

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 **Lalchara – Kanchanpur Section of NH-44A** in the State of **Tripura** on EPC mode, vide Supplementary Agreement Dated 07.09.2020. The commencement date for the project is 15.09.2020 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	NH-44A	85.125 km

For easy and fast development and existing site condition project road is divided in 4 packages. This report deals with the 2nd Package i.e. **Lalchara- Kanchanpur Section** which needs to be upgraded to Two Lane with paved Shoulders and the details of this road is given in **Table No. 1.2**.

Table 1.2 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	Lalchara – Kanchanpur Section	NH-44A	Km 17+070	Km 50+995	33.925	27.858

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. 17+070 of NH-44A in Lalchara, Tripura and terminates at Km. 50+995 of NH-44A in Kanchanpur Town, Tripura.

The project road traverses through Dhalai, Unakoti and North Tripura District in Tripura. Total length of the project road section is running between Latitudes of 23.99.8079° N; Longitudes of 91.99.3048° E and Latitudes of 23.97.4764° N; Longitudes of 92.047875° E.

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

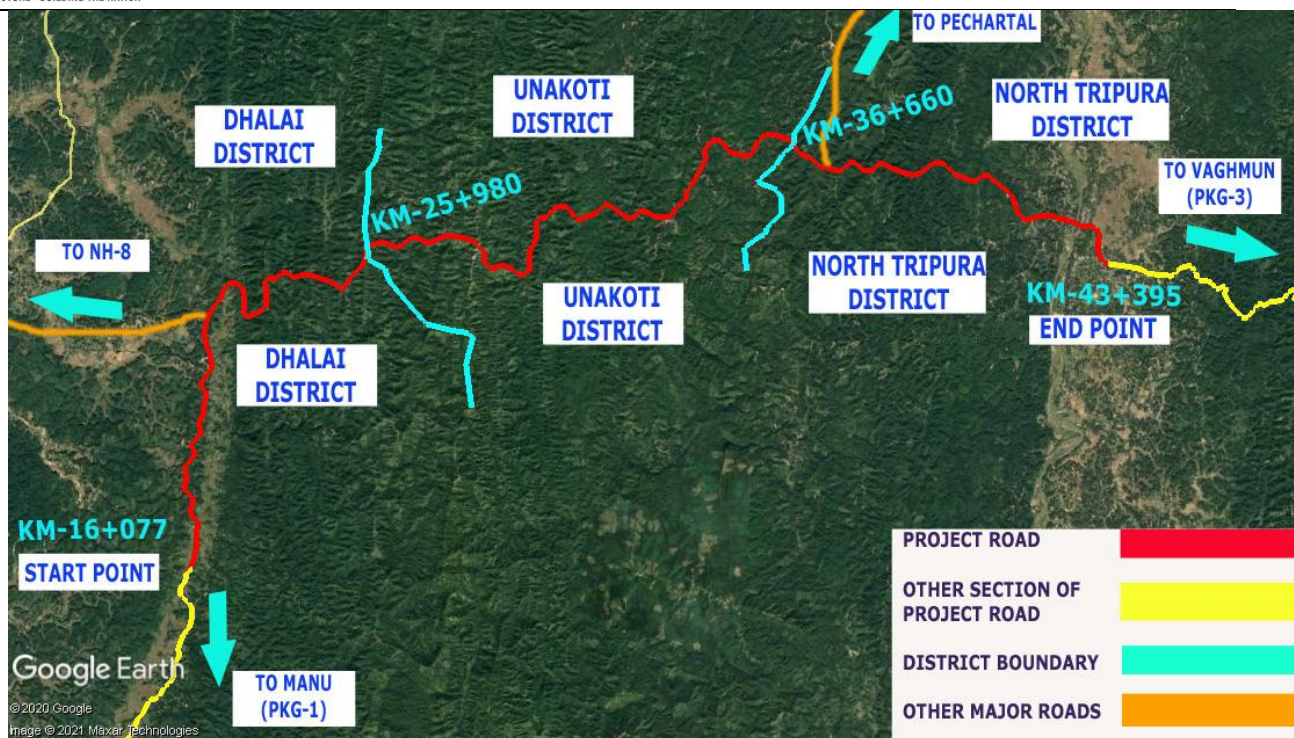


Figure 1.1: Location Plan

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. 17+070 of NH-44A in Lalcheria, Tripura.	.
2	End Point	terminates at Km. 50+995 of NH-44A in Kanchanpur Village, Tripura.	
3	Total Length	33.925 Km	Design Length is 27.858 Km.
4	Districts	3 No.	Dhalai, Unakoti & North Tripura
5	Terrain	Plain, Rolling & Hilly Terrain	
6	Right of Way(m)	0m to 10m	
7	Carriage way	3.75/5.5/7.0m Carriageway with 1.0-1.5m earthen shoulder throughout the project road section	

