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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 VaishnaviInfratech Services Pvt. Ltd.for preparation of Detailed Project Report of **Teliamura - Sabroom section (NH-208).**

The existing length of project roadis 132.882 Km and design length (after geometric improvements) is 107.654 km.

- **This Report describe the details from design km 18.0 to km 36.0 (Package VIII)**

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 ManagementPlan (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/ improvementof 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 allclarifications. 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) foracquisition 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.MeenaBhaduri**
4	Traffic cum Safety Expert	**Mr.SalilPathak**
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.VirBahadur Singh**

0.6 Project Alignment Description

- As per contract agreement, the Project alignment starts from Ompichowmuhani (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-08nearkm 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 start of project road in first 2.4 km length 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 Khowaichowmuhani towards Agartala) and merges at existing km 2+600 of Project road.**
- The existing length of project road is 132.882km and design length (after geometrical improvement) is 107.654km.
- Existing lane of Project road is maximum single lane with poor riding quality of PMGSY category.

- **This Report describe the details from design km 18.0 to km 36.0 (Package VIII)**

	NH km	Topo Survey Chainage (km)	Package Design Chainage (km)
Start of Project	145.319	22.200	18.000
End of Project	163.319	42.050	36.000

The Project Road alignment shown in figure below-

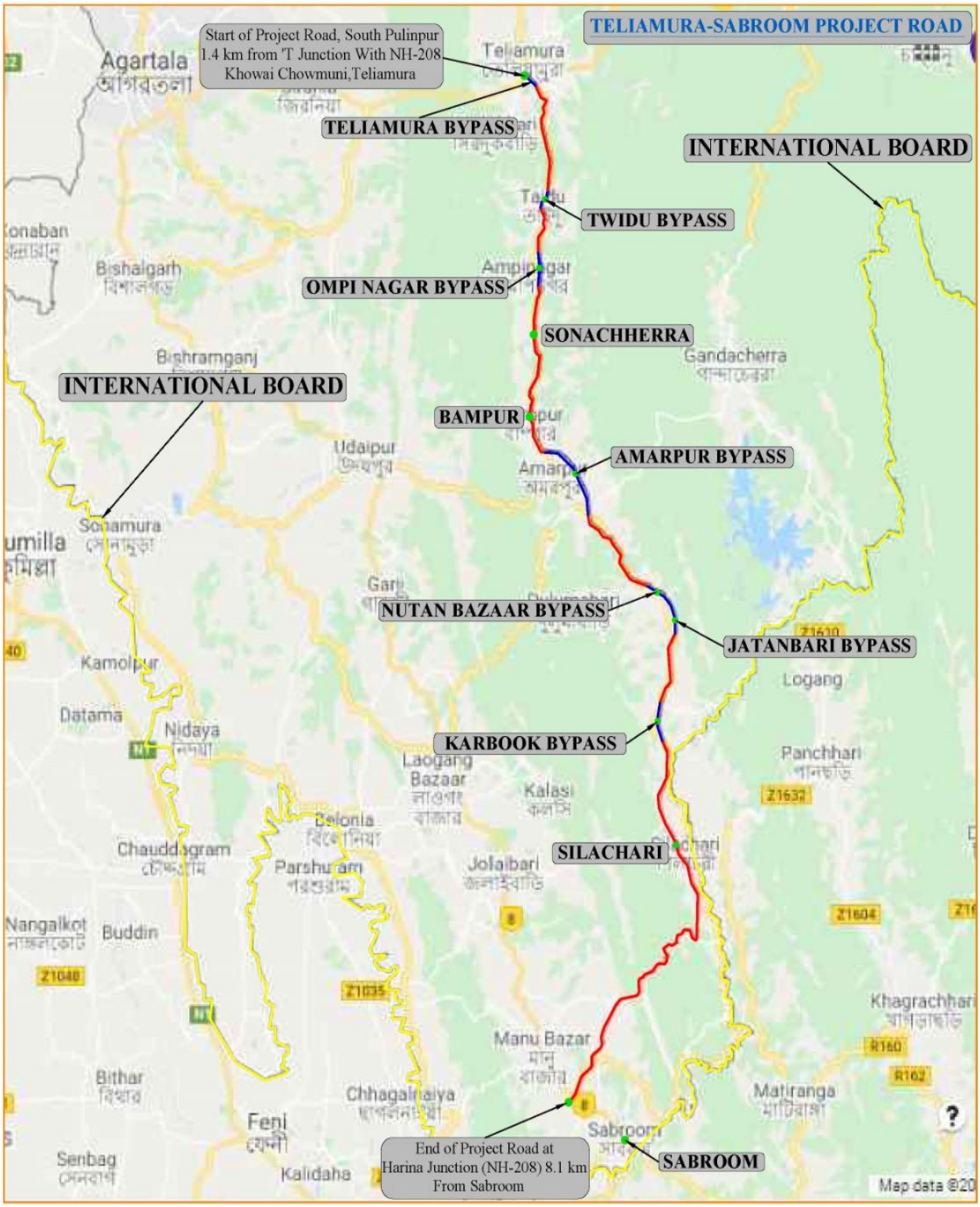


Figure 0.1– Proposed Alignmentof Project Road

0.7 Right of Way (ROW)

There is no marking of existing RoWat ground along the Project road, the details of existing RoW is not available with PWDalso, however, as per visual inspection and local people enquire, it is found the available land is only 6-15m.

The proposed RoW has been considered 15-45m for entire road stretch and details are presented below:

Table 0.2:- Details of Proposed RoW

Si. No.	Chainage		Length	PROW		Total PROW	Remarks
	From	To		LHS	RHS		
1	18000	19860	1860	22.5	22.5	45	
2	19860	19950	90	10	10	20	
3	19950	20740	790	15	15	30	
4	20740	21080	340	20	20	40	
5	21080	23860	2780	15	15	30	
6	23860	24300	440	20	20	40	
7	24300	25210	910	15	15	30	
8	25210	25315	105	7.5	7.5	15	School
9	25315	35260	9945	15	15	30	
10	35260	36000	740	22.5	22.5	45	

