

SECTION - 9
DRAWINGS

SECTION - 10**DOCUMENTS TO BE FURNISHED BY BIDDER**

Special Condition for Free maintenance guarantee period For New Road Construction

The contractor shall have to give **Five years free maintenance guarantee** from the certified date of completion. During this period contractor shall have to repair the damaged portion of the BT surface of road, and all other executed items at his risk and cost as per direction of Engineers – in – charge. If BT surface during maintenance period of 5 years is worn-out or damaged then, agency shall have to take remedial action as per table below and as directed by Engineer – in – charge. The cost of annual maintenance for five year shall required to be considered while quoting the tender and has to be born by the contractor. The periodicity of routine maintenance activity shall be as follows.

(a) **Maintenance of Bituminous surface road and/or Cement concrete road and/or gravel road and/or WBM road including filling pot holes and patch repairs etc as per clause 1904, 1905, 1906 and 1907 of the Specifications for Rural Roads (First Revision) IRC New Delhi 2014 respectively.**

Sr No	Distress and service Level	Remedy	Period to attend for the Contractor
1	Potholes	As per IRC:SP:20-2002 and specifications for rural roads of IRC-2014	7 Days
2	Surface damages/worn out surface in more than 50 meters of lane length in the road stretch	Renewal with wearing coat as originally laid by contractor - as per tender item and specification.	21 Days
3	Patch work area exceeds 30% in per KM length		

(b) **Other maintenance works to be carried out:**

Sr No	Name of Item/Activity	Frequency of operation in one year
1	Restoration of rain cuts and dressing of berms as per clause 1902 of the Specification for Rural Roads (First Revision) IRC New Delhi 2014.	As and when required
2	Maintenance of earthen shoulders as per clause 1903 of the Specification Rural Roads (First Revision) IRC New Delhi 2014.	As and when required.
3	Maintenance of drains as per clause 1908 of the Specifications Rural Roads (First Revision) IRC New Delhi 2014.	Twice in a year before/after monsoon
4	Maintenance of culverts and causeways including vent clearance as per clause 1909 and 1910 of the Specifications Rural Roads (First Revision) IRC New Delhi 2014.	Twice in a year before/after monsoon
5	Maintenance of road signs as per clause 1911 of the Specifications Rural Roads (First Revision) IRC New Delhi 2014.	Maintenance as and when required. Repainting once in every two years.
6	Maintenance of guard rails and parapet rails as per clause 1912 of the Specifications Rural Roads (First Revision) IRC New Delhi 2014.	Maintenance as and when required. Repainting once in a year.
7	Maintenance of 200 m and Kilo Meter stones as per clause 1913 of the Specifications Rural Roads (First Revision) IRC New Delhi 2014.	Maintenance as and when required. Repainting once in a year.
8	White washing guard stones	Once in year
9	Re-fixing displaced guard stones / KM stone / 200 meter stone/Sign board	Once in year
10	Maintenance of road delineators as per Clause 1914 of the Specifications Rural Roads (First Revision) IRC New Delhi 2014.	As and when required
11	Cutting of branches of trees, shrubs and trimming of grass and weeds etc as per clause 1915 of the Specifications Rural Roads (First Revision) IRC New Delhi 2014.	Twice in a year generally before/after rains or as and when required
12	White washing parapets of CD Works as per Clause 1916 of the Specifications Rural Roads (First Revision) IRC New Delhi 2014.	Once in year


However Maintenance does not include replacement or erection of new signages / stones etc, at the time of yearly maintenance.

The amount equivalent to 5 % of each bill shall be withheld and will be released after the free maintenance guarantee period of five year is over.

However this amount shall be released against fix deposit or Bank Guarantee pledged in the name of Executive Engineer after completion certificate of work is issued.

The contractor has to carry out routine maintenance as said above & has to report the Engineer-in-charge in the month of May and November of every year with a copy of the record of contractor's inspection and other instructions received from the Engineer- in-charge and maintenance carried out with colour photograph showing before and after maintenance (@ 3 nos. Of photographs per kilo metre of lane length with date and time digitally incorporated to be submitted by the contractor in 3 sets)

In the event of contractor not carrying out routine maintenance within time limit as specified above, the employer will get the maintenance work carried out through any source and the amount required **for this work shall be recovered from the 5% amount withheld for this purpose** available with the employer along with additional 20% of this amount as penalty.


 Executive Engineer
 Panchayat (R&B) Division
 Morbi

**PRE – QUALIFICATION BID
(TECHNICAL BID)**

Name of work:- CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS
ROADS IN MORBI DISTRICT - PACKAGE -I

Issued to Shri

On Date.....

**Divisional Accountant
R & B Panchayat Division
Morbi**

**Executive Engineer
R & B Panchayat Division
Morbi**

**GOVERNMENT OF GUJARAT
PANCHAYAT ROADS & BUILDINGS DEPARTMENT,**


PRE – QUALIFICATION BID

(TECHNICAL BID)

Name of Work: CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS
ROADS IN MORBI DISTRICT - PACKAGE -1

Implementation by :- Road & Building Department (Panchayat)
Government of Gujarat

State :- Gujarat


Executive Engineer
R & B Panchayat Division
Morbi

Superintending Engineer
R & B Panchayat Circle-I
Rajkot.

Work Details

Sr No.	Name of Road	Length in Kilometers.	Amount Put to Tender
1	1.MANABA SULTANPUR CHIKHLI ROAD, TA MADIYA, DIST MORBI. (0+950 to 1+050)	-	12469040.74
✓ 2	2.SH TO DALDI KASHIPAR ROAD, TA WANKANER, DIST MORBI. (1+600)	-	12186616.79
3	3.SH TO NESDA (SU) ROAD, TA TANKARA, DIST MORBI. (1+00 to 1+030)	-	15308847.36
4	4.KHIRSARA TO BODKI ROAD, TA MADIYA, DIST MORBI. (1+300 to 1+400)	-	20910456.04
5	5.SH TO KHIRSARA ROAD, TA MADIYA, DIST MORBI. (1+100 to 1+200)	-	8129138.75
✓ 6	6.MAHIKA HOLMADH ROAD, TA WANKANER, DIST MORBI (2+800 to 3+00)	-	12758163.93
7	7.SH to KHEVALIYA MANSAR ROAD, TA MORBI, DIST MORBI (7+00 to 7+200)	-	23693482.54
8	8.SH TO NANA DAHISARA VIRPARDA ROAD, TA MADIYA, DIST MORBI. (1+250 TO 1+350)	-	22177039.56
9	9.HALVAD VEGADVAV RANMALPUR ROAD, TA HALVAD, DIST MORBI (13+600 TO 13+800)	-	35910688.56
10	10.VEGADVAV ISHANPUR ROAD, TA HALVAD, DIST MORBI	-	4576573.37
11	11.C.H. TO PIPALIYA ROAD, TA MORBI, DIST MORBI (0+900 TO 0+920)	-	4552920.10
12	12.C.H. TO VIRPARDA ROAD, TA MORBI, DIST MORBI	-	2729140.42
13	13.KHEVALIYA VILLAGE, TA MORBI, DIST MORBI	-	2780823.24
14	14.NESDA (SU) TO DEVALYA ROAD (1+100 - 1+200)	-	6720970.63
15	15.NESDA (SU) TO DEVALYA ROAD (1+900 - 2+000)	-	5391887.01
16	16.NESDA (SU) TO DEVALYA ROAD (2+400 - 2+500)	-	5390178.33
✓ 17	17.MAHIKA HOLMADH ROAD (2+800 - 3+000)	-	4604711.63
✓ 18	18.LIMBADA APPROACH ROAD (0+500 - 0+800)	-	7073816.44
✓ 19	19.GARIDA SAMADHIYALA GUNDAKHADA ROAD (8+200)	-	6326673.66
✓ 20	20.Wankaner Sardharka (5+400)	-	3013937.55
✓ 21	21.Wankaner Sardharka (6+680)	-	3009990.10
	Total		219715096.75

Name of Work:

CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON
VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1.

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INVITATION FOR BID (IFB)

Notice Inviting On-Line Tender

Details about Tender :-Tender Notice No. /2026-27 Dt. / /2025

Department Name	:-	(R&B) Panchayat Dept. Gandhinagar
Circle	:-	Superintending Engineer Panchayat (R & B) Circle-I, Bahumali Bhavan, Rajkot
Division	:-	Executive Engineer, R & B Panchayat Division Morbi
IFB No.	:-	Tender Notice No. of 2026-2027
Name of Project	:-	Road work.
Name of Work	:-	CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -I
Estimated Contract Value (INR)	:-	Rs. 219715096.75
Period of Completion (in Months)	:-	12 (Twelve) Months
Bidding Type	:-	Two bid system
Bid Call (Nos)	:-	1
Tender Currency Type	:-	Single
Tender Currency Settings	:-	Indian Rupee (INR)
Joint Venture	:-	Not Applicable
Rebate	:-	Applicable

Amount Details

Bid Document Fee	:-	Rs. 18000/-
Bid Document Fee Payable To	:-	Executive Engineer, R & B Panchayat Division Morbi
Bid Security / EMD (INR)	:-	Rs. 2197200/-
Bid Security / EMD in favour of	:-	Executive Engineer, R & B Panchayat Division Morbi

Tender Dates

Bid Document Downloading Start Date	:-	-
Pre-Bid meeting		hrs 12.00
Bid Document Downloading End Date	:-	hrs 18.00
Last Date & Time for Receipt (Submission) of Bids	:-	hrs 18.00
Bid Validity Period	:-	Bids shall remain valid for a period of not less than 120 days after the deadline date for bid submission
Submission of certain documents etc. in person in the office of the E.E. (R&B) Division, Morbi		Submission of EMD, Tender fee and other Documents during office hours: to SE at the time of tender opening or send the same through RPAD so as to reach to EE Division- within 7 days from the last date of opening in the office of the Executive Engineer, (R&B) Panchayat Division, Morbi
Remarks	:-	FDR for EMD & DD/Banker cheque for Tender fee (schedule/Nationalized Bank) shall be submitted in Electronic Format Only through Online(By Scanning) While Uploading the bid. This submission shall mean that EMD & tender fee are received

		<p>Accordingly offer of those shall be opened whose EMD & tender fee is received electronically. However for the purpose of realization of FDR&DD bidder shall send the FDR&DD in original to SE at the time of tender opening or send the same through RPAD so as to reach to EE Panch. R&B Division-Morbi. within 7 days from the last date of opening Penetrative action for not submitting FDR&D.D. in original to E.E. by bidder shall be initiated. FDR for Exemption Certificate is not necessary. However Exemption Certificate shall have to be submitted electronically through online.</p> <p>All the necessary documents in supporting of bid and prequalification documents shall be submitted in electronic format only through online (by scanning) & hard copy will not be accepted and considered.</p>
Technical Bid Opening Date		12.00PM
	:-	Office of the Superintending Engineer, Panchayat (R & B) Circle-I, Rajkot.
Financial Bid Opening date.		Qualifying contractor shall be intimate to open price bid an approved of evaluation of Pre-qualification bid by R&B Deptt. Of Gujarat. Govt.
	:-	

Other Details

Officer Inviting Bids	:-	Executive Engineer, R & B Panchayat Division Morbi
Bid Opening Authority	:-	Superintending Engineer, Panchayat (R & B) Circle-I, Rajkot
Address	:-	Office of the Superintending Engineer, Panchayat (R & B) Circle-I, 1 st Floor, Bahumali Bhvan, Rajkot.

1.0 Introduction: -

Bids from contractors for qualification are invited for a project of **The Work of CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE - 1** Contractors. The details of contract sub-section together with its estimated costs are given in Para 4.0 General contractors, backed-up specialists, consortium who wishes to bid for this contract, should apply for qualification in the manner set out in this document. The other tender documents will be opened subsequently only of those parties selected by the employers, as having necessary qualification, suitability to perform the contract satisfactorily. Tender documents for technical bid along with "Price Bid" shall be considered valid of the bidders, those having registration in AA Class , Special Cat.-I (Bridge.) with Road & Building Department, Government of Gujarat or the Highest Class of Registration to undertake ROAD work of unlimited amount in respect of other State with the State, Public Works Department having turnover more than the estimated cost for the individual contract in any one year of the last five financial year or the Firm. The Firms having registration of other states authorities must get themselves registered in AA Class , Special Cat.-I (Bridge.) class with the (R&B) Department Government of Gujarat before opening of the Price bid. If this is not done before opening of the Price bid their tender will not be considered. In this regard, the decision of the Superintending Engineer, Rajkot Panchayat (R&B) Circle No.1, Rajkot, will be final. No claim on this account will be entertained. E-Tendering procedure as specified in NIT is to be followed for this work.

2.0 EMPLOYER: -

**Secretary (R&B) Department
Government of Gujrat
Schivalaya, Gandhinagar
Gujarat.**

2.1 Superintending Engineer Pachnayal R&B Circle-1, Rajkot Gujarat State on behalf of Governor of Gujrat.

3.0 ENGINEER – IN – CHARGE: -

**Executive Engineer,
Pachayat Road and Building Division
Morbi PHONE : (.....)**

4.0	NAME OF WORK:	CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1
	Chainage:	-
	District:	Morbi
	Proposed Work:	Road Work
	Estimated cost	Rs. 2197.15 Lacs
5.0	LOCATION OF WORK AND SITE INFORMATION:	
	The Site is in Morbi District, the work is to be carried out in CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1	
6.0	SCOPE OF WORK:	The work of developing following items. Item wise details of work is however as per BOQ named as price bid.
1	CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1	
	1.0	Bridge work Various Places in Morbi District.
	2.0	
	3.0	
7.0	PROGRAMME OF WORK :-	
	The programme of work for contract is as follows:	
Last Submission of Tender		Validity Period
		Period of Completion
/ /2026		Bids shall remain valid for a period of not less than 120 days after the deadline date for bid submission
		12 Months (Twelve Months)

8.0 CONDITIONS OF CONTRACT: -

Conditions of contract will be as per standard Bidding Documents attached with Price Bid or, modified as needed for local conditions. Price Escalation for Labour and Materials including POL will be governed as per the documents and conditions of contracts finalized for the work. The project will be governed as per the relevant Indian act in force from time to time. All works will conform to the Indian standards or other equivalent standards mentioned in the contract documents as approved by the Engineer-in charge.

The law governing the contract will be the Indian law. This work is proposed to be carried out from plan allocation of the state.

9.0 SPECIFIC INSTRUCTION TO APPLICANTS: -

A contractor may be pre-qualified for the works under this tender, if the requisite technical, financial and experience criteria are full filled.

9.1	The principal items covered in the contract are as under:	
	1.0	Bridge work Various Places in Morbi District.
9.2	One firm can be qualified only once either in its own name OR as private limited or as public limited.	
9.3	The Contract will be <u>Percentage Rate contract</u> .	
9.4	The completed pre-qualification documents along with tender documents completed in all respect should be submitted to web site as mentioned above on or before <u>-2025</u> . There should be two separate bid offer for Pre-Qualification bid and Price bid super scribing on each as :	
	(1) "Pre-qualification Bid for the Work of CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1	
	(2) "Price Bid for the work of CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1	
	These two bids should be separate bid offer super scrubbing as "Documents for the work of CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1 .The name & mailing address of the applicants shall be clearly marked on the bid.	
9.5	The language for submission of prequalification documents along with the tender documents shall be ENGLISH. If information is provided in another language, it shall be accompanied by a translation of its pertinent parts into ENGLISH. This translation will govern and be used for interpreting the information.	
9.6	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.	
9.7	Applications for prequalification shall be submitted in prescribed format.	
9.8	The blank tender form could be down loaded free of cost by the interested bidder, however the following documents duly have certified along with application & tender fee shall have to furnish to The Executive Engineer, Panchayat Roads And Building Division, Morbi during scheduled date and time fixed for the purpose.	
	(a) Current Registration Certificate AA Class, Special Category-I(Bridge) or equivalent with Roads And Building department of Government of Gujarat	
	(b) Solvency Certificate for the current Calander year from a Nationalized Bank/ Schedule Bank along with Sarder Sarovar Narmada Nigam's Bonds or SSNNL FDRs for at least 10% value of Bank solvency, pledged in the name of the Executive Engineer, whom had issued Current Registration Certificate in AA Class, Special Category-I(Bridge). or equivalent with Roads And Building department of Government of Gujarat.	
	(c) Partnership deed	
	(d) Latest Certificates of S.E. Mechanical for updated Drum mix plant and list of machineries owned by the contractor.	
	(e) Valid power of attorney.	
	(f) List of similar works completed and on hand along with their estimated cost.	
9.9	The enclosed schedules should be filled in completely and, if any particular quarry is not relevant, it should be stated as 'Not applicable' Financial data, project cost value of works etc. should be given in equivalent Indian Rupees only. Failure to provide information which is essential to evaluate the Applicant's qualifications or to provide timely clarification or supplementation of the information supplied may result in disqualification of Applicant.	

Prequalification Criteria for the Construction work of Road, Bridges and Building.

1.00	<u>Eligibility</u>
(a)	For works having amount put to tender less than Rs. 50.00 Crores I. Bidder can be a firm having valid registration as per para (3)a herein below
(b)	For works having amount put to tender equal to or more than Rs 50 crores. I. As per (a)I above Or, II. Bidder can be a Joint venture of not more than 3 firms. a. Each partner firm should have valid registration as per para 3(a) herein below. b. Lead Partner firm must have more than 51 % financial participation and other members must have not less than 20% financial participation. (Total should be 100%) III. No firm can bid for a given work simultaneously as separate bidder and as a member of any joint venture. Both, the firm and joint venture shall stand disqualified in such case.
(c)	Registered firm on registered on contractor's list and fir registered as its sister concern on registered on contractor's list, both simultaneously cannot bid the same work till the completion of 3 year of registration of sister concern as registered contractor.
2.00	<u>Qualification criteria :</u>
	<p>(a) <u>Annual Turn Over</u></p> <p>i. Annual turnover of any one of the last five financial year (i.e.2021-22 to 2025-2026) from current financial year, updated to the current financial year shall be more than an Rs. 21.97 Crore(x) For guidance of deriving x : This value shall be derived by dividing amount put to tender by the time limit expressed in year/s for the proposed work.</p> <p>ii. For Arriving at updated value, turnover of any financial year shall be multiplied by the enhancement factor corresponding to the year. These enhancement factor shall be as given para 4 herein below.</p> <p>iii. For Joint Venture, the lead Partner must have updated annual turnover not less than Rs, - crores (51% of x) and remaining of each partners must have updated annual turnover not less than Rs. - Crores (30% of x). The joint venture must collectively have updated annual turn over not less than Rs.- Crores(x) (JOINT VENTURE NOT ALLOWED FOR THIS BID)</p> <p>(b) <u>Successful experience</u></p> <p>Bidder must have as prime Contractor or as nominated (approved by employer) subcontractor successful experience as follows:</p> <p>i. At least one similar work having updated completion cost not less than Rs. 8.79 crores (40% of the amount put to tender of the proposed work)</p> <p>ii. Such work must have been completed within last five financial years i.e from 1-4-2021 till the date of bid for the proposed work.</p> <p>iii. A work would qualify as similar work only if it meets with definition given in Appendix-A</p> <p>iv. For updating completion cost of the work to the current financial year. Procedure narrated in 2(a) ii shall mutatis mutandis apply.</p> <p>v. Joint venture, qualifying threshold amount of updated completion cost would be</p> <p>a. Lead member Rs.- crore (75% of amount mentuioned in b(i) i.e 30% of amount put to tender.)</p> <p>b. Each remaining member Rs. - crores (51% of amount mentioned in b(i) i.e 20.4% of amount put to tender)</p> <p>(JOINT VENTURE NOT ALLOWED FOR THIS BID)</p>

	<p><u>(c) Bid Capacity</u></p> <p>i. The bidder must have Available Bid Capacity (ABC) more than the amount put to tender. $ABC = 2 * A * N - B$ Where A is the maximum of updated total amount of works executed in any one year of the last five financial year. From 2021-2022 to 2025-2026 N is the number of years prescribed for completion of the proposed work B is the amount of the existing commitments and ongoing works to be discharged during the time interval of N years from the bid due date. For the purpose of updating amount of works executed in any year, procedure narrated in para 2(a)ii shall mutatis mutandis apply. Existing commitments shall include all such works for which letters of acceptance of the tenders have been received by bidder till the date on which bidder has submitted his bid for the proposed work.</p>
	<p>ii. For Joint venture, each member's available bid capacity shall first be reduced in proportion to his proposed financial participation. Sum of reduced available bid capacity of all the members should be more than the amount put to tender. (JOINT VENTURE NOT ALLOWED FOR THIS BID)</p>
3.00	<u>Other Requirements.</u>
(a)	<u>Bidder's registration</u>
	<p>i. Only those bidder shall bid whose names are borne on the approved list of registered contractor in the "AA" Class, Special Category-I (Bridge).</p> <p>ii. The contractors, who are registered in appropriate category of C.P.W.D., M.E.S., Railways and Indian State Governments, can also bid provided the bidder produce such registration certificate at the time of bidding and obtain registration in required class & category from the Gujarat State R&BD/W.R.D. before issuing Work Order. Bidder will solely be responsible for obtaining the required registration.</p>
(b)	<u>Litigation history</u>
	<p>The applicant should provide accurate information on litigation and/or arbitration resulting from contracts completed or under execution by him over the last five years. A consistent history of arbitration awards/judgments against the applicant or any partner of a joint venture may result in disqualification for proposed work. If the details of Litigation History is hidden by the applicant and later on it comes to knowledge of the employer the bidder shall be disqualified for the proposed work and other appropriate actions shall be taken against the bidder.</p>
(c)	<u>Machinery /Equipment</u>
	<p>Bidder shall have to assure availability of machinery/equipment in working condition as per Appendix-B If bidder fails to provide proof of assured availability of required machinery, he will be disqualified for the proposed work. Machinery ownership documents or lease / hire agreement for the work under tender shall be considered as valid proof for assured availability.</p> <p>Site Laboratory: Contractor shall have to provide site laboratory along with Core cutting machinery at his own expenses to carry out field test. For this purpose a laboratory building measuring 25 sq. mt. shall be constructed by the contractor which shall have necessary facility of light, water etc.</p>
(d)	<u>Bidding in E-tendering.</u>
	<p>i. Submission of application must be through e-tendering i.e Electronic Form.</p> <p>ii. Bidder shall have to submit the bid in E-tendering form only.</p> <p>iii. Bids of those bidders who have submitted all information, statistical details as required in the bid documents through E-tendering will only be considered. If the employer desires any clarification, for verification/clarification, ambiguity or difference found in the documents/statistical details submitted online (by E-Tendering) by the bidder the same shall be furnished within stipulated time</p>

	otherwise further processing will be carried out in absence of a above and the bidders shall be liable for any consequence.																					
	iv. No bidder can participate in more than one bid for proposed work.																					
(c)	Submission of documents.																					
i.	Following documents/papers shall from part of the bid. <ol style="list-style-type: none">1. JV agreement (when bidder is JV) clearly indicating the name of lead partner and percentage financial participation of each partner. JV agreement must also demonstrate responsibility of each partner. The JV agreement should be so signed as to be legally binding to all partners jointly and severally.2. Annual turnover certificate issued by chartered accountant for last five financial year.3. Form 3A issued by employer to substantiate successful experience of similar work. When employer of similar work is not a government, following need also to be furnished<ol style="list-style-type: none">a. Self attested copy of work order.b. Self attested copy of agreement.c. Self attested copy of completion certificate.d. Self attested copy of Final bille. Self attested copy of TDS certificates.f. Self attested copy of letter of permission give by employer for subletting the work.4. Existing commitments and on going works as per schedule-E5. Litigation/Arbitration history.6. Poof of assured availability of required machinery/equipment.7. An undertaking for truthfulness of information on furnished.																					
ii.	Any information, data, statistics etc. which are not related to bid document will not be considered in evaluation even through furnished by the applicant.																					
iii.	In accordance with stipulation of Para 3 D(iii) Employer reserves the right to call any information/documents which is mandatory, essential and critical for the purpose of evaluation. Any information provided by the applicant after last date of Electronics submission will not be considered by in evaluation unless except the employer has specifically asked for any information/ documents, which is mandatory, essential and critical for evaluation of PQ documents. If required information is not furnished within stipulated time, proposal will be liable for rejection.																					
iv.	If any information provided by the bidder is found false during scrutiny or at the later stage, his EMB shall be forfeited and he shall be disqualified for the proposed work. In case when bidder has furnished exemption certificated in lieu of EMD, an amount equal to EMD shall be appropriated from his FDR pledged to avail of exemption certificate. If any of the information provided by the bidder is found false after award of work, the performance security of the bidder shall be forfeited and contract shall be terminated.																					
4.00	Escalation Factors																					
	Following enhancement factors will be applied to annual turnover and completion cost of work to bring them to the base year. The current financial year in which bid is invited shall be considered as the base year.																					
	<table><tr><th>Year</th><th>Financial year</th><th>Enhancement factor.</th></tr><tr><td>Base (year of Inviting tender)</td><td>2026-2027</td><td>1.00</td></tr><tr><td>-1</td><td>2025-2026</td><td>1.10</td></tr><tr><td>-2</td><td>2024-2025</td><td>1.21</td></tr><tr><td>-3</td><td>2023-2024</td><td>1.33</td></tr><tr><td>-4</td><td>2022-2023</td><td>1.46</td></tr><tr><td>-5</td><td>2021-2022</td><td>1.61</td></tr></table>	Year	Financial year	Enhancement factor.	Base (year of Inviting tender)	2026-2027	1.00	-1	2025-2026	1.10	-2	2024-2025	1.21	-3	2023-2024	1.33	-4	2022-2023	1.46	-5	2021-2022	1.61
Year	Financial year	Enhancement factor.																				
Base (year of Inviting tender)	2026-2027	1.00																				
-1	2025-2026	1.10																				
-2	2024-2025	1.21																				
-3	2023-2024	1.33																				
-4	2022-2023	1.46																				
-5	2021-2022	1.61																				

5.00 PUBLIC SECTOR COMPANIES: -

Majority public-owned enterprises may be eligible to qualify if, satisfy all the above requirements, they are also.

(a) Commercially – oriented legal-entities distinct from the Employer and are not a Govt.

(b) Financially autonomous as demonstrated by requirements in their constitutions to provide separate audited accounts and return on capital, powers to raise loans and obtain revenues through the sale of goods or devices and

(c) Managerial autonomous

6.00 Sub-Contractor's experience and resources shall not be taken into account in determining the Applicant's qualifying criteria.

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

8.00 Qualification required for executing Agency :

Project Planning Capacity :- The project will require detailed macro as well as micro level planning both - prior to and during execution of works. Planning will involve taking inputs, negotiating, forecasting phasing of works and constantly monitoring / reviewing and updating / revising the project time schedule. It will also involve synchronization of deployment of resources, equipment, cash flow management to ensure smooth and in time for execution of works.

Management Capacity :- The project will require sound and sensitive arrangement skills for housekeeping, safety, man power client relationship, consultants inputs. Therefore it is required that the contractor should have a strong management team.

Financial Capacity :- The project is large and there is much at stake with regard to size and nature of project viz: Fore sight, complexity, Size and Financial value. Therefore it is imperative that a large and financially sound contracting firm with adequate Plant and machinery and Human Resource be brought on board.

