays Ordered by the Engineer

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

31. Management Meetings

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

32. Early Warning

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

C.QUALITY CONTROL

33. Identifying Defects/ Defect liability period

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

A. For works of WRD Except Building

(a) (1) For all works costing up to Rs. 50,000 (amount put to tender), the period shall be 3 Months from the certified date of completion.

(b) (1) For WRD works likes Check Dam/ Canal / Drainage / Road Structure tender amount from RS. 50,000 to 10,00,000, the defect liability period shall be 12 months from the certified date of completion.

(2) For WRD work except likes Check Dam/ Canal / Drainage / Road Structure tender amount from RS. 50,000 to 10,00,000, the defect liability period shall be 11 Months from the certified date of completion.

(c) (1) For WRD works likes Check Dam/ Canal / Drainage / Road Structure tender amount more than RS. 10,00,000, the defect liability period shall be 3 Years from the certified date of completion.

(2) For WRD work except likes Check Dam/ Canal / Drainage / Road Structure tender amount from RS. 10,00,000 to 1 Crore, the defect liability period shall be 12 months from the certified date of completion.

(d) (1) For all WRD works of tender amount more than RS. 1 Crore, the defect liability period shall be 3 Years from the certified date of completion

B. For Building works of WRD:-

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

For original building works the defect liability period will be 4 years or elapse of 4 monsoon period following date of possession of building taken over by user agency following the certified date of completion, whichever is later.

For the purpose of deciding the monsoon period, the 30th September shall be treated as the last date.

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

33.2 ~~For Road works :-~~

~~Free maintenance guarantee period for works of Road/Bridge construction~~

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

~~(b) In case of widening of the road/strengthening of the road/bridge, the contractor shall have to give four years free maintenance guarantee from the certified date of completion. During this period the contractor shall visit the site every six months along with the concerned Section Officer / Deputy Executive Engineer and will examine the work already carried out in this contract like road work, jungle cutting, side shoulders, side gutter, road furniture, patta etc. and will prepare Km. wise inspection report duly signed by all concerned and any defect observed shall be done within 15 days by the contractor at his risk and cost as per the direction of Engineer in charge. The contractor needs to do videography of these visits and require to submit at the time of release~~

~~of FMG. If B.T. the surface during the maintenance period of 4 years is worn out then agency shall have to provide renewal coating as per tender item as directed by the Engineer in charge. The amount equivalent to 5% of each running bill shall be withheld and will be released after the free maintenance guarantee period (i.e. 4 years) is over.~~

~~However, this amount shall be released against fixed deposit or bank guarantee pledged in the name of Executive Engineer after completion certificate of work is issued.~~

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

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

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

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

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

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

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

~~(6) Maintenance during Construction Period~~

~~During the Construction Period, the Contractor shall maintain, at his own risk and cost, the existing lane(s) of the road so that the traffic worthiness and safety thereof are at no time materially inferior as compared to their condition 10 (ten) days prior to the date of the Agreement, and shall undertake the necessary repair and maintenance works for this purpose; provided that the Contractor may, at his cost,~~

~~interrupt and divert the flow of traffic if such interruption and diversion is necessary for the efficient progress of works and conforms to Good Industry Practice; provided~~

~~further that such interruption and diversion shall be undertaken by the Contractor only with the prior written approval of the Executive Engineer which approval shall not be unreasonably withheld. For the avoidance of doubt, it is agreed that the Contractor shall at all times be responsible for ensuring safe operation of the road.~~

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

34. Tests

- 34.1 If the engineer instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no defect the test shall be a Compensation Event.
- 34.2 #1% of the amount of work done for works upto Rs. 10 crore of estimate cost should be deducted from R.A. Bill of the contractor for testing the quality of material workmanship. Whereas for estimated cost of works more than 10 crore, the charges for testing of quality of material workmanship shall be deducted from R.A. bill of contractor as per actual charges. As Per GoG NWRWS & K Department's Circular No. PARCH/132023/401/MICELL Dated: 05/10/2023
- 34.3 Agency has to establish testing laboratory on site for the various test to be carried out in the work for this purpose agency shall construct a pukka laboratory building with all facility on site at location specified by the engineer in charge.

35. Correction of defects

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

36. Uncorrected Defects

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

D. COST CONTROL

37. Bill of Quantities

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

38. Change in the Quantities

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

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

39. Variations

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

40. Payments for Variations

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

- (ii) If the rate cannot be derived in accordance with (i) above, such class of works shall be carried out at the rate entered in the Schedule of Rates of

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

- (iii) If it is not possible to arrive at the rate from (i) and (ii) above, such class of work shall be carried out at the rate decided by the competent authorities on the basis of detailed rate analysis after hearing the contractor before a Committee of two Superintending Engineers stationed at the same place or the nearest place.

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

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

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

41. Cash Flow Forecasts

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

42. Payment certificates.

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

43. Payments

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

44. Compensation events

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

45. Tax

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

46. Currencies.

- 46.1 All payment shall be made in Indian Rupees.

47. Price Adjustment

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

48. Retention

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

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

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

49. Liquidated Damages

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

The employer may, without prejudice to any other method of recovery deduct the amount of such damages from any monies due or to become due to the contractor. The payment or deduction of such

damages shall not relieve the contractor from his obligation to complete the works on from any other of his obligations and liabilities under the contract.

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

50 — Bonus

- ~~50.1 If the contractor achieves completion of the whole of the works prior to the intended Completion Date prescribed in Contract Data the Employer shall pay to the contractor a sum stated in Contract Data as bonus for every completed month but subjected to maximum amount as stated in Contract Data; which shall elapse between the date of completion of all items of works as stipulated in the contract, including variations ordered by the Engineer and the time prescribed in Clause 17.~~
- ~~50.2 Bonus shall be paid only to works amounting to above INR 5 crore with time limit of the works is equal or more than 11 Months. The bonus would be paid as under~~

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

51. — Advance Payment:

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

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

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

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

~~51.4 Deleted~~

52. Securities

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

53. Deleted

54. Cost of Repairs.

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

E. FINISHING THE CONTRACT

55. Completion

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

56. Taking Over

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

57. Final Account

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

58. Operating and Maintenance Manuals

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

59. Termination

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

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

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

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

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

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

60. Payment upon Termination

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

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

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

61. Property

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

62. Release from Performance

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

F. SPECIAL CONDITIONS OF CONTRACT

63. LABOUR

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

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

64. COMPLIANCE WITH LABOUR REGULATIONS

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

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

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

- A) **Workmen Compensation Act 1923** :- The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- B) **Payment of Gratuity Act. 1972** :- Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years service or more on death, the rate of 15 days wages for

every completed year of service. The Act is applicable to all establishments employing 10 or more employees.

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

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

- J) **Industrial Disputes Act 1947 :-** The Act lays down the machinery and procedure for resolutions of Industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.
- K) **Industrial employment (standing Orders) Act 1946 :-** It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the State and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get the same certified by the designated Authority.
- L) **Trade Unions Act 1926:-** The Act lays the procedure for registration of trade unions of workmen and employers. The Trade Unions registered under the Act have given certain immunities from civil and criminal liabilities.
- M) **Child Labour (Prohibition & Regulation Act 1986 :-** The Act prohibits employment of children below 14 years of age in certain occupations and process and provides for regulation of employment of children in all other occupations and processes. Employment of Child labour is prohibited in Building and Construction Industry.
- N) **Inter – State Migrant workmen’s (Regulation of Employment & Conditions of service) Act 1979:-** The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state).The inter-state migrant workmen, is an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home upto the establishment and back, etc.
- O) **The Building and Other Construction workers (Regulation of employment and Conditions of Service) Act 1996 and the Cess Act of 1996:-** All the establishments who carry on any building or other constructions work and employ 10 or more workers are covered under this Act. All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the government. The Employer of the establishment is required to provide safety measures at the Building or construction work and other welfare measures, such as canteens, First Aid facilities, Ambulance, Housing accommodations for workers near the workplace etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officers appointed by the Government.

- P) **Factories Act 1948 :-** The Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in the manufacturing process.
- Q) **Royalty charges-**The contractor shall pay the royalty to the competent authority as per rule. The **royalty** charges paid shall be borne by the contractor and shall not be reimbursed by the Employer.
- R) **Following Pollution control Acts and amendments made thereof from time to time shall be applicable.**
1. Water (Preservation and control of Pollution) Act, 1974
 2. Air (Prevention and Control of Pollution Act 1981
 3. Environmental (Protection) Act 1986

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

65. ARBITRATION (GCC Clause 24)

The procedure for arbitration will be as follows: -

- 24.1 If the Contractor is of the view that a decision taken by the Engineer was either outside the authority given to the Engineer by the Contract or that the decision was wrongly taken, the decision shall be referred to **#Superintending Engineer** (Higher Authority) (Himatnagar Irrigation Project Circle, Himatnagar) 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** (Himatnagar Irrigation Project Circle, Himatnagar), 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

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

Clause Reference
With respect To
section 3

1. The Employers is [CL.1.1]
Name: Executive Engineer
Address: Aravalli Irrigation Division Modasa
Name of authorized Representative (will be intimated later)
2. The Engineer is Executive Engineer
Name of Authorized Representative: Executive Engineer, Aravalli
Irrigation Division Modasa
3. The Defects Liability Period is 36 Months from the date of completion. [CL.1.1&33]
4. The Start Date shall be 1st days for the date of issue of the Notice to proceed with the work. [CL.1.1]
5. The Intended Completion Date for the whole of the works is [CL.1.1,17&2]
11 Month after start of work with the following milestones:
Milestone dates: [CL.2.2& 49.1]
Physical works to be completed Period from the start date
Milestone 1 i.e. 10 % 60 days.
Milestone 2 i.e. 35 % 180 days.
Milestone 3 i.e. 75% 270 days.
Milestone 4 i.e. 100 % 330 days.
6. The Site is located at Ta. : Near Village Venpur, Ta. Shamlaji [CL.1.1]
7. The name and identification number of the Contract is: [CL.1.1]
8. The works consist of Construction Of Inspection Bungalow with items as per Schedule: B [CL.1.1]
B.O.Q. The works shall, inter alia, include the following, as Specified or as directed:

(A) WRD Works

Site clearance; setting – out and layout; carry out required excavation as suggested by Engineer also to carry out levelling trimming dressing with required compaction, Carry out RCC concrete as per approved mix design curing same with water or membrane all as per item specifications all aspects of quality assurance of various components of the works; rectification of The defects in the completed works during the Defects Liability Period; submission of “As- built” drawings and any other related documents; and other item of work as may be required to be carried out for completing the work in accordance with the drawings and the provisions of the contract and to ensure safety.

(B) Road Works :

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

(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~~

[CL.1.1]

(D) Other Items

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

[CL.2.3(9)]

~~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. The Site Possession dates shall be from the issue of work order [CL.21]

19. The period for submission of programme for approval of the engineer shall be 21 days from the issue of Letter of Acceptance. [CL. 27.1]

20. The period between program updates will be 90 days. [CL.27.3]

21. The amount to be withheld for late submission of an updated programme shall be Rs.5 lakhs [CL. 27.3]

22. The following events shall also be Compensation Events [CL. 44]
Substantially adverse ground conditions encountered during the course of execution of work not provided for in the bidding document.

(i) Removal of underground utilities detected subsequently

(ii) Significant changes in classification of soil requiring additional mobilization by the contractor, e.g. ordinary soil to rock excavation,

(iii) Removal of unsuitable material like marsh, debris dumps, etc. not caused by the contractor.

- (iv) Artesian conditions
- (v) Seepage, erosion landslide
- (vi) River training requiring protection of permanent work
- (vii) Presence of historical, archeological or religious structures, monuments interfering with the works
- (viii) Restriction of access to ground imposed by civil, judicial, or military authority

23. The currency of the Contract is Indian Rupees

[CL. 46]

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

[CL.47]

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

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

Adjustment for labour component

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

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

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

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

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

P_l = Percentage of labor component of the work.

Adjustment for cement component.

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

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

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

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

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

P_c = Percentage of cement component of the work

Adjustment for steel component

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

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

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

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

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

P_s = Percentage of steel component of the work

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

Adjustments of bitumen component

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

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

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

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

B_i = The official retail price of bitumen of IOC depot at the nearest centre for the 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

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

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_o = 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

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

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_o = 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	28.94
2.	Cement	6.87
3.	Steel	12.24
4.	Bitumen	0.00
5.	POL	0.82
6.	Plant and Machineries	0.83
7.	Other Materials	50.30
8.	Total	100.00

25. The proportion of payments retained (retention money) shall be 6% {CL. 48} from each bill subject to a maximum of 5% of final contract price.
26. Amount of Liquidated damages for delay in completion of works For Whole of work {CL.49} (1/2000)th of the Initial contract price, rounded off to the nearest Thousand, per day. For sectional Completion (wherever specified In item 6 of Contract data) (1/2000)th of initial contract price for #5 km Section, rounded off to the nearest thousand per day.

27. Maximum limit of liquidated damages For delay in completion work 10 percent of the Initial {CL. 49} Contract Price rounded off to the nearest thousand
28. Amount of Bonus for early completion Amount of bonus for early completion of work shall be given as per CL.50 of Section-3
29. ~~Maximum limit of bonus for early 5 percent of the Contract {CL. 50} Completion of work Price~~
30. ~~The amount of the advance payment are: {CL. 51 & 52}~~

#Nature of Advances

Amount (Rs.) Conditions to Be fulfilled

- | | | |
|-----|--|---|
| i | Mobilization 10% of the contract unconditional Price | On submission of 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 Advance for Non-persish able material Brought to site | Deleted |

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

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

~~The advance loan shall be repaid with percentage deduction from the interim payments certified by the Engineer under the Contract. Deduction shall commence in the next Interim Payment Certificate following that in which the total of all such payments to the Contractor has reached not less than 20~~

~~percent of the Contract Price or 6 (six) months from the date of payment of first installment of advance, whichever period concludes earlier, and shall be made at the rate of 20 percent **(collectively for both Mobilization Advance and Equipment Advance)** of the amounts of all Interim Payment Certificate until such time as the loan has been repaid, always provided that the loan shall be completely repaid prior to the expiry of the original time for completion pursuant to Clause 17 and 28.~~

32. Deleted
33. The securities shall be for the following minimum amounts equivalent {CL. 52} As a percentage of the Contract Price:
Performance Security for 5 percent of contract price plus Rs. (to be decided after evaluation of the bid) as additional security in terms of ITB Clause 29.5
The standard form of Performance security acceptable to the Employer shall be an unconditional Bank Guarantee of the type as presented in Section 8 of the Bidding Documents.
34. The Schedule of Operating and maintenance Manuals.....N/A. {CL. 58}
35. The date by which “as– built” drawings (in scale as directed) in 2 sets {CL. 58} are required within 28 days of the issue of certificate of completion of the whole or section of the work, as the case may be.
36. The amount to be withheld for failing to supply “as built” drawings {CL. 58} by the Date required is Rs Lakhs.
37. The following events shall also be fundamentals breach of contract: {CL.59.2} “The Contractor has contravened Sub- clause 7.1 and Clause 9 of GCC”
38. The percentage to apply the value of the work not completed representing {CL 60} the Employer’s additional cost for completing the Works shall be 20 per cent.

SECTION - 5

TECHNICAL SPECIFICATION

Technical Specification

Table of Contents

A	Work and Site Conditions	76	30	WORK UNDER POLICE PROTECTIONS:	83
1	Introduction	76	C.	Special Conditions	85
2	Brief Description of Work	76	31	ACCURACY OF LINES, LEVELS AND GRADES	85
3	Basic Amenities	76	32	TESTING OF MATERIALS AND WORKS	85
4	MATERIAL	77	33	LOAN OF GOVERNMENT TOOLS & PLANTS & MACHINERY	86
B	General Conditions	78	34	SECURITY MEASURES	86
5	DEFINATIONS	78	35	APPLICABILITY OF SPECIFICATIONS	86
6	AUTHORITY OF THE ENGINEER - IN - CHARGE	79	36	DE-WATERING	87
7	CONTRACT DRAWINGS AND SPECIFICATIONS		37	TREATMENT DURING MONSOON	87
8	BASE LINES AND GRADES	80	38	INSPECTION FACILITIES	87
9	FENCING, LIGHTING AND VENTILATION:	80	39	DIVERSION:	87
10	EXPLOSIVE AND INFLAMMABLE MATERIALS	81	40	DRAWING	87
11	DAMAGE BY FLOODS, CYCLONE, EARTH QUAKE OR ACCIDENT:	81	41	CLEARING WORK AREA	87
12	RELATION WITH PUBLIC AUTHORITY	81	42	MISC. POINTS REQUIRING SPECIFIC ATTENTIONS OF THE CONTRACTOR:	87
13	TRESPASS	81	D	GENERAL TECHNICAL SPECIFICATIONS	
14	OTHER PERMISSION	81	43	Chapter 1 – EXCAVATION	90
15	OCCUPANCY OF ADDITIONAL LAND	82	44	CHAPTER-2- MATERIALS	96
16	EMPLOYMENT OF RESIDENT ENGINEER:	82	45	CHAPTER-3 - CONCRETE WORK	102
17	FOREMEN, WATCHMAN AND WORKERS:	82	46	CHAPTER-4 - EARTHWORK AND COMPACTION	116
18	WORK ORDER BOOK	82	47	CHAPTER-5 – Reinforcement work	119
19	MODIFICATION	82	48	CHAPTER-6 Gabion Work	126
20	SIGNED DRAWINGS NO AUTHORITY TO THE CONTRACTORS:	82	E	Item Wise Technical Speciation	
21	COPIES OF DRAWING AND SPECIFICATIONS:	82	49	Item Wise Technical Speciation	129
22	PLANS & DRAWINGS :	82			
23	REFERENCE MARKS AND BENCH MARKS:	82			
24	MATERIALS AND WORKMANSHIP:	83			
25	INFORMATION AND DATA:	83			
26	PROTECTION OF ADJOINING PREMISES:	83			
27	LOCAL ROADS:	83			
28	REMOVAL OF CONTRACTOR'S MEN:	83			
29	OLD CURIOSITIES:	83			

Technical Specifications

A. Work and Site Conditions.

1. Introduction

- 1.1 Name of Work: Construction of new inspection Bungalow at Meshwo resrvoir project waste wier at village Venpur, Taluka : Shamlaji, Dist : Arvalli.
- 1.2 The proposed work site is situated nearby Venpur Village, Ta. shamlaji of Aravalli District. The nearest Railway station is Shamlaji Road.
- 1.3 The nearest place for ordinary marketing is Shamlaji and Modasa, Aravalli.

2. Brief Description of Work

- 2.1 The works to be carried out under this tender are as per Schedule B attached
- 2.2 Work to be performed for the various items is included in Schedule-'B'. The above information in only a general outline and does not in any way limit the performance of all work and supply of plant, machinery, all labour and materials necessary for completing the works as shown in the approved working drawing and mentioned in the specification. No extra payment or claim on account of any additions or an alteration in working drawing shall be admissible

3. Basic Amenities

3.1 WATER SUPPLY:

The contractor shall have to make his own arrangement of water supply for his work. Fresh use of water for work will be allowed free of cost to the contractor from the municipal tap connection in the construction area and area transferred to the N. W.R. & W.S. Deptt. Pumping, Purification storage tanks, pipeline, etc. for the said purpose should be arranged by the contractor at his own cost.

3.2 DRAINAGE:

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

3.3 CAMP REGULATIONS :

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

3.4 POWER SUPPLY:

Electric power for construction purpose, at present on work site is not available. If required, the contractor has to manage at his own expenses the required power or the work to be carried out under this contract. However, the department will co-operate for expediting the concerned authorities in UGVCL. for availing the power supply. The contractor will be directly responsible for payment of electrical charges as above with the UGVCL.

The contractor will have to make his own arrangement to lay and maintain the necessary distribution lines and wiring for the works at his own cost.

All such wiring and methods of construction for overhead distribution of other lines should be in accordance with the Indian Electricity Act. 1910 and Indian Rules 1956 and any other rules or instruction issued there under. Special attention shall be paid to comply with the rule No. 61,66,70,90,91 and 93 of the Indian Electricity Rules.

The layout and methods of laying the lines and wiring shall have the prior approval of the Engineer. The contractor shall however be remained as answerable and liable for any loss or damage or injury to any person or property of the Government or of other caused by or arising from his failure or observance of Indian Electricity Act. 1910. Indian Electricity Rules 1956 as amended from time to time.

3.5 ROADS:

The contractor shall construct and maintain suitable inspection paths in the works, limit. Any haul or approach road, if necessary for the contractors work shall be provided at his own cost. There will however be no charge for any reasonable use of any road constructed by Government.

The approach road / haul road shall be maintained by the contractor at his own cost. However, during the construction work in progress if other agencies are also working simultaneously, the haul road and / or approach roads shall be repaired & maintained by all such agencies sharing cost of. Decision of Engineer-in-charge for sharing of cost in this regard shall be considered final & shall be binding to all the agencies working simultaneously, as narrated above.

3.6 POST AND TELEPHONE:

A post office is available at shamlaji and Modasa. There is no trunk connection has been installed at work site. Contractor shall make his or her own arrangements for telephone, if required.

3.7 BANK FACILITY:

Branches of State Bank of India and other schedule banks are available at Shamlaji and Modasa.

3.8 SUPPLY OF PETROL AND DIESEL :

There is petrol pump at shamlaji Ta. shamlaji.

4. MATERIAL:

4.1 SAND :

Sand is available from Sabarmati River. If enough quantity and if required quantity of sand is not available from this sources contractor shall manage for receiving the sand from other sources without any extra claim. The contractor shall have to pay for dead rent lease charge and all other charges including royalty charge etc. and shall have to produce royalty payment documents to Department.

4.2 COARSE AGGREGATE:

The coarse aggregates for foundation concrete and R.C.C. work may be available from Vadagam at 60 km. from work site, However contractor shall arrange for approved quality of coarse aggregate at his own cost at suitable place.

4.3 CEMENT :

ISI Marked OPC Conforming to IS 12269 shall generally to be used unless otherwise specified. The use of cement in the various items of construction shall be on weight. No extra charge for such weighing for the purpose of use of cement is admissible and losses of cement quantity while weighting.

4.4 WATER :

Water used for mixing, curing etc. purpose shall be clean & potable shall confirm IS 456.

Contractor shall make his own arrangements for supply, storage and distribution of water at site at his own cost. No extra payment shall be made.

4.5 OTHER MATERIALS:

The contractor shall make his own inquiries regarding availability of other materials required for construction of entire work and accordingly he should quote the rate.

B. General Conditions

5. DEFINATIONS :

In the contract at hereinafter defined the following words and expressions will have the meaning hereby assigned to them.

- 5.1 Approved / Approval
Means approved in writing.
- 5.2 Construction Plant
Means all equipment, appliances or things or whatsoever Material required for the execution, completion or maintenance of the works or temporary work but does not include materials or other things intended to form or forming part of the permanent work.
- 5.3 Contract
Means the instructions and information for tenderers, general and special conditions of contractor, specifications, drawings, tender (including schedules of quantities and tender prices), the formal agreement and all added and attachments related to the above.
- 5.4 Contractor
Means the particular person, firm or representation with whom the contract has been made for executing the works.
- 5.5 Drawings
Means the drawing referred to in the specifications, any modification of such drawings approved in writing by the Executive Engineer, and such other drawings as may from time to time be furnished or approved in writing by the Engineer-in-charge.
- 5.6 Engineer-in-charge
Means the Engineer-in-charge of the works (i.e. Executive Engineer) of specified parts of works under the contract or such other departmental assistance or subordinates to whom the Engineer-in-charge (i.e. Executive Engineer) may have delegated certain duties, acting separately within the scope of the particular duties entrusted to them. The contractor will be given a copy of the Government's Authorization designation the Engineer-in-charge by name and delegating him his authority at the item when contract is signed. It is however, to be distinctly understood that, no delegation of powers shall be made to such departmental assistance or subordinates except in respect of supervision to ensure compliance of the contract conditions.
- 5.7 Government
Means Government of Gujarat, Narmada & Water Resources, Water Supply and Kalpsar Department of Gujarat State.
- 5.8 I.S.I.
Means Indian Standard Specifications.
- 5.9 Day
Means a day from midnight to midnight.
- 5.10 Month
Means from the beginning of a given date of a calendar month to the end of the preceding date of the next calendar month.
- 5.11 Week
Means seven consecutive days.
- 5.12 Rupees
Means Rupees of Indian currency.
- 5.13 Site
Means the lands and other places on, under, in or through which the works are to be executed or carried out and any other lands or places provided by the

owner for the purposes of the contract together with such other places as may be specifically designated in contract or subsequently approved as forming part of site.

5.14 Superintending Engineer

Means the Superintending Engineer in overall charge of the works.(i.e. S.E. H.I.P.Circle Himatnagar.)

5.15 Chief Engineer

Mean the officers to whom the Superintending Engineer of the circle in overall charges of the works reports. {i.e. C.E. & A.S. (C.G.)}.

5.16 Temporary works

Means all temporary works of every kind required for the performance of the contract.

5.17 Works

Mean the works to be executed in accordance with the contract.

5.18 Employer or owner

Means the Govt. of Guj. Narmada, Water Resources, water supply & kalpsar department on its commencement of business.

5.19 Tender Amount

Means the total amount included in the tender in Schedule - "B". of the tender documents or it's negotiated amount.

5.20 Contract Amount

Means the amount of the work done in accordance with contract duly certified by Engineer-in-charge in the bill of payment.

5.21 Contract Value

Means the total value of the works as mentioned in the letter of acceptance of the tender.

6. AUTHORITY OF THE ENGINEER - IN - CHARGE :

6.1 The contractor shall execute, complete and maintain the works in strict accordance with the contract under the directions and to the entire satisfaction of the Engineer-in-charge (i.e. Executive Engineer) and shall comply with the adhere strictly to the Engineer-in-charge instructions and directions on any matter (whether mentioned in the contract or not.) The Engineer-in-charge shall decide all questions, which may rise as for quality and acceptability of materials furnished and work executed. Manner of execution, rate of, progress of the works, interpretation of plans and specifications and acceptable fulfillment of the contract on the part of the contractor. He shall determine the amount and quantity of work performed and materials furnished and his decision and measurements shall be final. In all such matter and in any technical question which may arise touching the contract, his decision shall be final and binding upon the contractor.

6.2 The Engineer-in-charge shall have the power to enforce such decisions and orders. If the contractor fails to carry out promptly, and if the contractor fails to execute work ordered by the Engineer-in-charge, the Engineer-in-charge may give notice to the contractor specifying a reasonable period therein and on expiry of that period process to execute such work as may be deemed necessary and recover the cost there of from the contractor.

7. CONTRACT DRAWINGS AND SPECIFICATIONS:

7.1 The drawing which form part of these specifications show the work to be done in as much details as is possible at present stage of tender invitation. They will be supplemented or supersede by such additional detailed working drawing as may be necessary as the work progresses. The contractor shall perform the work on these features and in accordance with these additional detailed working drawing as may be necessary as the work progress. The contractor shall perform the work on these features and in accordance with these additional or revised drawings as the case may be and at the applicable rate and terms as per the contract. Revised and / or additional drawings will be available for inspection in the office of the Engineer-

in-charge and if copies of the same are required by the contractor, Contractor shall make his own arrangements for producing certified hard copies. One certified hard copie of each detailed drawing, map shall make available during site visit of E.I.C.

