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CHAPTER 0.0:

EXECUTIVE SUMMARY

0.1 Background

National Highways and Infrastructure Development Corporation (NHIDCL) has proposed the feasibility study, preparation of DPR & providing pre-construction services for up-gradation of selected road stretches/corridors to two lane with paved shoulder NH configuration under BHARATMALA Project and National Highways connectivity to Backward areas/Religious/Tourist places of the country in the state of Tripura.
Under this scheme, the consultancy work is awarded to M/s. Technocrats Advisory Services Pvt. Ltd. in association with Vaishnavi Infratech Services Pvt. Ltd. for preparation of Detailed Project Report of **Teliamura - Sabroom section (NH-208).**

The existing length of project road is 132.882 Km and design length (after geometric improvements) is 107.654 km (excluding 1.24km length for widening of NH-208 overlapped with NH-8 from Khowai chowmuhani to south pulinpur).

0.2 Consultancy Services

The consultancy services are to be provided in three stages as brought out below.

Stage 1: Inception Report (IR) & Quality Assurance Plan (QAP)

Stage 2: Feasibility Report

Stage 3: Detailed Project Report (DPR)

- **Stage – 1** i.e. Inception Report & Quality Assurance Plan has been submitted,
- **Stage – 2** i.e. Feasibility Report (Draft & Final) has been submitted,
- **Stage – 3** i.e. Detailed Project Report (Draft) has been submitted,

Detailed Project Report (Final) is described as below –

- Main Report
- Annexure to Main Report
- Design Report (Pavement & Bridge)
- Material Report
- Environmental Assessment Report including Environmental Management Plan (EMP) & Resettlement Action Plan (RAP)
- Technical Specifications

- Rate Analysis
- Cost Estimates
- Bill of Quantities
- Drawing Volume
- Civil work contract agreement
- Project Clearances

0.3 Objectives

The main objective of the consultancy service is to establish the technical, economical, and financial viability of the project and prepare detailed project reports for **Teliamura-Sabroom section.**

The viability of the project shall be established taking into account the requirements with regard to proposed alignment of Project road based on highway design, pavement design, provision of service/Slip roads wherever necessary, type of intersections, rehabilitation and widening of existing and/or construction of new bridges and structures, road safety features, quantities of various items of works and cost estimates and economic analysis.

0.4 Scope of Services

The Consultant is required to suggest alternative alignments (minimum 3 nos.) for proposed Bypasses, As far as possible, existing road having adequate ROW shall be include in the alignment. The widening / improvement work to 2 lane with paved shoulder shall be within the existing right of way avoiding land acquisition, except for locations having inadequate width and where provisions of short alignment corrections, improvement of intersections are considered necessary and practicable and cost effective. However, new alignment should also be considered, wherever improvement to 2 lane of the existing road is not possible. The Consultant shall furnish land acquisition details as per revenue records/maps for further processing.

The general scope of services is given in the sections that follow. However, the entire scope of services would, inter-alia, include the items mentioned in the Letter of Invitation and the TOR. The Consultant will also make suitable proposals for widening/ improvement of the existing road to 2 lanes etc. and strengthening of the carriageways, as required at the appropriate time to maintain the level of service over the design period.

All ready to implement 'good for construction' drawings shall be prepared.

Environmental Impact Assessment, Environmental Management Plan and Rehabilitation and Resettlement Studies shall be carried out by the Consultant meeting the requirements of MoEF / other statutory bodies.

Wherever required, consultant will liaise with concerned authorities and arrange all clarifications. Approval of all drawings including GAD and detail engineering drawings will be got done by the consultant from the Railways. However, if Railways require proof checking of the drawings prepared by the consultants, the same will be got done by NHIDCL. Consultant will also obtain 'No Objection Certificate 'from Ministry of Environment and Forest and also incorporate the estimates for shifting of utilities of all types involved from concerned local authorities in the DPR. Consultant is also required

to prepare all Land Acquisition papers (i.e. all necessary schedules as per L.A. act) for acquisition of land either under NH Act or State Act.

The Consultant shall prepare and submit the cost estimate and bid documents at Feasibility report stage

Consultant shall obtain all types of necessary clearances required for implementation of the project on the ground from the concerned agencies. The client shall provide the necessary supporting letters and any official fees as per the demand note issued by such concerned agencies from whom the clearances are being sought to enable implementation.

0.5 Key Professional Staff

Table 0.1 – Key Professional staff

S. No.	Position	Name
1	Team Leader	**Mr. Babban Ram**
2	Geo-Technical and Pavement Expert	**Mr. Brijesh Mishra**
3	Environmental Specialist	**Mrs. Meena Bhaduri**
4	Traffic cum Safety Expert	**Mr. Salil Pathak**
5	Hill Road / Tunnel Expert	**Mr. P.K Dubey**
6	Revenue / Survey Expert	**Mr. Mahaveer Singh**
7	Bridge Design Engineer	**Mr. D.P. Singh**
8	Contract Specialist	**Mr. Vir Bahadur Singh**

0.6 Project Alignment Description

- As per contract agreement, the Project alignment starts from Ompi chowmuhani (T-Junction with NH-08 at Teliamura) passes through Twidu, Sonacherra, Amarpur, Nutan Bazar, Karbook, Ailmara, Khedacherri, Ropaichari and ends at Harina (T-Junction with NH-08 near km 132.882). Sabroom is 8.1 km away from Harina junction.
- The Project road runs parallel to International border (India – Bangladesh) in some of its length.
- **The length of project road in first 2.4 km passes through Teliamura town, a heavy congestion of traffic / buildings exist at this section. To avoid these congestions, a bypass of 1.3 km is proposed for Teliamura town. This bypass starts at NH-08 (at South Pulinpur, 1.24 km from Khowai chowmuhani towards Agartala) and merges at existing km 2+600 of Project road.**
- The existing length of project road is 132.882 km
- The design length (after geometrical improvement) is 108.894 km (including 1.24km length for widening of NH-208 overlapped with NH-8 from Khowai chowmuhani to south pulinpur).
- Existing lane of Project road is maximum single lane with poor riding quality of PMGSY category.

The Proposals for improvement of Project road is as under –

a) **Widening of existing road (NH-208 overlapped with NH-8) from two lane to two lane with paved shoulder, Length 1.24 km (from khowai chowmuhani to south pulinpur),**

b) **Widening of existing road & new construction as two lane with paved shoulder from south pulinpur to Harina (junction with NH-8), length 107.654 km**

- **This Chapter describes the details of Package III (from design km 36.000 to km 72.000, design length – 36.0 km)**

The Project Road alignment shown in figure below-

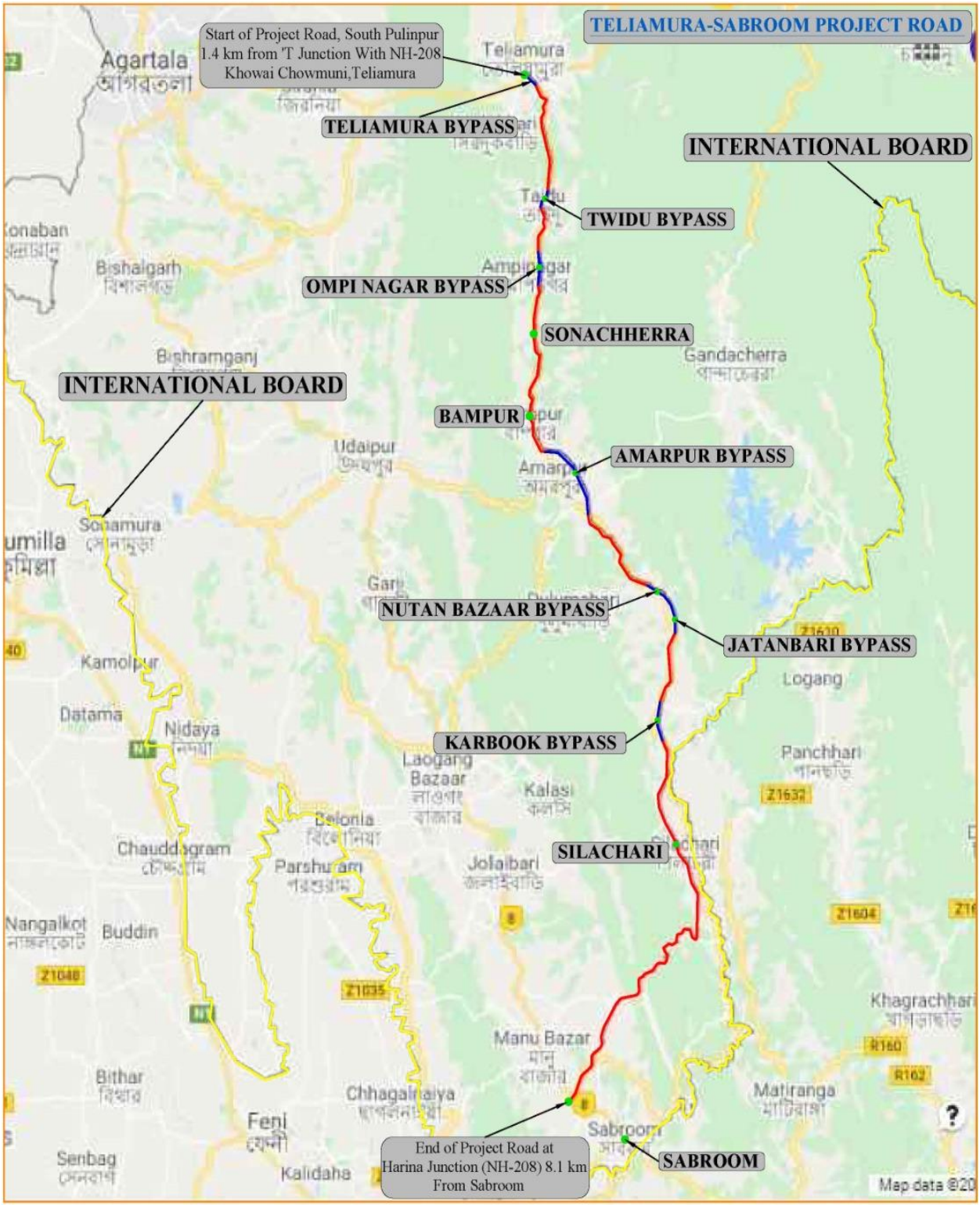


Figure 0.1– Proposed Alignment of Project Road

0.7 Right of Way (ROW)

There is no marking of existing RoW at ground along the Project road, the details of existing RoW is not available with PWD also, however, as per visual inspection and local people enquire, it is found the available land is only 8-10m.

The proposed RoW has been considered 20-80m for entire road stretch and details are presented below:

Table 0.2:- Details of Proposed RoW

Sl. No.	Chainage		Length (m)	Total PROW (m)
	From	To		
1	36000	42760	6760	45
2	42760	51040	8280	30
3	51040	51630	590	45
4	51630	51840	210	30
5	51840	52640	800	45
6	52640	53240	600	45
7	53240	54000	760	45
8	54000	56920	2920	45
9	56920	57640	720	30
10	57640	57820	180	45
11	57820	59940	2120	45
12	59940	60135	195	30
13	60135	60720	585	30
14	60720	61040	320	40
15	61040	61880	840	30
16	61880	62120	240	40
17	62120	62735	615	30
18	62735	63135	400	30
19	63135	66480	3345	45
20	66480	67235	755	30
21	67235	67735	500	30
22	67735	68320	585	30
23	68320	68600	280	40
24	68600	72000	3400	30

0.8 Abutting Land Use Pattern

Project road passing maximum in rolling terrain. Approx in 20% of total length, it passes through mountainous terrain also (From km 4+500 to km 12+500, km 13+500 to km 14+700 & km 84+500 to km 96+500).
Built-up and partially built-up are existing along the both side of Project road.

The land use pattern in chart view is shown below –

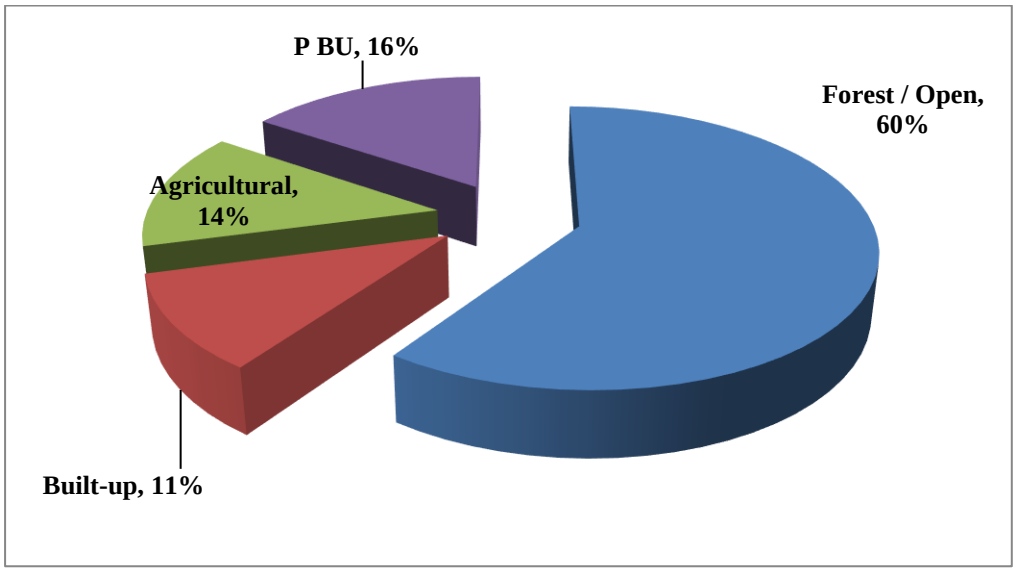


Fig 0.2 Land Use Pattern

Table 0.3 :- Details of Land

Sl. No.	Design Chainage (Km)		Length (Km)	Terrain	Remarks
1	36.00	72.00	36.00	Rolling	

0.9 Terrain

Terrain is plain, rolling and mountainous.