Technical Capacity :- The project will require expertise in various different fields. Complex and large scale infrastructural works, Extensive liaison works with multiple stakeholders associated with the project. High standard safety and immaculate housekeeping are the broad area where the firm should have concrete foundation. It is essential that the contracting firm can deploy team of experienced experts in various disciplines.

Mode of Evaluation :-

Based on the above proposed broad principles, the committee shall make an assessment and finalize its recommendations indicating the firm, which are considered suitable for pre-qualification purposes. The screening committee reserves the right to pre-qualify a firm who have applied or can pre-qualify them for a lesser amount based in its evaluation.

10.00 FINANCIAL POSITION: -

(1) The applicant should demonstrate that he has access to or has available, liquid assets, Unencumbered real assets, lines of credit and other financial means sufficient to meet the construction cash flow.

(2) The audited balance sheets for the last five years should be submitted and must demonstrate the soundness of the Applicant's financial position showing long term profitability. Where necessary the Employer will make inquires with the applicant's bankers.

11.00 Even though the Applicants meet the above criteria, they are subject to be disqualified if they have.

(i) Made misleading or false representation in the form, statement and attachments submitted and / or

(ii) A record of poor performance such as abandoning the work, not properly completing the work, not properly completing the contract, delays in completion, litigation history, financial failure etc.

- 12.00** If the bid is submitted by a proprietary firm, it shall be signed by the proprietor above his full name of his firm with its current address.
- 13.00** If the bid is submitted by a firm in partnership, its shall be signed by all the partners of the firm above their full names and current address or by a partner holding the power of attorney of the firm by signing of the application in which case a certified copy of the partnership deed, current address of all the partners of the firm shall also accompany the application.
- 14.00** If the bid is submitted by a Limited Company or a Limited corporation, it shall be signed by a duly authorized person holding power of attorney for signing the application in which case a certified copy of the power of an attorney shall accompany the application. Such Limited Company or Corporation will be required to furnish satisfactory evidence of its existence before the contract is awarded.
- 15.00** Joint Venture Not allowed.
- 16.00** The information furnished must be sufficient to show that the Applicant is capable in all respects to successfully complete the envisaged contract works strictly on the basis of the applicant having already earlier carried out satisfactorily works of similar size, nature and complexity.
- 17.00** The qualified tenderers while submitting the tenders for the works may be required to provide satisfactory evidence in respect of the information furnished by them in their application for technical bid regarding their structure and organization, financial position / arrangements, resources of the firm including personnel and equipment, experience as well as work on hand etc. The applicant's attention is drawn to the fact that even after the technical bid of potential bidders has already been carried out, all tenders shall include a statement of the changes that may have occurred since technical bid with particular reference to the various items listed above and the further more contract work shall be awarded to the successful tenderer only on the basis of careful scrutiny of all the above information furnished by the applicant.
- 18.00** The Applicant is expected to have visited the project site before submitting technical bid.
- 19.00** While submitting the schedule duly filled in the Applicant shall enclose the latest copies of brochures and technical documentation giving more information about the firm and all the consortium.
- 20.00** The bid documents received by Superintending Engineer, Rajkot Panchayat (R & B) Circle No. 1 Rajkot shall be considered by a Evaluation committee as per Appendix-C
- 21.00** Committee shall ascertain whether the bids.
- (i) Meet the eligibility requirements.
 - (ii) Have been properly prepared and signed.
 - (iii) Contain all the details called for and are in proper format.
 - (iv) Are accompanied by required authorization, and
 - (v) Are other wise generally in order?
- 21.1** The committee shall evolve a suitable methodology before opening of Price Bid for making final assessment of the Suitability of the firms who have applied for qualification which also include the following.
- I** Strength and Organization
 - II** Financial Status of the firm including average annual turnover work on hand, financial arrangements, proposed viz own resource, Bank credit etc.
 - III** Resources of the firm including personnel and equipment.
 - IV** Experience of the firm for road and bridge project as applicable and other works as well as prompt completion for work and available bid capacity.

- 22.00 Based on the above broad principles, the committee shall make an assessment and finalize its recommendations indicating the firms which are considered suitable for qualification purpose. The Screening Committee reserves the right to qualify a firm.
- 23.00 The applicants are also required to furnish name of works for which there firm already been qualified for Major road works in the country from 01-04-2021 onwards. They should also indicate the number of works for which their firm have submitted tenders.
- 24.00 The firm who are unregistered and / or contractor registered elsewhere must get themselves registered in the AA Class, Special cat. I (Bridge). with Government of Gujarat R&B Dept. before opening of the Price Bid if this is not done before opening of the price bid their tenders will not be considered.
- (i) Employers reserves the right of accept any bid, and
- (ii) Cancel the qualification process and reject all bids.
- The Employer shall neither be liable for any such actions nor be under any obligation to inform the applicant of the grounds for them. The Employer's decision shall be final and binding.
- 25.00 General information of the climate, hydrology, topography access to site, transportation and communication facilities medical facilities, project layouts, accepted construction period facilities and services provided by Employer is given under Sub head " Project Information " at the end.

APPENDIX-A

Definition of Similar Work.			
1	Road Work		
	a.	Strengthening / Resurfacing / Renewal work	
		1	Any asphalt work done by paver such as AC / BC / DBM / BM / SDBC / IPMC / BUSG.
	b.	Widening work. I. Widening up to 5.50m/7.0 m of carriageway. — 1. Any work of widening of carriageway to minimum 5.50m carriage-way and should have items of WBM/WMM and paver laid asphalt work. — OR — 2. New road construction work (minimum carriageway width not less than 3.5m) involving items of WBM/WMM and paver laid asphalt work.	
		II	Widening upto 10m of carriageway
		1	Any work of widening of carriageway to 10 m. OR
		2	Any work of carriageway widening involving addition of carriageway by 3.0 m OR
		3	New road construction work (minimum carriageway width not less than 3.5 m) involving items of WBM/WMM and paver laid asphalt work.
	c.	New Road/Four Laning / Six Laning	
		1	New road construction work (minimum carriageway width not less than 3.5m) involving items of WBM/WMM and paver laid asphalt work. OR
		2	Any work of Widening of carriageway up to 10m involving items of WBM and WMM plus asphalt work done by paver OR
		3	Any road work of carriage way widening involving addition of carriage way not less than 3.0M
		4	-
NOTE: For prequalification cost of the involving road widening is to be considered. If there is a package of work/single work consisting combination of resurfacing, strengthening and widening of road, only cost of road widening carried out is to be considered for financial criteria. For example (1) if package consisting three road works in which one work is for strengthening, one work is for resurfacing and other work is widening of road than cost of widening work is only to be considered for criteria of successful experience (2) if any single work consisting road works in which strengthening, resurfacing and widening of road than cost of widening work is only to be considered for criteria of successful experience.			
2	Bridge Works		
		i.	Any bridge work having completion cost more than 40% of the amount put to tender and
		ii.	Bidder shall have experience during last 10 financial years of executing bridge/s involving similar type of foundation and superstructure.

3	BUILDING WORKS	
	a-	Building having frame structure/composite structure: Upto G+3 storey i- Bidder shall have experience for the construction of any building having frame / composite structure.
	b-	Building having frame structure/composite structure: Upto G+5 storey i- Bidder shall have experience for the construction of any building having frame / composite structure of G+2 storey and above
	i-	Building having frame structure/composite structure: more than G+5 storey i- Bidder shall have experience for the construction of any building having frame / composite structure of G+4 storey and above
	i-	Building having load bearing structure. i- Bidder shall have experience for the construction of any building having load bearing structure.
	NOTE: Construction of water tank, lift well, staircase cabin will not be considered as storey.	
3	Any works which does not fall in above categories definition of nature of similar work shall be approved from component authority.	

APPENDIX-B

Indicative List of minimum plant and Equipment to be Deployed on Contract work.

Sr No	Type of Equipment	Amount put to tender (Rs. In crore.)			
		Upto Rs. 10	Rs. 10-20	Rs. 20-50	Rs. 50-100
1	Tipper ,Trucks	6	10	15	20
2	Motor grader.	1	2	3	4
3	Dozer	1	1	1	2
4	Front end Loader	2	2	2	4
5	Smooth Wheel Roller	2	2	3	4
6	Vibratory Roller	2	2	2	3
7	Hot mix plant with Electronic Controls (Minimum 60-70)	1	1	1	1
A	Continuous batch Mix Plant (Min 120TPH)	0	1	1	2
8	Paver Finisher with Electronic Sensor	1	1	1	2
9	Water Tanker	2	3	4	5
10	Bitumen Sprayer.	1	1	1	2
11	Tandom roller	1	1	1	1
12	Concrete Mixer with integral Wight batching facility	2	2	2	2
13	Concrete batching* mixing plant (Minimum Capacity 15 M ³ /Hour	0	1	1	1
14	Concrete paver capable of paving 7.5 meter width extensible to 10m. in one single pass including all accessories. Such as automatic dowel bar insertor integral vibratory system and electronic sensor ancillary equipment for applying curing compound, joint cutting etc.	1	1	1	1
15	Concrete bathing & Mixing plant with automatic control (Minimum Capacity-100 cum/hour)	0	0	0	1
		23	31	39	55

NOTE : Above indicative list of minimum machinery shall be modified in accordance with requirement of work on case to case basis.

*The minimum requirement of plants and Equipment specified in Appendix-B at sr.7-A and 8 will be considered for those works at the time of prequalification in which estimated amount of Asphalt work to be done by paver is of Rs.10/- crore or more, instead of amount put to tender of those work.

The requirement of sensor paver in which Blade can be extended upto 10.00 Mtr. Width will be considered for the works of widening and strengthening/strengthening of road having existing 7.0 mtr. Or more width of asphalt surface and for those works only in which the value of asphalt work to be done by sensor paver is of Rs.10/- crore or more, instead of amount put to tender of those works.

APPENDIX-C

Evaluation Committees :

	Road		Bridge/Building	
	Above Rs. 7.50 crores and upto Rs. 12 Crores.	Above Rs. 12.00 Crores	Above Rs. 7 crores and upto Rs. 10 Crores.	Above Rs. 10 Crores
Committee	A	B	A	B

Committee A must comprise total 4 members as below.

1. Concern Superintending Engineer
2. Other Superintending Engineer (same head quarter preferable)
3. Concern executive Engineer
4. Concern Divisional Accountant.

Committee B must comprise total 4 members as below

1. Concern Chief Engineer, Chairman
2. Other Chief Engineer, member
3. Concern Superintending Engineer
4. Financial Advisor

LETTER OF APPLICATION
QUALIFICATION APPLICATION

FORM OF BID

NAME OF WORK: - _____

To,
The Superintending Engineer,
Panchayat (R&B) Circle No. 1,
1st Floor Bahumali Bhavan.
Rajkot- 360001.

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

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 2021-2022
Work performed in the last five years 2022-2023
(in Rs. Lakhs) 2023-2024

2024-2025

2025-2026

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

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

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

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

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

ear	Name of the work	Name of the Employer	Quantity of work performed (Cum/MT)				Remarks* (indicate contract Ref)
			Cement Concrete (Including RCC & PCC)	Masonry	Earth Works	Bituminous Work	
2021-22							
2022-23							
2023-24							
2024-25							
2025-26							

- 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 procur ed	Nos/. Capacity	Age/ Conditions	
Tipper Trucks	15	-				
Motor Grader	3	-				
Dozer	1	-				
Front end Loader	2	-				
Smooth Wheel Roller	3	-				
Vibratory Roller	2	-				
Water Tanker	4	-				
Tandem Roller	1	-				
Concrete Mixer with integral Wight batching facility	2	-				
Automatic Concrete batching Mixing plant (Minimum 15cum /hours)	1	-				
Transit Truck mixer	3	-				
Concrete pump	1	-				
Generator	1	-				
Screed Vibrator	1	-				
Needle Vibrator	4	-				
Concrete Joint Cutter	1	-				
Trimix Assembly	1	-				

- 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	1	BE Civil	10 Year Exp.	5 years on Road construction
Structure Engineer	1	M.E Structure	10 Year Exp.	5 years on Road construction
Site Engineer	1	BE Civil	10 Year Exp.	5 years on Road construction
Quantity Surveyor	1	Diploma Civil	10 Years Exp.	5 years on Road construction
Material & Quality Control Engineer	1	Diploma Civil	10 Years Exp.	5 years on Road construction
Survey Engineer	1	Diploma Civil	10 Years Exp.	5 years on Road construction

- 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 watersupply/ 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
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- 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 ORAVAILABILITY OF CREDIT FACILITIES**

(CLAUSE 4.5.6 OF TB)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
..... firmM/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

PROJECT INFORMATION		
CLIMATE:		
(a)	TEMPERATURE	
	<p>The project road lies in the State of Gujarat. This state is situated in western part of Indian and has semi arid climate Ref. Index. Map. Large part of the state lies between 35° C and isotherms. May is the hottest month and January the coldest. The isotherm generally run east west and the temperature increase steadily as one moves southwards.</p>	
(b)	RAIN FALL	
	<p>Gujarat receives most of its rainfall form the south-west monsoon between June and September with maximum intensity in July and August. The monsoon arrives earlier in the south and east and last longer than in the northwest. Hence the rainfall intensity ranges from over 2400 mm in the southwest to less than 250 mm in the extreme west. Some depressions and cyclones in the Arabian Sea which move across the coastal area sometimes bring rains and strong winds in the months of April to June and October to November.</p>	
	<p>The State can be divided into four different rainfall Zones:</p>	
(i)	<p>Areas with more than 1000 mm rainfall include the districts of Valsad, Dangs, Surat and the eastern parts of Bharuch with Rajpipla Hills.</p>	
(ii)	<p>Areas receiving rainfall between 800 mm and 1000 mm include Panchmahals, Vadodara, Morbi, Kheda and part of Rajkot.</p>	
(iii)	<p>Areas having rainfall between 400 mm and 800 mm include Saurashtra and areas north of Rajkot.</p>	
(iv)	<p>Areas receiving less than 400 mm rainfall include Kachch Banaskantha and Coastal Jamnagar.</p>	
(c)	HUMIDITY:	
	<p>The relative humidity in all parts of the State, with the exception of the coastal areas is low in the summer the relative humidity varies from 75 and 80 percent in winter from 40 to 50 percent. The coastal areas, on the other hand, have moderately high humidity all the year round with a maximum in the summer months reaching as high as high as 90 percent.</p>	
(d)	HYDROLOGY:	
	<p>Narmada river is the major river (perennial) in the south of the state which serves as the main water source for drainage – Narmada river, river discharge in to Gulf of Khambhat.</p>	
(e)	TOPOGRAPHY:	
	<p>Gujarat is located in western side of the India and bounded by the State of Rajasthan in the north, Madhya Pradesh in east and Maharashtra in south. It has also an international border with Pakistan on its north for length of about 360 km. The state of Gujarat covers a total area of 195,904 sq. km. and is situated between 20°06" to 24°42". North latitude and 68 10" to 74 24" East longitude. The state has the longest coastline in the country measuring about</p>	

	1600 km along western part of India, extending from Lakhpat in North to Damam in the south.
	The state is divided into five major physiographic divisions.
(i)	The Alluvial Plains extend in North Gujarat to Bulsar in the south, and westward to the little Rann and Banni area of Kachchh.
(ii)	The Eastern hilly tract lies between the altitude of 300 –1400 m and forms a major divide.
(iii)	Uplands of Kachchh and Saurashtra consist of sandstone shale and basalt rock with elevations of about 150-500 m sloping radically towards the coast. The Girnar hill forest is at an elevation 1117 m.
(iv)	The Eastern hilly tract lies between the altitude of 300 –14000 m and forms a major divide.
(v)	The low-laying coastal tract ranges in elevation from 3-25 m surrounding the Kachchh and Saurashtra uplands. These low laying areas extend from Rann of Kachchh to little Rann of Kachchh and to the low laying delta region of Bhadar, Bhoqavo, Mahl, Dhadar. Narmada and Tapi rivers.
(vi)	The Marshy to saline desert of Rann of Kachchh and little Rann of Kachchh extend into the saline Tracts around the Gulf of Cambay. This vast fields of salt mixed with clay is devoid of any vegetation or habitation. The general elevation of this tract varies between 3 To 10 Mtr.
(f)	ACCESS TO SITE:
	<p>Gandhinagar the state capital is about 950 km. away from the National capital (New Delhi).The state is accessible by road, rail and air from the National capital as well as from other metropolitan cities of the country. The main arterial highway traversing through this state is NH-8 linking Delhi to Mumbai.</p> <p>It is near important towns of Rajkot and Porbandar CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -I is Connected _____ Index map at the end illustrates the accesses to various contacts by road rail and air. This index map also shows the important towns of Gujarat.</p>
(g)	ROAD TRANSPORT FACILITY:
	Passenger Road Transport in the state is mainly provided by Gujarat State Transport Corporation, a State Government undertaking Goods transport operation is with the private sector.
(h)	COMMUNICATION FACILITIES:
	The communication facilities in the State consist of post, telegraph, telex and fax. These facilities are provided by the Post and Telegraph Department of Government of India. Besides private sector operated courier, fax and other similar services, Government facilities also exists in all important cities of the state.
(i)	MEDICAL FACILITY:

	All the important cities have full fledged Government medical Hospitals besides private clinics and nursing homes etc.
(j)	PROJECT LAYOUT:
	Project layout for the contracts is given in the Index Map.
(k)	EXPECTED CONSTRUCTION PERIOD:
	Expected construction period from contracts is 12 (Twelve) months from the date of award.
(l)	FACILITY AND SERVICES PROVIDED BY THE EMPLOYER:
	Free access to the work sites will be assured by the Employer for expected Agencies.
(m)	OTHER RELEVANT INFORMATION:
1.	Soil Characteristics
	The Soils of Gujarat state can be classified into Black Cotton Soils, Alluvial Soils, Saline Alkaline Soils and desert Soils.
	<p>a) Black Soils : The black soils are either medium black or deep black.</p> <p>i) Medium Black Soil :- Medium black soils are found in Saurashtra, some parts of Sabarkantha and Panchmahal district, South – west of Rajkot and parts of Vadodara and Kachchh district. This soil type is not so deep. Soil textures clay loam to clayey.</p> <p>.ii) Deep Black Soil. The deep black soils are found in the district of Vadodara, Bharuch, Morbi, Surat and Valsad, Soil depth varies from less than one meter to as deep as six meters. These soils have very heavy clay content. Montmorilloniteper domination.</p> <p>.b) Alluvial Soils : These soils in Gujarat are formed due to silting by Indus river system. These soils occur through Banaskantha district and the greater part of Mehsana and Sabarkantha. Rajkot, Kheda district, Further more alluvial soils also occur in the northern part of Vadodara and Jambusar and eastern part of Surat and Valsad district.</p> <p>.c) Saline – Alkaline Soils: These soils are found in " Bhal Tract " of Porbadnar, Rajkot, and Kheda district and also in southern part of state along the sea coast except in Bharuch, Surat and Valsad district. Saline soil is also found in portions Kachchh. Mehsana and Banaskantha district due to less rain – fall and high evaporation.</p> <p>.d) Desert Soils : These are mainly found in Rann of Kachchh (Northern and north – eastern parts).</p> <p>.e) Earthquake Zone : The District of Kachchh comes under the Zone-5 of the earth quake where as districts of Sarasota comes under Zone-3 & Zone-4. The part of Bharuch district comes under Zone-4 where as other district of Gujarat comes under Zone-3. Since the district of Kachchh and some district of Saurashtra, part of Bharuch district comes under Earth quake Zones of moderate intensity, necessary precautions are to be taken for the construction works.</p>

TECHNICAL SPECIFICATIONS

1.0 PREAMBLE

- 1.1 The Technical Specifications contained herein shall be read in conjunction with the other Bidding Documents as specified in this Volume.

1.2 Site Information:

- 1.2.1 The information given here under and provided elsewhere is given in good faith by the Employer but the Contractor shall satisfy himself regarding all aspects of site conditions and no claim will be entertained on the plea that the information supplied by the Employer is erroneous or insufficient.

2.0 GENERAL REQUIREMENTS

The technical specifications in accordance with which the entire work described herein after shall be constructed and completed by the Contractor shall comprise of the: **"SPECIFICATION"**

- 2.1 Though **"SPECIFICATION"** for each item are attached with tender they are based on following:
- (1) **"SPECIFICATONS FOR ROAD AND BRIDGE WORKS"** (Fourth REVISION printed in year 2001) issued by the Ministry of Road Transport & Highways (MORT&H), Government of India and Published by the Indian Roads Congress, hereinafter to as MORT&H Specifications.
 - (2) The General Technical Specifications for Road Works
 - (3) The General Technical Specifications for Bridge Works
 - (4) The General Technical Specifications for Asphalt Works
 - (5) The General Technical Specifications for Building Works
- Note (2) To (5) are Conventional Specifications Booklets usually attached for (R&B) Works.
- 2.2 If, a particular clause (which is incorporated in **"SPECIFICATION"**) of specification booklets (1) To (5) above is Amended / Modified / Added upon then the Amendment / Modification / Addition shall supersede the relevant clause incorporated in **"SPECIFICATION"**
- 2.3 In so far as Amended/Modified/Added Clause may come in conflict or be inconsistent with any of the provisions of the MORT&H Specifications under reference, the Amended/Modified/Added Clause and the additional specifications shall always prevail.
- 2.4 In the absence of any definite provisions on any particular issue in the aforesaid Specifications, reference may be made to the latest codes and specification, of IRC and BIS in that order. Where even these are silent, the construction and completion of the works shall conform to sound engineering practice as approved by the 'Engineer' and, in case of any dispute arising out of the interpretation of the above, the decision of the 'Engineer' shall be final and binding on the Contractor.

ANNEXURE

SPECIAL CLAUSE - 1

Special Condition of Contract

Free Maintenance Gurantee for Four (4) Years


- 1 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 concern 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 sign by all concern and any defect observed shall be got done within 15 days by the contractor at his risk and cost as per the direction of Engineer incharge. The contractor needs to do videography of these visits and require to submit at the time of release of FMG. If B.T. surface during 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 fix deposit or bank guarantee pledged in the name of Executive Engineer after completion certificate of work is issued.
- 2 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.
- 3 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).
- 4 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.
- 5 Setting up of adequate laboratory & deployment of quality engineer. 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 engineers representative) by contractor in writing, Rs.2,00,000/- shall be withheld. The qualified quality Engineer shall be deployed exclusive 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 engineer shall not be refunded.
- 6 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.
- 7 **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 its 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.

ANNEXURE

ખાસ શરતો

૧. ઇજારદારશ્રી દ્વારા માત્ર સાઇટ ઉપર ઉભા કરેલ બેસ મીક્ષ પ્લાંટમાં તૈયાર થતા કોંક્રીટનો ઉપયોગ કરી કામગીરી કરવાની રહેશે તેમજ પ્લાંટ માટે કોષ્ટ અલગથી સુકવણુ કરવામાં નહીં આવે.
૨. કામર બેસ મીક્ષ પ્લાંટની માફક કોંક્રીટ બેસ મીક્ષ પ્લાંટ માટે ઇજારદારે ચાંચિક વિભાગનું પ્રમાણપત્ર મેળવવવાનું રહેશે.
૩. ખાસ કિસ્સામાં કુદત જગ્યાના અભાવે પ્લાંટ ઉભો થઈ શકે તેમ ન હોય તો અન્ય જગ્યાએ પ્લાંટ ઉભો કરવાનો રહેશે અને તેવા કામો માટે અધિક્ષક ઇજનેરશ્રી ની પૂર્વ મંજૂરી મેળવી ઇજારદારે સાઇટ થી નજીકમાં નજીક પોતાનો બેસ મીક્ષ પ્લાંટ ઉભો કરી માત્ર તેમાં તૈયાર કરવામાં આવેલ કોંક્રીટનો ઉપયોગ કરવાનો રહેશે.
૪. ગુજરાતસરકારશ્રીના મા. અને મ. વિભાગના પરિપત્રક્રમાંક : પરચ / ૧૦૨૨ / ૭૫૧ / સી-૧ તા. ૧૫/૦૭/૨૦૨૩ માં દર્શાવેલ શરતોનો સદરદુ કામ માટે અમલ કરવાનો રહેશે.

Sign of Contractor


Executive Engineer
(R & B) (P) Division
Morbi

CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1

ANNEXURE

SPECIAL CLAUSE - 2


The unit of controlled cement concrete items for RCC work of mix M-15, M-20, M-25, M-30 & M-35 including in tender are taken considering cement consumption as shown below in

TABLE : A

Sr. No.	Grade of Controlled Cement Concrete	Cement Consumption as per Circular No. PRC/10/2017/Cement Consumption/16/C Dated: 11-05-2017
		kg/cum
1	M-100/M-10	220
2	M-150/M-15	290
3	M-200/M-20	360
4	M-250/M-25	380
5	M-300/M-30	410
6	M-350/M-35	425
6	M-400/M-40	440
6	M-450/M-45	450

The contractor will have submit the mix design for different grade of cement concrete at his own cost before execution as directed and sum shall be got approved from engineer in charge. The rate of RCC items tendered by the contractor shall be reduced according to the cement consumption of the approved mix design. If the cement consumption of the mix design is less then as prescribed in Table-A. The recovery shall be made for the different of less consumption of cement at the input rate of cement mentioned in clause- 59. The condition is also applicable to the [i] Excess quantity for RCC item & [ii] Extra item list. The condition is to be followed in addition to clause-14. if there will be any change in grade of concrete items, only the cost difference of cement will be debited I deducted from concern item as per mix design.