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 –

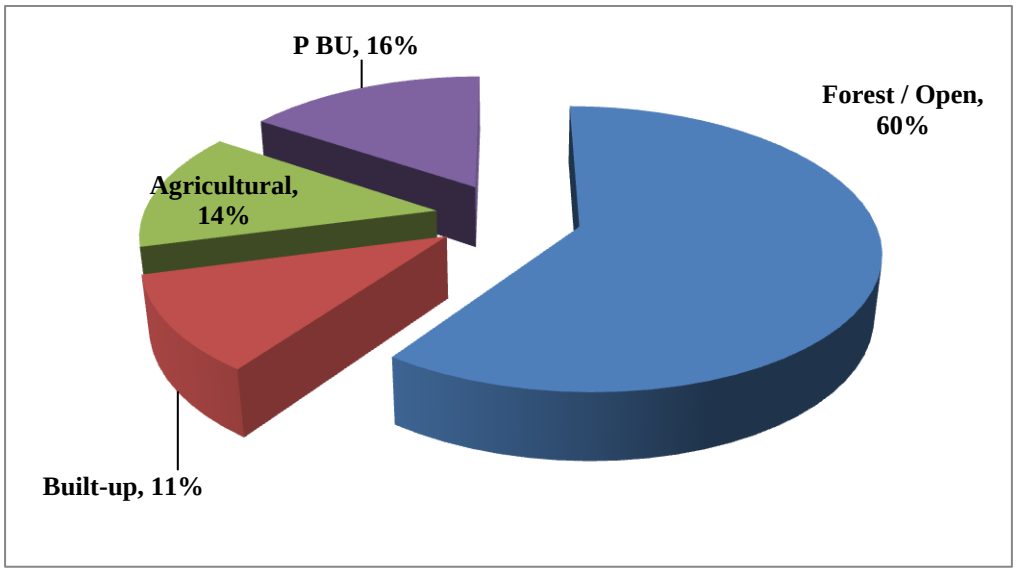


Fig 0.2Land Use Pattern

Table 0.3 :- Details of Land

Sl. No.	Design Chainage (Km)		Length (Km)	Terrain	Remarks
1	18.00	36.00	18.00	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		
1	18+000	36+000	3.5	

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

<table>
<tr><th>Item</th><th>Plain / Rolling / Mountainous Terrain</th><th>Reference</th></tr>
<tr><td>Design Speed(kmph)</td><td>Ruling -100 Kmph (P) / 60kmph (M)
Min.- 80 kmph (P) / 40kmph (M)</td><td>Table 2.1</td></tr>
<tr><td>Sight distance (minimum)</td><td>180 m</td><td>Table 2.6</td></tr>
<tr><td>Proposed Land width (ROW)</td><td>15-45m (refer table 0.2 of Executive Summary)</td><td></td></tr>
<tr><td>Lane configuration</td><td>2-lane with paved shoulders</td><td></td></tr>
<tr><td>Formation width</td><td>7.0 m of carriageway + 1.5 m Paved shoulder + 1.0 m earthen shoulder</td><td>Refer MoRT&H circular dated 17.07.2020</td></tr>
<tr><td rowspan="2">Edge strip</td><td>.25m Raised median</td><td></td></tr>
<tr><td>.5m Depressed Median</td><td></td></tr>
<tr><td>Camber/cross fall</td><td>2.5 %</td><td>Table 2.7</td></tr>
<tr><td>Shoulders</td><td>2.5 % for paved shoulder and 3.0 % for earthen shoulder</td><td>Clause 2.8.2</td></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 surveyshavebeenconducted at three locations.

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 angamati)	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, requirementforfour 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, consideringthe connectivity of Project road with adjacent towns / NH-08 & development of backward areas/ Religious / Tourist Places, it is proposedto develop theprojectroad 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 -37:2018is considered 1.5 forkm 88 & 132.800 and value adopted as 3.9for km 42.300.

0.12.5 Testing ofsoil from existing embankment

The soil samples fromvarious locations on theexisting embankment have been collected and subjected tolaboratory testing for determination of various engineering properties. The CBR isfoundan 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)*	
18+000	LHS	35	195	-	230
18+500	RHS	35	220	-	255
19+000	LHS	40	180	-	220

Chainage (Km)	*Position of Pit*	*Pavement Composition*			*Total (mm)*
		Bitumen Layer	*Brick Soling*	*Sub base Course*	
		(mm)	*(mm)*	*(mm)*	
19+500	RHS	45	250	-	295
20+000	LHS	35	275	-	310
20+500	RHS	45	170	-	215
21+000	LHS	35	165	-	200
21+500	RHS	30	195	-	225
22+000	LHS	50	165	-	215
22+500	RHS	50	180	-	230
23+000	LHS	40	195	-	235
23+500	RHS	35	215	-	250
24+000	LHS	40	275	-	315
24+500	RHS	45	245	-	290
25+000	LHS	35	255	-	290
25+500	RHS	40	150	-	190
26+000	LHS	45	150	-	195
26+500	RHS	45	180	-	225
27+000	LHS	45	180	-	225
27+500	RHS	40	155	-	195
28+000	LHS	30	160	-	190
28+500	RHS	45	165	-	210
29+000	LHS	45	195	-	240
29+500	RHS	30	250	-	280
30+000	LHS	35	200	-	235
30+500	RHS	35	225	-	260
31+000	LHS	35	255	-	290
31+500	RHS	35	260	-	295
32+000	LHS	40	230	-	270
32+500	RHS	45	245	-	290
33+000	LHS	50	220	-	270
33+500	RHS	30	195	-	225
34+000	LHS	45	265	-	310
34+500	RHS	40	255	-	295
35+000	LHS	45	245	-	290
35+500	RHS	50	200	-	250
36+000	LHS	50	240	-	290

0.12.6 CBR Test Results of soil samples

NORTH EAST SOIL TESTING (NEST)

ISO 9001:2008 Certified

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

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
Bhaumik
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 Approx300km away from Teliamura.

Sand source has been locatedfrom 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 Guwahatidepot (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

Pavement design shall be adopted with 8% CBR & 20msa as following –

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,

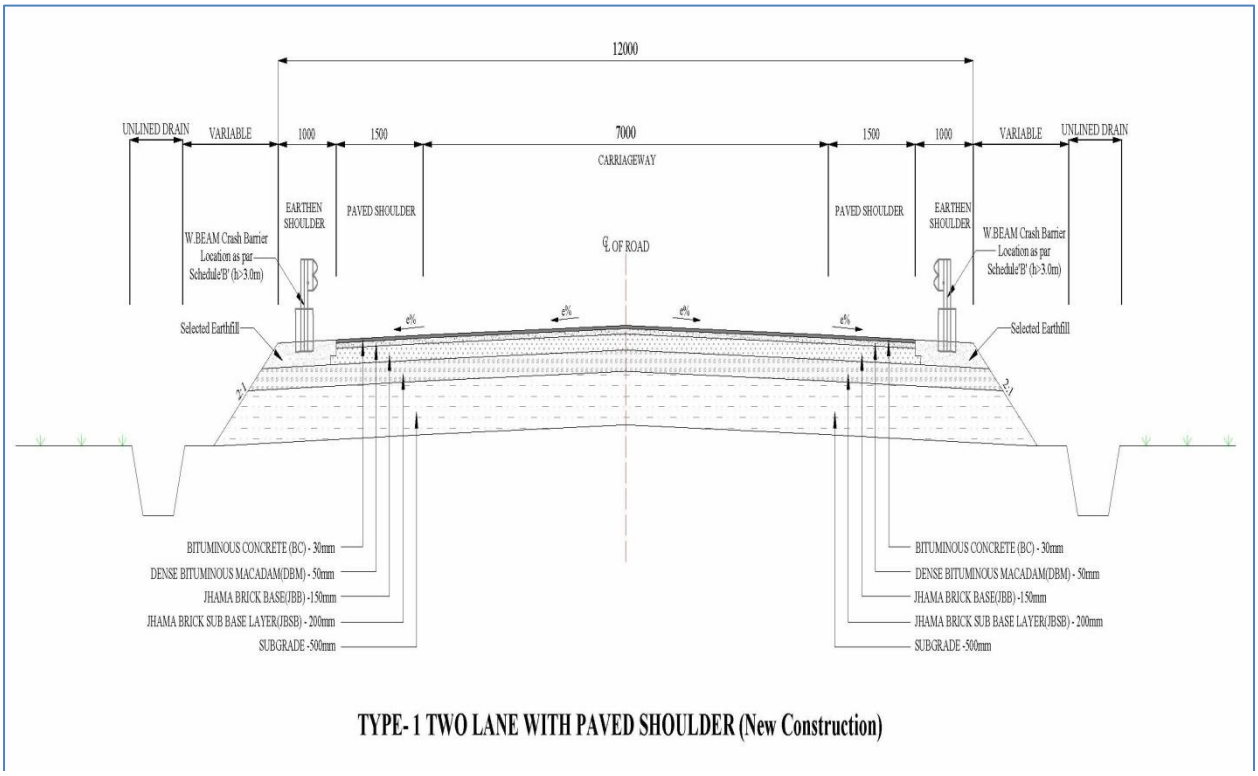
b. **For Built-up areas -** Roadway width of 12.00 (7.0+2x1.5 + 2x1.0 drain) is proposed for sections with 2 lane plus paved shoulders of 1.50m and RCC covered drain of 1m wide on either side of Road way,