0.10 Carriageway

The carriageway of the Project highway as per data collected at the time of reconnaissance survey is as shown below –

Table 0.4 :-Carriageway Width

Sl. No.	Chainage (km)		Carriage way width (m)	Remarks
	From	To		
2	36+000	42+500	3.5	
3	42+500	58+000	5 – 6	
4	58+000	72+000	3.5 – 4	

0.11 Design Standards

Following design standards have been adopted as per Indian Roads Congress (IRC) guidelines, contained in IRC: 73, IRC: 86, IRC: 38, IRC 58-2011 and IRC: SP: 23 and is given in Table0.5.

Table 0.5- Design Parameters

Item	Plain / Rolling / Mountainous Terrain	Reference
Design Speed (kmph)	Ruling -100 Kmph (Plain) / 60kmph (Hill) Min.- 80 kmph (Plain) / 40kmph (Hill)	Table 2.1
Sight distance (minimum)	180 m	Table 2.6
Proposed Land width (ROW)	20-80 m (refer table 0.2 of Executive Summary)	
Lane configuration	2-lane with paved shoulders	
Formation width	**In Open area** 7.0 m of carriageway + 1.5 m Paved shoulder + 1.0 m earthen shoulder **In Built-up area** 7.0 m of carriageway + 2.5 m Paved shoulder + 1.75 m RCC drain	Refer MoRT&H circular dated 17.07.2020
Edge strip	.25m Raised median	
	.5m Depressed Median	
Camber/cross fall	2.5 %	Table 2.7
Shoulders	2.5 % for paved shoulder and 3.0 % for earthen shoulder	Clause 2.8.2

<table>
<tr><th>Item</th><th>Plain / Rolling / Mountainous Terrain</th><th>Reference</th></tr>
<tr><td>Side Slope</td><td>1 (V): 2 (H) Fill (Fill height upto 3.0 m)
1 (V): 1.5 (H) Fill (Fill height 3 m to 6.0 m)
1 (V): 0.5 (H) Cut</td><td></td></tr>
<tr><td>Maximum super-elevation</td><td>7.0 %</td><td></td></tr>
<tr><td>Radii of horizontal curves in plain/hilly terrain (m)</td><td><table><tr><th></th><th>Plain</th><th>Hilly</th></tr><tr><td>Ruling Min</td><td>400 m</td><td>150m</td></tr><tr><td>Absolute Min</td><td>250 m</td><td>75m</td></tr></table></td><td>Table 2.5</td></tr>
<tr><td>Drains</td><td>“Rectangular “shape on - either side where warranted depending on Site Condition & U-shaped Drain in hill sections.</td><td></td></tr>
</table>

0.12 Survey & Investigation

0.12.1 Traffic Surveys

Traffic surveys have been conducted at three locations in entire project road length (Teliamura – Harina).

Table 0.6: Traffic count survey locations

Sl. No.	Homogenous Section	Location	Remarks to Capture
1	Section I :: Km 0 to Km 45.0 (Teliamura – Amarpur section)	Km 42.300 (near Rangamati)	Traffic coming from Agartala, Manu bazar & moving towards Amarpur, Harina, Sabroometc (both ways)
2	Section II :: Km 45.0 to Km 88.00 (Amarpur – Ailmara section)	Km 88.000 (near Ailmara)	Traffic coming from Agartala, Manu bazar, Amarpur& moving towards Harina, Sabroom also to Agartala via Harina (both ways)
3	Section III :: Km 88.0 to Km 133.00 (Ailmara – Harina section)	Km 132.800 (near Harina)	Traffic coming from Agartala, Manu bazar, Amarpur& moving towards Harina, Sabroom also to Agartala via Harina (both ways) Inclusion of local traffic.

0.12.2 Growth Rate

The Adopted Traffic Growth rate is taken an average of 5% for all type of vehicles.

0.12.3 AADT, CVPD & Projected Traffic

Table 0.7- Commercial Vehicle Per day

Sl. No.	Location	AADT	PCU	CVPD	Remarks
1	Km 42.30 (near Rangamati)	1579	1583	302	
2	Km 88.00 (near Ailmara)	246	225	35	
3	Km 132.80 (near Harina)	251	241	45	

Projected traffic on the project road is given below:

Table 0.8- Projected traffic

Year	Likely traffic on the Project road			
	PCU at km 42.30(Near Rangamati)	PCU at km 88.00 (Near Ailmara)	PCU at km 132.80 (Near Harina)	Requirement of
2017	1583	224	241	2 Lane
2020	2162	299	334	
2025	2750	368	423	
2030	3500	451	532	
2035	4457	559	666	
2040	5673	696	854	

As per the projected traffic & MoRT&H circular dated 26th May 2016, requirement for four lane is not qualifying upto year 2040 (For Plain terrain = 10000 PCU per day, for Rolling terrain = 8500 PCU per day & for Mountainous terrain = 6000 PCU per day), However, considering the connectivity of Project road with adjacent towns / NH-08 & development of backward areas/ Religious / Tourist Places, it is proposed to develop the project road as two lane with paved shoulder facility.

0.12.4 Axle load survey

Though CVPD (as per above table) on all three locations are found very less (302, 35 & 45), so the Axle load survey could not carried out and the default values of VDF as per table 4.2 of IRC -37:2018 is considered 1.5 for km 88 & 132.800 and value adopted as 3.9 for km 42.300.

0.12.5 Testing of soil from existing embankment

The soil samples from various locations on the existing embankment have been collected and subjected to laboratory testing for determination of various engineering properties. The CBR is found an average of 8%.

Table 0.9: - Existing Pavement Crust

Chainage (Km)	*Position of Pit*	*Pavement Composition*			*Total (mm)*
		Bitumen Layer	*Brick Soling*	*Sub base Course*	
		(mm)	*(mm)*	*(mm)*	
42+000	LHS	50	170	-	220
42+500	RHS	50	155	-	205
43+000	LHS	40	245	-	285
43+500	RHS	40	170	-	210
44+000	LHS	40	205	-	245
44+500	RHS	50	210	-	260
45+000	LHS	35	175	-	210
45+500	RHS	40	260	-	300
46+000	LHS	45	235	-	280
46+500	RHS	35	195	-	230
47+000	LHS	40	165	-	205
47+500	RHS	45	195	-	240
48+000	LHS	45	245	-	290
48+500	RHS	45	170	-	215
49+000	LHS	40	155	-	195
49+500	RHS	30	270	-	300
50+000	LHS	45	185	-	230
50+500	RHS	45	180	-	225
51+000	LHS	30	220	-	250
51+500	RHS	35	255	-	290
52+000	LHS	35	250	-	285
52+500	RHS	35	245	-	280
53+000	LHS	40	215	-	255
53+500	RHS	50	245	-	295
54+000	LHS	50	260	-	310
54+500	RHS	45	280	-	325
55+000	LHS	50	195	-	245
55+500	RHS	30	220	-	250
56+000	LHS	45	180	-	225
56+500	RHS	40	250	-	290
57+000	LHS	45	275	-	320
57+500	LHS	50	170	-	220
58+000	RHS	50	165	-	215
58+500	LHS	40	195	-	235

Chainage (Km)	*Position of Pit*	*Pavement Composition*			*Total (mm)*
		Bitumen Layer	*Brick Soling*	*Sub base Course*	
		(mm)	*(mm)*	*(mm)*	
59+000	RHS	50	165	-	215
59+500	LHS	35	180	-	215
60+000	RHS	40	230	-	270
60+500	LHS	35	245	-	280
61+000	LHS	35	220	-	255
61+500	RHS	45	195	-	240
62+000	LHS	45	265	-	310
62+500	RHS	35	255	-	290
63+000	LHS	35	245	-	280
63+500	RHS	35	200	-	235
64+000	LHS	35	240	-	275
64+500	LHS	40	225	-	265
65+000	RHS	45	215	-	260
65+500	LHS	35	150	-	185
66+000	RHS	45	200	-	245
66+500	LHS	35	170	-	205
67+000	RHS	30	170	-	200
67+500	LHS	50	240	-	290
68+000	LHS	50	250	-	300
68+500	RHS	40	195	-	235
69+000	LHS	40	265	-	305
69+500	RHS	40	205	-	245
70+000	LHS	50	215	-	265
70+500	RHS	35	155	-	190
71+000	LHS	40	210	-	250
71+500	LHS	45	200	-	245
72+000	RHS	35	265	-	300
72+500	LHS	40	245	-	285
73+000	RHS	45	255	-	300
73+500	LHS	45	245	-	290
74+000	RHS	45	210	-	255
74+500	LHS	40	210	-	250
75+000	LHS	30	235	-	265
75+500	RHS	45	210	-	255
76+000	LHS	45	155	-	200

Chainage (Km)	*Position of Pit*	*Pavement Composition*			*Total (mm)*
		Bitumen Layer	*Brick Soling*	*Sub base Course*	
		(mm)	*(mm)*	*(mm)*	
76+500	RHS	30	175	-	205
77+000	LHS	35	180	-	215
77+500	RHS	35	155	-	190
78+000	LHS	35	160	-	195
78+500	LHS	40	275	-	315
79+000	RHS	50	250	-	300
79+500	LHS	50	245	-	295
80+000	RHS	40	215	-	255
80+500	LHS	40	245	-	285
81+000	RHS	40	260	-	300
81+500	LHS	30	280	-	310
82+000	LHS	35	195	-	230
82+500	RHS	40	220	-	260
83+000	LHS	35	180	-	215
83+500	RHS	40	250	-	290
84+000	LHS	45	275	-	320
84+500	RHS	40	170	-	210
85+000	LHS	45	165	-	210
85+500	LHS	35	195	-	230
86+000	RHS	45	165	-	210

0.12.6 CBR Test Results of soil samples

NORTH EAST SOIL TESTING (NEST)

Regd. Office : Ujan Abhoynagar,
Opp. Post Office, Agartala ,
West Tripura, PIN – 799005 ,

ISO 9001:2008 Certified

Issue Date : 25.03.17
Issued To : TASPL
Sample Deposited by : Representative
Sample Description : Soil

Job No. : B 5533
Date of Sample received : 20.02.17
Page :3.of..3....

Location: - Teliamura - Sabroom Section

Sl.No.	Chainage No. (Km)	MDD (g/cc)	OMC (%)	Unsoaked CBR (%)	Soaked CBR (%)	Swelling Index (%)
01	10.00	1.756	15.71	15.43	7.54	3.86
02	20.00	1.878	11.55	18.86	8.14	2.65
03	30.00	1.782	15.26	16.52	7.86	3.79
04	55.00	1.794	14.78	17.47	7.98	3.79
05	65.00	1.802	13.92	18.58	8.04	2.98
06	75.00	1.816	14.11	18.61	8.12	2.78
07	95.00	1.823	13.75	17.94	7.96	2.71
08	105.00	1.787	15.78	16.76	7.89	3.73
09	115.00	1.796	14.74	17.33	7.85	3.81
10	Borrow Area Near Km 44.00	1.778	15.55	17.27	8.43	3.77
11	Borrow Area Near Km 82.00	1.800	13.76	17.78	8.16	3.02

Prepared by
25/03/17
B. Tech (Civil)
Quality Manager,
North East Soil Testing,
Agartala-799005

(1) This test report pertains only to the sample tested. (2) This test report is valid at the time of and under the conditions specified here in. (3) Any correction invalidates this test report. This test report should not be published in part or in full by any body without written permission from 'NEST'. (4) Samples will be destroyed after 90 days from the date of reporting unless otherwise specified. (5) This report not to be reproduced wholly or in part & can not be used as an evidence in the court of Law & should not be used in any advertising media without our special permission in writing.

0.13 Material survey

Aggregate quarry for structure works and road works is identified at Silchar (Assam) which is Approx 300km away from Teliamura.

Sand source has been located from Local River with average lead of 20 km.

Borrow earth can be obtained from number of locations along the project road.

Cement for concrete works may purchase from local vendors of different grades of OPC & PPC.

Steel for concrete work may also use from local suppliers.

Bitumen supply is considered from Guwahati depot (For packed bitumen) with lead of approx. 510Km. the rate of bitumen has been provided at Agartala with price of Rs 42000/- per MT + 18% GST, at Teliamura site it will be Rs 41000/- per MT +18% GST (a quotation is shown here)

Swastik Petrochem
Factory: Vill. Bheleuguri,
Samaguri, Nagaon, Assam – 782003
Mob.: +91-98120-39009
e-mail: petro.swastik@gmail.com

Ref:- SP/Q-108/2020-21 Dated: 06.01.2020

To,
M/s.Technocraft Advisory Services Pvt Ltd,
Ghaziabad,

Plant at :-Teliamura Tripura

Sub.: Offer for Sale of Bitumen VG-30 and Bitumen VG-40 (Packed in Drums)

Dear Sir,

This is with reference to your requirement of Bitumen and telephonic conversation had with you. We are pleased to offer our competitive rates for sale of Bitumen VG-30 and Bitumen VG-40 (Packed in Drums) as under:-

Sr. No.	Description	Quantity	Rates (in Rs.)
1	Bitumen VG-30 (Packed in Drums) HS Code : 27132000	1000 M.T. (Approx)	41000/- per M.T. + 18% GST
2	Bitumen VG-40 (Packed in Drums) HS Code : 27132000	1000 M.T. (Approx)	42000/- per M.T. + 18% GST

Note:-

1. These rates are F.O.R at Agartala.
2. Payment 100% advance before dispatch of Material.
3. GST @18% will be charged.
4. This offer is valid for 7 days.

Thanking you,
For Swastik Petrochem

Amit Monga
Mob. No : 80530-52130

0.14 Geotechnical Investigations

Geotechnical investigations have been completed and the results shown in other volume "Material Report".

