Chapter-1: Executive Summary

The Government of India has taken initiatives in construction, up-gradation and development of its road network along the international borders with different countries. In this context, The **National Highways and Infrastructure Development Corporation Limited (NHIDCL)** have been constituted by the Government of India in the year 2014 with the purpose of up-gradation and development of National Highways and Strategic Roads including interconnecting roads in parts of the country which share international boundaries with neighboring countries.

NHIDCL is a fully owned company of the **Ministry of Road Transport & Highways**, **Government of India**. The company promotes surveys, designs, builds, operates, maintains and upgrades the National Highways.

NHIDCL also proposes to improve **road connectivity** and efficiency of the **international trade corridor**, by expanding about 500 KMs of roads in the **North Bengal** and **Northeastern region** of **India** to enable efficient and safe transport regionally with other **South Asia Sub-regional economic Cooperation (SASEC) member countries**.

Keeping in view the growing importance of road network of the country is physical, social and economic and environment fabric, the **National Highways and Infrastructure Development Corporation Limited** with active support of **Ministry of Road Transport & Highways, Government of India** initiated a comprehensive Detailed Project Study for the 86 Km section of NH-44A. ***M/s Lion Engineering Consultants, Bhopal*** has been entrusted for providing Consultancy Services for Feasibility Study and Detailed Project Report for Two Laning with Paved Shoulder of **Manu – Simlung Section of NH-44A** in the State of **Tripura** on EPC mode, vide Letter to Proceed NHIDCL/DPR/Tripura/Manu-Simlung/NH-44A dated 23.12.2015. The commencement date for the project is 28.12.2015 and the period for completion of assignment is 09 Months. The description of the road given in **Table No. 1.1**:

Table 1.1 Details of Road Section In Tripura State.

Sr. No.	Name of Road	SH No.	Total length
1	Manu – Simlung Section	NH-44A	Km 85+860

For easy and fast development and existing site. Condition project road is divided in 4 packages listed below in Table no. 1.2

Table 1.2 Details of Road Section In Tripura State.

Package No.	Name of Road	District	Length as per agreement (KM)	Length as per Design(KM)
1	**Manu- Chalengeta- Lalcherra Section of NH-44A**	**Dhalai**	**86.00 Km**	**16.290**
2	**Lalcherra – Chandipur - Kanchanpur Section of NH-44A**	**Dhalai/North Tripura**		**30.307**
3	**Kanchanpur- Vaghmun Section of NH-44A**	**North Tripura**		**20.248**
4	**Vaghmun – Simlung Section of NH-44A**	**North Tripura**		**19.015**
Total Length (in Kms)			**86.00**	**85.860**

This report deals with the first Package i.e. **Kanchanpur- Vaghmun Section** which needs to be upgraded to Two Lane with paved Shoulders and the details of this road is given in **Table No. 1.3**.

Table 1.3 Details of Project Road

Sr. No.	Name of Road	SH No.	Chainage (in Km)		Length as per Topographic Survey (in Km)	Length as per Design (in Km)
			From (in Km)	To (in Km)		
1	**Kanchanpur – Vaghmun Section**	**NH-44A**	**Km 87+000**	**Km 110+119**	**23.119**	**20.248**

1.1. Project Road

Project road is located in Tripura State Tripura is a landlocked state in North East India, where the seven contiguous states – Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura – are collectively known as the Seven Sister States. Spread over 10,491.69 km2 (4,050.86 sq mi), Tripura is the third-smallest among the 29 states in the country, behind Goa and Sikkim. It extends from 22°56'N to 24°32'N, and 91°09'E to 92°20'E. Its maximum extent measures about 184 km (114 mi) from north to south, and 113 km (70 mi) east to west. Tripura is bordered by the country of Bangladesh to the west, north and south; and the Indian states of Assam to the north east; and Mizoram to the east. It is accessible by national highways passing through the Karimganj district of Assam and Mamit district of Mizoram.

The project road starts from Km. 87.000 of NH-44A in Kanchanpur Village, Tripura and terminates on Km. 110.119 near Talakshi village.