SL. No.	Particulars	Existing Details	Remarks
8	Major/Minor Bridge	(01 Major & 14 Minor)	
9	RCC Box	4 No.	
10	Pipe Culverts	21 Nos.	
11	Slab / Cut Stone Culverts	03 Nos.	
12	Arch Culvert	1 No.	
13	Minor Junctions	36 Nos.	
14	Major Junction	03 Nos.	
15	Villages/Towns	07 Nos.	
16	Existing Drainage System	Poor drainage System around in road.	
17	Miscellaneous Services	Fuel Stations: One 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 17.130 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

Dhalai District:

Important Demographic indicators of the District as per Census 2011 (P) Figures are as follows:

SI No	PARTICULARS	UNIT	DHALAI	TRIPURA	INDIA
1.	Area	Sq km	2426	10,419	3,28,72,40
2.	Total Population	Lakhs	3.77	36.71	12,101
3.	Male	Lakhs	1.94	18.71	62372
4.	Female	Lakhs	1.83	17.99	49656
5.	Sex Ratio	Per 1000	945	961	940
6.	Population Density	Per Sq km	157	350	382
7.	Literacy Rate Person	%	86.82	87.75	74.04
	Male	%	92.45	92.18	82.14
	Female	%	80.83	83.14	65.46
8.	SC Population(2001)	%	17	16	16.2
9.	ST Population (2001)	%	59	31	8.2
10.	Urban Population	%	6	18.24	27.8

District	Literacy Rate (%) CENSUS 2011			Literacy Rate (%) AS PER THE SPECIAL EVALUATION UNDERTAKEN IN SEPTEMBER 2014		
	Male	Female	Total	Male	Female	Total
Dhalai	89.96	79.16	84.68	97.91	95.69	96.79
TRIPURA	91.53	82.73	87.22	97.93	95.71	96.82

Details of Literacy Status as per the Special Evaluation conducted by the Indian Statistical Institute (ISI)						
Name of Sub-Division	Literacy Rate (%)			Category-Wise Literacy Status		
	Male	Female	Total	SC	ST	Others
Longtarai Valley	97.31	94.66	95.99	96.31	93.87	98.54

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.

As per IRC SP 48:1998 Hill road Manual 7.5 per cent growth rate is considered for hill road.

Hence traffic growth rate is adopted 7.5% for projection of present traffic.

Vehicle Damage Factor

Summary of VDF

LOCATION	DIRECTION	LCV	Bus	2 AXLE	3 AXLE
Near Manu	Manu- Simlung	0.001	0.157	1.207	3.531
	Simlung- Manu	0.009	0.337	2.696	8.848
	Adopted VDF	0.009	0.337	2.696	8.848

Cumulative Mean Standard Axles (CMSA)

Summary of CMSA		
Year	Manu- Simlung	Design year
2017 to 2021	Project Clearance & Construction Period	
2022	0.12	1
2023	0.25	2
2024	0.39	3
2025	0.54	4
2026	0.71	5
2027	0.88	6
2028	1.07	7
2029	1.27	8
2030	1.49	9
2031	1.72	10
2032	1.97	11
2033	2.24	12
2034	2.53	13
2035	2.84	14
2036	3.18	15
2037	3.54	16
2038	3.93	17
2039	4.35	18
2040	4.80	19
2041	5.28	20

Adopted MSA is 20 as per IRC SP 73:2018

For Details of Traffic Surveys and Analysis Please refer Chapter-5

1.4. PAVEMENT DESIGN

As per plate No.-46 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	WMM	CTSB
16+077	43+935	27.858	10	20	30	50	150	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

Proposed typical cross section for project highway is given in table 1.6 below:

Table No. 1.6: 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 Hilly Terrain with both side drain on hill side	13.080	TCS-2.11(new)
2	Two Lane Road with Paved shoulders in Hilly Terrain with Trapezoidal Drains on Hill side and Retaining wall on Valley Side in open country area	3.200	TCS-2.8
3	Reconstruction in Two-Lane Carriageway with Paved Shoulder in Hilly Terrain without retaining wall	8.680	TCS-2.9
4	Two Lane Road with Paved shoulders in Hilly Terrain with Retaining Wall both sides in open country area	1.200	Fig 2.12(new)
5	Two Lane Road with Paved shoulders in Plain/Rolling Terrain in open country area	0.423	Fig 2.1
6	Two Lane Road with Paved shoulders in Plain/Rolling Terrain in Builtup area without Service Road	1.065	Fig 2.6 A (new)
7	Length of Major Bridges	0.210	Major Bridge
	Total	27.858 km	

