

Consultancy services for 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.

Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km))

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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 Private Limited. for preparation of Detailed Project Report of **Agartala – Khowai section (NH -108 B)**.

The existing length of project road section is 15.750 km and design length after geometric improvement is 14.000 km.



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## **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)

## **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 **Agartala – Khowai Section (NH-108B)**.

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.



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- 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**

Sl. No.	Position	Name
1	Team Leader	Mr. Bhola Shanker Pandey
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



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## **0.6 Chainage Reference**

The Co-ordinates of proposed centre line @20m interval are presented at the end of this chapter **Table 0.25:-**

## **0.7 Project Alignment Description**

The Project road (existing) starts from T-Junction at Lichhubagan (at Agartala City - Airport road), passes through Lembuchhera, Fatikcherra, Mohanpur, Hezamara, Padambil and ends at Nripen Chakraborty Chowmuhan (At Khowai town).

The existing length of this project road section is 15.750 km and design length (with new proposals) is 14.000 km.

The Project road runs parallel to International border (India – Bangladesh) of some of its length.

Existing lane of Project road varies from two lane to single lane with fair to poor riding quality.

The Project Road alignment shown in figure below-



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**Figure 0.1– Proposed alignment of Project Road**



## 0.8 Right of Way (ROW)

There is no marking at ground of existing right of way along the Project road, also the details of existing RoW is not available with PWD, however as per visual inspection and local people enquire, it is found that maximum available ROW is varies upto 20 m.

The proposed RoW has been considered 18-45m (Refer table 0.2) for entire road stretch. The proposed RoW wrt to design chainages is presented below:



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**Table 0.2:- Details of Proposed RoW**

Sl. No.	Design Chainage (Km)		Length (m)	Adopted PROW		Total PROW	Remarks
	From	To		LHS	RHS		
1	31300	32000	700	18	12	30	Hill
2	32000	32650	650	20	20	40	
3	32650	33600	950	15	15	30	
4	33600	33700	100	25	15	40	
5	33700	34600	900	15	15	30	
6	34600	35450	850	9	9	18	
7	35450	36200	750	15	15	30	
8	36200	37350	1150	9	9	18	
9	37350	39000	1650	15	15	30	
10	39000	39500	500	20	20	40	
11	39500	40900	1400	15	15	30	
12	40900	41160	260	20	20	40	
13	41160	41650	490	9	9	18	
14	41650	45300	3650	15.5	29.5	45	Khowai Bypass

## **0.9 Abutting Land Use Pattern**

Project road passing maximum in plain & rolling terrain, only in 6.0 km length it passes through hilly-mountainous terrain.

Built-up and partially built-up are existing along the both side of Project road.

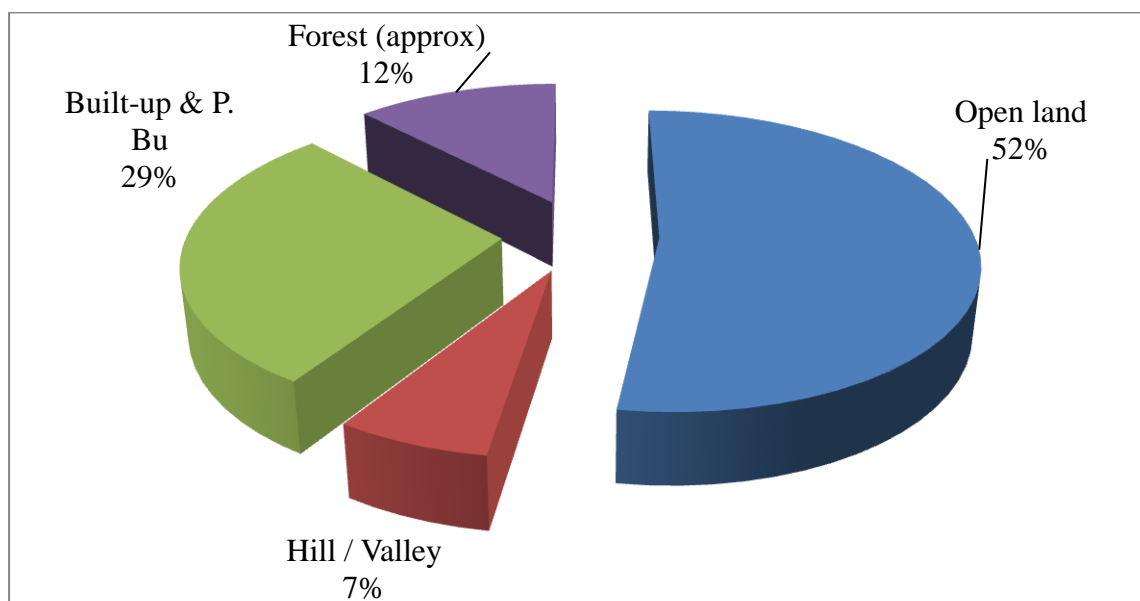
The details of Forest length will be described after confirmation of forest land length from concerned department.

*Land use pattern in graphical view is as follows-*



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**Fig 0.2- Land use Pattern**

The terrain detail with reference to design chainages is presented below:-

**Table 0.3 :- Details of Land**

Sl. No	Design Chainage (Km)		Length (Km)	Terrain	Remarks
	From	To			
1	31.300	45.300	14.000	Plain & Rolling	

## **0.10 Terrain**

Terrain is plain, rolling.

### **• 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 Table 0.4.





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**Table 0.4- Design Parameters**

Item	Plain / Rolling Terrain	Reference									
Design Speed (kmph)	Ruling -100 Kmph (P) / 60kmph (M) Min.- 80 kmph (P) / 40kmph (M)	Table 2.1									
Sight distance (minimum)	180 m (SSD) & 360m (ISD)	Table 2.6									
Proposed Land width (ROW)	as per table 0.2 of “Executive summary”										
Lane configuration	2-lane with paved shoulders										
Formation width	1. 7.0 m of carriageway + 2.5 m Paved shoulder + 1.5m earthen shoulder (Fig. 2.2) of two lane manual (IRC SP-73 : 2018										
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									
Side Slope	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): 1 (H) Cut										
Maximum super-elevation	7.0 %										
Radii of horizontal curves in plain/hilly terrain (m)	<table border="1"> <thead> <tr> <th></th><th>Plain</th><th>Hilly</th></tr> </thead> <tbody> <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> </tbody> </table>		Plain	Hilly	Ruling Min	400 m	150m	Absolute Min	250 m	75m	Table 2.5
	Plain	Hilly									
Ruling Min	400 m	150m									
Absolute Min	250 m	75m									
Drains	“Rectangular “shape on - either side where warranted depending on Site Condition& Kerb & Channel Drain in hill sections.										





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## **0.11 Surveys & Investigation**

### **0.11.1 Traffic Surveys**

Traffic surveys have been conducted at three locations.

**Table 0.5: Traffic count survey locations**

Sl. No.	Section	Chainage (Km)	Location	Remarks to Capture
1	Section I :: Km 0 to Km 24.300	Near Km 10.0 & Km 21.300	Before Agartala, Hezamara, Simna & Bijohnagar junction	Traffic coming from Agartala & moving towards simna, Khowai, Bijohnagar etc (both ways)
2	Section II :: Km 24.300 to Km 51.000	Near Km 45.600	Between in the homogenous section II	Traffic coming from Agartala, Simna, Bijohnagar & moving towards Khowai (both ways)

### **Growth Rate**

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

### **AADT, CVPD & Projected Traffic**

**Table 0.6- Commercial Vehicle Per day**

SL. No.	Location	AADT	PCU	CVPD	Remarks
1	Km 10.00 (near Kamalghat)	2462	2292	311	
2	Km 21.300 (near Tarapur)	2566	2379	287	
3	Km 45.600 (near Padmabil)	2338	2082	196	



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**Projected traffic on the project road is given below:**

**Table 0.7- Projected traffic**

Year	Likely traffic on the Project road			
	PCU at km 10.0 (Near Kamalghat)	PCU at km 21.300 (Near Tarapur)	PCU at km 45.600 (Near Padmabil)	Requirement of
2017	2291	2379	2082	2 Lane
2020	2647	2762	2404	
2025	4035	4177	3648	
2030	5143	5327	4643	
2035	6565	6787	5917	
2040	8372	8660	7532	

**As per the projected traffic & MoRT&H circular dated 26th May 2016, requirement for four lane is not qualifying upto year 2035 (For Plain terrain = 10000 PCU per day, for Rolling terrain = 8500 PCU per day & for Mountainous terrain = 6000 PCU per day). Hence, keeping view of importance of Project road, it is proposed to develop the Project Road as two lane with paved shoulder facility.**

**0.11.2 Axle load survey:**

Though CVPD (as per above table) on all three locations are found very less (311, 287 & 196), 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 3.9 (for initial traffic volume 150-1500).

**0.11.3 Testing of soil from existing embankment**

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



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**Table 0.8: - Existing Pavement Crust**

Chainage (Km)	Position of Pit	Pavement Composition			Total (mm)
		Bitumen Layer	Brick Soling	Sub base Course	
		(mm)	(mm)	(mm)	
34+000	LHS	35	245	-	280
34+500	RHS	40	200	-	240
35+000	LHS	45	240	-	285
35+500	RHS	35	225	-	260
36+000	LHS	40	215	-	255
36+500	RHS	45	150	-	195
37+000	LHS	45	200	-	245
37+500	RHS	45	170	-	215
38+000	LHS	40	180	-	220
38+500	RHS	30	215	-	245
39+000	LHS	45	275	-	320
39+500	RHS	45	255	-	300
40+000	LHS	30	250	-	280
40+500	RHS	35	200	-	235
41+000	LHS	35	170	-	205
41+500	RHS	35	155	-	190
42+000	LHS	40	245	-	285
42+500	RHS	50	170	-	220
43+000	LHS	50	205	-	255
43+500	RHS	40	210	-	250
44+000	LHS	30	175	-	205
44+500	RHS	35	260	-	295
45+000	LHS	40	235	-	275
45+500	RHS	45	195	-	240
46+000	LHS	35	165	-	200
46+500	RHS	30	195	-	225
47+000	LHS	40	245	-	285
47+500	RHS	40	170	-	210
48+000	LHS	50	155	-	205



**Detailed Project Report::****Chapter 00 :: Executive Summary**

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**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

Chainage (Km)	Position of Pit	Pavement Composition			Total (mm)
		Bitumen Layer	Brick Soling	Sub base Course	
		(mm)	(mm)	(mm)	
48+500	RHS	45	270	-	315
49+000	LHS	35	185	-	220
49+500	RHS	35	180	-	215
50+000	LHS	35	220	-	255
50+500	RHS	40	255	-	295

**Existing crust composition details**






### Detailed Project Report::

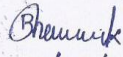
### Chapter 00 :: Executive Summary

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### CBR Test results of collected soil samples

		<b>NORTH EAST SOIL TESTING (NEST)</b>		Regd. Office : Ujan Abhoynagar, Opp. Post Office, Agartala , West Tripura, PIN – 799005 ,		 	
<b>TEST REPORT</b>							
Issue Date	: 25.03.17	Job No.	: B 5533				
Issued To	: TASPL	Date of Sample received	: 20.02.17				
Sample Deposited by	: Representative	Page	: 1 of 3 ....				
Sample Description	: Soil						
Location:- Agartala – Khowai Section							
Sl.No.	Chainage No. (Km)	MDD (g/cc)	OMC (%)	Unsoaked CBR (%)	Soaked CBR (%)	Swelling Index (%)	
01	5.00	1.754	14.85	14.73	7.69	3.83	
02	10.00	1.772	15.23	15.26	7.84	3.23	
03	16.00	1.821	11.9	19.64	10.55	2.78	
04	25.00	1.83	11.72	19.86	10.51	2.81	
05	35.00	1.762	15.38	14.87	7.79	3.46	
06	45.00	1.795	13.89	17.92	8.73	3.11	
07	Borrow Area Near Km 12.00	1.801	13.33	18.35	9.65	2.98	

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.