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),

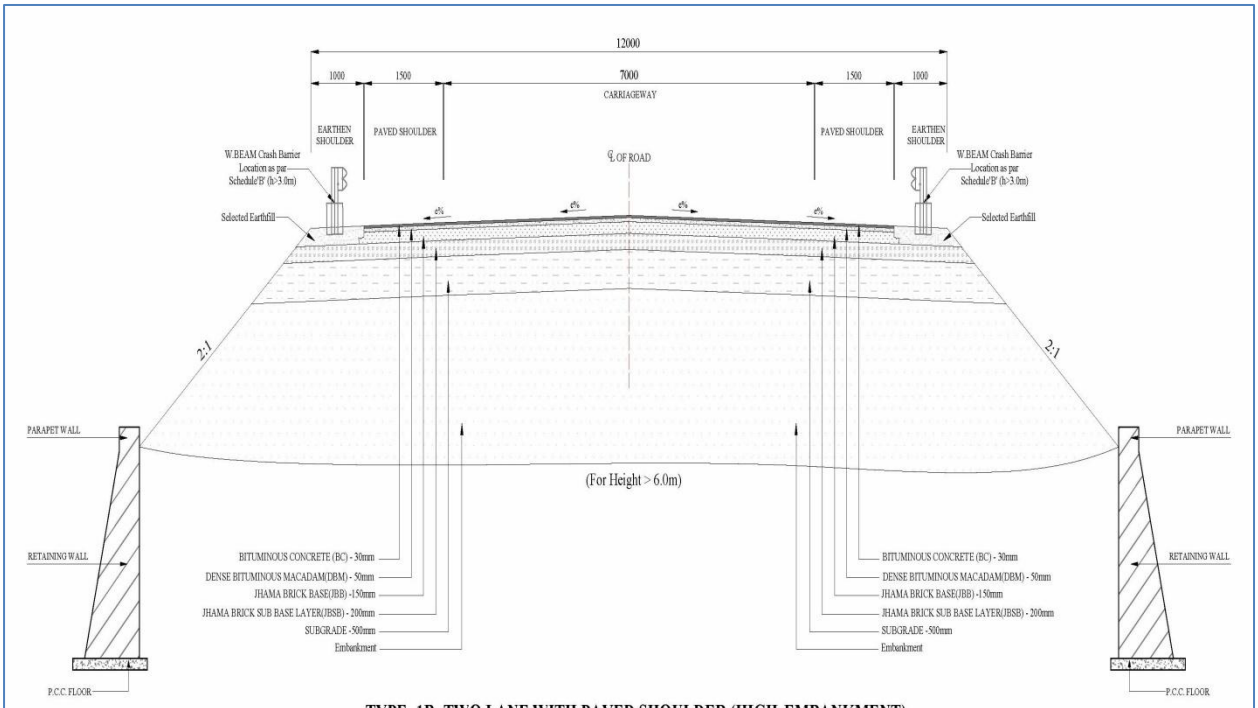
ii) **Carriageway Width -** Two Lane Carriage way (3.5m for each lane) is proposed,

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

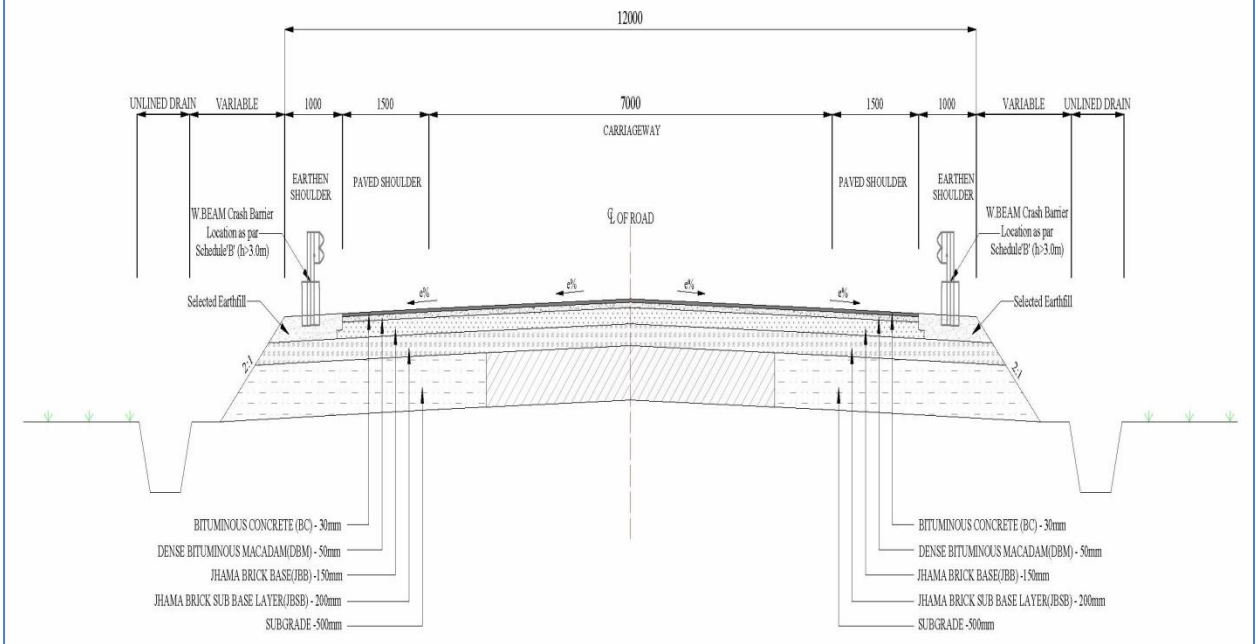
Proposed Typical cross sections are shown here –