0.15 Development Proposals

0.15.1 Pavement Design

Considering a growth rate of 5 % and VDF as 1.5 & 3.9 obtained from the IRC, design of pavement as per IRC 37 -2018 for a design life of minimum 15 years.

Accordingly design traffic has been worked out as 20MSA (as per 5.4.1 (i) of Two lane manual, IRC SP: 73: 2018) and considering sub-grade construction with soil of CBR not less than 8%,
The Pavement compositions for Project road as per IRC 37-2018 is as under:

a) Bituminous concrete (BC) - 40mm,
b) Bituminous stabilized material - 100mm,
c) Cement treated sub base - 200mm &
d) Subgrade - 500mm

0.15.2 Typical Cross Section and Widening Scheme

i) **Roadway width -**

a. **For Plain areas -** Roadway width of 12.00 (7.0+2x1.5+2x1.0) is proposed for sections with 2 lane plus paved shoulders of 1.50m and unpaved shoulder of 1.00m on either side in plain areas and,

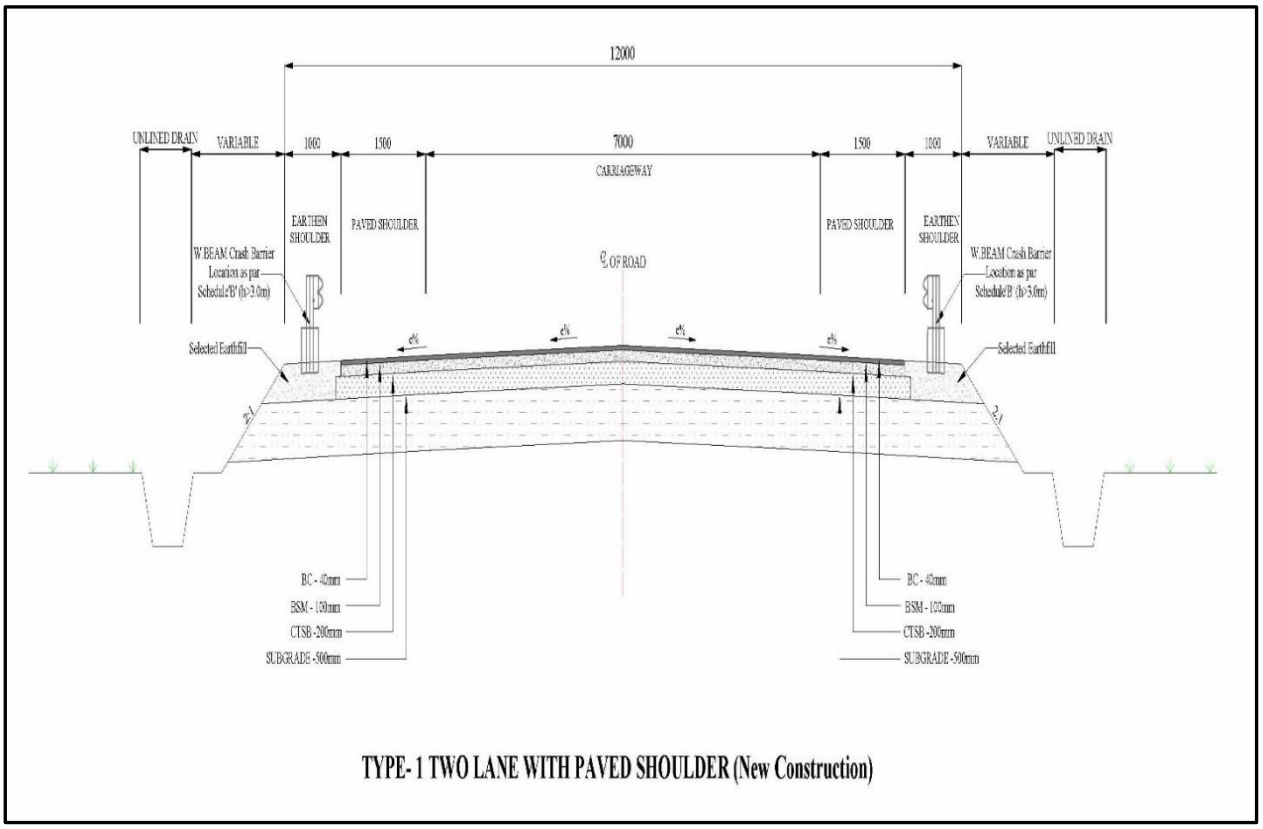
b. **For Built-up areas -** Roadway width of 12.00 (7.0+2x2.5 paved shoulder) + (2x1.75 drain) is proposed for sections with 2 lane plus paved shoulders of 1.50m and RCC covered drain of 1m wide on either side of Road way,

c. **For Hilly areas -** Roadway width of 10.00 (7.0+2x1.5) is proposed for sections with 2 lane plus paved shoulders of 1.50m (as per attached cross sections),

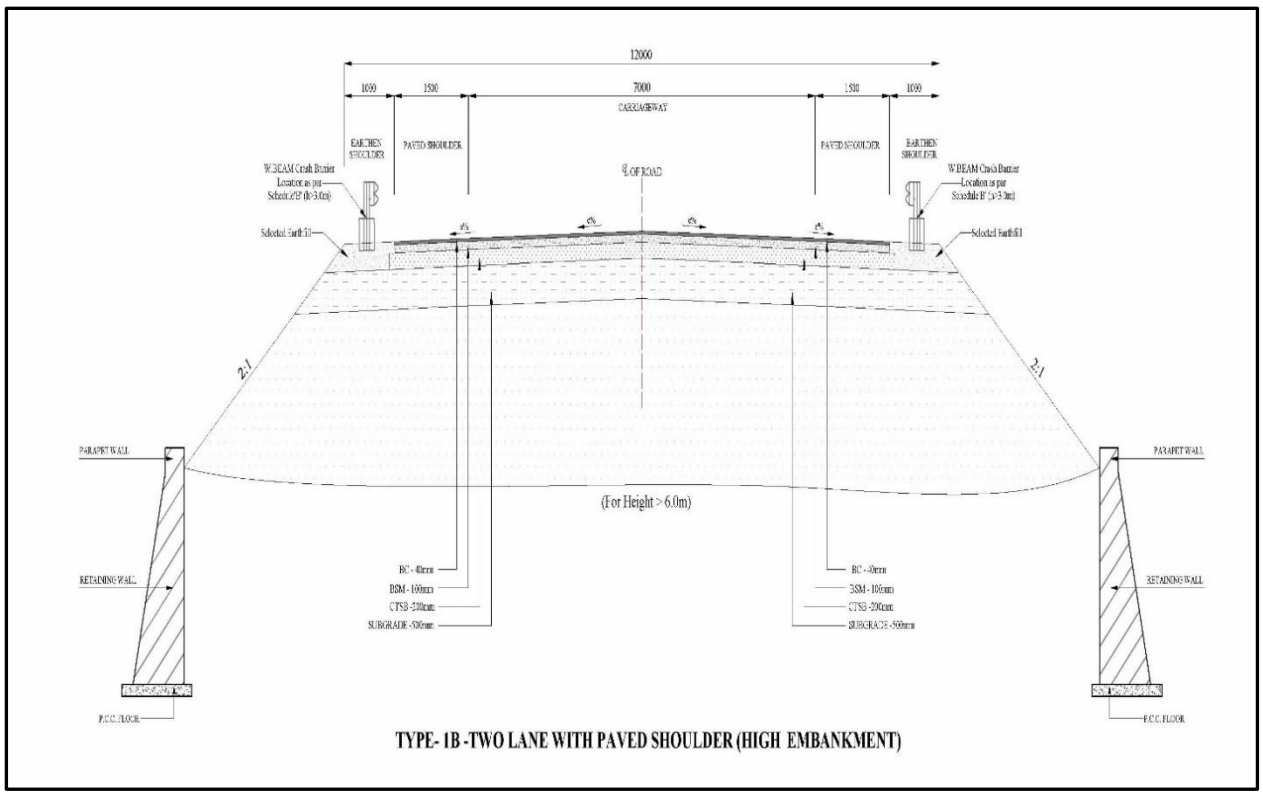
ii) **Carriageway Width -** Two Lane Carriage way (3.5m for each lane) is proposed,

iii) **Shoulders -** Unpaved shoulders of 1.0 wide and paved shoulder of 1.50m are proposed on either side of the Carriage way.

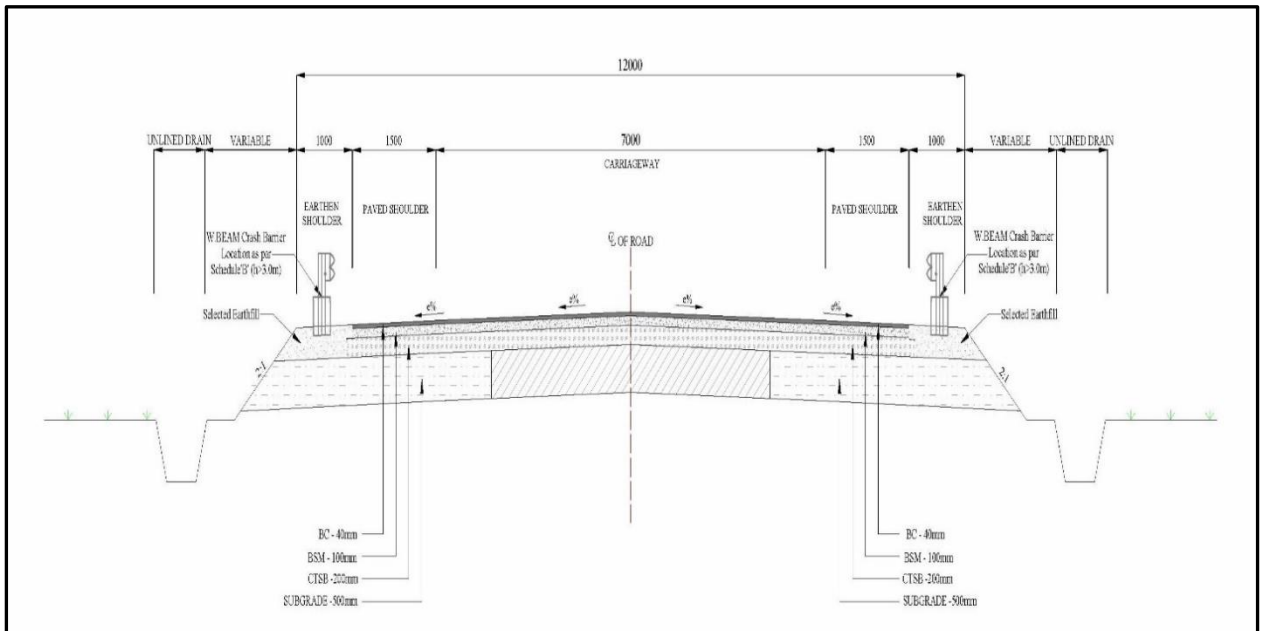
Proposed Typical cross sections are shown here –



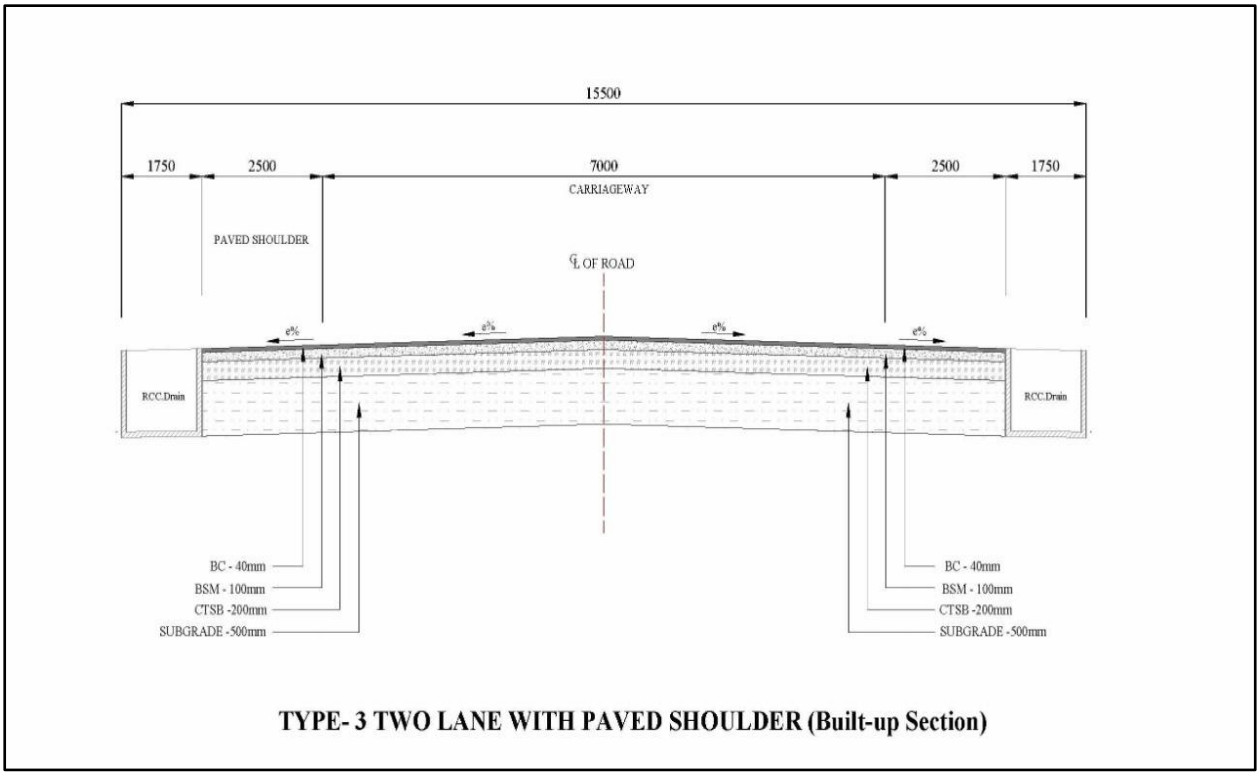
TYPE- 1 TWO LANE WITH PAVED SHOULDER (New Construction)