Sign of Contractor


Executive Engineer
(R & B) (P) Division
Morbi

CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1

SCHEDULE – B
BILL OF QUANTITIES

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities
				In Figure	
1	2	3	4	5	6
1	Demolition including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift. (i) R.C.C. work	3116.8	Cum	1082.3	3,373,479.38
2	Excavation for foundation in sand, gravel, clay soft soils and murrum etc. including shoring, strutting dewatering as necessary and disposing of the excavated stuff as directed. (A) Depth upto 3.0 M. and lead upto 100m for 10 Cum	18354.6	Cum	511.1	9,381,251.53
3	Providing and laying plain cement concrete in levelling course complete as per drawings and technical specifications as per sections 1500, 1700 and 2100 of MORTH. (M-15)	1388.5	Cum	3772.2	5,237,729.74
4	Providing and laying plain cement concrete grade M-15 PCC Toe wall for toe protection i.e. to prevent the slope pitching from sliding down, with graded machine mixed stone aggregate from 6 mm to 40 mm including tamping, vibrating, leveling and curing complete with all formwork, dewatering wherever required including all materials, labours, plants, machineries & tools, all leads and lifts, etc. complete as per specification.	1292.6	Cum	3772.2	4,875,834.02
5	Providing and fixing in position (Thermo mechanically Treated bars) TMT Fe550D CRS conforming to IS 1786 reinforcing bars of various diameters for Box structure, retaining wall, etc. as per detailed designs and drawings and schedule including cutting, bending, hooking the bars, binding with 18 SWG GI wires with cost of all labour, materials, tools, plants, equipments, supporting as required with all lifts and leads etc. all complete as per specification and as directed by Engineer The rate includes for supply, loading, unloading, transporting to site, cutting, bending, lap length, hooking, placing, tying in position with contractor's own binding wire, welding, forming the cage and lowering it in position in pile bore etc. Welding and supporting in position to ensure lines and levels during concreting, maintaining proper cover/ spacing, all leads & lifts, etc. including contractor's own equipment, labour, supervisor, taxes, machineries, etc. complete as per drawings and specification.	729.7	MT	77728.6	56,717,267.02

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities
				In Figure	
1	2	3	4	5	6
6	Providing and casting in situ controlled cement concrete M-25 for R.C.C. box structure, as per drawings, Stem of Retaining wall etc. using 6 mm to 20 mm machine crushed well graded stone aggregate, sand of approved quality, OPC 53 grade cement with contractor's own concrete mix design etc. complete as per specification. The rate is inclusive of all materials, including necessary mixing in fully automatic batch mix plant, transport, curing, vibrating, placing in position, scaffolding, staging, normal shuttering, formworks, deshuttering carefully, making good the damages, fixing embedment, inserts, pockets, wherever necessary, with all lead and lift with contractor's labour, tools & plants, machineries, as required, with including cost of fair finish form work.	7288.8	Cum	5304.3	38,662,095.80
7	Providing and laying - Filter Media 600mm thick directed at the back of abutments, returns and wing walls as per detailed specifications.	2206.2	Sqm	1226.0	2,704,688.32
8	Providing & laying weep hole in Abutments, and returns by using A.C pipe of 100mm including laying in proper grade and jointing the completed as per detailed specification.	1699.3	Nos.	86.7	147,326.59
9	Back filling behind Abutment, wing wall and return wall with selected granular material of approved quality including all the materials, compacting, labour, equipment charges, etc all complete as per drawing and Technical Specification Section 300 (Percentage of fine content maximum 15%, Backfill soil phi 30", Density 20 kN/m ³ , Field compaction 95±2% modified proctor density.	4877.2	Cum	504.4	2,460,186.04
10	Providing and laying rubble for apron (each stone weighting not less than 40Kg.) including and packing and filling in the interestices with quarry-spalls. For Rigid Apron.	1382.5	Cum	1083.8	1,498,349.70
11	Providing and laying plain cement concrete grade M-20 curtain wall with minimum depth below floor level of 2m on upstream and 2.5m on downstream side as per clause 20.1.2.3 of IRC-SP-13:2004 and section 2507.1 of MORTH specification.	1784.2	Cum	4591.5	8,192,414.67
12	Providing and laying rubble for apron (each stone weighting not less than 40Kg.) including and packing and filling in the interestices with quarry-spalls. For Flexible Apron.	2384.7	Cum	1083.8	2,584,561.61
13	Providing and laying Filter material underneath pitching in slopes 300mm thick complete as per drawing and Technical specification.	342.5	Sqm	309.8	106,106.93
14	Providing and laying Pitching on slopes laid over prepared filter media including boulder apron laid dry in front of toe of embankment complete as per drawing and Technical specifications.	170.2	Cum	1136.6	193,421.07

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities
				In Figure	
1	2	3	4	5	6
15	Providing and casting in situ controlled cement concrete M-25 for Parapet Wall, as per drawings. Stem of Parapet wall etc. using 6 mm to 20 mm machine crushed well graded stone aggregate, sand of approved quality, OPC 53 grade cement with contractor's own concrete mix design etc. complete as per specification.	363.5	Cum	5304.3	1,928,289.90
16	Providing and casting in situ controlled cement concrete M-30 for average 75 mm thick wearing coat laid as directed including tamping, vibrating, finishing, curing and filling joints with bitumen complete	850.1	Cum	5536.1	4,706,202.25
17	Clearing and grubbing road land including uprooting rank vegetation grass bushes, shrubs, sapling and trees girth up to 300 mm removal of stumps of trees cut earlier and disposal of unserviceable materials (C) By mechanical means in area of light jungle	0.8	Hectare	28448.5	23,043.30
18	Dismantling of flexible pavements and disposal of dismantled materials up to a lead of 1000 metres, stacking serviceable and unserviceable materials separately	0.0	0.0	0.0	
18.1	Dismantling of Bituminous Layer	474.7	cum	256.8	121,884.36
18.2	Dismantling of Granular Layer	1709.4	cum	357.3	610,690.30
19	Earthwork for embankment including breaking clods, dressing with all lead and lift and including watering rolling and consolidation of subgrade in layers at O.M.C. to required dry density including filling the depression which occur during the process using power roller 8T to 10T (E) From Borrow area within 3.0KM lead.	14093.2	Cum	210.2	2,962,396.61
20	Construction of sub-grade and earthen shoulders using quarry spall with all lead and lift and including watering and rolling and consolidation of sub grade in layers at OMC to required dry density including filling the depressions which occur during the process using power roller 8T to 10 T	2503.7	cum	290.6	727,454.00
21	Construction of granular Sub base with Coarse Graded Material (Grade II) (Table:- 400- 2) of 200 mm by providing coarse graded material Metal Crushed using size 53mm to 26.5 mm @ 27.5%, 26.5 mm to 9.5 mm @ 22.5%, 9.5mm to 4.75mm @12.50% and 4.75mm below @ 37.5% spreading in uniform layers with including and mixing the material obtained from cutting BT road by milling machine using motor grader on prepared surface mixing by mix in place method with rotavator at OMC and compacting with vibratory roller to achieve the desired density complete as per Clause 401.2 Table 400.1 grade-V.	1838.6	cum	1111.3	1,154,210.40

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities
				In Figure	
1	2	3	4	5	6
22	Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with vibratory roller 8-10 tonnes in stages to proper grade and camber, applying and brooming requisite type of screening/ binding Materials to fill up the interstices of coarse aggregate, watering and compacting to the required density-Grading 1, Using Screening Crushable type such as Moorum or Gravel.	1080.6	Cum	1559.1	1,684,698.95
23	Cement Concrete Pavement (Construction of un-reinforced, dowel jointed, plain cement concrete pavement over a prepared sub base with 43 grade cement @ 400 kg per cum, coarse and fine aggregate conforming to IS 383, maximum size of coarse aggregate not exceeding 25 mm, transported to site, spread, compacted and finished in a continuous operation including provision of contraction, expansion, construction and longitudinal joints, joint filler, separation membrane, sealant primer, joint sealant, debonding strip, dowel bar, tie rod, admixtures as approved, curing compound, finishing to lines and grades as per drawing)	1329.7	Cum	5586.0	7,427,803.55
24	Providing and fixing sign boards made out of 2.0 mm aluminium sheet / 4 mm ACP (Aluminum composite Panel); size 90x30 cms. rectangular as per design of IRC-67-2012. Pre treated with phosphating process & acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paint ;reflectorised with Micro Prismatic Grade retro reflectivesheeting of Type-11 as per ASTM D-4956 and latest M.O.S.T.Specifications; 1.8mtr long stand post of 75 x 75 x 6mm / 65NB Circular MS Pipe as required and frame fabricated from suitable size iron angle of 35 x 35 x 3mm; painted with bestquality epoxy coatings in black and white bands. The details of symbol for each board shall be as per theinstruction of engineer in charge. The fixing at site shall be in 1:2:4 CC blockof size 45 x 45 x 60 Cms. for each legincluding excavation, curing etc.complete under the supervision of engineer in charge. A warranty for 10 years for the Retro reflective sheeting from original manufacturer & a certified copy of 3 year outdoor exposure test report from third party test lab for the product offered shall be submitted by contractor. (A) Class-C Type-11 Retro Reflective sheeting.	18.0	Nos.	3666.3	65,993.40
25	Supplying and fixing reinforced concrete heavy duty non-pressure pipes with collars for culverts carrying heavy traffic as per IS 458-1991 specifications including setting the pipes in C.M. 1:2 watering and laying (to level or slopes) of class NP3 of following internal diameters.(v) 900mm dia.	405.0	Rmt	3469.3	1,405,050.30

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities
				In Figure	
1	2	3	4	5	6
26	Demolition of Brick work and stone masonry including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift. (ii) In Cement Mortar.	526.1	Cum	562.9	296,162.08
27	Excavation for foundation in hard murrum and boulders and very stiff or sticky, clays and other similar strata including shoring and strutting and dewatering as necessary and disposing of the excavated stuff as directed.	1498.2	Cum	611.3	915,897.12
28	Providing and laying plain cement concrete grade M-20 PCC protection wall, with graded machine mixed stone aggregate from 6 mm to 40 mm including tamping, vibrating, leveling and curing complete with all formwork, dewatering wherever required including all materials, labours, plants, machineries & tools, all leads and lifts, etc. complete as per specification.	775.1	Cum	4142.2	3,210,636.35
29	Providing parapet of ordinary cement concrete M-200 as per detailed drawings with necessary reinforcement including, shuttering, laying, vibrating and finishing to line and level complete. (ii) Cast in situ	400.0	Rmt	1062.5	424,996.12
30	Providing M5 Flood gauge on top of the bridge including supply, fixing and painting complete as directed by engineer in charge	4.0	Nos.	1877.5	7,510.15
31	Excavation in large boulders and soft rock by welding including shoring, strutting and dewatering as necessary and disposing of the excavated stuff as directed.	8587.0	Cum	716.6	6,153,088.78
32	Providing and laying plain cement concrete in levelling course complete as per drawings and technical specifications as per sections 1500, 1700 and 2100 of MORTH. (M-10)	561.4	Cum	3345.6	1,878,113.74
33	Providing and applying Acrylic paint to unplastered concrete surface after cleaning the surface of dirt, dust, oil, grease, efflorescence and applying paint @ of 1 litre for 2 sqm.	73.2	Sqm	115.4	8,444.37
34	Box cutting the road surface to proper slope and camber for making a base for road work including removing the excavated stuff and depositing on the road side slope as directed upto 50Mt lead.	935.6	Cum	215.6	201,723.29
35	Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification (200mm thk in two layers) including spreading in uniform thickness, hand packing, rolling with vibratory roller 8-10 tonnes in stages to proper grade and camber, applying and brooming requisite type of screening/ binding Materials to fill up the interstices of coarse aggregate, watering and compacting to the required density. Grading 2, Using Screening Crushable type such as Moorum or Gravel.	823.7	Cum	1539.5	1,268,097.50

Item No.	Description of item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities
				In Figure	
1	2	3	4	5	6
36	Providing and fixing "W" type metal beam crash safety barrier comprising of single row 3 mm thick galvanized sheet to be fixed on ISMC 150 (150 mm x 75 mm x 5.4 mm) series channel vertical post to be spaced 2.0 mtr c/c to be kept 1.65 mtr height including necessary foundation, fittings with bolts, painting and required all process as per specification and as per drawing.	692.5	Rmt	3356.5	2,324,214.22
37	Diversion sign board :-Providing & Fixing sign boards made out of 2mm aluminium sheet, size 180 x 60 cms. rectangle as per the attached drawing pre treated with phosphating process & acid etching. coated with one coat of epoxy primer and two coats of best quality epoxy paint reflectorised with retro reflective sheeting as per latest M.O.S.T. Specifications. Letters and numerals should be as per IRC-30-1968, 3.1m long (2nos) stand post and frame fabricated from iron angle of 35x35x3mm, 50x50x5mm painted with best quality epoxy coatings in black and white bends. The fixing at site shall be in 1:2:4 CC block of size 45 x 45x 60cms for each leg, including excavation curing etc. complete under the supervision of engineer in charge.(A) Engineer Grade(VR)	6.0	Nos.	6798.9	40,793.52
38	Granular sub base Grade 1 with black trap crushed stone well graded material (Table-400.1) by mix in place method construction of granular sub base by providing black trap crushed stone well graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC and compacting with vibratory roller to achieve the desired density complete. (As per technical specification clause-401) for Gr-1 Material	50.1	Cum	1116.0	55,913.52
39	Informatory Signs :-Providing and fixing Work in Progress sign boards made out of 2mm aluminium sheet; size 80 x 60cms. rectangle as per the design of IRC-67-1977 pre treated with phosphating process & acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paint; reflectorised with retro reflective sheeting as per latest M.O.S.T. Specifications; 3.1m long stand post and frame fabricated from suitable size iron angle of 35 x 35 x 3mm 75x75x6mm as required; painted with best quality epoxy coatings in black and white bends. the details of symbol for each board shall be as per the instruction of engineer in charge. The fixing at site shall be in 1:2:4 CC block of size 45 x 45 x 60cms. for each leg. including excavation curing etc. complete under the supervision of engineer in charge.(A) Engineer Grade(VR)	30.0	Nos.	3856.9	115,707.00

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities
				In Figure	
1	2	3	4	5	6
40	Providing and laying rubble for soling (each stone weighting not less than 40Kg.) including and packing and filling in the interstices with quarry-spalls. For rubble soling work under pcc.	688.5	Cum	1083.8	746,246.00
41	Type - A, "W" : Metal Beam Crash Barrier (Providing and erecting a "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fittings to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75 x 5 mm, 330 mm long complete as per clause II(1))	120.0	Rmt	3254.2	390,507.86
42	Providing and casting in situ ordinary cement concrete M-150 mix below CC pavement including laying ramming, vibrating and curing complete.	34.5	Cum	3772.2	130,140.21
43	Providing and laying Filter material underneath pitching in slopes 150mm thick complete as per drawing and Technical specification.	224.8	Sqm	309.8	69,649.68
44	Diversion: Providing temporary diversion suitable for traffic during the construction period of the C.D. Structure work by levelling existing ground and constructing suitable compacted embankment, road surface with providing, laying & consolidation of 200 mm WBM in layers on carriage width with safety measures like sign board, guard stone, necessary R.C.C. pipes with suitable slope protection & maintain for motorable road throughout construction period etc. and also dismantle diversion after completion of work etc. complete as per instruction of Engineer-in-Charge. (R.A)	570.0	Rmt	2498.5	1,424,120.20
45	Providing and filling in foundation with ordinary cement concrete M-10 mix and providing necessary vertical pin headers incl. Formwork, vibrating, ramming and curing complete.	97.7	Cum	3345.6	326,863.17
46	Providing and casting in situ. controlled Cement Concrete M-25 for R.C.C. Raft and cut-off walls including necessary shuttering laying, vibrating ramming of curing complete (Item No.27014+ R.A.)	480.7	Cum	4697.3	2,257,968.08
47	Providing and casting in situ Controlled cement concrete M- 25 for R.C.C. solid slab including centering, scaffolding curing and finishing complete. (SOR / Item No.27075-A) +RA)	474.0	Cum	5256.1	2,491,372.44
48	Providing and casting in situ Controlled cement concrete M-25 for approach slab including formwork curing and finishing complete (SOR / Item No 27103-BA + R.A.)	196.8	Cum	5235.7	1,030,379.86

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities
				In Figure	
1	2	3	4	5	6
49	Providing and casting in situ controlled cement concrete M-25 for Kerbs/Kerb blocks including form work, curing and finishing complete. (SOR / Item No. 27093 BA+ R.A.)	21.3	Cum	4948.6	105,404.97
50	Providing & casting in situ ordinary cement concrete M-20 mix and providing necessary pin headers including shuttering, scaffolding, laying, vibrating, curing and finishing complete without V-Grooves. (A) Height from 0.0 M. to 5.0 M. (SOR / Item - 27053AA + RA)	1071.0	Cum	4291.7	4,596,389.28
51	Providing and laying in position FE 500/500 D TMT bar reinforcement including cutting, bending, hooking and tying complete as per detailed drawings for the following. (A) Piers (B) Abutments (C) R.C.C. Return / Walls/ Caps/ Copings etc (SOR / Item No.27109)	9.4	MT	73858.7	695,010.27
52	Providing and placing in position FE 5000 TMT bar reinforcement including testing of coating at plant and all taxes including cutting, bending, hooking, and tying complete as per detailed drawing. (A) Solid Slab. / App slab / Wearing Coat (SOR / Item No.27113)	19.3	MT	73243.0	1,412,125.23
53	Providing 20 mm Thick Pre-moulded asphalt filler joints as per drawings (R.A.)	160.0	Sqm	769.6	123,139.20
54	Providing P.V.C. 100 mm diameter water spouts including necessary iron gratings as per drawings. (SOR Item No. 27100-A)	112.0	Nos.	159.4	17,848.32
55	Providing and laying weep hole in Abutments, and returns by using PVC pipe of 100 mm including fixing in proper grade and jointing the complete as per detailed specification (SOR Item No.27050-A + R.A.)	1120.0	Nos.	228.3	255,651.20
56	Providing & Fixing of Precast R.C.C. Railing of M 30 Grade Concrete having 2 - tire (Row) of Hand Rail dimension as shown in detail drawing & Vertical Post such as c/c pacing between vertical posts not to exceed 1.625 m including necessary TMT steel, Form Work, Painting with Weatherproof Paint, Supplying of all material, Labour etc. complete as per instruction of Engineer-in-Charge. (Rate Analysis)	276.0	Rmt	2142.4	591,305.51
57	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20 cm. in depth consolidating each deposited layer by ramming and watering. (SOR Item No.4006)	1740.0	Cum	136.9	238,240.80
58	Dismantling the existing structure including removing and stacking the dismantled materials as and where directed RCC work (SOR / Item No.27001-A)	497.5	Cum	930.4	462,845.13
59	Demolition and disposal of unserviceable materials with all lead and lift. (ii) Unreinforced concrete. (SOR Item No.200018)	391.0	Cum	623.0	243,596.91
60	Removing all types of Hume pipes and stacking within a lead of 1000 m including Earthwork and Dismantling of Masonry Works as per Technical Specification Clause 202. (Rate Analysis) (B) Above 600 mm to 900 mm dia Hume pipe	60.0	Rmt	419.0	25,140.60

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities
				In Figure	
1	2	3	4	5	6
61	Providing & casting in situ ordinary cement concrete M-15 mix and providing necessary pin headers including shuttering, scaffolding, laying, vibrating, curing and finishing complete without V-Groves.(A) Height from 0.0 M. to 5.0 M. (SOR/ Item - 27053-AA + R.A.)	1204.1	Cum	3921.6	4,722,046.72
62	Hazard Marker Sign :-Providing and fixing sing boards made out of 2mm aluminium sheet; size 90 x 30cms. rectangle as as per the design/drawing attached (IRC) pretreated with phospheting process & acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paint; reflectorised with retro reflective sheeting as per latest M.O.S.T. Specifications; 3.1m long stand post and frame fabricated from suitable size iron angle of 35 x 35 x 3mm & 50 x 50 x 5mm painted with best quality epoxy coatings The fixing at site shall be in 1:2:4 CC block of size 45x45x 60cms. for each leg, including excavation curing etc. complete under the supervision of engineer in charge.(A) Engineer Grade(VR) (SOR I. No. 26102A)	20.0	Nos.	2423.7	48,474.80
63	Cautionary Warning Sign :-Providing and fixing sing boards made out of 2mm aluminium sheet; size 90 x 90 x 90 cms. equilateral triangle as per design of IRC-67-1977. Pre treated with phospheting process & acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paint ;reflectorised with retro reflectivesheeting as per latest M.O.S.T.Specifications; 3.1m long stand postand frame fabricated from suitable sizeiron angle of 35 x 35 x 3mm, 75 x 75 x 5mm as required; painted with bestquality epoxy coatings in black andwhite bends. The details of symbol foreach board shall be as per theinstruction of engineer in charge. The fixing at site shall be in 1:2:4 CC blockof size 45 x 45 x 60 Cms. for each leg,including excavation, curing etc.complete under the supervision of engineer in charge.(A) Engineer Grade(VR)(SOR Item No.26092-A)	20.0	Nos.	3808.7	76,173.00
64	Dismantalling the existing structure including removing and stacking the dismantalled materials as and where directed Rubble masonry (SOR Item No.27001-B)	887.8	Cum	409.2	363,305.52
65	Excavation in hard rock by dry-wet blasting and chiselling including dewatering and chiselling including dewatering preparing foundation base by proper benching and steppingand disposing of the excavated stuff as directed. (B) Blasting prohibited. (SOR/ Item -270108)	159.3	Cum	1675.3	266,876.88

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities
				In Figure	
1	2	3	4	5	6
66	Providing and fixing Mild steel dowel bars of minimum 32MM dia for anchoring by drilling holes in foundation strata including necessary bending, hooking of dowel bars and grouting the holes complete as per detailed drawing and as directed (SOR/ item -27032)	72.0	Rmt	450.1	32,405.04
67	Providing and casting - in - situ controlled cement concrete DMC -20 for mass concrete for foundation below Piers, Abutments & Square Return including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete as per specification (R.A.)	444.3	Cum	5198.6	2,309,729.09
68	Providing and casting in situ controlled cement concrete M-25 for R.C.C. work in pier cap, abutment cap and dirt wall including controlled cement concrete M-30 bed blocks or pedestals of required size below bearings as per detailed drawings, centering, shuttering, scaffolding, wherever necessary, laying vibrating, curing and finishing complete. (SOR Item -27066-BA)	40.1	Cum	5384.3	215,909.23
69	Providing and fixing in position Mild steel dowel bars in pier cap or abutment caps for anchorage in fixed end as per detailed drawings including cutting bending and welding complete.	24.0	Nos.	341.3	8,190.96
70	Providing and fixing in position Mild steel dowel bars in pier cap or abutment caps for anchorage in free end as per detailed drawings including cutting bending and welding complete.	24.0	Nos.	399.7	9,592.80
71	Providing 12 mm. Thick Pre-moulded asphalt filler joints as per drawings (SOR Item No.27087)	116.1	Sqm	703.5	81,679.83
72	Providing temporary diversion suitable for traffic during the construction period of the Bridge/Box Structure work by levelling existing ground and constructing suitable compacted embankment, allweather road surface	82.0	Rmt	2298.0	188,432.67
73	Supplying & Laying of Extruded Polypropylene Geogrid for Base/Sub Base reinforcement of having minimum tensile strength 30 KN/m in the longitudinal & transverse direction and conforming MORTH specification, laid in layers below approach slab with all necessary tools to complete the work as per drawing. (R.A.)	188.9	Sqm	165.6	31,289.40
74	Earthwork for Embankment including breaking clods, dressing etc. complete with all lead and lift. (Excluding watering & consolidation)(C) From Borrow Area within 3.00 K.M. Lead. (S.O.R. / It. No. 26001-EA)	72.0	Cum	169.3	12,188.16
75	Rolling and Watering of earth work in layers with vibratory roller including filling in depressions which occur during the process as directed. (SOR / It. Code 26002A+26003)	1792.0	Cum	23.0	41,144.32

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities
				In Figure	
1	2	3	4	5	6
76	Providing and filling in foundation with ordinary cement concrete M-15 mix and providing necessary vertical pin headers incl. Formwork, vibrating, ramming and curing complete. (SOR/ Item -27012-A + R.A.)	648.4	Cum	3715.6	2,409,208.01
77	Providing and placing in position FE 550/550 D CRS TMT bar reinforcement including testing of coating at plant and all taxes including cutting, bending, hooking, and tying complete as per detailed drawing.(A) Solid Slab. / App slab / Wearing Coat (SOR / Item No.27113 + Rs. 3500 for Fe 550D CRS)	139.0	MT	76778.0	10,675,214.51
78	Earthwork for Embankment including breaking, clods, dressing etc. complete with all lead and lift. (Excluding watering & consolidation) (E) From Borrow Area within 5.00 Km. lead. (SOR It. No. -26001-A + R.A.)	1720.0	Cum	210.7	362,384.48
79	Providing and applying one coat Epoxy Phenolic primer of DFT 50 micron and two coats of Polyurethane (aliphatic) epoxy paint-75 micron DFT each or any other equivalent epoxy coating system to all concrete surfaces exposed to atmosphere in Substructure & Super Structure as directed by Engineer and as per specification. (R.A.)	3519.0	Sqm	233.3	821,017.89
80	Supplying & laying of bi-axial extruded high modulus polypropylene geogrid conforming to MORT&H specification for base/sub-base reinforcement having minimum tensile strength 30kN/m in the longitudinal and transverse direction, with 10.5kN/m and 21kN/m tensile strength at 2% and 5% strain respectively in the longitudinal and transverse direction, junction efficiency not less than 95% and with 38mm X 38mm mesh opening. (N.H. Rajkot SOR Item No.7.5 (ii))	1592.1	Sqm	253.5	403,613.27
81	Road marking with hot applied thermoplastic paints (Yellow Colour No. 356 on C.C. Road & White Colour on Asphalt Surfaces) with reflectorising glass beads on bitumin surface providing and laying a hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads @ 250gms per sqm area, thickness of 2.5mm is excluding of surface applied glass beds as per IRC:35-2015. The finished surface to be level, uniform and free from streaks and holes. zebra patta /bump patta lane/center line/ edge line/cut patta. The white color marking should provide luminance coefficient on cement road shall be min 130 mcd/m ² /lux and Asphalt road shall be min 100 mcd/m ² /lux during the service life during the day time. The marking should meet the performance criteria for night time reflectivity, wet reflectivity and skid resistance as mentioned in the section-15 of IRC 35-2015. Warranty for the Retro reflectivity should be two years. (SOR I. No. 26161)	137.0	sqm	367.7	50,377.64

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities
				In Figure	
1	2	3	4	5	6
82	Cat Eye / Road Stud / RPM: Supplying of Molded Twin Shanks Raised Pavement Markers made of polycarbonate and ABS moulded body and reflective panels with micro prismatic lens capable of providing total internal reflection of the light entering the lens face and shall support a load of 13635 kgs. tested in accordance to ASTM D 4280 Type H and complying to Specifications of Category A of MORTH Circular No RW/NH/33023/10-97 DO III Dt 11.06.1997. The height, width and length shall not exceed 20 mm, 130 mm and 130 mm and with minimum reflective area of 13 Sqcm on each side and the slope to the base shall be 35 +/- 5 degree. The strength of detachment of the integrated cylindrical shanks, (of diameter not less than 19 +/- 2 mm and height not less than 30 +/- 2 mm) from the body is to be a minimum value of 500 Kgf. Fixing will be by drilling holes on the road for the shanks to go inside, without nails and using epoxy resin based adhesive as per manufacturers recommendation and The color of the marker should be as per the IRC 35-2015 and as directed by Engineer-in-charge. (SOR I. No. 26162A)	164.0	Nos.	326.2	53,501.72
83	Excavation for foundation upto 1.5 m. depth including sorting out and stacking of useful materials and disposing of the excavated stuff upto 50 metre lead. Dense or hard soil (SOR item No.26075-II)	232.0	Cum	253.9	58,900.16
84	Supplying and fixing reinforced concrete heavy duty non-pressure pipes with collars for culverts carrying heavy traffic as per IS 458-1991 specifications including setting the pipes in C.M. 1:2 watering and laying (to level or slopes) of class NP3 of following internal diameters.(vii) 1200mm dia. with lead (SOR Item No.26089GA+R.A.)	30.0	Rmt	5560.0	166,800.30
85	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20 cm. in depth consolidating each disposed layer by ramming and watering. (SOR Item No.4006)	495.0	Cum	136.9	67,775.40
86	Providing and casting in situ ordinary cement concrete M-20 for various thickness wearing coat laid as directed including tamping, vibrating, finishing, curing and filling joints with bitumen complete. (ItemNo.27091AA)	80.4	Cum	4338.7	348,828.26
87	Providing and fixing Flood Gauge Post mark of "C" Channle angle size 100mm X 50mm X 5 mm Thick (In head Wall 0.50 m and 1.50 m Out side with Painting and lettering with radium color as direct) (RA)	6.0	Nos.	1748.2	10,488.90