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#### **0.11.4 Material survey**

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

**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 Haldia IOCL with lead of approx. 1700 km.

#### **0.12 Development Proposals**

##### **0.12.1 Pavement Design**

Considering a growth rate of 5 % and VDF as 3.9 obtained from the IRC, design of pavement as per IRC 37 -2018 for a design life of minimum 20 years.

Accordingly design traffic has been worked out as 20MSA (as per 5.4.1 (i) of Two lane manual 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 (Plate 20) is as under:

- BC - 30 mm
- DBM - 50 mm
- CT Base - 150 mm
- CT Sub Base - 200 mm





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### 0.12.2 Typical Cross Section and Widening Scheme

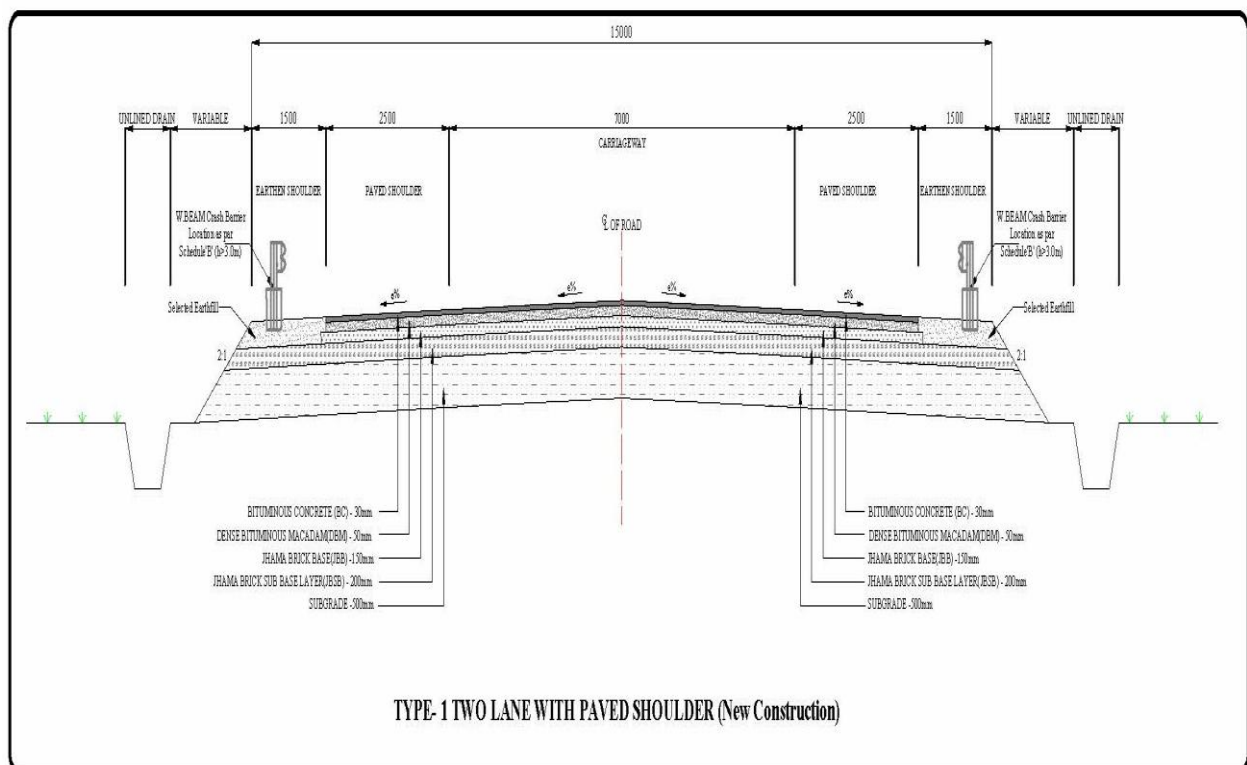
#### i) Roadway width -

- For Plain areas -** Roadway width of 15.00 (7.0+2x2.5+2x1.5) is proposed for sections with 2 lane plus paved shoulders of 2.50m and unpaved shoulder of 1.50m on either side in plain areas and,
- For Built-up areas -** Roadway width of 12.00 (7.0+2x2.5) is proposed for sections with 2 lane plus paved shoulders of 2.50m and RCC covered drain of 1m wide on either side of Road way,
- 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 1.50wide and paved shoulder of 2.50m are proposed on either side of the Carriage way

**Proposed Typical cross sections (As per Flexible pavement) are shown here –**



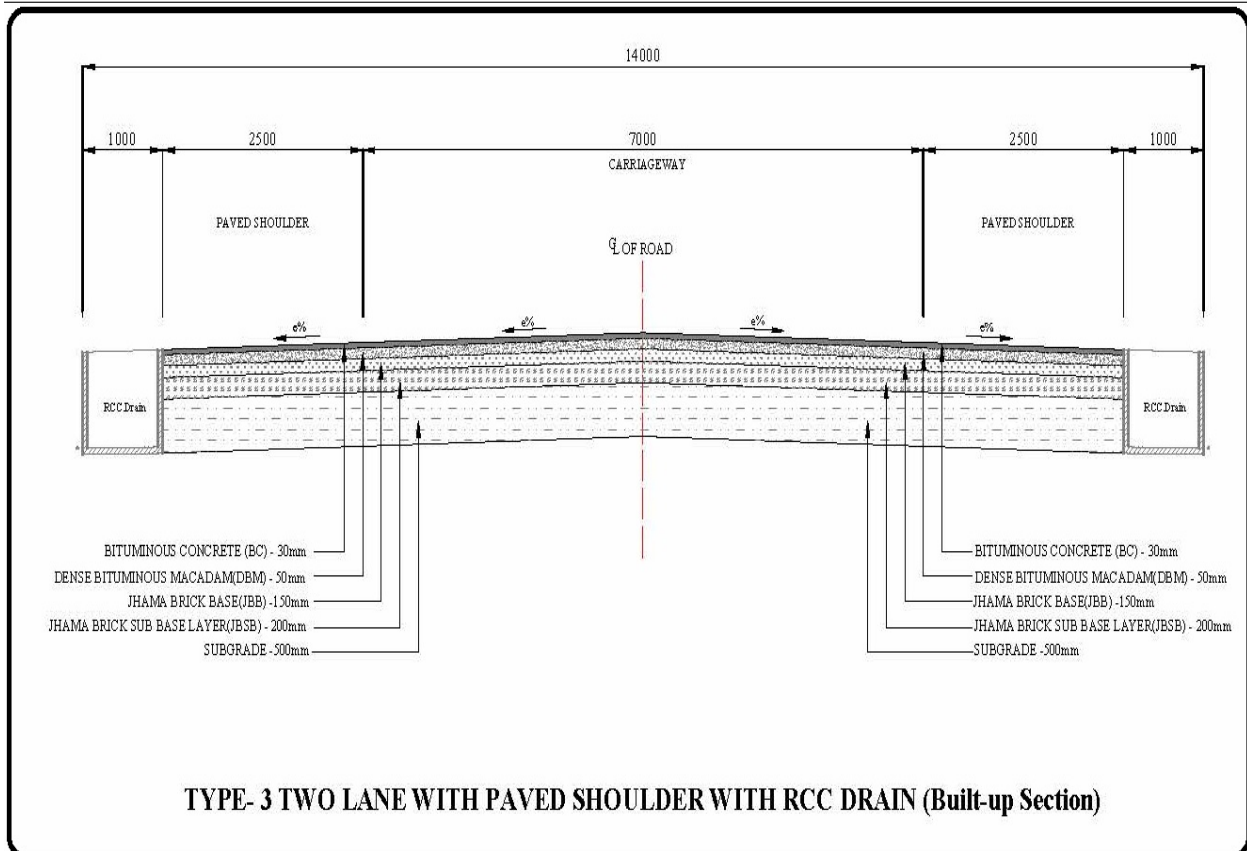
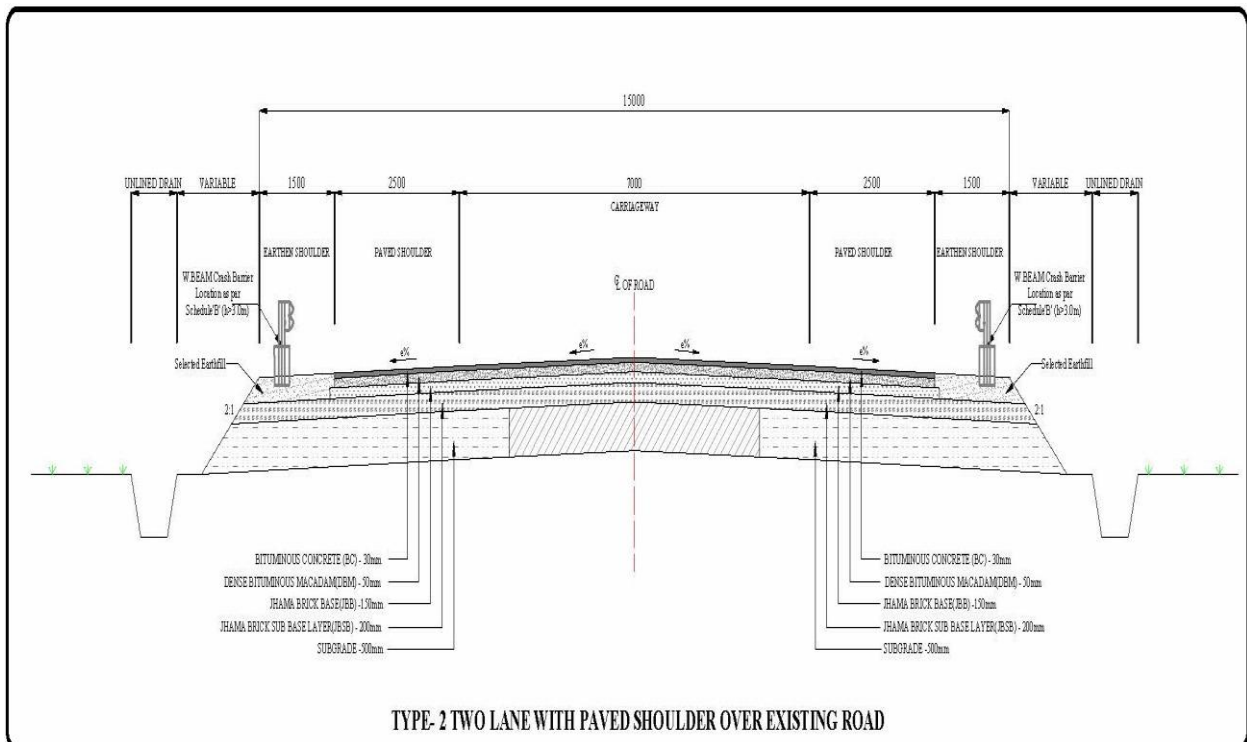