The project road traverses through North Tripura District in Tripura. Total length of the project road section is running between Latitudes of 24.039469° N; Longitudes of 92.202608° E and Latitudes of 23.947594° N; Longitudes of 92.313738° E.

The location plan of the project road section is illustrated in **Figure 1.1.**

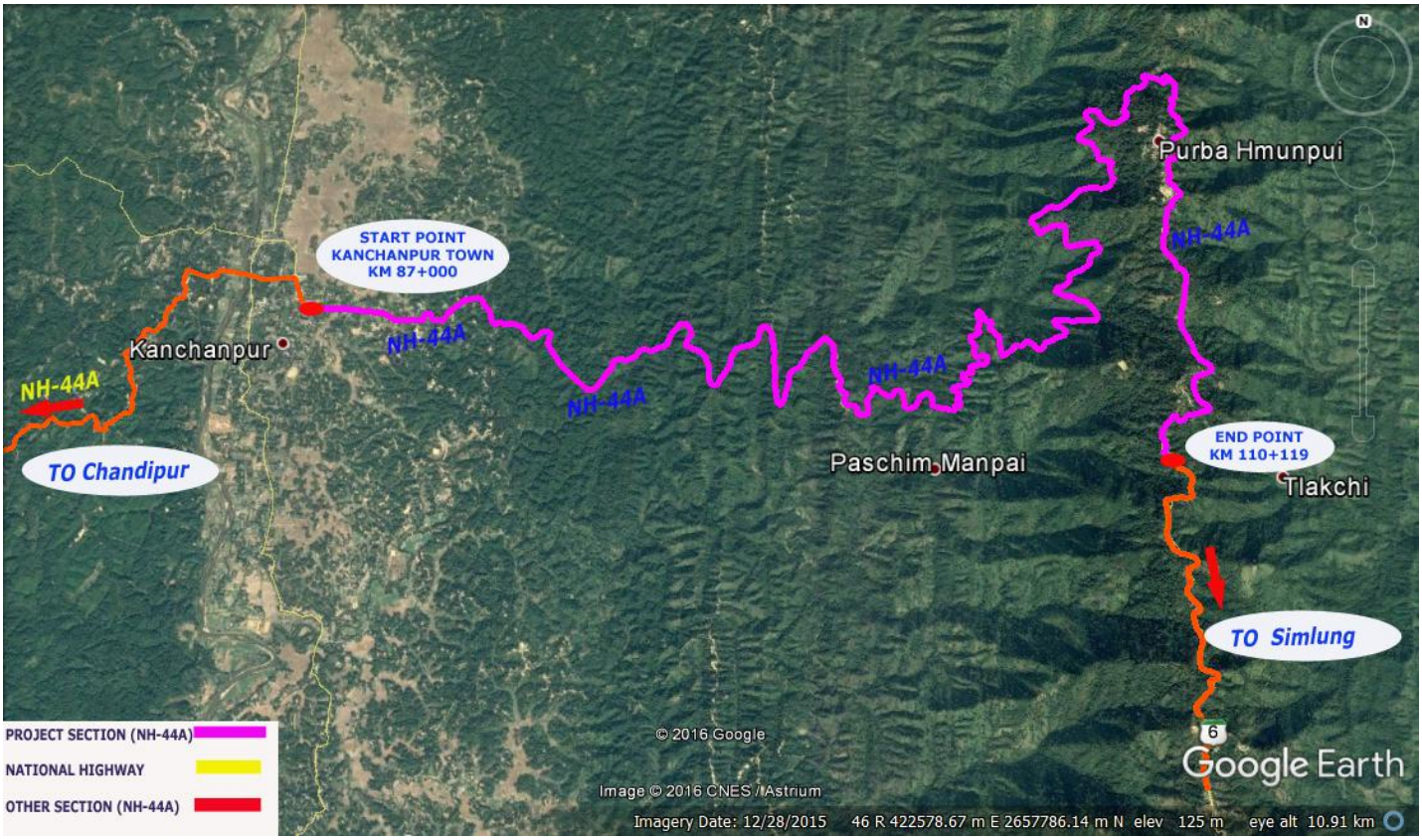


Figure 1.1: Location Plan

Summary of the existing features of the project are shown in **Table 1.4.**

Table 1.4: Summary of the existing features of the project road

SL. No.	Particulars	Existing Details	Remarks
1	Start Point	The project road starts from Km. 87.000 of NH-44A in Kanchanpur Village.	
2	End Point	Terminates on Km. 110+119 near Talakshi village.	
3	Total Length	23.119 Km	Design Length is 20.248 Km.
4	Districts	1 No.	North Tripura
5	Terrain	Plain, Rolling & Hilly Terrain	
6	Right of Way(m)	5.50 m to 19 m	

SL. No.	Particulars	Existing Details	Remarks
7	Carriage way	3.00 – 7.00 m Carriageway with 1.0-1.5m earthen shoulder throughout the project road section	
8	Major/Minor Bridge	0 Nos. (00 Major & 00 Minor)	
9	FCW	1 No.	
10	Pipe Culverts	28 Nos.	
11	R.C.C. Slab	8 Nos.	
12	Arch Culvert	0 No.	
13	Minor Junctions	10 Nos.	
14	Major Junction	00 Nos.	
15	Villages/Towns	03 Nos.	
16	Existing Drainage System	NIL	
17	Miscellaneous Services	**Fuel Stations:** No Fuel stations were observed on the road section. **Telephone Facilities:** Telephone facility is available in all villages on the road. **Police Station:** No Police stations were observed on the road section.	