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities
				In Figure	
1	2	3	4	5	6
88	Diversion: Providing temporary diversion suitable for traffic during the construction period of the C.D. Structure work by levelling existing ground and constructing suitable compacted embankment, road surface with providing laying & consolidation of 100 mm WBM in layers in carriage width with safety measures like sign board, guard stone & maintain for motorable road throughout construction period etc. and also dismantle diversion after completion of work etc. complete as per instruction of Engineer-in-Charge. (R/A)	100.0	Rmt	993.8	99,384.00
89	Provision of an Reinforced cement concrete crash barrier at the edges of the road, approaches to bridge structures and medians, constructed with RCC M-30 Grade conforming to MoRTH Specification and as per details given IRC-5 including dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board, keyed to the structure on which it is built and installed as per design given in the enclosure to MOST circular No. RW/NH - 33022/1/94-DO II dated 24 June 1994 as per dimensions in the approved drawing and at locations directed by the Engineer, all as specified (Rate Analysis)	48.4	Rmt	5255.0	254,238.35
90	Route marker sign :- Providing & fixing sign boards made out of 2mm aluminium sheet, size 60x45cms. rectangle plus 30x25cms additional plate as per the attached drawing (IRC) pre treated with phosphating process & acid etching. coated with one coat of epoxy primer and two coats of best quality epoxy paint reflectorised with retro sheeting as per latest M.O.S.T. Specifications ; 3.1m long stand post and frame fabricated from iron angle of 35 x 35 x 3mm , 75x75x6mm as required, painted with best quality epoxy coating in black and white bends The details of numerals for each board shall be as per the instruction of engineer in charge. The fixing at site shall be in 1:2:4 CC block of size 45 x 45x 60cms. for each leg, including excavation curing etc. complete under the supervision of engineer in charge.(A) Engineer Grade (SOR I No. 26108A)	16.0	Nos.	3744.7	59,914.88
91	Providing and fixing Precast R.C.C. Grade M-30 Guard Stone/Stud 15 cm dia at top, 30 cm at bottom and 90 cm high R.C.C. Guard Stone as per standard design, including fixing, painting, sticking radium patta etc. complete as per instruction of engineer-in-charge (Rate Analysis)	42.0	Nos.	860.5	36,141.84

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities
				In Figure	
1	2	3	4	5	6
92	Providing and casting -in - situ controlled cement concrete M-20 for R.C.C. work in Pier, Abutment, Return & Riding Return as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete.(A) Height from D.O to 5.0 M. (1) Piers (2) Abutment (3) RCC return (SOR Item No. 27064 AA + R.A.)	373.6	Cum	5198.6	1,942,189.49
93	Taking credit for NP3 Pipes	285.0	Rmt	-1809.4	-515,690.18
94	Credit for solid slab	11.0	MT	-46994.3	-518,112.05
95	Taking credit for NP4 Pipes (Considering 70% basic rate for 1.2m dia NP4 pipes)	45.0	Rmt	-3666.8	-165,006.58
96	Deduct Credit of 70% useful material of Diversion Rs.	1.0		-1128787.0	-1,128,787.01
97	Credit	1.0		-18144.0	-18,144.00
Amount in Word		Rupees Twenty One crores seventy three lakhs sixty nine thousand six hundred fifty six and fifteen paise only			₹ 217,369,356

Item No.	Description of Item (with brief specification and reference to book of specifications)	Quantity	Unit	Rate	Total Amount according to estimated quantities																								
				In Figure																									
1	2	3	4	5	6																								
<p>I/We am/are willing to carry out the work at _____ % above/below the (percentage should be written in figure and words only) Estimated rates as mentioned above, amount of my/our tender works out as under.</p> <table border="0"> <tr> <td>Estimated Amount</td><td></td><td>Estimated Amount</td><td></td></tr> <tr> <td>Put to Tender: RS.</td><td></td><td>Put to Tender: RS.</td><td></td></tr> <tr> <td>Deduct: _____ % Below</td><td></td><td>Deduct: _____ % Above</td><td></td></tr> <tr> <td>Net: RS.</td><td></td><td>Net: RS.</td><td></td></tr> <tr> <td>In Words RS.</td><td></td><td>In Words RS.</td><td></td></tr> <tr> <td>(Please Strike out whichever is not applicable)</td><td></td><td>(Please Strike out whichever is not applicable)</td><td></td></tr> </table> <p>Note:</p> <ol style="list-style-type: none"> The Contractor shall exhibit a board with detailed specification and details of work as directed by the Engineer-In-Charge for which no extra payment shall be made. The labour cess will be deducted as per prevailing rules i.e. 1% of the work done. GST and Income tax TDs will be deducted at a source while making payments of bills. In all R.C.C. items in Rate Analysis Standard Cement Consumption has been taken as per Govt. G.R. PRC-10/2017 Cement Consumption/16/C Date 11/05/2017 as stated in S.O.R. therefore in R.C.C. items where there is a change as per actual mix design the cost of difference of cement consumption have been deducted from the rate of original item at the rate of input rate mentioned in all the tender. <p><i>S. Credit shall be recovered from 3 consecutive bill of ₹ 23,45,739.07/-</i></p> <p>Signature of Contractor _____</p> <p style="text-align: right;"> <i>(Signature)</i> Executive Engineer (R & B) (P) Division Morbi </p>						Estimated Amount		Estimated Amount		Put to Tender: RS.		Put to Tender: RS.		Deduct: _____ % Below		Deduct: _____ % Above		Net: RS.		Net: RS.		In Words RS.		In Words RS.		(Please Strike out whichever is not applicable)		(Please Strike out whichever is not applicable)	
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CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1			
INDEX TO SPECIFICATION			
It No	Description of item as per schedule "B" of the tender.	Standard specification Booklet	Remarks
1	Demolition including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift. (i) R.C.C. work	Bridge Specification Booklet It. No. 1, Pg. No. 2	
2	Excavation for foundation in sand, gravel, clay soft soils and murrum etc. including shoring, strutting dewatering as necessary and disposing of the excavated stuff as directed. (A) Depth upto 3.0 M. and lead upto 100m for 10 Cum.	Bridge Specification Booklet It. No. 7, Pg. No. 6	
3	Providing and laying plain cement concrete in levelling course complete as per drawings and technical specifications as per sections 1500, 1700 and 2100 of MORTH (M-15)	Bridge Specification Booklet It. No. 12, Pg. No. 10	
4	Providing and laying plain cement concrete grade M-15 PCC Toe wall for toe protection i.e. to prevent the slope pitching from sliding down, with graded machine mixed stone aggregate from 6 mm to 40 mm including tamping, vibrating, leveling and curing complete with all formwork, dewatering wherever required including all materials, labours, plants, machineries & tools, all leads and lifts, etc. complete as per specification.	Bridge Specification Booklet It. No. 12, Pg. No. 10	
5	Providing and fixing in position (Thermo mechanically Treated bars) TMT Fe550D CRS conforming to IS 1786 reinforcing bars of various diameters for Box structure, retaining wall, etc. as per detailed designs and drawings and schedule including cutting, bending, hooking the bars, binding with 18 SWG GI wires with cost of all labour, materials, tools, plants, equipments, supporting as required with all lifts and leads etc. all complete as per specification and as directed by Engineer The rate includes for supply, loading, unloading, transporting to site, cutting, bending, lap length, hooking, placing, tying in position with contractor's own binding wire, welding, forming the cage and lowering it in position in pile bore etc. Welding and supporting in position to ensure lines and levels during concreting, maintaining proper cover/ spacing, all leads & lifts, etc. including contractor's own equipment, labour, supervisor, taxes, machineries, etc. complete as per drawings and specification.	Bridge Specification Booklet It. No. 21, Pg. No. 28	
6	Providing and casting in situ controlled cement concrete M-25 for R.C.C. box structure, as per drawings, Stem of Retaining wall etc. using 6 mm to 20 mm machine crushed well graded stone aggregate, sand of approved quality, OPC 53 grade cement with contractor's own concrete mix design etc. complete as per specification. The rate is inclusive of all materials, including necessary mixing in fully automatic batch mix plant, transport, curing, vibrating, placing in position, scaffolding, staging, normal shuttering, formworks, deshuttering carefully, making good the damages, fixing embedment, inserts, pockets, wherever necessary, with all lead and lift with contractor's labour, tools & plants, machineries, as required, with including cost of fair finish form work.	Bridge Specification Booklet It. No. 13, Pg. No. 15	
7	Providing and laying - Filter Media 600mm thick directed at the back of abutments, returns and wing walls as per detailed specifications.	Bridge Specification Booklet It. No. 4, Pg. No. 5	
8	Providing & laying weep hole in Abutments, and returns by using A.C. pipe of 100mm including laying in proper grade and jointing the completed as per detailed specification.	MORTH specification (5th revision) Section 2706, Pg. No. 755	
9	Back filling behind Abutment, wing wall and return wall with selected granular material of approved quality including all the materials, compacting, labour, equipment charges, etc all complete as per drawing and Technical Specification Section 300 (Percentage of fine content maximum 15%, Backfill soil phi 30°, Density 20 kN/m ³ , Field compaction 95±2% modified proctor density.	MORTH specification (5th revision) Section 304.3.7, Pg. No. 61	

It No	Description of item as per schedule "B" of the tender.	Standard specification Booklet	Remarks
10	Providing and laying rubble for apron (each stone weighting not less than 40Kg.) including and packing and filling in the interstices with quarry-spalls. <u>For Rigid Apron.</u>	MORTH specification (5th revision) Section 2503, Pg. No. 704	
11	Providing and laying plain cement concrete grade M-20 curtain wall with minimum depth below floor level of 2m on upstream and 2.5m on downstream side as per clause 20.1.2.3 of IRC:SP-13:2004 and section 2507.1 of MORTH specification.	Bridge Specification Booklet It. No. 12, Pg. No. 10	
12	Providing and laying rubble for apron (each stone weighting not less than 40Kg.) including and packing and filling in the interstices with quarry-spalls. <u>For Flexible Apron.</u>	MORTH specification (5th revision) Section 2503, Pg. No. 704	
13	Providing and laying Filter material underneath pitching in slopes 300mm thick complete as per drawing and Technical specification.	Bridge Specification Booklet It. No. 4, Pg. No. 5	
14	Providing and laying Pitching on slopes laid over prepared filter media including boulder apron laid dry in front of toe of embankment complete as per drawing and Technical specifications.	MORTH specification (5th revision) Section 2504, Pg. No. 709	
15	Providing and casting in situ controlled cement concrete M-25 for Parapet Wall, as per drawings. Stem of Parapet wall etc. using 6 mm to 20 mm machine crushed well graded stone aggregate, sand of approved quality, OPC 53 grade cement with contractor's own concrete mix design etc. complete as per specification.	Bridge Specification Booklet It. No. 13, Pg. No. 15	
16	Providing and casting in situ controlled cement concrete M-30 for average 75 mm thick wearing coat laid as directed including tamping, vibrating, finishing, curing and filling joints with bitumen complete	Bridge Specification Booklet It. No. 13, Pg. No. 15	
17	Clearing and grubbing road land including uprooting rank vegetation grass bushes, shrubs, sapling and trees girth up to 300 mm removal of stumps of trees cut earlier and disposal of unserviceable materials (C) By mechanical means in area of light jungle	MORTH specification (5th revision) Section 201, Pg. No. 37	
18	Dismantling of flexible pavements and disposal of dismantled materials up to a lead of 1000 metres, stacking serviceable and unserviceable materials separately	MORTH specification (5th revision) Section 202, Pg. No. 37	
19	Earthwork for embankment including breaking clods, dressing with all lead and lift and including watering rolling and consolidation of subgrade in layers at O.M.C. to required dry density including filling the depression which occur during the process using power roller 8T to 10T.(E) From Borrow area within 3.0KM lead	MORTH specification (5th revision) Section 408, Pg. No. 139	
20	Construction of sub-grade and earthen shoulders using quarry spall with all lead and lift and including watering and rolling and consolidation of sub grade in layers at OMC to required dry density including filling the depressions which occur during the process using power roller 8T to 10 T	MORTH specification (5th revision) Section 408, Pg. No. 139	
21	Construction of granular Sub base with Coarse Graded Material (Grade II) (Table:- 400- 2) of 200 mm by providing coarse graded material Metal Crushed using size 53mm to 26.5 mm @ 27.5%, 26.5 mm to 9.5 mm @ 22.5%, 9.5mm to 4.75mm @ 12.50% and 4.75mm below @ 37.5% spreading in uniform layers with including and mixing the material obtained from cutting BT road by milling machine using motor grader on prepared surface mixing by mix in place method with rotavator at OMC and compacting with vibratory roller to achieve the desired density complete as per Clause 401.2 Table 400.1 grade-V.	MORTH specification (5th revision) Section 401, Pg. No. 109	
22	Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with vibratory roller 8-10 tonnes in stages to proper grade and camber, applying and brooming requisite type of screening/ binding Materials to fill up the interstices of coarse aggregate, watering and compacting to the required density.-Grading 1, Using Screening Crushable type such as Moorum or Gravel.	MORTH specification (5th revision) Section 404, Pg. No. 121	

It No	Description of item as per schedule "B" of the tender.	Standard specification Booklet	Remarks
23	Cement Concrete Pavement (Construction of un-reinforced, dowel jointed, plain cement concrete pavement over a prepared sub base with 43 grade cement @ 400 kg per cum, coarse and fine aggregate conforming to IS 383, maximum size of coarse aggregate not exceeding 25 mm, transported to site, spread, compacted and finished in a continuous operation including provision of contraction, expansion, construction and longitudinal joints, joint filler, separation membrane, sealant primer, joint sealant, debonding strip, dowel bar, tie rod, admixtures as approved, curing compound, finishing to lines and grades as per drawing)	Bridge Specification Booklet It. No. 12, Pg. No. 10	
24	Providing and fixing sign boards made out of 2.0 mm aluminium sheet / 4 mm ACP (Aluminum composite Panel); size 90x30 cms. rectangular as per design of IRC-67-2012. Pre treated with phosphating process & acid etching, coated with one coat of epoxy primer and two coats of best quality epoxy paint ;reflectorisred with Micro Prismatic Grade retro reflectivesheeting of Type-11 as per ASTM D-4956 and latest M.O.S.T.Specifications; 1.8mtr long stand post of 75 x 75 x 6mm / 65NB Circular MS Pipe as required and frame fabricated from suitable size iron angle of 35 x 35 x 3mm; painted with bestquality epoxy coatings in black and white bends. The details of symbol foreach board shall be as per theinstruction of engineer in charge. The fixing at site shall be in 1:2:4 CC blockof size 45 x 45 x 60 Cms. for each leg.including excavation, curing etc.complete under the supervision of engineer in charge. A warranty for 10 years for the Retro reflective sheeting from original manufacturer & a certified copy of 3 year outdoor exposure test report from third party test lab for the product offered shall be submitted by contractor. (A) Class-C Type-11 Retro Reflective sheeting.	MORTH specification (5th revision) Section 801, Pg. No. 325	
25	Supplying and fixing reinforced concrete heavy duty non-pressure pipes with collars for culverts carrying heavy traffic as per IS 458-1991 specifications including setting the pipes in C.M. 1:2 watering and laying (to level or slopes) of class NP3 of following internal daimeters.(v) 900mm dia.	MORTH specification (5th revision) Section 2900, Pg. No. 783	
26	Demolition of Brick work and stone masonry including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift.(ii) In Cement Mortar.	MORTH specification (5th revision) Section 2900, Pg. No. 783	
27	Excavation for foundation in hard murrum and boulders and very stiff or sticky, clays and other similar strata including shoring and strutting and dewatering as necessary and disposing of the excavated stuff as directed .	MORTH specification (5th revision) Section 408, Pg. No. 139	
28	Providing and laying plain cement concrete grade M-20 PCC protection wall, with graded machine mixed stone aggregate from 6 mm to 40 mm including tamping, vibrating, leveling and curing complete with all formwork, dewatering wherever required including all materials, labours, plants, machineries & tools, all leads and lifts, etc. complete as per specification.	Bridge Specification Booklet It. No. 12, Pg. No. 10	
29	Providing parapet of ordinary cement concrete M-200 as per detailed drawings with necessary reinforcement including, shuttering, laying vibrating and finishing to line and level complete.(iii) Cast in situ	Bridge Specification Booklet It. No. 12, Pg. No. 10	
30	Providing MS Flood guage on top of the bridge including supply, fixing and painting complete as directed by engineer in charge	Bridge Specification Booklet It. No. 2, Pg. No.4	
31	Excavation in large boulders and soft rock by welding including shoring, strutting and dewatering as necessary and disposing of the excavated stuff as directed.	Bridge Specification Booklet It. No. 7, Pg. No. 6	
32	Providing and laying plain cement concrete in levelling course complete as per drawings and technical specifications as per sections 1500, 1700 and 2100 of MORTH (M-10)	Bridge Specification Booklet It. No. 12, Pg. No. 10	
33	Providing and applying Acrylic paint to unplastered concrete surface after cleaning the surface of dirt, dust, oil, grease, efflorescence and applying paint @ of 1 litre for 2 sqm.	As per Sheet	
34	Box cutting the road surface to proper slope and camber for making a base for road work including removing the excavated stuff and depositing on the road side slope as directed upto 50Mtr lead.	MORTH specification (5th revision) Section 408, Pg. No. 139	

It No	Description of item as per schedule "B" of the tender.	Standard specification Booklet	Remarks
35	Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification (200mm thk in two layers) including spreading in uniform thickness, hand packing, rolling with vibratory roller 8-10 tonnes in stages to proper grade and camber, applying and brooming requisite type of screening/ binding Materials to fill up the interstices of coarse aggregate, watering and compacting to the required density.-Grading 2, Using Screening Crushable type such as Moorum or Gravel.	MORTH specification (5th revision) Section 404, Pg. No. 121	
36	Providing and fixing "W" type metal beam crash safety barrier comprising of single row 3 mm thick galvanized sheet to be fixed on ISMC 150 (150 mm x 75 mm x 5.4 mm) series channel vertical post to be spaced 2.0 mtr c/c to be kept 1.65 mtr height including necessary foundation, fittings with bolts, painting and required all process as per specification and as per drawing.	MORTH specification (5th revision) Section 811, Pg. No. 360	
37	Diversion sign board :-Providing & Fixing sign boards made out of 2mm aluminium sheet, size 180 x 60 cms. rectangle as per the attached drawing pre treated with phosphating process & acid etching, coated with one coat of epoxy primer and two coats of best quality epoxy paint reflectorised with retro reflective sheeting as per latest M.O.S.T. Specifications; Letters and numerals should be as per IRC-30-1968, 3.1m long (2nos) stand post and frame fabricated from iron angle of 35x35x3mm, 50x50x5mm painted with best quality epoxy coatings in black and white bends. The fixing at site shall be in 1:2:4 CC block of size 45 x 45 x 60cms for each leg, including excavation curing etc. complete under the supervision of engineer in charge.(A) Engineer Grade(VR)	MORTH specification (5th revision) Section 801, Pg. No. 325	
38	Granular sub base Grade 1 with black trap crushed stone well graded material [Table-400.1] by mix in place method construction of granular sub base by providing black trap crushed stone well graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC and compacting with vibratory roller to achieve the desired density complete. [As per technical specification clause-401] for Gr-1 Material	MORTH specification (5th revision) Section 401, Pg. No. 109	
39	Informatory Signs :-Providing and fixing Work in Progress sign boards made out of 2mm aluminium sheet; size 80 x 60cms. rectangle as per the design of IRC-67-1977 pre treated with phosphating process & acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paint; reflectorised with retro reflective sheeting as per latest M.O.S.T. Specifications; 3.1m long stand post and frame fabricated from suitable size iron angle of 35 x 35 x 3mm 75x75x6mm as required; painted with best quality epoxy coatings in black and white bends. the details of symbol for each board shall details of symbol for each board shall be as per the instruction of engineer in charge. The fixing at site shall be in 1:2:4 CC block of size 45 x 45 x 60cms. for each leg, including excavation curing etc. complete under the supervision of engineer in charge.(A) Engineer Grade(VR)	MORTH specification (5th revision) Section 801, Pg. No. 325	
40	Providing and laying rubble for soling (each stone weighting not less than 40Kg.) including and packing and filling in the interstices with quarry-spalls. For rubble soling work under pcc.	MORTH specification (5th revision) Section 2503, Pg. No. 704	
41	Type - A, "W" : Metal Beam Crash Barrier (Providing and erecting a "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and fitments to be galvanised by hot dip process, all fittings to conform to IS:1367 and IS:1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75 x 5 mm, 330 mm long complete as per clause 811)	MORTH specification (5th revision) Section 811, Pg. No. 360	
42	Providing and casting in situ ordinary cement concrete M-150 mix below CC pavement including laying ramming, vibrating and curing complete.	Bridge Specification Booklet It. No. 12, Pg. No. 10	

It No	Description of item as per schedule "B" of the tender.	Standard specification Booklet	Remarks
43	Providing and laying Filter material underneath pitching in slopes 150mm thick complete as per drawing and Technical specification.	MORTH specification (5th revision) Section 2504, Pt. No. 709	
44	Diversion: Providing temporary diversion suitable for traffic during the construction period of the C.D. Structure work by levelling existing ground and constructing suitable compacted embankment, road surface with providing, laying & consolidation of 200 mm WBM in layers on carriage width with safety measures like sign board, guard stone, necessary R.C.C. pipes with suitable slope protection & maintain for motorable road throughout construction period etc. and also dismantle diversion after completion of work etc. complete as per instruction of Engineer-in-Charge. (R.A)	Bridge Specification Booklet It. No. 11, Pg. No. 10	
45	Providing and filling in foundation with ordinary cement concrete M-10 mix and providing necessary vertical pin headers incl. Formwork, vibrating, ramming and curing complete.	Bridge Specification Booklet It. No. 12, Pg. No. 10	
46	Providing and casting in situ. controlled Cement Concrete M-25 for R.C.C. Raft and cut-off walls including necessary shuttering laying, vibrating ramming of curing complete (Item No.27014+ R.A.)	Bridge Specification Booklet It. No. 13, Pg. No. 15	
47	Providing and casting in situ Controlled cement concrete M- 25 for R.C.C. solid slab including centering, scaffolding curing and finishing complete. (SOR / Item No.27075-A) +RA)	Bridge Specification Booklet It. No. 13, Pg. No. 15	
48	Providing and casting in situ Controlled cement concrete M-25 for approach slab including formwork curing and finishing complete.(SOR / Item No 27103-BA + R.A.)	Bridge Specification Booklet It. No. 13, Pg. No. 15	
49	Providing and casting in situ controlled cement concrete M-25 for Kerbs/Kerb blocks including form work,curing and finishing complete.(SOR / Item No. 27093 BA+ R.A. II)	Bridge Specification Booklet It. No. 13, Pg. No. 15	
50	Providing & casting in situ ordinary cement concrete M-20 mix and providing necessary pin headers including shuttering, scaffolding, laying, vibrating, curing and finishing complete without V-Grooves.(A) Height from 0.0 M. to 5.0 M. (SOR / Item - 27053AA + R.A.)	Bridge Specification Booklet It. No. 12, Pg. No. 10	
51	Providing and laying in position FE 500/500 D TMT bar reinforcement including cutting, bending, hooking and tying complete as per detailed drawings for the following.(A) Piers (B) Abutments (C) R.C.C. Return / Walls/ Caps/ Copings etc (SOR / Item No.27109)	Bridge Specification Booklet It. No. 21, Pg. No. 28	
52	Providing and placing in position FE 500D TMT bar reinforcement including testing of coating at plant and all taxes including cutting, bending, hooking, and tying complete as per detailed drawing.(A) Solid Slab. / App slab / Wearing Coat (SOR / Item No.27113)	Bridge Specification Booklet It. No. 21, Pg. No. 28	
53	Providing 20 mmThick Pre-moulded asphalt filler joints as per drawings (R.A.)	Bridge Specification Booklet It. No. 30, Pg. No. 37	
54	Providing P.V.C. 100 mm diameter water spouts including necessary iron gratings as per drawings. (SOR Item No. 27100-A)	Bridge Specification Booklet It. No. 35, Pg. No. 40	
55	Providing and laying weep hole in Abutments, and returns by using PVC pipe of 100 mm including fixing in proper grade and jointing the complete as per detailed specification(SOR Item No.27050-A + R.A.)	MORTH specification (5th revision) Section 401, Pt. No. 109	
56	Providing & Fixing of Precast R.C.C. Railing of M-30 Grade Concrete having 2 - tire (Row) of Hand Rail dimension as shown in detail drawing & Vertical Post such as c/c piling between vertical posts not to exceed 1.625 m including necessary TMT steel, Form Work, Painting with Weatherproof Paint, Supplying of all material, Labour etc. complete as per instruction of Engineer-in-Charge. (Rate Admiss)	Bridge Specification Booklet It. No. 13, Pg. No. 15	
57	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20 cm. in depth consolidating each disposed layer by ramming and watering. (SOR Item No.4006)	MORTH specification (5th revision) Section 408, Pg. No. 139	
58	Dismantling the existing structure including removing and stacking the dismantled materials as and where directed RCC work (SOR / Item No.27001 A)	MORTH specification (5th revision) Section 202, Pt. No. 37	
59	Demolition and disposal of unserviceable materials with all lead and lift.(ii) Unreinforced concrete. (SOR Item No.20001B)	Bridge Specification Booklet It. No. 1, Pg. No. 2	

