Ministry of Road Transport and Highways
(GOVERNMENT OF INDIA)

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

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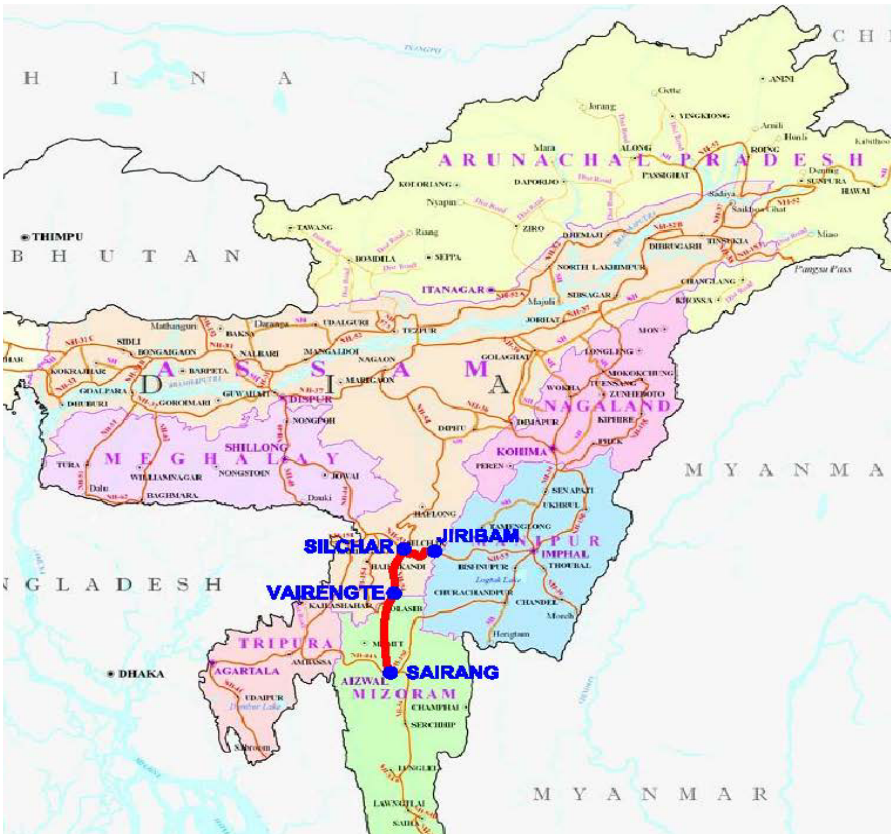
Consultancy Services for preparation of DPR for development of Economic Corridors, Inter Corridors and Feeder Routes to improve the efficiency of freight movement in India under Bharatmala Pariyojna (Lot-1) (Package-III) (Silchar-Vairengte (49.9 km), Vairengte-Sairang (111 km), Silchar-Jiribam (55 km)).



Final Detailed Project Report (Silchar-Jiribam) Package: SJ-2 (From D. Km 24+560 to D. Km 37+650) Executive Summary

November 2024

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Chapter 0 - Executive Summary

Consultancy Services for preparation of DPR for development of Economic Corridors, Inter Corridors and Feeder Routes to improve the efficiency of freight movement in India under Bharatmala Pariyojna (Lot-1) (Package-III) (Silchar-Vairengte(49.9 km), Vairengte-Sairang (111 km), Silchar-Jiribam (55 km))

Section: Silchar to Jiribam, Package: SJ-2 (From D. Km 24+560 to D. Km 37+650)

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0.1 The Consultancy Services

The Consultancy Services for preparation of DPR for development of Economic Corridors, Inter Corridors and Feeder Routes to improve the efficiency of freight movement in India under Bharatmala Pariyojna (Lot-1) (Package-III) (Silchar-Vairengte(49.9 km), Vairengte-Sairang (111 km), Silchar-Jiribam (55 km)) for a total length of 215.9 km was awarded to M/s. Transys Consulting Pvt. Ltd., by the National Highways Infrastructure Development Coorporation Ltd.

The Letter of Acceptance was issued on 22nd March 2018 vide letter ref no NHIDCL/Bharatmala/DPR/Phase-I/Lot-1/Package-III/2017/66 and the letter regarding commencement of services was issued on 02nd July 2018 vide letter ref no. NHIDCL/Bharatmala/DPR/Phase-I/Lot-1/Package-III/2017/107. The contract agreement was signed on 19.06.2018.

0.2 Project Background and Objectives

Recognising the need for improvement of capacity of road network in tune with intensity of traffic, the Ministry of Road Transport and Highways (MoRT&H) acting through the National Highways Infrastructure Development Corporation Ltd. (NHIDCL) has decided to take up the development of various National Highways stretches/Corridors of 10,000 kms out of 50,000 kms under proposed Bharatmala Pariyojna.

The project roads under Lot-1/ Package-3 comprise of following three stretches which are part of four Economic Corridors.

1) Silchar to Vairengte (Part of Silchar-Aizawl Economic Corridor NER) in the state of Assam and Mizoram.
2) Vairengte to Sairang (Part of Silchar-Aizawl Economic Corridor NER) in the state of Mizoram.
3) Silchar to Jiribam (Part of Silchar-Imphal Economic Corridor NER) in the state of Assam and Manipur.

The main objectives of the Consultancy Services are to establish the technical, economical, and financial viability of the project and prepare detailed project reports for development of economic corridors, Inter-corridors and feeder routes, as the case may be. These corridors are proposed for development to at least 4-lane access controlled (fully access control for Economic Corridors), however, DPR for access controlled 6-laning/8-laning may be required, in certain stretches, depending upon traffic.

0.3 Project Road (Silchar to Jiribam)

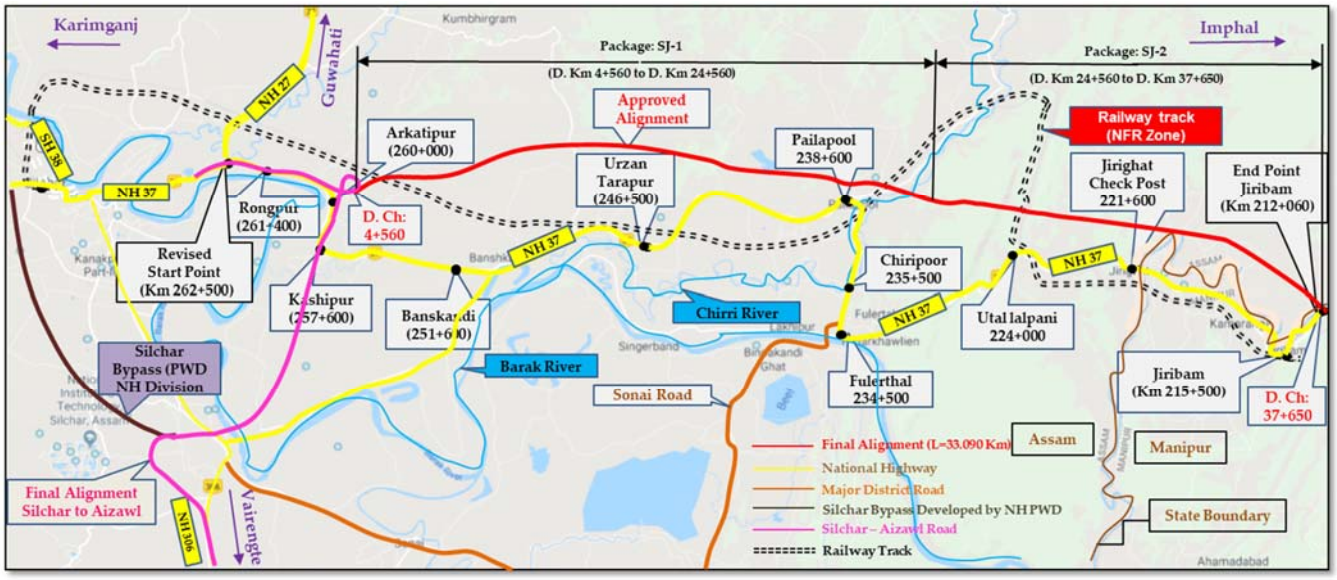

Fig 0.1 Section (Silchar - Jiribam)

a) As per the CA the project road from Silchar to Jiribam starts at Km 268+500 junction of NH-37 & SH-38 (kalian Jn.) in Silchar and end at Km 213+500 Jiribam in the state of Manipur. The project road is part of NH-37 (old NH-53) (Sutarakandi-Bhali NH road), connecting Sutarakandi, silchar and Jirighat) having a total length of 55.00km from Silchar to Jiribam.

b) After reconnaissance survey and further discussion held with NHICL, the DPR consultant has revised the start point of the project road for Silchar to Jiribam section from existing km 268+500 to km 263+500 near junction of NH-37 and NH-27 (towards Guwhathi) at Rongpur village due to already 4-lane developed under NH-PWD.