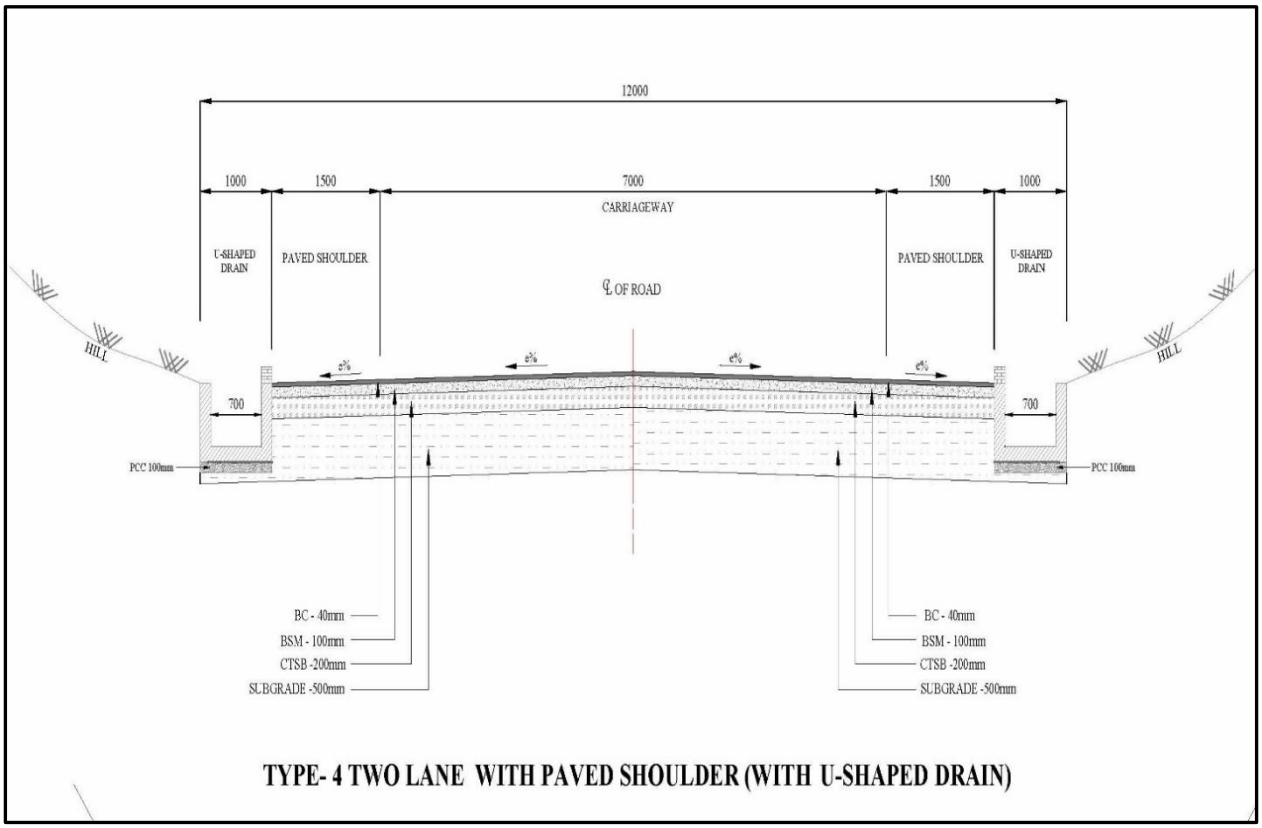
TYPE- 1B -TWO LANE WITH PAVED SHOULDER (HIGH EMBANKMENT)



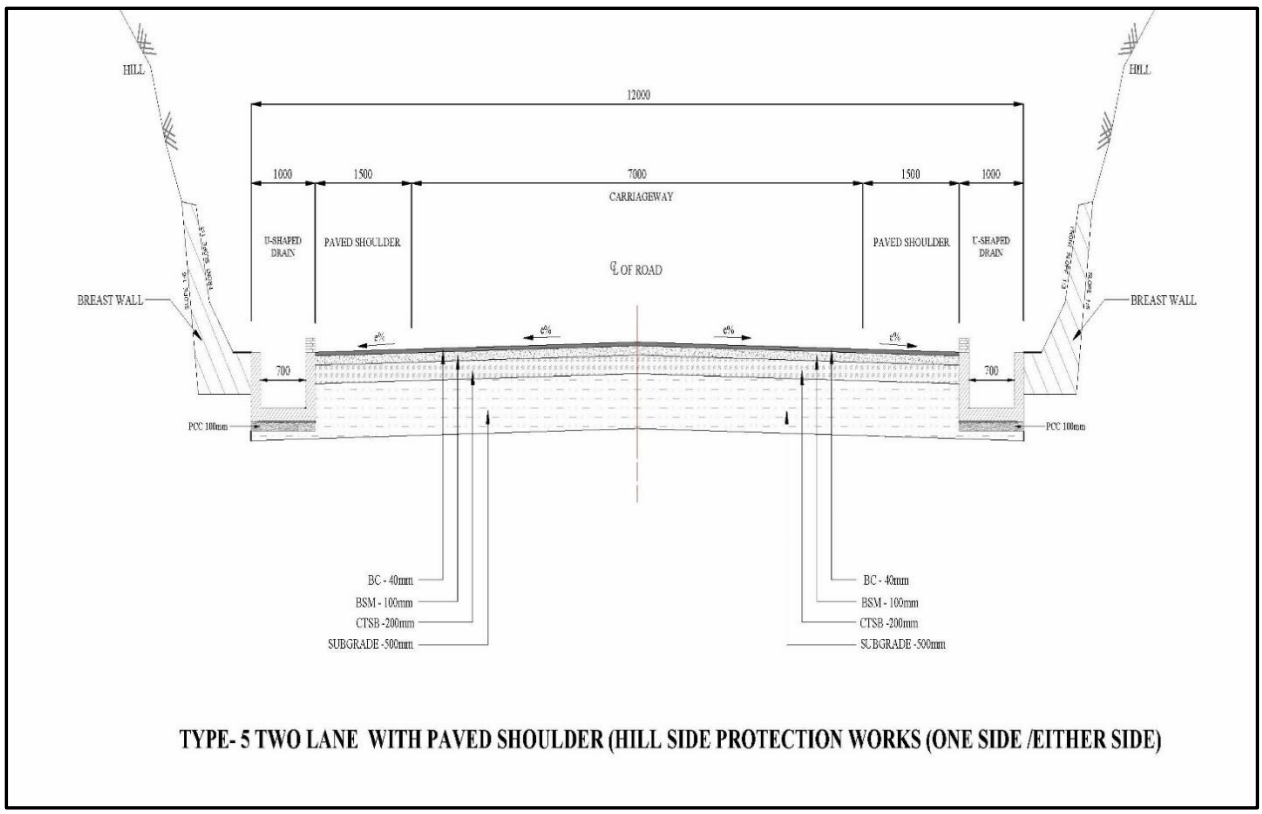
TYPE- 2 TWO LANE WITH PAVED SHOULDER (PARTIALLY EXISTING / NEW ALIGNMENT)



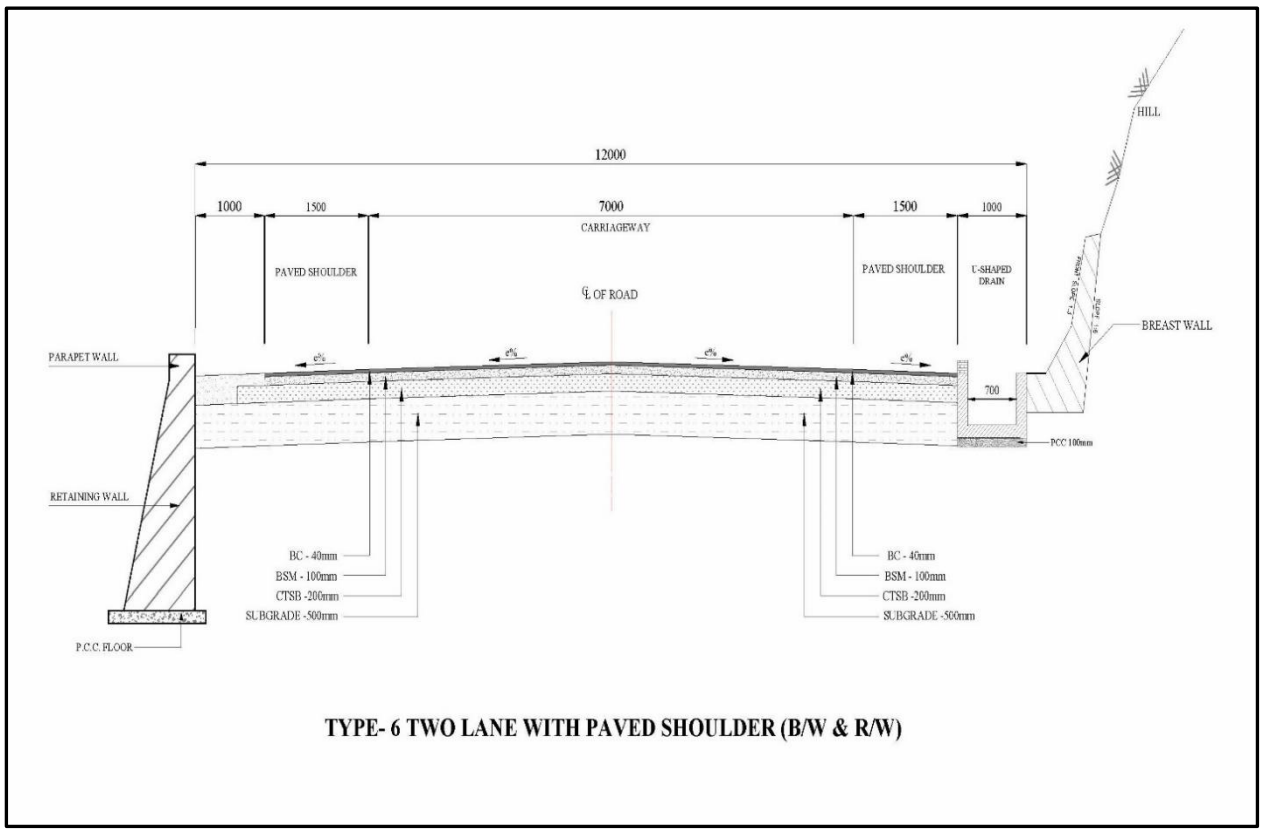
TYPE- 3 TWO LANE WITH PAVED SHOULDER (Built-up Section)



TYPE- 4 TWO LANE WITH PAVED SHOULDER (WITH U-SHAPED DRAIN)



TYPE- 5 TWO LANE WITH PAVED SHOULDER (HILL SIDE PROTECTION WORKS (ONE SIDE /EITHER SIDE)



TYPE- 6 TWO LANE WITH PAVED SHOULDER (B/W & R/W)

TCS Schedule -

Sl. No	Design Chainage (Km)		Bridge Length (m)	Total length	TCS Type	Description	
	From	To					
1	36+000	42+260	107	6+153	TCS-1	Two Lane With Paved Shoulder (New Construction) with high embankment also	Amarpur Bypass
2	42+260	42+620		0+360	TCS-5	Two Lane With Paved Shoulder in hill B/s Breast wall	
3	42+620	42+740		0+120	TCS-4	Two Lane With Paved Shoulder (b/s PCC drain)	
4	42+740	43+460	40	0+680	TCS-1	Two Lane With Paved Shoulder (New Construction) with high embankment also	
5	43+460	43+780		0+320	TCS-5	Two Lane With Paved Shoulder in hill B/s Breast wall	
6	43+780	44+100	25	0+295	TCS-1	Two Lane With Paved Shoulder (New Construction) with high embankment also	
7	44+100	44+180		0+080	TCS-5	Two Lane With Paved Shoulder in hill B/s Breast wall	
8	44+180	45+000		0+820	TCS-1	Two Lane With Paved Shoulder (New Construction) with high embankment also	
9	45+000	46+100	16	1+084	TCS-2	Two Lane With Paved Shoulder	(New Construction / over existing road)
10	46+100	46+600		0+500	TCS-1	Two Lane With Paved Shoulder (New Construction) with high embankment also	
11	46+600	47+020		0+420	TCS-4	Two Lane With Paved Shoulder (b/s PCC drain)	
12	47+020	48+280		1+260	TCS-2	Two Lane With Paved Shoulder	(New Construction / over existing road)

Sl. No	Design Chainage (Km)		Bridge Length (m)	Total length	TCS Type	Description	
	From	To					
13	48+280	49+240		0+960	TCS-4	Two Lane With Paved Shoulder (b/s PCC drain)	
14	49+240	50+080		0+840	TCS-1	Two Lane With Paved Shoulder (New Construction) with high embankment also	
15	50+080	50+180		0+100	TCS-5	Two Lane With Paved Shoulder in hill B/s Breast wall	
16	50+180	50+560		0+380	TCS-2	Two Lane With Paved Shoulder	(New Construction / over existing road)
17	50+560	50+720		0+160	TCS-5	Two Lane With Paved Shoulder in hill B/s Breast wall	
18	50+720	51+000	10	0+270	TCS-1	Two Lane With Paved Shoulder (New Construction) with high embankment also	
19	51+000	51+420		0+420	TCS-5	Two Lane With Paved Shoulder in hill B/s Breast wall	
20	51+420	52+900	25	1+455	TCS-1	Two Lane With Paved Shoulder (New Construction) with high embankment also	Nutan Bazar Bypass
21	52+900	53+100		0+200	TCS-3	Two lane with paved shoulder (Built-up section)	
22	53+100	53+980	75	0+805	TCS-1	Two Lane With Paved Shoulder (New Construction) with high embankment also	Jatan bari Bypass
23	53+980	54+000		0+020	TCS-5	Two Lane With Paved Shoulder in hill B/s Breast wall	Jatan bari Bypass
24	54+000	54+720		0+720	TCS-5	Two Lane With Paved Shoulder in hill B/s Breast wall	Jatan bari Bypass
25	54+720	55+120		0+400	TCS-4	Two Lane With Paved Shoulder (b/s PCC drain)	Jatan bari Bypass