### Detailed Project Report::

### Chapter 00 :: Executive Summary

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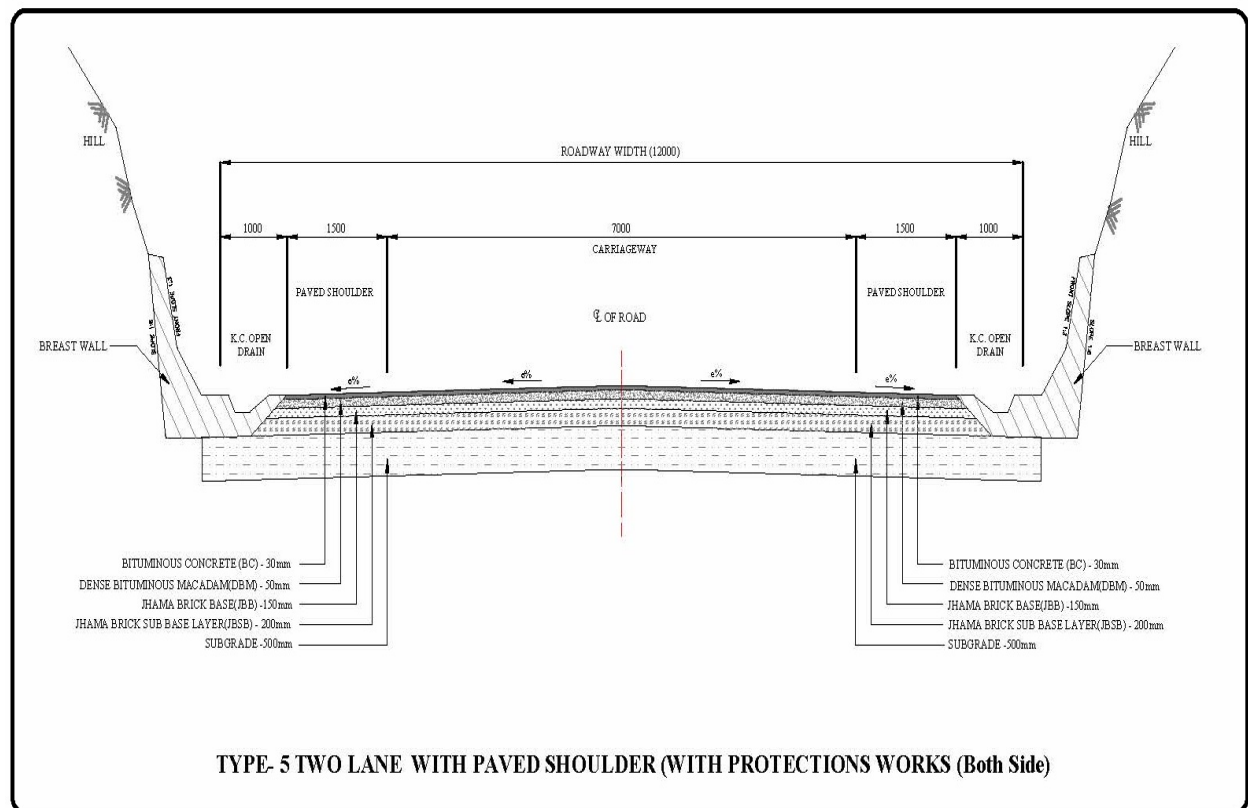
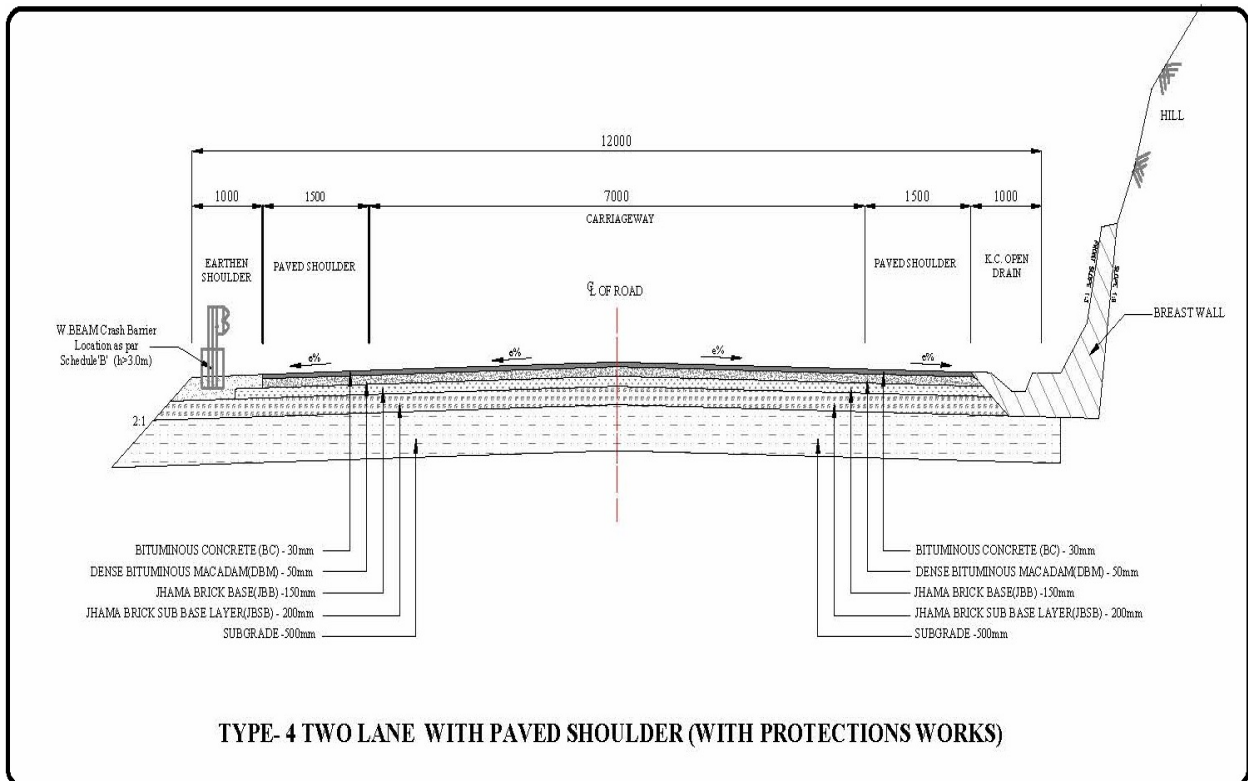


### Detailed Project Report::

### Chapter 00 :: Executive Summary

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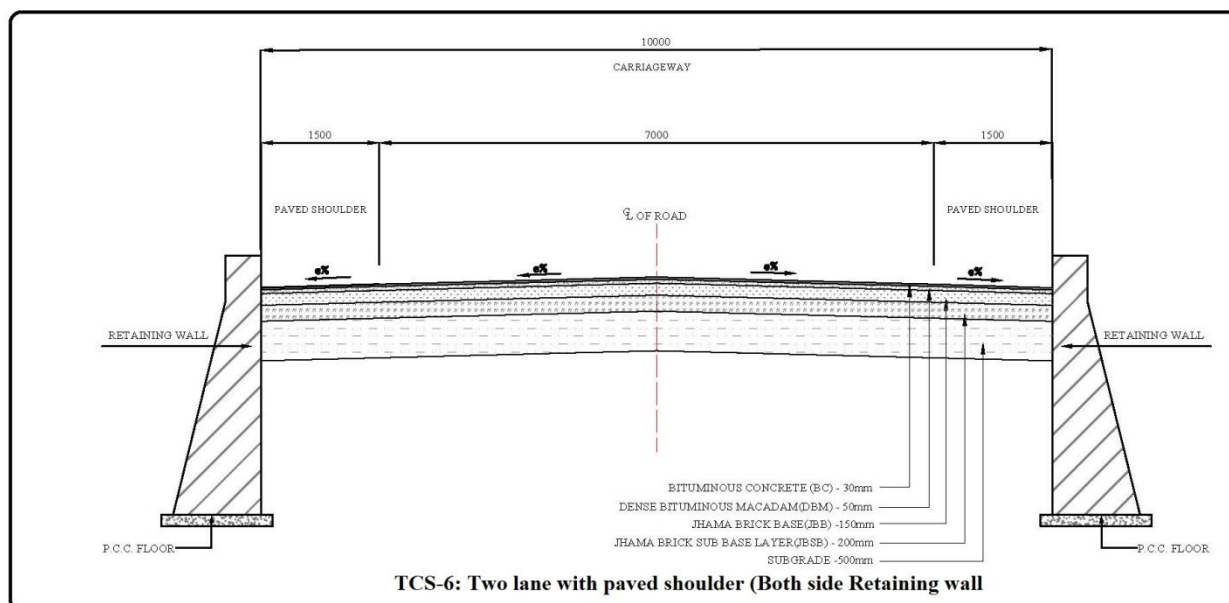


### Detailed Project Report::

### Chapter 00 :: Executive Summary

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### **0.12.3 Horizontal and Vertical Design of Project road**