Further, new 4-lane development between km 263+500 and km 260+000 stretch has been included under Package-1 in Silchar-Vairengte DPR section of Silchar-Vairengte-Sairang-Aizawl Economic Corridor due to prioritising of NHs development specially section of Guwahati-Silchar-Aizawal and Shilong/Dawki/Karimganj to Silchar.

Hence, start point of Silchar – Jiribam has been fixed at Km 260+000 of NH-37 and End point at Km 212+060. Accordingly, the total existing length of the project road comes to 47.940Km.

Therefore, Start Chainage shall be read with existing Km 260+000 (D. Ch. 4+560) and End with exiting km 212+060 (D. Ch. 37+650). Total Design length of the proposed 4-lane road turn into 33.09km.

However, after successful submission of Draft DPR vide through letter Transys / B'Lore /410/Silchar-Sairang/ 2021-22/40386, it was conveyed by NHIDCL that the package pertaining to Silchar – Jiribam (SJ) section shall be on hold as the project stretch has not been included in the priority list due to uncertainty of 4-lane development of said stretch.

However, in the month of May 2023 the said project has been reopened under the direction of MD & D(T) during VC meeting and DPR had been asked to accelerate the remaining pending assignment pertaining to said project as the project stretch was included under current year development plan.

Final DPR was submitted vide through letter no. Transys / B'Lore /410/Silchar-Sairang/ 2022-23/404037 dated but collectively decision was taken to bifurcate the project corridor in to two (02) packages due to tunnel proposal & its cost constraints and several other limitations.

Hence, based on assessment and in consultation with NHIDCL officers, the package distributions are as under.

1. Package: SJ-1 (Existing km 260+000=D. Ch. 4+560 at Silchar/ Nutan Dayapur to existing km 233+000= D. Ch 24+560 at Budha Nagar in Assam State).
2. Package: SJ-2 (Existing km 233+000= D. Ch 24+560 at Budha Nagar in Assam state to Existing km 212+060=D. Ch 37+650 at Jiribam in Manipur State).

Pkg: SJ-1 is already awarded in the month of February 2024.

The instant package SJ-2, Final Detailed Project Report (FDPR) is being submitted under R-1 in response to the Terms of Reference Clause 10.10 and contains the findings by our Project Team during detailed survey and investigations of the project road and initial interaction with officials of NHIDCL

0.4 Terrain

Terrain is classified by the general slope of the country across the highway alignment as per IRC: 73 and with these criteria the project Highway Road passes through mostly rolling and mountainous terrain.

The proposed green filed alignment falling 61 % under rolling terrain and 39% under mountainous / hill terrain. The details of the same is given below.

Table 0.1 Summary of Terrain along Project Road

Sl. No.	Proposed Chainage		Length (m)	Terrain
	From	To		
1	4+560	7+400	2840	Rolling
2	7+400	17+400	10000	Mountainous
3	17+400	18+600	1200	Rolling
4	18+600	21+100	2500	Mountainous

Sl. No.	Proposed Chainage		Length (m)	Terrain
	From	To		
5	21+100	23+150	2050	Rolling
6	23+150	23+550	400	Mountainous
7	23+550	37+650	14100	Rolling
Total Length (Km)			**33.090**	

0.5 Land use Pattern and Settlement along Project Road

Project existing road passes through mainly plain and hilly terrain at certain location. The alignment mostly passes through agricultural area, semi built-up, built-up areas and few stretches lying on hill cum forest area. The land use pattern along the existing project road is as tabulated below;

Table 0.2 Summary of Land use along Project Road

Sl. No.	Land use Description	Existing Length (km)	% of Length
1	Built up Area	29.650	64.00
2	Semi Built up Area	7.500	15.00
3	Agricultural Land	3.350	7.00
5	Hill Cum Forest Area	4.500	9.00
6	Hilly Area	2.940	5.00
Total Existing Road length		47.94	100

Major built-up areas along existing road are Rongpur Pt 1, Rongpur Pt2, Kashipur, Lakhipur, Banskhandi, Pailapool, Fulerthal and Jiribam. The condition of existing pavement varies from good to fair. The detailed discussion about the project road is given in Chapter 2: Project Description.

0.6 Road Geometry and Configuration

In order to arrive at a feasible option, alternatives were decided based on both horizontal design and an additional land requirement. Environmental, social perspective and safety parameters have also been considered while proposing the alignment. As far as geometric improvement is concerned, it includes the curve improvements, realignment at villages where ribbon development with substandard curves and inadequate land availability and bypass proposal in case of town advancement and based on future traffic demand.

Existing road is passing through congested built-up areas at majority of the locations, clustered with commercial, residential and industrial activities on both sides of existing road. Besides the above, the appreciable movement of pedestrians crisscrossing the road is observed at these locations. Existing horizontal geometrics are not as per NH standard at many locations, which are required to be upgraded. The Existing ROW along the project road varies from 9m to 30m as per PWD records. As the project road is 4/6 Lane Economic corridor, improving the geometry is not possible within the

available ROW wherever there is reduced EROW and it would entail for the demolition of structures within the immediate vicinity of the existing road, more over this does not ensure the safety of the designed facility as it would be passing through the built up and congested sections. As the existing project road has significantly encountered with number of substandard/acute horizontal curves beside ribbon development, bypass options were studied. The proposed bypasses were critically examined / studied for individual built-up vs option of Green-field single alignment for entire stretch.

Study was classified in to 02 options as below,

Option A: Imp of existing road with individual bypass options at Major built up

Option B: Green filed alignment.

The detail of the same is given below. The most economical with minimum disturbance has been considered, which details of these improvements are given in subsequent sections and summary is presented below.

Table 0.3 List of Bypass Proposals.

Sl. No	Location	Exist. Chainage (Km)		Exist. Length (Km)	Prop. Chainage (Km)		Prop Length (Km)
		Start	End		Start	End	
A.	**Improvement of existing road with bypass options at Major Built up**						
1	Kashipur Bypass (under Pkg-1)	259+600	254+600	5.000	These bypasses sections studied but ultimately merged / added with Approved green field alignment.		3.500
2	Banskhandi Bypass (under Pkg-1)	254+135	249+500	4.240			4.100
4	Ujan Tarapur, Pailapool, Fulerthal Bypass (under Pkg-1)	246+000	231+800	14.000			8.300
5	Jiribam Bypass (under Pkg-2)	225+000	215+750	9.250			8.100
		Total Length (m)		**32.490**			**24.000**
B	**Green Field Alignment**						
1	Green Field Alignment (under Pkg-1)	260+000	233+000	27.000	4+560	24+560	20.000
	Green Field Alignment (under Pkg-2)	233+000	212+060	20.940	24+560	37+650	13.090
		Total Length (m)		**47.940**			**33.090**
	Total Approval Length (m) along bypasses / Green Field Alignment			**47.940**			**33.090**

** The detailed discussion of the Green Field Alignment is given below, which is approved alignment however, the details of the other bypasses options are given in chapter 7.*

Green Field Alignment

From Km 262+500 to Km 212+060 the existing road passes through many built-up locations such as Kashipur, Banskandi, Ujain Tarapur, Pailapool, Fulertal and Jiribam. As discussed above options have been studied for improving the existing road along with the bypasses at built up locations. In this segment effort has been made to study the green filed alignment, which passes through green filed/agriculture land. The alignment of green filed vs. improving of existing alignment with bypass options are shown below.

The Green field alignment takes-off on LHS from Km 260+000 of NH-37 and passes through agricultural filed and Tea plantation at few locations and terminates / joins at NH-37 near Jiribam at km 212+060. The approximate length along green filed alignment comes to is 33.090 Kms as compared to existing road length of 47.700 Kms causing drastic reduction in length however, 01 tunnel (aapx.770m) being proposed to avoid extensive route via permissible contour gradient. The chosen green alignment also mitigates the effects on residential and commercial buildings. However, the proposed green filed alignment crosses existing railway line at Km 5+190, Km 22+535 and Km 26+385 that need to propose ROBs at these locations. In this option a green filed alignment is proposed to be bypassing all above built up areas through single alignment navigating through open / green field and fulfils all the requirement of developing 4-lane economic corridor.