- 7.2 The contractor shall check all drawings carefully and advise the Engineer-in-charge immediately if any errors or omissions recovered. The contractor shall not take undue advantage of any kind of error or omission in the drawings supplied.

8. BASE LINES AND GRADES :

- 8.1 Permanent base line (and cross line) shall be established at sufficiently close interval with bench marks at all corner points so serve as "reference grid". The contractor shall provide at his expenses, all templates, pillars, stackers, equipment, materials and labour for establishing the grid line and pillars and preserve during the whole period of construction. There shall be laid out with prior approval of the Engineer in charge. No base line or beach marks of reference marks without prior approval of the Engineer. The contractor shall maintain certified copies of such approved reference line marks and levels and shall not remove any of them with prior approval of the engineer.
- 8.2 The contractor shall further lay out the work from these reference base lines in consultation with the engineer and shall be level in connection therewith there with, notwithstanding the fact that the same might have been checked by the Engineer's staff.
- 8.3 The contractor shall be responsible for the proper execution of the work to such lines and grades as may be specified in the drawings or establish or indicated by the Engineer.

9. FENCING, LIGHTING AND VENTILATION:

- 9.1 Except as here in after provided, the contractor shall unless otherwise specified be responsible for the proper fencing, lighting ventilation regarding and taking of the necessary safety measures for all works comprised in the contract and/or for the proper provision of temporary roadways, foot ways, guard fences, caution, notice etc. as far as the same may be rendered necessary by reasons of the work for the accommodations of workmen, foot passengers or other traffic and of the owners and occupants of adjacent property and of the public and shall remain fully responsible for any accident that may occur on account of this failure to take proper and timely precautions.

9.2 LIGHTING

All the work, approaches and galleries shall be adequately illuminated with electric lights to the satisfaction of the Engineer. The power lighting connection wiring equipment shall be subjected to the inspection and passing by electrical inspector to Government prised under the Indian Electricity Act. Any addition and alternation or omissions shall be get approved from Engineer and got certified from the electrical inspector. Work spots such as faces of excavation, earthwork, concreting and masonry work, grouting etc. shall be adequately flood lighted to the satisfaction of the Engineer. All coats involved in drawings low tension or high tension lines, meters, switches, start-ing and lighting accessories are to be borne by the contractor. Assistance will be given by the Department in form of expediting power supply release and connections by Gujarat Electricity Board. Whether more than one agency is working in the areas the contractor who has already provided lighting arrangement shall extend the facilities to the other contractor who shall pay for such facilities at mutually agreed rates in case of dispute, the matter shall be decided by the Executive Engineer whose decision shall be final.

9.3 VENTILATION

All Galleries, cross drains, adits, stairwells shall be properly and adequately ventilated by system of ducts and fans to the satisfaction of the Engineer position artificial means of ventilation shall be employed and shall be in operation at all times.

When more than one agency is working at one location, all the agencies should cooperate with each other. No contractor shall stop or threaten to stop his ventilation system and jeopardize the work of other contractor. the contractor who will be using the ventilation facilities installed by other contractor shall make payment to him at

mutually agreed rates,. In case of disputes, the Engineer.-s decision shall be final .and binding on all parties.

In case of Works these are connection passages ventilation circulation system be kept on getting modified as and when different passage get jointed during excavation of the same and when they get out off the further works of concreting etc. as taken in hand. Also the demand of fresh air may change when more than one agency are working. The general layout ventilation shall be changed suitably to avoid any part being isolated from

- 9.4 All the arrangement made for fencing; lighting and ventilation shall be maintained by the contractor throughout the tendency of the contract, till physical taking over of the work by the department.

9.5 **MAINTENANCE OF SERVICE**

The contractor shall maintain lighting, ventilation, drainage, communication facility and other services throughout the currency of contract and thereafter, if so directed by Engineer, at his own cost. No separate payment admissible for the same.

10. EXPLOSIVE AND INFLAMMABLE MATERIALS:

- 10.1 If explosive and inflammable material to be used for the execution of the works, the contractor shall be at his own risk and expense obtain such license of licenses for storing and using explosive and the contractor shall produce such license when ever demanded by the Engineer-in-charge or its subordinates for its verification for storage of explosive and inflammable materials, contractor shall construct and maintain magazines either temporary or permanent required for storage in accordance with the requirement of the appropriate government explosive rules in force. Such magazines shall clearly marked t£ Dangerous Explosive" in the regional script and shall be in care of competent watchmen at all the times. The department shall not take any responsibility whatsoever in connection with the storage of explosive on site or of any accidents etc., in connection therewith. All operations of the contractor in which or for which explosives are applied shall be at his own risk and upon his sole responsibility contractor will have to engage licensed Blaster for all his such operation in actual excavation and needing blasting etc.

11. DAMAGE BY FLOODS, CYCLONE, EARTH QUAKE OR ACCIDENT:

- 11.1 The contractor shall take full precautions against any damage to the works by floods, cyclone, and earthquake or from accidents. No compensation shall be allowed to the contractor for any damage to the work and of his plants or materials lost or damaged by floods unprecedented or otherwise or from other such natural cause, during monsoons or unexpected shall be liable to make good any damage to the plant machinery or materials of department hired by him and loss on damaged flood or from other cause while in his possession for use of work.

12. RELATION WITH PUBLIC AUTHORITY:

- 12.1 The contractor shall comply with all proper and legal orders and directions given from time to time by local or public authority and shall pay out of his own money for any fees or charges to which he may be liable.

13. TRESPASS:

- 13.1 The contractor shall at all time to be responsible for any damage to all trespass committed by him or his agent, or working people in carrying out the work unless such trespass is authorized by the Engineer-in-charge of work.

14. OTHER PERMISSION:

- 14.1 The contractor shall approach directly to the municipal and other authorities for obtaining any type of permission required by law. Suitable assistance will be rendered by the department for expediting such permission. No claims for delay if any will be entertained.

15. OCCUPANCY OF ADDITIONAL LAND:

- 15.1 The case when it becomes necessary for the fulfillment of the contract for the contract to occupancy land outside the N.W.S.& W.R.D. limits, the contractor shall make his own

arrangement with the land owners and pay such amount as may be mutually agreed upon by them.

- 15.2 The department will render the contractor all possible assistance to enable to obtain land for such purpose.

16. EMPLOYMENT OF RESIDENT ENGINEER:

- 16.1 The contractor shall employ a qualified, skilled and experienced Resident Engineer for carrying out the work before appointing the Resident Engineer the contractor shall obtain approval of the Engineer-in-charge about the suitability and eligibility of the Resident Engineer, In submitting such proposal, the qualification and experience of the person shall be fully listed. The Resident Engineer shall be considered at all times to be acting for the contractor with full responsibility in all respect.

17. FOREMEN, WATCHMAN AND WORKERS:

- 17.1 Competent foremen, watchman and workmen shall be employed by the contractor. The Engineer-in-charge shall at all time have the right to remove from the work any foreman or watchman or workman on ground of his unfitness or misconduct of complaints.

18. WORK ORDER BOOK:

- 18.1 A work order book as prescribed by the Government will be required on the work and the contractor shall sign the orders in token of acceptance as given by the Engineer-in-charge or his representative. He shall carry out in the true spirit and as required for the correct performance. Work order book is the property of the Department and it remains in the custody of the Departmental supervisory staff on duty. The field compliance shall be carried out promptly and reported to the Engineer-in-charge in good time by the contractor so that the work can be checked. If the contractor fails to take note of the orders or an instruction issued in the work order book or tries to avoid the same, Engineer-in-charge will have the power to take suitable Action. Any such action of the Engineer for the noncompliance on the part of the contractor will be binding upon him.

19. MODIFICATION :

- 19.1 The Engineer-in-charge may order modifications at any time before the completion of the work. For all modifications, the Engineer-in-charge will issue revised plan, or written instruction or both and, no modifications shall be made unless so authorized.

20. SIGNED DRAWINGS NO AUTHORITY TO THE CONTRACTORS:

- 20.1 Signed drawings alone shall not be deemed to be an order for work unless it is entered in the agreement or schedule of drawing under proper attestation of the contractor and the Engineer-in-charge of work unless it has been sent to the contractor by the Engineer-in-charge with a covering letter confirming that the drawing is as authority for work in the contract.

21. COPIES OF DRAWING AND SPECIFICATIONS:

- 21.1 Certified soft copies of the drawing and modified or supplementary drawings and specifications shall be furnished free of cost to the contractor.

22. PLANS & DRAWINGS :

- 22.1 The contractor shall submit the following information free of cost to the Engineer-in-charge for approval within the time stipulated against each item below:
- 22.2 A general layout drawings plan of construction plants and equipment for the execution work and its planning which the contractor proposes to adopt at site submitted to ECI & his representative in triplicate within 14 days from date of notice to proceed with the work.
- 22.3 Drawing of prints in triplicate showing the location of major plants and other facilities which the contractor proposes put up at the site including any change in the general layout, at least 14 days, prior to the commencement of the respective work.

23. REFERENCE MARKS AND BENCH MARKS:

- 23.1 The basic centerline, reference points and bench marks will be fixed by the Department, the contractor shall establish at his cost, at suitable points, additional reference lines and bench marks as may be necessary, the contractor shall remain responsible for the sufficiency and accuracy of all his bench marks and reference marks. He should take precautions to see that

the reference lines or points and bench marks fixed by the department are not disturbed by his work and shall make good the damage at his cost, immediately.

24. MATERIALS AND WORKMANSHIP:

24.1 Contractor's Superintendence and Supervision

The contractor shall provide and install superintendence during the execution of the work and as long thereafter as may be necessary for the proper fulfilling of the contractor's obligation under the contract. The contractor or a competent and authorized agent or representative approved Engineer by the Engineer-in-charge, whose approval may be any time be withdrawn to be constantly on the works and shall give his whole time to the superintendence of the same.

The contractor shall provide and employ sufficient number of qualified man for supervision on all aspects of work.

24.2 Construction Plant

The contractor shall provide and install all necessary construction plant and shall use such methods and appliances for the performance of all the operations connected with the work entered under the contract as will secure and satisfactory quality of the work and rate of progress which will ensure the completion of the work within the time specified.

24.3 Setting Out Work

The contractor shall be responsible for the correct setting out of all works at his cost. The contractor shall execute the work true to alignment, grade and levels as shown in the drawings and as directed by Engineer-in-charge and shall check the same at frequent intervals. The contractor shall provide free of the cost all facilities like labour, instruments, etc. and all co-operation to the Engineer-in-charge to check all alignment, grades, levels and dimensions, such checking by the Engineer-in-charge shall not absolve the contractor of his own responsibility of maintaining the accuracy of the work.

25. INFORMATION AND DATA:

25.1 The information and data furnished herein tentative to the works and safe conditions are general it shall be the responsibility of the contractor to fully acquaint him all with the nature and the location of works quarries, local conditions and other aspects which are relevant to the work:

26. PROTECTION OF ADJOINING PREMISES:

26.1 The contractor shall protect the adjoining site against structural decorative and other damages that could be caused by the execution of these works and make good at his cost, and all such damages.

27. LOCAL ROADS:

27.1 The existing public roads (may be un-motor able) near the site or work and roads constructed by the Government in the work area are shown in Index plan of the project. The contractor may construct and maintain haul roads as required at his own expenses.

28. REMOVAL OF CONTRACTOR'S MEN:

28.1 The contractor shall on the written direction of the Engineer-in-charge immediately remove from the work any person employed thereon, who may in the opinion of the Engineer-in-charge be incomplete or has misconduct himself and such person shall not be again employed on the works without the written permission of the Engineer-in-charge.

29. OLD CURIOSITIES:

29.1 All old curiosities, retches coins, minerals, and any other item of archeological importance found in prevention or pulling down shall be the property of the Government and shall be handed over to the Engineer-in-charge, should any structure be uncovered, the Engineer-in-charge's instruction shall be obtained before it's demolition or removal.

30. WORK UNDER POLICE PROTECTIONS:

30.1 In case of dispute by the land owner and consequent constructions in execution of works when the land in question is in possession with the department, the contractor shall be bound to

execute the demarcated work under police protection, if required and no extra cost for stoppage slow work or obstructions shall be payable to the contractor.

C. Special Conditions

31. ACCURACY OF LINES, LEVELS AND GRADES:

- 31.1 The various works shall be done true to line level and grade. The periodical checking of these by the Government staff shall not absolve the contractor of his responsibility regarding the accuracy. In case of any deviation or discrepancy in line, level or grade in 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 discrepancy is found to arise at the junction of works of different contractors, the responsibility to set right such discrepancy these with the contractor concerned. The Engineer 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 they may consider reasonable.

32. TESTING OF MATERIALS AND WORKS:

- 32.1 All methods or procedures for execution of different items of the work and for testing of the materials etc. shall conform to Indian standard specifications or its latest edition unless otherwise specified.

The provision of these I.S. shall be applicable for the materials testing and for the work irrespective of whether the same is specified in specification or elsewhere in the tender documents.

- 32.2 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 materials are used without prior inspection (and when necessary prior testing) and without approval or written permission of the Engineer-in-charge is liable to be considered as unauthorized, defective and not acceptable. The testing of the materials which are to be used in this works shall be carried out in the Government project Laboratory; Government approved labs before starting of work at the cost of Government. The material rejected shall be immediately removed out of sight of work at his own cost.

Minimum 10 % Tests for All Materials and Works Should be tested at GERI.

The samples of rubble, steel, gabion box, nonwoven geofabric or any other materials, labours required shall be supplied by the contractor free of cost.

The contractor shall provide and extend all facilities and co-operation towards collection of samples, transportation of samples to the laboratories.

All testing charge of materials for concrete mix designs to be carried at GERI or other Govt. lab shall be borne by the Government but cost of testing material, labour & transportation to laboratory shall be borne by contractor. However, 1% of the estimated cost for testing charges shall be deducted from RA / final bills of the works.

Any additional tests required to be carried out at any stage of the work as per instruction of Engineer-in-charge shall be carried out by the Govt. lab/specified private lab. and the testing charge shall be borne by the contractor for additional tests than specified.

- 32.3 The day to day and periodical tests to be carried out on materials mixed and placed concrete, mortar etc. shall be specified by the Engineer from time to time and the contractor shall allow all facilities and co-operation towards collection of samples etc. Unless otherwise specified elsewhere, all labour for collection samples for tests will be supplied by contractor free of cost to Government.

In the following case where testing charge will be borne by the contractor when

- 32.3.1 The supply of sample and the carrying out of such tests is provided for or clearly intended in the contract and is carried out either at the site of work, or manufacture of at a place specified in the contract document.
- 32.3.2 The supply of the sample and the carrying out of such test is not provided for or clearly intended in the contract but on testing the such materials is found defective and has to be rejected.

- 32.3.3 Any additional test is to be carried out over and above those specified in the technical specifications.
- 32.4 The test samples which can, not be tested at site field laboratory shall be get tested in laboratory of G.E.R.I, at Gandhinagar/ Vadodara or elsewhere. In that case transportation charges etc. shall be borne by the contractor.
- The contractor shall however supply all materials required for tests and also make good at his cost materials, mixes and core holes, similar for other materials as may be directed by and to the satisfaction of the Engineer.
- An authorised representative of the contractor shall remain present at the time when the sample or cores etc. are taken and shall authenticate the facts if so required should the contractor's agent fail to be present as aforesaid the sample of cores etc. taken by the Engineer-in-charge or his representative shall be considered to be authentic. The contractor responsibility to produce on the works materials will however be informed of the details of such sample and cores having been taken.
- 32.5 The materials, mixes and cores etc. shall be tested day to day or periodically at the Government laboratory set up at the site of work and nearby regional established Government laboratory and the results given thereby shall be considered correct and authentic. The contractor shall be given access to all operational tests that may be carried out as aforesaid so that he may satisfy himself regarding the procedure and methods adopted. It shall then be the contractor's responsibility to carry out the finished items to the standards based on the laboratory designs and tests.
- 32.6 The method of sampling and testing and the procedures standard shall be as laid down by the Engineer-in-charge for the respective item.

33. LOAN OF GOVERNMENT TOOLS & PLANTS & MACHINERY:

- ~~33.1 No machinery or any tools and plants articles are at present available with the department. However, the machinery and tools and plants as and where available with the department shall be supplied as per rules and regulations as per the provisions contained in Government P.W.D/s G.R.No. MCN/167/(97)part IV/H dtd. 1-10-80, and as amended from time to time, it must be also noted that machinery or equipment actually justified for use in the work and available with the department will be given on hire. No claims for delay in procurements of such machinery or equipment will be entertained.~~

34. SECURITY MEASURES:

- 34.1 In view of the strategic importance of all the projects and installations security restriction may be imposed by the Engineer as per directions of the security authorities and the contractor shall abide by all such instruction scrupulously. In case a system of identity cards is introduced the contractor shall at his cost provide for his person all such identity cards with photos, if necessary and get those duly signed by the Engineer or his duly authorized representative. The contractor shall also keep the Engineer informed regarding all visitors and obtain proper permits for their visits. No unauthorized visitors will be allowed on work site.

35. APPLICABILITY OF SPECIFICATIONS:

- 35.1 Considering the common and general items required in execution of irrigation project, general subject wise specifications has been drawn and prodded separately with the tender. This provision suitably provides requirements of execution of each component of work in general, consistent with the present practice of the scope of work and mode of execution and standards to be observed etc. For the work financial limitation as regards to the admissibility of work payment and acceptance of work against the tender requirement etc. is described. To avoid descriptive matter suitable reference for the relevant Indian standards or otherwise is also specified. The whole idea is to guide the tender regarding the execution of work so as to base his rates accordingly. The general subject wise specifications are further supplemented in separate chapter to cover the item wise specification of work as per the schedule-'B' of the tender, these item-wise specifications will cover the applicable provision of the general

specifications considering the item description as per schedule-'A' over and above this, the specific qualification of each item such as applicable leads, lifts, proportion of the mix, description about the execution of the item, in detail and other applicable aspects will be covered in such specification. Intending tenderers are therefore requested to read the tender papers on above lines and quote their rates.

36. DE-WATERING :

- 36.1 The item of excavation includes "dewatering" also. The dewatering shall be carried out during entire construction in case of delay in excavation or construction no extra payment will be paid for dewatering. Hence bidder shall offer accordingly the dewatering shall be carried out till the completion of the said work or as directed by engineer in charge. No extra payment shall be made for the dewatering in any item of schedule-B. No claim pertaining to dewatering shall be entertained.

37. TREATMENT DURING MONSOON:

- 37.1 If during the time, the works are in progress the monsoon breaks in, it shall to the responsibility of the contractor to preserve and maintain the safe condition of all materials machinery and tools and work sites from and floods, due to unseasonable rains, cyclone etc. The damage to the work, plant, material, machineries etc. shall be made good by the contractor without any additional claims.

38. INSPECTION FACILITIES:

- 38.1 A motorable inspection road shall be maintained by contractor for inspection of the work during construction in working period. The contractor shall also provide necessary temporary inspection facilities for the detailed inspection of the work.

39. DIVERSION:

- 39.1 Proper diversion roads for road traffic and other cart track crossing etc. shall be provided and maintained by the contractor with proper sign board and red lights on entry and exit of the diversion etc. as directed by the engineer-in-charge during currency of the contract. No extra payment for such diversion shall be made to the contractor.

40. DRAWING:

- 40.1 The drawings supplied to the contractor are tentative and works to be carried out shall as per details furnished by the department from time to time.

41. CLEARING WORK AREA:

- 41.1 At the end of work the material collected on the bed of river shall be removed by the contractor and dispose off as directed by the engineer-in-charge.

42. MISC. POINTS REQUIRING SPECIFIC ATTENTIONS OF THE CONTRACTOR:

- 42.1 The item of excavation shall include all lifts and leads unless otherwise specified.
- 42.2 Excavation in project is taken in soft rock. B. However, weathered rock or hard material which may require blasting may meet within foundation of different components. The rate for item of excavation is inclusive of removal of such hard strata without any extra cost, no extra payment will be entertained for excavation of hard strata.
- 42.2.1 The item of excavation in soil shall also include excavations in soft / hard. Murrum unless otherwise specified.
- 42.3 If blasting is required to be done for foundation excavation or for any other purpose, the following points shall be attended.

In conducting blasting operation proper precautions shall be taken by the contractor for the protection of the persons, work and property. All prevailing Government laws and rules relating to the design and location of the magazine, transport and handling of explosives and other measures enacted for prevention of accidents shall be strictly observed, warning signal shall be prominently displayed on all magazine, Similarly proper warning signals shall be given before starting actual blasting, blasting shall be done at such time as decided in consultation with the engineer-in-charge. In addition the following restriction shall be

observed while blasting.

- 42.3.1 No blasting which may disturb or endanger the stability or quality of works of structures in the vicinity shall be permitted.
- 42.3.2 Blasting within 15 mt of any structure will not be permitted. However, if it is absolutely essential, it shall be done after the permission of Engineer-in-charge and the method including the type of explosive etc. to be adopted for such blasting shall be as directed by Engineer-in-charge.
- 42.4 The item of Excavation includes the dewatering from the foundation and keeping the work area dry by contractors own cost until the worksites affected by water table except when dewatering is provided for separately in the detailed specifications for this work. The mode of payment for special item of dewatering shall be as per the detailed technical specifications of item.
- 42.5 For preparing mortar and concrete mixes the proportioning of different ingredients shall be done by weight batching unless otherwise specified.
- 42.6 For all concrete works broken stone metal shall be allowed at the discrepancy of Engineer-in-charge to be used as coarse aggregate.
- 42.7 If rubble of required size and quality for quains corners and special shape etc. is not available, the contractors shall be allowed to use pre cast 1: 3:6 C.C. blocks in required sizes as approved by the Engineer-in-charge at his discretion without any extra claim.
- 42.8 The contractor may if required & approved by Engineer obtain on usual payment from the Government stores such material as many as available and could be spared.
- 42.9 C.G.I. sheets required for labour campus etc. will be given on hire if available and can be spared, as per terms and conditions that may be decided by the Engineer-in-charge. The necessary hire charges may be recovered from running bills.
- 42.10 After the completion of works, the existing road shall have to be brought to its original stage by the contractor by carrying out all the necessary item of road construction work as per standard specifications and as directed by the Engineer-in-charge.
 - 42.10.1 All such works shall have to be carried out as directed by the Engineer-in-charge and no extra claim by the contractor what so ever on-account of above mentioned works shall be entertained.
- 42.11 In case of excavation in Hard Rock for pipe laying and for structures the recovery for rubble/metal shall be made at the basic price of SOR as per quantity of excavation in cmt, and so the the excavated material shall be the property of the contractor and he shall dispose at his will. Without affecting government rules and regulation.
- 42.12 The item of cement concrete in M15 grade may in certain case be required to be used at scattered place in small quantities for certain works like canal structure repairing, deep and silt pocket etc. In such circumstances the contractor shall be allowed to use nominal proportion of CC1:2:4 for concrete mix on volumetric basis based on weigh batching converted with density, only with prior permission of engineer- in-charge and no extra charge for use of more cement as such shall be paid to the contractor.
- 42.13 Photography and videography of the work at initial stage, during work and after completion of work should be done by the contractor and soft copy and hard copy of same should be produced at the time of final bill submission.
- 42.14 The bidder must be a well-established contractor with experience and capability in construction of hydraulic irrigation project like canal works, sea erosion work river protection works, dams and barrages, pipe line works.
- 42.15 The bidder must have adequate qualified technical and skilled working staff and adequate equipment's for carrying out the work described in the brief note, efficiency and accordance with the time schedule.
- 42.16 Concrete work is required to be carried out with weigh batcher / flory / mechanical means by

- weight. This work required strict quality control and skilled supervision so bidder shall have to give name of site engineers who shall have remain present continuously during execution thought contact period.
- 42.17 Subletting of work is strictly not permitted at any stage. If it is found that subletting is done by contractor looking to financial transaction of company with regard to this work registration of company shall be put under abeyance. So it is advised that bidder shall apply only if he is resource full and capable to complete work within 11 months (including Monsoon) to avoid any penal action.
- 42.18 The bidder shall have to submit affidavit regarding to penalty in form of registration abeyance is imposed during last seven years i.e. 2019-20 to 2025-26.
- 42.19 The work is required to be done start on very next day from the date of work order. Bidder shall have all required machinery for concrete work, so that It can be mobilized on the same day of work order given.
- 42.20 The bidder shall be have to pay all security deposit as per govt. norms within 10 days from the date of Executive Engineer's office letter of paying required security deposit.
- 42.21 If bidder does not complete work of require quantity as per tender specification within time limit and damage occurs during defect liabilities period of 3 years, total cost of restoration of damage structure shall be covered from the contractor. If contractor does not pay above cost of losses same will be recovered as revenue arrears as land revenue act provision. ~~These losses will be recovered as per clause No. 2 of B-1 agreement.~~
- 42.22 If bidder fills tender online and doesn't sent or intentionally delay in sending documents like EMD tender fee and other documents as asked in physical from within time limit his registration will be put in abeyance for three years.
- 42.23 It is strictly advise that tender shall be filled by those contractors who are capable to complete work with required quality within time limit and have sufficient machinery and manpower available for contract period to avoid heavy penalty as mentioned above.
- 42.24 To execute work as per quality control criteria specified in tender and as direct by Executive Engineer during execution in the responsibility of contractor. So contractor shall have to establish its own quality control setup.
- 42.25 The contractor shall have to quote the rate in the tender considering the liability to remove all pipeline coming across canal as directed by Engineer in charge and to reinstall the same as required technically according to site condition as per the instruction of the Engineer in charge i.e. all the pipeline coming across canal shall be removed and reinstall as directed by Engineer in charge at the Risk and cost of the contractor
- 42.26 1% of the construction cost will be deducted from the RA and final bills of the contractor as recovery " The Building and other construction works, welfare Act -1996 if applicable.

D. General Technical Specifications

43. Chapter 1 – EXCAVATION

43.1 CLEARING SITE, EXCAVATION FOR FOUNDATIONS & TRENCHES INCLUDING BLASTING.

43.2 CLEARING SITE :

Unless otherwise specifically provided for the item of clearing site as given below will be considered as included in the item of excavation and will not be paid for separately.

43.3 REMOVAL OF RUBBISH:

The area to be occupied by the protection scheme and its apparatus works, etc. shall be made free from rubbish and shall be cleared off all rocks, stump, decayed timbers, bush and all other objectionable materials.

43.4 DISPOSAL OF WASTE MATERIAL FROM SITE CLEARANCE:

Waste materials, decide as such by the Engineer obtained from clearing operations shall be burnt or removed otherwise as directed by the Engineer with all leads and lifts, to such area so that it may not obstruct the progress of work neither it may cause problem to neighbouring people or farmers.

43.5 REMOVAL OF LOOSE ROCK ETC:

Before any work of excavation of foundation is taken up, all loose rocks semidetached rock in or close to the area to be excavated that is liable to fall or otherwise damage the work or workmen shall be stripped.

The methods employed shall be such as will not shatter or render unstable, and therefore unsafe and rock that was originally sound or safe. Any materials not requiring removal as contemplated herein, but which may later become loosened or unstable shall be promptly and satisfactorily removed. The cost of such clearing also shall be deemed to have been including in the unit of rates accepted, under the different items under work of dam seat clearance. The excavation for pipe trenches as well as for wells shall be done and protected such that no harm to the work or workmen may occur. The agency shall provide necessary scaffolding and side shuttering at his cost to cater the safety measures.

