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 85.125

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**		**18.280**
		Total Length (in Kms)	**86.00**	**85.125**

This report deals with the first Package i.e. **Vaghmun - Simlung 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	**Vaghmun - Simlung Section**	**NH-44A**	**Km 110+119**	**Km 131+480**	**21.361**	**18.280**

1.1. Project Road

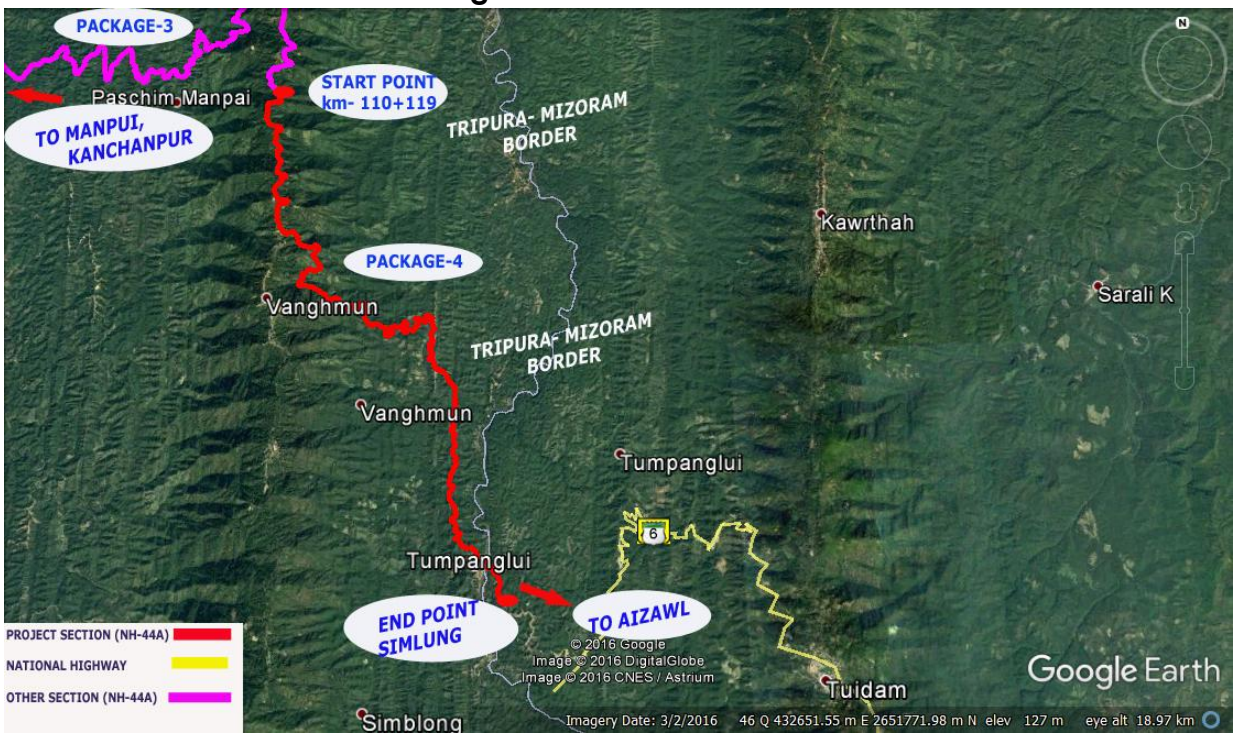
Project road is located in Tripura State Tripura is a landlocked state in North East India, where the seven contiguous states – Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura – are collectively known as the Seven Sister States. Spread over 10,491.69 km2 (4,050.86 sq mi), 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. 110.119 of NH-44A near Talakshi village, Tripura and terminates on Km. 131.480, Tripura.

The project road traverses through 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. 110.119 of NH-44A near Talakshi village, Tripura	
2	End Point	terminates on Km. 131.480, Tripura	
3	Total Length	21.361 Km	Design Length is 19.015 Km.
4	Districts	2 No.	North Tripura & Mizoram State
5	Terrain	Hilly Terrain	
6	Right of Way(m)	5m to 15m	
7	Carriage way	3.75 m Carriageway with 1.0 - 1.5m earthen shoulder throughout the project road section	
8	Major/Minor Bridge	03 Nos. (01 Major & 02 Minor)	
9	FCW	04 No.	
10	Pipe Culverts	12 Nos.	
11	Slab / Cut Stone Culverts	0 Nos.	
12	Arch Culvert	0 No.	
13	Minor Junctions	04 Nos.	
14	Major Junction	00 Nos.	
15	Villages/Towns	01 Nos.	
16	Existing Drainage System	There is no existing drainage along the project road	