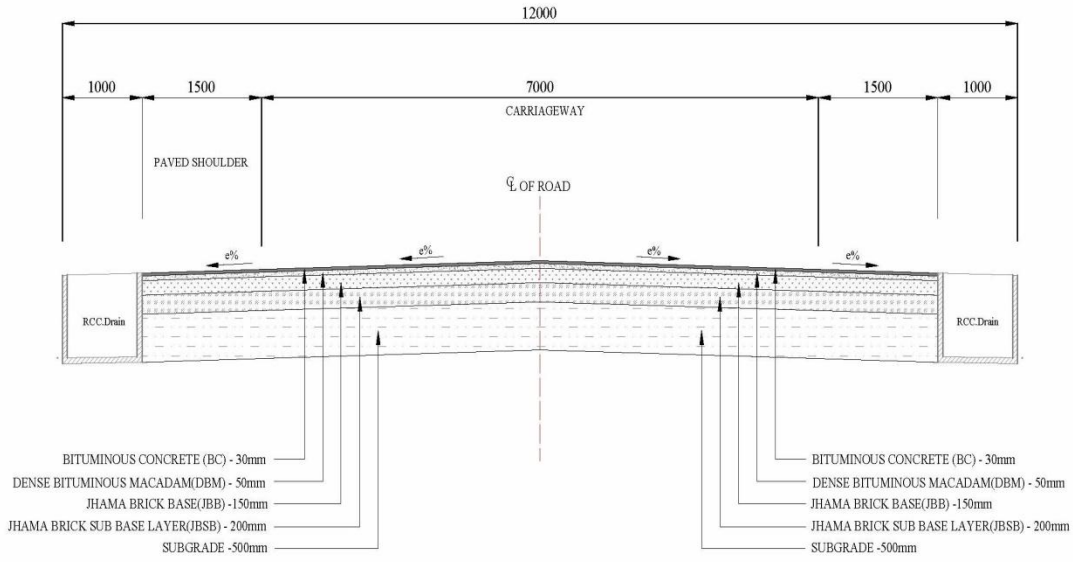
TYPE- 1 TWO LANE WITH PAVED SHOULDER (New Construction)



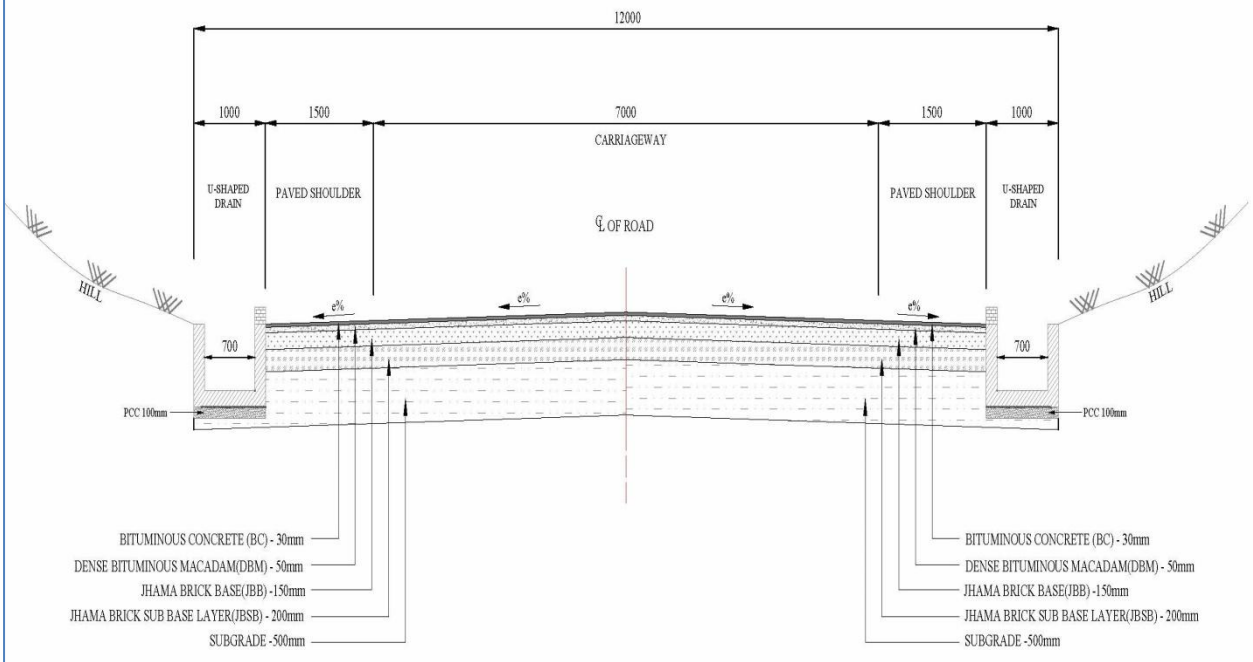
TYPE- 1B -TWO LANE WITH PAVED SHOULDER (HIGH EMBANKMENT)



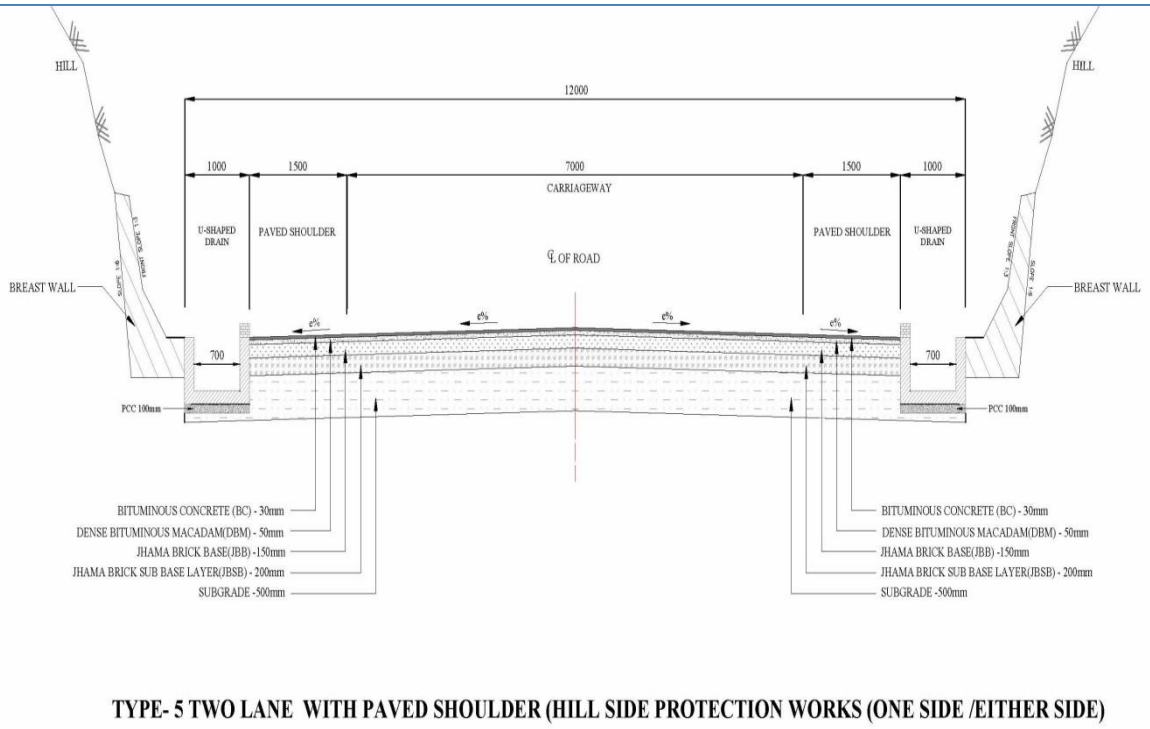
TYPE- 2 TWO LANE WITH PAVED SHOULDER (PARTIALLY EXISTING / NEW ALIGNMENT)