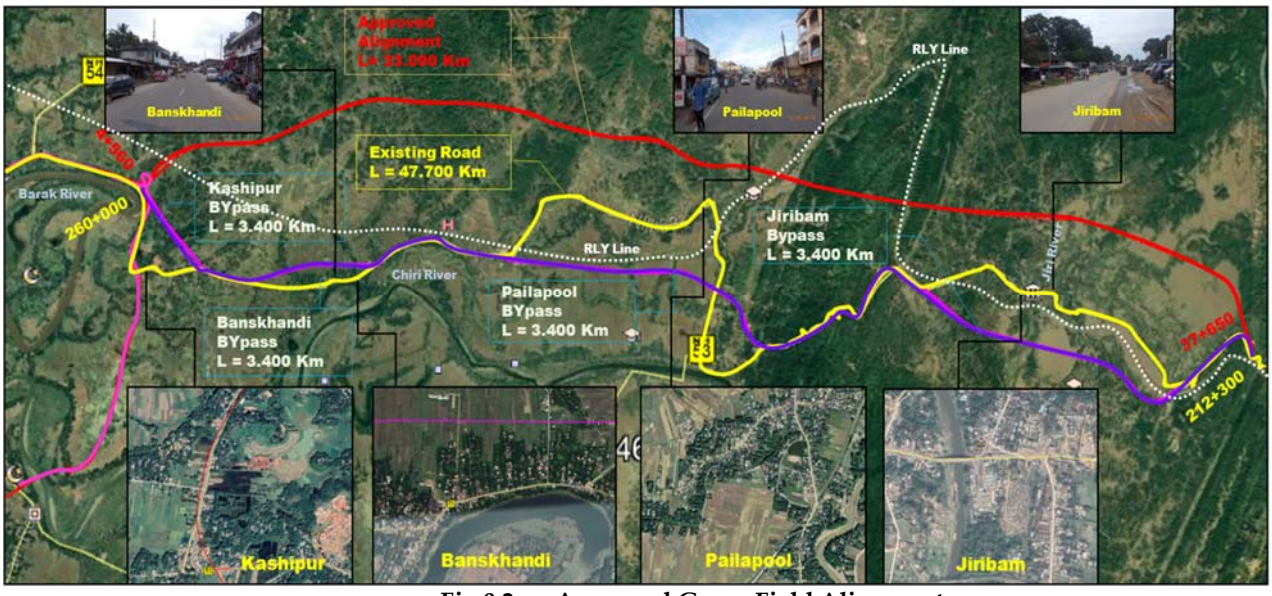

Fig 0.2 Approved Green Field Alignment

Eventually, all the above options were discussed during the presentation furnished on 15th January 2019 and 14th August 2019 at NHIDCL HQ, Delhi and green filed alignment (Option-V) were agreed by all the delegates during the presentation followed by letter no NHIDCL/Bharatmla/V-S/ DPR/ Mizoram/2019-20//353 on 23rd October 2019.

However, after superimposing the DPR alignment on "SOI TOPO map" issued by Survey of India (SOI), it has been found that 5.2km from D.Ch. 31+500 to D.Ch. 36+700 falls under forest land which was unavoidable. The section has been submitted for forest clearance on PARIVESH portal and is under process. The forest section falls under Pakg: SJ-2.

0.7 Pavement Condition and composition of the Project Corridor

The existing pavement type is flexible from Km 260+000 to Km 212+060. The pavement varies from Fair to Good. It is also observed that the road has developed cracks, potholes edge drop etc. for most of stretches. The width of earthen shoulder towards valley side varies from 0.5m to 1.0m.The shoulders, in majority of length, are earthen with fair condition. The side drainage is earthen and lined drains are observed along some habitations.

The soil type along the alignment is generally silty clay. The project road runs mainly in plain/rolling terrain and hilly terrain at some locations.

Table 0.4 Pavement Condition

Sl. No.	Pavement Condition	Potholes (%)	Cracking (%)	Patching (%)	Ravelling (%)	Rut (mm)
1	Excellent	Nil	≤5	Nil	≤1.0	≤5
2	Good	≤5	> 5 ≤ 10	≤ 0.5	>1.0 ≤ 2.0	> 5 ≤10
3	Fair	>5 <10	> 10 ≤ 20	> 0.5 ≤ 2.0	2.0 ≤ 5.0	> 10 ≤ 20
4	Poor	>10 <50	>20 ≤ 30	>2 ≤ 6.0	>5.0 ≤10.0	>20
5	Very poor	>50	>30	>6.0	>10.0	-

Total thickness of the existing pavement thickness is varying between 370 mm to 540 mm. The thickness of bituminous layer is varying between 80-140 mm. The detailed discussion is done in Chapter 2: Project Description.

0.8 Bridges and Structures

There are total 05 nos. of existing bridges out of which 01 is major bridge, whereas the other 04 nos. are minor bridges along the existing road under Pkg: Sj-2.

The Bridge across Jiri River in Jiribam at Km 222+200. The super structure consists of RCC Box girder. The Bridge is having a span arrangement of 2 x 56m having a total length of 112m with a deck width of 11.0m.

Out of 4 Nos. of Minor Bridges, 1 No RCC Slab Type, 2 Nos Box type, and 1 No Box girder type and. All the existing major structures are abandoned as the proposed alignment is passing through new green field alignment.

0.9 Culverts

The inventory data for the existing cross drainage structures, culverts and bridges, are given with details in Chapter 3: Analysis & Interpretation of Engineering Surveys and Investigations.

Table 0.5 Summary of Culverts / Bridges / ROB/RUB/VUP/LC

Culverts				Bridges			Causeway	ROB	RUB	LC	VUP
Pipe	Slab/Arch	Box	Total	Minor	Major	Total					
-	27	31	58	04	01	05	-	-	01	-	01

There are total 58 nos. of existing culverts along the project corridor under Pkg: Sj-2, out of which 31nos are Box and 27nos are RCC Slab. All the culverts are abandoned as the proposed alignment is passing through green filed.

0.10 Road Junctions and Intersections along Pkg: SJ-2

There are 01 no existing major road junctions with NH / SH / MDR and 90 no's minor junctions with village/city roads along the existing road. All the junctions are abandoned as the proposed alignment is passing through green filed.

0.11 Railway Level Crossings and ROBs

There are 1 no. RUB at Km 224+900 along the existing road.

0.12 Underpass and Overpass

There is 1 no. of VUP along existing road at Km 222+000.

0.13 Right-of-way

As per the records available with PWD NH division, the ROW in town/ built-up areas is presented in Table 2.6 of Chapter - 2.

0.14 Traffic Studies

There is mixed traffic plying on the Project Highway comprising of trucks, buses, cars, two wheelers, non-motorised vehicles, etc. 2 homogeneous sections tabulated below have been considered to know the traffic flow conditions as shown in the traffic report. The detailed survey location and traffic analysis is given in Chapter 4: Traffic studies and Demand forecast.

Table 0.6 Details of Homogeneous Sections

Section	Homogenous Section	Chainage		Length (Km)
		From (Km)	To (Km)	
Section - 1	Silchar (Rongpur) to Pailapool	263+500	240+000	23.500
Section – 2	Pailapool to Jiribam	240+000	212+060	27.940

The above homogeneous section is considered based on traffic pattern and type of state highways the project road is traversing.

In order to generate the essential inputs, various traffic surveys were organized on the project road. The surveys carried out with their location and period are:

Classified Volume Count (7 days) – 2 Locations

Classified Volume Count (3 days) – 1 Location

O-D Survey (1day) - 2 Locations

Intersection Volume Count (16 hrs) - 1 Locations

Axle Load Survey (2 day) - 2 Locations

***** *As per ToR, Classified Volume Count survey shall be conducted for 7 continuous days at minimum 3 locations. However, we have carried out 7 days CVC at 5 locations for the project sections ie Silchar-Vairengte, Vairengte-Sairnage and Silchar-Jiribam. However, the traffic survey that is conducted for Silchar to Jiribam section is represented above.*

Traffic Volume and Composition

The Annual Average Daily Traffic at different survey locations are presented below:

Table 0.7 Details of AADT for different sections (Base year 2020)

Section	Homogenous Section	AADT (No's)	AADT (PCUs)
Section – 1	Silchar (Rongpur) to Pailapool	11196	10985
Section – 2	Pailapool to Jiribam	6888	7493
-	Along Proposed Green Filed	5144	6259

AADT (PCU) shown above is combined traffic (Trough and local traffic) however, details discussion on same shall be referred in chapter 4 Traffic analysis and Demand forecast

Growth Rates

Using the growth rates relevant to (i) passenger vehicles and (ii) freight vehicles are calculated separately. The formulae and methods for passenger vehicles and freight vehicles are illustrated below:

Passenger Vehicles

The growth rates of population, per capita income and elasticity of transport demand in relation to the income have been used to estimate the growth rates, as suggested in the World Bank guidelines using the following formula: -

Passenger Vehicles : Tgr = ((1+Pgr)*(1+PCI gr)-1)*100*E

Where,
Tgr = Traffic Growth Rate
Pgr = Population Growth Rate
PCI gr = Per Capita Income Growth Rate
E = Elasticity value

Freight Vehicles

The forecast growth rates for trucks have been made by calculating the average growth rates of the core sectors of economy, viz., Agriculture, Industrial and mining sectors and by multiplying the projected growth rates of these sectors of the following elasticity factors for the different periods:

Freight Vehicles : Tgr = ½ (Agr + NSDPgr) x E x 100

Where,

Agr = Growth rate of agricultural sector

NSDPgr = Growth rates of industrial & mining sectors

The growth rates for different vehicle categories have been estimated as per the methodology outlined above and the adopted growth rate figures are presented in the following table.