It No	Description of item as per schedule "B" of the tender.	Standard specification Booklet	Remarks
60	Removing all types of Hume pipes and stacking within a lead of 1000 m including Earthwork and Dismantling of Masonry Works as per Technical Specification Clause 202. (Rate Analysis) (B) Above 600 mm to 900 mm dia Hume pipe	Bridge Specification Booklet It. No. 1, Pg. No. 2	
61	Providing & casting in situ ordinary cement concrete M-15 mix and providing necessary pin headers including shuttering, scaffolding, laying, vibrating, curing and finishing complete without V-Groves. (A) Height from 0.0 M. to 5.0 M. (SOR/ Item - 27053-AA + R.A.)	Bridge Specification Booklet It. No. 12, Pg. No. 10	
62	Hazard Marker Sign :-Providing and fixing sing boards made out of 2mm aluminium sheet; size 90 x 30cms. rectangle as as per the design/drawing attached (IRC) pretreated with phospheting process & acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paint; reflectorised with retro reflective sheeting as per latest M.O.S.T. Specifications; 3.1m long stand post and frame fabricated from suitable size iron angle of 35 x 35 x 3mm & 50 x 50 x 5mm painted with best quality epoxy coatings The fixing at site shall be in 1:2:4 CC block of size 45x45x 60cms. for each leg. including excavation curing etc. complete under the supervision of engineer in charge.(A) Engineer Grade(VR) (SOR I. No. 26102A)	MORTH specification (5th revision) Section 801, Pg. No. 325	
63	Cautionary Warning Sign :-Providing and fixing sing boards made out of 2mm aluminium sheet; size 90 x 90 x 90 cms. equilateral triangle as per design of IRC 67-1977. Pre treated with phospheting process & acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paint ; reflectorised with retro reflectivesheeting as per latest M.O.S.T.Specifications; 3.1m long stand postand frame fabricated from suitable sizeiron angle of 35 x 35 x 3mm, 75 x 75 x 6mm as required; painted with bestquality epoxy coatings in black andwhite bends. The details of symbol foreach board shall be as per theinstruction of engineer in charge. The fixing at site shall be in 1:2:4 CC blockof size 45 x 45 x 60 Cms. for each leg.including excavation, curing etc.complete under the supervision of engineer in charge.(A) Engineer Grade(VR)(SOR Item No.26092-A)	MORTH specification (5th revision) Section 801, Pg. No. 325	
64	Dismantalling the existing structure including removing and stacking the dismantalled materials as and where directed Rubble masonary (SOR Item No.27001-B)	MORTH specification (5th revision) Section 202, Pg. No. 37	
65	Excavation in hard rock by dry-wet blasting and chiselling including dewatering and chiselling incl uding dewatering preparing foundation base by proper benching and steppingand disposing of the excavated stuff as directed. (B) Blasting prohibited. (SOR/ Item -270108)	Bridge Specification Booklet It. No. 7, Pg. No. 6	
66	Providing and fixing Mild steel dowel bars of minium 32MM dia.for anchoring by drilling holes in foundation strata including necessary bending, hooking of dowel bars and grouting the holes complete as per detailed drawing and as directed (SOR/ Item -27032)	Bridge Specification Booklet It. No. 21, Pg. No. 28	
67	Providing and casting - in - situ controlled cement concrete DMC -20 for mass concrete for foundation below Piers, Abutments & Square Return including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete as per specification (R.A.)	Bridge Specification Booklet It. No. 13, Pg. No. 15	
68	Providing and casting in situ controlled cement concrete M-25 for R.C.C.workin pier cap,abutment cap and dirt wall including controlled cement concrete M-30 bed blocks or pedestals of required size below bearings as per detailed drawings, centering, shuttering, scaffolding, wherever necessary, laying vibating, curing and finishing complete. (SOR Item -27066-BA+)	Bridge Specification Booklet It. No. 13, Pg. No. 15	
69	Providing and fixing in position Mild steel dowel bars in pier cap or abutment caps for ancorage in fixed end as per detailed drawings including cutting bending and welding complete.	Bridge Specification Booklet It. No. 21, Pg. No. 28	
70	Providing and fixing in position Mild steel dowel bars in pier cap or abutment caps for ancorage in free end as per detailed drawings including cutting bending and welding complete.	Bridge Specification Booklet It. No. 21, Pg. No. 28	


It No	Description of item as per schedule "B" of the tender.	Standard specification Booklet	Remarks
71	Providing 12 mm. Thick Pre-moulded asphalt filler joints as per drawings (SOR Item No.27087)	Bridge Specification Booklet It. No. 30, Pg. No. 37	
72	Providing temporary diversion suitable for traffic during the construction period of the Bridge/Box Structure work by levelling existing ground and constructing suitable compacted embankment, alweather road surface	Bridge Specification Booklet It. No. 11, Pg. No. 10	
73	Supplying & Laying of Extruded Polypropylene Geogrid for Base/Sub Base reinforcement of having minimum tensile strength 30 KN/m in the longitudinal & transverse direction and confirming MORTH specification, laid in layers below approach slab with all necessary tools to complete the work as per drawing (B.A.)	MORTH specification (5th revision) Section 3103, Pg. No. 801	
74	Earthwork for Embankment including breaking clods,dressing etc.complete with all lead and lift. (Excluding watering & consolidation)(C) From Borrow Area within 3.00 K.M. Lead. (S.O.R. / It. No..26001-EA)	MORTH specification (5th revision) Section 202, Pg. No. 37	
75	Rolling and Watering of earth work in layers with vibratory roller including filling in depressions which occur during the process as directed. (SOR / It. Code 26002A+26003)	MORTH specification (5th revision) Section 404, Pg. No. 121	
76	Providing and filling in foundation with ordinary cement concrete M-15 mix and providing necessary vertical pin headers incl. Formwork, vibrating, ramming and curing complete. (SOR/ Item -27012-A + B.A.)	Bridge Specification Booklet It. No. 12, Pg. No. 10	
77	Providing and placing in position FE 550/550 D CRS TMT bar reinforcement including testing of coating at plant and all taxes including cutting, bending, hooking, and tying complete as per detailed drawing.(A) Solid Slab. / App slab / Wearing Coat (SOR / Item No.27113 + Rs. 3500 for Fe 550D CRS)	Bridge Specification Booklet It. No. 21, Pg. No. 28	
78	Earthwork for Embankment including breaking clods,dressing etc.complete with all lead and lift. (Excluding watering & consolidation) (E) From Borrow Area within 5.00 Km. lead. (SOR It. No. 26001-A + R.A.)	MORTH specification (5th revision) Section 408, Pg. No. 139	
79	Providing and applying one coat Epoxy Phenolic primer of DFT 50 micron and two coats of Polyurethane (aliphatic) epoxy paint-75 micron DFT each or any other equivalent epoxy coating system to all concrete surfaces exposed to atmosphere in Substructure & Super Structure as directed by Engineer and as per specification (B.A.)	As per booklet	
80	Supplying & laying of bi-axial extruded high modulus polypropylene geogrid conforming to MORTH specification for base/sub-base reinforcement having minimum tensile strength 30kN/m in the longitudinal and transverse direction, with 10.5kN/m and 21kN/m tensile strength at 2% and 5% strain respectively in the longitudinal and transverse direction, junction efficiency not less than 95% and with 38mm X 38mm mesh opening. (N.H. Rajkot SOR Item No.7.5 (iii))	MORTH specification (5th revision) Section 3103, Pg. No. 801	
81	Road marking with hot applied thermoplastic paints (Yellow Colour No. 356 on C.C. Road & White Colour on Asphalt Surfaces) with reflectorising glass beads on bitumin surface providing and laying a hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads @ 250gms per sqm area, thickness of 2.5mm is excluding of surface applied glass beads as per IRC:35-2015. The finished surface to be level, uniform and free from streaks and holes. zebra patta /bump patta lane/center line/ edge line/cut patta. The white color marking should provide liminance coefficient on cement road shall be min 130 mcd/m2/lux and Asphalt road shall be min 100 mcd/m2/lux during the service life during the day time. The marking should meet the performance criteria for night time reflectivity, wet reflectivity and skid resistance as mentioned in the section-15 of IRC 35-2015. Warranty for the Retro reflectivity should be two years. (SOR I. No. 26161)	MORTH specification (5th revision) Section 803, Pg. No. 338	


It No	Description of item as per schedule "B" of the tender.	Standard specification Booklet	Remarks
82	Cat Eye / Road Stud / RPM: Supplying of Molded Twin Shanks Raised Pavement Markers made of polycarbonate and ABS moulded body and reflective panels with micro prismatic lens capable of providing total internal reflection of the light entering the lens face and shall support a load of 13635 kgs. tested in accordance to ASTM D 4280 Type H and complying to Specifications of Category A of MORTH Circular No RW/NH/33023/10-97 DO III Dt 11.06. 1997. The height, width and length shall not exceed 20 mm, 130 mm and 130 mm and with minimum reflective area of 13 Sqcm on each side and the slope to the base shall be 35 +/- 5 degree. The strength of detachment of the integrated cylindrical shanks, (of diameter not less than 19 +/- 2 mm and height not less than 30 +/- 2 mm) from the body is to be a minimum value of 500 Kgf. Fixing will be by drilling holes on the road for the shanks to go inside, without nails and using epoxy resin based adhesive as per manufacturers recommendation and The color of the marker should be as per the IRC 35-2015 and as directed by Engineer-in-charge. (SOR I. No. 26162A)	MORTH specification (5th revision) Section 804, Pg. No. 353	
83	Excavation for foundation upto 1.5 m. depth including sorting out and stacking of useful materials and disposing of the excavated stuff upto 50 metre lead. <u>Dense or hard soil (SOR Item No.26075-B)</u>	Bridge Specification Booklet It. No. 7, Pg. No. 6	
84	Supplying and fixing reinforced concrete heavy duty non-pressure pipes with collars for culverts carrying heavy traffic as per IS 458-1991 specifications including setting the pipes in C.M. 1:2 watering and laying (to level or slopes) of class NP3 of following internal diameters.(vii) 1200mm dia. with lead (SOR Item No.26089GA+R A.1)	MORTH specification (5th revision) Section 2900, Pg. No. 783	
85	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20 cm. in depth consolidating each disposed layer by ramming and watering. (SOR Item No.4006)	MORTH specification (5th revision) Section 408, Pg. No. 139	
86	Providing and casting in situ ordinary cement concrete M-20 for various thickness wearing coat laid as directed including tamping, vibrating, finishing, curing and filling joints with bitumen complete. (ItemNo.27091AA)	Bridge Specification Booklet It. No. 12, Pg. No. 10	
87	Providing and fixing Flood Gauge Post mark of "C" Channle angle size 100mm X 50mm X 5 mm Thick (In head Wall 0.50 m and 1.50 m Out side with Painting and lettering with radium color as direct) (BA)	MORTH specification (5th revision) Section 801, Pg. No. 325	
88	Diversion: Providing temporary diversion suitable for traffic during the construction period of the C.D. Structure work by levelling existing ground and constructing suitable compacted embankment, road surface with providing, laying & consolidation of 100 mm WBM in layers in carriage width with safety measures like sign board, guard stone & maintain for motorable road throughout construction period etc. and also dismantle diversion after completion of work etc. complete as per instruction of Engineer-in-Charge. (R.A.)	Bridge Specification Booklet It. No. 11, Pg. No. 10	
89	Provision of an Reinforced cement concrete crash barrier at the edges of the road, approaches to bridge structures and medians, constructed with RCC M-30 Grade conforming to MoRTH Specification and as per details given IRC-5 including dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board, keyed to the structure on which it is built and installed as per design given in the enclosure to MQST circular No. RW/NH - 33022/1/94-DO III dated 24 June 1994 as per dimensions in the approved drawing and at locations directed by the Engineer, all as specified (Rate Analysis)	Bridge Specification Booklet It. No. 13, Pg. No. 15	

It No	Description of item as per schedule "B" of the tender.	Standard specification Booklet	Remarks
90	Route marker sign :- Providing & fixing sign boards made out of 2mm aluminium sheet, size 60x45cms. rectangle plus 30x25cms additional plate as per the attached drawing (IRC) pre treated with phosphating process & acid etching, coated with one coat of epoxy primer and two coats of best quality epoxy paint reflectorised with retro sheeting as per latest M.O.S.T. Specifications ; 3.1m long stand post and frame fabricated from iron angle of 35 x 35 x 3mm , 75x75x6mm as required, painted with best quality epoxy coating in black and white bends The details of numerals for each boardshall be as per the instruction of engineer in charge. The fixing at site shall be in 1:2:4 CC block of size 45 x 45x 60cms. for each leg, including excavation curing etc. complete under the supervision of engineer in charge.(A) Engineer Grade (SOR I.No. 26108A)	MORTH specification (5th revision) Section 801, Pg. No. 325	
91	Providing and fixing Precast R.C.C. Grade M-30 Guard Stone/Stud 15 cm dia at top, 30 cm at bottom and 90 cm high R.C.C. Guard Stone as per standard design, including fixing, painting, sticking radium patta etc. complete as per instruction of engineer in-charge (Rate Analysis)	Bridge Specification Booklet It. No. 13, Pg. No. 15	

It No	Description of item as per schedule "B" of the tender.	Standard specification Booklet	Remarks
92	Providing and casting -in - situ controlled cement concrete M-20 for R.C.C. work in Pier, Abutment, Return & Riding Return as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete. (A) Height from 0.0 to 5.0 M. (1) Piers (2) Abutment (3) RCC return / SOR Item No. 72064 AA + R & B 1	Bridge Specification Booklet It. No. 13, Pg. No. 15	
93	Taking credit for NP3 Pipes	MORTH specification (5th revision) Section 2910, Pg. No. 786 Item is self explanatory	
94	Credit for solid slab		
95	Taking credit for NP4 Pipes (Considering 70% basic rate for 1.2m dia NP4 pipes)	MORTH specification (5th revision) Section 2910, Pg. No. 786 Item is self explanatory	
96	Deduct Credit of 70% useful material of Diversion Rs.		
97	Credit	Item is self explanatory	

Signature of Contractor


Deputy Executive Engineer
(R & B) (P) Sub Division
Morbi


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CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1

SCHEDULE FOR TESTING OF MATERIALS

For ensuring quality control and workmanship, various tests prescribed below for materials shall be taken at periodical intervals as stipulated below.


The materials shall be a got tested at Government Laboratory (R & B) or Field Laboratory of GERI (R & B) for which 1% of the estimated amount put to Tender shall be recovered from the contractor from the R.A. bills and final bills at the testing charges shall be paid to the GERI by the Government. However if the charges increase over 1% no excess recovery shall be made from the contractor as per resolution of B & C Department dated 10th, May 1985 vide TNC/1085 (4) s.

Item No. as per Schedule 'B'	Brief Description Materials to be Tested	Qty. of Materials	Prescription of test which shall be carried out	Frequency @ which test shall be carried out	Total Nos of test to be taken
1		3	4	5	6
	Rubble	1732.89	*Gradation test *Impact Value *Flakiness Index of	1 to 100 - cum. 1 test 100 to 500 - cum. 3 test 500 to 1500 - cum. 5 test 1500 to 5000 - cum. 7 test	as per norms
	Kapchi	17467.92	*Gradation test *Impact Value *Flakiness Index of	1 to 100 - cum. 1 test 100 to 500 - cum. 3 test 500 to 1500 - cum. 5 test 1500 to 5000 - cum. 7 test	as per norms
	Grit	373.9 Cum	*Stripping Value	One test per work	as per norms
	stone dust	0.0 Cum	*P.L Value	One test per work	as per norms
	Supplying of Quarry spall	0.0 Cum	*Silt Content	One test per work	as per norms
	Sand	9099.3 Cum	*Gradation	One test per work	as per norms
	Asphalt	0.000	*Penetration Test	Tanker test in Geri Lab. Only	
		M.T.	as per I.S. 1203	Up to 10 1 11 to 20 2 20 to 50 3	
				Above 50 one per Tanker	
			Ductility Test	As per I.S. 1208	
			Specification Gravity test	As per I.S. 1202	
			Softening point test	As per I.S. 1204	
			Viscosity test	As per I.S. 1206	
			Quality of binder test	3 test per 2 tankers on plant site.	
	Cement	6039.880	*Consistency	1 test @ 50.0 M.T. 100 T 2 tests,	
		M.T.	*Setting time	200 T 3 tests, 300 T 4 tests, 500 T 5 tests,	
			*Compressive Strength.	800 T 6 tests, 1300 T 7 tests & 8 testd for large consignment.	8

Item No. as per Schedule 'B'	Brief Description Materials to be Tested	Qty. of Materials	Prescription of test which shall be carried out	Frequency @ which test shall be carried out	Total Nos of test to be taken
	Steel	TMT	*Tensile, (TMT) Yield	As per Manual of Quality Control 1 test/40 tonnes / per category	42
		903.86	*Elongation Size		
		MT Strands	Yield		
		0.00	*Elongation Size		
	C.C. Cube Test		*Compressive Strength.	1 test/40 tonnes / per category	0
	M10	659.07		1 to 5 cmt - 1 No	
	M15	4568.09		6 to 15 cmt - 2 No	17
	M20	4588.64		16 to 20 cmt - 3 No	95
	M25	8865.24		20 to 50 cmt - 4 No	95
	M30	2471.77		51 to above - 4 +1 additional sample for each 50 cu mt. Or part there of.	181
	M35				53
	M40				
	M45				
	M50				

The contractor shall have to pay 1% of the estimate cost put to tender towards all testing of materials & the same shall be deducted from their bills for the work. The testing of various materials Testing charges of GERT shall be born by Govt. No refund be made not extra charges over 1% shall be recoverable from the contractor.

Signature of Contractor


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CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1

Error Statement

(A)	Amount put to Tender Rs.	₹	21,73,69,356	
	Grand Total	₹	21,73,69,356	(A)
(B)	Amount not put to Tender			
	Add 1% Contingency Charges	₹	24,72,166	
	Add 1% Q.C. Charges	₹	21,73,700	
	Add Consultancy services	₹	61,29,649	
	GST	₹	4,04,46,953	
	Total Rs.	₹	5,12,22,468	(B)
	A + B Rs.	₹	26,85,91,824	
	T.S. Amount Rs.	₹	26,88,40,890	
	Arithmetic Correction & Rounding	Rs. ₹	2,49,066	

In the works of Box Culvert (16 × 4 × 4 m) on SH to Khevaliya Mansar Road and Box Type Major Bridge (16 × 4.0 × 4.5 m) on SH to Nana Dahisara Virpada Road, the credit for pipes used in diversion work has not been considered. Hence, the above error has been observed.


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CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1


Schedule - A

Sr no.	Material	Qty.	Rate	Per	Place of delivery
..... NIL					

Notes :

- 1 The person or firm submitting the tender should be that the rates to the above schedule are filled by the Engineer – in – charge in the items of the form prior to the submitting tender.
- 2 Store to be supplied to the contractor for the work free of cost or should sanctioned at in should be additional schedule B and specifications to the contractor agreement form.
- 3 Rate of cement inclusive of the cost of packing bags , empty bags will be the property of the contractor


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CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1

CEMENT CONSUMPTION STATEMENT

Sr. No.	It. No	Description of Items	Qty.	Consumption rate In Kg	Unit	Total In Kg
1	2	3	4	5	6	7
1	1	Providing and laying plain cement concrete in levelling course complete as per drawings and technical specifications as per sections 1500, 1700 and 2100 of MORTH. (M-15)	1388.5	290.0	Cum	402670
2	1	Providing and laying plain cement concrete grade M-15. PCC Toe wall for toe protection i.e. to prevent the slope pitching from sliding down, with graded machine mixed stone aggregate from 6 mm to 40 mm including tamping, vibrating, leveling and curing complete with all formwork, dewatering wherever required including all materials, labours, plants, machineries & tools, all leads and lifts, etc. complete as per specification.	1292.6	290.0	Cum	374848
3	6	Providing and casting in situ controlled cement concrete M-25 for R.C.C. box structure, as per drawings. Stem of Retaining wall etc. using 6 mm to 20 mm machine crushed well graded stone aggregate, sand of approved quality, OPC 53 grade cement with contractor's own concrete mix design etc. complete as per specification. The rate is inclusive of all materials, including necessary mixing in fully automatic batch mix plant, transport, curing, vibrating, placing in position, scaffolding, staging, normal shuttering, formworks, desluttering carefully, making good the damages, fixing embedment, inserts, pockets, wherever necessary, with all lead and lift with contractor's labour, tools & plants, machineries, as required, with including cost of fair finish form work.	7288.8	380.0	Cum	2769748
4	11	Providing and laying plain cement concrete grade M-20 curtain wall with minimum depth below floor level of 2m on upstream and 2.5m on downstream side as per clause 20.1.2.3 of IRC-SP-13:2004 and section 2507.1 of MORTH specification.	1784.2	360.0	Cum	642328
5	15	Providing and casting in situ controlled cement concrete M-25 for Parapet Wall, as per drawings. Stem of Parapet wall etc. using 6 mm to 20 mm machine crushed well graded stone aggregate, sand of approved quality, OPC 53 grade cement with contractor's own concrete mix design etc. complete as per specification.	363.5	380.0	Cum	138142
6	16	Providing and casting in situ controlled cement concrete M-30 for average 75 mm thick wearing coat laid as directed including tamping, vibrating, finishing, curing and filling joints with bitumen complete	850.1	410.0	Cum	348538
7	21	Cement Concrete Pavement (Construction of un-reinforced, dowel jointed, plain cement concrete pavement over a prepared sub base with 43 grade cement @ 400 kg per cum, coarse and fine aggregate conforming to IS 383, maximum size of coarse aggregate not exceeding 25 mm, transported to site, spread, compacted and finished in a continuous operation including provision of contraction, expansion, construction and longitudinal joints, joint filler, separation membrane, sealant primer, joint sealant, debonding strip, dowel bar, tie rod, admixtures as approved, curing compound, finishing to lines and grades as per drawing.)	1329.7	410.0	Cum	545181
8	23	Providing and laying plain cement concrete grade M-20 PCC protection wall, with graded machine mixed stone aggregate from 6 mm to 40 mm including tamping, vibrating, leveling and curing complete with all formwork, dewatering wherever required including all materials, labours, plants, machineries & tools, all leads and lifts, etc. complete as per specification.	775.3	360.0	Cum	279036
9	29	Providing parapet of ordinary cement concrete M-200 as per detailed drawings with necessary reinforcement including, shuttering, laying vibrating and finishing to line and level complete. (ii) Cast in situ	60.0	360.0	Cum	21600
10	32	Providing and laying plain cement concrete in levelling course complete as per drawings and technical specifications as per sections 1500, 1700 and 2100 of MORTH. (M-10)	561.4	230.0	Cum	129502
11	42	Providing and casting in situ ordinary cement concrete M-150 mix below CC pavement including laying ramming, vibrating and curing complete.	34.5	290.0	Cum	10005

CEMENT CONSUMPTION STATEMENT

Sr. No.	It. No.	Description of Items	Qty.	Consumption rate in Kg	Unit	Total in Kg
1	2	3	4	5	6	7
12	45	Providing and filling in foundation with ordinary cement concrete M-10 mix and providing necessary vertical pin headers incl. Formwork, vibrating, ramming and curing complete.	97.7	220.0	Cum	21494
13	46	Providing and casting in situ, controlled Cement Concrete M-25 for R.C.C. Raft and cut-off walls including necessary shuttering, laying, vibrating ramming of curing complete (Item No.27034+ R.A.)	480.7	380.0	Cum	182666
14	47	Providing and casting in situ Controlled cement concrete M- 25 for R.C.C. solid slab including centering, scaffolding curing and finishing complete. (SOR / Item No.27075-A) + R.A.)	474.0	380.0	Cum	180120
15	48	Providing and casting in situ Controlled cement concrete M-25 for approach slab including formwork curing and finishing complete (SOR / Item No 27103-8A + R.A.)	196.8	380.0	Cum	74784
16	49	Providing and casting in situ controlled cement concrete M-25 for Kerbs/Kerb blocks including form work,curing and finishing complete.(SOR / Item No. 27093 BA+ R.A.)	21.3	380.0	Cum	8094
17	50	Providing & casting in situ ordinary cement concrete M-20 mix and providing necessary pin headers including shuttering, scaffolding, laying, vibrating, curing and finishing complete without V-Grooves (A) Height from 0.0 M. to 5.0 M. (SOR / Item - 27053AA + R.A.)	1071.0	360.0	Cum	385560
18	56	Providing & Fixing of Precast R.C.C. Railing of M-30 Grade Concrete having 2 x tire (Row) of Hand Rail dimension as shown in detail drawing & Vertical Post such as c/c pacing between vertical posts not to exceed 1.625 m including necessary TMT steel, Form Work, Painting with Weatherproof Paint, Supplying of all material, Labour etc. complete as per instruction of Engineer-in-Charge. (Rate Analysis)	276.0	410.0	Rmt	113160
19	61	Providing & casting in situ ordinary cement concrete M-15 mix and providing necessary pin headers including shuttering, scaffolding, laying, vibrating, curing and finishing complete without V-Grooves.(A) Height from 0.0 M. to 5.0 M. (SOR/ Item - 27053-AA + R.A.)	1204.1	290.0	Cum	349189
20	67	Providing and casting - in - situ controlled cement concrete DMC -20 for mass concrete for foundation below Piers, Abutments & Square Return including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete as per specification (R.A.)	444.3	360.0	Cum	159948
21	68	Providing and casting in situ controlled cement concrete M-25 for R.C.C.work on pier cap,abutment cap and dirt wall including controlled cement concrete M-30 bed blocks or pedestals of required size below bearings as per detailed drawings, centering, shuttering, scaffolding, wherever necessary, laying vibrating, curing and finishing complete. (SOR Item -27066-BA+)	90.1	380.0	Cum	15238
22	75	Providing and filling in foundation with ordinary cement concrete M-15 mix and providing necessary vertical pin headers incl. Formwork, vibrating, ramming and curing complete. (SOR/ Item -27013-A + R.A.)	648.4	280.0	Cum	188036
23	86	Providing and casting in situ ordinary cement concrete M-20 for various thickness wearing coat laid as directed including tamping, vibrating, finishing, curing and filling joints with bitumen complete. (ItemNo.27091AA)	80.4	360.0	Cum	28944
24	89	Provision of an Reinforced cement concrete crash barrier at the edges of the road, approaches to bridge structures and medians, constructed with RCC M-30 Grade conforming to MoRTH Specification and as per details given IRC-5 including dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board, keyed to the structure on which it is built and installed as per design given in the enclosure to MOST circular No. RMW/NM - 33022/1/94-00 III dated 24 June 1994 as per dimensions in the approved drawing and at locations directed by the Engineer, all as specified (Rate Analysis)	16.0	410.0	Cum	6546

CEMENT CONSUMPTION STATEMENT

Sr. No.	It. No	Description of Items	Qty.	Consumption rate in Kg	Unit	Total in Kg
1	2	3	4	5	6	7
25	02	Providing and casting -in - situ controlled cement concrete M-20 for R.C.C. work in Pier, Abutment, Return & Riding Return as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete.(A) Height from 0.0 to 5.0 M. (1) Piers (2) Abutment (3) RCC return (SOR Item No. 27064 AA + R.A.)	373.5	350.0	Cum	134495
Total Kg						6039878
Say MT						6039.88
I.e. Bags						120798

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CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1

REINFORCEMENT CONSUMPTION STATEMENT

Sr.No	It. No.	Description of Items	Qty.	Unit	Total
1	1	Providing and fixing in position (Thermo mechanically Treated bars) TMT Fe500 CRS conforming to IS 1786 reinforcing bars of various diameters for box structure, retaining wall, etc. as per detailed designs and drawings and schedule including cutting, bending, hooking the bars, binding with 18 SWG GI wires with cost of all labour, materials, tools, plants, equipments, supporting as required with all lifts and leads etc. all complete as per specification and as directed by Engineer The rate includes for supply, loading, unloading, transporting to site, cutting, bending, lap length, hooking, placing, tying in position with contractor's own binding wire, welding, forming the cage and lowering it in position in pile bore etc. Welding and supporting in position to ensure lines and levels during concreting, maintaining proper cover/spacing, all leads & lifts, etc. including contractor's own equipment, labour, supervisor, taxes, machineries, etc. complete as per drawings and specification.	729.7	MT	729.68
2	41	Type - A, "W" - Metal Beam Crash Barrier (Providing and erecting a "W" metal beam crash barrier comprising of 3 mm thick corrugated sheet metal beam rail, 70 cm above road/ground level, fixed on ISMC series channel vertical post, 150 x 75 x 5 mm spaced 2 m centre to centre, 1.8 m high, 1.1 m below ground/road level, all steel parts and filaments to be galvanised by hot dip process, all fittings to conform to IS-1367 and IS-1364, metal beam rail to be fixed on the vertical post with a spacer of channel section 150 x 75 x 5 mm, 330 mm long complete as per clause 811)	120.0	Rmt	5.09
3	51	Providing and laying in position FE 500/500 D TMT bar reinforcement including cutting, bending, hooking and tying complete as per detailed drawings for the following (A) Piers (B) Abutments (C) R.C.C. Return / Wall/Caps/ Copings etc (SOR / Item No-27109)	9.4	MT	9.41
4	52	Providing and placing in position FE 500D TMT bar reinforcement including testing of coating at plant and all taxes including cutting, bending, hooking, and tying complete as per detailed drawing (A) Solid Slab. / App slab / Wearing Coat (SOR / Item No-27113)	19.3	MT	19.28
5	66	Providing and fixing Mild steel dowel bars of minimum 32MM dia. for anchoring by drilling holes in foundation strata including necessary bending, hooking of dowel bars and grouting the holes complete as per detailed drawing and as directed (SOR/ Item -27032)	72.0	Rmt	0.45
6	69	Providing and fixing in position Mild steel dowel bars in pier cap or abutment caps for anchorage in fixed end as per detailed drawings including cutting bending and welding complete.	24.0	Nos.	0.45
7	70	Providing and fixing in position Mild steel dowel bars in pier cap or abutment caps for anchorage in free end as per detailed drawings including cutting bending and welding complete.	24.0	Nos.	0.45
8	77	Providing and placing in position FE 550/550 D CRS TMT bar reinforcement including testing of coating at plant and all taxes including cutting, bending, hooking, and tying complete as per detailed drawing (A) Solid Slab. / App slab / Wearing Coat (SOR / Item No-27113 + Rs. 3500 for Fe 550D CRS)	139.0	MT	139.04
		Total		Total	903.9 MT