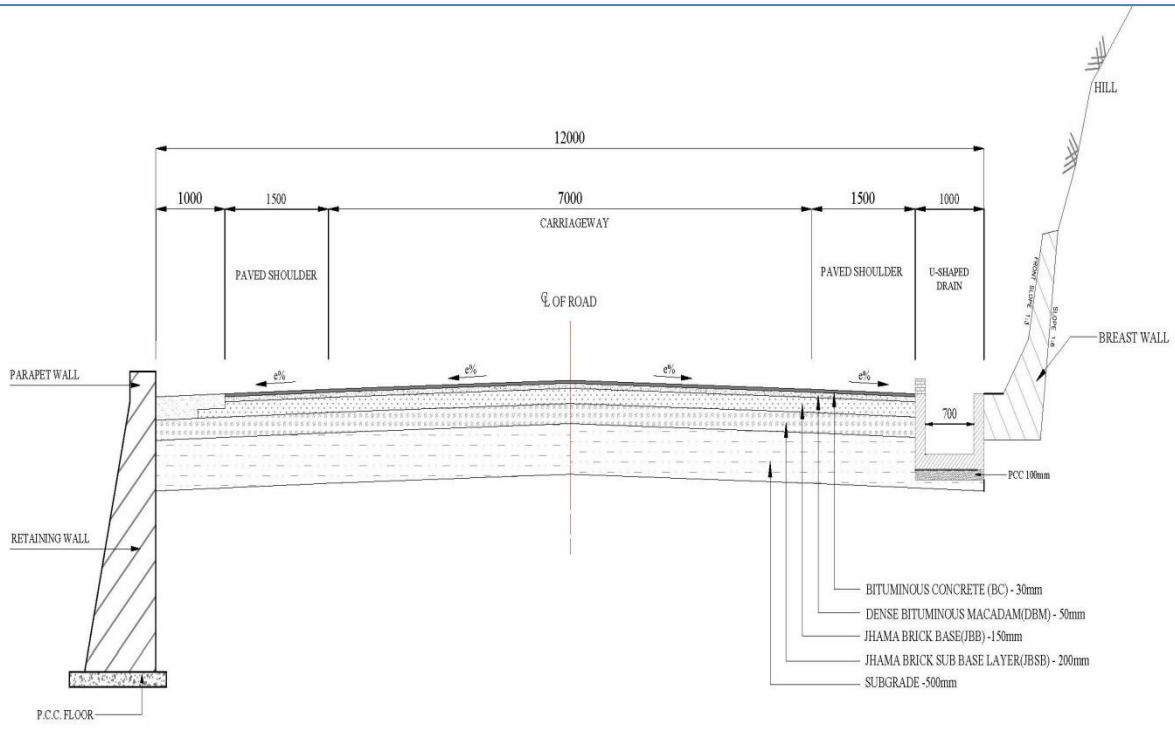
TYPE- 3 TWO LANE WITH PAVED SHOULDER (Built-up Section)



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)

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 (m)	Speed (Kmph)
	Start Chainage (Km)	End Chainage (Km)	Radius	Direction			
1	18+656.906	18+927.069	2000	Right	Plain	0	100
2	19+852.624	19+945.585	1500	Left	Plain	35	100
3	20+469.410	20+560.390	500	Right	Plain	95	100
4	21+240.534	21+499.364	1500	Left	Plain	35	100
5	22+004.427	22+106.958	800	Left	Plain	60	100
6	22+429.793	22+514.133	400	Right	Plain	55	80
7	22+882.648	22+939.487	600	Left	Plain	80	100
8	23+199.086	23+380.207	500	Left	Plain	45	80
9	23+524.587	23+793.880	400	Right	Plain	55	80
10	23+894.499	24+001.028	500	Left	Plain	45	80
11	24+150.281	24+212.098	500	Left	Plain	45	80
12	24+924.102	24+987.308	2000	Left	Plain	0	100
13	25+379.291	25+628.609	400	Left	Plain	55	80
14	25+929.854	26+455.728	500	Right	Plain	95	100
15	26+874.608	26+965.244	400	Left	Plain	115	100
16	27+135.391	27+304.446	400	Right	Plain	55	80
17	27+540.102	27+639.173	400	Left	Plain	55	80
18	27+877.987	28+234.476	700	Right	Plain	70	100
19	28+980.832	29+666.321	700	Left	Plain	35	80
20	30+061.226	30+332.180	400	Right	Plain	55	80
21	30+644.989	30+840.040	600	Left	Plain	80	100
22	31+024.439	31+214.064	600	Right	Plain	35	80
23	31+335.797	31+957.713	600	Left	Plain	35	80
24	32+065.197	32+465.732	400	Right	Plain	55	80
25	32+701.244	32+924.777	400	Left	Plain	55	80
26	33+781.002	33+957.508	600	Left	Plain	80	100
27	34+221.422	34+326.727	600	Right	Plain	80	100
28	34+663.330	35+220.201	600	Left	Plain	80	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	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)		
1	19+060.331	48.342	200	-0.334	2.826	18+960.331	19+160.331	48.676	51.168	Sag	63.299
2	19+554.839	62.317	350	2.826	0.337	19+379.839	19+729.839	57.371	62.906	Hog	140.59
3	20+407.818	65.19	400	0.337	-1.548	20+207.818	20+607.818	64.516	62.095	Hog	212.249
4	21+120.000	54.168	100	-1.548	-0.425	21+070.000	21+170.000	54.942	53.956	Sag	89.061
5	21+549.132	52.345	100	-0.425	1.461	21+499.132	21+599.132	52.557	53.076	Sag	53.014
6	21+989.505	58.781	300	1.461	-0.42	21+839.505	22+139.505	56.589	58.151	Hog	159.423
7	22+792.276	55.407	400	-0.42	-1.615	22+592.276	22+992.276	56.248	52.176	Hog	334.728
8	23+473.700	44.4	250	-1.615	0.406	23+348.700	23+598.700	46.419	44.907	Sag	123.692
9	24+410.000	48.2	500	0.406	-0.296	24+160.000	24+660.000	47.185	47.461	Hog	712.81
10	25+500.000	44.978	150	-0.296	1.856	25+425.000	25+575.000	45.2	46.37	Sag	69.703
11	26+175.392	57.516	425	1.856	-1.014	25+962.892	26+387.892	53.571	55.36	Hog	148.042
12	26+640.000	52.803	150	-1.014	1.248	26+565.000	26+715.000	53.564	53.739	Sag	66.305
13	27+349.922	61.662	500	1.248	-1.172	27+099.922	27+599.922	58.542	58.733	Hog	206.643
14	28+560.000	47.483	250	-1.172	0.372	28+435.000	28+685.000	48.948	47.948	Sag	161.977
15	29+180.000	49.787	400	0.372	-0.799	28+980.000	29+380.000	49.044	48.19	Hog	341.79
16	30+718.569	37.499	400	-0.799	0.382	30+518.569	30+918.569	39.097	38.263	Sag	338.702
17	31+430.000	40.217	400	0.382	-0.341	31+230.000	31+630.000	39.453	39.535	Hog	553.127
18	33+149.469	34.353	200	-0.341	0.326	33+049.469	33+249.469	34.694	34.679	Sag	299.606
19	35+363.602	41.581	300	0.326	-0.393	35+213.602	35+513.602	41.092	40.992	Hog	417.009