Table 0.8 Proposed Traffic Growth rates for Silchar to Jiribam section

Vehicle Type	Upto 2025	2026-30	2031-35	2036-40	Beyond 2040
Most Likely Scenario					
Car/Van/Jeep	5.00%	9.70%	8.50%	5.00%	5.00%
Bus/Minibus	5.00%	5.00%	5.00%	5.00%	5.00%
LCV	5.00%	12.40%	10.85%	5.00%	5.00%
2A Trucks	5.00%	5.00%	5.00%	5.00%	5.00%
3A Trucks	5.00%	7.00%	6.50%	6.00%	5.00%
MAV	5.00%	7.00%	6.50%	6.00%	5.00%
Optimistic Scenario					

Vehicle Type	Upto 2025	2026-30	2031-35	2036-40	Beyond 2040
Car/Van/Jeep	6.00%	10.70%	9.50%	6.00%	6.00%
Bus/Mini Bus	6.00%	6.00%	6.00%	6.00%	6.00%
LCV	6.00%	13.40%	11.85%	6.00%	6.00%
2A Trucks	6.00%	6.00%	6.00%	6.00%	6.00%
3A Trucks	6.00%	8.00%	7.50%	7.00%	6.00%
MAV	6.00%	8.00%	7.50%	7.00%	6.00%
Pessimistic Scenario					
Car/Van/Jeep	4.00%	8.70%	7.50%	4.00%	4.00%
Bus/Mini Bus	4.00%	4.00%	4.00%	4.00%	4.00%
LCV	4.00%	11.40%	9.85%	4.00%	4.00%
2A Trucks	4.00%	4.00%	4.00%	4.00%	4.00%
3A Trucks	4.00%	6.00%	5.50%	5.00%	4.00%
MAV	4.00%	6.00%	5.50%	5.00%	4.00%

Projected Traffic

The assigned traffic is projected for the different homogeneous section from Silchar to Jiribam based on the above growth rates and the summary of projected traffic in PCUs is presented below;

Table 0.9 Projected Traffic AADT in PCU

Homogeneous Section	Proposed Green filed alignment		
	Most Likely	Optimistic	Pessimistic
2020	6259	6259	6259
2021	6571	6634	6509
2022	6899	7031	6768
2023	7242	7451	7037
2024	7603	7897	7318
2025	7982	8370	7609
2026	8380	8871	7913
2027	9002	9618	8421
2028	9676	10433	8967
2029	10405	11324	9552
2030	11194	12296	10182
2031	12049	13358	10858
2032	12895	14429	11512
2033	13804	15591	12209
2034	14782	16850	12952
2035	15834	18217	13744
2036	16966	19701	14589

Homogeneous Section	Proposed Green filed alignment		
	Most Likely	Optimistic	Pessimistic
2037	17829	20901	15186
2038	18737	22174	15808
2039	19692	23526	16455
2040	20695	24960	17129
2041	21750	26481	17831
2042	22836	28068	18543
2043	23976	29750	19283
2044	25173	31533	20053
2045	26430	33423	20854
2046	27749	35426	21686
2047	29135	37549	22552
2048	30590	39799	23453
2049	32117	42185	24390
2050	33721	44713	25364
2051	35405	47393	26377
2052	37174	50234	27430
2053	37192	50264	27441

Homogeneous Section	Section-1 Silchar to Pailapool (Km 263+500 to Km 240+000)		
	Most Likely	Optimistic	Pessimistic
2020	10985	10985	10985
2021	11521	11631	11411
2022	12084	12315	11855
2023	12675	13041	12316
2024	13295	13809	12795
2025	13945	14623	13293
2026	14628	18582	15192
2027	15606	19892	16056
2028	16658	21314	16978
2029	17792	22857	17964
2030	19014	24534	19018
2031	20331	26346	20146
2032	21649	28202	21252
2033	23061	30206	22426
2034	24574	32372	23673
2035	26196	34714	25000
2036	27935	37197	26411
2037	29330	39333	27465
2038	30795	41599	28563

Homogeneous Section	Proposed Green filed alignment		
	Most Likely	Optimistic	Pessimistic
2039	32334	44001	29705
2040	33951	46548	30893
2041	35650	49246	32130
2042	37412	52082	33398
2043	39263	55086	34716
2044	41206	58270	36087
2045	43245	61644	37512
2046	45386	65220	38994
2047	47634	69009	40535
2048	49993	73025	42138
2049	52470	77280	43805
2050	55071	81790	45538
2051	57801	86569	47340
2052	60667	91634	49214
2053	60697	92163	49409

Homogeneous Section	Section-2 Pailapool to Jiribam (Km 240+000 to Km 212+300)		
	Most Likely	Optimistic	Pessimistic
2020	5713	5713	5713
2021	5998	6056	5941
2022	6298	6418	6179
2023	6612	6803	6425
2024	6943	7211	6682
2025	7289	7643	6949
2026	7653	8101	7226
2027	8148	8705	7621
2028	8677	9358	8039
2029	9243	10062	8484
2030	9849	10823	8955
2031	10499	11644	9457
2032	11147	12480	9946
2033	11838	13378	10463
2034	12574	14343	11009
2035	13358	15380	11586
2036	14193	16496	12195
2037	14981	17577	12750
2038	15814	18729	13331
2039	16693	19958	13939
2040	17622	21268	14575
2041	18604	22665	15242

Homogeneous Section	Section-2 Pailapool to Jiribam (Km 240+000 to Km 212+300)		
	Most Likely	Optimistic	Pessimistic
2042	19533	24024	15851
2043	20509	25465	16484
2044	21534	26992	17143
2045	22610	28610	17828
2046	23740	30326	18541
2047	24926	32144	19282
2048	26172	34072	20053
2049	27479	36115	20854
2050	28853	38281	21688
2051	30294	40577	22555
2052	31808	43011	23456
2053	31824	43037	23466

As per IRC SP: 73-2018 and IRC SP: 84-2019, as the project road from Silchar to Jiribam is passing through plain terrain the following capacity values has been adopted.

- For 2-Lane Highway capacity (4-Lane requirement) : 10,000 PCU/day
- 4-Lane Highway capacity (6-Lane requirement) : 60,000 PCU/day

Hence, based on above traffic projection and in line with TOR, DPR consultant has proposed for 4-Lane divided carriageway.

0.15 Pavement Design

Detailed stuy under "**Chapter 6: Pavement Design**" of Main Report, pavement options has been studied viz. 1) Flexible Pavement, 2) Flexible pavement with cement treated base (CTB) and cement treated sub-base (CTSB), 3) Reinforced Flexible pavement with geo-grid and 4) Rigid pavement.

As the proposed alignment is a new green filed alignment and in submerged area, DPR consultant has recommended Flexible pavement with Geo grid provision and the same has been used for arriving the cost.

The Flexible pavement with geogrid provision between WMM layer is designed for Main carriageways, Bus bay, Truck lay bye, Rest area and service road as well.

The summary of the recommended pavement thickness is given below;

Table 0.10 Proposed Flexible pavement detail

Pavement Layer	Main Carriageway Thickness	Service Road Thickness
BC	40 mm	30 mm
DBM	65 mm	60 mm
WMM	250 mm	250 mm
Geogrid	Biaxial	-
GSB	200 mm	200 mm
Subgrade	500 mm	500 mm

However, during PATSC (25.09.2023) of Package:SJ-1, it has been recommended to modify pavement design of the main carriageway and service road, the CBR value as obtained at site shall be taken for design if less than 6%. The maximum value of CBR to be taken for design shall not exceed 6%.

Therefore, pavement design thickness has been modified for instant Pkg:SJ-2 considering 6% CBR value for design traffic of 40 MSA with a minimum design period of 20 years for flexible.