SL. No.	Particulars	Existing Details	Remarks
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 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:

S. 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.

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 than 1500 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**

1.4. PAVEMENT DESIGN

As per plate No.-30 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**
66+845	85+125	18+280	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

Table 7.5 Type TCS

S.no	Ex. Ch.		Design Ch.		Design Length (km)	TCS as per IRC SP :73-2018
	From	To	From	To		
1	110.119	110.660	66.845	67.300	0.455	2.8
2	110.660	110.790	67.300	67.400	0.100	2.11(New)
3	110.790	110.990	67.400	67.600	0.200	2.8
4	110.990	111.180	67.600	67.800	0.200	2.11(New)
5	111.180	111.520	67.800	68.100	0.300	2.8
6	111.520	111.680	68.100	68.200	0.100	2.11(New)
7	111.680	120.180	68.200	78.700	10.500	2.8
8	120.180	120.320	78.700	78.800	0.100	2.11(New)
9	120.320	120.420	78.800	78.900	0.100	2.8
10	120.420	120.630	78.900	79.000	0.100	2.11(New)
11	120.630	123.330	79.000	81.400	2.400	2.8
12	123.330	127.570	81.400	82.900	1.500	2.11(New)
13	127.570	128.680	82.900	83.900	1.000	2.8
14	120.280	129.550	83.900	84.400	0.500	2.11(New)
15	129.550	129.850	84.400	85.645	0.245	2.8
16	129.850	131.480	85.645	85.125	0.480	2.1
Total Design Length					**18.280**	

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	New Construction	01	02	03
	Total	01	02	03

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	Slab	-	-	-	-	-
2	Box	-	-	09	49	58
Total		**-**	**-**	**09**	**49**	**58**

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	69.950	RHS	**Vaghmun**
2	70.750	RHS	**Vaghmun**
3	84.350	LHS	**Simlung**

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. 9.1: Type of Typical Cross Section		
Sr. No.	**TCS-No**	**Description of Typical Cross Section**
1	TCS-2.11 (NEW)	Reconstruction in Two Lane Road with Paved shoulders in Hilly Terrain with Hill side drain both side
2	TCS-2.8	Reconstruction in Two Lane Road with Paved shoulders in Hilly Terrain with Hill side drain and Retaining wall
3	TCS-2.1	Reconstruction in Two Lane Road with Paved shoulders in Plain/Rolling Terrain in open country area

Table No. 1.8: Type of Typical Cross Section

Sr. No.	**Description**	**Design Length (Km.)**	**Proposed TCS Type**
		HS-I (Km)	
1	Two-Lane with with paved shoulder in Hilly Terrain with Hill side Drain on Both sides in open Country area (Box cut)	2.6	TCS-2.11 (NEW)
2	Two Lane Road with Paved shoulders in Hilly Terrain with Hill side drain on one side & retaining wall on other side	15.200	TCS-2.8
3	Two Lane Road with Paved shoulders in Plain/Rolling Terrain in open country area	0.48	TCS-2.1
	Total	**18.28 km**	

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

Table No. 1.9: Cost Estimate Abstract

Abstract cost of Vaghmun-Simlung Section of NH-44A		
1	Design Length	18.280km
2	Construction Period	24 Months

Sl. No.	Item of Work	Estimated Cost (in Rs)
1	Cost of Road Works i/c misc items	**2,460,178,906**
2	Cost of Structures	**592,625,926**
3	**Total Civil Construction cost as per Tripura PWD (NH) SOR 2020**	**3,052,804,832**
4	Add 2.8% contingency on (3)	85478535.3
5	Add 3% supervision charges on (3)	91,584,145
6	Add 3% agency charges on (3)	91,584,145
7	Add Price escalation @ 5% per year for 0.5 years i.e 2.5% on (3)	76,320,121
8	Maintenance cost @3.75% on (3)	114,480,181
9	**Total Civil Construction Cost including centages**	**3,512,251,959**
10	Cost of Land Acquisition in/c structures	200,000,000
11	Utility Shifting Cost	51,800,000
12	Tree-Felling/Forest Diversion	150,000,000
13	**Total Capital Cost**	**3,914,051,959**