43.6 SCOPE OF WORK:

The work to be done under these specifications shall consist of furnishing all tools, plant and labour and materials required for carrying out excavation conveyance, disposal & stacking of the excavated stuff dewatering up to completion of entire work maintaining the excavation slopes and trenches, preparing the foundation as shown on the drawing and as directed by the Engineer and all operations covered including all required scaffolding and shuttering.

43.7 CLASSIFICATIONS:

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

43.8 EXCAVATION IN OVER BURDEN:

This shall include all excavation done in strata other than soft and hard rocks such as soil, clay, sand, gravels, soft murum, kankar, hard murum and boulders or mixtures of above strata. Hard murum and boulders shall include all kinds of disintegrated rock or shale or indurated sand or conglomerate interspersed with boulders less than 0.70 m³ (1cyd) and larger than 0.028 m³ (1c.ft.) which do not need blasting and can be removed by pick bar and shovel.

43.9 EXCAVATION IN SOFT ROCK:

This shall include all excavation in rock occurring in masses which can be best removed by blasting/chiseling. This shall also include rock required to be removed by pick axes, where required.

43.10 EXCAVATION IN HARD ROCK:

This shall include all excavation in hard rock occurring in masses which can be best removed by blasting. This shall also include rock required to be removed by chiseling, where required. Necessary requirements for blasting relevant rules and regulations shall be applied.

43.11 BLASTING :

OBSERVING RULES REGARDING BLASTING:

In conducting blasting operations proper precautions shall be taken for the protection of

persons, the work and property. All prevailing Government laws and rules relating to the design and location of magazine, transport and handling of explosive and the measures enacted for the prevention of accidents shall be strictly observed. Warning signal shall be prominently deployed on all magazines.

Similar proper warning signal shall be given before actual blasting.

RULES FOR BLASTING:

Relevant rules for blasting shall be carefully and rigidly observed.

STORING OF EXPLOSIVES:

Explosive shall be stored in a safe place and at a safe distance from the work and under the special care of watchmen as per rules so that in case of accidents no damage occur to other parts of the work. Explosive, detonator and fuses shall be separately stored. No objection certificate from the District Magistrate or inspector of explosive Gujarat shall be obtained by the contractor as required.

RESTRICTION OF BLASTING:

- (a) No blasting, which may disturb or endanger the stability safety or quality of the foundation shall be permitted.
- (b) Blasting within 15 m. of masonry progress or permanent structure shall not permitted.
- (c) Progressive blasting shall be limited to the one third of the legal remaining depth of excavation.
- (d) Blasting limit shall be 10 m. for blasting with shallow holes.
- (e) No large scale blasting operation shall be resorted to when the canal excavation reaches the last 0.75 m. to 1.0 m. only small charge preferably of black gun powder may be allowed so as to prevent shattering of the canal bed.

RULES FOR BLASTING OPERATIONS

GENERAL:

- (i) The contractor shall acquaint himself with all the prevailing laws and rules and regulations concerning storing, handling and the use of explosive. All such laws, regulations and rules etc. as in force from time to time shall be binding upon contractor.
- (ii) The provisions detailed in these rules are supplementary to the above laws, rules and regulation etc. and are applicable except where they conflict with the above mentioned laws etc., from time to time, further the Engineer-in-charge may issue modification, alternations or instructions from time to time. The contractor shall comply with the same without these being made a cause for any claim.

MATERIALS:

- (i) All materials such as explosive, detonators, fuses tamping materials etc. that are proposed to be used in the blasting operations shall have the prior approval of the Engineer-in-charge.
- (ii) Black powder and safe explosive (as commonly current in India) shall be used wherever possible. Explosive with nitroglycerine shall be used only under exceptional circumstances, and where the above explosives are not effective.
- (iii) The use of a fuse with only one protective coat is permitted. The fuse shall be sufficiently water resistance as to be unaffected when immersed in water for thirty minutes. The rate of burning of the fuse shall be uniform and not less than 4 seconds per inch of length with 10 percent tolerance on either side.
Before use the fuse shall be inspected and the moist, damaged broken once shall be discarded. The rate of burning of all new type of fuses or when they have been in stock for long shall be tested before use.
- (iv) The detonators used shall be capable of giving effective blasting of the explosive. Most or damaged detonators shall be discarded.

PERSONNEL :

- (i) Excavation by blasting will be permitted only under personnel supervision of competent and licensed persons and trained workman.
- (ii) All supervisors and workman in charge of make up handling Storage and blasting work may be adequately incurred by the contractor.
- (iii) These storage shall be in charge of very reliable person approved by the Engineer-in-charge who may if necessary cause police enquire being made as to his validity antecedents etc. the contractor shall have to produce a security for the person in charge of the explosive if and as required by the Engineer-in-charge or by the civil authorities of the District.
- (iv) The contractor shall make sure that his supervisors and work men are fully conversant with all the rules to the observed in storing ,handling and use of the explosive .It shall be assured that the supervisor in charge is thoroughly acquainted with all the details of the handling and the blasting operations.

PROCUREMENTS :

In case of short supply of explosive, the contractors shall be responsible for the progress of works and he shall have to make his own arrangement for procurement of explosive. No claim shall be entertained on this account. The department is only assist for procurement as far as possible in case of non-supply of explosives should be stored in a clean ,dry, well ventilated bulletproof and fire proof building on an isolated site.

The explosive ,detonators and fuses shall each be separately stored.

- (ii) A careful and day-to-day account of the use of explosive shall be kept by the contractor in an approved register and in approved manner. The register shall be produced by the contractor for the inspector of the Engineer-in-charge when so required by the latter. The Engineer-in-charge may also pay surprise visits to the storage of the explosive. If the account is not found to have been maintained in a manner prescribed by the Engineer-in-charge the contractor shall be liable to be penalized with forfeiture of security deposit lodged by him with the Government or his tender shall be liable to be cancelled in which case he shall not be entitled to any compensation for the losses etc. The action taken under this causes shall be in addition to that which might be taken by competent civil authorities in a court of law.
- (iii) The magazine shall at all times be kept compulsory clean.
- (iv) No unauthorized Person shall at any time be admitted inside the magazine.
- (v) The magazine shall when not in use of authorized persons be kept securely locked.
- (vi) The magazine shall on no account be opened during or in the approach of a thunderstorm and no person shall remain into vicinity of the magazine during such period.
- (vii) Magazine shoes without nails shall at all time be kept in the magazine and wood or cement through about one foot (0.30 m) high and eighteen inches (0.46 m) in diameter which shall be kept always filled with water and shall be fixed near the door of the magazine.
Persons entering the magazine must put on the magazines shoes, which shall be provided by the contractor for the purpose and are further instructed as below :
 - (a) Not to put their feet on the clean floor unless they have the magazine shoes on.
 - (b) Not to allow the magazine shoes to touch the ground outside the clean floor.
 - (c) Not to allow any dirt or grit to fall on the clear floor.
- (viii) Persons with bare feet shall before entering the magazine dip their feet in water and then step direct from the trough over barrier (if there be one) on the clean floor.
- (ix) A brush or broom shall be kept in the lobby of the magazine dip their feet in water and then step direct from the trough over barrier (if there be one) on the clean floor.
- (x) No matches of inflammable materials shall be allowed in the magazine .Light shall be obtained from electric storage battery lantern.
- (xi) No person having articles of steel or iron on him shall be allowed to enter the magazine.
- (xii) Cotton rags, waste and articles liable to Instantaneous ignition shall not be allowed in the magazine.
- (xiii) Workmen shall be examined before they enter the magazine to see that they have none of the prohibited articles on their person.
- (xiv) No tools or implements other than those of copper ,brass, gun metal or wood shall be allowed inside the magazine ,all tools shall be used with extreme gentleness and care.
- (xv) Boxes of explosive shall not be thrown or dragged along the floor. These shall be stocked on wooden trestles. Where there are white ants the leg or the trestles should rest in shallow copper, lead or brass bowls containing water. Open boxes of dynamite shall never be exposed to the direct rays of the sun.
- (xvi) Empty boxes or loose packing materials shall not be kept inside the magazine.
- (xvii) The magazine shall have a lightening conductor, which shall be tested at least once a year by an officer authorized by the Engineer. The contractor shall within 15 days comply with all the recommendations made by the officer testing the lightening conductor falling which the Engineer shall be entitled to comply with the same at the contractor's expense which shall not be open to question or any consider any action that he may consider fit.
- (xviii) A notice shall be hung near the store prohibiting entrance of unauthorized persons.
- (xix) The following shall be hung in the lobby of the magazine.
 - (a) A copy of rules both in English and in the language which the workers concerned are familiar.
 - (b) A statement showing the up to date stock in the magazine.
 - (c) A certificate showing the last stock of testing of the lightening conductor.
 - (d) A notice that smoking is strictly prohibited.
- (xx) The magazine will be inspected at least twice a year by an officer representing the Engineer-in-

charge who will see that all rules are strictly complied with. He will notify all omission etc. to the contractor who shall rectify the defects within a period of 15 days from the date of receipt of the notice failing which the Engineer may take whatever action considered suitable.

USE OF EXPLOSIVES:

- (i) For the transport of the explosive and detonators between the store and the site closed and strong container made of soft materials such as timber sine copper leather and the line materials shall be used.
- (ii) Explosive and detonators shall be carried in separate boxes and transported separately. For the conveyance of primers special container shall be used.
- (iii) The boxes and container used shall be kept well closed.
- (iv) Explosive shall be stored and used chronologically to ensure the once received earlier being used first.
- (v) A make up house shall be provided at each working place in which cartridges will be made by experienced man as required. The make pup house shall be separated from other buildings. Only electric storage battery lamps shall be used in this house.
- (vi) No smoking shall be allowed in the makeup house.

DISPOSAL OF DETERIORATED EXPLOSIVE:

All deteriorated explosives shall be disposed off in an approved manner. The quantity of the deteriorated explosives to be disposed off shall be intimated to the Engineer prior to its disposal.

PREPARATION OF PRIMERS:

The primer shall not be prepared near open flames of fires. The work of the preparation of primers shall always be entrusted to the same personnel. Primers shall be used as soon as possible after they are ready.

CHARGING OF HOLES:

- (i) The work of charging shall not commence before all the drilling work at the site for the shift is completed and the supervisor has satisfied himself to that effect by actual inspection.
- (ii) While charging open lamps shall be kept away for charging with powdered explosives, naked, flame shall not be allowed.
- (iii) Only wooden tamping rods without any king of metal on them shall be allowed to be used.
- (iv) Bore holes must be such a size that the cartridges can easily pass down them.
- (v) Only one cartridge shall be inserted at a time and gently pressed into the holes with the tamping rod. The sand, clay or other tamping materials used for filling the holes completely shall not be tamped too hard.

BLASTING:

- (i) Blasting shall be carried out during fixed hours of the day which shall have the prior approval of the Engineer-in-charge. The hours once fixed shall not be altered without prior written approval of the Engineer-in-charge.
- (ii) The site of blasting operations shall be permanently demarcated by red danger flags. The order to fire shall be given only by the supervisor in charge of the work and this order shall be given only after giving warning signal 3 times so as to enable the labourer, watchmen etc. to reach safe shelter and after having ascertained that no body is within the danger zone.
- (iii) A bugle with a distinctive note shall be sued to give the warning signals. This bugle shall not be used for any other purpose. All the labours shall be made acquainted with the sound of the bugle and shall be strictly warned to leave their work immediately at the first warning signal and to make for safe shelters and not to leave the shelters until clear signal is given in case of major working operations sirens-electrically run with range of one K.M. radius be utilized for waning.
- (iv) All the roads and footpaths leading to the blasting area shall be attached.
- (v) In special cases suitable extra precautions shall be taken. The Engineer-in-charge may however permit blasting for fixed time provided he is satisfied those proper precautions are taken to give sufficient warning to all concerned and that the work of other agencies on the site is not unduly hampered.
- (vi) For lighting the fuses a lamp with a strong flame such as a carbide lamp be used.
- (vii) The supervisor shall watch the time required for the firing of the fuses and shall see that all the workmen are under safe shelter in good time.

ELECTRICAL FIRING :

- (i) Only the supervisor in charge shall keep the key of the firing apparatus and he shall keep it away with himself.
- (ii) Special apparatus shall be used as a source of current for the blasting operations. Power lines

- shall not be tapped for the blasting operations. Power lines shall not be tapped for the purpose.
- (iii) All the detonators shall be checked before use.
- (iv) For blasting in one series only detonators of the same manufacture and of same group of electrical resistance shall be used.
- (v) Such of the electrical lines as could constitute danger for work of charging shall be removed from the site.
- (vi) The firing cable shall have a proper insulation cover so as to avoid short circuit due to contact with water, metallic parts of rock etc.
- (vii) The use of the earth as a return line shall not be permitted.
- (viii) The firing cable be connected to the sources of current only after ascertaining that no body is in area of blasting.
- (ix) Before firing the circuit shall be checked by a suitable apparatus.
- (x) After firing whether with or without an actual blasting the contract the firing cable and the sources of current shall be cut off before any persons are allowed to leave the shelters.
- (xi) During storms charging with electrical detonators shall be suspended. The charges already placed into the holes shall be blasted as quickly as possible after taking all the safety precautions and giving necessary warning signals. If this is not possible the site shall be abandoned till the storm has passed.

PRECAUTIONS AFTER BLASTING:

- (i) After the blast, supervisor shall carefully inspect the work and satisfy himself that all charges have exploded.
- (ii) After the blast has taken place in underground works the workmen shall not be allowed to go to the face till the toxic gases get evacuated from the face.

MISFIRES :

- (i) If it is suspected that part of the blast has failed to fire or is delayed sufficient time shall be allowed to lapse before entering the danger zone. When fuses and blasting caps are used a safe time should be allowed and then the supervisor alone shall leave the shelter to see the misfire.
- (ii) Drilling near the holes that has misfired shall not be permitted until one of the two following operation are carried out by the Supervisor.
 - (a) The supervisor should very carefully (when the tamping is damp clay) extract the tamping with a wooden scraper or jet of water or compressed air (using the pipe of soft material) and withdraw the fuse with the primer and detonator attached. A fresh primer and detonator with fuse shall then be placed in this hole and fired.
 - (b) The supervisor shall get one of the tamping cleaned off holes and indicate the direction by placing a stick in the holes. Another hole may then be drilled at least 9" (23 cm) away and parallel to it. This hole should then be charged and fired. The balance of the cartridges and detonator found in the hole shall be removed.
- (iii) Before leaving his work the supervisor should inform the supervisor of the relieving shift of any case of misfire and shall point out also state that action if any he has taken in the matter.
- (iv) The supervisor shall at once report to the office all cases of misfire, the cause of misfire and the steps taken in connection herewith.
- (v) Names of the supervisors in charge of day and night shifts must be noted daily.
- (vi) If misfire has been found to be due to defective detonator or dynamite. The whole quantity in the box from which the defective articles were taken must be returned to the authority as may be directed by the Engineer-in-charge for inspection to whether the whole box contains defective materials.
- (vii) Re-drilling the hole that the misfired either wholly or partly shall not be permitted

43.12 PAY LINE:

The pay line shall slopping as 1:1 (H:V) in over burden and at 1/4 :1 (H:V) in soft rock and vertical in hard rock or as per approved drawing. Decision of engineer in charge shall be binding on to the contractor in this matter. Additional shoring and strutting for maintenance of excavated trench shall be done by the agency at his risk and cost. In case of the depth of hard rock in excavation for pipe trench is more than 4.0 berms of 1.0 m on either side at top every 4.0 m height from formation level shall be allowed as pay line for ease of excavation with rehandling of material.

The basis for the width of excavation shall be foundation levels as marked in the drawing (herein after termed as proposed foundation level)

When the actual depth of foundation considered in same with the proposed foundation level, the pay line shall be the line starting from the limiting lines of structure of foundation level and slopping at the rates specified above.

When the actual depth of foundation is taken lower than proposed foundation level, the pay line shall be the line starting from the limiting lines of structure at actual foundation level and sloping at the rates specified above.

When the actual depth of foundation is taken above the proposed foundation level, the pay line shall be the line confirmed to appropriate slopes excavated on the basis of width required for proposed foundation levels, but ending at the level of actual foundation.

No payment shall be made for any work done beyond the specified pay line. Not with standing the standards given above the contractor shall however be permitted to excavated at flatter slopes in interest of stability and safety of work without extra cost. The contract shall take care to see that the slopes excavated are stable and accident or slip does not occur.

UNDER CUTS AND OVER CUTS:

In the event of actual line of excavation being steeper than that specified under pay line above, payment shall be made for the actual line of excavation only.

Over cut beyond specified pay line of excavation carried out by the contractor for any purpose or reasons unless at the specified direction of Engineer-in-charge shall be at expenses of contractor. Refilling required of such unauthorised excavation with concrete, masonry or other suitable materials, as may be directed by the Engineer in charge shall also be done by the contractor at his own expenses.

43.13 SHORING AND STRUTTING :

MAINTENANCE OF EXCAVATION SLOPES AND TRENCH SIDES

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

SLIPS GOVERNMENT NOT RESPONSIBLE :

Slips shall be avoided. But if any slip occurs in account of any reasons, the excavation shall be properly restored to stability. No extra claims shall be entertained for such slip and their consequences.

The excavated trenches filled up due to monsoons or any other reasons shall be cleared as directed by the Engineer-in-charge by the contractor without any extra cost to Government.

43.14 DISPOSAL OF EXCAVATED MATERIALS :

43.15 The contractor shall not sell or otherwise use or remove except for the purpose of this contract, the sand, clay, ballast, earth work or other substances or materials which may be obtained from any excavation made for the purpose of this contract produce upon the site at time of delivery of the possession of the land, but all such substances, materials and produce shall be property of the Government and shall be disposed off in the manner and place shown in the drawings or as and where the Engineer may direct with all lead& lifts. The contractor shall however, use such of the excavated useful materials or stones, obtained from excavations, in masonry as well as in banking which the Engineer may direct and approve. In case of excavation in Hard Rock for pipe laying and for structures the recovery for rubble/metal shall be made at the basic price of SOR as per quantity of excavation in cubic meter, and so the excavated material shall be the property of the contractor and he shall dispose at his will.

After sorting of useful materials is done, the rest of the materials which is declared not useful shall be disposed off in areas as directed with all leads and lifts.

No materials shall be disposed where it will detract from the appearance or interfere with the accessibility of the complete structures. Waste shall be leveled and trimmed to reasonable regular lines and all the work shall be done with reasonable neatness, excavated materials shall not be carelessly thrown over the entire premises of work, but shall be deposited directly in permanent position, consistent with proper execution of work. The directives of Engineer-in-charge shall be binding in respect of location of disposing the waste materials.

If for the convenience of the contractor and at the express permission of the Engineer part of whole of useful materials stack supplied at site is washed away to floods or any other reasons, the contractor shall make good for the credit which the Government could have driven, from the use of this material had the material been not washed away.

43.16 MODE OF MEASUREMENT AND PAYMENT :

For the purposes of measurements, initial survey by levels shall be carried out of the whole area of excavation along cross sections spaced 5 m. apart. Levels shall be taken every 30 m. along these cross section (in this case chainage zero will be at the axis) thus establishing a level grid of 30m x 5m with levels at each corner. Bench marks established for those cross sections shall be maintained throughout the works by permanent pillars and this grid will form the basis of all excavation measurement for over burden the rock unless some other method of acceptable to or directed by the Engineer-in-charge any particular location of work. The cross section for the whole area of excavation shall be taken in the manner stated at the start of work and also as and where the site changes.

The quantity shall be computed from the cross sectional areas by the trapezoidal formula only. The contractor shall have to sign cross section in token of the acceptance of the correctness of the working ground levels before commencing work and also at the end of the work is taken of the respective foundation level. Executed quantity in trial pits pockets and seams shall be determined by taking levels on grid with interval of 5 m. or close as required.

The rate for the respective excavation including necessary leads lifts including dewatering up to completion of entire work and all depth and disposal of excavated stuff as desired in these specifications. The measurement will be computed by putting the actual excavated levels and the original ground or rock level and calculating the area between the original and excavated line.

No payment shall be made for any silt debris etc. that might accumulate in excavation pits during monsoons or summer showers or otherwise on any account and the removal thereof shall be deemed to have been included in the tendered rates for the main items.

The payment shall be made on quantities ascertained as stated herein above and at rates accepted on the relevant class of material which shall be determined by the Engineer in charge whose decision shall be final.

No claim for extra rate shall be entertained for any excavation in over burden and rock that may be required to be done for widening or deepening the foundations. Consequent upon lowering of foundation below those shown in the drawings. The work so done shall be paid at the rates as specified in the tendered item. The rates are inclusive of all lifts and leads and dewatering as required up to completion of entire work.

For jungle clearance area cleared by removing rubbish, bushes, small tree & stump shall be measured and paid in hector basis.

44. CHAPTER-2- MATERIALS

44.1 CEMENT

The contractor shall procure & supply ordinary Portland cement for the entire work from open market, from the manufacturing company directly having major cement plant with yearly production more than one lacs MT. or from the authorized dealer of such company. Only ordinary Portland cement conforming to IS 12269: 2013 shall be used for entire work.

The cement older than six months or the period as specified in I. S. shall not be used on work. The samples of the cement older than 3 months shall be tested by quality control unit or G. E. R. I. at the contractors cost. If the test results are in accordance with the I. S. specifications, then and then Engineer- in-charge may permit to use such cement. The Contractor shall have to remove the discarded cement at his own cost and no claims on account of purchase cost of discarded cement, it's transportation and stacking cost shall be entertained.

The Engineer- in-charge and contractor shall jointly maintain cement consumption register in which the receipt of cement and its use shall be signed by both. i.e. representative of contractor and the Engineer- in-charge or his authorized person.

The contractor shall provide at the site of work satisfactory storage for not less than 3 months average consumption of cement and shall keep the cement stored in manner that will satisfy the Engineer in charge.

The store shed constructed shall be having double locking arrangements one key of the lock will remain with the department. Account of receipt, issue and balance of cement shall be kept so as to facilitate check of stores and consumption at any time. The cement shall be supplied by the contractor in plastic/paper bags. The cement should conform the I. S. 269-2015. For the verification of the original bill of company, the contractor shall have to produce bill to the

concerned Executive Engineer. The cement shall be ordinary Portland and. tested before use as required by the Engineer- In-charge and should comply all the requirements of IS 12269: 2013 and then the cement shall be allowed to be used in the work. The testing shall be done for each consignment received on site.

The frequency of the test shall be as under.

Weight of lot in ton	No. of sample to be taken
Up to 50	1
51 to 100	2
101 to 200	3
201 to 300	4
301 to 500	5
501 to 1000	6
1001 to 1300	7

Each consignment shall be stacked separately The cement stack after testing not found as per standard laid down shall be rejected and such stack of cement shall be removed immediately from the site of work. No extra cost either for testing or to rejected material shall be 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 result of cement should be submitted as required by the Engineer-in-charge. No extra payment shall be made to the contractor for testing of cement.

The arrangement of storage and utilization shall be such that to ensure the utilization of cement in order of its arrival at the storage and contractor shall maintain up to date record which would at any time show the dates of receipt and proposed utilization of cement laying in the stores at site.

The Engineer- in-charge shall at all time, have an easy access to the stores and site of the contractor and Engineer- in-charge shall have authority to check and examine the method of storage records accounting and security provided by the contractor. The contractor shall comply with the instructions to satisfy that the cement is used for the purpose for which it is stored. The Contractor shall, on demand from Engineer- in-charge produce proofs, by way of records, books returns, Performa etc. maintained by his staff on site and the contractor shall at all-time keep this records up to date to enable the Engineer-in-charge to apply such checks as may desire to impose.

After completion of work at any time after testing if it is found that the cement is not of required quality or it does not satisfy the requirements of the I. S. then the whole work done by such quantity of cement shall be removed and all the materials should be removed including used and unused quantity of cement and the contractor is bound to reconstruct such work without any extra cost. The balance quantity of the bad Cement should be replaced by the fresh and new cement to the satisfaction of the Engineer -in-charge and no extra payment will be made on this account Following physical requirements are necessary as per para-6 of IS 12269: 2013.

44.1.1 Fineness: -

When tested for fineness by Blaine's air permeability method as described in I. S. 4031 (Part 2)1999, the specific surface of cement shall not be less than 225m²/kg.

44.1.2 Soundness: -

When tested by Le-chatelier method and autoclave test described in I. S. 4031 (part-3) 1988. unaerated cement shall not have an expansion of more than 10 mm and 0.8 percent respectively. In the event of cement failing to comply with any one or both the requirements specified above, further tests in respect of each failure shall be made as described in I. S. 4031 (part-2) from another portion of the same sample after aeration. The aeration shall be done by spreading out the sample to depth 75 mm at a relative humidity of 50 to 80 percent for a total period of 7 days the expansion of cement so aerated shall not be more than 5 mm when tested by Le chateliers method.

44.1.3 Setting time:-

The setting time of the cement, when tested by the vital apparatus method described in I. S. 4031 (part-5)1988 shall confirm to the following requirements.

(a) Initial setting time in minutes not less than 30

(b) Final setting time in minutes not more than 600

If cement exhibits false set, the ratio of final penetration measured after 5 minute of completion

of mixing period the initial penetration measured exactly after 20 seconds of completion of mixing period expressed as percent shall not be less than 50 in the event of cement exhibiting false set The initial setting time of cement then tested by the method, described in I. S. 4031 (part-5) 1988 after breaking the false set shall confirm to setting time.

44.1.4 Compressive strength

The average compressive strength of at least three mortar cubes (area of face 7.07 x 7.07 cm cube size) composed of one part of cement three parts of standard sand (confirming to I. S. 650-1966) by mass and (p/4 + 3.00) percent (of combined mass of cement plus sand) water and prepared, stored and tested in the manner described I. S. 4031 (part-5) 1988 shall be as follows.

- (a) 72 ± 1 hour, not less than 16 mpa.
- (b) 168 ± 2 hours, not less than 22 mpa.
- (c) 672 ± 4 hours, not less than 33 mpa.

Note :- 'P' is percentage of water, required to produce a paste of standard consistency, mpa, is N/mm² i.e. (newton)=0.102 Kg.

By agreement between the purchaser and the manufactures transverse strength of plastic mortar in accordance with the method described in I. S. 4031 (part-8) 1988 may be specified in addition to the test specified above the permissible value of the transverse strength shall be mutually agreed to between the purchaser and the supplier at the time of placing the order. Notwithstanding the strength requirement specified above cement shall show a progressive increase in strength from strength at 72 hours.

44.1.5 Tests :-

Consistency of standard cement paste. The quantity of water required to produced paste of standard consistency, to be used for the determination of water content of mortar for compressive strength tests and for the determination of soundness and setting time shall be obtained by the method described in I. S. 4031 (part-4) 1988.

44.1.6 Chemical test :-

The chemical tests as to be suggested in by Engineer- in- charge shall be carried out as per I. S. and it should conform to the provision made in I. S.

44.1.7 Rejection :-

Cement shall be rejected if it does not comply within any of requirement of above specification All cement shall be stored in dry water tight store sheds, the floor on which cements to be stored shall be raised at least 30 cms above ground level, cement should be used in the work in the order in which it is delivered to the site, For this purpose each consignment it arrives should be stacked separately card bearing date of arrival should be pinned to the pile. Contractor shall be responsible for prepare storage of cement and damage deterioration there in. He shall be responsible for the change and shall have to make good the same.