Sl. No	Sections (design Chainage)	Length (Km)	*Type of Pavement	Modified Thickness
1	From Km 4+560 to Km 37+650	33.09	Flexible with Geogrid	BC = 40 mm DBM = 75 mm WMM = 250 mm Geogrid (Biaxial) GSB = 200 mm Subgrade = 500 mm

PMB / CRMB shall be used for BC.

The pavement layer thickness for Service road design traffic of 10 MSA and 6% CBR is given in below table.

Sl No	Sections (design Chainage)	Design MSA	Length (Km)	Type of Pavement	Thickness
1	From Km 4+560 to Km 37+650	10	33.09	Flexible	BC = 40 mm DBM = 70 mm WMM = 250 mm GSB = 200 mm Subgrade = 500 mm

As the proposed alignment is passing through high embankment and falls under submerged area were the CBR value varies from 5 % to 6 %. Hence, an additional geogrid layer has been introduced between natural ground (after clearing and grubbing) and selected earth (Embankment).

A sand blanket has been considered between subgrade and selected earth (embankment) wherever applicable/as per site condition.

Thickness for Toll Plaza & Tunnel

Based on study under "**Chapter 6: Pavement Design**" of Rigid pavement is proposed for **Toll Plaza & Tunnel portion** and the details of proposed rigid pavement thickness is given in below table.

Table 0.11 Summary of Pavement Type and Thickness for Toll Plaza and Tunnel portion

Sl No	Sections	Type of Pavement	Thickness
1	Toll Plaza and Tunnel portion	Rigid	PQC = 280 mm DLC = 150 mm GSB = 150 mm Subgrade = 500 mm

0.16 Improvement Proposals

The details of the improvement proposals along the proposed road are discussed in chapter 7: Improvement Proposals however, the summary of the same is given in table below.

Table 0.12 Summary of Improvement Proposals

Sl. No.	Description	Unit	Total
1	**Alignment & Geometrics**		
	Total Length	Km	13.090
	Re-alignments	Km	-
	Green Field Alignment		
	Green Field Alignment	Km	13.090
	Total (Green Field Alignment)	**Km**	**13.090**
2	**Cross Section**		
	4-Lane Road	Km	13.090
	6-Lane Road	Km	Nil
3	**Bridges**		
	Existing	Nos	05
	Major	Nos	01
	Minor	Nos	04
	Rehabilitation Proposal of Existing Bridges		
	Existing Bridges reconstruction (Major and Minor)	Nos	-
	Existing Bridges Repair/ Retain MJB	Nos	-
	Existing Bridges Widening (Major and Minor)	Nos	-
	Abandoned (not in use)	Nos	05

Sl. No.	Description	Unit	Total
	New Bridges	**Nos**	06
	a. Major Bridges	Nos	02
	b. Minor Bridges	Nos	04
4	**Culverts**		
	Existing Culverts	Nos	58
	Proposed Culverts	Nos	40
	Rehabilitation Proposal of Culvert		
	Existing Culverts reconstruction / widened / Retained	Nos	-
	Existing Culverts Abandon	Nos	58
	New Culvert along project road	Nos	28
	New Culvert for crossroads	Nos	12
5	**Major & Minor Junctions**		
	Major Junction	Nos	At-Grade-02 Underpaas-03
	Minor Junctions	Nos	At-Grade-04 Underpaas-07
6	**Tunnel**	Nos	01
7	**Toll Plaza**	Nos	01
8	**Service/Slip Road (LHS/RHS)**	Km	4.000
9	**Rest Area**	Nos	-
10	**Grade Separator**		
	Overpass	Nos	00
	Vehicular Underpass (VUP)	Nos	02
	Light Vehicular Underpass (LVUP)	Nos	02
	Smaller Vehicular Underpass (SVUP)	Nos	06
	Railway over Bridge (ROB)	Nos	01
11	**Bus Bay**	Nos	02
12	**Truck Lay bye (Km 36+100, LHS)**	Nos	01
13	**Protection Work**		

Sl. No.	Description		Unit	Total
	Retaining Wall	**LHS**	Mts	Nil
		RHS	Mts	Nil
	Breast Wall	**LHS**	Mts	410
		RHS	Mts	410
	Crash Barrier	**LHS**	Mts	6630
		RHS	Mts	6760
14	**Drain**			
	RCC Cover Drain at Tunnel	**LHS**	Mts	770
		RHS	Mts	770
	PCC Open Drain @ Grade Separator	**LHS**	Mts	1700
		RHS	Mts	1700
	PCC Open Drain @ Other Location	**LHS**	Mts	715
		RHS	Mts	725
	PCC Open Drain at Hill side	**LHS**	Mts	3640
		RHS	Mts	3575
15	**Additional Land requirement for the project**		Km.	13.090
16	**% of Land Requirement for the Project (Length wise)**		%	100.00
17	**Pavement Design Life**			
	Flexible		Year	20
	Rigid		Year	30
18	**Traffic in MSA: Km 24+560 to Km 37+650**		MSA	40
19	**Pavement Type Proposed** **1. Km 24+560 to Km 37+650**		Flexible	Flexible –4L
	Existing Type		BT	
	<u>Proposed new 4 Lane (Main Carriageway)-6% CBR</u>		**Flexible**	
	BC(PMB/CRMB)		**mm**	40
	DBM (VG-40)		**mm**	75
	WMM		**mm**	250

Sl. No.	Description	Unit	Total
	Geogrid		Biaxial
	Granular Sub-Base (GSB)	**mm**	200
	Subgrade	**mm**	500
	Service Road (CBR 6%)	**Flexible**	
	BC(VG-30)	mm	40
	DBM (VG-30)	mm	70
	WMM	mm	250
	Granular Sub-Base (GSB)	mm	200
	Subgrade	mm	500

Geometric Design Standards

The entire project section passes through plain/rolling terrain. The design speeds as per IRC: SP: 84-2019, have been proposed as under:

Plain and Rolling Terrain		Mountainous and steep Terrain	
Ruling	**Minimum**	**Ruling**	**Minimum**
100	80	60	40

Proposed Cross-sectional elements for the project road have been adopted as follows

Table 0.13 Typical Cross Section element

Four-lane Road (Built-up area)	
Paved Carriageway	2 x 7.0 m = 14.00m
Paved Shoulders	2 x 2.5m = 5.00m
Kerb shyness	4 x 0.50m = 2.00m
Median	1 x 2.50m = 2.50m
Separator	2 x 1.75 = 3.5m
Service Road	2 x 7.00 = 14.0m
Drain cum Footpath	2 x 1.50 = 3.0 m
Space for Service	2 x 2.00 = 4.0m
Total Roadway Width	48.00 m

Four-lane Road (Rural area)		
Paved Carriageway		2 x 7.0 m = 14.0m
Shoulders	Paved	2 x 2.5m = 5.0m
	Unpaved	2 x 1.5m = 3.0m
Kerb shyness		2 x 0.50m = 1.00m
Median		4.00 m
Total Roadway Width		27.00 m

However, collective decision was made during PATSC (25.09.2023) to modify TCS mainly modification of paved shoulder from 2.5 m to 1.5 m and earthen shoulder from 1.5 m to 2.0 m. The revised cross-sectional element is as below,

Four-lane road (Rural area)		
Paved Carriageway		2 x 7.0 m = 14.0m
Shoulders	Paved	2 x 1.5m = 3.0m
	Unpaved	2 x 2.0m = 4.0m
Kerb shyness		2 x 0.50m = 1.00m
Median		4.00 m
Total Roadway Width		26.00 m

Grade Separator/Underpass/Overpass

At all crossing of major road, start and end point of bypass/green filed alignment Flyover/Vehicular underpass is provided. These grade separation facilities are classified and tabulated in following Table.

Table 0.14 Proposed Grade-Separated Structures for Cross Roads

Sl. No.	Type / Location of Structure	Type of Structure	Span arrangement and Vertical clearance
1	SVUP	27+210	Span = 1 x 7m Vertical Clearance = 4.0 m
2	SVUP	29+700	Span = 1 x 7m Vertical Clearance = 4.0 m
3	VUP	30+510	Span = 1 x 24m Vertical Clearance = 5.5 m
4	LVUP	31+409	Span = 1 x 12m Vertical Clearance = 4.0 m
5	SVUP	31+607	Span = 1 x 7m Vertical Clearance = 4.0 m
6	SVUP	32+671	Span = 1 x 7m Vertical Clearance = 4.0 m
7	LVUP	33+844	Span = 1 x 12m Vertical Clearance = 4.0 m

Sl. No.	Type / Location of Structure	Type of Structure	Span arrangement and Vertical clearance
8	SVUP	34+850	Span = 1 x 7m Vertical Clearance = 4.0 m
9	SVUP	36+940	Span = 1 x 7m Vertical Clearance = 4.0 m
10	VUP	37+125	Span = 1 x 24m Vertical Clearance = 5.5 m

Summary of Grade Separated Structures:

Type	Nos.
VUP	02 Nos.
LVUP	02 Nos.
SVUP	06 Nos.
TOTAL	10 Nos.