#### **Horizontal Alignment**

**Table 0.9: Horizontal Report**

Curve No.	HORIZONTAL CURVE				Terrain	Transition Length (m)	Speed
	Start Chainage (Km)	End Chainage (Km)	Radius	Direction			(Kmph)
1	31+380.125	31+479.493	400	Left	Hilly	0	65
2	31+547.328	31+590.596	125	Right	Hilly	35	50
3	31+663.777	31+731.419	200	Left	Hilly	20	50
4	32+038.796	32+095.785	200	Left	Hilly	35	50
5	32+302.670	32+440.152	250	Right	Plain	90	80
6	32+624.399	32+848.874	700	Left	Plain	35	80
7	33+165.100	33+222.430	2000	Right	Plain	0	100
8	33+454.074	33+561.488	400	Right	Plain	55	80
9	33+753.005	33+822.847	400	Right	Plain	55	80
10	34+047.032	34+275.996	250	Left	Plain	90	80
11	34+456.034	34+699.072	400	Right	Plain	55	80
12	34+828.875	35+087.982	400	Left	Plain	55	80
13	35+393.594	35+420.335	800	Right	Plain	60	100
14	35+686.944	35+912.229	1200	Right	Plain	40	100



Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km))**

Curve No.	HORIZONTAL CURVE				Terrain	Transition Length (m)	Speed
	Start Chainage (Km)	End Chainage (Km)	Radius	Direction			(Kmph)
15	36+381.700	36+567.688	1500	Left	Plain	35	100
16	37+112.908	37+135.758	150	Right	Plain	45	50
17	37+341.835	37+873.993	400	Left	Plain	55	80
18	38+005.293	38+324.021	400	Right	Plain	55	80
19	38+635.302	38+868.144	600	Left	Plain	80	100
20	39+912.555	40+392.298	800	Right	Plain	60	100
21	40+808.762	41+208.515	700	Left	Plain	70	100
22	41+657.060	42+060.216	400	Right	Plain	115	100
23	43+045.433	43+263.101	1500	Left	Plain	35	100
24	44+182.393	44+391.164	1000	Left	Plain	50	100
25	44+658.516	44+882.622	1000	Left	Plain	50	100

**Out of 25 Curves, the 01 Nos. of curve is coming under deviation.**

### **Vertical Alignment**

**Table 0.10: Vertical Report**

PVI No	PVI		Curve Length (m)	Gradient		Chainage(m)		Level (m)		Type of Curve	K Value
	Design Chainage (m)	Level (m)		IN	OUT	Start of Curve	End of Curve	Start of Curve	End of Curve		
1	31+557.452	87.254	150	-6.466	-0.632	31+482.452	31+632.452	92.103	86.78	Sag	25.713
2	31+844.097	85.443	150	-0.632	-0.079	31+769.097	31+919.097	85.917	85.384	Sag	271.046
3	32+772.074	84.714	350	-0.079	-1.196	32+597.074	32+947.074	84.851	82.62	Hog	313.086
4	33+745.563	73.067	300	-1.196	-1.289	33+595.563	33+895.563	74.862	71.133	Hog	3227.439
5	34+417.596	64.402	150	-1.289	-0.632	34+342.596	34+492.596	65.369	63.928	Sag	228.339
6	34+773.940	62.148	150	-0.632	-1.532	34+698.940	34+848.940	62.623	60.999	Hog	166.801
7	35+027.398	58.266	150	-1.532	0.052	34+952.398	35+102.398	59.415	58.305	Sag	94.742
8	35+272.004	58.392	200	0.052	-1.412	35+172.004	35+372.004	58.34	56.98	Hog	136.668
9	35+850.000	50.231	150	-1.412	0.675	35+775.000	35+925.000	51.29	50.737	Sag	71.884
10	36+052.818	51.6	125	0.675	0	35+990.318	36+115.318	51.178	51.6	Hog	185.238
11	36+300.000	51.6	60	0	0.162	36+270.000	36+330.000	51.6	51.649	Sag	369.729
12	38+105.281	54.53	600	0.162	-0.645	37+805.281	38+405.281	54.043	52.595	Hog	743.437
13	39+894.162	42.995	400	-0.645	-0.078	39+694.162	40+094.162	44.285	42.838	Sag	706.248
14	41+524.418	41.717	350	-0.078	-2.17	41+349.418	41+699.418	41.854	37.919	Hog	167.324
15	42+090.000	29.443	225	-2.17	-0.168	41+977.500	42+202.500	31.884	29.255	Sag	112.353



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

PVI No	PVI		Curve Length (m)	Gradient		Chainage(m)		Level (m)		Type of Curve	K Value
	Design Chainage (m)	Level (m)		IN	OUT	Start of Curve	End of Curve	Start of Curve	End of Curve		
16	43+456.927	27.153	400	-0.168	0.197	43+256.927	43+656.927	27.488	27.547	Sag	1096.768
17	44+527.529	29.264	400	0.197	-0.215	44+327.529	44+727.529	28.87	28.835	Hog	971.582

**No verticals Curves are coming under deviation**



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### **0.13 Road Junctions/Intersections**

- There are 71 junctions exist on the project road including on realignment/bypasses.
- Out of 71, 33 Junction are proposed to improve/ Developed at grade only.
- Out of 71, 38 Junction are retained due realignment/bypasses.

**Table 0.11: Details of Improvement proposal at the intersections**

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Type of Junction	Arm	Side	Village Name	Remarks
1	36+600	32+820	T	3	LHS	Ratana Pur Road	Improvement
2	37+975	34+200	Y	3	RHS	Mare Huded Road	Improvement
3	38+075	34+310	T	3	RHS	Mare huded Road	Improvement
4	38+100	34+330	T	3	LHS	C.R.P.F Camp ( S C Para)	Improvement
5	38+600	34+830	T	3	RHS	TSR	Improvement
6	38+750	34+970	Y	3	LHS	Chankhola village	Improvement
7	38+825	35+050	T	3	RHS	chankhola village	Improvement
8	39+300	35+570	Y	3	RHS	-	Improvement
9	39+720	35+940	Y	3	RHS	-	Improvement
10	39+750	35+960	Y	3	LHS	-	Improvement



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Type of Junction	Arm	Side	Village Name	Remarks
11	39+850	-	Y	3	LHS	Chhankhola	Retained Due to bypass/Realignment
12	40+650	36+870	T	3	RHS	Don-Boscho School	Improvement
13	40+900	37+100	+	4	BHS	LHS-Bazal bari P.H.C RHS-Uddab das	Improvement
14	41+350	37+550	+	4	BHS	LHS-Bazal bari	Improvement
15	41+550	-	T	3	RHS	Ampura Bazar	Retained Due to bypass/Realignment
16	41+920	38+020	T	3	LHS	Uddhav das para	Improvement
17	41+950	38+060	Y	3	RHS	-	Improvement
18	42+580	38+670	Y	3	LHS	-	Improvement
19	42+600	38+700	Y	3	RHS	Baluya	Improvement





**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Type of Junction	Arm	Side	Village Name	Remarks
20	42+675	-	T	3	LHS	Baluya (Ampura Bazar)	Retained Due to bypass/Realignment
21	43+100	-	T	3	LHS	Nagaro chhodar para	Retained Due to bypass/Realignment
22	43+200	-	T	3	LHS	Nil chardra pra	Retained Due to bypass/Realignment
23	43+520	-	T	3	LHS	Jama para	Retained Due to bypass/Realignment
24	43+575	-	T	3	LHS	Padmabil	Retained Due to bypass/Realignment
25	43+725	-	T	3	LHS	Child development project officer	Retained Due to bypass/Realignment



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

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Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Type of Junction	Arm	Side	Village Name	Remarks
26	43+850	-	T	3	LHS	Office of the block development officer	Retained Due to bypass/Realignment
27	44+375	-	T	3	LHS	Ratan pur	Retained Due to bypass/Realignment
28	44+425	-	Y	3	LHS	Bash bari	Retained Due to bypass/Realignment
29	44+750	-	Y	3	RHS	Laaltilla Chebbri	Retained Due to bypass/Realignment
30		39+560	+	4	BHS	-	Improvement
31		40+050	+	4	BHS	-	Improvement
32	45+350	41+170	y	3	LHS	-	Improvement
33	45+500	41+330	T	3	RHS	Dhalabil colony	Improvement
34	45+725	41+550	T	3	LHS	Dhalabil Colony (J B School)	Improvement
35	45+800	41+620	T	3	RHS	Dhalabil Colony	Improvement



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Type of Junction	Arm	Side	Village Name	Remarks
36	45+830	41+660	Y	3	LHS	-	Improvement
37	45+850	41+680	T	3	RHS	Dhalabil Chowmuhani	Improvement
38	46+025	-	T	3	LHS	Dhalabil bagan	Retained Due to bypass/Realignment
39	46+380	-	T	3	LHS	Dhalabil colony	Retained Due to bypass/Realignment
40	46+450	-	T	3	LHS	Dhalabil Power House	Retained Due to bypass/Realignment
41	46+630	-	T	3	LHS	Dhalabil munda para	Retained Due to bypass/Realignment
42	46+650	-	T	3	RHS	Village Road	Retained Due to bypass/Realignment
43	46+950	-	Y	3	RHS	Dev tila	Retained Due to bypass/Realignment



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

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Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Type of Junction	Arm	Side	Village Name	Remarks
44	47+200	-	Y	3	LHS	Village Road	Retained Due to bypass/Realignment
45	47+300	-	T	3	RHS	Khowai tea bagan	Retained Due to bypass/Realignment
46	48+000	-	+	4	BHS	Baidyanath Chowmuhan	Retained Due to bypass/Realignment
47	48+150	-	T	3	LHS	Pharmura Play Ground	Retained Due to bypass/Realignment
48	48+270	-	T	3	LHS	Hathkata	Retained Due to bypass/Realignment
49	48+800	-	Y	3	RHS	Village Road	Retained Due to bypass/Realignment
50	49+075	-	+	4	RHS	Chakber village road	Retained Due to bypass/Realignment



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Type of Junction	Arm	Side	Village Name	Remarks
51	49+220	-	T	3	RHS	Chakber	Retained Due to bypass/Realignment
52	49+550	-	+	4	BHS	Paschim Chargonki & Paschim chargonki	Retained Due to bypass/Realignment
53	49+700	-	T	3	LHS	Bil para	Retained Due to bypass/Realignment
54	49+950	-	Y	3	RHS	Agargar tali	Retained Due to bypass/Realignment
55	49+985	-	T	3	RHS	Village Road	Retained Due to bypass/Realignment
56	50+025	-	T	3	RHS	Village Road	Retained Due to bypass/Realignment



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Type of Junction	Arm	Side	Village Name	Remarks
57	50+275	-	T	3	LHS	Village Road	Retained Due to bypass/Realignment
58	50+300	-	T	3	RHS	Village Road	Retained Due to bypass/Realignment
59	50+400	-	+	4	BHS	Village Road	Retained Due to bypass/Realignment
60	50+475	-	T	3	LHS	Village Road	Retained Due to bypass/Realignment
61	50+510	-	T	3	LHS	Kali bari	Retained Due to bypass/Realignment
62	50+540	-	T	3	RHS	Kali bari	Retained Due to bypass/Realignment
63	50+750	-	+	4	BHS	Subhash park	Retained Due to bypass/Realignment



Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Type of Junction	Arm	Side	Village Name	Remarks
64	-	42+140	+	4	BHS	-	Improvement
65		42+590	Y	3	LHS	-	Improvement
66	-	43+840	+	4	BHS	-	Improvement
67	-	44+200	+	4	BHS	-	Improvement
68	-	44+370	+	4	BHS	-	Improvement
69		44+640	Y	3	RHS	-	Improvement
70		44+910	+	4	BHS	-	Improvement
71		45+270	+	4	BHS	-	Improvement

#### **0.14 Railway Track & Proposals**

No any railway track is falling on the Project road section.