44.1.8 Admixture :-

The contractor shall not without the written consent of the Engineer-in charge shall add any admixture to any mix of concrete or mortar the decision of the Engineer shall be final and binding on the contractor. The Engineer-in-charge shall have the authority at any time and from time to time to order the addition or any air entraining agent or other admixture to any mix of concrete or mortar in such proportion or quantity or make as he may specify and the contractor shall comply with the same. The admixture shall be supplied free of cost for the purpose of the concrete or the mortar as the case may be No extra payment shall be made for this purpose.

44.2 SAND

44.2.1 Source& site:-

Sand to be used after screening and shall be from Sabarmati river bed as approved by the Engineer- in-charge. However, sand from local river can be used after proper screening& cleaning as directed

44.2.2 Quality:-

Sand shall be natural sand, clean, well graded, hard strong durable and gritty particle free from injurious amounts of dust clay, kantar nodules, soft or flaky particles shade, alkali, salts organic matter loam, mica or other deleterious substance and shall got approved from the Engineer-in-charge. The sand shall not contain more than 3 percent of silt as determined by field test, if necessary the sand shall be washed to make it clean.

44.2.3 Sand for Concrete: -

Sand to be used for concrete shall be natural Zone-2 sand and shall be from Sabarmati river. The maximum size of sand particles shall be limited 4.75 mm. The sand shall consist of hard dense uncoated siliceous of rock fragment and shall be free from injurious amount of dust, limbs soft or flaky particle, shale, alkaline, organic, loam, mica and other deleterious substance.

44.2.4 Coarse Sand: -

The fineness modulus of coarse sand shall not be less than 2.2 and shall not exceed 3.2
The sieve analysis of coarse sand shall be as under

IS Sieve Designation	Percentage passing for			
	Grading Zone-I	Grading Zone-II	Grading Zone-III	Grading Zone-IV
10 mm	100	100	100	100
4.75 mm	90-100	90-100	90-100	95-100
2.36 mm	60-95	75-100	85-100	95-100
1.18 mm	30-70	55-90	75-100	90-100
600 micron	15-34	35-19	60-79	80-100
300 micron	5-20	8-30	12-40	15-50
150 micron	0-10	0-10	0-10	0-15

44.2.5 Grading: -

The sand for concrete shall be well graded and the sieve analysis of the natural sand shall confirm to following gradation

Confirming to the IS 460-1978	Confirming to ASTM Specification	Confirming to I.S. Specification	Percentage by weight retained on sieve
Sieve no. 480	4	3/16	0-5
Sieve no. 240	8	7	5-15
Sieve no. 120	16	14	10-25
Sieve no. 60	30	25	20-40
Sieve no. 30	50	52	15-35
Sieve no. 15	100	100	5-10
75 Micron	Pan	Pan	2-7

Deviation from the prescribed limits of cumulative percentage retained on sieve no. 3/16, 7, 14, 25, 52, & 100 shall be permitted. Provided in total sub deviation shall not exceed 10% deviation from the prescribed on sieve no. 25

44.3 COARSE AGGREGATE: •

44.3.1 Quality: -

Coarse aggregate shall consist of machine crushed black trap stone/stone. It shall be uncoated hard, strong, dense and durable. It shall be free from disintegrated stones, soft, flaky and elongated particles, salt, alkali, vegetable matter and other deleterious materials and such quantities as to reduce the strength and durability of the concrete or attack the steel reinforcement.

The amount of deleterious materials in coarse aggregate shall not exceed the percentage limits given below and the sum of the percentage of all the deleterious material shall not exceed the

limits.

Deleterious materials	Maximum % Uncrushed.	limit by Weight Crushed.
Coal lignite.	1.00	1.00
Clay lumps.	1.00	1.00
Soft fragments.	3.00	—
Materials passing 75 micron I.S.. sieve.	3.00	3.00

44.3.2 Grading:-

The grading of coarse aggregate shall be the normal and sizes in Table 7 of I. S. 383-2016 referred below.

Sr. No.	IS Sieve Designation	Percentage passing for single sized aggregate of nominal size						Percentage passing for graded aggregate of nominal size			
		63 mm	40 mm	20 mm	16 mm	12.5 mm	10 mm	40 mm	20 mm	16 mm	12.5 mm
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
i)	80 mm	100	-	-	-	-	-	100	-	-	-
ii)	63 mm	85-100	100	-	-	-	-	-	-	-	-
iii)	40 mm	0-30	85-100	100	-	-	-	90-100	100	-	-
iv)	20 mm	0-5	0-20	85-100	100	-	-	30-70	90-100	100	100
v)	16 mm	-	-	-	85-100	100	-	-	-	90-100	-
vi)	12.5 mm	-	-	-	-	85-100	100	-	-	-	90-100
vii)	10 mm	0-5	0-5	0-20	0-30	0-45	85-100	10-35	25-55	30-70	40-85
viii)	4.75 mm	-	-	0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
ix)	2.36 mm	-	-	-	-	-	0-5	-	-	-	-

The pieces shall be angular in shape and shall have granular or crystalline surfaces. Friable, flaky and laminated pieces, mica and shale, if present, shall be only within tolerance limits which will not affect adversely the strength and or durability of concrete. The maximum size of coarse aggregate shall be as directed by the Engineer-in-charge or specified otherwise. The maximum size of coarse aggregate shall be the maximum size specified above but in no case greater than 1/4th of the minimum thickness of the member, provided that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and fill the corners of the form. For plain concrete, the maximum size of aggregate shall be of 40mm. (For heavily reinforced concrete members, the nominal maximum size of the aggregate shall be 5 mm. less than the minimum clear distance between the reinforcing main bars or 5 mm less than concrete cover whichever is smaller, shall be maintained

44.4 WATER

44.4.1 Quality:-

Water shall be clean and free from oils, acids, alkalis, vegetable, objectionable quality of silt or other organic impurities; in general, water that is fit to drink is suitable for cement work. Excess of acidity or alkalinity can be tested by litmus paper, Repaid change of the litmus papers indicates dangerous amount of acid or alkali present, soft water-may produce a weaker cement work than hard water, water containing decayed vegetable matter should be particularly avoided as they may interfere with setting of the cement. Hydrate the cement Water has two purposes, hydrate the cement and to lubricate the mix so as to aid compaction.

44.4.2 Turbidity permissible:-

The turbidity of water to be used in works shall not exceed 2000 parts per million and shall

preferably as low as possible.

44.5 OTHER MATERIALS :-

If the contractor desires to obtain the materials other than those provided in Schedule 'A', he may request Engineer-in-charge in writing. Depending upon the materials as may be available and can be spared as per terms in force, the Engineer-in-charge may approve the contractor's request. The contractor shall have to pay the equal payment comprising of the cost of materials, storage charge and supervision charges etc. for such materials, material will be issued at Government stores. The machinery, if available with the department, shall be spared to the contractor on rental basis as per prevailing rules in force.

44.5.1 Aggregate (Stone Grit)

Grit consist of crushed of broken stone and be hard strong dense, durable, clean of proper gradation and free from skin or coating likely to prevent adhesion of mortar, grit shall generally be cubical in shape and as far as possible flaky elongated places shall be avoided. It shall generally comply with the provisions of I.S. 383. Unless special stone of particular quarries is mentioned, grit shall be obtained from the best clack trap or equivalent hard stones approved by the Engineer-in-charge the grit shall have on deleterious reaction with cement.

The grit shall confirm to the following gradation as per sieve analysis.

I.S. Sieve	% passing through sieve
12.50 mm	100%
10.0 mm	85-100%
4.75 mm	20%
2.36	0.25%

The crushing strength of grit will be such as to allow the concrete in which it is used to build up the specified strength of concrete.

The necessary tests of grit shall be carried out as per the requirements of I.S. 2386 (Part I to VII) as per instruction of the Engineer-in-charge. The necessity of test will be decided by the Engineer-in-charge.

44.5.2 Stone Coarse Aggregate (Metal):

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

The aggregate shall be well graded and shall have maximum size of 40mm. It will generally be cubical in shape unless special stones or particular quarries mentioned, aggregates shall be machine crushed from the best black trap or equivalent hard stone as approved. Aggregate shall have not deleterious reaction with cement. The gradation shall be in the nominal sizes as mentioned in Table – II of IS 383-1970.

I.S.Sieve Designation	Percentage passes for single size aggregate of nominal	
	40 mm	20 mm
80 mm	-	-
63 mm	100	-
40 mm	95-100	100
20 mm	30-70	95-100
16 mm	-	-
12.5 mm	-	-
10.0 mm	10-35	25-55
4.75 mm	0-50	0-10
2.35	-	-

NOTE: This percentage may be varied since what by the Engineer-in-charge when considered for obtaining better density and strength of concrete. The gradation shall give a dense concrete of the specified strength and consistency that will work readily into position without segregation and without use of excessive water cement.

The grading test shall be taken in the beginning and at the change of source of materials. The necessary test indicated in IS 383-1970 & IS 456-1968 shall have to be carried out to ensure the acceptability. The aggregate shall be stored separately. The aggregate shall be stored separately and handled in such a manner as to prevent the intermixing of different aggregate. If the aggregate is covered with dust, they shall be washed with water to make them clean.

44.6 Brick :

- The bricks shall be hand or machine molded and made from suitable soils and kiln burnt. They shall be free from cracks and flaws and nodules of free lime they shall have smooth rectangular faces with sharp corners and shall be of uniform colour. The bricks shall be moulded with a frog of 100 mm. x 40 mm. and 10 mm. to 20 mm. deep on one of its flat sides. The bricks shall not break when thrown on the ground from a height of 600 mm.
- The size of modular bricks shall be 190 mm.x 90 mm.x 90 mm.
- Only bricks of one standard size shall be used on one work. The following tolerances shall be permitted in the conventional size adopted in a particular work. Length $+ 1/8"$ (3.0 mm.) Width $\pm 1/16"$ (1.50 mm.) Height $\pm 1/16"$ (1.50 mm.)
- The crushing strength of the bricks shall not be less than 35 Kg/Sq. Cm. The average water absorption shall not be more than 20 percent by weight Necessary tests for crushing strength and water absorption etc. shall be carried out as per I.S. 3495 (Part-I to IV) -2019

45. CHAPTER-3 - CONCRETE WORK

45.1 SCOPE OF WORK:

The work covered by this chapter consist of furnishing all materials, equipment and labour for the manufactures, transport, placing, finishing and curing of all grades of concrete in the structure including in these specification and performing all the functions necessary and ancillary there to etc. complete.

The item of concrete will have to be split up into several items according to the grade of concrete to be used and its locations and will be measured and paid for accordingly. The general specifications described hereinafter shall however in relevance, apply to all concrete items.

45.2 COMPOSITION:

Concrete shall be composed of cement, fine aggregate (natural sand) or manufactured sand or both, coarse aggregate (broken rock/crushed metal or natural and screened gravel) and water, all well mixed in proper proportion and brought to the proper consistency. Whenever so ordered by the Engineer, admixtures shall be added as stated in the special conditions. The exact proportions of each type of aggregate will be determined and adjusted from time to time on the mechanical analysis of the aggregate stock pile and tests of resulting concrete test cylinders. In general, the design mix proportions shall be adjusted to produce a durable, plastic and workable concrete, suitable for the specific conditions, of placement and design strength as specified in each case. The specifications for the stone, fine and coarse aggregate and water shall be strictly adhered to as directed.

45.3 CLASSIFICATION:

The cement concrete work to be carried out has been approximately decided in the following classification as per statement attached. If any mix of concrete requiring increases in cement level is to be prepared additional required cement will be procured. On account of any such variation in any proportion of fine and coarse aggregates which are required to be adopted as directed by the Engineer-in-charge considering required grade concrete. For the purpose of tendering, the cement factor for the production of required grade of concrete herein normal circumstances is to be considered as given below of concrete produced variation in cement content of concrete required grade concrete mix from the stipulated cement level either due to change in mix design or as per direction of Engineer-in-charge.

45.4 CRUSHING STRENGTH:

The compressive strength test of concrete shall be conducted on 150 mm x 150 mm shall be marked date& mix no and sample no by oil painting at the time of casting cubes. The required materials for marking on cubes shall be bared by contractor. The design mix for different classes of concrete to be used on the specified work will be furnished by using the same materials as approved for use in the structure of dam and appertain works or canal works,

concrete mix shall be prepared in the laboratory at frequent interval and cubes 150 mm x 150 mm will be casted and tested for strength. The strength of field test specimen casted for the concrete use on the permanent work should be determined and these should not be less than 80 percent of the respective standard strength mentioned above or as per mix design. The testing of cubes will be carried out as per relevant Indian standard specification.

80 percent of the test specimen shall fulfill the above stipulation. Also coefficient of variation shall not be more than 15 percent. One set of test cubes for every 30 cum. of each class of concrete or part of it per day for R.C.C. works and/or for 30 cum or part of it per day for plain concrete work done shall be taken. The set of test cubes shall consist of 3 cubes each for testing for crushing strength at 7 days, 28 days Relevant I.S.I. 456-2000 for such evaluation of results shall apply. Their acceptance criteria of concrete on test result of cubes will be as per the provisions of I.S. 456-2000 & its latest version.

If the test result show that concrete cubes give result below the acceptance criteria, such substandard quality of concrete shall be removed and redone by the contractor at his cost. In case of doubtful work, cores shall be tested by the department, in presence of the contractor or his representatives. The results of such testing shall be binding on him. If it is impossible, to remove the substandard work as per circumstances, the rate for such a class of work shall be reduced suitably by the Engineer in charge, which shall be binding on him.

The cement level for various grades of controlled concrete shall be considered as under for the purpose of working out the rates to be quoted in Schedule-B.

Sr. No.	Type of concrete	Grades of concrete	Tentative Cement level required in kg. for one cubic meter of Concrete.
1	Plain / RCC	M-15 MSA 40	280
2	Plain / RCC	M-15 MSA 20	300
3	Plain / RCC	M-20 MSA-20	360
3	Plain / RCC	M-20 MSA-40	330

However, depending on the technical requirement various size of aggregate may be required to be used in various components of the structure. In that case, the minimum cement level for various grade of concrete with various size of aggregate shall be as per IS-456-2000.

- (b) Actual cement level required for the aggregate to be used shall be determined by tests. The mix proportions shall be selected to ensure that the workability of the fresh concrete is suitable for the conditions of handling and placing so that after compaction it surrounds all reinforcement and completely fills the formwork. When concrete is hardened, it shall have the required strength, durability and surface finish.
- (c) A mix shall be designed to produce the grade of concrete having the required workability and cohesiveness and characteristic strength not less than that stipulated in I.S. 456-2000. However, due to change in design mix, if it becomes obligatory to use less or more cement per cubic meter of concrete, the Contractor shall do the same without claiming any extra cost for handling using of extra cement. In case of actual use being less than the cement level specified in table herein as per para 3.03.3 the Department shall deduct the cost of cement from the bill at the base price of star rates and rate analysis per ton of cement at worksite for the reduced consumption of OPC. **In case of actual use being more than that specified above, the contractor will not be paid any extra amount for the increase in use of OPC cement.** For any reason including introduction of new item or enhancing grade of item already included in Schedule-B for use of cement be being more than that specified above the contractor will be paid for any increase in use of cement. For price adjustment, the amount so recoverable will be deducted in "R" the value of the work done and price adjustment will be made in accordance with clause 60 A of B1 Booklet. Design mix details of this includes the proportion of each separate size of grade of aggregate and actual cement level required shall be communicated to the contractor in writing by the Engineer-in-charge and any subsequent charges shall be suitably declared.

45.5 Strength Requirement of concrete.

Ordinary Portland cement conforming to IS-8112 shall be used. The permission of Engineer in charge shall be obtained for other grade of cement. The compressive strength requirements for the various grades of controlled concrete shall be as given in table.

Grade of Concrete	Compressive strength of 15 cm Cubes at 28-days after mixing conducted in accordance with		Compressive Strength on 15 cm Cubes.
	I.S. 516-1991 Preliminary Min, Strength (In N/mm ²)	Works test Minimum Strength (on Field in N/mm ²)	(Minimum at 7 days in N/mm ²)
1	2	3	4
M 15	15	15	10
M-20	20	20	13.5

In all cases the 7 and 28 days compressive strength specified in Table shall alone be the Criteria for acceptance or rejection of the concrete.

Where the strength of a concrete mix as indicated by tests lies in between the strength for the two grade specified in Table, such concrete shall be classified for all purposes as concrete belonging to the lower of the two grades between which it's strength lies.

45.6 CASTING TEST SPECIMENS :

45.6.1 TESTS :

The concrete for test specimen for compressive strength shall be collected at random as it comes out of the mixer at rates specified above or more as the Engineer may direct and in the quantity sufficient to proper necessary number of test pieces from each samples. The compressive strength of concrete shall be determined through the medium of test of cubes 150 mm x 150 mm x 150 mm if concrete with maximum size of aggregate of more than 40 mm is to be tested for strength the concrete shall be wet screened. In case of air entrained concrete of hand packed fraction of the coarse aggregate the remaining concrete shall be used for casting the specimens.

45.6.2 FREQUENCY OF SAMPLING

The minimum frequency of sampling of concrete of each grade shall be in accordance with the following

Qty of Concrete work in M3	Number of Samples	Remark
1-5	1	One sample for each class of concrete cast during day plus one additional sample for each additional 50 M3 or part thereof.
6-15	2	
16-30	3	
31-50	4	
50 - 100	5	

45.7 ACCESS TO TESTING:

The contractor shall at all-time have access to and association with sampling, designs and tests of trial mixes, test of strength and similar other operations. It shall be the responsibility of the contractor to associate himself with the work of tests in Government laboratory and in the field. The contractor's representative shall sign record of such tests done on the part of the contractor to associate with the operation aforesaid but shall not absolve him of the responsibility of producing in the work specified quality and strength determined with design mix from laboratory tests and results. It should be the contractor's responsibility to obtain on the work, concrete of quality, density and strength corresponding to the laboratory and test design. The laboratory mix will be so designed that the maximum strength achieved on the laboratory test cubes is 25 % higher than that specified as design strength in Para 3.03 above.

45.8 PRELIMINARY TEST:

45.8.1 The exact proportions in which the different ingredients are to be used for different part of the work shall be determined by Engineer from time to time during the progress of the work as analysis and tests are made of the samples of the aggregates and the resulting concrete. No extra payment or deduction shall be made in the unit rate for variation in the several ingredients. (Including for change in cement content)

45.9 SLUMP TEST:

45.9.1 In order to test, the consistency of their mixed content, slump test shall be made as and when required. This slump test shall be as per I.S. Specification 456-2000 and its

latest version.

45.9.2 Additional tests if deemed necessary for concrete for determining unit weight and air content will also be carried out by the department. The frequency of all the tests mentioned above shall depend on the nature of the job and will be decided by the Engineer. Contractor shall provide all necessary facilities and materials etc. for these tests as the engineer may consider necessary for which no separate payment shall be made.

45.10 MATERIALS:

(a) Cement shall be brought by the contractor as per para 3(1) special conditions.

(b) Steel shall be brought by the contractor as per para 3 (II) of special condition as well as per specification in chapter V of reinforcement.

45.10.1 SAND:

(1) The sand to be used after screening will be from the natural course in the river bed. The maximum size shall be limited to 4.75 mm.

(2) Detailed gradation charts for sand at different locations in river bed can be seen in the office of the executive Engineer-in-charge of the project. It may be pointed out in particular that all the sand will not be available in natural condition (above or below water level) and may require screening and washing blending without any extra claim to meet the specifications. The contractor may however consider the alternatives of bringing sand from outside source, which may meet with the specifications without any extra cost of department, with permission of the Engineer-in-charge.

(3) QUALITY:

The Sand shall consist of hard, dense, durable, uncoated, siliceous gritty materials from rock fragments. It shall be free from injurious amount of dust, lumps, soft and flaky particles shale, organic matter, loam mica and other deleterious substances. The maximum percentage of each of the deleterious substances in sand as delivered to the mixer shall not screen the following values.

Material Passing sieve:

Sieve B.S.S. or (I.S.No.8)		% age by weight	
Clay lumps	:1	% by weight Cinders and clinkers	
	: 0.5	% by weight Micac	: 2 % by weight

Total of deleterious substance such alkali mica, coals, organic, particles soft and flaky particles loan etc. shall not exceed 5 % by weight.

(4) The sum of the percentages of all deleterious materials listed above in 3.08.2 however shall not exceed 5 percentage by weight. The sand shall be free from injurious amounts of organic impurities and sand producing, a colour darker than the standard calorimetric test for organic impurities shall be rejected.

(5) GRADING :

The sand for concrete shall be well graded and the sieve analysis of the natural sand shall confirm to following gradation

Confirming to the IS 460-1978	Confirming to ASTM Specification	Confirming to I.S. Specification	Percentage by weight retained on sieve
Sieve no. 480	4	3/16	0-5
Sieve no. 240	8	7	5-15
Sieve no. 120	16	14	10-25
Sieve no. 60	30	25	20-40
Sieve no. 30	50	52	15-35
Sieve no. 15	100	100	5-10
75 Micron	Pan	Pan	2-7

Deviation from the prescribed limits of cumulative percentage retained on sieve no. 3/16, 7, 14, 25, 52, & 100 shall be permitted. Provided in total sub deviation shall not exceed 10% deviation from the prescribed on sieve no. 25.

45.10.2 COARSE AGGREGATE :

- (1) The coarse aggregate for concrete shall consist of clean, hard dense, durable, uncoated particles of natural sand, natural gravel, serein & graded gravel including crushed metal wherever specified. Predominantly flaky aggregate shall not be used.
- (2) The percentage of deleterious substances in any size of coarse aggregate as delivered to the mixer shall not exceed the following values. :

Materialized passing No.100 screen.

Shale	: 1% by weight
Coal	: 1% by weight
Soft fragments	: 1 % by weight
Other deleterious substances	: 1 % by weight
Clay	: 1% by weight

- (3) The sum of the percentage of all the deleterious substances in any size shall however not exceed 5 percent by weight. The coarse aggregate shall satisfy the abrasion, soundness, impact, hardness and water absorption test be laid down in I.S. 383-1970 & 2386-1963 & its latest version.
- (4) **GRADING:**
- Coarse aggregate shall be of such size as shall be retained on mesh 4.75 mm square.
 - The 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.
 - The actual gradation shall be as indicated by the project laboratory studies.
 - The materials coming out of the screen shall be in grade ranging from 40 mm to 4.75 mm. as mentioned above. Each grade of material shall be stacked separately. The stack shall be considered as approved only if it confirms the following criteria.
 - The material retained on sieve corresponding to the upper limit of size of stack not exceeding 15 %.
 - Materials passing through the sieve corresponding of the lower limit of size of stack not exceeding 15 %.
 - Sum of (1) and (2) above shall not exceed 20 %.

45.10.3 WATER:

- (1) Water used for both mixing and curing shall conform to IS: 456. Potable water is generally satisfactory. Water containing any excess of acid, alkali, sugar or salt shall not be used.

(2) TURBIDITY:

The turbidity in water shall not be more than 2000 parts per million and shall preferably be as low as possible.

Testing of the water shall be confirming to IS 456.

45.10.4 ADMIXTURES :

(A) ACCELERATORS :

Admixtures for increasing the strength of concrete at early ages may be permitted to be used at the cost, of contractor upon written approval covering the type, amount and location of use. The amount of accelerator used shall be not more than that necessary to produce the designed results. Calcium chloride shall not be used in excess of 2 % by weight, of cement, Accelerators shall be measured accurately and shall be introduced into the mixer in solution of the mixing water. Use of accelerator in the concrete shall be in no way effect the compliance with the requirements of these specifications covering protection and curing of concrete.

(B) AIR ENTRAINING AGENTS& ADDITIVE :

If necessary suitable air entertaining agents shall used to improve the quality and workability of the concrete. The same shall be procured by the contractor at the own cost at site of work. The contractor shall not claim anything extra for addition for such mixing.

45.11 BATCHING OF MATERIALS :

The method of measuring materials shall be by weight in simple weight batches and concrete shall be such that the proportions of constituents in the mixes are controlled and readily checked at any time during the progress of the work. The measuring of the materials for first

four to five batches shall be done accurately in weight batcher and hence after the volume of each ingredients shall be decided for the whole days work and contractor shall be allowed to carry out the work according to volumetric calibration of each day, materials shall be measured as follows.

45.11.1 AGGREGATES :

Each size of aggregates shall be weighted separately. The weight shall be done by simple weight batches which should meet the following requirements.

- (i) The weight equipment shall be designed to permit ready and proper adjustment of the proportion of the mix.
- (ii) Test scale weights shall be provided and periodic check mode of the accuracy of all weighing equipment's.

45.11.2 MEASUREMENT OF CEMENT AND WATER :

The cement shall be used in each batch on weight basis only. No extra charges shall be payable for the weightment of the cement before mixing. The contractor shall not be entitled to any claim or composition form the Government on account of any shortages in the weight cement in bags.

Water for mixing shall be measured by weight and the measuring device shall give accuracy within 1 percent. A reliable method of compensating for free water shall be used for maintaining the desired water cement ratio.

45.11.3 CHECK TESTS FOR EQUIPMENT :

The contractor shall provide standard tests, weights and other auxiliary equipment required for checking the operation performance of each scale of other measuring device and shall make period tests over the range of measurements involved in the batching operations.

The test shall be made in the presence of a Government representative nominated by the Engineer and shall be adequate to prove the accuracy of the measuring devices. The frequency of such tests shall be determined by the Engineer. Unless otherwise directed, tests shall be made once in two weeks at random without any notice in the case of cement and water scales and once a month in the case of all scales. The contractor shall make such adjustments repairs or replacements as may be necessary to meet the requirements, specified by the Engineer for accuracy of measurements.

45.11.4 VOLUMETRIC BATCHING:

1. Volumetric batching shall not be resorted to without prior consent of the Engineer in charge who may allow this at his sole discretion when the quantity of concrete work and the rate or its placement are so small as not to warrant the use of complete batching equipment.

When it is found necessary to resort volumetric batching instead of weight batching it shall be subject to the specific approval of the Engineer. The quantities of the fine and coarse aggregates shall be specified in volumetric unit based on bulk density of fine and coarse aggregates determined from time to time when the concreting is in progress. The cement shall always be weight batched.

Addition of water shall be by mechanical device with calibrated tanks attached to the mixers. This shall apply in volumetric batching also.

45.12 MIXING OF CONCRETE:

- 45.12.1** The concrete ingredients shall be fed into the mechanical mixer / RMC / mixing by weight simultaneously. A portion of water (5 to 10 %) shall precede and equal quantity shall follow the introduction of other materials. Mixer shall not be loaded in excess of its rated capacity. The concrete ingredients shall be mixed in a batch for not less 1/2 to 3 minutes according to capacity and efficiency of mixer, after all of the ingredients, except the full amount of water are in the mixer.

Mixing shall however have to be continued for longer periods if proper mixing does not results with timing indicated above.

The minimum mixing speed shall not be less than 4 revolutions per minutes and the peripheral speed of the drum shall not be more than 68.60 (225 ft.) m per minutes.

Mixer shall be examined daily for change in condition due to accumulation of hard concrete or mortar to wear of blades. No mixer shall be charged in excess of its rated capacity for mixing or agitation. However, if any mixer cannot produce, concrete meeting the requirements here to for specified, when mixing at rated capacity, within the specified limitation on the number of

revolutions of the mixing drum at mixing speed, the size of batch mixed in the mixer may be reduced, until upon testing a uniformly mixed batch, confirming to the performance test as provided here in after is obtained. Hand mixing shall not be permitted under any circumstances.