Sl. No	Design Chainage (Km)		Bridge Length (m)	Total length	TCS Type	Description	
	From	To					
26	55+120	55+780		0+660	TCS-5	Two Lane With Paved Shoulder in hill B/s Breast wall	Jatan bari Bypass
27	55+780	56+100		0+320	TCS-4	Two Lane With Paved Shoulder (b/s PCC drain)	Jatan bari Bypass
28	56+100	56+220		0+120	TCS-5	Two Lane With Paved Shoulder in hill B/s Breast wall	Jatan bari Bypass
29	56+220	56+820		0+600	TCS-4	Two Lane With Paved Shoulder (b/s PCC drain)	Jatan bari Bypass
30	56+820	57+000		0+180	TCS-5	Two Lane With Paved Shoulder in hill B/s Breast wall	Jatan bari Bypass
31	57+000	58+500		1+500	TCS-4	Two Lane With Paved Shoulder (b/s PCC drain)	
32	58+500	59+975	27	1+448	TCS-2	Two Lane With Paved Shoulder	(New Construction / over existing road)
33	59+975	60+135		0+160	TCS-3	Two lane with paved shoulder (Built-up section)	
34	60+135	60+720	30	0+555	TCS-2	Two Lane With Paved Shoulder	(New Construction / over existing road)
35	60+720	60+980		0+260	TCS-5	Two Lane With Paved Shoulder in hill B/s Breast wall	
36	60+980	61+420		0+440	TCS-4	Two Lane With Paved Shoulder (b/s PCC drain)	
37	61+420	61+800		0+380	TCS-5	Two Lane With Paved Shoulder in hill B/s Breast wall	
38	61+800	62+760	16	0+944	TCS-1	Two Lane With Paved Shoulder (New Construction) with high embankment also	
39	62+760	62+920		0+160	TCS-4	Two Lane With Paved Shoulder (b/s PCC	

Sl. No	Design Chainage (Km)		Bridge Length (m)	Total length	TCS Type	Description	
	From	To					
						drain)	
40	62+920	64+680	41	1+719	TCS-1	Two Lane With Paved Shoulder (New Construction) with high embankment also	Karbook Bypass
41	64+680	65+380		0+700	TCS-4	Two Lane With Paved Shoulder (b/s PCC drain)	Karbook Bypass
42	65+380	66+020		0+640	TCS-5	Two Lane With Paved Shoulder in hill B/s Breast wall	Karbook Bypass
43	66+020	66+450		0+430	TCS-4	Two Lane With Paved Shoulder (b/s PCC drain)	Karbook Bypass
44	66+450	67+200		0+750	TCS-4	Two Lane With Paved Shoulder (b/s PCC drain)	
45	67+200	67+700		0+500	TCS-3	Two lane with paved shoulder (Built-up section)	
46	67+700	72+000	32	4+268	TCS-1	Two Lane With Paved Shoulder (New Construction)	
	Total Length..		**444**	**35+556**			
				18+749	**TCS-1**	Two Lane With Paved Shoulder (New Construction)	
				4+727	**TCS-2**	Two Lane With Paved Shoulder	(New Construction / over existing road)
				0+860	**TCS-3**	Two lane with paved shoulder (Built-up section)	
			13600	6+800	**TCS-4**	Two Lane With Paved Shoulder (b/s PCC drain)	
			8840	4+420	**TCS-5**	Two Lane With Paved Shoulder in hill B/s Breast wall	

Sl. No	Design Chainage (Km)		Bridge Length (m)	Total length	TCS Type	Description	
	From	To					
			0+000	0+000	**TCS-6**	Two Lane With Paved Shoulder in hill (BW & RW)	

0.16 Horizontal Design of Project road

The horizontal alignment design report is tabulated below.

Table 0.10: Horizontal Report

Curve No.	HORIZONTAL CURVE				Terrain	Transition length	Speed (Kmph)
	Start Chainage	End Chainage	Radius	Direction			
77	36+235.077	36+795.375	1000	Right	Plain	50	100
78	37+868.949	38+442.221	1200	Right	Plain	40	100
79	39+077.601	39+319.403	1800	Left	Plain	30	100
80	40+299.392	40+984.914	1800	Right	Plain	30	100
81	43+029.802	43+912.390	1000	Left	Plain	50	100
82	44+449.491	44+727.446	400	Right	Plain	55	80
83	44+901.096	45+414.217	400	Left	Plain	55	80
84	45+604.454	45+998.336	400	Right	Plain	55	80
85	46+205.014	46+253.354	2000	Left	Plain	0	100
86	46+714.444	46+997.380	1500	Left	Plain	35	100
87	47+216.858	47+770.354	500	Right	Plain	45	80
88	47+942.566	48+380.919	400	Left	Plain	55	80
89	48+590.722	48+632.913	400	Right	Plain	55	80
90	48+895.287	48+969.404	1800	Right	Plain	30	100
91	49+632.566	50+192.809	800	Left	Plain	60	100
92	51+055.717	51+090.853	2000	Left	Plain	0	100
93	51+578.151	51+752.661	400	Right	Plain	55	80
94	52+062.423	52+332.872	700	Left	Plain	70	100
95	53+178.229	53+340.493	400	Right	Plain	55	80
96	53+631.924	53+769.368	2000	Left	Plain	0	100
97	54+299.960	54+364.311	800	Right	Plain	60	100
98	55+005.113	55+149.195	500	Right	Plain	95	100
99	55+991.015	56+081.646	1200	Right	Plain	40	100
100	56+644.624	57+013.814	1000	Right	Plain	50	100
101	57+990.649	58+239.696	1000	Left	Plain	50	100
102	58+566.373	58+703.238	1000	Left	Plain	50	100
103	59+479.821	59+585.742	1500	Left	Plain	35	100
104	59+995.924	60+164.673	1500	Right	Plain	35	100
105	60+873.839	61+371.488	800	Right	Plain	60	100
106	62+218.343	62+545.136	800	Left	Plain	60	100
107	63+109.293	63+254.510	1500	Left	Plain	35	100
108	63+482.245	63+599.973	800	Right	Plain	60	100
109	63+863.979	63+974.899	1500	Left	Plain	35	100
110	64+881.060	65+295.913	1000	Left	Plain	50	100
111	66+264.718	66+436.247	600	Left	Plain	80	100
112	66+796.501	66+960.367	800	Right	Plain	60	100
113	67+656.858	68+127.830	600	Right	Plain	80	100
114	68+250.515	68+800.026	800	Left	Plain	40	100
115	69+481.179	70+217.072	1000	Right	Plain	50	100

Curve No.	HORIZONTAL CURVE				Terrain	Transition length	Speed (Kmph)
	Start Chainage	End Chainage	Radius	Direction			
116	71+451.208	71+965.183	800	Left	Plain	60	100
117	72+757.908	73+041.025	2000	Left	Plain	0	100

Table 0.11: Deviation in Horizontal curves

Curve No.	HORIZONTAL CURVE				Terrain	Transition Length (m)	Speed	Reason of Deviation
	Start Chainage (Km)	End Chainage (Km)	Radius	Direction			(Kmph)	
Nil								

0.17 Vertical Design of Project road

Vertical design report is tabulated below.

Table 0.12: Vertical Report

PVI No	PVI		Curve Length (m)	Gradient (%)		Chainage (m)		Level (m)		Type Of Curve	K Value
	Design Chainage (km)	Level (m)		IN	OUT	Start of Curve (km)	End of Curve (km)	Start of Curve (m)	End of Curve (m)		
39	37+622.352	32.706	250	-0.393	0.396	37+497.352	37+747.352	33.197	33.201	Sag	316.808
40	39+985.117	42.067	250	0.396	-0.326	39+860.117	40+110.117	41.572	41.66	Hog	346.222
41	40+760.837	39.539	200	-0.326	0.315	40+660.837	40+860.837	39.865	39.854	Sag	312.205
42	41+547.574	42.015	300	0.315	-0.78	41+397.574	41+697.574	41.543	40.845	Hog	274.044
43	42+409.750	35.29	250	-0.78	0.656	42+284.750	42+534.750	36.265	36.11	Sag	174.048
44	43+634.986	43.33	200	0.656	2.151	43+534.986	43+734.986	42.674	45.48	Sag	133.79
45	44+196.733	55.412	400	2.151	1.067	43+996.733	44+396.733	51.11	57.546	Hog	369.016
46	46+579.926	80.839	500	1.067	0.354	46+329.926	46+829.926	78.171	81.725	Hog	701.667
47	47+572.875	84.357	300	0.354	-1.235	47+422.875	47+722.875	83.826	82.504	Hog	188.736
48	48+257.432	75.901	200	-1.235	1.559	48+157.432	48+357.432	77.137	77.461	Sag	71.573
49	49+193.757	90.5	750	1.559	-3.967	48+818.757	49+568.757	84.653	75.623	Hog	135.711
50	50+005.489	58.296	150	-3.967	-1.419	49+930.489	50+080.489	61.271	57.232	Sag	58.854
51	50+706.928	48.345	200	-1.419	0.338	50+606.928	50+806.928	49.764	48.683	Sag	113.87

PVI	PVI		Curve Length (m)	Gradient (%)		Chainage (m)		Level (m)		Type Of Curve	K Value
No	Design Chainage (km)	Level (m)		IN	OUT	Start of Curve (km)	End of Curve (km)	Start of Curve (m)	End of Curve (m)		
52	51+435.805	50.807	300	0.338	-0.655	51+285.805	51+585.805	50.3	49.824	Hog	302.061
53	52+386.875	44.573	200	-0.655	0.302	52+286.875	52+486.875	45.228	44.875	Sag	208.827
54	54+103.370	49.762	200	0.302	1.704	54+003.370	54+203.370	49.46	51.466	Sag	142.646
55	54+817.785	61.938	300	1.704	0.319	54+667.785	54+967.785	59.381	62.417	Hog	216.598
56	56+213.632	66.395	125	0.319	2.063	56+151.132	56+276.132	66.195	67.684	Sag	71.694
57	57+024.511	83.122	600	2.063	-1.904	56+724.511	57+324.511	76.934	77.41	Hog	151.254
58	57+620.000	71.784	200	-1.904	1.285	57+519.964	57+720.036	73.689	73.07	Sag	62.735
59	58+345.527	81.105	600	1.285	-3.172	58+045.527	58+645.527	77.251	71.59	Hog	134.64
60	58+950.000	61.933	150	-3.172	0.499	58+875.000	59+025.000	64.312	62.307	Sag	40.868
61	59+520.736	64.779	300	0.499	-0.382	59+370.736	59+670.736	64.031	64.205	Hog	340.471
62	60+233.864	62.051	150	-0.382	1.405	60+158.864	60+308.864	62.338	63.105	Sag	83.897
63	60+943.801	72.029	400	1.405	-1.099	60+743.801	61+143.801	69.218	69.831	Hog	159.71
64	62+316.358	56.943	300	-1.099	0.343	62+166.358	62+466.358	58.592	57.458	Sag	208.04
65	64+364.868	63.968	300	0.343	-0.473	64+214.868	64+514.868	63.454	63.259	Hog	367.703
66	65+106.405	60.461	200	-0.473	0.7	65+006.405	65+206.405	60.934	61.161	Sag	170.547
67	67+164.559	74.863	500	0.7	-1.133	66+914.559	67+414.559	73.114	72.03	Hog	272.794
68	68+644.764	58.09	300	-1.133	-0.333	68+494.764	68+794.764	59.79	57.591	Sag	374.822
69	70+809.836	50.886	250	-0.333	0.466	70+684.836	70+934.836	51.302	51.469	Sag	312.837

0.19 Sight Distance

Table 0.14: Sight Distance

PVI	PVI		Curve	Type of	K Value	Safe stopping Sight Distance	Speed
No.	Design Chainage (km)	Level (m)	Length	Curve			
42	37608	32.472	200	Sag	261.609		
43	39985	41.067	400	Hog	640.837	552.224	
44	41244	37.762	300	Sag	472.012		
45	41961	40.437	350	Hog	512.445	496.893	
46	43117	36.853	250	Sag	160.184		
47	43635	43.33	200	Sag	231.354		
48	44197	55.22	400	Hog	398.343	418.942	
49	45080	65.03	300	Hog	598.557	588.648	
50	46190	71.8	200	Sag	161.78		
51	46710	81.4	400	Hog	266.053	342.03	
52	47573	84.357	300	Hog	190.128	289.137	
53	48257	75.901	200	Sag	66.018		
54	49125	91.463	750	Hog	137.705	246.069	
55	50005	59.301	200	Sag	256.698		
56	50511	44.768	300	Sag	90.198		
57	51199	47.882	400	Hog	455.33	450.264	
58	52375	42.877	300	Sag	352.359		
59	53208	46.424	150	Hog	205.41	376.067	

PVI No.	PVI Design Chainage (km)	PVI Level (m)	Curve Length	Type of Curve	K Value	Safe stopping Sight Distance	Speed
60	53840	44.5	60	Sag	23.261		
61	54910	68.845	500	Hog	181.442	282.456	
62	56243	62.437	225	Sag	71.924		
63	57025	83.122	700	Hog	153.789	260.042	
64	57620	71.784	200	Sag	62.713		
65	58346	81.105	600	Hog	118.655	228.414	
66	58881	60.892	150	Sag	35.338		
67	59517	63.895	300	Hog	292.826	364.595	
68	60087	60.75	150	Sag	93.72		
69	60940	69.7	400	Hog	194.842	292.7	
70	62120	57.85	300	Sag	239.137		
71	64365	63.468	300	Hog	544.941	549.356	
72	65499	60.061	200	Sag	187.963		
73	67119	72.434	500	Hog	233.292	320.281	
74	68560	52.56	300	Sag	169.21		
75	69520	56.339	500	Hog	523.788	479.909	
76	70382	51.503	300	Sag	290.611		
77	71272	55.694	300	Hog	3328.965	2589.608	
78	71984	58.41	300	Hog	428.6	464.097	

0.20 Road Junctions/ Intersections

The details of cross roads/ junction development is as under -

Table 0.15: Improvement proposal at the intersection

Sl. No.	Section	Existing Junctions	Proposals
1	Section II km 36.0 to km 72.0	105 (1 Major & 104 Minor junctions)	85 minor intersections coming in project alignment shall be improved.