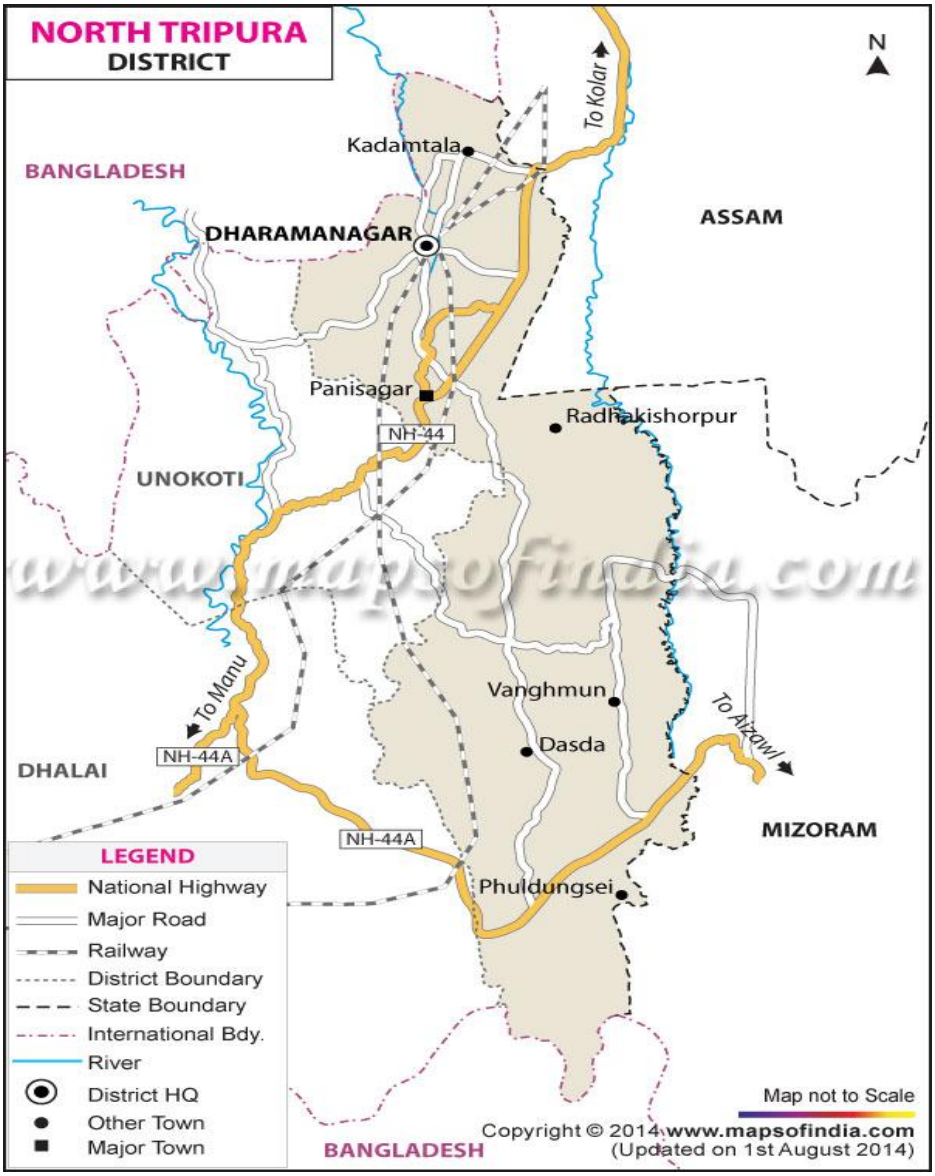
1.2. SOCIO-ECONOMIC PROFILE

Project Description

Socio Economic Profile chapter illustrates a brief of the socio – economic profile of the project influenced area (PIA) for NH-44A having a length of 32.961 Kms. The road primarily connects districts viz, Dhalai and North Tripura. This highway segment serves as the artery, provides connectivity to existing National Highway-44 & Proposed National Highway-44A in Tripura State. Also it provides interstate connectivity between Tripura & Mizoram.

Demographic Profile

DISTRICT NORTH TRIPURA



History:

Tripura a hilly, picturesque, princely state was first conquered by the Britishers in 1761. However, no political agent was appointed till 1871 and the Maharaja ruled hill territory "Hill Tipperah" almost independently. The State acceded to the Indian union on 13.08.1947, the agreement of merger being signed on 09.09.1949. The administration was formally taken over on 15.10.1949.Tripura, initially a one district state, was trifurcated into three Districts w.e.f. 01.09.1970. The North Tripura District started functioning in the office of the Sub-divisional officer at Kailashahar and partly at Kumarghat, later the whole office was shifted to Kailashahar. The Collectorate was shifted to the newly constructed complex at Gournagar on 13.11.1987, subsequently North Tripura District has been bifurcated and a new District namely "DHALAI DISTRICT" has been inaugurated on 14.04.1995 with district head quarter at Ambassa. On 21.01.2012 the decision to further bifurcate North