#### **0.15 Cross Drainage Works**

##### **0.15.1 Bridges**

Total **3 existing bridges** falling on Project Alignment

- 2 existing bridges are retained due to realignment / bypasses.
- 1 bridges are proposed as new construction..
- 2 additional bridge is proposed on bypasses as new construction of 2 lane bridge.





Consultancy services for 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.

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**Table 0.12: Proposal of Bridges**

Sl. No.	Existing Chainage (km)	Design Chainage (km)	Existing Details				Proposals			Remarks
			Type of structure	No. of span	Span Arrangement (m)	C'way width (m)	Proposal	Type of structure	Span Arrangement (m)	
1	40+150	36+350	RCC/SLA B	1	21.7	11	New Construction of 2 lane bridge	RCC Slab	1 x 25	Existing Bridge Retained
2	49+400	-	RCC/SLA B	6	160.5	7.6	Retained due to realignment / bypass			
3	50+725	-	RCC	1	8	8.3	Retained due to realignment / bypass			
4	-	43+400 (Bypass)	-				New Construction of 2 lane bridge	PSC Girder	4 x 30	New Proposal
5	-	44+520 (Bypass)					New Construction of 2 lane bridge	RCC Slab	1 x 25	New Proposal

### 0.15.2 Culverts

Total 20 culverts are falling in this section of Project alignment.

- 9 culverts are proposed for reconstruction.
- 11 culverts are retained due to realignment or bypasses.
- 30 additional culverts are proposed as balancing culverts on new alignment.



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**Table 0.13 – Proposal of Existing Culverts**

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Proposal		
			Proposal	Size (m)	Type
1	35+250	31+550	Reconstruction	1 x 3 x 3	Box
2	35+450	31+750	Reconstruction	1 x 3 x 3	Box
3	35+520	-	Retained due to realignment/bypass		
4	35+635	31+920	Reconstruction	1 x 3 x 3	Box
5	35+720	-	Retained due to realignment/bypass		
6	35+900	32+180	Reconstruction	1 x 3 x 3	Box
7	36+050	-	Retained due to realignment/bypass		
8	36+320	32+550	Reconstruction	1 x 3 x 3	Box
9	38+360	34+590	Reconstruction	1 x 2 x 2	Box
10	39+230	35+450	Reconstruction	1 x 3 x 3	Box
11	39+650	-	Retained due to realignment/bypass		
12	39+870	-	Retained due to realignment/bypass		
13	40+000	36+220	Reconstruction	1 x 3 x 3	Box
14	45+220	-	Retained due to realignment/bypass		
15	45+590	41+410	Reconstruction	1 x 2 x 2	Box
16	45+780	-	Retained due to realignment/bypass		
17	47+100	-	Retained due to realignment/bypass		
18	47+350	-	Retained due to realignment/bypass		
19	47+570	-	Retained due to realignment/bypass		
20	47+770	-	Retained due to realignment/bypass		



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## **Additional Culverts**

**Table 0.14: Proposal of Additional Culverts**

<b>Sl. No</b>	<b>Design Chainage (Km)</b>	<b>Type</b>	<b>Size (m)</b>	<b>Remark</b>
1	32+900	Box Culvert	1 x 2 x 2	
2	33+160	Box Culvert	1 x 2 x 2	
3	33+440	Box Culvert	1 x 3 x 2	
4	33+840	Box Culvert	1 x 2 x 2	
5	34+200	Box Culvert	1 x 2 x 2	
6	34+960	Box Culvert	1 x 2 x 2	
7	35+800	Box Culvert	1 x 2 x 3	
8	36+700	Box Culvert	1 x 2 x 3	
9	37+040	Box Culvert	1 x 2 x 3	
10	37+360	Box Culvert	1 x 3 x 3	
11	37+880	Box Culvert	1 x 2 x 3	
12	38+220	Box Culvert	1 x 2 x 2	
13	38+520	Box Culvert	1 x 2 x 2	
14	38+920	Box Culvert	1 x 2 x 2	
15	39+200	Box Culvert	1 x 2 x 6	
16	39+620	Box Culvert	1 x 3 x 4	
17	39+960	Box Culvert	1 x 2 x 2	
18	40+320	Box Culvert	1 x 2 x 2	
19	40+620	Box Culvert	1 x 2 x 2	
20	40+860	Box Culvert	1 x 3 x 3	
21	41+160	Box Culvert	1 x 2 x 4	
22	41+760	Box Culvert	1 x 2 x 2	
23	42+080	Box Culvert	1 x 2 x 3	
24	42+500	Box Culvert	1 x 2 x 2	
25	42+760	Box Culvert	1 x 3 x 5	
26	43+060	Box Culvert	1 x 2 x 4	
27	43+780	Box Culvert	1 x 2 x 4	
28	44+160	Box Culvert	1 x 3 x 3	
29	44+860	Box Culvert	1 x 3 x 4	



Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

Sl. No	Design Chainage (Km)	Type	Size (m)	Remark
30	45+160	Box Culvert	1 x 2 x 3	

### **0.16 Bus Lay Bys**

4 Bus bays (including both side) are proposed along the Project road. The Locations are:

**Table 0.15- Proposed Bus Bays**

Sl. No.	LHS	RHS	Remarks
1	33.250	33.000	
2	42.200	42.300	

#### **0.16.1 Truck Lay Bye**

No Truck Lay bye is proposed in this section of Agartala – Khowai Project road.

#### **0.16.2 Religious Structures**

4 religious structures exist on the project road and details are presented in table below:

**Table 0.16: Religious Structures**

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Side	Type	Remarks
1	40+450	36+670	LHS	Temple	
2	43+250	-	LHS	Temple	Kali Temple
3	44+640	-	RHS	Bapist Church	
4	45+850	41+700	RHS	Temple	Kalibari Temple

#### **0.16.3 School Details**

3 School exists on this section of project road and details are presented in table below:



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**Table 0.17: School Details**

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Side	Remarks
1	36+650	32+900	RHS	School
2	38+000	34+220	RHS	School
3	40+950	37+150	LHS	Bazalbari Primary School

#### **0.16.4 Pond Locations**

13 pond exists on this section of project road and details are presented in table below:

**Table 0.18: Pond Locations**

Sl. No.	Design Chainage (Km)	Side	Length (m)	Remarks
1	35+870	BHS	15	
2	39+740	BHS	15	
3	40+660	BHS	10	
4	40+980	LHS	5	
5	41+020	BHS	15	
6	41+780	LHS	10	
7	42+610	BHS	15	
8	42+880	BHS	10	
9	44+220	RHS	40	
10	44+420	BHS	10	
11	44+700	BHS	15	
12	45+110	BHS	20	
13	45+250	BHS	15	
<b>Total..</b>			195	



Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

### **0.16.5 Toll Plaza**

No Toll plaza is proposed.

### **0.16.6 Submergence Details**

As per enquire with local people, The Following areas found submerge during heavy rain, the locations are:

**Table 0.19: Submergence Details**

<b>Sl. No.</b>	<b>Existing Chainage (Km)</b>	<b>Area Name</b>	<b>Water Level (m)</b>
1	36+350	Belbang	0.5-1.0
2	38+350	Chankhota	0.5-1.0
3	46+350	Dhalabil Colony	0.5-1.0
4	47+300	Khowai Tea Bagan (S.G High School)	0.5-1.0
5	47+600	Khowai Tea Bagan (S.G High School)	0.5-1.0
6	47+800	Dhalabil Teshil	0.5-1.0
7	47+900	Banbithai park	1.0 -2.0
8	50+700	Shubhas Park	1.0 -2.0

**The embankment has been raised at these locations.**

### **0.17 Proposed Bypasses/ Realignment**

#### **1. Khowai Bypass**

- To match the Project Road with another Khowai bypass (Proposed by M/s CE Testing consultant), a bypass of Khowai town is proposed on right side of Project road (Starts from Dhalabil chowmuhani). This bypass starts from design km 41.700 (existing km 45.900) dhalabil chowmuhani of Project road and ends at near Mahadev Tila, design km 45.300 (Teliamura – Khowai Road, a section of M/s CE testing consultant). The length of this proposal is 3. 600 km.