- 45.12.2 Whenever mixing is done at higher elevations, chutes formed of plan G.I. sheets shall be provided inclination of the chutes should be so adjusted that segregation does not take place. The chutes shall be washed clean as and when necessary. The first batch of concrete at the commencement of work shall be made richer by adding 10 % of cement extra without any extra claim over above that required for the particular mix. Concrete from chute should be deposited on nonabsorbent platform at lower level after that concrete should be remixed properly with hand shovel before placed in position.

45.13 TESTING OF MIXER PERFORMANCE:

The concrete shall be uniform throughout the concreting as revealed by tests carried out at the starting of the job and at intervals as fixed by the Engineer during the progress of work.

To carry out test of mixer performance two samples of freshly mixed concrete of sufficient quantity are taken for each test. The samples are taken from and batch of concrete with mixer stopped or there may be taken from the first and last portion of the batch as discharged from the mixer.

Immediately after samples are taken from the mixer the weight and air content of each sample are determined. The portion of samples in each test shall be screened on I.S. 480 sieve and washed. The weight of coarse aggregate retained on I.S. 480 sieve is found out in the saturated surface dry condition. By computation, the weight and the absolute volume of air free mortar in both the samples (from and the back of the mixer) can be found and from that the unit weight of air free mortar worked out. The variation in the individual unit weight of mortar (air free) from the average of the two shall be within 0.8% and variation in the weight of coarse aggregate retain on I.S. Sieve from the average of the two shall be within 5 %.

In the event that the tests indicate variability in the unit weight of air free mortar greater than that permitted. Mixing time should be increased, to bring the variability within the limit required a variation in the coarse aggregate is usually and indication that the mixer was improperly designed or has become worn out. Repairs to the mixer may be required or shape and spacing of the mixer blades may need changing before uniform concrete can be produced in the desired mixing time.

45.14 CONVEYING:

Concrete, shall be conveyed from mixer to the site of work as rapidly as practicable by methods which will prevent segregation and or less of ingredients. In case such segregation, occurs inadvertently concrete shall be remixed before being laid in place. The distance between the mixer and the place of constructing and also mode of transport of concrete shall be subject to the prior approval of the Engineer. It shall be deposited in its final position as early as practicable but always within a period of 30 minutes after mixing. When the initial set has taken place in a batch of concrete before it is placed in position, such concrete shall be rejected and taken away from the site to a distance and disposed off as ordered by the Engineer. No claim in this respect shall be entertained. Method of conveying concrete to any parts of the structure where concrete is loaded into chutes, belt conveyer or other similar equipment and carried in a this continuously explodes flow to the form will not be permitted, except for equally limited or isolated sections of the work and only when approved in writing by the Engineer-in-charge.

45.15 FORMS, GENERAL :

The Forms for concrete work shall have sufficient strength and rigidity to hold and to withstand the pressures of fresh concrete, during compaction, including live load and shaped to the required line within the tolerance specified. The tolerances specified are for finished concrete and not for the forms. Where the concrete surface can be trimmed to the prescribed lines the use of forms shall not be required. All exposed concrete surfaces having slopes of two horizontal to one vertical or steeper shall be formed.

Forms shall be constructed of M S Acro shuttering plate. MS Acro plate should have minimum

2.5 mm thick plate or any other approved material, shall be used for formwork. The surface of all form in contact with the concrete shall be clean, smooth, rigid and tight.

Form work for concrete shall be designed, together, treating concrete as fluid, weighting 160 lbs. per cu.ft. and in addition a live load of 50 lbs. per sq. ft. on horizontal projection of the surface, shall be used. The supports shall be so arranged to keep the maximum deflection within 1/360 of the span. Forms shall be designed and constructed to permit early removal without injury to the concrete, suitable devices shall be used to hold corners, adjacent ends of panels of other forms together in accurate alignment during compaction of concrete by vibration or other means. The forms and their joints shall be tight enough to prevent. While vibrating, the loss of mortar or water from concrete. The ties and bracing as may be necessary shall be attached to form and to be used more than once.

They shall be maintained in serviceable condition. They shall be clean, smooth and free from adhering grout before being reused.

Curved and special forms shall be of character that will result in smooth concrete surfaces. They shall be designed and constructed so that they will not warp or wrinkle during erection and placing of concrete.

45.16 PREPARATION FOR PLACING:

These minimum requirements are by experience known to be safe and no claims shall be entertained against Government for damages alleged by wing to the requirements no being sufficient. The contractor may where and if he so desires, extend the above to longer intervals. This shall not constitute any reason for any claims or extension of time.

Generally no concrete shall be placed until all form works, installation or parts to be embedded and preparation of surface/involved in the placing have been approved. No concrete shall be placed in water, except with the written permission of the Engineer and the method of depositing the concrete shall be subject to his approval; (concrete shall not be placed in running water until after concrete has hardened.) All surface of forms and embedded materials that have become encrusted with dried mortar or grout and from the concrete previously placed shall be cleaned of all such mortar or grout before the surrounding of adjust concrete is placed.

45.17 FOUNDATION SURFACE :

Immediately before placing concrete all surface of foundations upon or against which concrete is to be placed, shall be free from standing water and debris. All surface of rock upon or against which concrete is to be placed shall in addition to the foregoing requirements be clean and free from all objectionable coatings and loose semidetached or unsound fragments and shall be sufficiently rough to assume satisfactory bond with concrete.

The preparation of the surface over which new concrete is to be placed shall be prepared and cleaned as per separate prescribed para in chap-ter-4 for foundation preparation works. Where the work is dry enough to absorb water from the mortar layer, it shall be kept continuously wet for 24 hours. Immediately prior to placing concrete thereon.

45.18 SURFACE OF CONTRACTION& CONSTRUCTION JOINTS :

Concrete surface upon or against which concrete is to be placed and the surface of existing concrete to which new concrete is to be bonded and the surfaces of concrete placed, under these specifications to which new concrete is to be placed on old concrete so rigid that the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surface of construction joints shall be clean rough and dry when covered with fresh concrete, cleaning shall consist of the removed of all laitance, loose or defective concrete coating and sealing compound if used, and other foreign material. The surfaces of construction joints shall be crushed thoroughly with air and water jets and surface dried point to placement of adjoining concrete, drying of the surface shall be completed and any be accomplished by air jet. The surface of all construction joints shall be cleaned thoroughly of accretions of concrete of other foreign material by scrapping, chipping or other means approved by the Engineer.

45.19 CHIPPING& ROUGHENING OF CONCRETE SURFACE :

Concrete surface upon or against which additional concrete is to be placed, shall be chipped and roughened to a depth not more than 2 cm. of the surface. The roughening shall be chipped and roughened to a depth not more than 2 cm. of the surface. The roughening shall be

performed by chipping or other satisfactory, methods and in such a manner as not to loosen space or shatter any part of the concrete beyond the roughened surface. After being roughened the surface of the concrete shall be cleaned thoroughly of all loose fragments, dirt, lime and other objectionable materials and shall be sound and hard and in such conditions as to assume good mechanical bond between old and new concrete. All concrete which is not hard, dense and durable shall be removed to the depth required to secure a satisfactory surface. Cost of work for chipping and roughening shall be deemed to have been included in the rate tendered for item of concrete.

45.20 PLACING :

The contractor shall keep the Engineer-in-charge advised as to when placing of concrete will be performed. Unless inspection is waived in each specified case by a decision in writing from the Engineer-in-charge, placing of concrete shall be performed only in the presence of an authorised representative of the Engineer-in-charge.

The surface of all rock and concrete against which concrete is to be placed, shall be thoroughly cleaned and damped. After the surface are prepared satisfactorily and approximately 10 mm thick, the mortar shall have the same proportion of water, cement, and sand as the required concrete mixture, unless otherwise directed. The water cement ratio of the mortar in place shall not exceed that of the concrete to be placed upon it, and the consistency of the mortar shall be suitable for placing and working in the manner hereinafter specified. The mortar shall be spread and shall be worked thoroughly in to all irregularities of the surface; concrete shall be placed immediately upon the fresh mortar.

In placing concrete against formed construction joints the surface of the joints where accessible, shall be coated thoroughly with the wire brooms dipped in the fresh mortar. Where it is impracticable to apply such mortar coating special precautions shall be taken to ensure that the new concrete is brought into the intimate concrete with the surface of the joint by careful padding and puddling with the aid of suitable tools.

Re-tempering of concrete will not be permitted. Any concrete which has become so stiff that proper placing cannot be assumed, shall be at contractor's cost. Concrete shall be deposited in all cases as nearly as practicable, directly in its final position and shall not be caused to flow such that the internal movement will permit or cause segregation of the coarse aggregate from the concrete mass. Methods and equipment employed in depositing concrete in forms shall be such as will not result in cluster or groups of coarse aggregate particles being separated from the concrete mass but if cluster do occur they shall be scattered before the concrete is vibrated. A new scattered individual pieces of coarse aggregate that can be restored into the mass by vibration will be objectionable.

Except as intercepted by joints, all formed mass concrete shall be placed in continuous approximately Horizontal layers, the depths of which generally shall not exceed 50 cm. The Engineer-in-charge reserve the right to require lesser depths of layers, where concrete is 50 cm. layer cannot be placed on accordance with the requirements of these specification. All intersections of construction joints with concrete surfaces which will be exposed to view shall be made straight and level or plumb. Construction joints shall be allowed only at placed as directed by the Engineer-in-charge.

In reinforced concrete work, the thickness of the layer shall be reduced to 150 mm to 300 mm or as directed. In congested parts, care shall be taken to see that all the bars are properly embedded and that no voids are left on flat, horizontal surfaces where the congestion of steel near the forms makes placing difficult, a mortar of the same cement sand ratio as is used in the concrete 0.75 mm back from it's loading edge. Concrete ahead of the slip from screen shall be completed by internal vibrator so as to assume complete filling under the slip forms.

In placing uniform concrete on slopes so steep as to make internal vibrating of the concrete impracticable without form work, the concrete shall be placed, ahead of non-vibrated slipped from screen extending approximately 0.75 mm back from it's loading edge. Concrete ahead of the slip from screen shall be completed by internal vibrator so as to assume complete filling under the slope form.

- 45.20.1 If concrete is placed monolithic apply around opening, if having vertical dimensions greater than 0.60 m. or if concrete in deck floor slabs, beams or other similar part of

structure is placed monolithically with supporting concrete, the following instructions shall be strictly observed.

- (i) Placing of concrete may be delayed from 1 to 3 hrs. at the top of openings and at the bottom of the levels under deck floor slab, beam, girders or other similar parts of structures when levels are specified and at the bottom of structures when levels are specified and at the bottom of such structural members when levels are not specified but in no case shall the placing be delayed so long that the vibrating unit will not readily penetrate of its own weight, concrete placed after the delay the vibrating unit shall penetrate and reverberated the concrete placed before the delay.
- (ii) The last 0.60 m. or more of concrete placed immediately before the delay shall be placed with as low slump as practicable and special care shall be exercised.
- (iii) The surface of concrete where delays are made shall be clean and free from loose and foreign materials when concrete placing is started after the delay.
- (iv) Concrete placed over openings and in decks, floors, beams, girders and other similar parts of structures shall be placed with a low slump as practicable. The contractor shall be entitled on additional payment over the unit price bid in the schedule for concrete by reasons of may limitation in the placing of concrete required under the previous of this paragraph.

45.21 COMPACTION:

Concrete shall be compacted to the maximum practicable density so that it is free pockets of coarse aggregate voids, honey combing, free of entrapped air and closes snugly against all surface of forms and embedded materials. Compaction of concrete in structures shall be by petrol/diesel driven or electric or pneumatic drive immersion type vibrators concrete vibrators shall be operated at speeds of at least 7000 rpm. when immersed in the concrete. Form vibrators where use shall be rigidly attached to the forms and shall operate at speeds of at least 8000 rpm. when vibration concrete.

In compacting each layer of concrete, the vibrator shall be operated in near vertical position and the situations head shall be allowed to penetrate and re-vibrate the concrete in the upper portion of the under laying layer. Layers of concrete shall not place until the layers previously placed have been worked thoroughly as specified. Care shall be exercised to avoid contract of the vibrating head with surfaces of the forms of displacing reinforcement or embedded metal parts large voids or air pockets which may be left in the permanently exposed faces of the structure by vibration shall be eliminated by systematically padding the face with the appropriate flat tool.

Excessive vibration causing segregation or bending to bring an excessive amount of water to the surface shall be avoided. Cobbles and coarse gravel producing the surface shall be avoided. Cobbles and coarse gravel producing the surfaces of the lift shall be embedded into mass during the initial compacting and vibrating operation. Surface vibrators or peddlers shall not be used except for wearing coat for the roadway.

Disturbance of the surface concrete at construction joint during the early stage of hardening shall be avoided. Necessary traffic on new concrete shall be on timber walkway constructed so as not to cause injury to the concrete.

For the forms for concrete surfaces which are to be exposed though velocities of water, special precautions shall be taken to prevent or to minimise surface pilling without resorting to over manipulation of the concrete next to the form.

In advertent or intended re-vibration of some concrete is beneficial provided the concrete becomes momentarily plastic again during re-vibration. Re-vibration shall be resorted to only after specific instructions are given by the Engineer-in-charge.

45.22 WEATHER CONDITIONS:

Concrete operations shall be temporarily suspended during excessively hot or rainy weather conditions are such that the concrete cannot be properly placed and cured.

During hot weather no concrete shall be deposited when the temperature within the forms is more than 120F. When ever necessary, exposed surface of fresh or green concrete shall be shaded from the direct rays of the sun and immediately protected against premature setting of drying by being cured under continuous fine spray of water.

During continued rainy weather or heavy down pour all freshly placed concrete shall be covered and protected against surface flow of water.

The top of all badly washed or streaked surface shall have to be removed and washed without extra payment before depositing the next course.

45.23 TOLERANCES FOR CONSTRUCTION:

GENERAL:

The intent of this paragraph is to establish tolerances that are consistent with modern construction practice yet governed by the effect that permissible deviation will have upon the structural action or operational function of the structure.

Where tolerances are not stated in the specifications of drawing for any individual structures of feature there of, permissible deviations will interpreted in conforming with the provision of this paragraph.

The contractor shall construct all concrete structures to the exact lines, grades and dimensions established. However, inadvertent variations from the established lines, grades and dimensions will be permitted to the extent set forth herein, provided that the Engineer reserves the right to diminish the tolerances set forth herein for such tolerance impairs the structural action or operational function of the structure. The notation on the drawing of specific maximum or minimum tolerance in connection with any dimensions shall be considered as a supplemental to the tolerances, specified herein.

Rejected work shall be remedied or removed and replaced at the expense, if any by the contractor.

45.24 FINISHING:

- (A) General, the concrete surface shall be termed as formed or unformed, both types of surfaces shall be finished by skilled workmen. The concrete surface shall be tested as the tailed below and compared with the tolerances fixed. The surface irregularities shall be classified as either abrupt on gradual. Offsets and fines caused by displaced or misplaced sheathing. Gleaming of form sections by loose knots in form or by otherwise defective form in plumb shall be classified as abrupt and tested by direct measurements, other shall be termed as gradual irregularities and measured with a template consisting of a straight edge for plain surface of its equivalent for curved surface. The length of the template will be 1.5 m for formed surface and 3m for unformed surfaces, all exposed surfaces shall be cleaned of all unsightly incrustation of stains.

(B) **FORMED SURFACES :**

Surfaces having slope steeper than two horizontal to one vertical shall be formed. The classes of finish for formed concrete surface are designated by the use of symbols F1, F2, F3 and F4. Unless otherwise specified or indicated on the drawings. The classes of finished shall apply as follows:

(I) **FINISH - F1 :**

Applies to formed surfaces upon or against which back fill or concrete is to be placed or which will otherwise be permanently concealed. The surfaces require to no treatment after form removal, except removal and repair of defective concrete and the specified during, correction of surface irregularities will be required only for depressions greater than 25 mm. form sheathing may be anything that will not leak mortar when concrete is vibrated. Form may be built with a minimum or refinement.

(II) **FINISH - F2 :**

Finish F2 applies to all formed surface not permanently concealed by back fill or concrete except surface for which finish F3 or F4 is specified. This would apply to permanently exposed surfaces for which other finishes are not specified.

Surface for which finish F2 is specified will need no filling of pits or rack rubbing and no grinding other than that needed for repair for surface. Imperfection surface irregularities shall not exceed 25 mm for abrupt irregularities and 12 mm for gradual irregularities.

(III) **FINISH - F3 :**

Finish F3 applied to formed surface. This shall be applicable for surfaces of structures permanently exposed to public view when appearance is of special importance such as parapets. Spillway/piers, interior and exterior wall of hoist elevator towers and other decorative features. No general stoning or grinding will be required on surfaces for which finish F3 is

specified, although in some cases conspicuous air holes shall be filled by sack rubbing. Surface irregularities shall not exceed 8 mm, for abrupt irregularities and 6 mm for gradual irregularities.

Irregularities exceeding these limits shall be reduced by grinding with No. 60 Carborandum stone or sand grinder to a level of 1 to 20 ratio of height to length. Immediately after removal of form work from surface for which F3 is impinged sack rubbed mortar finish as desired below shall be given be fill up the air holes and to remove difference in colour if any due to use of excess oil in forms and rust stains, pitching, cleaning, operations and correction or major imperfections.

SACK RUBBED FINISH :

The surface shall be thoroughly wetted and sack rubbing commenced while they are still damp. The surface shall be finished in areas sufficiently, small to prevent drying of any part before the sack rubbing is completed for those area. mortar consisting of one part of cement and two parts of sand passing through I.S.S. No. 120 and water enough to make mortar of thick creamy consistency, shall be rubbed thoroughly over the surface with the burlap or a sponge rubber float to fill all air holes wire tie holes, pits or other irregularities. Portland cement in the above mix shall, if ordered, be blended with good lime or white cement in the proportions as directed, while the mortar in the pits is still plastic, dry ingredients of the above mortar in the same proportions, shall be rubbed after the mortar has stiffened adequately to prevent smearing but before it has hardened the excess mortar shall be removed by rubbing with clean burlap till the pits are flush with concrete surface. After the final seek rubbing, a light spraying shall be applied to the coated surface and the surface shall be kept cured till the completion of the curing period of concrete.

(IV) FINISH - F4 :

Finish F4 applies to form surfaces where accurate alignment and evenness of surface are essential for prevention of destructive effect of rubbing water e.g. it applies to hydraulic surfaces. Such surfaces include spillway crest, spillway face, splay wall part of divide wall exposed to running water, intake for canals, penstock, outlet for canals, energy dissipation for outlet works, intake structures, spillway face except where special finish is required. In addition to any necessary repairs, surface treatment will consist of the grinding of off sets and bulges on a level of 1 to 20 ratio. Gradual surface irregularities shall not exceed 6 mm.

SPECIAL FINISH :

This finish shall be applied to stair risers, and other important places where specially smooth and even surface is required. From the vertical surface where the special finish is required shall be removed between 12 to 24 hrs. after completion of concreting all required patching and repair of major imperfection shall be done. Then the entire surface shall be rubbed with brush and rubbed with a hard wood float, dipped in water, containing two pounds of Portland cement per gallon of water rubbing shall be continued, until all form marks and projections are removed, wood float rubbing shall be time in such a way, that the aggregate should not be dislodged for so late, that the surface is too hard to be readily dressed. Curing of the surface shall be continued till the completion of the curing period of concrete the grinding from the rubbing operations shall be uniformly spread over the entire surface with a brush in such a manner as to fill all pits and small holes. The brushed surface shall be allowed to harden and shall then be kept moist for at least 3 days. The final shall then be obtained by rubbing with a carperandum stone of No.5 grit until the entire surface has a smooth texture and is uniform in colour.

(C) UNFORMED SURFACES :

The classes of finish specified for unformed surfaces area designated as U1, U2 and U3 unformed surfaces exposed together and those which would normally be horizontal, shall be slopped for drainage. Unless otherwise indicated on drawing or ordered, narrow surface such as the top of walls and curbs shall be sloped 10mm per 0.30 of width and broader surface such as road way platform and decks shall be sloped 6 mm per 0.30 m. concrete having unformed exposed surfaces shall contain just enough mortar to avoid the necessary for excessive floating. Collection of excess mortar at the surface after thorough compaction should be avoided and any fine materials on excess mortar worked up to the top should be removed. No dry cement nor a mixture of dry cement and sand shall be sprinkled directly on the surface to

stiffen the mix. Use of finishing tools in area where water has accumulated should be prohibited. Operations on such areas should be delayed for nearly 30 to 45 minutes until the water absorbed has evaporated or is removed by drains over by other means.

The finish shall be brought to smooth surface free from defects and blemishes. Working of the surface of the various finishing operations should be the minimum necessary to obtaining the desire finish.

FINISH U-1 :

Finish U1 shall apply to unformed surface finished by screening. This finish shall be done for all concrete surface such as floor which will be covered, concrete floor topping and for surfaces requiring roughness such as ramp surfaces. This is also as the first stage for finish U2 and U3. Concrete to produce uneven uniform surface and surface irregularities of more than 10 mm shall not be permitted.

SCREED FINISH :

The finishing operations shall be of leveling and screening the where feasible electrically operated with a screeds shall be used. After the concrete is thoroughly vibrated finishing pass of the vibrating screed should follow with the vibrator running at the specified frequency finishing pass shall be made with the agreed sliding along the forms and shall be per formed by ski I led workmen.

Wherever wooden or metal screed is used. It should be moved back and forth across the concrete with a skewing motion and advanced forward a short distance with each movement with some excess concrete against the front face of the screed, this will facilitate filling of, low portion of concrete to the desired surfaces as template passes over. Metal edged screed should be used where minimum tearing surface is desired.

FINISH U-2 :

This is floated finish and shall be used for stilling basin, exposed faces of surfaces of gutters and similar other out door unformed surfaces. Floating shall be done either by wire screed or metal edged screed. The concrete surface shall be left undisturbed for 30 to 40 mt. until all surface water has disappeared and there is no visible shine. Minimum floating necessary to produce surface uniform. In texture and free from screed marks should be done. Wherever finish U3 is to be applied, the floating should leave small amount of mortal without excess water cutting or filling should be done during the following operations. Joints and edges shall be finished with steel edging tools, surface irregularities shall not exceed 1/4 inch.

FINISH U-3 :

This is a troweled finish and shall be applicable to uniformed surfaces permanently exposed to view which the floated surface has stiffened sufficiently

to prevent excess to the fine material or free water being drawn to the surface, steel, troweling shall be started and delay in troweling should be avoided as the surfaces will become to hard for finishing steel troweling shall be performed with a firm pressure that will flatten and smoothen the sandy texture left by floating and the troweling should produce dense uniform surface free of blemishes for surface irregularities more than 6 mm and trowel marks. For spillway crest portion, hard steel troweled finish shall be applied for this regular U3 finish shall be troweled again after the surface is nearly hardened using firm pressure and trowel until true surface is hard and has somewhat glossary appearance. When the concrete surface has hardened sufficiently. Initial curing shall be done by gently spraying of water taking case to protect the finish surface.

45.25 PREVENTING HAIR CRACKS :

Hair cracks are usually the result of concentration of water and fines at the surface, caused by over manipulation during finishing operation. Such cracking is aggregated by untimely finishing and by rapid drying or cooling when the humidity is low as to cause cracking of the finished surface before it can be moisture and kept temporarily with a very fine spray of water supplied so as to wash the surface but not to form pools on it. Since chilling of the green concrete increases its tendency to crack. It is desirable that the water used for preliminary moistening not to be so cold and should preferably be warmed than concrete.

45.26 CURING PROTECTION :

All concrete shall be protected against injury until final acceptance. Un-hardened concrete shall be protected from heavy rains and flowing water. No fire or excessive load shall be permitted near or indirect contact with the concrete as at any time. All conduits and other dam openings shall be buck headed during construction period to prevent free circulation or air and resultant drying of concrete. Exposed finish surface of concrete shall be protected from the direct rays of the sun for at least first there days after placement. Such protection shall be made effective as

soon as practicable after placing of unformed concrete or after the removal of forms from concrete. Exposed finished surfaces of concrete shall be protected from the direct rays of sun for at least 72 hours after placement, concrete shall be kept continuously moist when Portland cement is used cured up to 28 days as prescribed and directed by Engineer, Construction joints in the same way as other concrete, shall also be kept moist for at least 72 hours. Prior to the placing of additional concrete upon the joints. Approximately horizontal surfaces shall be cured by sprinkling or by covering by damp sand or may be cured by covering with mats. If damp sand is used for curing it should be removed completely. Later water curing shall be used on all concrete work. It shall be applied by means of sprays or sprinklers of making adequate pools.

Forms shall be kept sprinkled until removal. The contractor shall protect all concrete against injury until final acceptance by the Engineer-in-charge.

45.27 REPAIRS OF CONCRETE :

Repairs of concrete shall be performed by skilled workers. All imperfections of the concrete surface shall be corrected as necessary to produce surface that conform to the requirements specified in para 5.19 above. Repairs of imperfection in formed concrete shall be completed as soon as practicable within 24 hours after the removal of forms. From shall be neatly removed from the surface for which finish F2, F3 & F4 are required, concrete that is honeycombed, fractured from or otherwise defective and concrete which because of excessive surface depressions must be removed and built up to bring the surface to the prescribed lines or shall be removed and replaced by dry mortar of concreting hereinafter specified without any extra cost.

Where bulges and abrupt irregularities procured outside the limits specified in para 5.19 (above) on formed surfaces for which finished F2 and F3 are required. The protrusions shall be reduced by both hammering and grinding so that the surface are within the specified limits.

Dry pack filling shall be used for holes that have surface dimensions smaller than the depth of holes left by the removal of fastener from the ends of form tie rods for grout insert holes and for narrow, slots, but for repair of cracks, filling of holes left by removal of fastener from the ends of the rods in the surfaces for which finish F1 is specified will not be required. Dry pack shall not be used for filling behind reinforcements. For filling holes that extend completely through concrete sections.

Mortar filling, placed under impact by use of mortar gun shall be used for holes too wide for dry pack filling and too shallow for concrete filling and no deeper than the size of the reinforcement that is nearest to concrete surfaces.

Concrete filling shall be used for holes extended entirely through concrete section for holes which are graded in area than one square foot and deeper than 10 cms. and for holes in reinforced concrete which are greater in area than half square foot and which extend beyond reinforcement. All materials, procedures and operations used in the repairs of concrete shall be subject to direction by the Engineer. All fillings shall be bound tightly to the surfaces of the holes and shall be sound and free from shrinkage, cracks and areas after the filling has been cured finish F3 is specified shall contain sufficient white portland cement to produce the same colour as that of the adjoining concrete.

All patching shall be done with extreme care, so that patched will not be noticeable from a distance of 50 mt. patches will not be noticeable from a distance 20 m. colored cement at as ingredient of the patching mortar, may be used if necessary of produce patches of same colour as he adjoining concrete.

45.28 DRY PACK MORTAR :

Repair operation shall be preceded by a careful inspection to see that the holes are thoroughly clean and lightly wet but with a small amount of free water on the interior surface. The surface shall than be dusted lightly and slowly with cement by means of a small dry brush until all surfaces are covered and darkened by the absorption of water by the cement. There shall be not dry cement in the hole when packing beings and such cement if present shall be removed. The holes shall be pined with neat cement grout.