HT STRANDS CONSUMPTION STATEMENT

Sr.No	It. No.	Description of Items	Qty.	Unit	Total
1	-		-	-	-
				Total	0.00 MT

Deputy Executive Engineer
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CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1

POL STATEMENT


Sr. No.	Description	Amount	
1	Amount put to tender	= ₹ 21,73,69,356	A
2	Cost of Cement ,Steel, Emulsion & Asphalt	= ₹ 8,53,20,342	B
	Cement	₹ 3,16,12,732	B1
	Steel	₹ 5,37,07,610	B2
	Asphalt (VG-30)	₹ -	B3
	Asphalt (VG-40)	₹ -	B4
3	Cost of DTP except Cement, Steel & Asphalt C = A - B	= ₹ 13,20,49,014	C
4	Cost of other Material	= ₹ 1,29,71,879	D
5	Cost of POL Fuel	= ₹ 54,21,146	E
6	Cost of Labour F = C - (D + E)	= ₹ 11,36,55,989	F

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CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1

7	Percentage of Cement B1 / A x 100	$\frac{₹ 3,16,12,731.92}{₹ 21,73,69,356.16}$	x	100	=	14.54%
8	Percentage of Steel B2 / A x 100	$\frac{₹ 5,37,07,610.31}{₹ 21,73,69,356.16}$	x	100	=	24.71%
11	Percentage of Other Material D / A x 100	$\frac{₹ 1,29,71,879.33}{₹ 21,73,69,356.16}$	x	100	=	5.97%
12	Percentage of Labour F / A x 100 assume 40% of labour amt	$\frac{₹ 4,54,62,395.57}{₹ 21,73,69,356.16}$	x	100	=	20.91%
13	Percentage of POL fuel F / A x 100	$\frac{₹ 54,21,145.67}{₹ 21,73,69,356.16}$	x	100	=	2.49%
14	Percentage of plant and Machineries F / A x 100 assume 60% of labour amt	$\frac{₹ 6,81,93,593.36}{₹ 21,73,69,356.16}$	x	100	=	31.37%
Total						100%



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CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1

COST OF BASIC MATERIALS

Sr. No.	Materials	Qty.	Unit	Rate	Per	Amount in Rs.
1	2	3	4	5	6	7
1	Cement	6039.9	M.T.	5234	M.T.	₹ 3,16,12,731.92
2	TMT/HYSD Bars	903.9	M.T.	59420	M.T.	₹ 5,37,07,610.31
					TOTAL	₹ 8,53,20,342.23



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CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1

COST OF OTHER MATERIALS

Sr. No.	Materials	Qty.	Unit	Unit Rate	Amount in Rs.
1	2	3	4	5	6
1	Earth	23316.21	cum	40.00	₹ 9,32,648.32
2	Metal 40-63mm	1732.89	cum	303.74	₹ 5,26,349.47
3	Sand	9099.30	cum	293.00	₹ 26,66,094.57
4	Kapachi	17467.92	cum	471.73	₹ 82,40,143.28
5	Metal 19-26.5 mm	1007.49	cum	471.73	₹ 4,75,261.42
6	Grit	373.91	cum	351.37	₹ 1,31,382.27
7	Stone Dust	0.00	cum	160.85	₹ 0.00
					₹ 1,29,71,879.33


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Item No.	Brief Description	Qty.	Unit	Metal 25-90mm Cum	Metal 40-63mm Cum	RT 75-28.5mm Cum	Earth Cum	Quarry Spall Cum	Sand Cum	Rapachi Cum	Gravel Cum	Hard Marmor Cum	Metal 38.5 to 4.75 mm Cum	Grit Cum	Stone Dust Cum	Bricks Cum
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
11	Construction of granular Sub base with Coarse Graded Material (Gravels II) (Table- 400-2) of 200 mm by providing coarse graded material Metal Crushed using size 53mm to 26.5 mm @ 27.5%, 26.5 mm to 8.5 mm @ 23.5%, 8.5mm to 4.75mm @12.50% and 4.75mm below @ 17.5% spreading in uniform layers with including and mixing the material obtained from existing RT road by milling machine using motor grader on prepared surface mixing by mix in place method with rotavator at OMC and compacting with vibratory roller to achieve the desired density complete as per Clause 401.2 Table 400.1 grade-V	1058.6	cum										778.973	258 6835		
12	Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification including spreading in uniform thickness, hand packing, rolling with vibratory roller 8-10 tonnes in stages to proper grade and camber, applying and brooming requisite type of screening/ binding Materials to fill up the interstices of coarse aggregates, watering and compacting to the required density-Grading 1, Using Screening Cruitable type such as Moorum or Gravel.	1080.5	Cum		983.319									64.8342		
13	Cement Concrete Pavement (Construction of unreinforced, dowel jointed, plain cement concrete pavement over a prepared sub base with 43 grade cement @ 400 kg per cum, coarse and fine aggregate conforming to IS 383, maximum size of coarse aggregate not exceeding 25 mm, transported to site, spread, compacted and finished in a continuous operation including provision of contraction, expansion, construction and longitudinal joints, joint filler, separation membrane, sealant primer, joint sealant, debonding strip, dowel bar, tie rod, substructure as approved, curing compound, finishing to lines and grades as per drawing 1	1828.7	Cum						807.0	1214.0						
19	Providing and laying plain cement concrete grade M-20 RCC protection wall, with graded machine mixed stone aggregate from 8 mm to 40 mm including tamping, vibrating, leveling and curing complete with all formwork, dewatering whenever required including all material, labour, plants, machines & tools, all loads and lifts, etc. complete as per specification.	775.1	Cum						359.4	718.8						
25	Providing parapet of ordinary cement concrete M-200 as per detailed drawings with necessary reinforcement including, shuttering, laying vibrating and finishing to line and level complete. (2) Cast in situ.	60.0	Cum													
31	Providing and laying plain cement concrete in levelling course complete as per drawings and technical specifications as per sections 1500, 1700 and 2100 of MORTH. (M-10)	581.4	Cum						240.3	520.6						
35	Providing, laying, spreading and compacting stone aggregates of specific sizes to water bound macadam specification (200mm thk in two layers) including spreading in uniform thickness, hand packing, rolling with vibratory roller 8-10 tonnes in stages to proper grade and camber, applying and brooming requisite type of screening/ binding Materials to fill up the interstices of coarse aggregates, watering and compacting to the required density.- Grading 2, Using Screening Cruitable type such as Moorum or Gravel.	821.7	Cum		749.576								98.8453	49 4226		

Item No.	Brief Description	Qty.	Unit	Metal 25-90mm Cum	Metal 40-63mm Cum	RT 75-26.5mm Cum	Earth Cum	Quarry Spall Cum	Sand Cum	Kapchi Cum	Gravel Cum	Hard Mortar Cum	Metal 36.5 to 4.75 mm Cum	Grit Cum	Stone Dust Cum	Bricks Cum
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
10	Granular sub base Grade 1 with black trap crushed stone well graded material (Table-400.1) by mix in place method construction of granular sub base by providing black trap crushed stone well graded material, spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with roller at G.M.C. and compacting with vibratory roller to achieve the desired density complete. (As per technical specification clause-401) for G-3 Material	50.1	Cum				50.1									
42	Providing and casting in situ ordinary cement concrete M-150 mix below CC pavement including laying, ramming, vibrating and curing complete.	34.5	Cum						18.6	29.8						
43	Providing and filling in foundation with ordinary cement concrete M-10 mix and providing necessary vertical pin headers incl. formwork, vibrating, ramming and curing complete.	97.7	Cum						47.3	80.7						
44	Providing and casting in situ controlled cement concrete M-25 for R.C.C. flat and cut-off walls including necessary shuttering, laying, vibrating, ramming of curing complete (Item No.27014+ R.A.)	480.7	Cum						221.5	443.0						
47	Providing and casting in situ Controlled cement concrete M-25 for R.C.C. solid slab including shuttering, scaffolding curing and finishing complete. (SCM / Item No.27075-A) + R.A.	474.8	Cum						218.4	436.8						
48	Providing and casting in situ Controlled cement concrete M-25 for approach slab including formwork curing and finishing complete (SCM / Item No.27503-BA + R.A.)	136.8	Cum						80.7	161.4						
49	Providing and casting in situ controlled cement concrete M-25 for kerbs/curb blocks including form work, curing and finishing complete (SCM / Item No.27093 BA+ R.A.)	21.3	Cum						9.8	19.6						
50	Providing and casting in situ ordinary cement concrete M-20 mix and providing necessary pin headers including shuttering, scaffolding, laying, vibrating, curing and finishing complete without V-Grooves (A) Height from 0.0 M. to 5.0 M. (SCM / Item - 27093AAA + R.A.)	1071.0	Cum						496.6	993.2						
51	Providing and casting in situ controlled cement concrete M-25 for R.C.C. work on pier trap, abutment cap and dirt wall including controlled cement concrete M-30 bed blocks or pedestals of required size below bearings as per detailed drawings, centering, shuttering, scaffolding, whenever necessary, laying vibrating, curing and finishing complete. (SCM Item - 27065-BA)	40.1	Cum						18.5	37.0						
70	Earthwork for Embankment including breaking clods, dressing etc. complete with all lead and lift. (Excluding watering & consolidation) (C) From Borrow Area within 3.00 K.M. Lead (S.O.A. / S. No. 26001-EB.)	72.0	Cum				72.0									
76	Providing and filling in foundation with ordinary cement concrete M-15 mix and providing necessary vertical pin headers incl. Formwork, vibrating, ramming and curing complete. (SCM / Item-27017-A + R.A.)	648.4	Cum						349.7	699.6						
78	Earthwork for Embankment including breaking clods, dressing etc. complete with all lead and lift. (Excluding watering & consolidation) (S) From Borrow Area within 5.00 Km. Lead. (SCM Item No. 26001-A + R.A.)	1720.0	Cum				1720.0									
86	Providing and casting in situ ordinary cement concrete M-20 for various thickness wearing coat laid as directed including tamping, vibrating, finishing, curing and filling joints with bitumen complete. (Item No. 27091AA)	80.4	Cum						37.3	74.6						

Item No.	Item Description	Qty.	Unit	Metal 25-90mm Cum	Metal 40-63mm Cum	RT 75-26.5mm Cum	Earth Cum	Quarry Spall Cum	Sand Cum	Kapchi Cum	Gravel Cum	Hard Marmor Cum	Metal 3/8.5 to 4.75 mm Cum	Grill Cum	Stone Dust Cum	Bricks Cum
1	2 Provision of an Reinforced cement concrete crash barrier at the edges of the road, approaches to bridge structures and medians, constructed with RCC M-30 Grade conforming to MoRTH Specification and as per details given IRC-9 including dowel bars 25 mm dia, 450 mm long at expansion joints filled with pre-moulded asphalt filler board, keyed to the structure on which it is built and installed as per design given in the enclosure to MOST circular No. RW/TH - 3302/7/94-00 II dated 24 June 1994 as per dimensions in the approved drawing and at locations directed by the Engineer, all as specified (Rate Analysis)	3	m	5	6	7	8	9	10	11	12	12	14	15	16	17
2	3 Providing and casting in situ reinforced cement concrete M-30 for R.C.C. work in Pier, Abutment, Return & Rising Retain as per drawings including centering shuttering, scaffolding where necessary, laying vibrating, curing and finishing complete. (a) Height from 0.0 to 5.0 M. (1) Piers (2) Abutment (3) RCC return (SOB Item No. 27064 AA + B, A,)	373.6	Cum						179.2	346.5						
	Total			5	1751.89	0	28116.21	0	9099.399	17467.82	0	0	1007.48	373.9148	0	0

Deputy Executive Engineer
R & B (P) Sub Division
Mumbai

Executive Engineer
R & B (P) Division
Mumbai

CONSTRUCTION OF CROSS DRAINAGE STRUCTURES ON VARIOUS ROADS IN MORBI DISTRICT - PACKAGE -1

POL COST CALCULATION

Consumption of diesel considered : 1 Liter / 4 KM
Cost of diesel considered : 91

Consumption of oil considered : 1 Liter / 150 KM
Cost of oil considered : 200

Item No	Material	Total Quantity	Unit	Qty. per trip	No of trips	Lead	Total Km	Consumption (Ltr)		Rate		Total cost
								Diesel	Oil	Diesel	Oil	
1	2	3	4	5	6	7	8	9	10	11	12	13
1	Cement	6039.88	MT	20 MT	301.99	15	4530	1132	30	₹ 1,03,055.45	₹ 6,039.88	₹ 1,09,095.33
2	Steel & HT	903.86	MT	20 MT	45.19	15	678	169	5	₹ 15,422.18	₹ 903.86	₹ 16,326.05
3	Bulk asphalt & Emulsion	0.00	MT	20 MT	0.00	25	0	0	0	₹ 0.00	₹ 0.00	₹ 0.00
4	Earth	37305.93	MT	8.5 MT	4388.93	10	43889	10972	293	₹ 9,98,482.32	₹ 58,519.11	₹ 10,57,001.43
5	Metal 40-63mm	2773	MT	8.5 MT	326.19	25	8155	2039	54	₹ 1,85,521.68	₹ 10,873.07	₹ 1,96,394.74
6	Sand	14558.88	MT	8.5 MT	1712.81	20	34256	8564	228	₹ 7,79,328.19	₹ 45,674.91	₹ 8,25,003.10
7	Kapachi	27948.68	MT	8.5 MT	3288.08	20	65762	16440	438	₹ 14,96,076.22	₹ 87,682.12	₹ 15,83,758.35
8	Metal 19-26.5 mm	1611.98	MT	8.5 MT	189.64	20	3793	948	25	₹ 86,288.22	₹ 5,057.19	₹ 91,345.41
9	Grit	598.26	MT	8.5 MT	70.38	20	1408	352	9	₹ 32,024.66	₹ 1,876.90	₹ 33,901.56
10	Stone Dust	0.00	MT	8.5 MT	0.00	20	0	0	0	₹ 0.00	₹ 0.00	₹ 0.00
Unit Oil Consumption per unit time												
11	Spreading (Non BT)	25435.41	cum	30 m³/hr	847.8 hrs	10	0.10	848	8478	85	₹ 7,71,540.71	₹ 16,956.94
12	Spreading (BT)	0.00	MT	400 MT/day	0.0 days	50	2.00	0	0.00	0.00	₹ 0.00	₹ 0.00
13	Rolling (Non BT)	25435.41	cum	10 m³/hr	2543.5 hrs	3	0.05	2544	7630.62	127.18	₹ 6,94,386.64	₹ 7,19,822.05
14	Rolling (BT)	0.00	MT	200 MT/day	0.0 days	100	3.00	0	0.00	0.00	₹ 0.00	₹ 0.00
Total :											₹ 54,21,145.67	

Deputy Executive Engineer
R & B (P) Sub Division
Morbi

Executive Engineer
R & B (P) Division
Morbi

Painting on concrete surface (Providing and applying 2 coats of water based cement paint to unplastered concrete surface after cleaning the surface of dirt, dust, oil, grease, fluorescence and applying paint @ of 1 litre for 2 Sq.m.)

1.0 Material & Workmanship

The relevant specifications given in Section – 2808 of MORTH fifth revision specification shall apply to this item.

2.0 Mode of Measurement

The rate includes labour, material, equipment as per specification and as directed by the engineer including all lead and lifts etc. complete.

The rate shall be for a unit of one sqm.

112 ARRANGEMENT FOR TRAFFIC DURING CONSTRUCTION

112.1 General

The Contractor shall at all times, carry out work on the highway in a manner creating least interference to the flow of traffic while consistent with the satisfactory execution of the same. For all works involving improvements to the existing highway, the Contractor shall, in accordance with the directives of the Engineer, provide and maintain, during execution of the work, a passage for traffic either along a part of the existing carriageway under improvement or along a temporary diversion constructed close to the highway. Before taking up any construction or maintenance operation, the Contractor shall prepare a Traffic Management Plan for each work zone and submit it to the Engineer for prior approval. This plan should include inter alia:

- i) Provision of a qualified safety officer with support staff to serve as a site safety team
- ii) Provision of traffic safety devices and road signs in construction zones as per IRC:SP:55 and other relevant IRC Codes and para 112.4:
- iii) Safety measures for the workers engaged including personal protection equipment
- iv) First aid and emergency response arrangements
- v) Details and drawings of arrangements in compliance with other sub Sections of this Section.

112.2 Passage of Traffic along a Part of the Existing Carriageway under Improvement

For widening/strengthening existing carriageway where part width of the existing carriageway is proposed to be used for passage of traffic, treated shoulders shall be provided on the side on which work is not in progress. The treatment to the shoulder shall consist of providing at least 150 mm thick granular (Wet Mix Macadam/Water Bound Macadam) base course covered with bituminous surface dressing in a width of at least 1.5 m and the treated shoulder shall be maintained throughout the period during which traffic uses the same to the satisfaction of the Engineer. The continuous length, in which such work shall be carried out, would be limited normally to 500 m at a place. However, where work is allowed by the Engineer in longer stretches passing places at least 20 m long with additional paved width of 2.5 m shall be provided at every 0.5 km interval.

In case of eccentric widening of existing two-lane to four-lane, the additional two-lanes would be constructed first and the traffic diverted to it and only thereafter the required treatment to the existing carriageway would be carried out. In case of concentric widening, stipulations as in paragraph above shall apply.

After the works are completed, with the approval of the Engineer, the treated shoulder shall be dismantled, the debris disposed of and the area cleared as per the direction of the Engineer.

112.3 Passage of Traffic along a Temporary Diversion

In stretches where it is not possible to pass the traffic on part width of the carriageway, a temporary diversion shall be constructed with 7 m carriageway and 2.5 m earthen shoulders on each side (total width of roadway 12 m) with the following provision for road crust in the 7 m width:

- i) Earthwork
- ii) 200 mm (compacted) granular sub-base
- iii) 225 mm (compacted) granular base course
- iv) Priming and Tack Coat and
- v) Premix carpet with Seal Coat/Mix Seal Surfacing

The location of such stretch, alignment and longitudinal section of diversion including junctions and temporary cross drainage provision shall be as approved by the Engineer.

112.4 Traffic Safety and Control

The Contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, marking, flags, lights and flagmen as per the traffic management plan submitted by the Contractor and approved by the Engineer, referred to in Sub-Section 112.1. Before taking up any construction, an agreed phased programme for the diversion of traffic on the highway shall be drawn up in consultation with the Engineer.

All construction equipment working or parked on or within the traffic lanes or shoulders under "Traffic maintained" conditions shall be equipped with flashing yellow beacons.

The Contractor shall conduct all operations to minimize any drop-offs (abrupt changes in roadway) exposed to traffic. Drop-offs in the travelled way shall be protected by a wedge of compacted stable material capable of carrying traffic (the wedge being 1 vertical to 4 horizontal or flatter).

The Engineer shall authorize other methods, to protect drop-offs when conditions do not allow a wedge of compacted, stable material.

Warning signs, barricades, warning lights, and all other traffic control devices shall not be removed if the hazard has not been eliminated. Only upon receipt of specific written authorization from the Engineer, the Contractor may remove or cease to maintain warning signs, barricades, warning lights, and all other traffic control devices.

The barricades erected on either side of the carriageway/portion of the carriageway closed to traffic, shall be of strong design to resist violation, and painted with alternate black and white stripes. Red lanterns or warning lights of similar type shall be mounted on the barricades at night and kept lit throughout from sunset to sunrise.

At the points where traffic is to deviate from its normal path (whether on temporary diversion or part width of the carriageway) the channel for traffic shall be clearly marked with the aid of pavement markings, painted drums or a similar device to the directions of the Engineer. At night, the passage shall be delineated with lanterns or other suitable light source including solar energy bulbs.

One-way traffic operation shall be established whenever the traffic is to be passed over part of the carriageway inadequate for two-lane traffic. This shall be done with the help of temporary traffic signals or flagmen kept positioned on opposite sides during all hours. For regulation of traffic, the flagmen shall be equipped with red and green flags and lanterns/lights.

On both sides, suitable regulatory/warning signs as approved by the Engineer shall be installed for the guidance of road users. On each approach, at least two signs shall be put up, one close to the point where transition of carriageway begins and the other 120 m away. The signs shall be of approved design and of reflective type, as directed by the Engineer.

112.5 Maintenance of Diversions and Traffic Control Devices

Signs, lights, barriers and other traffic control devices, adequate lighting and other arrangements, as well as the riding surface of diversions and treated shoulders shall be maintained in a satisfactory condition till such time they are required and as directed by the Engineer. The temporary travelled way shall be kept free of dust by frequent applications of water, if necessary.

112.6 Measurements for Payment and Rate

All arrangements, as contained in this Section 112 for safety of road users, during construction including provision of temporary diversions/temporary cross drainage structures/treated shoulders shall be measured and paid as per the BOQ. However their maintenance, dismantling and clearing debris shall be considered as incidental to the Works and shall not be paid separately.

201 CLEARING AND GRUBBING**201.1 Scope**

This work shall consist of cutting, removing and disposing of all materials such as trees, bushes, shrubs, stumps, roots, grass, weeds, rubbish, top organic soil, etc. to an average depth of 150 mm in thickness, which in the opinion of the Engineer are unsuitable for incorporation in the works, from the area of road land containing road embankment, drains, cross-drainage structures and such other areas as may be specified on the drawings or by the Engineer. It shall include necessary excavation, backfilling of pits resulting from uprooting of trees and stumps to required compaction, handling, salvaging, and disposal of cleared materials with all leads and lifts. Clearing and grubbing shall be performed in advance of earthwork operations and in accordance with the requirements of these Specifications.

201.2 Preservation of Property/Amenities

Roadside trees, shrubs, any other plants, pole lines, fences, signs, monuments, buildings, pipelines, sewers and all highway facilities within or adjacent to the highway which are not to be disturbed shall be protected from injury or damage. The Contractor shall provide and install at his own cost, suitable safeguards approved by the Engineer for this purpose.

During clearing and grubbing, the Contractor shall take all adequate precautions against soil erosion, water pollution, etc., and where required, undertake additional works to that effect vide Clause 306. Before start of operations, the Contractor shall submit to the Engineer for approval, his work plan including the procedure to be followed for disposal of waste materials, etc., and the schedules for carrying out temporary and permanent erosion control works as stipulated in Clause 306.3.

201.3 Methods, Tools and Equipment

Only such methods, tools and equipment as are approved by the Engineer and which will not affect any property to be preserved shall be adopted for the Work. If the area has thick vegetation/roots/trees, a crawler or pneumatic tyred dozer of adequate capacity may be used for clearance purposes. The dozer shall have ripper attachments for removal of tree stumps. All trees, stumps, etc., falling within excavation and fill lines shall be cut to such depth below ground level that in no case these fall within 500 mm of the bottom of the subgrade. Also, all vegetation such as roots, under-growth, grass and other deleterious matter unsuitable for incorporation in the embankment/subgrade shall be removed between fill lines to the satisfaction of the Engineer. All branches of trees extending above the roadway shall be trimmed as directed by the Engineer.

All excavations below the general ground level arising out of the removal of trees, stumps, etc., shall be filled with suitable material and compacted thoroughly so as to make the surface at these points conform to the surrounding area.

Ant-hills both above and below the ground, as are liable to collapse and obstruct free subsoil water flow shall be removed and their workings, which may extend to several metres, shall be suitably treated.

201.4 Disposal of Materials

All materials arising from clearing and grubbing operations shall be taken over and shall be disposed of by the Contractor at suitable disposal sites with all leads and lifts. The disposal shall be in accordance with local, State and Central regulations

201.5 Measurements for Payment

Clearing and grubbing for road embankment, drains and cross-drainage structures shall be measured on area basis in terms of hectares. Cutting of trees upto 300 mm in girth and removal of their stumps, including removal of stumps upto 300 mm in girth left over after trees have been cut by any other agency, and trimming of branches of trees extending above the roadway and backfilling to the required compaction shall be considered incidental to the clearing and grubbing operations. Clearing and grubbing of borrow areas shall be deemed to be a part of works preparatory to embankment construction and shall be deemed to have been included in the rates quoted for the embankment construction item and no separate payment shall be made for the same.

Ground levels shall be taken prior to and after clearing and grubbing. Levels taken prior to clearing and grubbing shall be the base level and will be accordingly used for assessing the depth of clearing and grubbing and computation of quantity of any unsuitable material which is required to be removed. The levels taken subsequent to clearing and grubbing shall be the base level for computation of earthwork for embankment.

Cutting of trees, excluding removal of stumps and roots of trees of girth above 300 mm shall be measured in terms of number according to the girth sizes given below :-

- | | | |
|------|-------|-------------------|
| i) | Above | 300 mm to 600 mm |
| ii) | Above | 600 mm to 900 mm |
| iii) | Above | 900 mm to 1800 mm |
| iv) | Above | 1800 mm |

Removal of stumps and roots including backfilling with suitable material to required compaction shall be a separate item and shall be measured in terms of number according to the sizes given below:-

- | | | |
|------|-------|-------------------|
| i) | Above | 300 mm to 600 mm |
| ii) | Above | 600 mm to 900 mm |
| iii) | Above | 900 mm to 1800 mm |
| iv) | Above | 1800 mm |

For the purpose of cutting of trees and removal of roots and stumps, the girth shall be measured at a height of 1 m above ground or at the top of the stump if the height of the stump is less than one metre from the ground.

201.6 Rates

201.6.1 The Contract unit rates for the various items of clearing and grubbing shall be payment in full for carrying out the required operations including full compensation for all labour, materials, tools, equipment and incidentals necessary to complete the work. These will also include removal of stumps of trees less than 300 mm girth excavation and backfilling to required density, where necessary, and handling, giving credit towards salvage value disposing of the cleared materials with all lifts and leads. Clearing and grubbing done in excess of 150 mm by the Contractor shall be made good by the Contractor at his own cost as per Clause 301.3.3 to the satisfaction of the Engineer prior to taking up earthwork. Where clearing and grubbing is to be done to a level beyond 150 mm, due to site considerations, as directed by the Engineer, the extra quantity shall be measured and paid separately.