0.21 Railway Track& Proposals

No any Railway track exists on this Project road.

0.22 Cross Drainage Works

0.22.1 Bridges

- **32 bridges** exist on project alignment including one bridge between km 127.319 & km 128.559.
- 4 existing bridges are proposed to reconstruction.
- 1 box culvert proposed to construct as minor bridge (at km 76+600)
- 1 bridge proposed to widen upto 18m, (at km 127.469, between khowai chowmuhani & South pulinpur)
- 27existing bridges are retained due to realignment.
- 42 additional new bridges (1major & 41 minor including bridge at km 76+600) are proposed on the realignment and bypass.

Details of existing bridges & the proposal of new bridges are tabulated below –

Table 0.16: Major Bridge (Existing)

Sl. No.	Survey Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-Structure	Super structure		
1	49+450	CONCRETE BRIDGE			23.5+23.2+24+24.2 = 94.9	7.5
2	64+000	CONCRETE BRIDGE			22.4+22.9+24 = 69.3	7.5

Table 0.17: Major Bridge (Re-construction)

Sl. No.	Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-Structure	Super structure		
Nil						

Table 0.18: Major Bridge (New-construction)

Sl. No.	Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-Structure	Super structure		
1	53+500	PSC Girder			3x25	18m

Table 0.19: Minor Bridge (Existing)

Sl. No.	Survey Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-Structure	Super structure		
1	44+300	OLD WOODEN BRIDGE			30	3
2	47+700	CONCRETE BRIDGE			10	6.3
3	48+850	CONCRETE BRIDGE			5.9+5.9 = 11.8	5.1
4	51+520	OLD WOODEN BRIDGE			30	3
5	60+725	CONCRETE BRIDGE			9.7	6.4
6	62+250	OLD WOODEN BRIDGE			30	3
7	71+120	CONCRETE BRIDGE			2.8+2.8 = 5.6	5.3
8	71+800	CONCRETE BRIDGE			19.5	5.9
9	74+050	CONCRETE BRIDGE			29	5.5
10	77+680	CONCRETE BRIDGE			3.0+3.0+3.0 = 9	5.0
11	82+300	CONCRETE BRIDGE			3.0+3.0+3.0 = 9	5.0
12	83+150	CONCRETE BRIDGE			4.0+4.0+4.0 = 12	5.0
13	84+350	OLD WOODEN BRIDGE			30	3

Table 0.20: Proposal of Minor Bridges (Re-construction)

Sl. No.	Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-Structure	Super structure		
1	60+450	PSC Girder			1x30	18m

Table 0.21: Proposal of Minor Bridges (New Construction)

Sl. No.	Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-Structure	Super structure		
1	36+290	PSC Girder			1x35	18m
2	37+280	RCC BOX			1x12	18m
3	39+705	PSC Girder			1x35	18m
4	40+960	PSC Girder			1x25	18m
5	43+430	RCC Girder			2x20	18m
6	43+900	PSC Girder			1x25	18m

Sl. No.	Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-Structure	Super structure		
7	46+070	RCC BOX			2x8	18m
8	50+775	RCC BOX			1x10	18m
9	52+100	PSC Girder			1x25	18m
10	58+987	RCC BOX			1x12	18m
11	59+970	RCC BOX			2x7.5	18m
12	62+625	RCC BOX			2x8	18m
13	63+780	RCC BOX			2x8.5	18m
14	64+045	RCC BOX			3x8	18m
15	69+895	RCC BOX			2x8	18m
16	70+930	RCC BOX			2x8	18m

Tapper width @ 1:15m shall be adopted to match the road width with CD structure width.

0.22.2 Culverts

Total 89 culverts exist on Project alignment in which -

- 8 culverts are proposed for reconstruction.
- 81 culverts are retained due to proposal of realignments/bypasses.
- 92 new culverts are proposed in entire length as balancing culverts.

Table 0.22 – Proposal of Existing Culverts

Existing Detail						New Proposal			
Sl. No.	Existing Chainage (Km)	Type of Structure (Pipe/Slab /Box /Arch)	Span Arrangement		C'way Width (m)	Design Chainage (Km)	Proposal	Type	Size (m)
			No	Vent Width (m) (Clear)					
1	42+050	SLAB	1	0.8	3.4	-	Retained due to Realignment/Bypass		
2	42+100	SLAB	1	0.9	3.6	-	Retained due to Realignment/Bypass		
3	42+500	SLAB	1	0.9	3.6	-	Retained due to Realignment/Bypass		
4	43+250	SLAB	1	0.8	3.3	-	Retained due to Realignment/Bypass		
5	43+600	SLAB	1	1.5	3.6	-	Retained due to Realignment/Bypass		

Existing Detail						New Proposal			
Sl. No.	Existing Chainage (Km)	Type of Structure (Pipe/Slab /Box /Arch)	Span Arrangement		C'way Width (m)	Design Chainage (Km)	Proposal	Type	Size (m)
			No	Vent Width (m) (Clear)					
6	43+650	SLAB	1	0.9	3.6	-	Retained due to Realignment/Bypass		
7	44+070	PIPE	2	1	3.3	-	Retained due to Realignment/Bypass		
8	44+150	PIPE	2	1	3.3	-	Retained due to Realignment/Bypass		
9	45+250	PIPE	2	1	3.4	-	Retained due to Realignment/Bypass		
10	45+770	PIPE	2	1	3.4	-	Retained due to Realignment/Bypass		
11	45+880	SLAB	1	0.75	4.1	-	Retained due to Realignment/Bypass		
12	46+050	SLAB	1	0.75	4.1	-	Retained due to Realignment/Bypass		
13	46+120	SLAB	1	0.75	4.1	-	Retained due to Realignment/Bypass		
14	46+340	SLAB	1	0.7/1	3.5	-	Retained due to Realignment/Bypass		
15	46+450	SLAB	1	0.7/1	3.5	-	Retained due to Realignment/Bypass		
16	46+650	SLAB	1	0.8	3.5	-	Retained due to Realignment/Bypass		
17	46+830	SLAB	1	0.8	3.5	-	Retained due to Realignment/Bypass		
18	46+960	SLAB	1	0.8	3.5	-	Retained due to Realignment/Bypass		
19	47+500	PIPE	2	1	7	-	Retained due to Realignment/Bypass		
20	47+650	PIPE	2	1	7	-	Retained due to Realignment/Bypass		
21	48+000	SLAB	1	0.9	7.2	-	Retained due to Realignment/Bypass		
22	48+200	SLAB	1	1.5	5.2	-	Retained due to Realignment/Bypass		
23	48+330	SLAB	1	1	6.1	-	Retained due to Realignment/Bypass		
24	48+400	SLAB	1	1	6.1	-	Retained due to Realignment/Bypass		
25	48+750	SLAB	1	1.5	7	-	Retained due to Realignment/Bypass		
26	49+030	SLAB	1	1.2	5.6	-	Retained due to Realignment/Bypass		
27	49+100	SLAB	1	1.2	5.6	-	Retained due to Realignment/Bypass		
28	49+600	SLAB	1	0.5	6	-	Retained due to Realignment/Bypass		
29	49+830	SLAB	1	0.5	6	-	Retained due to Realignment/Bypass		
30	49+970	PIPE	1	1	4.3	-	Retained due to Realignment/Bypass		
31	50+250	PIPE	1	1	4.3	-	Retained due to Realignment/Bypass		
32	50+500	SLAB	1	1	5.4	-	Retained due to Realignment/Bypass		
33	51+250	PIPE	1	1	5	-	Retained due to Realignment/Bypass		
34	52+050	SLAB	1	0.9	5.1	-	Retained due to Realignment/Bypass		
35	52+200	PIPE	1	1	4	-	Retained due to Realignment/Bypass		

Existing Detail						New Proposal			
Sl. No.	Existing Chainage (Km)	Type of Structure (Pipe/Slab /Box /Arch)	Span Arrangement		C'way Width (m)	Design Chainage (Km)	Proposal	Type	Size (m)
			No	Vent Width (m) (Clear)					
36	53+200	SLAB	1	0.8	4.6	-	Retained due to Realignment/Bypass		
37	53+550	PIPE	1	1	4.5	-	Retained due to Realignment/Bypass		
38	54+330	SLAB	1	1	5.4	45+410	Reconstruction		Bo Cu
39	55+830	PIPE	1	1	5	-	Retained due to Realignment/Bypass		
40	56+130	SLAB	1	0.9	5.1	-	Retained due to Realignment/Bypass		
41	57+430	PIPE	1	1	4	48+135	Reconstruction		Bo Cu
42	59+130	SLAB	1	0.8	4.6	49+590	Reconstruction		Bo Cu
43	60+220	PIPE	1	1	4.5	-	Retained due to Realignment/Bypass		
44	60+330	SLAB	1	3	6.1	-	Retained due to Realignment/Bypass		
45	60+530	PIPE	1	0.6	4.9	-	Retained due to Realignment/Bypass		
46	60+620	PIPE	1	0.6	5.4	-	Retained due to Realignment/Bypass		
47	61+230	SLAB	1	1.6	4.6	-	Retained due to Realignment/Bypass		
48	61+460	SLAB	1	1	4.8	-	Retained due to Realignment/Bypass		
49	61+800	SLAB	1	0.5	4.6	51+630	Reconstruction		Bo Cu
50	61+900	PIPE	1	1	3	51+720	Reconstruction		Bo Cu
51	62+900	SLAB	1	3	6.1	-	Retained due to Realignment/Bypass		
52	63+050	PIPE	1	0.6	4.9	-	Retained due to Realignment/Bypass		
53	63+250	PIPE	1	0.6	5.4	-	Retained due to Realignment/Bypass		
54	63+300	SLAB	1	1.6	4.6	-	Retained due to Realignment/Bypass		
55	63+950	SLAB	1	1	4.8	-	Retained due to Realignment/Bypass		
56	64+100	SLAB	1	1	4.4	-	Retained due to Realignment/Bypass		
57	64+200	SLAB	1	1	4.4	-	Retained due to Realignment/Bypass		
58	64+300	PIPE	3	1	3	-	Retained due to Realignment/Bypass		
59	64+500	PIPE	3	1	3	-	Retained due to Realignment/Bypass		
60	65+020	SLAB	1	1	6.3	-	Retained due to Realignment/Bypass		
61	65+300	PIPE	1	0.6	4	-	Retained due to Realignment/Bypass		
62	65+330	SLAB	1	1	6.3	-	Retained due to Realignment/Bypass		

Existing Detail						New Proposal			
Sl. No.	Existing Chainage (Km)	Type of Structure (Pipe/Slab /Box /Arch)	Span Arrangement		C'way Width (m)	Design Chainage (Km)	Proposal	Type	Size (m)
			No	Vent Width (m) (Clear)					
63	65+840	SLAB	1	1	6.3	-	Retained due to Realignment/Bypass		
64	65+890	SLAB	1	1.2	5.4	-	Retained due to Realignment/Bypass		
65	68+600	SLAB	1	1	4.8	-	Retained due to Realignment/Bypass		
66	68+680	SLAB	1	0.9	3.7	-	Retained due to Realignment/Bypass		
67	69+250	SLAB	2	4.9	3.6	58+250	Reconstruction		Bo Cu
68	70+010	SLAB	1	1.5	3.7	-	Retained due to Realignment/Bypass		
69	70+220	SLAB	1	1.7	3.7	59+200	Reconstruction		Bo Cu
70	70+910	SLAB	1	1	3.8	-	Retained due to Realignment/Bypass		
71	71+470	BOX	1	1.7	3.9	-	Retained due to Realignment/Bypass		
72	71+960	SLAB	2	4	3.9	60+585	Reconstruction		Bo Cu
73	72+400	PIPE	1	1	3.4	-	Retained due to Realignment/Bypass		
74	72+790	SLAB	1	0.8	3.3	-	Retained due to Realignment/Bypass		
75	73+850	PIPE	2	1	3.2	-	Retained due to Realignment/Bypass		
76	74+900	PIPE	1	1	3	-	Retained due to Realignment/Bypass		
77	76+960	SLAB	1	1	3.8	-	Retained due to Realignment/Bypass		
78	78+850	BOX	1	1.6	3.1	-	Retained due to Realignment/Bypass		
79	79+000	BOX	1	1.9	3.4	-	Retained due to Realignment/Bypass		
80	79+250	BOX	1	2	3.7	-	Retained due to Realignment/Bypass		
81	83+120	SLAB	1		3.6	-	Retained due to Realignment/Bypass		
82	83+370	PIPE	1	0.3	3.6	-	Retained due to Realignment/Bypass		
83	83+440	BOX	1	1.3	3.2	-	Retained due to Realignment/Bypass		
84	83+990	BOX	1	0.7	3.2	-	Retained due to Realignment/Bypass		
85	84+475	BOX	1	1.3	3.1	-	Retained due to Realignment/Bypass		
86	84+680	SLAB	1	1	3.5	-	Retained due to Realignment/Bypass		
87	85+450	PIPE	2X2	1X0.3	3.3	-	Retained due to Realignment/Bypass		
88	85+785	PIPE	3	0.3	3.2	-	Retained due to Realignment/Bypass		
89	85+930	BOX	1	1.7	3.5	-	Retained due to Realignment/Bypass		