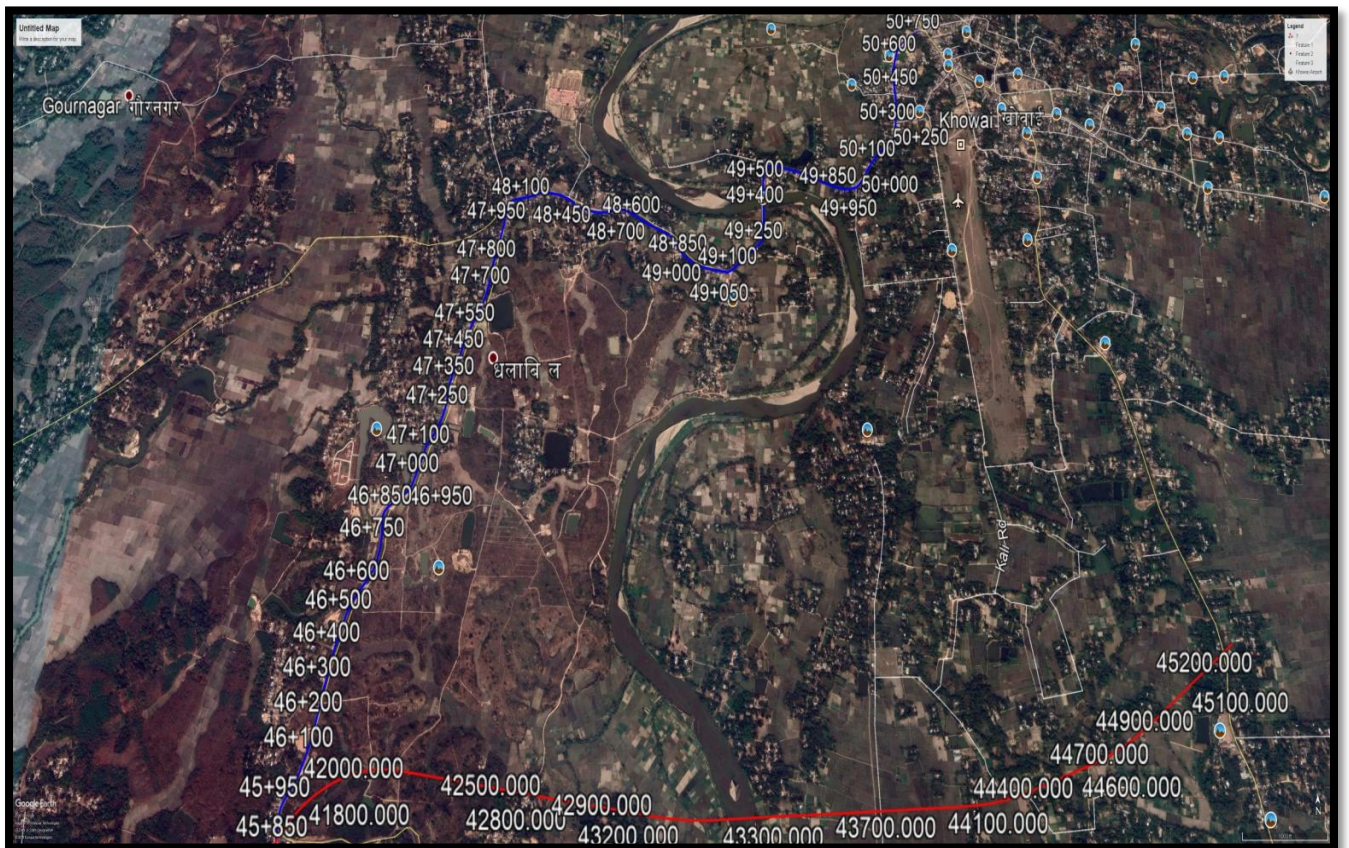






Consultancy services for feasibility study, preparation of DPR & providing pre-construction services for up-gradation of selected road stretches/corridors to Two lane with paved shoulder NH configuration under BHARATMALA Project and National Highways connectivity to Backward areas/Religious/Tourist places of the country in the state of Tripura.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

- A view of this bypass is shown below –



**Figure 0.3: Khowai Bypass**

Existing Road	
Proposed Alignment	

## **2. Other Realignments**

Including above bypasses some realignments are also proposed for improvement of geometry as per IRC standards, the location wise details of realignments are:





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**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

**Table 0.20 - Realignment Details**

Sl. No	Existing Chainage (Km)			Design Chainage (Km)		
	From	To	Length	From	To	Length
1	35+860	36+300	0+600	32+140	32+550	0+410
2	39+225	39+980	0+755	35+450	36+200	0+750
3	41+150	42+000	0+850	37+350	38+100	0+750
4	42+600	45+340	2+740	38+700	41+160	2+460
	<b>Total Length</b>		<b>4+945</b>	<b>Total Length</b>		<b>4+370</b>

## **0.18 Protection Works**

The protection work 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**

Sl. No.	Description	LHS	RHS	Total
1	Breast Wall 1m height	140	60	200
2	Breast Wall 2m height	140	100	240
	<b>Total ..</b>	<b>280</b>	<b>160</b>	<b>440</b>

**The chainage wise details of breast wall is presented in Vol. 8 Bill of Quantity**

- b) Retaining wall – Retaining wall is proposed in 760m length, The Chainage wise detail of retaining wall is presented in Vol. 8:: Bill of Quantity.**
- c) W- Beam Crash Barrier – W Beam crash barrier is proposed in 5531m length (Where height of embankment is more than 3.0m and at horizontal curves having radius less then 450m), The chainage wise details of W Beam crash barrier is presented in Vol. 8:: Bill of Quantity.**
- d) RCC Drain – RCC linear drain is provided in 2930m length (BHS) in Built up section.**



Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

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**e) PCC Drain – PCC drain is provided in 1040m length (BHS).**

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

**0.19 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.

**0.20 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.

**0.21 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.

**0.22 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,

**0.23 Utilities**

The estimate of utilities relocation will be submitted after obtaining it from concerned departments.

**0.24 Land Acquisition**

The detail of Land acquisition will be finalized after approval of alignment, however, on tentative basis, the amount of **Rs 42.38cr** is considered for Land acquisition for this section.

*The details of adjacent land of projection road is presented below, the details may change after got confirmation/joint site visit with/ forest department.*



Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

**Table 0.21: Details of Land**

Sl. No.	Design Chainage (Km)		Length (Km)	Type of land	
	From	To		LHS	RHS
1	26+000	32+000	6+000	Forest/Govt.	
2	32+000	37+000	5+000	Private	32+000
3	37+000	39+200	2+200	Govt.	
4	39+200	39+800	0+600	Private	
5	39+800	40+200	0+400	Private	
6	40+200	42+000	1+800	Govt.	40+200
7	42+000	45+300	3+320	Private	

## **0.25 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.

## **0.26 Cost Estimate**

The details of the cost abstract are as under **Table 0.22** –



Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

**Table 0.22 - Abstract of Cost**

Bill No.	Description	Amount (in RS)	Amount (in Crores)	%age of Civil Cost
	Design Length in Km	14.000		
1	Site Clearance and Dismantling	1331901.00	0.13	0.13%
2	Earth Work	92460084.00	9.25	9.06%
3	Sub base and Base Course	207847475.00	20.78	20.37%
4	Bituminous Courses	238746737.00	23.87	23.40%
5	Bridges	254700000.00	25.47	24.96%
6	Culverts	116851768.00	11.69	11.45%
7	Drainage and Protection Works	82049461.00	8.20	8.04%
8	Traffic Signs, Marking and Appurtenances	2230446.00	0.22	0.22%
9	Bus Bays	6061116.34	0.61	0.59%
10	Junctions	16469087.03	1.65	1.61%
11	Truck Lay Bye	0.00	0.00	0.00%
11	Miscellaneous Items	1611500.00	0.16	0.16%
A	Civil Cost (sum of 1 to 11)	1020359575.37	102.04	
B	** GST on 'A' @ (Total 12%, 6% as VAT + 6% GST)	6.00%	61221574.52	6.12
C	Civil Cost including GST (A+B)	1081581149.89	108.16	
	Cost per km	77255796.42	7.73	
D	Contingencies charges on 'C' @	2.80%	30284272.20	3.03
E	Sub Total (C + D)....	1111865422.09	111.19	
F	Maintenance for 5 years (0.25%+0.25%+0.5%+0.5%+1%) on 'C'	2.50%	27039528.75	2.70
G	escalation (5% per year for two years) on 'C' @	10.00%	108158114.99	10.82



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

H	Construction Supervision Charges on 'C' @	3.00%	32447434.50	3.24	
I	Agency (NHIDCL) Charges on 'E' @	3.00%	33355962.66	3.34	
J	<b>Total Project Cost (E to I)</b>		<b>1312866463</b>	<b>131.29</b>	
K	Approx cost of Land Acquisition		423820000.00	42.38	
L	Approx Cost of Utility Shifting		60000000.00	6.00	
M	<b>Total Project Cost (J to M)</b>		<b>1796686463</b>	<b>179.67</b>	



Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

## **0.27 Economic Analysis -**

The consultants carried out the economic appraisal using the appraisal methodology and economic costs and benefits described in the preceding paragraphs of this report.

### **0.27.1 Base case**

Derivation of passenger time costs always remained controversial issue, especially in respect of developing nations as saving in leisure time is mostly not appreciated that constitute majority except for commercially developed urban centres. Economic analysis for the base case has therefore, been carried out without considering the benefits on account passenger time savings.

### **0.27.2 Sensitivity Analysis**

Two critical factors could affect the viability of the project and these are the Capital Cost and traffic level. The capital cost can increase or the expected traffic growth could not materialize or both factors could occur simultaneously sensitivity check using the following parameters has been carried out:

Sensitivity Option S1	Increase in base costs by 15%
Sensitivity Option S2	Decrease in base benefits by 15%
Sensitivity Option S3	Increase in base costs by 15% and decrease in base benefits by 15%

The EIRR and NPV (at 12%) for each link and section along with sensitivity analysis have been presented as follows:

**Table 0.23 - Summary of Sensitive Analysis**

Link ID	Length (km)	NPV (Million) @ 12%, Base Case	Economic Internal Rate of Return (%)			
			Base Case	Sensitivity S1	Sensitivity 2	Sensitivity S3
ESRR	14.000	2629	48.4%	38.3%	21.5%	18.4%

The project road is found to be economically viable with EIRR more than the resource cost of capital @ 12%.



Consultancy services for 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.

Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km))

### 0.27.3 Financial Analysis -

Based on the project structure, study of all possible sources of revenue, financial feasibility analysis has been carried out as per the methodology outlined in earlier sections. The objective of the financial analysis is to ascertain the existence of sustainable project returns, which shall successfully meet the expectations of its financial investors. The analysis reveals various FIRR values corresponding to each year of operation. FIRR for the Returns on Investment and Returns on Equity for the years from 2020 and 2035 (concession period 15 years including 2 years construction period) for the following alternatives with varying subsidy options are: -

**Alternative I :** With Nil Grant.

**Alternative I ;** With 40%. Grant

With the above mention options financial analysis has been carried out for 15 years concession period when grant is 40% of the Capital Cost. The results are given below in **Table 0.24** for concession period 15 years are as under.