0.18 Extra Width on Curves

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			
1	18270	50.627	250	Hog	268.314	360.959	
2	19053	47.5	300	Sag	79.917		
3	19481	61.872	300	Hog	156.299	262.156	
4	20181	71.916	400	Hog	111.021	220.945	
5	21130	51.34	300	Sag	119.771		
6	21640	53.058	200	Sag	153.776		
7	21990	58.781	300	Hog	145.79	253.189	
8	22792	55.407	400	Hog	378.582	408.081	
9	23473	45.352	250	Sag	147.336		
10	24361	47.304	400	Hog	580.147	518.867	
11	25146	43.615	250	Sag	228.017		
12	25563	46.228	300	Sag	246.62		
13	26175	57.516	425	Hog	148.72	255.721	
14	26640	52.803	150	Sag	66.305		
15	27350	61.662	500	Hog	214.396	307.036	
16	28355	50.761	250	Sag	345.986		
17	30602	42.633	200	Hog	164.362	280.678	
18	30900	37.931	80	Sag	40.723		
19	31297	39.463	200	Hog	337.71	471.233	
20	32417	37.15	500	Hog	1491.37	905.764	
21	33360	32.037	300	Sag	349.539		
22	35800	39.756	150	Hog	208.533	380.644	

0.20 Road Junctions/ Intersections

There are38minor junctions exist on theproject road proposed to develop at grade only.

Table 0.15: Minor intersection

Sl. No.	Design Chainage (Km)	Side	Type of Junction	Area
1	18+750	BHS	Minor Junction	315.652
2	19+430	RHS	Minor Junction	319.886
3	19+540	BHS	Minor Junction	159.540
4	19+830	RHS	Minor Junction	353.089
5	20+225	LHS	Minor Junction	189.029
6	21+700	BHS	Minor Junction	294.541
7	21+900	RHS	Minor Junction	248.814
8	23+250	RHS	Minor Junction	158.397
9	23+580	LHS	Minor Junction	160.022
10	23+810	RHS	Minor Junction	142.167
11	24+100	BHS	Minor Junction	201.737
12	24+700	BHS	Minor Junction	269.426
13	25+200	LHS	Minor Junction	402.892
14	25+460	RHS	Minor Junction	180.623
15	26+025	LHS	Minor Junction	154.535
16	27+250	RHS	Minor Junction	154.294
17	27+750	RHS	Minor Junction	129.792
18	28+320	RHS	Minor Junction	213.486
19	28+440	LHS	Minor Junction	142.873
20	28+900	BHS	Minor Junction	287.890
21	29+000	RHS	Minor Junction	83.266
22	29+240	RHS	Minor Junction	153.668
23	29+240	LHS	Minor Junction	147.425

Sl. No.	Design Chainage (Km)	Side	Type of Junction	Area
24	29+950	RHS	Minor Junction	189.291
25	30+400	LHS	Minor Junction	316.744
26	30+760	RHS	Minor Junction	158.923
27	30+900	BHS	Minor Junction	168.732
28	31+480	LHS	Minor Junction	123.634
29	31+730	RHS	Minor Junction	186.936
30	32+850	BHS	Minor Junction	313.920
31	33+340	BHS	Minor Junction	371.285
32	33+550	RHS	Minor Junction	133.273
33	33+570	RHS	Minor Junction	337.622
34	33+800	LHS	Minor Junction	152.468
35	34+400	RHS	Minor Junction	317.162
36	34+740	BHS	Minor Junction	342.537
37	35+200	BHS	Minor Junction	145.284
38	35+800	BHS	Minor Junction	159.330

0.21 Railway Track& Proposals

No any Railway track exists on this Project road.

0.22 Cross Drainage Works

0.22.1 Bridges

Details of existing bridges& the proposalof 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		
Nil						

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		
Nil						

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	23+000	OLD STEEL TRUSS BRIDGE			30	5
2	26+600	OLD WOODEN BRIDGE			30	3
3	29+650	OLD WOODEN BRIDGE			30	3
4	30+400	CONCRETE BRIDGE			11.4	7.4
5	31+050	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	24+060	PSC Girder			2x23.5	18m
2	25+340	RCC Girder			2x20	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	18+800	RCC Girder			2x20	18m
2	19+770	RCC BOX			2x8	18m
3	21+320	RCC Girder			1x21	18m

Sl. No.	Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-Structure	Super structure		
4	24+760	RCC Girder			1x21	18m
5	24+930	RCC Girder			1x21	18m
6	29+470	RCC Girder			2x10	18m
7	31+050	PSC Girder			2x25	18m
8	32+870	RCC Girder			1x20	18m
9	34+450	RCC Girder			1x20	18m