Tripura District was accepted and the district "UNAKOTI DISTRICT" has been created with its headquarter at Kailashahar & North Tripura district headquarter shifted to Dharmanagar.

Geography:

It is Located at Latitude-24.3, Longitude-92.0. North Tripura District is sharing border with Karimganj District to the North, Mamit District to the East, Dhalai District to the South. It is sharing Border with Assam State to the North, Mizoram State to the South. North Tripura District occupies an area of approximately 2821 square kilometres. It's in the 60 meters to 43 meters elevation range. This District belongs to Eastern India.

Demographics:

According to the 2011 census North Tripura district has a population of 693,281, roughly equal to the nation of Bhutan or the US state of North Dakota. This gives it a ranking of 503rd in India (out of a total of640). The district has a population density of 341 inhabitants per square kilometre (880/sq mi). Its population growth rate over the decade 2001-2011was 17.32%. North Tripura has a sex ratio of 967 females for every 1000 males, and a literacy rate of 88.29%.

Sino-Tibetan languages spoken in North Tripura district include:

- Garo language
- Darlong language
- Ralte language

1.3. TRAFFIC SURVEYS AND ANALYSIS

To comprehensively appreciate the traffic and travel characteristics on the project corridor from Manu – Simlung via Kanchanpur. The type of surveys, locations and duration, as identified at the inception stage of the study have been followed during data collection exercise with minor modifications on account of the project corridor.