201.6.2 The Contract unit rate for cutting trees of girth above 300 mm shall include handling, giving credit towards salvage value disposing of the cleared materials with all lifts and leads.

201.6.3 The Contract unit rate for removal of stumps and roots of trees girth above 300 mm shall include excavation and backfilling with suitable material to required compaction, handling, giving credit towards salvage value disposing of the cleared materials with all lifts and leads.

201.6.4 The Contract unit rate is deemed to include credit towards value of usable materials, salvage value of unusable materials and off-set price of cut trees and stumps belonging to the Forest Department. The off-set price of cut trees and stumps belonging to the Forest Department shall be deducted from the amount due to the Contractor and deposited with the State Forest Department. In case the cut trees and stumps are required to be deposited with the Forest Department the Contractor shall do so and no deduction towards the off-set price shall be effected. The offset price shall be as per guidelines / estimates of the State Forest Department.

201.6.5 Where a Contract does not include separate items of clearing and grubbing, the same shall be considered incidental to the earthwork items and the Contract unit prices for the same shall be considered as including clearing and grubbing operations.

202 DISMANTLING CULVERTS, BRIDGES AND OTHER STRUCTURES/ PAVEMENTS

202.1 Scope

This work shall consist of dismantling and removing existing culverts, bridges, pavements,

kerbs and other structures like guard-rails, fences, utility services, manholes, catch basins, inlets, etc., from the right of way which in the opinion of the Engineer interfere with the construction of road or are not suitable to remain in place, disposing of the surplus/unsuitable materials and backfilling to after the required compaction as directed by the Engineer.

Existing culverts, bridges, pavements and other structures which are within the highway and which are designated for removal, shall be removed upto the limit and extent specified in the drawings or as indicated by the Engineer.

Dismantling and removal operations shall be carried out with such equipment and in such a manner as to leave undisturbed, adjacent pavement, structures and any other work to be left in place.

All operations necessary for the removal of any existing structure which might endanger new construction shall be completed prior to the start of new work.

202.2 Dismantling Culverts and Bridges

The structures shall be dismantled carefully and the resulting materials so removed as not to cause any damage to the part of the structure to be retained and any other properties or structures nearby.

Unless otherwise specified, the superstructure portion of culverts/bridges shall be entirely removed and other parts removed up to at least 600 mm below the sub-grade, slope face or original ground level whichever is the lowest or as necessary depending upon the interference they cause to the new construction. Removal of overlying or adjacent material, if required in connection with the dismantling of the structures, shall be incidental to this item.

Where existing culverts/bridges are to be extended or otherwise incorporated in the new work, only such part or parts of the existing structure shall be removed as are necessary and directed by the Engineer to provide a proper connection with the new work. The connecting edges shall be cut, chipped and trimmed to the required lines and grades without weakening or damaging any part of the structure to be retained. Due care should be taken to ensure that reinforcing bars which are to be left in place so as to project into the new work as dowels or ties are not injured during removal of concrete.

Pipe culverts shall be carefully removed in such a manner as to avoid damage to the pipes.

Steel structures shall, unless otherwise provided, be carefully dismantled in such a manner as to avoid damage to members thereof. If specified in the drawings or directed by the Engineer that the structure is to be removed in a condition suitable for re-erection, all members shall be match-marked by the Contractor with white lead paint before dismantling; end pins, nuts, loose plates, etc. shall be similarly marked to indicate their proper location; all pins, pin holes

and machined surfaces shall be painted with a mixture of white lead and tallow and all loose parts shall be securely wired to adjacent members or packed in boxes.

Timber structures shall be removed in such a manner as to avoid damage to such timber or lumber having salvage value as is designated by the Engineer.

202.3 Dismantling Pavements and Other Structures

In removing pavements, kerbs, gutters, and other structures like guard-rails, fences, manholes, catch basins, inlets, etc., where portions of the existing construction are to be left in the finished work, the same shall be removed to an existing joint or cut and chipped to a true line with a face perpendicular to the surface of the existing structure. Sufficient removal shall be made to provide for proper grades and connections with the new work as directed by the Engineer.

All concrete pavements, base courses in carriageway and shoulders etc., designated for removal shall be broken to pieces whose volume shall not exceed 0.02 cu.m and used with the approval of the Engineer or disposed of.

202.4 Back-filling

Holes and depressions caused by dismantling operations shall be backfilled with excavated or other approved materials and compacted to required density as directed by the Engineer.

202.5 Disposal of Materials

All surplus materials shall be taken over by the Contractor which may either be re-used with the approval of the Engineer or disposed of with all leads and lifts.

202.6 Measurements for Payment

The work of dismantling shall be paid for in units indicated below by taking measurements before and after, as applicable:

i)	Dismantling brick/stone masonry/ concrete (plain and reinforced)	cu.m
ii)	Dismantling flexible and cement concrete pavement	cu.m
iii)	Dismantling steel structures	tonne
iv)	Dismantling timber structures	cu.m
v)	Dismantling pipes, guard rails, kerbs, gutters and fencing	linear m
vi)	Utility services	No.

202.7 Rates

The Contract unit rates for the various items of dismantling shall be paid in full for carrying out the required operations including full compensation for all labour, materials, tools, equipment, safeguards and incidentals necessary to complete the work. The rates will include excavation and backfilling to the required compaction and for handling, giving credit towards salvage value disposing of dismantled materials with all lifts and leads.

300

**EARTHWORK, EROSION
CONTROL AND
DRAINAGE**

301 EXCAVATION FOR ROADWAY AND DRAINS**301.1 Scope**

This work shall consist of excavation, removal and disposal of materials necessary for the construction of roadway, side drains and waterways in accordance with requirements of these Specifications and the lines, grades and cross-sections shown in the drawings or as indicated by the Engineer. It shall include the hauling and stacking of or hauling to sites of embankment and subgrade construction suitable cut materials as required, as also the disposal of unsuitable cut materials in specified manner, with all leads and lifts, reuse of cut materials as may be deemed fit, trimming and finishing of the road to specified dimensions or as directed by the Engineer.

301.2 Classification of Excavated Material

301.2.1 Classification : All materials involved in excavation shall be classified by the Engineer in the following manner:

a) Soil :

This shall comprise topsoil, turf, sand, silt, loam, clay, mud, peat, black-cotton soil, soft shale or loose moorum, a mixture of these and similar material which yields to the ordinary application of pick, spade and/or shovel, rake or other ordinary digging equipment. Removal of gravel or any other modular material having dimension in any one direction not exceeding 75 mm shall be deemed to be covered under this category.

b) Ordinary Rock (not requiring blasting) This shall include :

- i) rock types such as laterites, shales and conglomerates, varieties of limestone and sandstone etc., which may be quarried or split with crow bars, also including any rock which in dry state may be hard, requiring blasting but which, when wet, becomes soft and manageable by means other than blasting;
- ii) macadam surfaces such as water bound and bitumen bound; soling of roads, cement concrete pavement, cobble stone, etc. compacted moorum or stabilized soil requiring use of pick axe or shovel or both.
- iii) lime concrete, stone masonry and brick work in lime/cement mortar below ground level, reinforced cement concrete which may be broken up with crow bars or picks and stone masonry in cement mortar below ground level; and
- iv) boulders which do not require blasting found lying loose on the surface or embedded in river bed, soil, talus, slope wash and terrace material of dissimilar origin.

c) **Hard Rock (requiring blasting)**

This shall comprise :

- i) any rock or cement concrete for the excavation of which the use of mechanical plant and/or blasting is required,
- ii) reinforced cement concrete below ground level and in bridge/ ROB/RUB/flyover piers and abutments,
- iii) boulders requiring blasting.

d) **Hard Rock (using controlled blasting) :**

Hard rock requiring blasting as described under (c) but where controlled blasting is to be carried out in locations where built-up area, huts, and are situated at within 200 m of the blast site.

e) **Hard Rock (blasting prohibited)**

Hard rock requiring blasting as described under (d) but where blasting is prohibited for any reason like people living within 20 m of blast sites etc. and excavation has to be carried out by chiselling, wedging or any other agreed method.

f) **Marshy soil**

This shall include soils like soft clays and peats excavated below the original ground level of marshes and swamps and soils excavated from other areas requiring continuous pumping or bailing out of water.

301.2.2 Authority for Classification

The classification of excavation shall be decided by the Engineer and his decision shall be final and binding on the Contractor. Merely the use of explosives in excavation will not be considered as a reason for higher classification unless blasting is clearly necessary in the opinion of the Engineer.

301.3 Construction Operations

301.3.1 Setting Out

After the site has been cleared as per Clause 201, the limits of excavation shall be set out true to lines, curves, slopes, grades and sections as shown on the drawings or as directed by the Engineer. Clause 109 shall be applicable for the setting out operations.

301.3.2 Stripping and Storing Topsoil

When so directed by the Engineer, the topsoil existing over the sites of excavation shall be

stripped to specified depths and stockpiled at designated locations for re-use in covering embankment slopes, cut slopes, berms and other disturbed areas where re-vegetation is desired in accordance with Clause 305.3.3. Prior to stripping the topsoil, all trees, shrubs etc. shall be removed along with their roots, with approval of the Engineer.

301.3.3 Excavation-General

All excavations shall be carried out in conformity with the directions laid here-in-under and in a manner approved by the Engineer. The work shall be so done that the suitable materials available from excavation are satisfactorily utilized as deemed fit or as approved by the Engineer.

While planning or executing excavations, the Contractor shall take all adequate precautions against soil erosion, water pollution etc. as per Clause 306, and take appropriate drainage measures to keep the site free of water in accordance with Clause 311.

The excavations shall conform to the lines, grades, side slopes and levels shown on the drawings or as directed by the Engineer. The Contractor shall not excavate outside the limits of excavation. Subject to the permitted tolerances, any excess depth/width excavated beyond the specified levels/dimensions on the drawings shall be made good at the cost of the Contractor with suitable material of characteristics similar to that removed and compacted to the requirements of Clause 305.

All debris and loose material on the slopes of cuttings shall be removed. No backfilling shall be allowed to obtain required slopes excepting that when boulders or soft materials are encountered in cut slopes, these shall be excavated to approved depth on instructions of the Engineer and the resulting cavities filled with suitable material and thoroughly compacted in an appropriate manner.

After excavation, the sides of excavated area shall be trimmed and the area contoured to minimize erosion and ponding, allowing for natural drainage to take place.

301.3.4 Methods, Tools and Equipment

Only such methods, tools and equipment as approved by the Engineer shall be adopted/used in the work. If so desired by the Engineer, the Contractor shall demonstrate the efficacy of the type of equipment to be used before the commencement of work.

301.3.5 Rock Excavation

Rock, when encountered in road excavation, shall be removed upto the formation level or as otherwise indicated in the drawings. Where, however, unstable shales or other unsuitable materials are encountered at the formation level, these shall be excavated to the extent of

500 mm below the formation level or as otherwise specified. In all cases, the excavation operations shall be so carried out that at no point on cut formations the rock protrudes above the specified levels. Rocks and boulders which are likely to cause differential settlement and also local drainage problems shall be removed to the extent of 500 mm below the formation level in the formation width including side drains.

Where excavation is done to levels lower than those specified, the excess excavation shall be made good as per Clauses 301.3.3 and 301.6 to the satisfaction of the Engineer.

Slopes in rock cutting shall be finished to uniform lines corresponding to slope lines shown on the drawings or as directed by the Engineer. Notwithstanding the foregoing, all loose pieces of rock on excavated slope surface which move when pierced by a crowbar shall be removed.

Where blasting is to be resorted to, the same shall be carried out as per Clause 302 and all precautions indicated therein observed.

Where presplitting is prescribed to be done for the establishment of a specified slope in rock excavation, the same shall be carried out as per Clause 303.

301.3.6 Marsh Excavation

The excavation of soil from marshes/swamps shall be carried out as per the programme approved by the Engineer.

Excavation of marshes shall begin at one end and proceed in one direction across the entire marsh immediately ahead of backfilling with materials like boulders, sand moorum, bricks bats, dismantled concrete as approved by the Engineer. The method and sequence of excavating and backfilling shall be such as to ensure, to the extent practicable, the complete removal or displacement of all muck from within the lateral limits indicated on the drawings or as staked by the Engineer.

301.3.7 Excavation of Road Shoulders/Verge/Median for Widening of Pavement or Providing Treated Shoulders

In the works involving widening of existing pavements or providing paved shoulders, the existing shoulders/verge/median shall be removed to its full width and upto top of the subgrade. The subgrade material within 500 mm from the bottom of the pavement for the widened portion or paved shoulders shall be loosened and recompacted as per Clause 305. Any unsuitable material found in this portion shall be removed and replaced with the suitable material. While doing so, care shall be taken to see that no portion of the existing pavement designated for retention is loosened or disturbed. If the existing pavement gets disturbed or loosened, it shall be dismantled and cut to a regular shape with sides vertical and the

disturbed/loosened portion removed completely and relaid as directed by the Engineer, at the cost of the Contractor.

301.3.8 Excavation for Surface/Sub-Surface Drains

Where the Contract provides for construction of surface/sub-surface drains, the same shall be done as per Clause 309. Excavation for these drains shall be carried out in proper sequence with other works as approved by the Engineer.

301.3.9 Slides

If slips, slides, over-breaks or subsidence occur in cuttings during the process of construction, they shall be removed at the cost of the Contractor as ordered by the Engineer. Adequate precautions shall be taken to ensure that during construction, the slopes are not rendered unstable or give rise to recurrent slides after construction. If finished slopes slide into the roadway subsequently, such slides shall be removed and paid for at the Contract rate for the class of excavation involved, provided the slides are not due to any negligence on the part of the Contractor. The classification of the debris material from the slips, slides etc. shall conform to its condition at the time of removal and payment made accordingly regardless of its condition earlier.

301.3.10 Dewatering

If water is met with in the excavations due to springs, seepage, rain or other causes, it shall be removed by suitable diversions, pumping or bailing out and the excavation kept dry whenever so required or directed by the Engineer. Care shall be taken to discharge the drained water into suitable outlets as not to cause damage to the works, crops or any other property. Due to any negligence on the part of the Contractor, if any such damage is caused, it shall be the sole responsibility of the Contractor to repair/restore to the original condition at his own cost or compensate for the damage.

301.3.11 Use and Disposal of Excavated Materials

All the excavated materials shall either be reused with the approval of the Engineer or disposed off with all loads and lifts as directed by the Engineer.

301.3.12 Backfilling

Backfilling of masonry/concrete hume pipe or drain excavation shall be done with approved material with all loads and lifts after concrete/masonry/hume pipe is fully set and carried out in such a way as not to cause undue thrust on any part of the structure and/or not to cause differential settlement. All space between the drain walls and the side of the excavation

shall be backfilled to the original surface making due allowance for settlement, in layers not exceeding 150 mm compacted thickness to the required density, using suitable compaction equipment such as trench compactor, mechanical tamper, rammer or plate compactor as directed by the Engineer.

301.4 Plying of Construction Traffic

Construction traffic shall not use the cut formation and finished subgrade without the prior permission of the Engineer. Any damage arising out of such use shall be made good by the Contractor at his own cost.

301.5 Preservation of Property

The Contractor shall undertake all reasonable precautions for the protection and preservation of any or all existing roadside trees, drains, sewers, sub-surface drains, pipes, conduits and any other structures under or above ground, which may be affected by construction operations and which, in the opinion of the Engineer, shall be continued in use without any change. Safety measures taken by the Contractor in this respect, shall be got approved from the Engineer. However, if any, of these objects is damaged by reason of the Contractor's negligence, it shall be replaced or restored to the original condition at his cost. If the Contractor fails to do so, within the required time as directed by the Engineer or if, in the opinion of the Engineer, the actions initiated by the Contractor to replace/restore the damaged objects are not satisfactory, the Engineer shall arrange the replacement/restoration directly through any other agency at the risk and cost of the Contractor after issuing prior notice to the effect.

301.6 Preparation of Cut Formation

The cut formation, which serves as a sub-grade, shall be prepared to receive the sub-base/base course as directed by the Engineer.

Where the material in the subgrade has a density less than specified in Table 300-1, the same shall be loosened to a depth of 500 mm and compacted in layers in accordance with the requirements of Clause 305 adding fresh material, if any required, to maintain the formation level as shown on the drawings. Any unsuitable material encountered in the subgrade level shall be removed as directed by the Engineer, replaced with suitable material and compacted in accordance with Clause 305.

In rocky formations, the surface irregularities shall be corrected and the levels brought up to the specified elevation with granular base material as directed by the Engineer, laid and compacted in accordance with the respective Specifications for these materials. The unsuitable material shall be disposed of in accordance with Clause 301.3.11. After satisfying

the density requirements, the cut formation shall be prepared to receive the sub-base/base course in accordance with Clauses 310 and 311.

301.7 Finishing Operations

Finishing operations shall include the work of properly shaping and dressing all excavated surfaces.

When completed, no point on the slopes shall vary from the designated slopes by more than 150 mm measured at right angles to the slope, except where excavation is in rock (ordinary or hard) where no point shall vary more than 300 mm from the designated slope. In no case shall any portion of the slope encroach on the roadway.

The finished cut formation shall satisfy the surface tolerances described in Clause 902.

Where directed, the topsoil removed and conserved (Clauses 301.3.2 and 305.3.3) shall be spread over cut slopes, shoulders and other disturbed areas. Slopes may be roughened and moistened slightly, prior to the application of topsoil, in order to provide satisfactory bond. The depth of topsoil shall be sufficient to sustain plant growth, the usual thickness being from 75 mm to 100 mm.

301.8 Measurements for Payment

Excavation for roadway shall be measured by taking cross-sections at suitable intervals before the excavation starts (after clearing and grubbing/stripping etc. as the case may be) and after its completion and computing the volumes in cu.m by the method of average end areas for each class of material encountered. Where it is not feasible to compute volumes by this method because of erratic location of isolated deposits, the volumes shall be computed by other accepted methods.

At the option of the Engineer, the Contractor shall leave depth indicators during excavations of such shape and size and in such positions as directed so as to indicate the original ground level as accurately as possible. The Contractor shall see that these remain intact till the final measurements are taken.

For rock excavation, the overburden shall be removed first so that necessary cross-sections could be taken for measurement. Where cross-sectional measurements could not be taken due to irregular configuration or where the rock is admixed with other classes of materials, the volumes shall be computed on the basis of measurement of stacks of excavated rubble allowing a deduction of 35% therefrom. When volume is calculated on the basis of measurement of stacks of the excavated material other than rock, a deduction of 16% of stacked volume shall be allowed.

Works involved in the preparation of cut formation shall be measured in units indicated below:

i)	Loosening and recompacting the loosened material at subgradecu.m
ii)	Loosening and removal of unsuitable material and replacing with suitable material and compacting to required density	...cu.m
iii)	Preparing rocky subgrade	...sq.m
iv)	Stripping including storing and reapplication of topsoil	...cu.m

301.9 Rates

301.9.1 The Contract unit rates for the items of roadway and drain excavation shall be payment in full for carrying out the operations required for the individual items including full compensation for:

- i) setting out;
- ii) transporting the excavated materials for use or disposal with all leads and lifts by giving suitable credit towards the cost of re-usable material and salvage value of unusable material;
- iii) trimming bottoms and slopes of excavation;
- iv) dewatering;
- v) keeping the work free of water as per Clause 311;
- vi) arranging disposal sites; and
- vii) all labour, materials, tools, equipment., safety measures, testing and incidentals necessary to complete the work to Specifications.

Where presplitting of rock is prescribed it shall be governed by Clause 303.5.

301.9.2 The Contract unit rate for loosening and recompacting the loosened materials at subgrade shall include full compensation for loosening to the specified depth, including breaking clods, spreading in layers, watering where necessary and compacting to the requirements.

301.9.3 Clauses 301.9.1 and 305.8 shall apply as regards Contract unit rate for item of removal of unsuitable material and replacement with suitable material respectively.

301.9.4 The Contract unit rate for item of preparing rocky sub-grade as per Clause 301.6 shall be full compensation for providing, laying and compacting granular base material for correcting surface irregularities including all materials, labour and incidentals necessary to complete the work and all leads and lifts.

301.9.5 The Contract unit rate for the items of stripping and storing topsoil and of reapplication of topsoil shall include full compensation for all the necessary operations including all lifts and leads.

302 BLASTING OPERATIONS

302.1 General

Blasting shall be carried out in a manner that completes the excavation to the lines indicated in drawings, with the least disturbance to adjacent material. It shall be done only with the written permission of the Engineer. All the statutory laws, regulations, rules, etc., pertaining to the acquisition, transportation, storage, handling and use of explosives shall be strictly followed by the contractor.

The Contractor may adopt any method or methods of blasting consistent with the safety and job requirements. Prior to starting any phase of the operation, the Contractor shall provide information describing pertinent blasting procedures, dimensions and notes.

The magazine for the storage of explosives shall be built to the designs and specifications of the Explosives Department concerned and located at the approved site. The storage places shall be clearly marked "DANGER-EXPLOSIVES". The Contractor shall be liable for property damage, injury or death resulting from the use of explosives. All permits shall be obtained by the Contractor. No unauthorized person shall be admitted into the magazine which, when not in use, shall be kept securely locked. No matches or inflammable material shall be allowed in the magazine. The magazine shall have an effective lightning conductor. The following shall be hung in the lobby of the magazine:

- a) A copy of the relevant rules regarding safe storage both in English and in the language with which the workers concerned are familiar,
- b) A statement of up-to-date stock in the magazine,
- c) A certificate showing the last date of testing of the lightning conductor, and
- d) A notice that smoking is strictly prohibited.

All explosives shall be stored in a secure manner in compliance with all laws and ordinances, and all such storage places shall be marked. Where no local laws or ordinances apply, storage shall be provided to the satisfaction of the Engineer and in general not closer than 300 m from the road or from any building or camping area or place of human occupancy. In addition to these, the Contractor shall also observe the following instructions and any further additional instructions which may be given by the Engineer and shall be responsible for damage to property and any accident which may occur to workmen or public on account of any operations connected with the storage, handling or use of explosives and blasting. The Engineer shall frequently check the Contractor's compliance with these precautions.

302.2 Materials, Tools and Equipment

All the materials, tools and equipment used for blasting operations shall be of approved type. The Engineer may specify the type of explosives to be allowed in special cases. The fuse to be used in wet locations shall be sufficiently water-resistant as to be unaffected when immersed in water for 30 minutes. The rate of burning of the fuse shall be uniform and definitely known to permit such a length being cut as will permit sufficient time to the firer to reach safely before explosion takes place. Detonators shall be capable of giving effective blasting of the explosives. The blasting powder, explosives, detonators, fuses, etc., shall be fresh and not damaged due to dampness, moisture or any other cause. They shall be inspected before use and damaged articles shall be discarded totally and removed from the site immediately.

302.3 Personnel

The blasting operation shall remain in the charge of competent and experienced supervisor and workmen who are thoroughly acquainted with the details of handling explosives and blasting operations.

302.4 Blasting Operations

The blasting shall be carried out during the pre-determined hours of the day preferably during the mid-day luncheon hour or at the close of the work as ordered in writing by the Engineer. The hours shall be made known to the people in the vicinity.

The Contractor shall notify each public utility company having structures in proximity to the site of the work of his intention to use explosives. Such notice shall be given sufficiently in advance to enable the companies to take such steps as they may deem necessary to protect their property from injury. In advance of any blasting work within 50 m of any railway track or structures, the Contractor shall notify the concerned Railway Authority of the location, date, time and approximate duration of such blasting operation.

Red danger flags shall be displayed prominently in all directions during the blasting operations. The flags shall be planted 200 m from the blasting site in all directions. People, except those who actually light the fuse, shall be prohibited from entering this area and all persons including workmen shall be kept away from the flagged area, and all persons including workmen shall be removed from the flagged area at least 10 minutes before the firing. A warning siren shall be sounded for the above purpose.

Only controlled blasting shall be resorted to along with the safeguard above at locations where built-up area, huts and structures in use lie within 200 m. Similarly excavation of hard rock without blasting is mandatory where people live within 20 m of blast site.

The charge holes shall be drilled to required depths and at suitable places. Blasting should be as light as possible consistent with thorough breakage of the material necessary for economic loading and hauling. Any method of blasting which leads to overshooting shall be discontinued.

When blasting is done with powder, the fuse cut to the required length shall be inserted into the hole and the powder dropped shall be gently tamped with copper rods with rounded ends. The explosive powder shall then be covered with tamping material which shall be tamped lightly but firmly.

When blasting is done with dynamite and other high explosives, dynamite cartridges shall be prepared by inserting the square cut end of a fuse into the detonator and finishing it with nippers at the open end, the detonator gently pushed into the primer leaving 1/3rd of the copper tube exposed outside. The paper of the cartridge shall then be closed up and securely bound with wire or twine. The primer shall be housed into the explosive. Boreholes shall be cleared of all debris and explosives inserted. The space of about 200 mm above the charge shall then be gently filled with dry clay, pressed home and the rest of the tamping formed of any convenient material gently packed with a wooden rammer.

At a time not more than 10 such charges will be prepared and fired. The man in charge shall blow a siren in a recognized manner for cautioning the people. All the people shall then be required to move to safe distances. The charges shall be lighted by the man-in-charge only. The man-in-charge shall count the number of explosions. He shall satisfy himself that all the charges have been exploded before allowing the workmen to go back to the work site.

After blasting operation, the Contractor shall compact the loose residual material below subgrade and replace the material removed below subgrade with suitable material.

302.5 Misfire

In case of misfire, the following procedure shall be observed:

- i) Sufficient time shall be allowed to account for the delayed blast. The man-in-charge shall inspect all the charges and determine the missed charge.
- ii) If it is the blasting powder charge, it shall be completely flooded with water. A new hole shall be drilled at about 450 mm from the old hole and fired. This should blast the old charge. In case, it does not blast the old charge, the procedure shall be repeated till the old charge is blasted.
- iii) In case of charges of gelignite, dynamite, etc., the man-in-charge shall gently remove the tamping and the primer with the detonator. A fresh detonator and primer shall then be used to blast the charge. Alternatively,

the hole may be cleared of 300 mm of tamping and the direction then ascertained by placing a stick in the hole. Another hole may then be drilled 150 mm away and parallel to it. This hole shall then be charged and fired when the misfired hole should explode at the same time. The man-in-charge shall at once report to the Contractor's office and the Engineer all cases of misfire, the cause of the same and what steps were taken in connection therewith.

If a misfire has been found to be due to defective detonator or dynamite, the whole quantity in the box from which defective article was taken must be sent to the authority directed by the Engineer for inspection to ascertain whether all the remaining materials in the box are also defective.

302.6 Account

A careful and day to day account of the explosive shall be maintained by the Contractor in an approved register and manner which shall be open to inspection by the Engineer at all times.

303 PRESPLITTING ROCK EXCAVATION SLOPES

303.1 General

Presplitting is defined as the establishment of a specified excavation slope in rock by the controlled use of explosives and blasting accessories in properly aligned and spaced drill holes.

The presplitting technique shall be used for forming rock excavation slopes at locations shown on the drawings or as otherwise decided by the Engineer.