Cross drainage Structures:

There are total 17 nos of existing culverts along the project corridor. All the culverts along existing road is abandoned as the proposed alignment is passing through green field and new 49 no's of box culverts on MCW and 12 nos on Cross Road are proposed along proposed green filed alignment.

Table 0.15 Summary of Proposed culverts

Existing				Proposed						Total
Pipe	Slab	Box	Total	New Box On MCW	New Box On CR	Reconstruction	Widening	Retained	Abandoned	
-	27	31	58	28	12	-	-	-	58	40

Major and Minor Bridges:

As the proposed alignment is passing through green filed 2 no's of new Major and 4 no's of Minor bridges are provided where the proposed alignment crossed the river or Nala. The details of the same is given below

Table 0.16 Summary of Proposed Bridges

Existing		Proposed			Retained	Abandoned	Total
Type	No.	New	Reconstruction	Widening			
Major Bridge	1	2	-	-	-	1	2
Minor Bridge	4	4	-	-	-	4	4

Note: *All existing bridges are abandoned as the proposed alignment is passing through green filed.*

Rail Over Bridge (ROB):

The proposed green filed alignment is crossing the existing railway line at 1 Locations, which has been proposed for ROB. The details of the same is given below.

Table 0.17 Details of Proposed ROB

Sl. No.	Location of Structure (Design Chainage)	Type of structure	Type of track	Span arrangement (m)	Total Width of Structure (m)
1	26+279	ROB	Silchar-Jiribam BG Railway Line	4 x 36 + 1 x 20m	2x13.5

Tunnel:

To avoid huge cut and fill, a tunnel of length 940m has been propose and the details of the same is given below.

Table 0.18 Improvement Proposal of Tunnel

Sl. No.	Type	Chainage of West Portal	Chainage of East Portal	Length (m)	Location	Total Width of Structure (m)
1	Twin Tube Tunnel	24+770	25+710	940	Kalam Naga Punji	2x13.0

The detailed discussion about the proposed structures along the project road is discussed in Chapter 7: Improvement proposals

0.17 Environment Screening

The main objectives of the study are: i) identify the impacts of the project improvement on environment and ii) alleviate the unsafe condition and congestion of the existing highway on NH 37 by enhancing the capacity and quality of the road to the users in a sustainable and environment friendly manner.

MoEF, GoI, has enforced Environment (Protection) Act 1986 and Notification on Environmental Impact Assessment dated 14th September 2006 and subsequent amendments to avoid, mitigate and prevent the environmental impacts from project activities. The EIA Report is prepared in line with EIA Notification guidelines. The report attempts to identify, predict and communicate information on impacts of the proposed subproject on the environment along with mitigation and management measures for the indicated impacts

Key Environmental Laws & Policies:

The Constitutional Provisions like Article 48 and 51-A (g) and 74th Amendment to the Constitution serve as principle guidelines of environmental protection. Further Regulations, Acts, Policies applicable to sustainability and environmental protection are as follows.

- *EIA Notification, September 2006 & subsequent Amendments*
- *The Environment (Protection) Act, 1986*
- *The Water (Prevention and Control) Act, 1974*
- *The Air (Prevention and Control) Act, 1981*
- *The Indian Forest Act, 1927*
- *The Karnataka Forest Act, 1963*
- *The Forest (Conservation) Act, 1980 (as amended in 1988)*
- *The Forest Conservation Rules, 1981*
- *The Wildlife Protection Act, 1972*
- *The Hazardous Waste (Management and Handling) Rules, 1989*
- *Fly ash Notification, 2009*
- *The Ancient Monuments and Archaeological Sites and Remains Act 1958*
- *The Motor Vehicles Act 1988*
- *Public Liability Insurance Act, 1991*
- *Coastal Regulation Zones Act*
- *The Factories Act 1956*

The other guidelines and norms related to road construction by Indian Road Congress that help for environmental protection include, IRC: 104-1988, IRC: 36-1974, IRC: 10-1961, IRC: 36-1970, IRC: 43-1972, IRC: 72-1978, IRC: 33-1982, etc.

Applicability of EIA Notification, 2006:

The **project** road from Km 4+560 to Km 37+650 has a length of 33 km but involves additional right of way or land acquisition less than 40 m on the existing alignment and 60m acquisition for bypass/green filed alignment proposal. Hence, the highway does not qualify for environmental clearance.

Baseline Environment:

Information on baseline environment is collected from secondary sources of data for the macro environmental parameters like climate, physiography (geology and geomorphology), biological and socio-economic environment of the project influence

area. The micro-environmental details within the Corridor of Impact (CoI) have been collected from primary source of data such as base maps prepared by reconnaissance survey, extrapolation of environmental features on the proposed design, tree enumeration, analysis for environmental attributes along the project road.

Analysis of Alternatives:

The existing National Highway NH-37 is being up-graded to 4/6 Lane standards. An alignment options were studied by providing realignments for improving the road geometrics and for smoothening the sharp curves and bypasses to avoid narrow and congested stretches of the project road along with green filed alignment option. Hence analysis has been done for provision of bypass and green filed alignment.

Stakeholder Consultation:

During the survey, informal and unstructured stakeholder consultations were conducted at DC office Silchar, the purpose of the surveys and salient features of the proposed project were explained to the stakeholders to gather their opinions and concerns regarding the project.

Anticipated environmental impacts and mitigation measures:

The key Environmental impacts, both direct and indirect on various environmental attributes during construction and operational phases of proposed NH improvement project are discussed in detail in the report. Significant positive and negative impacts due to project are summarized in the following impact matrix.

Environmental Attributes	Physical Environment			Biological Environment		Geology		Topo-graphy
	Air	Water	Noise	Flora	Fauna	Natural Drainage	Soil	
I. Construction Phase								
Labour Camp Activities		-ve/t						
Quarrying	**-ve/t**		**-ve/t**	-ve/t		-ve/t	**-ve/p**	**-ve/p**
Material Transport & Storage	-ve/t	-ve/t	-ve/t	-ve/t		-ve/t	-ve/t	
Drilling and Blasting	**-ve/t**		**-ve/t**	-ve/t				**-ve/p**
Pavement works	-ve/t	-ve/t	-ve/t	-ve/t	-ve/t	**-ve/p**	-ve/t	**-ve/p**
Use of Construction Equipment	**-ve/t**	**-ve/t**	**-ve/t**					
Cutting of Trees				**-ve/p**				

Environmental Attributes	Physical Environment			Biological Environment		Geology		Topo-graphy
	Air	Water	Noise	Flora	Fauna	Natural Drainage	Soil	
Plantation	+ve/p		+ve/p	**+ve/p**			+ve/p	
Culvert and Bridge Construction		-ve/t	-ve/t			**-ve/p**		
Stripping of Topsoil				-ve/t		-ve/t	**-ve/t**	
Debris Generation	-ve/t	-ve/t				-ve/t	-ve/t	
Oil and Grease		-ve/t					-ve/t	
II. Operational Phase								
Vehicular Movement	+ve/p		+ve/t	+ve/t	-ve/p			

Note: t – Temporary; p- Permanent; Impacts indicated in bold letters are Significant Impacts.

Environmental Management Plan:

Environmental Management Plan (EMP) deals with the implementation procedure of the guidelines and mitigation measures recommended to avoid, minimize and mitigate foreseen environmental impacts of the project. The implementation of environmental management plan needs suitable organization set up and the success of any environmental management plan depends on the efficiency of the group responsible for implementation of the programme. It is proposed to carryout regular environmental monitoring to provide information to the management for periodic review to ensure that environmental protection is optimized at all stages of the project implementation.

Conclusion:

The proposed improvement to the existing National Highway section road and it is proposed to be up-graded with new.

The Environmental Assessment study nation report attempts to identify significant potential environmental impacts associated with the construction and operational phases of the proposed road Project. Apart from positive impacts road projects could also generate some adverse direct and indirect environmental impacts. Direct environmental impacts are usually due to construction activities, while indirect environmental impacts are usually related to the operation of improved roads.

Other than the temporary insignificant impacts during construction phase, the two most significant issues involved are cutting of road side trees along the proposed stretch of NH-37 and acquisition of forest land in the forest along the proposed green field alignment.