Culverts (Reconstruction)

Table 0.23 – Proposal of Existing Culverts (Reconstruction)
Details have been shown in table 0.22

Additional Culverts

Table 0.24 – Proposal of additional culverts

Sl. No.	Design Chainage (Km)	Type of Culvert	Span / Opening with span length (m)	Width (m)
1	36+240	Box Culvert	1x2x2	12m
2	36+540	Box Culvert	1x2x3	12m
3	36+890	Pipe Culvert	1x1.2	27.5m
4	37+190	Box Culvert	1x3x4	12m
5	37+460	Box Culvert	1x5x3	12m
6	37+720	Box Culvert	1x5x4	12m
7	37+970	Box Culvert	1x5x4	12m
8	38+230	Box Culvert	1x5x4	12m
9	38+730	Box Culvert	1x2x2	12m
10	38+945	Box Culvert	1x2x2	12m
11	39+250	Pipe Culvert	1x1.2	20m
12	39+550	Box Culvert	1x2x3	12m
13	39+940	Pipe Culvert	1x1.2	25m
14	40+190	Pipe Culvert	1x1.2	25m
15	40+460	Pipe Culvert	1x1.2	25m
16	40+890	Pipe Culvert	1x1.2	20m
17	41+390	Box Culvert	1x4x4	12m
18	41+850	Box Culvert	1x2x2	12m
19	42+150	Box Culvert	1x2x2	12m
20	42+550	Box Culvert	1x2x2	12m
21	42+850	Box Culvert	1x5x4	12m
22	43+190	Box Culvert	1x5x4	12m
23	43+650	Box Culvert	1x2x2	12m
24	44+260	Box Culvert	1x5x3	12m
25	44+530	Box Culvert	1x5x3	12m
26	44+760	Box Culvert	1x2x2	12m
27	45+125	Box Culvert	1x2x2	12m
28	45+620	Box Culvert	1x2x2	12m
29	45+975	Pipe Culvert	1x1.2	12.5m

Sl. No.	Design Chainage (Km)	Type of Culvert	Span / Opening with span length (m)	Width (m)
30	46+425	Pipe Culvert	1x1.2	15m
31	46+675	Box Culvert	1x2x2	12m
32	46+950	Box Culvert	1x2x2	12m
33	47+210	Box Culvert	1x5x4	12m
34	47+530	Box Culvert	1x2x2	12m
35	47+840	Box Culvert	1x2x2	12m
36	48+530	Box Culvert	1x2x2	12m
37	48+880	Box Culvert	1x2x2	12m
38	49+230	Box Culvert	1x2x2	12m
39	50+060	Box Culvert	1x2x3	12m
40	50+540	Pipe Culvert	1x1.2	20m
41	51+240	Box Culvert	1x2x2	12m
42	51+530	Box Culvert	1x3x4	12m
43	52+280	Box Culvert	1x5x4	12m
44	52+610	Box Culvert	1x2x2	12m
45	52+830	Box Culvert	1x2x2	12m
46	53+150	Box Culvert	1x2x3	12m
47	53+440	Box Culvert	1x2x2	12m
48	53+590	Box Culvert	1x4x4	12m
49	53+835	Box Culvert	1x5x4	12m
50	54+240	Box Culvert	1x2x2	12m
51	54+535	Box Culvert	1x2x2	12m
52	54+890	Box Culvert	1x2x2	12m
53	55+235	Box Culvert	1x2x2	12m
54	55+440	Box Culvert	1x5x4	12m
55	55+900	Box Culvert	1x2x3	12m
56	56+300	Box Culvert	1x5x4	12m
57	56+765	Box Culvert	1x5x4	12m
58	57+250	Box Culvert	1x2x2	12m
59	57+680	Box Culvert	1x5x4	12m
60	58+000	Box Culvert	1x2x2	12m
61	58+810	Box Culvert	1x2x2	12m
62	59+710	Box Culvert	1x4x4	12m
63	60+100	Box Culvert	1x2x3	12m
64	60+750	Box Culvert	1x2x2	12m
65	61+000	Box Culvert	1x2x2	12m
66	61+550	Box Culvert	1x4x3	12m

Sl. No.	Design Chainage (Km)	Type of Culvert	Span / Opening with span length (m)	Width (m)
67	61+950	Box Culvert	1x2x2	12m
68	62+250	Box Culvert	1x5x4	12m
69	63+050	Box Culvert	1x5x4	12m
70	63+435	Box Culvert	1x5x4	12m
71	64+130	Box Culvert	1x5x4	12m
72	64+550	Box Culvert	1x2x2	12m
73	64+900	Box Culvert	1x2x3	12m
74	65+145	Box Culvert	1x4x4	12m
75	65+550	Box Culvert	1x2x2	12m
76	65+950	Box Culvert	1x2x2	12m
77	66+380	Box Culvert	1x5x4	12m
78	66+600	Box Culvert	1x2x2	12m
79	66+925	Box Culvert	1x2x2	12m
80	67+200	Box Culvert	1x2x2	12m
81	67+550	Box Culvert	1x2x2	12m
82	67+850	Box Culvert	1x2x2	12m
83	68+250	Box Culvert	1x2x2	12m
84	68+550	Box Culvert	1x2x2	12m
85	68+950	Box Culvert	1x2x3	12m
86	69+225	Box Culvert	1x4x4	12m
87	69+645	Box Culvert	1x3x4	12m
88	70+250	Pipe Culvert	1x1.2	20m
89	70+550	Box Culvert	1x2x2	12m
90	71+300	Box Culvert	1x5x4	12m
91	71+550	Box Culvert	1x2x2	12m
92	72+000	Box Culvert	1x2x2	12m

0.23 Bus Lay Byes

4 (2 x 2) Bus bays are proposed on both side of Project road.
The locations are–

Table 0.25- Proposed Bus Bays

Sl. No.	Design Chainage (Km)		Remarks
	LHS	RHS	
1	42.435	42.315	
2	63.275	62.855	

0.24 Truck Lay Bye

- No Truck lay bye exist along the Project road,
- 1 Truck lay bye is proposed, the locations are

Table 0.26- Proposed Truck Lay Bye

Sl. No.	Proposed Chainage (Km)	Side
1	71.100	LHS

0.25 Religious Structures

2 religious structures exist along the project road and their details are presented in table below-

Table 0.27: Religious Structures

Sl. No.	Design Chainage (km)	Existing Chainage (km)	Side	Type	Remarks
1	52+700	-	RHS	Temple	Refer Design Chainage
2	71+550	-	RHS	Temple	Refer Design Chainage

0.26 School Details

No School exist along the project road.

0.26 Pond Location

49 ponds exist along the project road and details are presented in table below:

Table 0.29: Pond Locations

Sl. No.	Design Chainage (Km)	Side	Remarks
1	36+050	BHS	
2	37+400	BHS	
3	37+800	BHS	
4	38+500	RHS	
5	40+650	BHS	
6	41+230	BHS	
7	41+100	RHS	
8	41+030	LHS	
9	41+300	LHS	
10	41+400	BHS	
11	41+600	BHS	
12	43+000	BHS	
13	44+520	BHS	
14	51+600	BHS	
15	51+980	BHS	
16	52+500	RHS	
17	52+650	LHS	
18	52+880	BHS	
19	53+800	BHS	
20	53+900	BHS	
21	54+300	BHS	
22	54+450	LHS	
23	54+800	LHS	
24	55+050	BHS	
25	54+450	BHS	
26	55+810	LHS	
27	56+770	BHS	
28	59+600	BHS	
29	59+700	BHS	
30	59+800	BHS	
31	60+170	BHS	
32	60+620	RHS	

Sl. No.	Design Chainage (Km)	Side	Remarks
33	61+250	BHS	
34	61+300	LHS	
35	61+370	BHS	
36	61+550	BHS	
37	62+600	LHS	
38	62+970	BHS	
39	63+230	RHS	
40	64+400	RHS	
41	64+500	RHS	
42	64+600	RHS	
43	64+800	RHS	
44	64+900	RHS	
45	66+460	RHS	
46	66+680	RHS	
47	68+000	BHS	
48	68+300	LHS	
49	70+750	BHS	

Retaining wall with sad filling is proposed on above locations to protect seepage in embankment.

0.27 Toll Plaza

No toll plaza is exist and proposed.

0.28 Submergence Details

The existing road found submergence at some locations, although realignments are proposed in maximum length for betterment of its geometry and a minimum height of 2.5m is considered of embankment to keep away from submergence.

0.29 Proposed Bypasses& Realignments

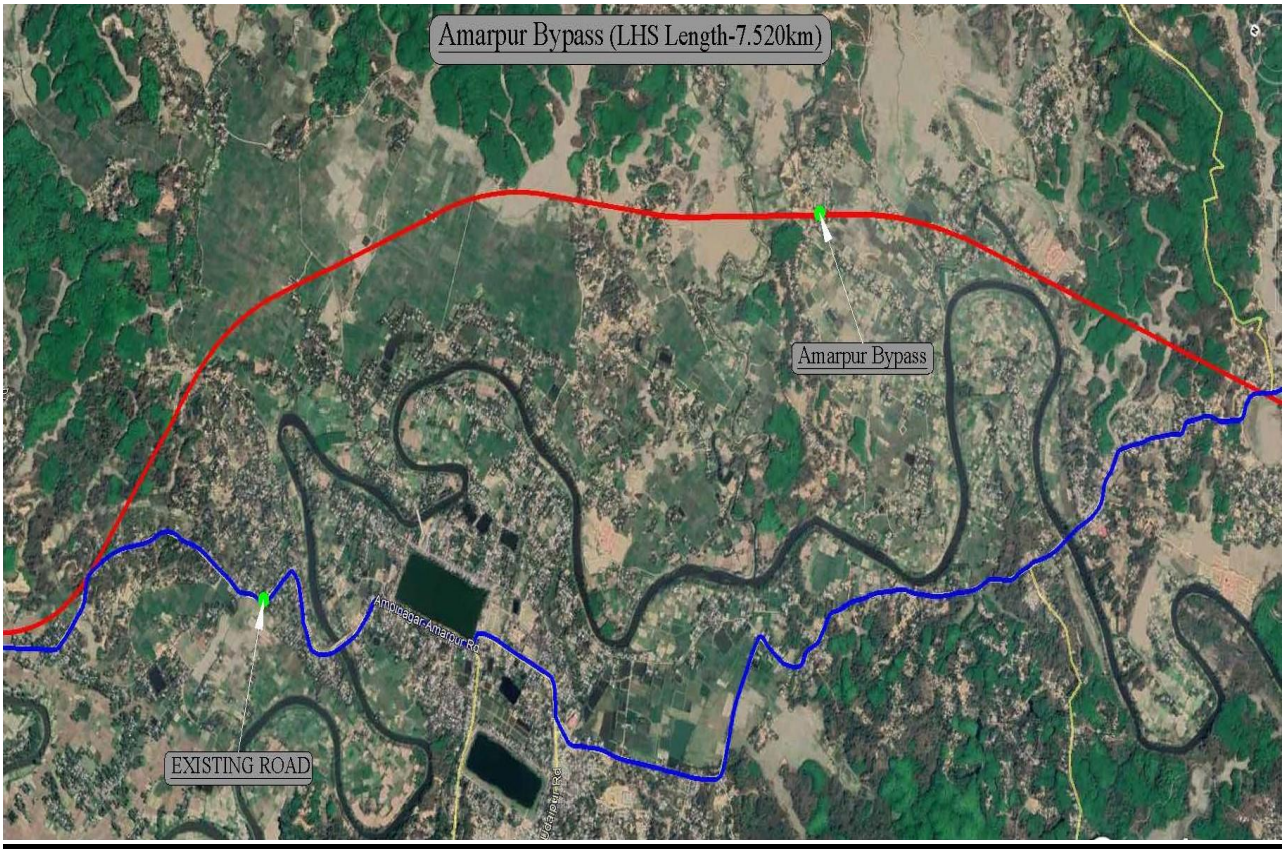
0.29.1 Bypasses

Total 4 bypasses of 21.725 km are proposed in entire Project length, the details are –