**Table 0.24- Summary of Financial Analysis**

Scenario	Pre tax FIRR %	Returns on Equity%	Post tax FIRR%	DSCR
Alternative- I	1.55%	-1.59%	1.19%	0.22
Alternative- II	4.92%	2.60%	4.48%	0.38

### 0.27.4 Conclusion

As it is clear from the results of the both the alternatives that the project is financially not viable even with 40% Grant. This is because of high cost of Construction and very low toll able traffic. **Therefore it is strongly recommended to construct the road on EPC basis and not on BOT basis.**





Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

## **Centre Line Co-Ordinates**

**Table 0.25- Centre Line Co-ordinates**

Chainage (m)	Nothing	Easting		Chainage (m)	Northing	Easting
31300	347427.1	2655092		31340	347466.3	2655099
31320	347446.7	2655095		32340	348386.2	2655411
31360	347486	2655103		32360	348405	2655417
31380	347505.6	2655107		32380	348424.4	2655423
31400	347525.2	2655111		32400	348444	2655426
31420	347544.5	2655116		32420	348463.9	2655428
31440	347563.5	2655123		32440	348483.9	2655429
31460	347582.1	2655130		32460	348503.9	2655428
31480	347600.4	2655138		32480	348523.7	2655425
31500	347618.5	2655146		32500	348543.5	2655422
31520	347636.6	2655155		32520	348563.1	2655418
31540	347655.1	2655163		32540	348582.7	2655414
31560	347674.3	2655168		32560	348602.3	2655410
31580	347694.1	2655170		32580	348621.9	2655406
31600	347714.1	2655170		32600	348641.5	2655402
31620	347733.8	2655166		32620	348661.2	2655399
31640	347753.5	2655163		32640	348680.9	2655395
31660	347773.2	2655159		32660	348700.7	2655393
31680	347793.1	2655157		32680	348720.6	2655390
31700	347813.1	2655157		32700	348740.5	2655389
31720	347833	2655159		32720	348760.5	2655388
31740	347852.6	2655163		32740	348780.5	2655387
31760	347872	2655168		32760	348800.5	2655388
31780	347891.3	2655173		32780	348820.5	2655388
31800	347910.7	2655178		32800	348840.4	2655389
31820	347930.1	2655183		32820	348860.4	2655391
31840	347949.4	2655188		32840	348880.2	2655394
31860	347968.8	2655193		32860	348900	2655397
31880	347988.2	2655197		32880	348919.7	2655400
31900	348007.6	2655202		32900	348939.4	2655403
31920	348026.9	2655207		32920	348959.1	2655407
31940	348046.3	2655212		32940	348978.8	2655410
31960	348065.7	2655217		32960	348998.5	2655414
31980	348085.1	2655222		32980	349018.2	2655417



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

Chainage (m)	Nothing	Easting		Chainage (m)	Northing	Easting
32000	348104.4	2655227		33000	349037.9	2655421
32020	348123.8	2655232		33020	349057.6	2655424
32040	348142.9	2655238		33040	349077.4	2655427
32060	348161.3	2655246		33060	349097.1	2655431
32080	348178.9	2655256		33080	349116.8	2655434
32100	348195.5	2655267		33100	349136.5	2655438
32120	348211	2655279		33120	349156.2	2655441
32140	348226.2	2655292		33140	349175.9	2655444
32160	348241.4	2655305		33160	349195.6	2655448
32180	348256.5	2655318		33180	349215.3	2655451
32200	348271.7	2655331		33200	349235	2655454
32220	348286.8	2655345		33220	349254.8	2655457
32240	348302.1	2655357		33240	349274.6	2655460
32260	348317.6	2655370		33260	349294.4	2655463
32280	348333.7	2655382		33280	349314.2	2655466
32300	348350.4	2655393		33300	349334	2655469
32320	348368	2655402		34300	350274.6	2655316
33320	349353.8	2655472		34320	350290.7	2655328
33340	349373.6	2655475		34340	350306.4	2655340
33360	349393.4	2655477		34360	350321.7	2655353
33380	349413.2	2655480		34380	350337	2655366
33400	349433	2655483		34400	350352.3	2655379
33420	349452.8	2655486		34420	350367.6	2655392
33440	349472.6	2655488		34440	350383.1	2655404
33460	349492.6	2655490		34460	350399.1	2655416
33480	349512.5	2655491		34480	350415.7	2655427
33500	349532.5	2655490		34500	350432.7	2655438
33520	349552.5	2655489		34520	350450.3	2655447
33540	349572.4	2655487		34540	350468.3	2655456
33560	349592.1	2655484		34560	350486.8	2655464
33580	349611.6	2655479		34580	350505.6	2655471
33600	349631	2655474		34600	350524.7	2655476
33620	349650.4	2655469		34620	350544.1	2655481
33640	349669.7	2655464		34640	350563.7	2655485
33660	349689	2655459		34660	350583.5	2655488
33680	349708.3	2655454		34680	350603.4	2655490



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km))**

Chainage (m)	Nothing	Easting		Chainage (m)	Northing	Easting
33700	349727.6	2655449		34700	350623.4	2655491
33720	349746.9	2655443		34720	350643.3	2655491
33740	349766.1	2655438		34740	350663.3	2655490
33760	349785	2655431		34760	350683.3	2655490
33780	349803.7	2655424		34780	350703.3	2655489
33800	349821.9	2655416		34800	350723.3	2655488
33820	349839.7	2655407		34820	350743.3	2655488
33840	349857	2655397		34840	350763.3	2655488
33860	349874	2655386		34860	350783.2	2655490
33880	349890.8	2655375		34880	350803	2655492
33900	349907.6	2655364		34900	350822.7	2655496
33920	349924.4	2655353		34920	350842.2	2655500
33940	349941.2	2655343		34940	350861.4	2655506
33960	349957.9	2655332		34960	350880.4	2655512
33980	349974.8	2655321		34980	350899	2655520
34000	349991.8	2655310		35000	350917.2	2655528
34020	350009.3	2655301		35020	350934.9	2655537
34040	350027.2	2655292		35040	350952.2	2655547
34060	350045.8	2655284		35060	350969	2655558
34080	350064.9	2655278		35080	350985.2	2655570
34100	350084.4	2655274		35100	351000.7	2655582
34120	350104.1	2655271		35120	351015.8	2655596
34140	350124.1	2655270		35140	351030.6	2655609
34160	350144.1	2655270		35160	351045.4	2655623
34180	350164	2655272		35180	351060.2	2655636
34200	350183.7	2655276		35200	351074.9	2655650
34220	350203	2655281		35220	351089.7	2655663
34240	350221.9	2655287		35240	351104.4	2655677
34260	350240.2	2655295		35260	351119.2	2655690
34280	350257.7	2655305		36260	351967.1	2656206
35280	351133.9	2655704		36280	351985.4	2656214
35300	351148.7	2655717		36300	352003.8	2656222
35320	351163.4	2655731		36320	352022.1	2656230
35340	351178.2	2655744		36340	352040.4	2656238
35360	351193	2655758		36360	352058.8	2656246
35380	351207.9	2655771		36380	352077	2656254



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km))**

Chainage (m)	Nothing	Easting		Chainage (m)	Northing	Easting
35400	351223.1	2655784		36400	352095.2	2656263
35420	351238.6	2655796		36420	352113.3	2656271
35440	351254.4	2655809		36440	352131.3	2656280
35460	351270.4	2655821		36460	352149.1	2656289
35480	351286.5	2655833		36480	352166.8	2656298
35500	351302.7	2655844		36500	352184.4	2656308
35520	351318.8	2655856		36520	352201.9	2656318
35540	351334.9	2655868		36540	352219.2	2656328
35560	351351	2655880		36560	352236.4	2656338
35580	351367.2	2655892		36580	352253.5	2656348
35600	351383.3	2655903		36600	352270.5	2656359
35620	351399.4	2655915		36620	352287.4	2656370
35640	351415.6	2655927		36640	352304.4	2656380
35660	351431.7	2655939		36660	352321.3	2656391
35680	351447.9	2655951		36680	352338.3	2656401
35700	351464.2	2655962		36700	352355.2	2656412
35720	351480.8	2655973		36720	352372.2	2656423
35740	351497.5	2655984		36740	352389.1	2656433
35760	351514.4	2655995		36760	352406.1	2656444
35780	351531.5	2656006		36780	352423	2656454
35800	351548.7	2656016		36800	352440	2656465
35820	351566.2	2656025		36820	352457	2656476
35840	351583.7	2656035		36840	352473.9	2656486
35860	351601.5	2656044		36860	352490.9	2656497
35880	351619.4	2656053		36880	352507.8	2656507
35900	351637.4	2656062		36900	352524.8	2656518
35920	351655.6	2656070		36920	352541.7	2656529
35940	351673.9	2656078		36940	352558.7	2656539
35960	351692.2	2656086		36960	352575.6	2656550
35980	351710.5	2656094		36980	352592.6	2656560
36000	351728.8	2656102		37000	352609.6	2656571
36020	351747.2	2656110		37020	352626.5	2656582
36040	351765.5	2656118		37040	352643.5	2656592
36060	351783.8	2656126		37060	352660.4	2656603
36080	351802.2	2656134		37080	352677.4	2656613
36100	351820.5	2656142		37100	352694.7	2656623



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km))**

Chainage (m)	Nothing	Easting		Chainage (m)	Northing	Easting
36120	351838.8	2656150		37120	352712.9	2656632
36140	351857.1	2656158		37140	352732.1	2656637
36160	351875.5	2656166		37160	352751.7	2656641
36180	351893.8	2656174		37180	352771.6	2656643
36200	351912.1	2656182		37200	352791.5	2656646
36220	351930.5	2656190		37220	352811.4	2656648
36240	351948.8	2656198		38220	353333.1	2657362
37240	352831.3	2656650		38240	353344.8	2657378
37260	352851.1	2656652		38260	353357.3	2657393
37280	352871	2656654		38280	353370.6	2657408
37300	352890.9	2656656		38300	353384.6	2657423
37320	352910.8	2656659		38320	353399.4	2657436
37340	352930.5	2656662		38340	353414.7	2657449
37360	352950.2	2656665		38360	353430.5	2657461
37380	352969.6	2656670		38380	353446.5	2657473
37400	352988.7	2656676		38400	353462.5	2657485
37420	353007.5	2656683		38420	353478.6	2657497
37440	353025.9	2656691		38440	353494.6	2657509
37460	353044	2656699		38460	353510.7	2657521
37480	353061.6	2656709		38480	353526.7	2657533
37500	353078.7	2656719		38500	353542.7	2657545
37520	353095.2	2656730		38520	353558.8	2657557
37540	353111.2	2656742		38540	353574.8	2657569
37560	353126.5	2656755		38560	353590.8	2657581
37580	353141.2	2656769		38580	353606.9	2657593
37600	353155.2	2656783		38600	353622.7	2657605
37620	353168.5	2656798		38620	353638.4	2657617
37640	353181	2656814		38640	353653.7	2657630
37660	353192.7	2656830		38660	353668.6	2657644
37680	353203.5	2656847		38680	353683	2657657
37700	353213.6	2656864		38700	353697	2657672
37720	353222.7	2656882		38720	353710.5	2657686
37740	353231	2656900		38740	353723.4	2657702
37760	353238.3	2656919		38760	353735.9	2657717
37780	353244.7	2656938		38780	353747.8	2657733
37800	353250.1	2656957		38800	353759.2	2657750