303.2 Construction Operations

Prior to starting drilling operations for presplitting, the Contractor shall furnish the Engineer a plan outlining the position of all drill holes, depth of drilling, type of explosives to be used, loading pattern and sequence of firing. The drilling and blasting plan is for record purposes only and will not absolve the Contractor of his responsibility for using proper drilling and blasting procedures. Controlled blasting shall begin with a short test section of a length approved by the Engineer. The test section shall be presplit, production drilled and blasted and sufficient material excavated whereby the Engineer can determine if the Contractor's method have produced an acceptable slope.

All overburden soil and weathered rock along the top of the excavation for a distance of about 5 to 15 m beyond the drilling limits, or to the end of the excavation, as decided by the

Engineer shall be removed before drilling the presplitting holes. Particular care and attention shall be directed to the beginning and end of excavations to ensure complete removal of all overburden soil and weathered rock and to expose fresh rock to an elevation equal to the bottom of the adjacent lift of the presplitting holes being drilled.

Slope holes for presplitting shall be drilled along the line of the planned slope within the specified tolerances. The drill holes shall not be less than 60 mm nor more than 75 mm in diameter. Drilling operations shall be controlled by the use of proper equipment and technique to ensure that no hole shall deviate from the plane of the planned slope by more than 300 mm nor shall any hole deviate from being parallel to an adjacent hole by more than two-third of the planned horizontal spacing between holes.

The length of presplit holes for any individual lift shall not exceed 9 m.

The spacing of presplit holes shall not exceed 900 mm on centres and shall be adjusted to result in a uniform shear face between holes.

Auxiliary drill holes along the presplit line, not loaded or stemmed, may be ordered by the Engineer. Except for spacing, auxiliary drill holes shall conform to the provisions for presplit holes.

The line of production holes shall be placed inside the presplit lines in such a manner as to avoid damage to the presplit face.

If necessary, to reduce shatter and overbreak of the presplit surface, the first line of the production holes shall be drilled parallel to the slope line at the top of the cut and at each bench level thereafter.

Any blasting technique, which results in damage to the presplit surface, shall be immediately discontinued.

No portion of any production holes shall be drilled within 2.5 m of a presplit plane except as approved by the Engineer. The bottom of the production holes shall not be lower than the bottom of the presplit holes.

A maximum offset of 600 mm will be permitted for a construction working bench at the bottom of each lift for use in drilling the next lower presplitting pattern. The drilling operations shall be adjusted to compensate for drift of previous levels and for the offset at the start of new levels to maintain the specified slope plane.

The maximum diameter of explosives used in presplit holes shall not be greater than one-half the diameter of the presplit hole.

Only standard cartridge explosives prepared and packaged by explosive manufacturing firms shall be used in presplit holes. These shall be fired as recommended by the manufacturer. Ammonium nitrate composition blasting agents will not be permitted in presplitting operations.

Stemming may be required to achieve a satisfactory presplit face. Stemming material shall be dry free-running material all of which passes 11.2 mm sieve and 90 percent of which is retained on 2.80 mm sieve. Stemmed presplit holes shall be completely filled to the collar.

All charges in each presplitting pattern shall be detonated simultaneously.

303.3 Tolerances

The presplit face shall not deviate more than 300 mm from the plane passing through adjacent drill holes, except where the character of the rock is such that, as determined by the Engineer, irregularities are unavoidable. When completed, the average plane of the slopes shall conform to the slopes indicated on the plans and no point on the completed slopes shall vary from the designated slopes by more than 300 mm. These tolerances shall be measured perpendicular to the plane of the slope. In no case shall any portion of the slope encroach on the side drains.

As long as equally satisfactory presplit slopes are obtained, then either the slope face may be presplit before drilling for production blasting or presplitting the slope face and production blasting may be done at the same time, provided that the presplitting drill holes are fired with zero delay and the production holes are delayed starting at the row of holes farthest from the slope and progressing in steps to the row of holes nearest the presplit lines, which row shall be delayed at least 50 milliseconds. In either case the presplitting holes shall extend either to the end of the excavation or for a distance of not less than 15 m beyond the limits of the production holes to be detonated.

303.4 Measurements for Payment

The area of presplitting to be paid for, will be measured as square metres of acceptable presplit slope surface.

303.5 Rates

The Contract unit rate for presplitting work shall be payment in full for carrying out the required operations for obtaining acceptable presplit slope surfaces. The quantity of rock excavated through the production/presplit holes shall be paid for as per Clause 301.9.1.

304 EXCAVATION FOR STRUCTURES**304.1 Scope**

Excavation for structures shall consist of the removal of material for the construction of foundations for bridges, culverts, retaining walls, headwalls, cutoff walls, pipe culverts and other similar structures, in accordance with the requirements of these Specifications and the lines and dimensions shown on the drawings or as indicated by the Engineer. The work shall include construction of the necessary cofferdams and cribs and their subsequent removal; all necessary sheeting, shoring, bracing, draining and pumping; the removal of all logs, stumps, grubs and other deleterious matter and obstruction, necessary for placing the foundations; trimming bottoms of excavations; backfilling and clearing up the site and the disposal of all surplus material.

304.2 Classification of Excavation

All materials involved in excavation shall be classified in accordance with Clause 301.2.

304.3 Construction Operations**304.3.1 Setting Out**

After the site has been cleared according to Clause 201, the limits of excavation shall be set out true to lines, curves and slopes to Clause 301.3.1.

304.3.2 Excavation

Excavation shall be taken to the width of the lowest step of the footing including additional width as required for construction operation. The sides shall be left plumb where the nature of soil allows it. Where the nature of soil or the depth of the trench and season of the year do not permit vertical sides, the Contractor at his own cost shall put up necessary shoring, strutting and planking or cut slopes to a safer angle or both with due regard to the safety of personnel and works and to the satisfaction of the Engineer.

The depth to which the excavation is to be carried out shall be as shown on the drawings, unless the type of material encountered is such as to require changes, in which case the depth shall be as ordered by the Engineer. Propping shall be undertaken when any foundation or stressed zone from an adjoining structure is within a line of 1 vertical to 2 horizontal from the bottom of the excavation.

Where blasting is to be resorted-to, the same shall be carried out in accordance with Clause 302 and all precautions indicated therein observed. Where blasting is likely to

endanger adjoining foundations or other structures, necessary precautions such as controlled blasting, providing rubber mat cover to prevent flying of debris etc. shall be taken to prevent any damage.

304.3.3 Dewatering and Protection

Normally, open foundations shall be laid dry. Where water is met with in excavation due to stream flow, seepage, springs, rain or other reasons, the Contractor shall take adequate measures such as bailing, pumping, constructing diversion channels, drainage channels, bunds, depression of water level by well-point system, cofferdams and other necessary works to keep the foundation trenches dry when so required and to protect the green concrete/masonry against damage by erosion or sudden rising of water level. The methods to be adopted in this regard and other details thereof shall be left to the choice of the Contractor but subject to the approval of the Engineer. Approval of the Engineer shall, however, not relieve the Contractor of the responsibility for the adequacy of dewatering and protection arrangements for the quality and safety of the works.

Where cofferdams are required, these shall be carried to adequate depths and heights, be safely designed and constructed and be made as watertight as is necessary for facilitating construction to be carried out inside them. The interior dimensions of the cofferdams shall be such as to give sufficient clearance for the construction and inspection and to permit installation of pumping equipments, etc., inside the enclosed area.

If it is determined beforehand that the foundations cannot be laid dry or the situation is found that the percolation is too heavy for keeping the foundation dry, the foundation concrete shall be laid under water by tremie pipe only. In case of flowing water or artesian springs, the flow shall be stopped or reduced as far as possible at the time of placing the concrete.

Pumping from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of the movement of water through any fresh concrete. No pumping shall be permitted during the placing of concrete and for a period of at least 24 hours thereafter, unless it is done from a suitable sump separated from the concrete work by a watertight wall or other similar means.

At the discretion of the Contractor, cement grouting or other approved methods may be used to prevent or reduce seepage and to protect the excavation area.

The Contractor shall take all precautions in diverting channels and in discharging the drained water as not to cause damage to the works, crops or any other property.

304.3.4 Preparation of Foundation

The bottom of the foundation shall be levelled both longitudinally and transversely or stepped as directed by the Engineer. Before footing is laid, the surface shall be slightly watered and

rammed. In the event of excavation having been made deeper than that shown on the drawings or as otherwise ordered by the Engineer, the extra depth shall be made up with concrete as per Clause 2104.1 at the cost of the Contractor. Ordinary filling shall not be permitted to bring the foundation to the design level as shown in the drawing.

When rock or other hard strata is encountered, it shall be freed of all soft and loose material, cleaned and cut to a firm surface either level or stepped as directed by the Engineer. All seams shall be cleaned out and filled with cement mortar or grout to the satisfaction of the Engineer. In the case of excavation in rock, annular space around footing shall be filled with lean concrete M 15 upto the top level of rock.

If the depth of fill required is more than 1.5 m in soft rock or 0.6 m in hard rock above the foundation level, the filling upto this level shall be done with M-15 concrete and portion above shall be filled by concrete or by boulders grouted with cement.

When foundation piles are used, the excavation for pile cap shall be done after driving/casting of all piles forming the group. After pile driving operations in a given pit are completed, all loose and displaced materials therein shall be removed to the level of the bottom of the pile cap.

304.3.5 Slips and Slip-Outs

If there are any slips or slip-outs in the excavation, these shall be removed by the Contractor at his own cost.

304.3.6 Public Safety

Near towns, villages and all frequented places, trenches and foundation pits shall be securely fenced, provided with proper caution signs and marked with red lights at night to avoid accidents. The Contractor shall take adequate protective measures to see that the excavation operations do not affect or damage adjoining structures. For safety precautions, guidance may be taken from IS:3764.

304.3.7 Backfilling

Backfilling shall be done with approved material after concrete or masonry is fully set and carried out in such a way as not to cause undue thrust on any part of the structure. All space between foundation masonry or concrete and the sides of excavation shall be refilled to the original surface in layers not exceeding 150 mm compacted thickness. The compaction shall be done with the help of suitable equipment such as trench compactor, mechanical tamper, rammer, plate vibrator etc., after necessary watering, so as to achieve the maximum dry density.

304.3.8 Disposal of Surplus Excavated Materials

Clause 301.3.11 shall apply.

304.4 Measurements for Payment

Excavation for structures shall be measured in cu.m for each class of material encountered, limited to the dimensions shown on the drawings or as directed by the Engineer. Excavation over increased width, cutting of slopes, production/support to the existing structures shoring, shuttering and planking shall be deemed as incidental to the main work and shall not be measured and paid separately.

Preparation of rock foundation shall be measured in square metres.

304.5 Rates

304.5.1 The Contract unit rate for the items of excavation for structures shall be payment in full for carrying out the required operations including full compensation for:

- i) setting out;
- ii) transporting the excavated materials for use or disposal with all leads and lifts;
- iii) construction of necessary cofferdams, cribs/sheeting, shoring and bracing and their subsequent removal;
- iv) removal of all logs, stumps, grubs and other deleterious matter and obstructions, for placing the foundations including trimming of bottoms of excavations;
- v) foundation sealing, dewatering including pumping when no separate provision for it is made in the Contract;
- vi) backfilling, clearing up the site and disposal of all surplus material with all leads and lifts or as otherwise specified; and
- vii) all labour, materials, tools, equipment, safety measures, diversion of traffic and incidentals necessary to complete the work to Specifications.

304.5.2 The Contract unit rate for preparation of rock foundation shall be full compensation for cutting, trimming and cleaning the foundation surface and filling/sealing of all seams with cement grout or mortar including all materials, labour and incidentals required for completing the work.

305 EMABANKMENT CONSTRUCTION**305.1 General****305.1.1 Description**

These Specifications shall apply to the construction of embankments including sub-grades, earthen shoulders and miscellaneous backfills with approved material obtained from approved source, including material from roadway and drain excavation, borrow pits or other sources. All embankments sub-grades, earthen shoulders and miscellaneous backfills shall be constructed in accordance with the requirements of these Specifications and in conformity with the lines, grades, and cross-sections shown on the drawings or as directed by the Engineer.

305.2 Materials and General Requirements**305.2.1 Physical Requirements**

305.2.1.1 The materials used in embankments, subgrades, earthen shoulders and miscellaneous backfills shall be soil, moorum, gravel, reclaimed material from pavement, fly ash, pond ash, a mixture of these or any other material as approved by the Engineer. Such materials shall be free of logs, stumps, roots, rubbish or any other ingredient likely to deteriorate or affect the stability of the embankment.

The following types of material shall be considered unsuitable for embankment:

- a) Materials from swamps, marshes and bogs;
- b) Peat, log, stump and perishable material; any soil that classifies as OL, OI, OH or Pt in accordance with IS:1498;
- c) Materials susceptible to spontaneous combustion;
- d) Materials in a frozen condition;
- e) Clay having liquid limit exceeding 50 and plasticity index exceeding 25; and
- f) Materials with salts resulting in leaching in the embankment.

305.2.1.2 Expansive clay exhibiting marked swell and shrinkage properties ("free swelling index" exceeding 50 percent when tested as per IS:2720 – Part 40) shall not be used as a fill material. Where an expansive clay having "free swelling index" value less than 50 percent is used as a fill material, subgrade and top 500 mm portion of the embankment just below sub-grade shall be non-expansive in nature.

305.2.1.3 Any fill material with a soluble sulphate content exceeding 1.9 grams of sulphate (expressed as SO_3) per litre when tested in accordance with BS:1377, Part 3, but using a 2:1 water-soil ratio shall not be deposited within 500 mm distance (or any other distance described in the Contract), of permanent works constructed out of concrete, cement bound materials or other cementitious material.

Materials with a total sulphate content (expressed as SO_3) exceeding 0.5 percent by mass, when tested in accordance with BS:1377, Part 3 shall not be deposited within 500 mm, or other distances described in the Contract, of metallic items forming part of the Permanent Works.

305.2.1.4 The size of the coarse material in the mixture of earth shall ordinarily not exceed 75 mm when placed in the embankment and 50 mm when placed in the sub-grade. However, the Engineer may at his discretion permit the use of material coarser than this also if he is satisfied that the same will not present any difficulty as regards the placement of fill material and its compaction to the requirements of these Specifications. The maximum particle size in such cases, however, shall not be more than two-thirds of the compacted layer thickness.

305.2.1.5 Ordinarily, only the materials satisfying the density requirements given in Table 300-1 shall be employed for the construction of the embankment and the sub-grade.

Table 300-1 : Density Requirements of Embankment and Sub-grade Materials

S. No.	Type of Work	Maximum laboratory dry unit weight when tested as per IS:2720 (Part 8)
1)	Embankments up to 3 m height, not subjected to extensive flooding	Not less than 15.2 kN/cu.m
2)	Embankments exceeding 3 m height or embankments of any height subject to long periods of inundation	Not less than 16 kN/ cu.m
3)	Subgrade and earthen shoulders/verges/backfill	Not less than 17.5 kN/cu.m

- Notes:**
- 1) This Table is not applicable for lightweight fill material, e.g., cinder, fly ash, etc.
 - 2) The material to be used in subgrade shall be non-expansive and shall satisfy design CBR at the specified dry density and moisture content. In case the available materials fail to meet the requirement of CBR, use of stabilization methods in accordance with Clauses 403 and 404 or by any stabilization method approved by the Engineer shall be followed.

305.2.1.6 The material to be used in subgrade shall conform to the design CBR value at the specified dry density and moisture content of the test specimen. In case the available

materials fails to meet the requirement of CBR, use of stabilization methods in accordance with Clauses 403 and 404 or by any stabilization method approved by the Engineer or by the IRC Accreditation Committee shall be followed.

305.2.1.7 The material to be used in high embankment construction shall satisfy the specified requirements of strength parameters.

305.2.2 General Requirements

305.2.2.1 The materials for embankment shall be obtained from approved sources with preference given to acceptable materials becoming available from nearby roadway excavation under the same Contract.

The work shall be so planned and executed that the best available materials are saved for the subgrade and the embankment portion just below the subgrade.

305.2.2.2 Borrow Materials

The arrangement for the source of supply of the material for embankment and sub-grade and compliance with the guidelines, and environmental requirements, in respect of excavation and borrow areas as stipulated, from time to time by the Ministry of Environment and Forests, Government of India and the local bodies, as applicable shall be the sole responsibility of the Contractor.

Borrow pits along the road shall be discouraged. If permitted by the Engineer, these shall not be dug continuously. Ridges of not less than 8 m width should be left at intervals not exceeding 300 m. Small drains shall be cut through the ridges to facilitate drainage. The depth of the pits shall be so regulated that their bottom does not cut an imaginary line having a slope of 1 vertical to 4 horizontal projected from the edge of the final section of the bank, the maximum depth in any case being limited to 1.5 m. Also, no pit shall be dug within the offset width of a minimum of 10 m.

Haulage of material to embankments or other areas of fill shall proceed only when sufficient spreading and compaction plant is operating at the place of deposition.

Where the excavation reveals a combination of acceptable and unacceptable materials, the Contractor shall, unless otherwise agreed by the Engineer, carry out the excavation in such a manner that the acceptable materials are excavated separately for use in the permanent works without contamination by the unacceptable materials. The acceptable materials shall be stockpiled separately.

The Contractor shall ensure that he does not adversely affect the stability of excavation or fills by the methods of stockpiling materials, use of plants or siting of temporary buildings or structures.

305.2.2.3 Fly-Ash

Use of fly-ash shall conform to the Ministry of Environment and Forest guidelines. Where fly-ash is used the embankment construction shall conform to the physical and chemical properties and requirements of IRC:SP:38-2001, "Guidelines for Use of Flyash in Road Construction". The term fly-ash shall cover all types of coal ash such as pond ash, bottom ash or mound ash.

Embankment constructed out of fly ash shall be properly designed to ensure stability and protection against erosion in accordance with IRC guidelines. A suitable thick cover may preferably be provided at intervening layers of pond ash for this purpose. A thick soil cover shall bind the edge of the embankment to protect it against erosion. Minimum thickness of such soil cover shall be 500 mm.

305.2.2.4 Compaction Requirements

The Contractor shall obtain representative samples from each of the identified borrow areas and have these tested at the site laboratory following a testing programme approved by the Engineer. It shall be ensured that the subgrade material when compacted to the density requirements as in Table 300-2 shall yield the specified design CBR value of the sub-grade.

Table 300-2 : Compaction Requirements for Embankment and Sub-grade

S. No.	Type of work/material	Relative compaction as percentage of max. laboratory dry density as per IS:2720 (Part 8)
1)	Subgrade and earthen shoulders	Not less than 97%
2)	Embankment,	Not less than 95%
3)	Expansive Clays	
	a) Subgrade and 500 mm portion just below the subgrade	Not allowed
	b) Remaining portion of embankment	90-95%

The Contractor shall at least 7 working days before commencement of compaction submit the following to the Engineer for approval:

- i) The values of maximum dry density and optimum moisture content obtained in accordance with IS:2720 (Part 8), appropriate for each of the fill materials he intends to use.
- ii) A graph of dry density plotted against moisture content from which each of the values in (i) above of maximum dry density and optimum moisture content were determined.

The maximum dry density and optimum moisture content approved by the Engineer shall form the basis for compaction.

305.3 Construction Operations

305.3.1 Setting Out

After the site has been cleared to Clause 201, the work shall be set out to Clause 301.3.1 The limits of embankment/sub-grade shall be marked by fixing batter pegs on both sides at regular intervals as guides before commencing the earthwork. The embankment/sub-grade shall be built sufficiently wider than the design dimension so that surplus material may be trimmed, ensuring that the remaining material is to the desired density and in position specified and conforms to the specified side slopes.

305.3.2 Dewatering

If the foundation of the embankment is in an area with stagnant water, and in the opinion of the Engineer it is feasible to remove it, the same shall be removed by bailing out or pumping, as directed by the Engineer and the area of the embankment foundation shall be kept dry. Care shall be taken to discharge the drained water so as not to cause damage to the works, crops or any other property. Due to any negligence on the part of the Contractor, if any such damage is caused, it shall be the sole responsibility of the Contractor to repair/restore it to original condition or compensate for the damage at his own cost.

If the embankment is to be constructed under water, Clause 305.4.6 shall apply.

305.3.3 Stripping and Storing Topsoil

When so directed by the Engineer, the topsoil from all areas of cutting and from all areas to be covered by embankment foundation shall be stripped to specified depths not exceeding 150 mm and stored in stockpiles of height not exceeding 2 m for covering embankment slopes, cut slopes and other disturbed areas where re-vegetation is desired. Topsoil shall not be unnecessarily subjected to traffic either before stripping or when in a stockpile. Stockpiles shall not be surcharged or otherwise loaded and multiple handling shall be kept to a minimum.

305.3.4 Compacting Ground Supporting Embankment/Sub-Grade

Where necessary, the original ground shall be levelled to facilitate placement of first layer of embankment, scarified, mixed with water and then compacted by rolling in accordance with Clauses 305.3.5 and 305.3.6 so as to achieve minimum dry density as given in Table 300-2.

In case where the difference between the sub-grade level (top of the sub-grade on which pavement rests) and ground level is less than 0.5 m and the ground does not have 97 percent relative compaction with respect to the dry density (as given in Table 300-2), the ground shall be loosened upto a level 0.5 m below the sub-grade level, watered and compacted in layers in accordance with Clauses 305.3.5 and 305.3.6 to achieve dry density not less than 97 percent relative compaction as given in Table 300-2.

Where so directed by the Engineer, any unsuitable material occurring in the embankment foundation (500 mm portion just below the sub-grade) shall be removed, suitably disposed and replaced by approved materials laid in layers to the required degree of compaction.

Any foundation treatment specified for embankments especially high embankments, resting on suspect foundations as revealed by borehole logs shall be carried out in a manner and to the depth as desired by the Engineer. Where the ground on which an embankment is to be built has any of such material types (a) to (f) in Clause 305.2.1.1 at least 500 mm of such material must be removed and replaced by acceptable fill material before embankment construction commences.

305.3.5 Spreading Material in Layers and Bringing to Appropriate Moisture Content

305.3.5.1 The embankment and sub-grade material shall be spread in layers of uniform thickness in the entire width with a motor grader. The compacted thickness of each layer shall not be more than 250 mm when vibratory roller/vibratory soil compactor is used and not more than 200 mm when 80-100 kN static roller is used. The motor grader blade shall have hydraulic control suitable for initial adjustment and maintain the same so as to achieve the specific slope and grade. Successive layers shall not be placed until the layer under construction has been thoroughly compacted to the specified requirements as in Table 300-2 and got approved by the Engineer. Each compacted layer shall be finished parallel to the final cross-section of the embankment.

305.3.5.2 Moisture content of the material shall be checked at the site of placement prior to commencement of compaction; if found to be out of agreed limits, the same shall be made good. Where water is required to be added in such constructions, water shall be sprinkled from a water tanker fitted with sprinkler capable of applying water uniformly with a controllable rate of flow to variable widths of surface but without any flooding. The water shall be added uniformly and thoroughly mixed in soil by blading, using disc harrow until a uniform moisture content is obtained throughout the depth of the layer.

If the material delivered to the roadbed is too wet, it shall be dried, by aeration and exposure to the sun, till the moisture content is acceptable for compaction. Should circumstances arise, where owing to wet weather, the moisture content cannot be reduced to the required amount by the above procedure, compaction work shall be suspended.

Moisture content of each layer of soil shall be checked in accordance with IS:2720 (Part 2), and unless otherwise mentioned, shall be so adjusted, making due allowance for evaporation losses, that at the time of compaction it is in the range of 1 percent above to 2 percent below the optimum moisture content determined in accordance with IS:2720 (Part 8) as the case may be. Expansive clays shall, however, be compacted at moisture content corresponding to the specified dry density, but on the wet side of the optimum moisture content obtained from the laboratory compaction curve.

After adding the required amount of water, the soil shall be processed by means of graders, harrows, rotary mixers or as otherwise approved by the Engineer until the layer is uniformly wet.

Clods or hard lumps of earth shall be broken to have a maximum size of 75 mm when being placed in the embankment and a maximum size of 50 mm when being placed in the sub-grade.

305.3.5.3 Embankment and other areas of fill shall, unless otherwise required in the Contract or permitted by the Engineer, be constructed evenly over their full width and their fullest possible extent and the Contractor shall control and direct construction plant and other construction vehicles. Damage by construction plant and other vehicular traffic shall be made good by the Contractor with material having the same characteristics and strength of the material before it was damaged.

Embankments and unsupported fills shall not be constructed with steeper side slopes or to greater widths than those shown in the drawings, except to permit adequate compaction at the edges before trimming back, or to obtain the final profile following any settlement of the fill and the underlying material,

Whenever fill is to be deposited against the face of a natural slope, or sloping earthworks face including embankments, cuttings, other fills and excavations steeper than 1 vertical to 4 horizontal, such faces shall be benched as per Clause 305.4.1 immediately before placing the subsequent fill.

All permanent faces of side slopes of embankments and other areas of fill shall, subsequent to any trimming operations, be reworked and sealed to the satisfaction of the Engineer by tracking a tracked vehicle, considered suitable by the Engineer, on the slope or any other method approved by the Engineer.

305.3.6 Compaction

Only the compaction equipment approved by the Engineer shall be employed to compact the different material types encountered during construction. Static three-wheeled roller, self propelled single drum vibratory roller, tandem vibratory roller, pneumatic tyre roller, pad foot

roller, etc., of suitable size and capacity as approved by the Engineer shall be used for the different types and grades of materials required to be compacted either individually or in suitable combinations.

The compaction shall be done with the help of self-propelled single drum vibratory roller or pad foot vibratory roller of 80 to 100 kN static weight or heavy pneumatic tyre roller of adequate capacity capable of achieving the required compaction. The Contractor shall demonstrate the efficacy of the equipment he intends to use by carrying out compaction trials. The procedure to be adopted for the site trials shall be submitted to the Engineer for approval.

Earthmoving plant shall not be accepted as compaction equipment nor shall the use of a lighter category of plant to provide any preliminary compaction to assist the use of heavier plant be taken into account.

Each layer of the material shall be thoroughly compacted to the densities specified in Table 300-2. Subsequent layers shall be placed only after the finished layer has been tested according to Clause 903.2.2 and accepted by the Engineer. The Engineer may permit measurement of field dry density by a nuclear moisture/density gauge used in accordance with agreed procedure and provided the gauge is calibrated to give results identical to that obtained from tests in accordance with IS:2720 (Part 28). A record of the same shall be maintained by the Contractor.

When density measurements reveal any soft areas in the embankment/sub-grade/earthen shoulders, further compaction shall be carried out as directed by the Engineer. If inspite of that the specified compaction is not achieved, the material in the soft areas shall be removed and replaced by approved material, compacted using appropriate mechanical means such as light weight vibratory roller, double drum walk behind roller, vibratory plate compactor, trench compactor or vibratory tamper to the density requirements and satisfaction of the Engineer.

305.3.7 Drainage

The surface of the embankment/sub-grade at all times during construction shall be maintained at such a crossfall (not flatter than that required for effective drainage of an earthen surface) as will shed water and prevent ponding.

305.3.8 Repairing of Damages Caused by Rain/Spillage of Water

The soil in the affected portion shall be removed in such areas as directed by the Engineer before next layer is laid and refilled in layers and compacted using appropriate mechanical means such as small vibratory roller, plate compactor or power rammer to achieve the required density in accordance with Clause 305.3.6. If the cut is not sufficiently wide for use of required mechanical means for compaction, the same shall be widened suitably to permit their use for proper compaction. Tests shall be carried out as directed by the Engineer to