Proposed ROW

- In Mountainous and steep terrain
Open Area- 30-50m
Built-up Area-24m
- In Plain/Rolling terrain
Open Area- 24-30m
Built-up Area-24m

MAJOR & MINOR BRIDGES

Provision has been made for the following structures in the estimate. Details are given in table 1.7 below:

Table No. 1.7: Major & Minor Bridge proposals

S. No.	Type	Major Bridge	Minor Bridge	Total
1	Reconstruction	01	13	14
2	New-construction	01	02	03
	Total	02	15	17

HPC & SLAB CULVERTS

A summary of all the types of culverts proposed are given in table 1.8 below:

Table No. 1.8: Culvert Proposals

S. No.	Type	Retain With Repair	Widening	Reconstruction	New construction	Total
1	Box	-	-	14	45	59
	Total	-	-	14	45	59

Drainage and Protection works

- Hill side drain:- 38040m
- Catch water Drain:- 38040m
- Rectangular Drain:- 2130m
- Breast Wall (1.5m above GL):- 4250m
- Breast Wall (3.0m above GL):- 7220m
- Retaining wall:- 5600m
- Hydro seeding:- 12670m
- Metal Beam Crash barrier:- 14280m

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, 05 nos. pick-up bus shelters have been proposed both side along the project road.

Sr. No.	Type of	Design Chainage	Side	Location
1	Bus Bay & Shelter	18650	BS	Jarulchara
2	Bus Bay & Shelter	24950	BS	Ishan rouja para
3	Bus Bay & Shelter	38800	BS	Mitrojoypara
4	Bus Bay & Shelter	41850	BS	Kanchanchara
5	Bus Bay & Shelter	43900	BS	Kanchanpur

Service Roads

In keeping the view of low traffic and least habitation in the enroute 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 there are many trees 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 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 rate for various items has been adopted from Schedules of Rates, PWD-NH, Tripura (Revision-2020).

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

**Table No. 1.9:
General Abstract of Cost
Total Length 27.858 Kms**

S. No.	Item	Total Cost in Crores
A	ROAD WORKS	
1	EARTHWORK UPTO SUBGRADE	63.28
2	GRANULAR SUB-BASE	28.51
3	NON BITUMINOUS BASE-COURSE	32.79
4	BITUMINOUS BASE-COURSE	23.41
5	WEARING COAT	16.80
	SUB TOTAL (A)	164.79
B	CROSS DRAINAGE STRUCTURES	
6	Reconstruction/ New Construction of Culverts	19.39
7	Reconstruction/ New Construction of Minor bridges	36.98
8	Reconstruction/ New Construction of Major bridges	26.50
	SUB TOTAL OF CROSS DRAINAGE STRUCTURES (B)	82.87
C	OTHER ITEMS	
9	Traffic Signs, marking and Appurtenances	17.82
10	Project Facilities	1.33
11	Drainage Works	12.92
12	Protection Works	95.94
13	One Time Improvement of Rural Road	18.88
14	Other Misc Items	3.53
	SUB TOTAL OF OTHER ITEMS (C)	150.43
15	Add Cost of Utility Shifting (Approx)	5.45
D	Total Civil Construction Cost including GST (D= A+B+C)	403.54
	Cost Per Km	14.49
E	Total Civil Construction Cost Excluding GST (E)	360.30
	Cost Per Km	12.93
G	Pre Construction Activities	
16	Cost of Land Acquisition(Approx)	7.65
17	Add Cost of Forest Clearance (Approx)	45.65
	Total of Pre Construction Activities (G)	53.30
H	GST/Contingencies and Centages	
18	Contingencies @ 2.8% of E above	10.09
19	Agency Charges @ 3% of E above	10.81
20	Supervision charges @ 3% of E above	10.81

21	Price Escalation @ 5% of 'E' above as per phasing of the project execution only for the period beyond 1 year of the Bid submission date	9.01
22	Maintenance during construction/Defect Liability Period (Calculate as per the rate prescribed in the latest Document on EPC Contract	9.01
	Total of GST/Contingencies and Centages (H)	49.72
Total Project Cost (F+G+H)		506.56
Cost per Km.		18.18