The traffic characteristics on the project road for the base year are essential for formulating improvement programs. The objectives of the traffic study are:

- Traffic estimation in terms of volume on various sections.
- Growth factor estimation for traffic forecasting.
- Capacity assessment based on traffic forecasting for next 30 years.
- Pavement and intersection design

Average Annual Daily Traffic and it Composition

The Average Annual Daily Traffic (AADT) obtained from the volume count surveys for all the locations are given in **Table no. 1.5.** To study the variation in the intensity of traffic, consultants have analyzed the variation of traffic along the project road. The following observations are made from the analysis for each location along the project stretch.

Table 1.5 : Annual Average Daily Traffic (AADT)
(24.07.2016 to 30.07.2016)

Categories	PCU Factor	Km. 0+200 at Manu town Location-1		Km. 87+080 after Kanchanpur town Location-2		Average of all locations	
		Vehicles	PCUs	Vehicles	PCUs	Vehicles	PCUs
Car/Jeep/Van	1.0	751	751	540	540	646	646
3 Wheeler	1.0	973	973	797	797	885	885
Mini Bus	1.5	8	12	7	11	8	12
Standard Bus	3.0	5	15	1	3	3	9
LCV / Tempo	1.5	400	600	22	333	311	467
2-Axle	3.0	67	201	26	78	47	141
3-Axle	3.0	30	90	2	6	16	48
MAV (4-6)	4.5	0	0	0	0	0	0
Two Wheeler	0.5	1484	742	1426	713	1455	728
Animal Cart	6.0	0	0	0	0	0	0
Cycle	0.5	764	382	605	303	685	343
Tractor with trolly	4.5	0	0	0	0	0	0
Tractor	1.5	0	0	0	0	0	0
Hand Cart	6.0	20	60	10	30	15	45
Total Traffic		4502	3826	3636	2814	4071	3324

Traffic growth rate during the design life in percentage

It is learnt that the National Highways and Infrastructure Development Corporation Limited (NHIDCL) did not carried out traffic volume count on the project road. Therefore, no previous data has been provided to Consultant.

IRC:37-2018 stated" If the data for the annual growth rate of commercial vehicles is not available or if it is less than 5 per cent, a growth rate of 5 per cent should be used".

Hence traffic growth rate is adopted 5% for projection of present traffic.

Vehicle Damage Factor

As per IRC: 37-2018 clause 4.4.6 stated" where the sufficient information on axle loads is not available the default values of vehicles of vehicle damage factor as given in table 4.2 may be used".

As per table 4.2 for CVPD more than1500 adopted VDF should be 2.5 for Hilly terrain.
Hence, The Adopted VDF is 2.5.

Cumulative Mean Standard Axles (CMSA)

Summary of CMSA (Design traffic)		
Year	**Section-1**	**Design year**
2016 to 2020	Construction Period & Project Clearance	
2021	**0.73**	1
2022	**1.50**	2
2023	**2.30**	3
2024	**3.15**	4
2025	**4.04**	5
2026	**4.97**	6
2027	**5.95**	7
2028	**6.98**	8
2029	**8.06**	9
2030	**9.20**	10
2031	**10.39**	**11**
2032	11.64	12
2033	**12.95**	13
2034	**14.33**	14
2035	**15.78**	15
2036	**17.30**	16
2037	**18.90**	17
2038	**20.57**	18
2039	**22.33**	19
2040	**24.18**	20
2041	**26.12**	21
2042	**28.16**	22
2043	**30.30**	**23**
2044	**32.55**	**24**
2045	**34.91**	**25**

As per IRC SP:37-2018, Adopted MSA is 30.

1.4. PAVEMENT DESIGN

As per plate No.-20 of IRC-37:2018 the Pavement Design is:-

Design crust thickness for the flexible pavement as arrived is given below in **table 1.6**

Table 1.6

Homogenous Section (Km)			CBR (%)	MSA	Adopted Pavement Composition In Widening Position (mm)			
From	**To**	**Length (in Km)**		**Adopted**	**BC**	**DBM**	**BSM**	**CTSB**
0+000	20+247	20.247	10	30	40	60	100	200

CBR Results

As Per test results the average CBR is >10%. So, the value of adopted CBR is 10%.

1.5. IMPROVEMENT PROPOSAL

Development to 2 Lane with paved shoulder option is planned for the development of project road.