Dry pack mortar shall consist of a mixtures of one parts of cement to 2 parts of sand by volume that will pass no. 120 IS sieve. White cement will be used in sufficient quantity to produce uniform colour matching with that of surrounding concrete at points wherever desired by the Engineer-in-charge.

For packing concrete holes a leaner mixture of 1 to 3 or 1 to 3.5 will be used. Only enough water shall be used to produce a mortar which when used will slick together on being molded into a ball by slight presence of hand and will not be trude water but will have the hard damp

(The proper amount of mixing water and proper consistency are those which will produce filling which is at a point of becoming rubbery when the materials is solidly packed.)

Dry pack mortar shall be placed and packed in layers having a compacted thickness of about 10 mm. The surface of each layer shall be scratched to facilitate bonding with the next layers. No layer may follow unless appreciable rubber laces develops in which case work on the repair shall be delayed by 30 to 40 minutes. Under the circumstances alternate layers of wet and dry materials shall be used.

Each layer must be solidly compact over the entire surface by use of hard wood stick and a hammer. These sticks are usually 0.25 to 0.30 mt. long and not over 25 mm. in diameter and area used of the holes to secure maximum compaction in this area. The holes shall not be overfilled and finishing shall be completed at once by laying the flat side of a hand wood piece against the fill and striking it several good blow finishing of look shall not be used and water must be used to facilitate finishing.

45.29 RECORD OF CONCRETING OPERATIONS:

A systematic joint record in the form approved by the Engineer shall be maintained to record the details regarding weighting and use of cement, number of mixes of concrete and of mortar used on works, rejected mixes, locations in which concrete or mortar is used etc. This record shall be signed by the Engineer or his authorised representative on the site in token of having scrutinized and verify the entries such joint record, as scrutinized, verified and signed by the Engineer or his representative shall be taken as final and binding on the contractor.

45.30 MEASUREMENT AND PAYMENT:

Measurement and payment of concrete shall be made on the basis of the actual volume of the concrete for the grade as placed within the lines as specified or as otherwise directed by the Engineer according to all the provisions mentioned above no deduction shall be made for the space occupied by reinforcement and other metal work, electric conduit line etc. The quantities of all holes and passage greater than 0.50 sqmt. In cross section shall however by deducted from the payment, the reinforcement steel and other embedded metal parts shall be separately paid at the rates accepted as per the schedule of prices (Schedule-B) Payment will however be made for embedding minor fixtures or providing grooves blocks outs, recess etc. for gates and other installations, electric conduits etc. All labour, materials, plants etc. involved in providing cement, slurry and mortar on rock surface and construction joints etc. shall be deemed to be included in the unit rate to be paid for concrete. The work pertaining to labour charges for erection of horizontal and vertical anchorage system as per approved design including of necessary supports, templates etc. will have to be carried out by the contractor as per separate items.

3.24.2 The rate is also inclusive of erection and removal of form work and centering if any required for the work done changing on design of the structure etc.

3.24.3 The rate includes concreting with best types form work required in case of block out and grooves. No extra payment will be paid for this measurement and payment.

45.31 ANCHORS IN CONCRETE:

Anchor bolts, rods, structural shapes, plates and bearing, required in connection with installation of gate etc. and other apparatus for the same shall be supplied by the contractor at his own cost and shall be placed, erected in the concrete by the contractor under separate first stage and second stage concrete. The facilitate first stage and second stage concrete. The various anchor bars and rods and other embedded parts of the gate will be procured by the contractor at his own cost and the same will be erected and embedded in concrete by the contractor. The concreting work shall be carried out as and when required and after erection of the embedded parts. No claim shall be entertained on account of any delay. Care shall be taken to obtain well finished surface after removal of forms, eliminating the necessity of subsequent repairs, the responsibility to maintain level and position of embedded parts during and after concreting and removal of centering shall rest with the contractor.

The contractor shall also give necessary templates of position of anchors of gates already embedded in concrete. For drilling holes in exact position in anchor girders etc. by contractor for gate work full cooperation for the embedded of main anchorages for the gate, horizontal and vertical girders, bottom and side seal girders, track plate, guide rails etc. and hoisting mechanism inclusive of the shaft arrangement, hoist platform etc. shall be extended by the contractor.

46. CHAPTER-4 - EARTHWORK AND COMPACTION

46.1 Applicable publications

46.1.1 **Indian Standards.**

1	IS: 2720-1978 (part I to xx)	Methods for testing of soils
2	IS: 1498-1970	Classification and identification of soils for general engineering purposes(first revision) (Amendment Nos. 1 and 2)
3	IS: 1888-1982	Methods of load test on soil (second revision)
4	IS: 2131-1981	Method of standard penetration test for soils (first revision)
5	IS: 2809-1972	Glossary of terms and symbols relating to soil engineering (first revision).
6	IS: 4701-1982	Code of practice for earthwork on canals (first revision)
7	IS: 5529-1985 (Part-I)	Test in overburden (first revision)
8	IS: 7894-1975	Code of practice for stability analysis of earth dams (Amendment-No.1)
9	IS: 8237-1985	Code of practice for protection of slopes for reservoir embankments (first revision)

46.2 **Stripping**

46.2.1 **General**

- (A) Before embankment works commence, the area concerned for entire behind abutment and training wall shall be stripped off the surface soil including vegetation, overlaying grass, organic matter, bushes, roots and other perishable or unsuitable matter on existing surfaces and disposing off these as directed within a lead of 1.00 Km and all lifts. Similar operations shall be done in the borrow areas also. The stripping shall generally be done for depth of about 0.15m to 0.30m. But where organic matter and other unsuitable soil exist below 0.30 m depth, the stripping shall extend to the required depth to remove all the unsuitable materials. No extra payment shall be made to contractor for stripping work.

46.3 **Embankment**

General

- (A) Bushes, roots, shrubs or other perishable or unsuitable materials shall not be placed in the embankment. The suitability of each part of the foundation (bank seat) for placing embankment materials thereon and of all materials for use in embankment construction will be determined by the Engineer-in-Charge on the basis of field laboratory tests. The difference in elevation of the embankment within each working length of not less than 20 m shall not exceed 1.2 m anywhere in cross section unless specifically permitted by the Engineer-in-Charge. Placing of the layers for the embankment portion programmed for construction in the season shall be continuous and approximately horizontal.
- (B) Embankment materials shall be spread in successive horizontal layers up to 20 cm. thickness, extending to the full width of the embankment including slopes at the level of the particular layer. Construction of embankment shall begin at the toe of the fill and in no case shall embankment be widened by material dumped from the top. Adequate extra width that is, proud section not less than 20 cm in thickness as measured perpendicular to the slope from line representing the behind abutment and training wall earth side slope and from line of outer side slope as per original Ground on outer side slope shall be provided so that when compacted, lines of the finished works shall have not less than 95 percent..

- (C) Thickness of layers shall be adjusted by the Engineer-in-Charge, if the Contractor satisfies the Engineer-in-charge that the particular type of compactor used by him gives required density by carrying out trial compaction and requisite tests.
- (D) No fresh layer shall be laid until the previous layer is properly watered and compacted as per requirement. The work of spreading and compaction shall be so adjusted as not to interfere with each other and in such a way that neither of the operations is held up because of non-completion of the rolling and watering. If the work is held-up due to failure of machinery, no claim whatsoever shall be entertained, even in case the machinery is supplied by the Department. The surface of the banking shall at all time of construction be maintained true to required cross section.
- (E) Before starting of the embankment work, the Contractor shall provide all necessary facilities without any extra cost for collection of soil samples from borrow area with required depth as directed by the Engineer-in-Charge. Engineer-in-Charge will carry out the requisite tests for the suitability of construction material well in advance and the Contractor shall ensure that only approved reaches, as directed by the Engineer-in-Charge. materials are used for construction of embankment in different
- (F) For proper bond of the embankment done in the previous season with the new embankment, the work be carried out and finished as under.
 - i. In case of the old bank to be extended horizontally it shall be cut to a slope not steeper than 1 in 3 and the surface so prepared shall be scarified and made loose at least for a depth of 15 cm. Necessary watering shall be done and the earth surface shall be thus prepared to receive the new embankments. The bank material shall be laid in layers and compacted to the required dry density to have a proper bond with the old one.
 - ii. If the old bank is to be raised vertically, vegetation shall be cleared followed by scarifying watering and placing of the new earth layer and compacted to required dry density as specified above. No extra payment shall be made in this regard.
 - iii. The surfaces which are damaged due to rain shall be made good by filling with proper soil duly compacted by tampers. A cross slope away from the center of check dam of about 1 in 80 shall be maintained throughout the rainy season to ensure proper drainage in the event of occasional rainfall.

46.4 Preparation of Seat under Embankment

No material shall be placed in any section of the earth fill portion of the embankment until the embankment seat for that section has been dewatered, suitably prepared and approved by the Engineer-in-Charge. All portions of excavation made for test pits or other subsurface investigations and all other existing cavities found within the area to be covered and which extend below the established lines of excavation for embankment seat shall be filled with earth of the corresponding zone of the embankment and suitably compacted.

Pools of water shall not be permitted in the foundation for embankment and such water shall be drained and cleared prior to placing the first layer of embankment materials.

46.5 Soil Foundation

Soil foundation under the seat of embankment shall be scarified and loosened by means of a plough, ripper or other means to a depth of about 15 cm to 20 cm to the satisfaction of the Engineer-in-Charge. Roots or other debris turned up during scarifying shall be removed from the entire foundation area for the fill. It shall then be moistened to slightly above the optimum moisture and compacted by required number of passes of the compaction equipment to the same percentage of compaction as that of the embankment. The purpose of using higher moisture than optimum is to ensure forcing of the soil into any unseen soft zones just below the surface. The first few layers of fill for the embankment shall be of depth of 10 cm to 15 cm and shall be carefully placed, ensuring uniform compaction and a satisfactory intimate bond between the foundation soil and fill material. In case of soils of different permeability are available; these layers shall be composed of the most impervious materials in the central portion. Sheep foot roller shall be used for compaction of impervious soil and preferably vibratory type roller shall be used for compaction of all other soils and rock. Separate payment shall not be made for preparation of foundation as above and it shall be deemed to have been included in the rate quoted for respective item of embankment.

46.6 Construction

46.6.1 Earthfill

(a) General

- (i) Embankment shall be constructed to the top width and side slopes as shown on the drawings. Suitable excavated material available from the borrow area cutting, removal of ramps and excavation for structures shall be used for construction of banks. Material should be free from the organic matter and any deleterious material.
- (ii) In areas, where suitable and adequate material for constructing embankment is not available from excavation of structures, the material shall be obtained from the borrow areas fixed for the purpose. The borrow areas shall be excavated to the dimensions and depths actually required and as per the instructions of the Engineer-in-Charge.
- (iii) The Contractor shall utilize all suitable excavated material from the work construct embankment by conveying in varying leads not exceeding as indicated in para 1.06 of Chapter 1 . The Contractor shall make his own best plan to use the available excavated material from canal and also that to be obtained from borrow area for the embankment. The payment will be regulated under relevant items of excavation and embankment .The soils and murrum excavated from the canal useful or construction of the work will be decided by the Engineer-in-Charge as regards their suitability in the work embankment. If the Contractor has to utilize the usable and suitable excavated material, with the lead as specified by the Engineer-in-Charge. The Contractor shall not be allowed to spoil any usable and suitable material from structure excavation. The Contractor shall only be allowed to use the borrow area after utilizing the suitable material for the entire reach. The balance quantities of soils and murrum can be obtained from the borrow area approved by the Engineer- in-Charge. If the Contractor fails to utilize all suitable excavated material from the work within the lead as mentioned in Para 1.06 of chapter -I and obtains excess quantity of soils from the borrow area, payment for obtaining the soils from the borrow area shall be limited to the quantities required to be borrowed in excess of the above mentioned suitable material available from excavation and such excess quantities shall be paid under the respective item of Schedule-B. The decision about the usable soils available from the work excavation taken by Engineer-in- Charge shall be final and binding to the Contractor.
- (iv) The compaction shall be done at natural Moisture Content by suitable compacting equipment. The materials shall be compacted to required dry density. The suitability of compacting equipment shall be decided by the Engineer-in-Charge and his decision shall be final and binding to the Contractor.
- (v) The payment shall be made on volumetric basis for cubic meter and shall be based on initial and final levels of canal.

47. CHAPTER-5 – REINFORCEMENT WORK

47.1 Scope of work

- (a) The section covers specifications for Item as per Schedule B.
- (b) The work includes supplying, cutting, bending, binding, welding and erecting in position high yield strength deformed (HYSD)/TMT(Fe-500)steel bars and

mild steel(MS) bars as reinforcement for concrete of various components of drainage syphons, cross regulators, bridges, escapes, head regulators, aqueduct, canal lining and various types of canal structures.

47.2 Description of Item.As per Schedule – B

47.3 Applicable Publications

47.3.1 Indian Standards

1	IS: 226 and IS 2062	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: 814	Covered electrodes for metal are welding of structural steels.
7	IS: 814(Part-I)	For welding products other than sheets (fourth revision) (with Amendment No. 1 to 3)
8	IS: 814(Part-II)	For welding sheets (fourth revision)
9	IS: 1139	Hot rolled mild steel, medium tensile steel and high yield strength steel deformed bars for concrete reinforcement.
10	IS: 1278	Filler rods & wires for gas welding (second revision) (with Amendment No.1)
11	IS: 1481	Metric steel scales for engineers (first revision) (with 2 Amendments)
12	IS: 1521	Method for tensile testing of steel wire (first revision)
13	IS: 1566	Specification for hard drawn steel wire fabric for concrete reinforcement. (second revision) (Amendment No.1)
14	IS: 1608	Method for tensile of steel products (first revision)
15	IS: 1786	Specification for high yield strength deformed steel bars and wires for concrete reinforcement (third revision)
16	IS: 2502	Code of practice for bending and fixing of bars for concrete reinforcement.
17	IS: 2751	Recommended practice for welding of mild steel plain and deformed bars for reinforced construction (first revision)
18	IS: 5525	Recommendations for detailing of reinforcement in

		reinforced concrete works.
19	IS: 9417	Recommendation for welding cold worked bar for reinforced concrete construction.

Note: Generally the Bureaus of Indian Standards Code will be followed for all items of works. Whenever this code does not exist the reference will be taken to other technical publications as directed by Engineer-in-Charge

47.4 Steel Reinforcing Bars

47.4.1 General

- a) Type of steel to be used shall be procured as specified in the drawings issued at the time of execution or as directed by the Engineer- in- Charge for the various kind of steel viz. HYSD/TMT(FE 500) Steel reinforcing bars shall be placed in concrete where shown on the drawings or as directed by the Engineer-in-Charge. The tender drawing issued with these specification show only tentative requirement of reinforcement and further detailed construction drawings shall be issued by the Engineer-in-Charge during the course of the contract.
- b) The Contractor shall go through the schedule of Reinforcement given with the construction drawing and if there is any discrepancy in the same the same the Contractor shall bring to the notice of the Engineer-in-Charge. The Engineer-in-Charge after ascertaining the discrepancy from Design organization shall issue new superseded drawing which shall form the basis for bending schedules. In case of detailing of structural member where bending schedule are not given, the Contractor shall prepare and get it approved by the Engineer-in-Charge. Not less than 30 days prior to placement of reinforcement, the Contractor shall submit to the Engineer-in-Charge, three prints and reproducible tracing of each of reinforcement detailed working drawings for approval. The Contractor's reinforcement detailed drawing for approval shall be prepared in accordance with IS: 456-2000 "Code of Practice for Plain and Reinforced Concrete" IS: 2502-1963 "Code of Practice for Bending and Fixing of Bars for Concrete Reinforcement "and IS: 5525-1969. "Recommendation for Detailing of Reinforcement in Reinforced Concrete Work" unless otherwise shown on the reinforcement detail drawings. Contractor's drawings shall show necessary details for checking the bars during placement and for use in establishing payment quantities. Reinforcement bars shall conform to requirements shown on the drawings or as directed by the Engineer-in-Charge. The approval of the Engineer-in-Charge to the Contractor's reinforcement detailed drawings shall not absolve the Contractor of his responsibility for the correctness of details or for conformance with the requirements of these specifications.
- c) As far as possible High Yield Strength Deformed steel bars or TMT/FE(415) bars conforming to IS: 1786-1985, shall be used as reinforcement as shown in the drawings or as directed by the Engineer-in-Charge. If required mild steel (MS) bars shall also be used as per the direction of the Engineer-in-Charge or as per the requirement of works as

shown in the drawing. However in case of non availability of such bars, other steel bars conforming to IS: 432-1982 and/or IS: 1139-1966 shall be used as per the direction of Engineer-in-Charge on production of necessary documentary evidence by the Contractor. The Contractor shall have to procure the required category and type of steel such as mild steel, HYSD, TMT/FE(415) bars from primary manufacturers only and the stacking of each type of steel shall be made separately, For each type of steel, the central place for stacking shall be established by the Contractor at the site of work.

- d) The reinforcement steel shall be procured from the BIS manufactures, BIS primary manufacturer, before thirty days prior to the using in works. The contractor shall furnish BIS manufacturer's test certificate along with test results for each category for every lot brought to the site of work. The manufacturer's test results shall be from the manufacturer's lab only. The test results from other lab shall not be accepted and the consignment will be rejected. Testing of steel shall be carried out as per relevant IS code. Frequency for steel testing (Physical properties) is as under as per IS: 1786-1985.

	Quantity	
	Lot below 100 Ton.	Lot above 100Ton.
Under 10 mm	1 sample from each 25 ton.	1 sample from each 40 ton.
10 to 16 mm	1 sample from each 35 ton.	1 sample from each 45 ton.
Over 16 mm	1 sample from each 45 ton	1 sample from each 50 tone.

Note: - The frequency for chemical analysis for steel to be decided by the Engineer-in-Charge as per the requirement.

- e) The corrosion resistant TMT steel bars conforming to the chemical and physical properties as below shall be used in the work as per the instruction of the Engineer-in-charge.

Chemical properties of TMT bars:

Chemical Properties	Proportion (Limit)	The Frequency for chemical testing for steel to be decided by the engineer in charge as par requirement
1.0 Carbon percentage maximum	0.18	
2.0 Sulphur percentage maximum	0.05	
3.0 Phosphorous percentage maximum	0.12	
4.0 S + P percentage maximum	0.17	
5.0 Silicon percentage maximum	0.45	

Mechanical properties of TMT Bars: (d= diameter of bar)

Mechanical property	Proportion (Limit)
1:0 Yield stress Mpa (minimum)	500
2:0 Ultimate tensile stress Mpa (minimum)	545
3:0 Elongation percentage (minimum)	12
4:0 Bend up to including 22 mm	4d
Over 22 mm	5d

5.0 Re-bend up to including 10 mm Over 10 mm	5d 7d
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However, if the TMT bars satisfying the field requirement in such case, Department may also consider the proportion (limit) for the Chemical and Mechanical properties as under only for the following cases.

Chemical Properties:

1.0 Carbon % (maximum) 0.20

Mechanical Properties:

1.0 Elongation % (minimum) 20.0

2.0 Bend up to and including 22 mm 2d

However proportion (limit) for other component for chemical and mechanical properties shall be as above. However the Engineer-in-Charge shall decide the acceptable test result and field requirement for use of TMT bars in the R.C.C. work and it shall be considered as final. TMT bars shall be used in the work for the various components of various canal structures to be constructed under the contract.

TMT bars shall be tested prior to use in the work and after getting the acceptable test results for the assessment of its quality before it shall be used in the work.

f) Testing of TMT bars

- a. The testing of TMT bars for chemical as well as mechanical properties shall have to be done prior to use in the work, moreover the following tests to ascertain the quality of the TMT bars shall also be carried out as per the frequency fixed by the Engineer-in-Charge.

Salt spray test

Alternate immersion test.

Sulphur dioxide test.

Potential dynamic test & Atmospheric corrosion test.

- b. The permissible criteria / indices / limits for the test results for abovementioned testing shall be decided by the Engineer-in-Charge for acceptance for TMT bars. The steel shall also conform the above mentioned required standard for the above tests for which the contractor shall have to produce the authentic certificates from the manufacturer for such type of testing for each lot of steel manufactured at a time and transported to the works side. Moreover the further testing shall be done by department before its use in the work. The TMT bars shall only be used after getting satisfactory results, however if no adequate facility for above mentioned testing shall be available in Government Laboratory, in such case and considering the express request of contractor, Engineer-in-Charge may allow the contractor for testing of TMT bars at the laboratory established by manufacturer or any other laboratory approved by the Engineer-in-Charge.
- c. The frequency of testing shall be decided by the Engineer-in-Charge as per

necessity during the course of execution. The testing charge shall be borne by contractor.

47.4.2 Cutting, Bending and Binding

- a) The Contractor shall be responsible for the accuracy of the cutting, bending and placing of the reinforcement. Reinforcement shall be inspected for compliance with the requirements as to grade, size, shape, length, splicing and locations after it has been placed. No concreting shall be started unless the reinforcement as placed in the work is finally checked, recorded and certified by the Engineer-in-Charge. All bending shall be as per the IS 456-2000 and IS 2502-1963 and only cold bending shall be allowed.
- b) Before the reinforcement is placed, the surface of the bars and the surfaces of any metal bar supports shall be cleaned of the rust, loose scale, dirt, grease and other objectionable foreign substances. After being placed, the reinforcing bars shall be maintained in a clean condition until they are completely embedded in the concrete.
- c) Reinforcing bars shall be accurately placed and secured in positions so that there will be clear distance of at least 25 mm between the bars and any adjacent embedded metal work and the bars and fabric shall not be displaced during the placing of concrete. The Contractor shall also ensure that there is no disturbance of the reinforcing bars in concrete that has already been placed.
- d) Wire for binding reinforcement shall be of soft and annealed mild steel and shall conform to IS: 280-1978. Binding wire shall have tensile strength of not less than 56 kg/mm². The wire shall have minimum diameter of 1 mm. Chairs, hangers, spacers and other supports for reinforcement may be of concrete, metal or other approved material. Where portions of such supports will be exposed on concrete surface designated to receive F2 or F3 finish, the exposed portion of support shall be galvanized or coated with other corrosion resistant material without which the concreting will not be permitted. Such supports shall not be exposed on surfaces designated to receive F4 finish unless otherwise shown on the drawings. The minimum allowable clearance between parallel round bars shall not be less than 1 ½ times the diameter of the larger bars and for square bars shall not be less than twice the side dimensions of the larger bars or 1 ½ times the maximum size of aggregate which ever is greater. Bars crossing each other, where required shall be secured by binding wire in such a manner that they do not slip over each other at the time of fixing and concreting. Wire used for binding reinforcement shall not be measured for payment.

47.4.3 Splicing

- a) Where it is necessary to splice reinforcement the splices shall be made by lapping, by welding or by mechanical means.
- b) Joints or splices in reinforcing bars shall generally be made at the locations where neither shear nor bending moment is maximum, but the Contractor would be permitted to make joints splices at other positions provided that such positions are approved by the Engineer-in-Charge. The splices shall be in staggered fashion so that

in the adjacent bars it shall not be closer than 8m in horizontal bars or 6m in vertical measured between mid points of laps. Splicing of bars shall not be permitted for length of bar less than 8m in case of horizontal bars and 6m in vertical bars.

- c) If the Contractor proposes to use welded splices in reinforcing bars, the equipment, the material and all welding and testing procedures shall be subject to the approval of the Engineer-in-Charge. The contractor shall also carry out test welds as required by the Engineer-in-Charge.
- d) In case of welded splices for reinforcing bars conforming to IS: 1786-1985 welding shall be done in accordance with IS: 9417-1979. For reinforcing bars conforming to IS: 432 (part-I)-1982 welding shall be done in accordance with IS: 2751-1979. Electrodes for manual metal arc welding shall conform to IS: 814 (Part-I) 1974 and IS: 814 (Part-II)-1974. Mild steel filler rods for Oxy-acetylene welding shall conform to IS: 1278-1972 provided they are capable of giving a minimum butt weld tensile strength of 41 kg/mm².
- e) Reinforcing bars 25 mm in diameter and less may be either lapped or butt welded, whichever is the most practicable.
- f) Reinforcing bars 28 mm in diameter and large may be connected by butt welding provided that lapped splices are permitted when found to be more practicable than butt welding and the lapping does not encroach on cover limitation or hinder the concrete or reinforcement placing.
- g) Butt welding of reinforcing bars shall be performed under cover from weather and may be performed either by the gas pressure or Flash pressure welding process or by the electric arc methods. Following requirements shall apply to all welding of reinforcing bars including butt welding and the preparation of welded reinforcement mats.
- h) Welded pieces of reinforcement shall be tested at the rate of 0.5 % of total number of joints welded. Specimens shall be taken from the actual site of work. Strength of the weld provided shall be at least 25 % higher than the strength of bar.
- i) If the Contractor proposes to use mechanical couplings for reinforcing bars, he shall submit samples of the proposed coupling to the Engineer-in-Charge for approval not less than 60 days prior to their proposed use.
- j) The overlaps for connecting two bar's shall in no case be less than 45 times dia. of the bars and shall be paid extra. Relevant specifications for this item conform para 6.0 of general technical specification.

47.4.4 Care of Placed Reinforcement and Concrete

Where reinforcement bars are bent aside at construction joints and afterwards bent back into their original position care shall be taken to ensure that at no time the radius of the bend is less than 6 times diameter (6D) for deformed bars and 4 times diameter (4D) for plain mild steel bars. Care shall also be taken, when bending such bars to ensure that the concrete around the bars is not damaged. Care shall also be taken to remove the silted materials around the bars.

47.4.5 Cover and cover Block

The clear cover and cover to the reinforcement shall be provided as shown in the drawing. In case it is not shown, the clear cover and cover block to be ascertained from the Engineer-in-Charge.

To maintain the correct clear cover, cement mortar block of size 5 cm x 5 cm and thickness according to the clear cover as of the strength of the concrete shall be fasted. The cover block shall have binding wires rigidly inserted in them to tie it with the reinforcement. The cover block shall be sufficiently cured to attain the required strength.

47.4.6 Measurement and Payment

- a) Measurement for payment for providing and placing reinforcing bars will be made only on the calculated weight of the bars placed in concrete on tonnage basis, in accordance with the drawings or as directed by the Engineer-in-Charge. Payment shall be made as per the quoted rate of relevant item on the basis of calculated weight in ton as shown in Schedule-B. After placing the reinforcement in position as per the drawing on site, Contractor shall have to give advance information to the Engineer-in-Charge or his authorized subordinates for verifying & recording reinforcement as laid in position by him to avoid delay and dispute etc. No concrete work shall be started prior to taking the detail measurement of reinforcement as laid on site. The calculated weight for reinforcing bars shall be determined as follows. :
 - i. The calculated weight/meter of reinforcing bars used shall be based on the standard weight and the corresponding lengths of bars placed in concrete by the Contractor.
 - ii. All other joints or splices shown on the drawings or as directed by the Engineer-in-Charge shall be measured as laps. Mechanical coupling and welded joints approved by the Engineer-in-Charge shall be measured for payment in terms of length of equivalent lap joint. Payment for furnishing and placing reinforcement bars shall be made at the rate tendered thereof in the Schedule-B. The rate shall include the cost of preparing reinforcement as per detailed drawings including bar placing drawings, bar bending diagrams, submitting the drawing to the department preparing all necessary bar cutting lists, furnishing and attaching wire ties and cutting bending, cleaning, securing and maintaining in position all reinforcing bars as shown on the drawings or as directed by the Engineer-in-Charge. The unit rate shall also include cost of all incidental operations necessary to complete the work as per specifications.
 - iii. Supporting chairs/separator prepared from TMT bar reinforcement shall be measured and paid for as per the standard weights on the line of payment for reinforcing bars.