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

Chainage (m)	Nothing	Easting		Chainage (m)	Northing	Easting
37820	353254.5	2656976		38820	353770	2657767
37840	353258	2656996		38840	353780.3	2657784
37860	353260.5	2657016		38860	353790	2657801
37880	353262	2657036		38880	353799.1	2657819
37900	353262.6	2657056		38900	353807.7	2657837
37920	353262.7	2657076		38920	353816	2657855
37940	353262.7	2657096		38940	353824	2657874
37960	353262.6	2657116		38960	353831.9	2657892
37980	353262.7	2657136		38980	353839.9	2657910
38000	353263.4	2657156		39000	353847.8	2657929
38020	353264.9	2657176		39020	353855.8	2657947
38040	353267.4	2657196		39040	353863.8	2657965
38060	353270.9	2657215		39060	353871.7	2657984
38080	353275.4	2657235		39080	353879.7	2658002
38100	353280.9	2657254		39100	353887.6	2658020
38120	353287.3	2657273		39120	353895.6	2658039
38140	353294.7	2657292		39140	353903.5	2658057
38160	353303	2657310		39160	353911.5	2658076
38180	353312.1	2657327		39180	353919.4	2658094
38200	353322.2	2657345		40180	354364.8	2658983
39200	353927.4	2658112		40200	354379.1	2658997
39220	353935.4	2658131		40220	354393.7	2659011
39240	353943.3	2658149		40240	354408.6	2659024
39260	353951.3	2658167		40260	354423.9	2659037
39280	353959.2	2658186		40280	354439.5	2659050
39300	353967.2	2658204		40300	354455.3	2659062
39320	353975.1	2658222		40320	354471.5	2659074
39340	353983.1	2658241		40340	354488	2659085
39360	353991	2658259		40360	354504.8	2659096
39380	353999	2658277		40380	354521.8	2659106
39400	354007	2658296		40400	354539.1	2659116
39420	354014.9	2658314		40420	354556.6	2659126
39440	354022.9	2658332		40440	354574.2	2659136
39460	354030.8	2658351		40460	354591.9	2659145
39480	354038.8	2658369		40480	354609.5	2659154
39500	354046.7	2658387		40500	354627.2	2659164



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km))**

Chainage (m)	Nothing	Easting		Chainage (m)	Northing	Easting
39520	354054.7	2658406		40520	354644.9	2659173
39540	354062.6	2658424		40540	354662.6	2659182
39560	354070.6	2658443		40560	354680.2	2659192
39580	354078.5	2658461		40580	354697.9	2659201
39600	354086.5	2658479		40600	354715.6	2659210
39620	354094.5	2658498		40620	354733.3	2659220
39640	354102.4	2658516		40640	354750.9	2659229
39660	354110.4	2658534		40660	354768.6	2659239
39680	354118.3	2658553		40680	354786.3	2659248
39700	354126.3	2658571		40700	354804	2659257
39720	354134.2	2658589		40720	354821.6	2659267
39740	354142.2	2658608		40740	354839.3	2659276
39760	354150.1	2658626		40760	354857	2659285
39780	354158.1	2658644		40780	354874.5	2659295
39800	354166.1	2658663		40800	354892	2659305
39820	354174	2658681		40820	354909.1	2659315
39840	354182	2658699		40840	354926	2659326
39860	354189.9	2658718		40860	354942.5	2659337
39880	354197.9	2658736		40880	354958.8	2659349
39900	354206.2	2658754		40900	354974.6	2659361
39920	354214.8	2658772		40920	354990.2	2659373
39940	354223.8	2658790		40940	355005.3	2659387
39960	354233.3	2658808		40960	355020.1	2659400
39980	354243.2	2658825		40980	355034.5	2659414
40000	354253.5	2658842		41000	355048.5	2659428
40020	354264.3	2658859		41020	355062.1	2659443
40040	354275.5	2658876		41040	355075.2	2659458
40060	354287	2658892		41060	355088	2659473
40080	354299	2658908		41080	355100.2	2659489
40100	354311.4	2658924		41100	355112	2659505
40120	354324.2	2658939		41120	355123.4	2659522
40140	354337.4	2658954		41140	355134.3	2659539
40160	354350.9	2658969		42140	355770.3	2660189
41160	355144.7	2659556		42160	355790.1	2660187
41180	355154.6	2659573		42180	355809.9	2660184
41200	355163.9	2659591		42200	355829.7	2660181





**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

Chainage (m)	Nothing	Easting		Chainage (m)	Northing	Easting
41220	355172.8	2659609		42220	355849.6	2660179
41240	355181.3	2659627		42240	355869.4	2660176
41260	355189.5	2659645		42260	355889.2	2660173
41280	355197.5	2659663		42280	355909	2660170
41300	355205.5	2659682		42300	355928.8	2660168
41320	355213.6	2659700		42320	355948.6	2660165
41340	355221.6	2659718		42340	355968.4	2660162
41360	355229.6	2659737		42360	355988.2	2660159
41380	355237.6	2659755		42380	356008.1	2660157
41400	355245.7	2659773		42400	356027.9	2660154
41420	355253.7	2659791		42420	356047.7	2660151
41440	355261.7	2659810		42440	356067.5	2660148
41460	355269.7	2659828		42460	356087.3	2660146
41480	355277.7	2659846		42480	356107.1	2660143
41500	355285.8	2659865		42500	356126.9	2660140
41520	355293.8	2659883		42520	356146.7	2660138
41540	355301.8	2659901		42540	356166.6	2660135
41560	355309.8	2659920		42560	356186.4	2660132
41580	355318	2659938		42580	356206.2	2660129
41600	355326.5	2659956		42600	356226	2660127
41620	355335.4	2659974		42620	356245.8	2660124
41640	355345	2659992		42640	356265.6	2660121
41660	355355.3	2660009		42660	356285.4	2660118
41680	355366.4	2660025		42680	356305.2	2660116
41700	355378.3	2660041		42700	356325	2660113
41720	355391	2660057		42720	356344.9	2660110
41740	355404.5	2660072		42740	356364.7	2660107
41760	355418.7	2660086		42760	356384.5	2660105
41780	355433.5	2660099		42780	356404.3	2660102
41800	355449	2660112		42800	356424.1	2660099
41820	355465.2	2660123		42820	356443.9	2660096
41840	355481.9	2660134		42840	356463.7	2660094
41860	355499.1	2660145		42860	356483.5	2660091
41880	355516.8	2660154		42880	356503.4	2660088
41900	355535	2660162		42900	356523.2	2660086
41920	355553.6	2660170		42920	356543	2660083



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

Chainage (m)	Nothing	Easting		Chainage (m)	Northing	Easting
41940	355572.5	2660176		42940	356562.8	2660080
41960	355591.7	2660182		42960	356582.6	2660077
41980	355611.1	2660186		42980	356602.4	2660075
42000	355630.8	2660190		43000	356622.2	2660072
42020	355650.6	2660193		43020	356642	2660069
42040	355670.6	2660194		43040	356661.9	2660066
42060	355690.5	2660195		43060	356681.7	2660064
42080	355710.5	2660195		43080	356701.6	2660062
42100	355730.5	2660193		43100	356721.5	2660060
42120	355750.4	2660192		44100	357720.9	2660080
43120	356741.4	2660058		44120	357740.9	2660081
43140	356761.4	2660057		44140	357760.9	2660081
43160	356781.3	2660056		44160	357780.9	2660082
43180	356801.3	2660055		44180	357800.9	2660083
43200	356821.3	2660054		44200	357820.8	2660084
43220	356841.3	2660054		44220	357840.8	2660086
43240	356861.3	2660054		44240	357860.6	2660088
43260	356881.3	2660054		44260	357880.5	2660091
43280	356901.3	2660055		44280	357900.3	2660093
43300	356921.3	2660055		44300	357920	2660097
43320	356941.3	2660056		44320	357939.7	2660100
43340	356961.3	2660056		44340	357959.3	2660104
43360	356981.3	2660057		44360	357978.8	2660109
43380	357001.3	2660058		44380	357998.2	2660114
43400	357021.3	2660058		44400	358017.5	2660119
43420	357041.2	2660059		44420	358036.7	2660124
43440	357061.2	2660060		44440	358055.9	2660130
43460	357081.2	2660060		44460	358075	2660136
43480	357101.2	2660061		44480	358094.2	2660141
43500	357121.2	2660061		44500	358113.4	2660147
43520	357141.2	2660062		44520	358132.5	2660153
43540	357161.2	2660063		44540	358151.7	2660159
43560	357181.2	2660063		44560	358170.9	2660164
43580	357201.2	2660064		44580	358190	2660170
43600	357221.2	2660065		44600	358209.2	2660176
43620	357241.1	2660065		44620	358228.4	2660182



**Detailed Project Report::****Chapter 00 :: Executive Summary**

Consultancy services for 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.

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km))**

Chainage (m)	Nothing	Easting		Chainage (m)	Northing	Easting
43640	357261.1	2660066		44640	358247.5	2660187
43660	357281.1	2660066		44660	358266.6	2660193
43680	357301.1	2660067		44680	358285.5	2660200
43700	357321.1	2660068		44700	358304.3	2660207
43720	357341.1	2660068		44720	358323	2660214
43740	357361.1	2660069		44740	358341.5	2660221
43760	357381.1	2660070		44760	358359.9	2660229
43780	357401.1	2660070		44780	358378.1	2660237
43800	357421.1	2660071		44800	358396.1	2660246
43820	357441.1	2660071		44820	358414	2660255
43840	357461	2660072		44840	358431.7	2660264
43860	357481	2660073		44860	358449.2	2660274
43880	357501	2660073		44880	358466.5	2660284
43900	357521	2660074		44900	358483.6	2660295
43920	357541	2660075		44920	358500.5	2660305
43940	357561	2660075		44940	358517.4	2660316
43960	357581	2660076		44960	358534.3	2660327
43980	357601	2660076		44980	358551.2	2660337
44000	357621	2660077		45000	358568.1	2660348
44020	357641	2660078		45020	358585	2660359
44040	357660.9	2660078		45040	358601.9	2660369
44060	357680.9	2660079		45060	358618.8	2660380
44080	357700.9	2660080				
45080	358635.7	2660391				
45100	358652.6	2660401				
45120	358669.5	2660412				
45140	358686.4	2660423				
45160	358703.3	2660433				
45180	358720.2	2660444				
45200	358737.1	2660455				
45220	358754	2660466				
45240	358770.9	2660476				
45260	358787.8	2660487				
45280	358804.7	2660498				
45300	358821.6	2660508				
45320	358838.6	2660519				



**Detailed Project Report::**

**Chapter 00 :: Executive Summary**

Consultancy services for 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.**

**Package I : Agartala – Khowai Section :: Section III (design km 31.300 to km 45.300 (length = 14.000 km)**

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