TCS Schedules: Tentative TCS schedules based on horizontal alignment plan

S.no	Ex. Ch.		Design Ch.		Design Length (km)	TCS as per IRC SP :73-2018
	From	To	From	To		
1	87.000	87.930	46.597	47.520	0.923	2.1
2	87.930	88.620	47.520	48.120	0.600	2. 9
3	88.620	89.760	48.120	49.220	1.100	2.8
4	89.760	90.870	49.220	50.320	1.100	2. 9
5	90.870	91.000	50.320	50.420	0.100	2.11(New)
6	91.000	92.920	50.420	52.320	1.900	2. 9
7	92.920	93.020	52.320	52.420	0.100	2.8
8	93.020	94.890	52.420	54.300	1.880	2. 9
9	94.890	95.420	54.300	54.720	0.420	2.11a(New)
10	95.420	95.720	54.720	55.020	0.300	2.9a(New)
11	95.720	95.920	55.020	55.120	0.100	2.11a(New)
12	95.920	96.010	55.120	55.220	0.100	2.9a(New)
13	96.010	96.200	55.220	55.320	0.100	2.11b(New)
14	96.200	96.380	55.320	55.520	0.200	2.9a(New)
15	96.380	96.660	55.520	55.670	0.150	2.11a(New)
16	96.660	96.900	55.670	55.920	0.250	2.9a(New)
17	96.900	98.550	55.920	57.020	1.100	2.11a(New)
18	98.550	98.850	57.020	57.320	0.300	2.9a(New)
19	98.850	99.220	57.320	57.620	0.300	2.11a(New)
20	99.220	99.300	57.620	57.720	0.100	2.9a(New)
21	99.220	99.550	57.720	57.970	0.250	2.11a(New)
22	99.300	99.650	57.970	58.070	0.100	2.9a(New)
23	99.550	99.770	58.070	58.120	0.050	2.11a(New)
24	99.650	99.870	58.120	58.220	0.100	2.9a(New)
25	99.770	100.050	58.220	58.420	0.200	2.11a(New)
26	99.870	100.370	58.420	58.720	0.300	2.9a(New)
27	100.050	101.100	58.720	59.270	0.550	2.11a(New)
28	100.370	101.650	59.270	59.820	0.550	2.9a(New)
29	101.100	102.220	59.820	60.270	0.450	2.11a(New)
30	102.220	102.420	60.270	60.470	0.200	2.9a(New)
31	102.420	102.720	60.470	60.720	0.250	2.11a(New)
32	102.720	102.880	60.720	60.870	0.150	2.9a(New)
33	102.880	103.010	60.870	61.020	0.150	2.11a(New)
34	103.010	103.350	61.020	61.320	0.300	2.9a(New)
35	103.350	103.520	61.320	61.420	0.100	2.11a(New)
36	103.520	104.200	61.420	62.070	0.650	2.9a(New)

37	104.200	105.510	62.070	62.970	0.900	2.11a(New)
38	105.510	105.600	62.970	63.070	0.100	2.9a(New)
39	105.600	105.900	63.070	63.270	0.200	2.11a(New)
40	105.900	106.090	63.270	63.470	0.200	2. 9
41	106.090	106.250	63.470	63.570	0.100	2.11a(New)
42	106.250	106.380	63.570	63.670	0.100	2. 9
43	106.380	106.900	63.670	64.070	0.400	2.11a(New)
44	106.900	107.300	64.070	64.470	0.400	2. 9
45	107.300	107.700	64.470	64.820	0.350	2.11a(New)
46	107.700	108.100	64.820	65.220	0.400	2. 9
47	108.100	108.300	65.220	65.420	0.200	2.11a(New)
48	108.300	108.480	65.420	65.570	0.150	2. 9
49	108.480	108.730	65.570	65.720	0.150	2.11a(New)
50	108.730	109.020	65.720	66.020	0.300	2. 9
51	109.020	109.750	66.020	66.470	0.450	2.11a(New)
52	109.750	110.119	66.470	66.845	0.375	2. 9
Total Design Length					**20.248**	

MAJOR & MINOR BRIDGES

Provision has been made for the following structures in the estimate.