E. Item Wise Technical Specification

48. Item Wise Technical Specification As Attached Separately..

SECTION - 6
FORM OF BID

FORM OF BID

Description of the Works:

- BID

To :

Address :

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

(-----)

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

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

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

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

(in block capitals or typed)

Address

Witness

Address

Occupation

SECTION - 7
BILL OF QUANTITIES

BILL OF QUANTITIES

Preamble

1. The bill of Quantities shall be read in conjunction with the Instructions to Bidder, Conditions of Contract, Technical Specifications and Drawings.
2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Engineer and valued at the rates and prices tendered in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix within the terms of the Contract.
3. The rates and prices tendered in the priced Bill of Quantities shall, except in so far as it is otherwise provided under the Contract, include all constructional plant, layout, supervision, materials, erection, maintenance, insurance, profit, taxes and duties, together with all general risks, liabilities and obligations set out or implied in the Contract.
4. The rates and prices shall be quoted entirely in Indian Currency.
5. A rate or prices shall be entered against each item in the Bill Quantities, whether quantities are stated or not. The cost of Items against which Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities (in case of Item rate contract).
6. The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Bill of Quantities, and where no Items are provided the cost shall be deemed to be distributed among the rates and prices entered for the related items of Work.
7. General direction and descriptions of work and materials are not necessarily repeated or summarized in the Bill of Quantities. References to the relevant sections of the contract documentation shall be made before entering rates or prices against each item in the Bill of Quantities.
8. The method of completed work of payment shall be in accordance with the specification for Road and Bridge works. For building works specifications for building are to be followed.
9. Errors will be corrected by the Employer for any arithmetic errors pursuant to **Clause 29** of the Instructions to Bidder.
10. Rock is defined as all materials which, in the opinion of the Engineer, required blasting, or the use of metal wedges and sledgehammers, or the use of compressed air drilling for its removal, and which cannot be extracted by ripping with a tractor of at least 150 kw with a single rear mounted heavy duty ripper.

BILL OF QUANTITIES

(A) Percentage Rate Tender (Up to INR 50 Cr.)

BOQ of This work

Item No.	Description of Item	Quantity	Unit	Rate	Amount
1	2	3	4	5	6
1	Excavation for foundation upto 1.5 m depth including sorting out and stacking of useful materials and disposing off the excavated stuff upto 50 Meter lead.(B) Dense or Hard soil	71.4	Cum	272.57	19,461.50
2	Excavation for foundation for depth from 1.5 m to 3.0 m including sorting out and stacking of useful materials and disposing off the excavated stuff upto 50 Meter lead.(B) Dense or Hard soil	26.2	Cum	295.1	7,731.62
3	Providing and laying cement concrete 1:4:8 (1-Cement : 4- coarse sand : 8- hand broken stone aggregates 40 mm nominal size) and curing complete excluding cost of formwork in (A) Foundation and Plinth	21.1	Cum	2769.69	58,440.46
4	Providing and laying controlled cement concrete M.200 and curing complete including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in (A) Foundations, footings, Base of columns and Mass concrete.	15.3	Cum	4309.67	65,937.95
5	Providing and laying controlled cement concrete M-200 and finishing smooth with cuing etc. complete including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in columns up to Ground level (Pedestal).	2.2	Cum	7536.62	16,580.56
6	Filling available excavated earth (excluding rock) in trenches. sides of foundations etc. in layers not exceeding 20 cm. in depth consolidating each deposited layer by ramming and watering.	71.3	Cum	136.92	9,762.40
7	Carring out plinth treatment to post construction / by spraying chemical solution for termite control treatment including labour and material consistment with I.S.I specification. Using Chlordene and Chiorpurfiles 20 EC. As Per 6131_paret-II Concentration Weight one percent is recommended, i.e one litre 20 EC chemical emulsion with 19 liter give 1 % concenteration inclusive of one litre chemical emulsion appication at the rate of 5 Litre chemical / Sqm of surface is recommended as per I.S	98	Sqmt	86.82	8,508.36
8	Providing and laying controlled cement concrete M-200 and curing complete including the cost of formwork but excluding the cost of reinforcement for RCC work in Ground beam and Plinth Beam.	10.1	Cum	6970.01	70,397.10
9	Filling in plinth with murrum or selected soil in layers of 20cm. thickness including watering, ramming and consolidating etc. complete.	34.3	Cum	294.38	10,097.23
10	Filling in plinth with sand under floors including watering ramming, consolidating and dressing complete.	14.7	Cum	481.8	7,082.46
11	Providing and laying controlled cement concrete M.200 and curing complete Including the cost of formwork but excluding reinforcement for reinforced concrete work in Columns, Pillars posts and struts, Ground floor level.	3.8	Cum	7889.11	29,978.62
12	Providing and laying controlled cement concrete M.200 and curing complete Including the cost of formwork but excluding reinforcement for reinforced concrete work in Columns, Pillars posts and struts, First floor level.	3.8	Cum	7930.52	30,135.98

13	Providing and laying controlled cement concrete M.200 and curing complete including the cost of formwork but excluding reinforcement for reinforced concrete work in Beams, Ground Floor Level.	7.4	Cum	6871.03	50,845.62
14	Providing and laying controlled cement concrete M.200 and curing complete including the cost of formwork but excluding reinforcement for reinforced concrete work in Beams, First Floor Level.	6	Cum	6912.44	41,474.64
15	Providing and laying Controlled cement concrete M-200 with curing etc. complete, including the cost of formwork but excluding the cost of reinforcement for R.C.C. slabs work for Ground Floor	13.3	Cum	6618.53	88,026.45
16	Providing and laying Controlled cement concrete M-200 with curing etc. complete, including the cost of formwork but excluding the cost of reinforcement for R.C.C. slabs work for First Floor	10	Cum	6659.94	66,599.40
17	Providing and laying Controlled cement concrete M-200 For R.C.C. lintel/Chhajja with curing etc. complete, including the cost of Formwork but excluding the cost of reinforcement for Ground Floor.	1.9	Cum	6970.01	13,243.02
18	Providing and laying Controlled cement concrete M-200 For R.C.C. lintel/Chhajja with curing etc. complete, including the cost of Formwork but excluding the cost of reinforcement for First Floor.	1.7	Cum	7011.42	11,919.41
19	Providing and laying Controlled cement concrete M-200 Curing etc. complete, including the cost of Formwork but excluding the cost of reinforcement for R.C.C. Stair case for Ground Floor.	1.3	Cum	7330.58	9,529.75
20	Providing TMT Bar FE 500D reinforcement for R.C.C. work including bending, binding and placing in position complete upto floor two level	6905	KG	77.29	5,33,687.45
21	Brick work using common burnt clay building bricks having crushing strength not less than 35 kg./Sq.Cm. in in superstructure above floor two level in Cement mortar 1:5 (1-Cement : 5-coarse sand) Conventional (Ground Floor)	32.7	Cum	4526.75	1,48,024.73
22	Brick work using common burnt clay building bricks having crushing strength not less than 35 kg./Sq.Cm. in in superstructure above floor two level in Cement mortar 1:5 (1-Cement : 5-coarse sand) Conventional (First Floor)	31.4	Cum	4569.18	1,43,472.25
23	Providing 10mm thick cement plaster in single coat on ceiling for interior plastering upto floor two level and finished even and smooth in (i)Cement mortar 1:3 (1-cement:3-sand)	158.7	Sqmt	164.76	26,147.41
24	Providing 10mm thick cement plaster in single coat on brick/concrete walls for interior plastering upto floor two level and finished even and smooth in (i)Cement mortar 1:3 (1-cement:3-sand)	459.2	Sqmt	138.7	63,691.04
25	20mm thick sand faced gutka finish cement plaster on walls upto height 10 metres above ground level consisting of 12mm thick backing coat of C.M. 1:3 (1-cement : 3-sand) and 8mm thick finishing coat of C.M. 1:1 (1-cement : 1-sand) etc. complete.	353.9	Sqmt	321.1	1,13,637.29
26	Applying two coats of Birla or Asian acrylic lappy (putty) and two coats of primer of approved brand and manufacture on new wall surface to give an even shade including thoroughly brushing the surface free from mortar dropping and other foreign matter and sand papered smooth.	617.9	Sqmt	40.59	25,080.56
27	Wall painting (three coats) with plastic emulsion paint of approved brand and manufacture on wall surfaces to give an even shade including thoroughly brushing the surface free from mortar droppings and other foreign matter and sand papered smooth	617.9	Sqmt	125.52	77,558.81
28	Providing and fixing window having extruded	25	Sqmt	1713.7	42,842.50

	aluminum Colour anodized section frame main outer size 63.50 x 38.10 x 1.95 mm,@ Wt 1.094 Kg / Rmt, horizontal two track member size 61.85 mm x 31.75 mm x 1.20mm @ wt.of 0.695 Kg/mt, vertical member of size 61.85 mm x 31.75mm x 1.30 mm @ wt.of 0.659 Kg/mt with sliding shutters of horizontal member size 40mm x 18mm x 1.29mm @ wt.of 0.456Kg/mt, vertical member of size 40mm x 18mm x 1.29mm @ wt.of 0.456Kg/mt, @ Wt. 0.457 Kg/mt with 5 mm thick transparent bronze colour tinted float glass with powder coated aluminum fittings and fixtures and transparent silicon sealant glass fixing to frame as per details etc complete for window.				
29	Providing and fixing standard extruded of alluminium section of size 63mm x 38.10mm x 1.2mm @ Wt. 0.643 Kg/mt with colour anodized alluminium frame for ventilation with 5 mm thick frosted glass as details etc complete for Ventilation	1.1	Sqmt	1175.56	1,293.12
30	providing and fixing 30 mm thick solid core flush type door having outer frame 5" thick teak wood fram with all core should be teak wood Patti and both side decorative 4.0MM thick teak veneer finished(with pu polish and fixed with granite framing include 150mm top and bottom s.s. pivot and s.s. screws)and europa make tubular lock system including as per architect instruction etc(flush door basic rate should be 160 rs /sq.ft and veneer basic rate 95 rs/sqft). Complete	16.7	Sqmt	4767.2	79,612.24
31	Providing and fixing FRP frame size 100x50 mm and 28mm thick FRP depress panel shutter having extra reinforcement on sides & edges in Gel coat finish. The core of the shutter & frame is to be filled up with injected fire retardant grade polyurethane foam done in situ alongwith embedded wooden pieces for stiffening & also taking hinges & finitures. The whole FRP frame & shutter is to be water proof weather proof, termite proof & resistance to mild acid/alkali. Rates are to be inclusive of S.S hinges with necessary screws & alluminium fixtures & fastenings & fastener sleeve.	6.1	Sqmt	2377.76	14,504.34
32	Providing fabricating, erecting and fixing of M.S.grill, fabricated from m.s. plat, angles, tees, spacebar, round bar, pipes etc. complete as per Architect detail & Drawing including applying one coat of red oxide & two coat synthetic enamel paint etc complete. As per Architect instructions and drawing or as directed by engineer in charge.	1399.3	KG	113.12	1,58,288.82
33	Providing and laying 1200 mm X 600 mm X 8 (Matt & Glossy Finish) to 10mm thick (or above size) first quality virified floor tiles of desired finish (fully polished glossy, matt, satin, guard, anti skid) in desired pattern in floor & wall with residue and skirting as per drawing / specification. The tiles shall have minimum scratch hardness of 7 on Moh's scale with a density of 2.2 to 2.3 & bonding strength of 250 kg/sqcm. The tiles shall be set with cement slurry (3.3 kg. cement / m2.) over a minimum 25 mm. thick cement sand mortar (1:3) bedding on average 40 mm thick (1:2:4- 6mm down aggregates) wired finish screed & laid to proper gradient. Finishing to be done with flush pointing in white cement & matching approved pigment incl. curing, polishing & cleaning with mild oxalic acid etc. complete for all floors / all levels, as per drawing / specification and or as per direction of Engineer in charge for flooring, skirting or channel work etc. complete The rate should be inclusive of protection of flooring until the	252.8	Sqmt	1722.05	4,35,334.24

	handling of project by covering the joints with abrotaps, plastic sheet & plaster of Paris. The rate shall include cost of 25mm cement mortar, 40mm wired finish screed.(basic rate of tiles- 65 rs/sq.ft) (make johnson, RAK,karjariya,SYMPOLO or approved make)				
34	Pro. And fixing single layer water proof gypsum board 12.5 mm thick sections using water proof board of size 1220 mm x 1830 mm x 8.0 mm suspended by GI suspender channel of size 25 mm x 3 mm with intermediate channel og size 18 mm x 40 mm x 0.8 mm at 1220 mm center to center ceiling section of size 40 mm x 35 mm x 0.55 mm at 457 mm c/c and perimeter channel A of size 20 mm x 27 mm x 30 mm x 0.5 mm at edges & drops incl.paper tap sand soffit cleat, anchor fastener, scoch bolt connecting cleat,joining compound top coat on ceiling incl.making necy.opening for light fitting,diffuser etc. comp. as per detail drawing as directed	108.7	Sqmt	606.95	65,975.47
35	Providing & fixing granite stone average 18 mm thick machine-cut & machined polished stone in treads of steps, sill, copings, parapet top, window,door,sill, planter top, and such other locations, laid on 20 mm(average) thick cement mortar 1:4 (1 cement:4coarse sand) and jointed with Super flex guranted fixing solution by kerakoll mixed with pigment to match the shades of the slabs, including rubbing and polishing complete. The Stone used should be in one single long piece up to 3000 mm as per drawing or as directed by Engineer-in-charge. The exposed projected edges shall be of uniform thickness and of uniform projection including molding , chamfering, rounding, polishing complete. (basic rate of granite- 150 rs/sq.ft)	50.6	Sqmt	2536.11	1,28,327.17
36	Providing and laying Vitrified tiles 8 to 10 mm thick , in skirting risers of steps and dedo on 10mm thick cement plaster 1:3 (1-cement : 3-coarse sand) and jointed with white cement slurry	10.6	Sqmt	1592.4	16,879.44
37	Providing and fixing concealed center point to wall ceiling & floor CPVC (SDR 13.5) PIPE having National Sanitation Foundation (NSF) seal for potable water of following dia. nominal bore tube fittings and clamps including making good the wall, ceiling and floor etc. complete.[A] 15 mm.	25	Rmt	170.36	4,259.00
38	Providing and fixing concealed center point to wall ceiling & floor CPVC (SDR 13.5) PIPE having National Sanitation Foundation (NSF) seal for potable water of following dia. nominal bore tube fittings and clamps including making good the wall, ceiling and floor etc. complete. [C] 25 mm.	50	Rmt	253.82	12,691.00
39	Providing laying and jointing in true line and level 40 mm dia. U.P.V.C. Pipe (SCH -40) line including fittings approved by Engineer In charge. Pipe shall be fixed on the wall with the help of clamp at every two meter C/C or shall be concealed as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.	20	Rmt	148.12	2,962.40
40	Providing laying and jointing in true line and level 110 diameter U.P.V.C. SWR Type B pipe conforming to IS 13592-1992 with one end plain and other end socketed with rubbering, & fitting conforming to ISI 14735-1999 of approved make for drainage system pipe line, pipe shall be jointed with each other with rubber lubricant, pipe shall be fixed on wall using of PVC clamp of the size 110 mm	70	Rmt	876.11	61,327.70

	diameter x 149 mm length x 145 mm high at every 2000 mm centre to centre or shall be concealed in walls as directed including necessary fittings such as bends, shoes etc. including testing of pipes and joints and jointed with adhesive solvent cement including cost of all materials.				
41	Providing and fixing to wall ceiling floor 10.0 Kg. F/Cm2 working pressure polythene pipes for soil waste and ventilating pipes of the following outside dia. low density, complete with necessary fittings ,wall clamps etc including making good the wall ceiling and floor. {Finolex, Supreme, Prince or equivalent brand} (A) 110 mm	5	Rmt	339.05	1,695.25
42	Providing and fixing PVC SWR Nahni trap IS 14735 for drain - 100 mm diameter with jali of the following nominal diameter of self cleansing design with C.I scread down or hinged grating including the cost of cutting and making good the walls.	5	Nos	586.6	2,933.00
43	Providing and fixing Screw down Quarter turn bib taps of following size (A) Brass chromium plated screw down Bib tap (I) 15 mm dia	5	Nos	388.83	1,944.15
44	Providing and fixing C.P. bib cock 15mm ϕ heavy duty with cap	5	Nos	602.58	3,012.90
45	Providing and fixing C.P. Pillar cock 15 mm Heavy duty swan neck	4	Nos	849.95	3,399.80
46	providing and fixing screw down brass chromium plated heavy quality bib-tap of Johnson (Coral brass long nose T1325C) on water supply pipe lines of 15mm dia with or with extension piece but with a flange etc. complete to the satisfaction of EI and approved Johnson/ cera make.	3	Nos	2070.5	6,211.50
47	providing and fixing white glazed vitreous chinaware over the counter type / under counter type wash basin with / without single or double hole for pillar-tap comprising of (a) white glazed vitreous chinaware wash basin of Johnson (omega recta NXT) make with supporting MS or CI brackets. (b)1 no. 32mm CP cast brass bottle trap Johnson (T0060C) heavy casted of Johnson /cera make, with 250mm long wall connection pipe and wall flange with rubber adopter for waste connection and one waste coupling. (c) 1 no heavy quality CP brass angle cock (T0410C) with wall CP flange of Johnson make. , (d)1 no 15mm NB heavy quality CP brass inlet connection with unions end. the supporting bracket shall be painted with 3 coats of approved paint of approved shade etc complete	3	Nos	13318.87	39,956.61
48	providing and fixing (A) White glazed vitreous chinaware extended wall mounted cantilever type European type water closet (Johnson make BREEZE model 520 x 360 x 310) with HYDROLIC seat cover, with (B) flushing tank constellation cistern (JOHNSON MAKEP0096P00019) with cistern fittings, CI chair bracket with rag bolt and GI 12mm rag bolt with nut and metal washer etc. including supply and fixing of (C) 1 no CP heavy duty angle cock with CP wall flange with CP brass inlet connection with integral P or S trap including cutting and making good the wall and floor as under with supported on CI wall brackets and etc. complete to the satisfaction of EIC	3	Nos	18737.52	56,212.56
49	providing and fixing Single Lever Tall Basin Mixer (Johnson T6146C) with on water supply pipe lines of 15mm dia with or with extension piece but with a flange etc. complete to the satisfaction of EIC and approved Johnson/ cera make.	2	Nos	6443.8	12,887.60

50	providing and fixing Single Lever wall mount Tap (Johnson T6086C) with concealed body for wall mounted (Johnson T0068C) with on water supply pipe lines of 15mm dia with or with extension piece but with a flange etc. complete to the satisfaction of EIC and approved Johnson/ cera make.	1	Nos	6610.45	6,610.45
51	providing and fixing cp BRASS Bathroom 3 Inlet Single Lever High Flow Concealed Diverter make-Johnson (T3439C) with concealed body (Johnson T0066C) quarter turn of approved Johnson/ cera make and as approved by the consultants.	3	Nos	8865.78	26,597.34
52	providing and fixing ocean square overhead shower with shower arm 1' long of (Square Shower Square Shower Johnson (S0032C) 200 MM " or equivalent make on water supply pipe lines of 15mm dia. complete to the satisfaction of EIC and approved Johnson/ cera make.	3	Nos	3977.38	11,932.14
53	providing and fixing hand shower (health faucet)(Johnson health faucet) (S3248C) " or equivalent make Health Faucet with cp flange with 8 mm dia., 1 m long pvc tube and wall hook of approved by the consultants.	3	Nos	1599.84	4,799.52
54	providing and fixing chrome plated controll valve CERA make (F8015102) on water supply pipe lines of 25mm dia with required fittings etc. complete to the satisfaction of EIC.	3	Nos	2777.5	8,332.50
55	providing and fixing best Indian make mirror of specified size like modi float, saint gobain, i.a.g or equivalent silvered locally, with plain edge as required, with 12mm thick marine plywood backing, with cp brass caps, etc., complete teakwood beading of 20mm x 32mm size, with French polish or 3 coast of paint etc. complete to the satisfaction of eic.	2.88	SMT.	6680.14	19,238.80
56	Providing and fixing C.P. brass towel rail complete with C.P. brass brackets fixed to wooden plugs with C.P.brass screws.(B) 600mm x 20mm size.	3	Nos	717.42	2,152.26
57	Providing and fixing toilet paper holder.(A) C.P. Brass	3	Nos	528.99	1,586.97
58	Providing erecting and fixing double coated ISI water tank of required capacity each with all necessary fittings and connection etc. complete on terrace.	1000	Lit.	4.96	4,960.00
59	Providing & constructing BB masonry in C.M. 1:6 (1 cement : 6 coarse sand) and cement concrete 1:2:4(1 cement : 2 sand : 4 graded stone age. of 0mm size BT kapchi) septic tank of 3m x 0.9 m x 1.5 m internal dimension with necessary compartment of grit chambers and septic tank with necessary inlet and outlet connections with cement plaster (15 mm thick) in C.M. 1:4 (1 cement : 4 sand) with water proofing material 1:5:10 (1 cement : 4 sand) brick bat concrete bedding RCC 1:2:4 top cover slab 12 cm thick with C.I. cover of 60 cm x 45 cm size (light duty) 75mm dia. C.I. ventilating pipe 2 mt. long with cowl vent 40mm thick IPS flooring 10 cm. thick cement vata mild steel for steel and finishing to exposed faces in C.M. 1:3 (1 cement : 3 sand) curing etc. complete As per Architect instructions and as directed by engineer in charge.	1	NOS	29934.38	29,934.38
60	Providing and constructing sock pit of 3.00 mt. dia inside and 5.00 mt. depth with honey combed masonry 6.50 mt. from bottom and 0.60 mt. brick masonry in C.M. 1:6 top with RCC slab cover of M200 vent pipe 1.80 mt. long 75 mm dia & C.I. cover and cowl vent etc. complete	1	NOS	59772.81	59,772.81
61	Constructing brick masonry chamber for underground C.I. inspection chamber and bends with bricks having crushing strength not less than 35Kg/	3	NOS	7180.44	21,541.32

	Cm2 in C.M. 1:5 C.I. cover with frame (Light duty) 455mm x 610mm intenal dimensions total weight of cover with frame to be not less than 38Kg. (Wt. of cover 23 Kg.) and Wt. of frame 15Kg.) (R.C.C. top slabe with 1:2:4 mix (1-cement :2- coarse sand :4-graded stone aggregate 20mm size) foundation concrete 1:5:10 inside plaster 15mm thick with cement mortar 1:3 finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete.(iii) Inside dimensions 600mm x 850 mm and 450mm deep for pipe lines with three or more inlets.				
62	Providing and fixing S.W. gully trap with C.I. grating brick masonry chamber and water tight C.I. cover with frame of 300mm x 300mm size (inside) with standard weight.(i) Square mouth traps. (A) 100mm x 100mm size P type.	3	NOS	1292.19	3,876.57
63	providing and fixing Nirali make SS sink (460 x 385 x 200 mm) (Glister NG Glossy) with tapered sides walls including 15 mm knob cp brass heavy quality wall or floor mounted sink tap Johnson make (T4818C), with cp wall flange, casted spout of three way etc. complete to the satisfaction of eic.	2	NOS	7999.2	15,998.40
64	Charges for making holes in brick walls / RCC with or without plaster / tiles with mechanical cutter like HILTI etc. Including disposing the debris and finishing the same as per requirements. Measurement of holes will be taken per no. of holes drilled as per following range of diameters. Making of holes by hammer and chisel will not be considered in this item. For Diameter of holes up to 100 mm clear.	4	NOS	555.5	2,222.00
65	Steel work, riveted in built up sections framed work including cutting, hoisting, fixing in position and applying a priming coat of red lead paint. (A) In beams and joists, channels angles Tees, flats, with connecting plates or angle cleats as in main and cross beams. Hip and jack rafters, purlins conneted to common rafters and the like.	6.18	NOS	6762.96	41,795.09
66	Providing and fixing square Roof Tiles having natural clay terracotta finish cladding used for both interior and exterior as directed by EIC. Basic Rate : Rs.100/Sft	62.1	Sqmt	1222.1	75,892.41
67	Providing and fixing Stone cladding work in Exterior wall including Fitting and scaffolding as directed by EIC. Rs.300/Sft	260	Sqmt	3333	8,66,580.00
68	Storage UNIT Providing and fixing storage unit with 18 mm thick box and shutters from 25mm ply with 1.0 mm laminte of approved shade in exterior side and 0.8 mm laminte of approved shade in interior side vertical and horizontal surface 19mm plywood with inside 0.8mm and outside 1mm laminate finish. provide one 18mm self with 0.8mm laminate .All teak wood bidding should be finished with 1mm leminate with required pattern/drawing rack and with lock, handles ,drawer, chenals,, hinges etc. complete. Including side luggage self of 75mm x 50mm size teak wood patti with pupolish completa . all materials and labor etc. complete as per detail drawing and instruction of engineer- in charge.	7.99	SMT	22779.54	1,82,008.52
69	Window Curtains Providing and fixing black-out roller blinds of "Aerolux" or equivalent make of any color and size for windows, with super-soft mechanism using clutch and springs housed in aluminum channel fixed to the masonry/ RCC surfaces by use of	24.8	SMT	2439.15	60,490.92

	brackets. The fabric to be of 100% polyester yarn, cut of site-specific size cut using ultra-sonic machines to avoid threads coming out from its edges. The rubberized coating over the fabric to enhance blacking out of the space. complete at all levels and heights. Complete or as directed as per architect drawing and as per instruction of architect & engineer in charge.				
70	6 SEATER DINING TABLE : Provide and supply Nilkamal Jewel Six Seater Dining Set (Walnut) dining table of 1.50m length 0.90m width and 0.75 m height made of Solidwood and melamine finished with PU polish and 6 chairs 450 mm width 524mm length and 900mm height with 2" cushion as per drawing or image provided by consultant and suggested by engineer in charge.	1	NOS	36107.5	36,107.50
71	Three seated sofas Providing and supplying Nilkamal Rippon 3 Seater sofa or equivalent make Width 209 cm (82.3" Inch), Depth 82 cm (32.3" Inch), Height 92.5 cm (36.4" Inch), Seating Height 47.5 cm (18.7" Inch), springs ensures exceptional comfort Elegant fabric and leatherette upholstery for luxurious comfort Circular shaped armrests and tufted backrest with buttons add a touch of luxury Rose gold legs provide support and a chic and modern aesthetic Built from robust MDF and Neem wood for enhanced durability.	2	NOS	23886.5	47,773.00
72	CENTER TABLE:- Manufacturing and Supply of Center Table Coffe table size 650 (L) x 650 (D) x 400 (H) 1. Wood Framing - Base frame round molded 25x50 mm Sq. thick CP teakwood duly polished with mahogany melamine finished . 2. Top Glass made of 10 mm thick clear toughen glass with crystal edges . 3. Glass support shall be button fitted on all corner.& have pvc buffers at bottom.	1	NOS	7221.5	7,221.50
73	TV UNIT : (1.35 M X 0.25 M X 0.26 M) Provide and supply wall mounted tv made off 19mm ply and both side side drawer and center portion empty, outer coverd with 1mm laminate and inside 0.80mm laminate of required shade as per drawing or image provided by consultant and suggested by EIC.	1	NOS	11665.5	11,665.50
74	SLEEPING BED (1.95 m x 2.15 m x 0.37m) Providing and fixing bed with 25mm ply with 1.0 mm laminte of approved shade in exterior side and 0.8 mm laminte of approved shade in interior side vertical and horizontal surface 19mm plywood with inside 0.8mm and outside 1mm laminate finish provide with two openable shutter at top with handles. Also provide six s.s. legs .All teak wood bidding should be finished with 1mm leminate and also provide two side box (600 x 400 x 450mm) with each two drower made off 19mm ply, outer 1mm and inside 0.8mm laminate etc complete with all materials and labor as per detail drawing and instruction of engineer- in charge.	2	NOS	28280	56,560.00
75	MATTRESS: (1.95M X 2.15 M X 0.15M) Provide and supply required size of mattress provide with memory foam with removable and washable cover of sleepweel or eql. Make as suggested by EIC.	2	NOS	13574.4	27,148.80
76	BED SHEET: (2.50 M X 2.30M) Provide and supply required size of pure cotton bedsheet of required pattern and colour as suggested by eic.	2	NOS	1696.8	3,393.60
77	PILLOW : (0.68 M X 0.45 M) Provide and supply required size of pillow made of microfiber of sleepweel make or etc with it's cotton cover as	4	NOS	1131.2	4,524.80

	suggested by EIC.				
78	Earthwork in cutting including preparing the slope and camber and stacking or utilising the cutting stuff in bank as directed upto 200 Meters from the end of cutting with all lead and lift.(i) Hard murrum.	106.3	Cmt.	500.04	53,154.25
79	Earthwork for embankment including breaking clods, dressing with all lead and lift (excluding watering and consolidation)(A) From Borrow pits within land width	106.25	Cmt.	109.05	11,586.56
80	Rolling of earthwork in layers with power roller including filling in depressions which occur during the process. With Watering of earth work as directed.	106.3	Cmt.	22.88	2,432.14
81	Point wiring for Light / Bell with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multi strand copper wires up to 10 mtr length , in below type of pipe erected with 6A Modular type switch / bell push & accessories and earth continuity of following type, erected on PVC / Metallic/Wooden box, single mounting base frame covered with textured/metallic/white front plate modules erected on / in wall / ceiling as per pipe erected, with necessary Lamp holder/ceiling rose / H.D.Connector as directed. (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete.Cat. III	59	PT	481	28,379.00
82	Point wiring for Two Way Controlled Light Point with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (green) both are of .ISI marked 1.1 KV grade FRLS PVC insulated multi strand copper wires erected in below type of pipe with 6A Modular type switches and following type of accessories erected on PVC / Metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate modules erected on / in wall / ceiling as per pipe erected. with necessary batten/angle holder or ceiling rose or H.D.Connector as directed.(a) with medium class Rigid PVC pipe and accessories erected flushed on wall/ceiling complete Cat. III	6	PT	562	3,372.00
83	Point wiring for FAN with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (Green) both are of .ISI marked 1.1 KV Grade FRLS PVC insulated multi strand copper wires up to 10 mtr length, in below type of pipe erected with 6A Modular type switch and hum free EME step type electronic fan regulator mounted and accessories with earth continuity of following type erected on PVC / Metallic/Wooden box, single mounting base frame covered with textured/metallic/white front plate modules erected on / in wall / ceiling as per pipe erected. with necessary ceiling rose / H.D.Connector as directed.(f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete. cat III	7	PT	668	4,676.00
84	Point wiring for Tissino / Modular secondary light point with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multi strand copper wires, in below type of pipe to be erected complete with earth continuity and necessary connection with primary light with accessories erected on Metal / PVC / wooden box covered with 3 mm thick PC(Polycarbonate) / Acrylic sheet for open / concealed wiring. with necessary Lamp holder / ceiling rose / H.D.Connector as directed. (a) with medium class Rigid PVC pipe and accessories erected flushed on wall/ceiling complete	7	PT	131	917.00