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

0.22.2 Culverts

Total 23 culverts exist on Project alignment in which -

- 3culverts are proposed for reconstruction.
- 20culverts are retained due to proposal of realignments/bypasses.
- 48new 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	18+650	PIPE	4	1.0	4.0	15+530	Reconstruction		
2	18+800	PIPE	4	1.0	4.0	-	Retained due to Realignment/Bypass		
3	19+510	SLAB	1	1.4	4.0	-	Retained due to Realignment/Bypass		
4	20+000	SLAB	1	0.9	4.0	-	Retained due to Realignment/Bypass		
5	20+200	SLAB	1	0.9	3.6	-	Retained due to Realignment/Bypass		
6	20+650	PIPE	1	1.0	3.7	17+070	Reconstruction		
7	21+200	SLAB	1	0.9	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)					
8	23+500	SLAB	1	1.0	3.1	-	Retained due to Realignment/Bypass		
9	23+700	SLAB	1	1.0	3.1	-	Retained due to Realignment/Bypass		
10	24+100	SLAB	1	1.2	3.8	-	Retained due to Realignment/Bypass		
11	24+500	SLAB	1	1.2	3.8	-	Retained due to Realignment/Bypass		
12	26+800	PIPE	1	1	3.4	-	Retained due to Realignment/Bypass		
13	28+300	PIPE	2	1.0	3.6	22+770	Reconstruction	Box Culvert	1x3x4m
14	28+900	PIPE	1	1.0	4.0	-	Retained due to Realignment/Bypass		
15	29+550	PIPE	1	1.0	3.1	-	Retained due to Realignment/Bypass		
16	30+220	PIPE	1	1	3.5	-	Retained due to Realignment/Bypass		
17	30+450	PIPE	1	1	3.5	-	Retained due to Realignment/Bypass		
18	30+650	PIPE	1	0.6	3.7	-	Retained due to Realignment/Bypass		
19	31+150	SLAB	1	1.6	4	-	Retained due to Realignment/Bypass		
20	31+670	SLAB	1	1.6	4	-	Retained due to Realignment/Bypass		
21	33+050	SLAB	1	0.7	3.6	-	Retained due to Realignment/Bypass		
22	34+450	SLAB	1	0.7	3.6	-	Retained due to Realignment/Bypass		
23	35+400	PIPE	1	0.5	3.6	-	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 additionalculverts

Sl. No.	Design Chainage (Km)	Type of Culvert	Span / Opening with span length (m)	Width (m)
1	18+090	Box Culvert	1x2x2	12m
2	18+390	Box Culvert	1x2x2	12m
3	18+740	Box Culvert	1x2x2	12m
4	19+090	Box Culvert	1x2x2	12m
5	19+440	Box Culvert	1x2x2	12m
6	20+090	Box Culvert	1x2x2	12m
7	20+440	Box Culvert	1x2x2	12m
8	20+790	Box Culvert	1x2x2	12m
9	21+090	Box Culvert	1x2x2	12m
10	21+490	Box Culvert	1x4x5	12m
11	21+680	Box Culvert	1x2x2	12m
12	21+990	Box Culvert	1x2x2	12m
13	22+285	Box Culvert	1x4x4	12m
14	23+000	Box Culvert	1x2x2	12m
15	23+300	Pipe Culvert	1x1.2	30m
16	23+690	Pipe Culvert	1x1.2	30m
17	23+950	Box Culvert	1x3x4	12m
18	24+550	Box Culvert	1x2x2	12m
19	25+440	Box Culvert	1x2x2	12m
20	25+760	Box Culvert	1x2x2	12m
21	25+945	Pipe Culvert	1x1.2	27.5m
22	26+410	Box Culvert	1x4x5	12m
23	26+760	Box Culvert	1x2x2	12m
24	27+090	Box Culvert	1x2x2	12m
25	27+400	Box Culvert	1x2x2	12m
26	27+700	Box Culvert	1x2x2	12m
27	27+960	Box Culvert	1x2x2	12m
28	28+400	Box Culvert	1x2x2	12m
29	28+820	Pipe Culvert	1x1.2	22.5m
30	29+060	Box Culvert	1x2x2	12m
31	29+380	Pipe Culvert	1x1.2	17.5m
32	29+630	Box Culvert	1x2x2	12m
33	29+820	Box Culvert	1x2x2	12m

Sl. No.	Design Chainage (Km)	Type of Culvert	Span / Opening with span length (m)	Width (m)
34	30+840	Pipe Culvert	1x1.2	25m
35	31+090	Pipe Culvert	1x1.2	30m
36	31+550	Box Culvert	1x2x2	12m
37	31+950	Pipe Culvert	1x1.2	30m
38	32+300	Box Culvert	1x2x2	12m
39	32+600	Box Culvert	1x2x2	12m
40	33+390	Box Culvert	1x4x4	12m
41	33+600	Box Culvert	1x2x3	12m
42	33+950	Box Culvert	1x2x3	12m
43	34+245	Box Culvert	1x3x4	12m
44	34+630	Box Culvert	1x4x5	12m
45	34+890	Box Culvert	1x3x4	12m
46	35+300	Pipe Culvert	1x1.2	12.5m
47	35+590	Pipe Culvert	1x1.2	27.5m
48	35+940	Box Culvert	1x2x2	12m

0.23 Bus Lay Byes

2Bus bays are proposed on both side ofProject road.
The locations are–

Table 0.25- Proposed Bus Bays

Sl. No.	Design Chainage (Km)		Remarks
	LHS	RHS	
1	33.140	33.010	

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	28.600	LHS

0.25 Religious Structures

1 religious structure 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	28+450	34+950	LHS	Temple	Refer Existing Chainage

0.26 School Details

2 School exist alongthe project road and details are presented in table below:

Table 0.28: School Details

Sl.No.	Design Chainage (km)	Existing Chainage (km)	Side	Type	Remarks
1	23+270	28+850	RHS	School	Refer Existing Chainage
2	25+300	31+000	LHS	School	Refer Existing Chainage

0.26 Pond Location

21ponds 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	18+600	BHS	
2	18+720	BHS	
3	18+900	BHS	
4	21+170	BHS	
5	21+870	BHS	
6	22+200	BHS	
7	22+280	BHS	
8	23+320	LHS	
9	23+800	RHS	

Sl. No.	Design Chainage (Km)	Side	Remarks
10	24+280	BHS	
11	24+600	BHS	
12	24+800	BHS	
13	25+000	RHS	
14	25+630	BHS	
15	30+850	BHS	
16	33+200	RHS	
17	35+280	BHS	
18	33+400	BHS	
19	33+850	BHS	
20	34+580	RHS	
21	35+500	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.