S. No.	Type	Major Bridge	Minor Bridge	Total
1	Reconstruction	-	-	-
2	Retain & Repair	-	-	-
3	Retain	-	-	-
4	Under Construction	-	-	-
	Total	-	-	-

HPC & SLAB CULVERTS

A summary of all the types of culverts proposed are:-

S. No.	Type	Retain With Repair	Widening	Reconstruction	New construction	Total
1	Pipe	-	-	-	-	-
2	Slab	-	-	-	-	-
3	BOX	-	-	30	41	71
Total		**-**	**-**	**30**	**41**	**71**

Drainage and Protection works

Lined drains are proposed to be constructed in urban areas .

Major & Minor Junctions

Detailed Estimates has been prepared for major and minor junctions as per site requirement.

Traffic Safety features, Road Furniture and road markings

Detailed Estimates has been prepared for traffic safety features, road furniture and road markings as per site requirement.

1.6. PROJECT FACILITIES

Bus Shelter

Considering the overall safety of traffic and minimum hindrance to through traffic, 03 nos. pick-up bus shelters have been proposed both side along the project road.

Sr. No.	Design Chainage	Side	Location
1	48.450	LHS	Kanchanpur
2	64.050	RHS	Manpui
3	66.450	RHS	Talakshi

Service Roads

In keeping the view of low traffic and least habitation in the enrouted villages; there is no requirement of service road in the towns/villages.

Toll Plaza

No toll plaza is proposed on road section.

Landscaping

The landscaping and tree plantation along the project road shall be done as per IRC: SP: 21 -2009. In the topographic survey it is seen that their are Many trees are lying within the ROW along the alignment of project road. These trees are proposed to be cut as per actual requirement at site in a phased manner. It is proposed to have a new plantation at 10m c/c on both side side of project corridor.

1.7. Cost Estimates

The cost estimates have been prepared for reconstruction/widening of the existing two lane carriageway including strengthening of the existing pavement, strengthening / widening of existing bridge structures, construction of new bridges, rehabilitation and reconstruction/ widening of cross drainage structures, longitudinal drains, junction improvements, road furniture, street lighting, bus shelters etc.

The rates for the items of work have been assessed from SOR, PWD-NH tripura -2017 and escalation of 5% per year is adopted.

Proposed typical cross section for project highway is given in table 1.7 & table 1.8 below:

Table No. 1.7: Type of Typical Cross Section

Sr. No.	TCS-No	Description of Typical Cross Section
1	TCS-2.1	Reconstruction in Two-Lane Carriageway with Paved Shoulder in Open Country (Plain/Rolling Terrain)
2	TCS-2.9	Reconstruction in Two Lane Road with Paved shoulders in Hilly Terrain with Hill side drain
3	TCS-2.9a (New)	Reconstruction in Two Lane Road with Paved shoulders in Hilly Terrain with Hill side drain and breast wall
4	TCS-2.11a(New)	Reconstruction in Two Lane Road with Paved shoulders in Hilly Terrain with Hill side drain and breast wall
5	TCS-2.11b(New)	Reconstruction in Two Lane Road with Paved shoulders in Hilly Terrain with Hill side drain and breast wall both side
6	TCS-2.11(New)	Reconstruction in Two Lane Road with Paved shoulders in Hilly Terrain with Hill side drain both side
7	TCS-2.8	Reconstruction in Two Lane Road with Paved shoulders in Hilly Terrain with Hill side drain and Retaining wall