0.18 Social Assessment

Social Assessment details the processes for assessing the project's potential social impacts and defining opportunities to enhance benefits and mitigate adverse social impacts. It contains the modalities for profiling socio-economic conditions, identifying stakeholder groups and analysing their interests and concerns, conducting social screening to assess potential impacts and linking these findings to project design. This will provide input for the Resettlement Action Plan, which will be prepared in due course.

Expected Socio-Economic Benefits Of the Project

The project will help to increase new economic and employment opportunities by providing improved linkages to markets, production centres and other areas of economic opportunities. The project is major transportation corridor which connects Silchar and Imphal. The road will increase the connectivity of the project area as well as the state as a whole to the surrounding region.

This project aims at maximizing project benefits while minimizing the negative social impacts. The social development outcome of the project will include:

i) The project road connects Assam and Manipur. The proposed green filed alignment will serve the settlement along existing road with better access to economic activities. Improved connectivity will facilitate travel, will help to have better access to amenities such as health, education, town/market, and improved social networking.

ii) The project will improve the accessibility of the population along the project corridor to education, health, employment, trading and employment opportunities and in the long run help towards poverty alleviation.

iii) The project will help to increase new economic and employment opportunities by providing improved linkages to markets, production centers and other areas of economic opportunities. Better and quicker transportation would help the rural population to transport their produce faster and get more profit margins instead of depending solely on local 'markets' and middlemen. This corridor has abundant tourism potential other places of tourist interests.

iv) Women will benefit, as their mobility will be facilitated both in terms of access to social services, as well as access to higher levels of schooling. Women's access to higher levels of health care outside the village particularly during the time of childbearing will also improve considerably.

v) Targeted assistance will be provided to vulnerable groups including below poverty line families, women headed households, and handicapped persons, through the Resettlement Policy for the Project.

The likely adverse impacts of the project are:

i) Potential adverse impacts associated with land acquisition;

ii) Loss of livelihood and

iii) Social exclusion where the affected non-titleholder and encroachers may not be eligible for assistance and compensation under local laws and procedures

Overall, the proposed Project will bring in economic and social changes, which in turn would bring economic prosperity and would lead to poverty alleviation.

Methodology

Collection and Analysis of Secondary Data: Secondary data pertaining to various socioeconomic parameters was collected from government departments like Census of India, Department of Industries, Department of Economics and Statistics, Department of Agriculture, etc.

Screening survey: A preliminary screening survey was conducted within a width of 45 meter to quantify the impact on buildings/structures that likely to be affected by the widening of the road. The number of residences, commercial buildings, common property resources and religious structures were surveyed for RHS and LHS separately. The survey covered: the settlements along the alignment, structures likely to be affected, community structures likely to be affected and communities affected.

Focused Group Discussions (FGD): Focus Group Discussions were conducted at selected places throughout the corridor to understand the people's perception about the project as well as their issues and concerns. The willingness of the people to part with their land for the project and the compensation anticipated also noticed.

Task of the assignment

The tasks of this assignment include:

a) Carry out a preliminary social screening in coordination with other screening exercise (environment and technical) – desk review and field visit- of the highway to determine the magnitude of actual and potential impact and ensure that social considerations are given adequate weight in the selection and design of proposed highway improvements;

b) Collect information – desk review and field visit – on existing baseline conditions (include all within the proposed width or Right of Way), and undertake a preliminary evaluation of the highway selected for improvement in order to define, the zone of impact of such component or activities, design and management studies;

c) Explore viable alternative project designs and alignments to avoid, where feasible, or minimize displacement and carry out public consultations on alternate bypass alignments.

d) Identify major and minor social impact issues and estimate the economic and social negative impacts on people and land of upgrading the highway and propose cost-effective measures to avoid and/or mitigate negative impacts;

e) Identify case of likely impact on Indigenous communities, to establish the applicability of GOI/State Government regulation;

f) Carry out public consultation with the likely affected groups, NGOs, district administration and other stakeholders and document the outcomes;

g) Provide a preliminary cost estimate for land acquisition, transfer and resettlement and rehabilitation and ensure inclusion in the overall project cost;

h) Assets both within and outside of the right of way such structures and land will be recorded on strip maps; and

0.19 Cost Estimates

The project cost has been worked out for civil works for main carriageway, Service road, Truck lay bye, Toll Plaza, bus bays and junction improvement with Flexible pavement. Project road length is considered as Budha Nagar – Jiribam section, Package: SJ-2 from D. Km 24+560 to D. Km 37+650. The details are presented in the Volume VI, VII & VIII: Rate analysis and Cost estimate. The item - wise abstract of cost of Civil Works for this Package are given below.

Table 0.19 Abstract of Cost Estimate

Bill No.	Item of works	Cost (Rs. Crores)	% of Total cost
1	Site Clearance	0.26	0.04%
2	Earthwork	87.38	13.19%
3	Granular Sub-base & Base Courses	69.65	10.51%
4	Bituminous Base and Surface Courses	31.02	4.68%
5	Drain works	8.31	1.25%
6	Protection Works		
	a) Breast wall	6.8	1.03%
	b) Retaining /Toe wall	0	0.00%
	c) Slope protection work	14.42	2.18%
7	Traffic Signs, Markings and Other Road Appurtenances	15.55	2.35%
8	Miscellaneous works	10.31	1.56%
9	Toll Plaza	11.81	1.78%
10	Cross Drainage Works - Box Culverts		
	Pipe culverts	1.09	0.16%
	Box culverts	17.02	2.57%

Bill No.	Item of works	Cost (Rs. Crores)	% of Total cost
11	Bridges		
	a) Minor Bridge	42	6.34%
	b) Major Bridge	31.83	4.80%
12	Underpasses	-	
	a) SVUP	6.32	0.95%
	b) LVUP	3.77	0.57%
	c) VUP/VOP	6.07	0.92%
13	ROBs	28.88	4.36%
14	Tunnel	270.16	40.77%
I	**Cost of Civil Works (in Crores)**	662.63	100.00%
II	Utility Shifting Cost (PHE & PnE)	14.59	
III	Labour cess @ 1% of civil cost (I)	6.63	
IV	**Total Civil Cost (I+II+III)**	**683.85**	
V	IC/pre-operative expenses @ 1% of Total Civil Cost (IV)	6.84	
VI	Financing expenses on Debt	4.49	
VII	IDC (Interest During Construction) on Debt (Term loan)	37.86	
VIII	**Estimated Project Cost (Bid Invitation Cost) including IC/Pre-operative expenses, Financial Expenses and IDC and without GST (IV+V+VI+VII)**	**733.04**	
VIII A	Bid Project Cost on bid due date (variation with respect to EPC is 24.37% as per financial model)	911.70	
IX	GST @ 18% of Total EPC cost (VIII) excluding IDC	125.13	
X	Estimated Project Cost including centages with GST (VIII + IX)	858.17	
XI	**Others**		
a	Supervision Charge 2.5% on Utility shifting cost (II) and GST @ 18%	0.43	
b	Supervision charges @ 3% of total civil cost (IV) (as per MORTH Letter no. EW-Nh-33044/10/2019-S&B 9 P&B dated March 7, 2019)	20.52	
c	Agency Charges @ 3% of Total civil cost (IV) and GST @ 18%	24.21	
d	O & M charges as assessed by FC as per financial model document for 15 years	117.62	
XII	Subtotal for others (a+b+c+d)	162.78	
XIII	Preconstruction Activities (Non-Civil Cost)		

Bill No.	Item of works	Cost (Rs. Crores)	% of Total cost
	Environmental Forest clearance Cost	24.5	
	AGCL (132 KV)	7.00	
	PGCIL (400 KV & 132 KV)	18.48	
	Land Acquisition and Rehabilitation & Resettlement cost	129.89	
XIV	Sub-Total (in Crores)	179.86	
XV	**Total Capital Cost = X+XII+XIV (Rs. Crores)**	**1200.82**	
	Length of the project road (Km)	13.09	
	Civil Cost Rate per km (in Crores)	50.62	
	Total Capital Cost Rate per km (in Crores)	91.74	

Annexure

Annexure 1. DPR Checklist – Stage 4 – Final Detailed Project Report (R1)

General Details	
Project Name	Silchar to Jiribam, Package: SJ-1 (D. Km 4+560 to D. Km 24+560)
Consultant's Name	Transys Consulting Pvt.Ltd.
Date of Review	