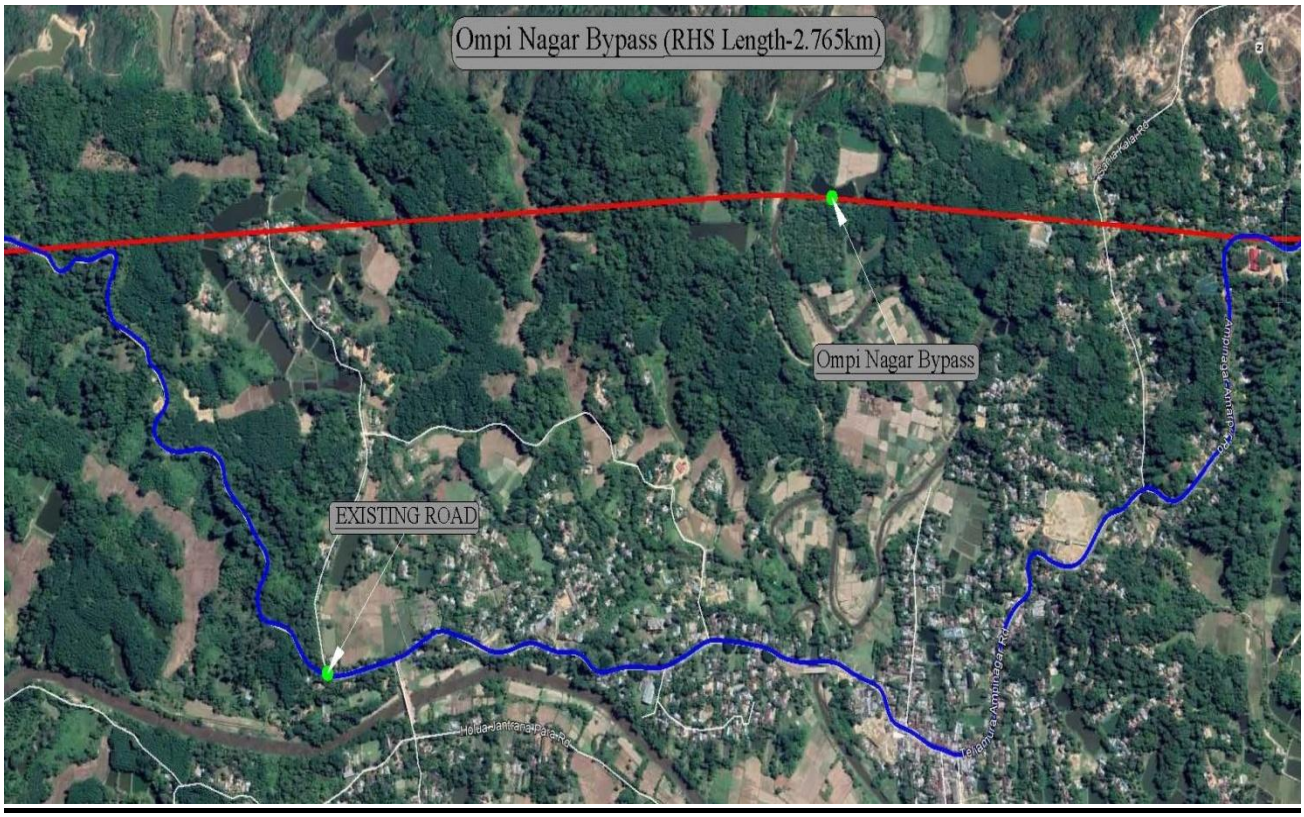
0.29 Proposed Bypasses& Realignments

0.29.1 Bypasses

Table 0.30: Details of Bypass

Sl. No	Existing Chainage (Km)			Design Chainage (Km)			Bypass Name
	From	To	Length (m)	From	To	Length (m)	
1	20+650	24+750	4.100	17+075	19+840	2.765	Ompi Nagar Bypass

1. Ompi Nagar 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				12830	17075	4.25	
2	24750	29150	4.40	19840	23550	3.71	
3	29450	38525	9.08	23840	31500	7.66	
4	38750	40775	2.03	31720	33700	1.98	
5	42250	42450	0.20	34170	35240	1.07	

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)
1	Breast Wall 1m height	547	603
2	Breast Wall 2m height	785	865
3	Breast Wall 3m height	619	681
4	Breast Wall 4m height	428	472
		2380	**2620**

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	LHS& RHS (m)
1	Retaining Wall 1.5m height	3115
2	Retaining Wall 3.0m height	445
3	Retaining Wall 1.5m height (Pond areas)	850
		4410

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

c) **W-Beam crash Barrier**- W- Beam crash barrier is proposed in **14100m**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**–

Sl. No.	Design Chainage (km)		Drain Length = (Length – Bridge length) (m)	Side	Remarks
	From	To			
A	**RCC Drain (1.75m wide)**				
1	23+100	23+300	400	BHS	TCS-3
	Total Length (m) (Both Side)		**400**		
B	**PCC Drain**				
	PCC (U-shaped) drain along hill sections (where cut height > 2.5m)		**8960**	Refer TCS 4,5 & 6	Refer fig e of IRC SP 48-1998 (Page71)
C	**Unlined Surface drain**		**22688**		

e) **Providing PCC** on embankment slope at bridge approaches (46 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 PPP.

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 PPP.

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 PPP.

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

The detail of utilities to be shifted is enclosed with drawing volume and the estimate of relocation will be submitted after obtaining it from concerned departments.

0.36 Land Acquisition

The alignment is passing through plain, rolling & Hilly terrain; the calculation of land acquisition area is approximate **360 hectare for entire project length (107.654 km),**

Verification of Land to be acquired is in progress at site

0.37 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.

0.38 Cost Estimate

The details of the cost abstract are as under table -

Table 0.34- Abstract of Cost (For Entire Section)

Bill No.	Description		Amount (in RS)	Amount (in Crores)	%age of Civil Cost
	Design Length in Km	18.000			
1	Site Clearance and Dismantling		1970643.00	0.20	0.09%
2	Earth Work		212696367.00	21.27	9.90%
3	Sub base and Base Course		190729894.00	19.07	8.88%
4	Bituminous Courses		331524584.00	33.15	15.43%
5	Bridges		665289348.00	66.53	30.97%
6	Culverts		160804703.63	16.08	7.49%
7	Drainage and Protection Works		543445608.00	54.34	25.30%
8	Traffic Signs, Marking and Appurtenances		6554662.00	0.66	0.31%
9	Bus Bays		3239192.45	0.32	0.15%
10	Truck Lay Bye		2916482.40	0.29	0.14%
11	Junctions		25025825.08	2.50	1.17%
12	Miscellaneous Items		3770000.00	0.38	0.18%
A	Civil Cost (sum of 1 to 12)		2147967309.57	214.80	
	Cost per km		119331517.20	11.93	
B	Contingencies charges on 'A' @	1.00%	21479673.10	2.15	
C	Sub Total (A + B)….		2169446982.66	216.94	
D	Maintenance for 5 years (0.25%+0.25%+0.5%+0.5%+1%) on 'A"	2.50%	53699182.74	5.37	
E	escalation (5% per year for two years) on 'A' @	10.00%	214796730.96	21.48	
F	Construction Supervision Charges on 'A' @	3.00%	64439019.29	6.44	

Bill No.	Description		Amount (in RS)	Amount (in Crores)	%age of Civil Cost
G	Agency (NHIDCL) Charges on 'C' @	3.00%	65083409.48	6.51	
H	Total Project Cost (C to G)		2567465325	256.75	
I	Approx Cost of Utility Shifting		15007710.00	1.50	
J	Total Cost (A + I)		2162975020	216.30	