Table No. 1.8: Type of Typical Cross Section

Sr. No.	Description	Design Length (Km.)	Proposed TCS Type
		HS-I (Km)	
1	Reconstruction in Two-Lane Carriageway with Paved Shoulder in Open Country (Plain/Rolling Terrain)	0.923	TCS-2.1
2	Two-Lane with with paved shoulder in Hilly Terrain with Hill side Drain on Both sides and breast wall on one side in open Country area (Box cut)	6.820	TCS-2.11a(New)
3	Two-Lane with with paved shoulder in Hilly Terrain with Hill side Drain and breast wall on both sides in open Country area (Box cut)	0.100	TCS-2.11b(New)
4	Two-Lane with with paved shoulder in Hilly Terrain with Hill side Drain on Both sides in open Country area (Box cut)	0.100	TCS-2.11(New)
5	Two Lane Road with Paved shoulders in Hilly Terrain with Trapezoidal drain on hill side and retaining wall on valley side	1.200	TCS-2.8
6	Two Lane Road with Paved shoulders in Hilly Terrain with Hill side drain	7.405	TCS-2.9
7	Two Lane Road with Paved shoulders in Hilly Terrain with Hill side drain and breast wall	3.700	TCS-2.9a(New)
	Total	**20.248 km**	

The summary of cost estimate is presented in table 1.9 below:

Table No. 1.9: Cost Estimate Abstract

Kanchanpur - Vaghmun Section of NH - 44A

General Abstract of Cost

Total Length 20.248 Kms

	Item	Total (Rs.)	Total in Crores
A	***CIVIL WORK FOR RECONSTRUCTION OF PROJECT ROAD***		
1	*SITE CLEARANCE & DISMANTLING*	2,982,778	0.30
2	*EARTHWORK*	235,036,651	23.50
3	*SUB BASE*	171,171,222	17.12
4	*BITUMINOUS COURSES*	649,638,362	64.96
	SUB TOTAL (A)	**1058829013**	**105.88**
B	***CROSS DRAINAGE STRUCTURES***		
5	*RECOSNTRUCTION OF Culverts*	459,978,476	46.00
	SUB TOTAL OF CROSS DRAINAGE STRUCTURES (B)	**459978476**	**46.00**
C	***OTHER ITEMS***		
6	*TRAFFIC SIGNS MARKING AND ROAD APPURTENANCES*	57,125,788	5.71
7	***Drainage***		
	Catch Water Drains	41,618,408	4.16
	Hill Side Dains	68,935,183	6.89
8	***Protection Works***		
	Breast wall & Retaining Wall	802,380,884	80.24
9	*Project Facilities*	15,175,733	1.52
	SUB TOTAL OF OTHER ITEMS (C)	**985,235,996**	**98.52**
D	***SubTotal (D= A+B+C)***	**2,504,043,485**	**250.40**
E	*Add Contingency Charges @ 2.8 % on D (E)*	70,113,218	7.01
F	***Total Civil Cost (F= D+E)***	**2,574,156,702**	**257.42**
	Cost Per Km	**127,131,406**	**12.71**
X	*ADD GST @12% on F (X)*	308,898,804	30.89
Y	***Total Civil Cost including GST (Y= F+X)***	**2,883,055,507**	**288.31**
G	*Add 3% Supervision Charges on Y (G)*	86,491,665	8.65
H	*Add 3% Agency Charges on Y (H)*	86,491,665	8.65
I	*Add 0.25% QC Charges on Y (I)*	7,207,639	0.72
J	*Add 0.25% Road Safety Cell Audit Charges on Y (J)*	7,207,639	0.72
K	*Add Price Escalation @ 5% per annum for 2.5 years Construction Period i.e total 12.5% on Y (K)*	360,381,938	36.04
L	*Add Post Construction Maintainence During DLP Payable @ 5% for 4 Years to EPC Contrator on Y(L)*	144,152,775	14.42
M	***Sub Total (M= Y+G+H+I+J+K+L)***	***3,574,988,828***	**357.50**
N	***NON BOQ Items***		
	Utility Shifting Cost		

	Electric Poles Shifting Cost as per TSECL	14,334,831	1.43
	Water Supply Pipelines Shifting Cost as per DWS Estimates	3,785,506	0.38
	Forest Clearance Cost (L/s)	235,000,000	23.50
	Land Acquisition Cost (L/s)	250,000,000	25.00
	Environmental Management Plan cost @1% of Civil Cost	28,830,555	2.88
	Sub Total (N)	**531,950,892**	**53.20**
Total Project Cost (M+N)		**4,106,939,720**	**410.69**
Cost per Km.		**202,831,871**	**20.28**