85	Point wiring for on board Looped Plug with 6A Modular type switch & 5 pin socket erected on PVC / Metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate modules erected on / in wall / ceiling with following type accessories Cat. III	18	PT	255	4,590.00
86	Point wiring for Individual Plug with & earth wire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multi strand copper wires up to 10 mtr length, in below type of pipe erected complete with Modular type switch & 5 pin Plug erected on PVC / Metallic/Wooden box covered with appropriate front plate modules erected on / in wall / ceiling as per pipe erected with following type of accessories.[I] For 6A Plug and 6 a switch with 2-1.5 sq.mm Cu. Wire from nearby switchboard/mcb db board (a) with medium class Rigid PVC pipe and accessories erected flushed on wall/ceiling complete.Cat. III.)	3	PT	471	1,413.00
87	Point wiring for Individual Plug with & earth wire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multi strand copper wires up to 10 mtr length, in below type of pipe erected complete with Modular type switch & 5 pin Plug erected on PVC / Metallic/Wooden box covered with appropriate front plate modules erected on / in wall / ceiling as per pipe erected with following type of accessories.[II] For 16A Plug and 16 amp switch with 2-2.5 sq.mm Cu. Wire from mcb db board.(a) with medium class Rigid PVC pipe and accessories erected flushed on wall/ceiling complete Cat. III	8	PT	704	5,632.00
88	Providing following type of Modular Type Accessories mounted with PVC / metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate , modules erected with necessary connections as per site situation directed by Engineer In charge. Car.III (1)One No. SP 6 Amp.	100	Ea.	150	15,000.00
89	Providing following type of Modular Type Accessories mounted with PVC / metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate , modules erected with necessary connections as per site situation directed by Engineer In charge. Car.III (2) One No 5 pin plug	37	Ea.	150	5,550.00
90	Providing following type of Modular Type Accessories mounted with PVC / metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate , modules erected with necessary connections as per site situation directed by Engineer In charge. Car.III (7) Blank Plate Single	25	Ea.	25	625.00
91	Providing following type of Modular Type Accessories mounted with PVC / metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate , modules erected with necessary connections as per site situation directed by Engineer In charge. Car.III (8) Computer RJ-45 socket	1	Ea.	159	159.00
92	Providing following type of Modular Type Accessories mounted with PVC / metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate , modules erected with necessary connections as per site situation directed by Engineer In charge. Car.III (9) 16 Amp. SP one way switch	9	Ea.	179	1,611.00
93	Providing following type of Modular Type	37	Ea.	198	7,326.00

	Accessories mounted with PVC / metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate , modules erected with necessary connections as per site situation directed by Engineer In charge. Car.III (10) 6/16Amp. Universal socket				
94	Providing following type of Modular Type Accessories mounted with PVC / metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate , modules erected with necessary connections as per site situation directed by Engineer In charge. Car.III (13) 6A/10A/16A/20A/25A/32A Single pole Modular MCB Switch	10	Ea.	307	3,070.00
95	Providing following type of Modular Type Accessories mounted with PVC / metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate , modules erected with necessary connections as per site situation directed by Engineer In charge. Car.III (24) Batten Holder/Angle Holder with modular frame with metal ring. Cat-III	15	Ea.	64	960.00
96	Providing and erecting ISI mark Medium class RIGID PVC PIPES of following size complete to be erected on/in wall or ceiling erected with necessary PVC fittings & Junction boxes fixed with adhesive solution & Clamps with following dia of pipes, in approved manner as directed (a)20 mm	400	Mtr	24	9,600.00
97	Providing and erecting ISI mark Medium class RIGID PVC PIPES of following size complete to be erected on/in wall or ceiling erected with necessary PVC fittings & Junction boxes fixed with adhesive solution & Clamps with following dia of pipes, in approved manner as directed (b) 25 mm	200	Mtr	33	6,600.00
98	Providing and erecting Mains with 1.1 KV grade FRLS PVC insulated ISI marked stranded Copper conductor wire in following type of pipe to be erected concealed in /flushed on wall/ceiling, with 1.5 sq. mm copper conductor FRLS PVC insulated stranded wire of green colour for earth continuity of following size.(A) With medium class Rigid PVC pipe and accessories (a) 2 wire 1.5 sq. Mm	1000	Mtr	62	62,000.00
99	Providing and erecting Mains with 1.1 KV grade FRLS PVC insulated ISI marked stranded Copper conductor wire in following type of pipe to be erected concealed in /flushed on wall/ceiling, with 1.5 sq. mm copper conductor FRLS PVC insulated stranded wire of green colour for earth continuity of following size.(A) With medium class Rigid PVC pipe and accessories (b) 2 wire 2.5 sq. mm	350	Mtr	82	28,700.00
100	Providing and erecting Mains with 1.1 KV grade FRLS PVC insulated ISI marked stranded Copper conductor wire in following type of pipe to be erected in / on wall / ceiling with 2.5 sq. mm copper conductor FRLS PVC insulated stranded wire of green colour for earth continuity of following size.(A) with medium class Rigid PVC pipe and accessories. (a) 2 wire 4 sq. mm	350	Mtr	111	38,850.00
101	Supplying and erecting LED indoor fittings with LEDs of wattage 0.2 Watt to 0.5 Watt assembled on single MCPCB, with housing used as a heat sink shall be made of thick sheet Steel conforming to IS:	23	Ea.	530	12,190.00

	513/CRCA/ aluminium die cast powder coated and high U.V. & corrosion resistance with diffuser with company mark/name 160V to 270V, Power Factor more than 0.95, THD < 15%, CCT 3000 K to 6500K, Luminaire efficacy> 85 lumens/watt ,LED LED driver efficiency > 85 % (fitting required LM-79 & LM-80 Certificates)(NOTE: Below description have shown ranges of Wattage capacity of LED fittings.The Engineer incharge may select any wattage capacity between the ranges shown.) (A) Tube Light with integral driver (v) 36-40 Watts, Surge-2 KV, IP-20, conventional 4 feet cat-III				
102	Supplying and erecting LED indoor fittings with LEDs of wattage 0.2 Watt to 0.5 Watt assembled on single MCPCB, with housing used as a heat sink shall be made of thick sheet Steel conforming to IS: 513/CRCA/aluminium pressure die cast powder coated and high U.V. & corrosion resistance with diffuser housed in aluminium casted body with company mark/name 160V to 270V,Power Factor more than 0.95, THD < 15 %, CCT 3000 K to 6500K, Luminaire efficacy> 85 lumens/watt , LED driver efficiency > 85 % (fitting required LM-79 & LM-80 Certificates)(NOTE: Below description have shown ranges of Wattage capacity of LED fittings.The Engineer incharge may select any wattage capacity between the ranges shown.) (A) Square/ Circular shaped Surface/Recessed Mount Downlight with provision for spring loaded mounting clips complete.IP20 (iii) 16-20 watts, Surge-2 KV	65	Ea.	584	37,960.00
103	Supplying and erecting LED street light / Flood light fittings with High power White LEDs wattage of 3 Watt and above assembled on single MCPCB, efficiency more than 130 lm/w and corrosion free High pressure die cast aluminum housing with smooth finish powder coated and heat sink extruded aluminium with diffuser and Polycarbonate optics/ lenses, with toughened glass with company mark/name engraved or embossed 160 to 270 V,Power Factor more than 0.95, THD < 10 %, CCT 3000 K to 5700K,Uniformity ratio >0.45, Luminaire efficacy> 100 lumens/watt . LED driver efficiency > 85 %.(fittings required LM-79 & LM-80 certificates)(NOTE: Below description have shown ranges of Wattage capacity of LED fittings.The Engineer incharge may select any wattage capacity between the ranges shown.)(A) Street Light (IP-65), Surge protection -4KV integral and ,Light must have 440VAC line supply with over-voltage protection. (iii) Above 60 to 90 watts	3	Ea.	5917	17,751.00
104	Providing & erecting Approved make Ceiling Fan with double ball bearing ISI mark with Condenser 230 volt A.C.50 Hz 1200 mm sweep complete having 3 blades aluminium body and blade sets having ornamental design shanks , canopy erected with earthing. [Make shall be approved by Engineer in Charge]	5	Ea.	2289	11,445.00
105	Supplying and erecting 19 / 20 mm. nominal bore Medium Class M.S. Pipe down rod erected duly painted for fan complete with proper insulation without leakage and earthing.	5	Mtr	107	535.00
106	Supplying & erecting fan hook box of 10 mm M.S. round bar bounded to the RCC bars up to 50mm	5	Ea.	107	535.00

	length each side and pierced through a 16 Gauge M.S. box / Heavy Duty PVC box complete erected concealed in Ceiling with necessary finishing.				
107	Supplying & erecting single phase approved make industrial exhaust fan suitable for medium duty ring mounted low noise operation suitable for medium duty having following dia size and maximum speed in RPM. [C] [A] 305 mm dia 900 RPM.Cat.ii	3	Ea.	2034	6,102.00
108	Providing and erecting XLPE(IS:7098)(I)-88 ISI armoured cable multistrand Aluminium conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe of following size of cables (C) 3 1/2 core 50 Sq. mm (25 Sq.1/2 mm core)	10	Mtr	282	2,820.00
109	Making trench in soft soil of suitable width of 90 cm deep for laying cable or locating the fault all over the run and back filling the same and making the surface as normal ground.	10	Mtr	55	550.00
110	Covering of cable with second class bricks or cement tiles laid cover the cable crosswise & also on both sides with covering of 7.5 Cm. layer of sand above & below cable (16 bricks per meter)	10	Mtr	139	1,390.00
111	Providing and erecting iron clad cable route marker duly marked with ELE.CABLE of size 23 cm.X 12 cm. Flushed with ground in cement foundation as directed by Engineer in charge.	2	Ea.	238	476.00
112	Providing and erecting Annealed bare Copper wire 8 to 16 SWG.	5	Kg	928	4,640.00
113	Supplying & erecting earth pit of minimum bore dia.150mm size approved make arthing Electrode consisting Pipe-in-Pipe Technology as per IS 3043-1987 made of corrosion free hot dipped G.I.Pipes having Outer pipe dia of 50mm having 80-200 Micron galvanising, Inner pipe dia of 25 mm having 200-250 Micron galvanising, connection terminal dia of 12mm with constant ohmic value surrounded by highly conductive compound with high charge dissipation suitable for following type of applications with chamber and heavy duty cover.(approved make OEM has to submit test certificate) & having back filling compound of (B) Inner chemical (CCM Compound)- Resistivity:- 0.2 W/ meter testing as per IEC 62561-2017, Voltage drop:- < 1 volt at no load & dry form, Sulphur content:- <2%(C) Back fill Compound :- Earthing compound should be capable to retain moisture for long time Necessary test report must be submitted.(b)For Electrical installation up to 11 KV in normal soil. Length of Pipe : 2.00 mtrs Back filling Compound :1 no. Bag of 25 Kg.)	1	Ea.	5703	5,703.00
114	Providing and erecting Approved make RCCBs conforming to IS: 12640 and having sensitivity of 30 mA and Short Circuit withstand capacity of 10 KA and suitable for operation on single phase 240 V,50Hz. having characteristic of quick action & tripping with all advance feature & do not incorporate any electronic component. for following Max. rating erected as directed.(iii) 63 Amps. DP Cat. III	1	Ea.	2628	2,628.00
115	Providing & erecting 415 V MCB Four Pole for Motor & Inductive Load (C Curve) having 10KA breaking capacity & confirms to IS :8828 in existing box having following capacity. (c)63 Amp.	2	Ea.	730	1,460.00
116	Providing & erecting 240 V MCB double pole switch for motor & inductive load (C Curve) having 10 KA breaking capacity & confirms to IS : 8828 in existing box having following capacity.(A) 6 to 32 Amp. Cat iii	5	Ea.	297	1,485.00
117	providing and erecting Miniature circuit breaker single pole 6A to 25A suitable to operate on 240 V	15	Ea.	111	1,665.00

	A.C. system and having breaking capacity 10 KA to be erected in existing box. confirming to IS 8828/1996 with ISI Mark Cat.III				
118	Providing and erecting Sheet Steel powder coated MCB distribution board - flush / surface mounted fitted with busbar, neutral link, earth bar and DIN rail, Conforms to IS 8623-1 & 3, IEC 61439-1 & 3 without MCB to house appropriate nos. of MCBs.(The DBs should be used of same company of MCB to be used) suitable for,(A) single phase incoming and horizontal single phase outgoing (A) single phase incoming and horizontal single phase outgoing (iii)8 way	2	Ea.	696	1,392.00
119	Providing and erecting Sheet Steel powder coated MCB distribution board - flush / surface mounted fitted with busbar, neutral link, earth bar and DIN rail, Conforms to IS 8623-1 & 3, IEC 61439-1 & 3 without MCB to house appropriate nos. of MCBs.(The DBs should be used of same company of MCB to be used) suitable for,(A) single phase incoming and horizontal single phase outgoing (A) single phase incoming and horizontal single phase outgoing (iv)12 way	1	Ea.	859	859.00
	Total				49,48,108.93

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-figure s	In-Word s	

(A) Total Tendered Amount

(B) Rebate on above tendered amount (if any) % (in figure) (in-words).....

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(C) Net Tendered Amount (A-B) (in figure)
(in-words).....

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1	The Contractor shall exhibit a board with brief details of work as directed by the Engineer-In-Charge for which no extra payment shall be made.
2	The labour cess. will be deducted as per prevailing rules i.e. 1% of the work done.

3	GST and Income tax TDS will be deducted at a source while making payments of bills
4	In all R.C.C. Items in Rate Analysis Standard Cement Consumption has been taken as per Govt. G.R. NO.: MIS102010/17/K1 Dated:30/07/2018 as stated in S.O.R. therefore in R.C.C. items where there is a change as per actual mix design the cost of difference of cement consumption have been deducted from the rate of original item at the rate of input rate mentioned in all the tender.

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 us
registered office at ----- (hereinafter called
"the bank") are bound unto ----- (name of Employer)
(hereinafter called "The Employer") in the sum of ----- *
for which payment well and truly to be made to the said Employer the Bank itself,
his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this ----- day of ---20

THE CONDITIONS of these obligations are:

(1) If after Bid opening the Bidder withdraws his bid during the period of Bid validity specified in the Form of Bid;

Or

(2) If the Bidder has been notified of the acceptance of his bid by the Employer during the period of Bid Validity:

A Fails or refuses to execute the Form of Agreement in accordance with the Instructions to Bidders, if required; or

B. Fails or refuse to furnish the Performance Security, in accordance with the Instructions to Bidders; or

C. does not accept the correction of the Bid Price pursuant to Clause 27 (Correction of Errors)

We undertake to pay to the Employer up to the above amount upon receipt of his first written demand, without the employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of one or any of the three conditions, specifying the occurred conditions or conditions.

This Guarantee will remain in force up to and including the date ----- **
days after the deadline for submission of Bids as such the deadline is stated in
the Instructions to Bidders or as it may be extended by the Employer, notice of
which extension (s) to the Bank is hereby waived. Any demand in respect of
this guarantee should reach the Bank not later than the above date

DATE -----

SIGNATURE-----

WITNESS -----

SEAL -----

(Signature, name and address)

* The Bidder should insert the amount of the guarantee in words and figures
denominated in Indian Rupees. This figure should be the same as shown in
Clause 16.1(Bid Security) of the Instructions to Bidders.

****45 days** after the **end of the validity period** of the Bid. Date should be
inserted by the Employer before the Bidding documents are issued.

PERFORMANCE SECURITY

TO,

----- (Name of Employer)
----- (Address of Employer)

WHEREAS ----- (name and address of contractor) (hereafter called "the Contractor") has undertaken, in pursuance of Contracts No. ----- dates ----- to execute -----
----- (name of Contract and brief description of Works) (hereinafter called "The Contract")

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligation in accordance with the Contract.

AND WHEREAS we have agreed to give the Contractors such a bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor, up to a total of -----

(amount of guarantee)* ----- (in words), such sum being payable in types and proportions of currencies in which the Contract prices is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of -----
(amount of guarantee) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the contractor before presenting is with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract to of the Works to be performed thereunder or of any of the Contract documents which may be made between your and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such charge, addition or modifications.

This guarantee shall be valid until 60 days from the date of expiring of the Defect Liabilities period.

Signature and Seal of the guarantor -----

Name of Bank -----

Address -----

Date -----

*An amount shall be inserted by the Guarantor, representing the percentage the Contract price specified in the Contract denominated in Indian Rupees.

ADDITIONAL PERFORMANCE SECURITY

[Clause 34.1. (A)]

TO,

----- (Name of Employer)

----- (Address of Employer)

WHEREAS ----- (Name and address of contractor) (hereafter called "The Contractor") has undertaken, in pursuance of Contracts No. ----- dates ----- to execute -----
----- (Name of Contract and brief description of Works) (hereinafter called "The Contract")

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligation in accordance with the Contract.

AND WHEREAS we have agreed to give the Contractors such a bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor, up to a total of -----

(amount of guarantee) ----- (in words), such sum being payable in types and proportions of currencies in which the Contract prices is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of -----
(amount of guarantee) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the contractor before presenting is with the demand

We further agree that no change or addition to or other modification of the terms of the Contract to of the Works to be performed thereunder or of any of the Contract documents which may be made between your and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such charge, addition or modifications.

This guarantee shall be valid until **28 days** from the project completion date.

Signature and Seal of the guarantor -----

Name of Bank -----

Address -----

Date -----

BANK GUARANTEE FOR ADVANCE PAYMENT

TO,

----- (Name of Employer)

----- (Address of Employer)

----- (Name of Contractor)

Gentlemen:

In accordance with the provisions of the Conditions of Contract, sub-clause 51.1 ("Advance Payment") of the above mentioned Contract, -----

----- (name and address of Contractor) (hereinafter called "the Contractor") shall deposit with ----- (name

of

Employer) a bank guarantee his proper and faithful performance under the said Clause of the Contract in an amount of ----- (amount of Guarantee) *

-

-----in words).

We, the ----- (bank of financial institution), as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to ----- (name of Employer) on his first demand without whatsoever right of obligation on our part and without his first claim to the Contractor, in the amount not exceeding -

--

----- (amount of guarantee) ----- (in * words)

We further agree that no change or addition to or other modifications of the terms of the Contractor or Works to be performed thereunder or of any of the Contract documents which may be made between ----- (name of Employer) and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modifications.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until ----- (name of employer) receives full repayment of the same amount from the contractor.

YOUR'S TRULY

Signature and Seal _____

Name of Bank/ Financial Institution _____

Address _____

Date _____

* An amount shall be inserted by that Bank or Financial Institution representing the amount of the Advance Payment, and denominated in Indian Rupees.

Letter of Acceptance
(Letter head paper of the Employer)

_____ (date)

To, _____ (Name and address of the Contractor)

Dear Sirs,

This is to notify you that your Bid dated _____ for execution of the _____ (Name of the contract and identification number, as given in the Instructions to Bidders) for the Contract Price of Rupees _____ (_____) (amount in words and figures) as corrected and modified in accordance with the Instructions to Bidders* is hereby accepted by our agency.

You are requested to furnish performance security, in the form detailed in para 34.1 of ITB for an amount equivalent to Rs. _____ within **10 days** of the receipt of this letter of acceptance up to beyond **60 days** from the date of expiry of defects Liability period i.e. up to _____ and the Additional Performance Security for an amount equivalent to Rs. _____ shall be valid beyond 28 (twenty-eight) days of Project Completion Date i.e. up to _____ and sign the contract, failing which action as stated in Para 34.3 of ITB will be taken.

Yours Faithfully

Authorized Signature
Name and title of
Signatory Name of
Employer

* Delete "Corrected and" or and modified if only one of these actions applies. Delete as corrected and modified in accordance with the Instructions to Bidders, if corrections or modifications have not been affected.

Issue of Notice to proceed with the work

(Letterhead of the Employer)

----- (date)

To,

_____(Name and address of the Contractor)

Dear Sirs,

Pursuant to your furnishing the requisite security in ITB Clause 34.1
and signing of the Contract for the construction of _____

_____ at a bid Price of Rs.

_____.

You are hereby instructed to proceed with the execution of the said works in
accordance with the contract documents.

Yours faithfully

(Signature, name and title of signatory authorized
To sign on behalf of Employer)

AGREEMENT FORM

This agreement, made on the _____ day of _____ between _____ (name and address of Employer) (Hereinafter called "the Employer) and _____ (name and address of contractor) hereinafter called "the Contractor" of the other part.

Whereas the Employer is desirous that the Contractor execute

Name and identification number of contract (hereinafter called "the works") and the employer has accepted the Bid by the Contractor for the execution and completion of such works and the remedying of any defects therein, at a cost of Rs.

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS

1. In this Agreement, words and expression shall have the same meanings as are respectively assigned to them in the conditions of contract hereinafter referred to and they shall be deemed to form and be read construed as part of this Agreement.
2. In Consideration of the payment to be made by the Employer to the contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to executive and complete the works and remedy any defects therein in conformity in all aspects with the provisions of the contracts.
3. The employer hereby covenants to pay the Contractor in consideration of the execution and completion of the works and the remedying the defects wherein contract price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the contract.
4. The Following documents shall be deemed to form and be ready and construed as part of this Agreement viz.
 - i) letter of Acceptance
 - ii) Notice to proceed with the works:
 - iii) Contractor's Bid

- iv) Conditions of contract: General and Special
 - v) Contract Data
 - vi) Additional conditions
 - vii) Drawings
 - viii) Bill of Quantities and
 - ix) Any other documents listed in the Contract
- data as forming part of the Contract.

In witness whereof the parties there to have caused this Agreement to be executed the day and year first before written

The Common seal of _____
Was hereunto affixed in the presence of :

Signed, sealed and Delivered by the said _____

In the presence of

Binding signature of Employer _____

Binding Signature of Contractor _____

UNDERTAKING (For Investment)

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

(Signed by an Authorized officer of the firm)

Title of officer

Name of firm

DATE

UNDERTAKING

(For Validity)

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

Format for Site Visit Certificate (For Tender Draft Papers)

Certified that M/s _____
through their authorized representative Shri _____
has visited and inspected the site of work for the tender:

Name of Work:

Tender Reference No.: _____

The contractor/representative has examined the site conditions, approach road, availability of water, electricity, local conditions, working constraints, nature, duration, frequency of work, scope of work and all other factors likely to affect the execution of the work before submitting the tender. As a proof of that, photograph of site showing latitude, longitude and time is attached here within

No claim on account of lack of knowledge of site conditions shall be entertained later on.

Contractor Seal & Signature: _____

Date of Site Visit: ____ / ____ / ____

Place: _____

Self-Attested by Contractor / Authorized Signatory

Name of Contractor/Firm: _____

Name of Authorized Signatory: _____

Designation: _____

Seal & Signature: _____

*Note: Photograph of site showing latitude, longitude and time must be attached

SECTION - 9
DRAWINGS

----- Attached separately-----

SECTION - 10

DOCUMENTS TO BE FURNISHED BY BIDDER

- (1) Bid Document Fee/Tender Fee
- (2) Bid Security/EMD 180 days or Valid EMD Exemption Certificate of Appropriate Class of Registration of Approved Contractors
- (3) Registration Certificate of AS per Notice
- (4) Registration Certificate of special category–Building Category III
- (5) GST Number
- (6) Pan Card
- (7) Current Calendar Year 2026 Solvency Certificate 20 percent of Approximate value
- (8) Format for site visit certificate dually sign by Self attested and with Latitude and Longitude photographs