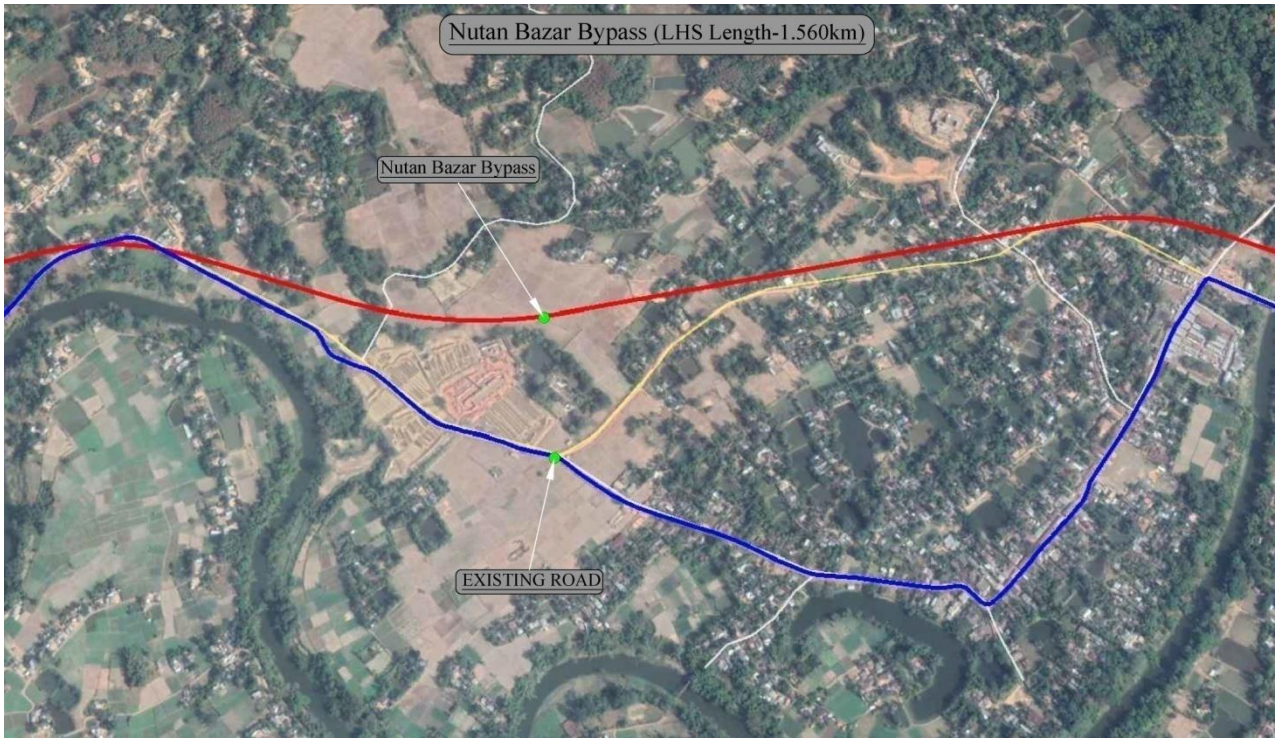
Table 0.30: Details of Bypass

Sl. No	Existing Chainage (Km)			Design Chainage (Km)			Bypass Name
	From	To	Length (m)	From	To	Length (m)	
4	42+450	50+900	8.450	35+240	42+760	7.520	Amarpur Bypass
5	61+800	-	-	51+640	53+200	1.560	Nutan Bazar Bypass
6	-	67+750	3.900	53+200	56+900	3.700	Jatanbari Bypass
7	74+975	79+350	4.375	63+100	66+450	3.350	Karbook Bypass
	Total Length..		**16.725**	**Total Length..**		**16.130**	

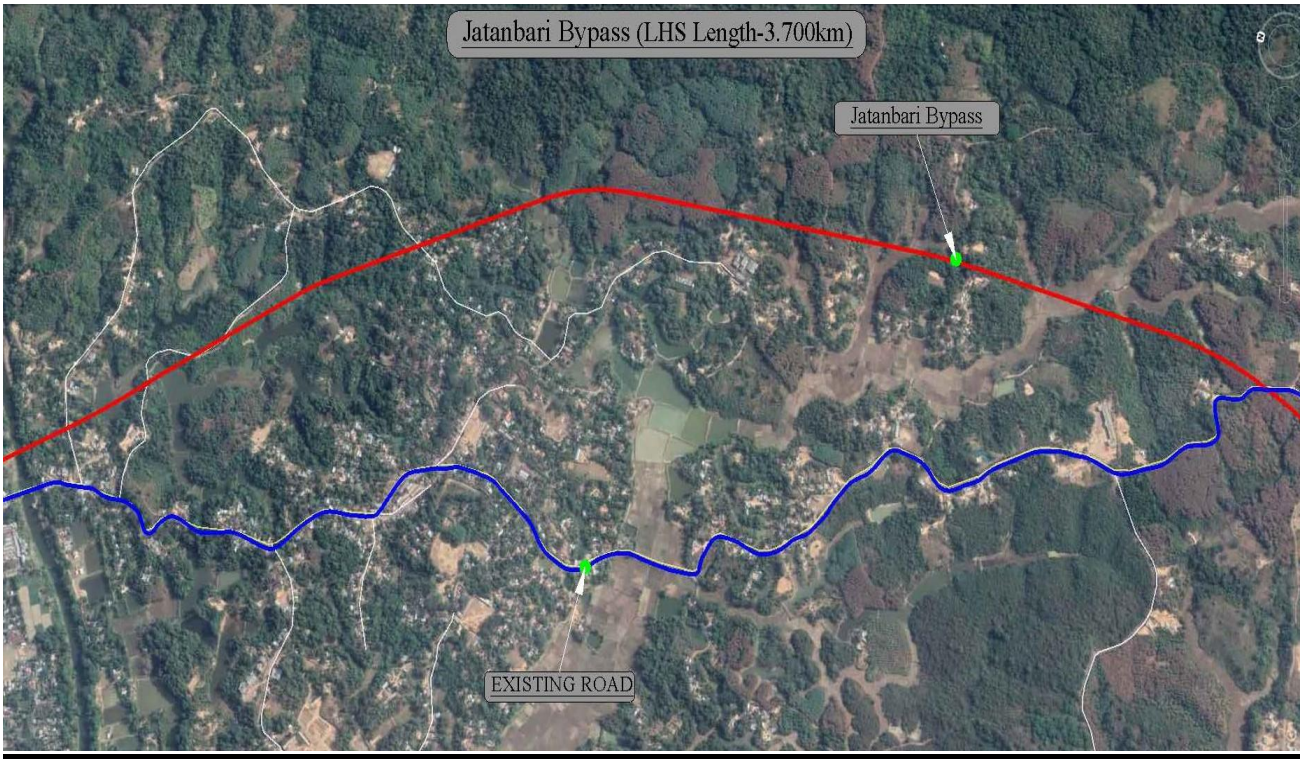
1. Amarpur Bypass



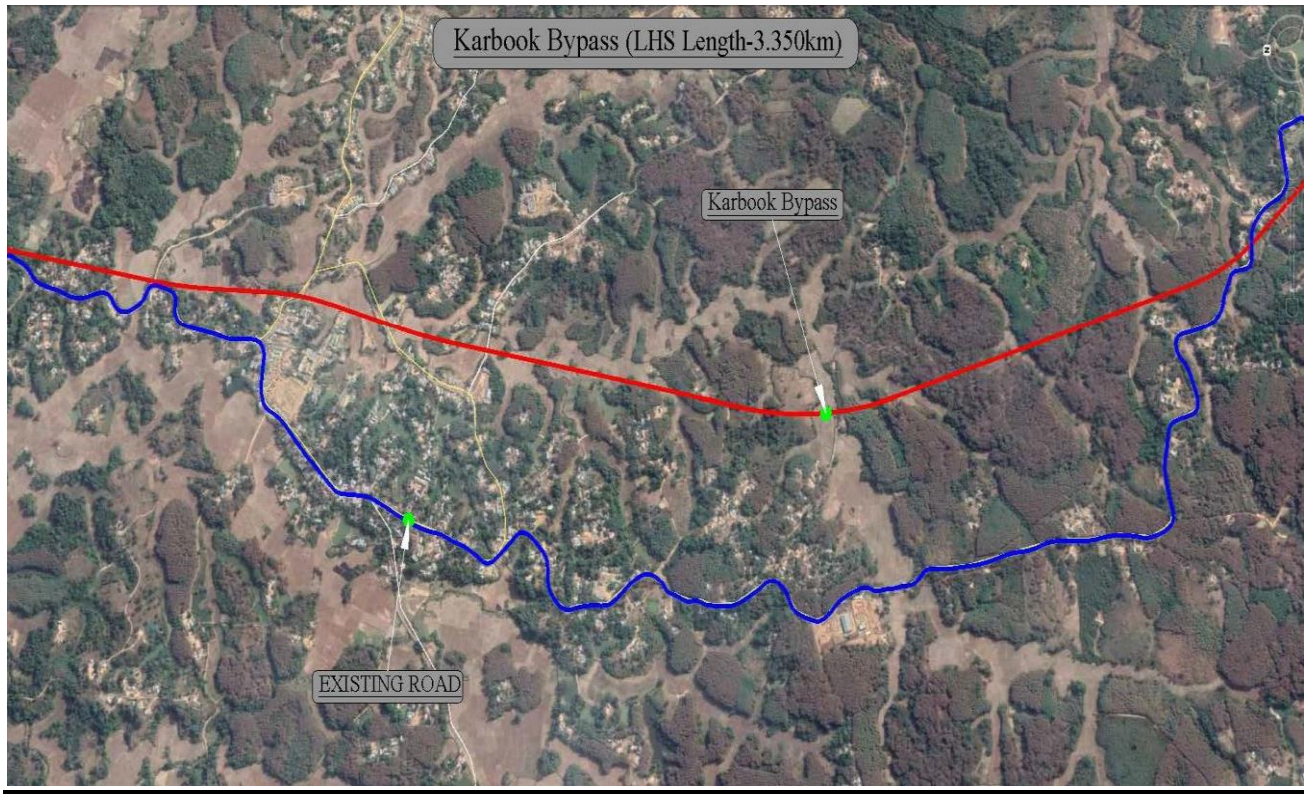
2. Nutan Bazar Bypass



3. Jatan Bari Bypass



4. Karbook Bypass



0.29.2 Realignments

Except above bypasses some re-alignments are also proposed for improvement of existing geometry, the details of these realignments are:

Table 0.31: Details of Realignments

Sl. No	Existing Chainage (Km)			Design Chainage (Km)			Remarks
	From	To	Length	From	To	Length	
1	50900	58125	7.23	42760	48750	5.99	
2	58325	61800	3.48	48950	51640	2.69	
3	67750	68950	1.20	56900	57970	1.07	
4	69400	74975	5.58	58420	63100	4.68	
5	79350	80250	0.90	66450	67200	0.75	
6	80850	89600	8.75	67800	75600	7.80	Upto design km 72.000 in this package

0.30 Protection Works

Protection works like Retaining walls, Breast Walls, W-Beam crash barrier are provided at different locations as per site requirement, the details of protection works with their details are presented below:-

a) Breast walls –

Table 0.32

Sl. No.	Description	LHS (m)	RHS (m)	Section
1	Breast Wall 1m height	828	787	Km 36+0 to km 72+0
2	Breast Wall 2m height	1188	1129	
3	Breast Wall 3m height	936	889	
4	Breast Wall 4m height	648	615	
	Total	**3600**	**3420**	

The chainage wise details of Breast wall is presented in Vol. 8:: Bill of Quantity

b) **Retaining Wall** - Retaining wall is proposed for length given below:

Table 0.33

Sl. No.	Description	Km 36.0 to km 72.0
1	Retaining wall 1.5m height	3210
2	Retaining wall 3.0m height	850
3	Retaining wall 1.5m height in Pond areas (minimum)	1475
	Total	**5535**

c) **W-Beam crash Barrier**- W- Beam crash barrier is proposed in **26980m** length (Where height of embankment is more than 3.0m), The chainage wise detail of W-Beam crash barrier is presented in Vol. 8:: Bill of Quantity.

d) **RCC Drain** - RCC linear drain of 1.75m wide is provided in **1720m** length (both sides, as per TCS type 3) &

4m wide From Km 53+300 to km 53+400 (100m long) on LHS.

e) **PCC Drain** - PCC drain is provided in **12120m** length. The chainage wise detail of PCC drain is presented in Vol. 8:: Bill of Quantity.

f) **Unlined surface drain** – Unlined surface drain is provided in **46.952 km** length.

g) Pitching work - at km 62.700, due to diversion of nala, pitching work is proposed on both side slope of nala

h) **Providing PC** on embankment slope at bridge approaches (18 bridges)

The Details of above all protection works has been provided in Vol.8:: Bill of Quantity.

0.31 Road Side furniture

Road side furniture shall be provided in accordance with Section 11 of the Manual of Specification and Standards for Two Laning of Highways through EPC.

0.32 Landscaping and Tree Plantation

Landscaping and tree plantation shall be provided in accordance with Section 12 of the Manual of specification and Standards for Two Laning of Highways through EPC.

0.33 Highways Lighting

Street lighting shall be provided in accordance with para 13.3 of Section 13 of the Manual of Specification and Standards for Two Laning of Highways through EPC.

0.34 Safety

Keeping view of these all features, a proper safety precautions are recommended on roadway width, the safety items to be provided are –

i) W Beam Crash Barrier/ Concrete Crash Barrier on either side of carriageway,
ii) Pavement Marking on Centre and edges lines,
iii) Provide adequate warning of hazards,
iv) Providing Bio-turfing for Slope protection,

0.35 Utilities

Utilities shifting estimates have been obtained from concerned departments, the details of amount received from departments is as under –

SI NO.	Package	Chainage		DWS Amount	WRD Amount	TSECL Amount	Total Amount
		From	To				
1	Package 3	36+000	54+000	11990881	1123532	56390184	69504597
2	Package 3	54+000	72+000	13967078	766458	4185173	18918709
	Junctions			3893694	283499	9086304	13263496
				29851653	**2173489**	**69661661**	**101686802**
Grand Total							**101686802**

0.36 Land Acquisition

Approximate Rs 223.000 Cr considered for land acquisition of package 3 as per average circle rate.

0.37 Forest Clearance

Approximate Rs 24.000 Cr considered for Forest clearance of package 3.

0.38 Resettlement and Rehabilitation (R & R) Policy

The Ministry of Rural Development (Department of Land resources) has prepared the National Policy on Resettlement and Rehabilitation for the people who will be affected by the project. The policy describes the principle and approach to minimize and mitigate the negative social and economic impacts caused by the project. The R & R policy broadly addresses all issues such as compensation, assistance, replacement value, vulnerable group, etc. The policy ensures that people affected by project must be able to restore their livelihood to the pre project level.