1	**Main Report**	Yes ☑ No ☐ NA ☐	NA	
2	**Introduction and project background**	Yes ☑ No ☐ NA ☐	NA	
2.1	Overview of project location, project objectives etc.	Yes ☑ No ☐ NA ☐	NA	
2.2	Overview of report structure, deliverables etc.	Yes ☑ No ☐ NA ☐	NA	
3	**Social analysis of the project**	Yes ☑ No ☐ NA ☐	NA	
3.1	Project impact on stakeholders such as local people	Yes ☑ No ☐ NA ☐	NA	
3.2	Project impact on residential, commercial and public properties	Yes ☑ No ☐ NA ☐	NA	
3.3	Any other details relevant to the project	Yes ☑ No ☐ NA ☐	NA	
4	**Reconnaissance survey**	Yes ☑ No ☐ NA ☐	NA	
4.1	Geometric Features of the Existing Road Design Speed • Sight distance details • Horizontal Alignment Details • Vertical Alignment Details • Height of Embankment	Yes ☑ No ☐ NA ☐		
4.2	Topographical Survey using LiDAR (or equivalent technology) as per IRC:SP:19 • Gradient • Terrain	Yes ☑ No ☐ NA ☐	NA	
4.3	Pavement composition and condition survey as per IRC:SP:19	Yes ☑ No ☐ NA ☐	NA	
4.4	Pavement roughness survey as per IRC:SP:16	Yes ☑ No ☐ NA ☐	Na	
4.5	Pavement structural strength survey as per IRC:81	Yes ☑ No ☐ NA ☐	NA	
4.6	Geological Survey • Geological Map of the Area • Seismicity	Yes ☑ No ☐ NA ☐	NA	
4.7	Climatic Conditions • Temperature • Rainfall • Wind	Yes ☑ No ☐ NA ☐	NA	
4.8	Land Use along the existing alignment • Map of the Project Area depicting Agricultural/Habitation/Forest Area	Yes ☑ No ☐ NA ☐	NA	

S.No	SECTION OF THE REPORT	YES / NO / NA	Details / Specifications	Remarks
4.9	Details of Existing Structures • Map of the Project Area depicting Hutments/Buildings/Temples/Public Building/Any Other Significant Structure	Yes ☑ No ☐ NA ☐	NA	
4.10	Inventory and condition survey of culverts	Yes ☑ No ☐ NA ☐	NA	
4.11	Geo-technical and sub-soil explorations as per IRC:78	Yes ☑ No ☐ NA ☐	NA	
4.12	Number of Bore holes dug (holes for every pier and abutment)	Yes ☑ No ☐ NA ☐		
4.13	Field testing, soil sampling, laboratory testing as per IRC: 78	Yes ☑ No ☐ NA ☐	NA	
4.14	Recommendation of Foundation Type and Depth	Yes ☑ No ☐ NA ☐		
4.15	Hydrological investigations as per IRC:5	Yes ☑ No ☐ NA ☐	NA	
4.16	High Flood Level specified	Yes ☑ No ☐ NA ☐	NA	
4.17	Depth of Water Table specified	Yes ☑ No ☐ NA ☐	NA	
4.18	Ponded Water Level specified	Yes ☑ No ☐ NA ☐	NA	
4.19	Materials Survey conducted as per IRC:SP:19	Yes ☑ No ☐ NA ☐	NA	
4.20	Sources of Naturally Occurring Aggregates specified • Details of Borrow Pits with Distance from Project Site • Cost of Material/Transportation	Yes ☑ No ☐ NA ☐		
4.20.1	Sources of environmentally friendly construction materials identified as per MoRT&H circular	Yes ☑ No ☐ NA ☐	NA	
4.21	Sources of Manufactured Items specified • Details of Suppliers with Distance from Project Site • Cost of Material/Transportation	Yes ☑ No ☐ NA ☐	NA	
4.22	Source of Water for construction specified as per IS:456	Yes ☑ No ☐ NA ☐	NA	
4.23	Any other details relevant to the project	Yes ☑ No ☐ NA ☐	NA	
5	**Traffic studies and demand forecast designs**	Yes ☑ No ☐ NA ☐	NA	
5.1	Classified traffic volume counts using IHMCL data (7 day data)	Yes ☑ No ☐ NA ☐	NA	
5.2	Traffic projection methodology as per IRC:108	Yes ☑ No ☐ NA ☐	NA	
5.3	Projected Traffic data for 20 years	Yes ☑ No ☐ NA ☐	NA	
5.4	Current and Projected PCU	Yes ☑ No ☐ NA ☐		
5.5	Current and Projected TVU	Yes ☑ No ☐ NA ☐		
5.6	Origin destination surveys as per IRC: 102	Yes ☑ No ☐ NA ☐	NA	
5.7	Speed and delay studies as per IRC:102	Yes ☑ No ☐ NA ☐	NA	
5.8	Traffic surveys for the design of road junctions as per data in IRC: SP:41	Yes ☑ No ☐ NA ☐	NA	

5.9	Analysis for replacing railway level crossings with over bridges/ subways	Yes ☑ No ☐ NA ☐	NA	
5.10	Axle load survey as per IRC:SP:19	Yes ☑ No ☐ NA ☐	NA	
5.11	Any other details relevant to the project	Yes ☑ No ☐ NA ☐	NA	
5.12	Traffic surveys monitored and reviewed by the client	Yes ☑ No ☐ NA ☐	NA	
6	**Cost estimates**	Yes ☑ No ☐ NA ☐	NA	
6.1	Project costing as per latest SoR	Yes ☑ No ☐ NA ☐	NA	
7	**Environmental aspects**	Yes ☑ No ☐ NA ☐	NA	
7.1	Environment profile of the project region	Yes ☑ No ☐ NA ☐	NA	
7.2	Details of Public consultation at residential and commercial settlements affected	Yes ☑ No ☐ NA ☐	NA	
7.3	Impact analysis and mitigation measures	Yes ☑ No ☐ NA ☐	NA	
8	**Economic and commercial analysis**	Yes ☑ No ☐ NA ☐	NA	
8.1	Estimated cost details	Yes ☑ No ☐ NA ☐	NA	
8.2	Projected revenues details	Yes ☑ No ☐ NA ☐	NA	
8.3	Assumptions stated	Yes ☑ No ☐ NA ☐	NA	
8.4	Analysis and results (IRR, Sensitivity Analysis, Financial Viability)	Yes ☑ No ☐ NA ☐	NA	
8.5	Conclusions and recommendations	Yes ☑ No ☐ NA ☐	NA	
8.6	Financial model shared with client and reviewed	Yes ☑ No ☐ NA ☐	NA	
9	**Conclusions and recommendations**	Yes ☑ No ☐ NA ☐	NA	
9.1	Report fulfils project objectives and scope as per RFP	Yes ☑ No ☐ NA ☐	NA	
9.2	Report reviewed for errors and omissions	Yes ☑ No ☐ NA ☐	NA	
9.3	Compliance report prepared on client observations	Yes ☑ No ☐ NA ☐	NA	
10	**Design Report**	Yes ☑ No ☐ NA ☐	NA	
10.1	Highway improvement proposals	Yes ☑ No ☐ NA ☐	NA	
10.2	Highway geometric designs	Yes ☑ No ☐ NA ☐	NA	
10.3	Roadside drainage	Yes ☑ No ☐ NA ☐	NA	
10.4	Intersections	Yes ☑ No ☐ NA ☐	NA	
10.5	Urban service roads	Yes ☑ No ☐ NA ☐	NA	
10.6	Bus-stops	Yes ☑ No ☐ NA ☐	NA	
10.7	Toll plazas	Yes ☑ No ☐ NA ☐	NA	
10.8	Pedestrian crossings	Yes ☑ No ☐ NA ☐	NA	
10.9	Utility relocation	Yes ☑ No ☐ NA ☐	NA	
10.10	Pavement	Yes ☑ No ☐ NA ☐	NA	
10.11	Structures	Yes ☑ No ☐ NA ☐	NA	
10.12	Any other details relevant to the project	Yes ☑ No ☐ NA ☐	NA	
10.13	Pavement deflection survey as per IRC 81-1997	Yes ☑ No ☐ NA ☐	NA	
10.14	Any other details relevant to the project	Yes ☑ No ☐ NA ☐	NA	

S.NO	SECTION OF THE REPORT	ESSENTIAL	Details/ Observations	Remarks
11	**Materials Report**	Yes ☐ No ☐ NA ☐	NA	
11.1	Material investigations as per IRC:10	Yes ☐ No ☐ NA ☐	NA	
11.2	Review of material investigations by client	Yes ☐ No ☐ NA ☐	NA	
11.3	Multiple borrow areas identified	Yes ☐ No ☐ NA ☐	NA	
11.4	Material survey as per IRC: SP: 19	Yes ☐ No ☐ NA ☐	NA	
11.5	Review of material survey by client	Yes ☐ No ☐ NA ☐	NA	
11.6	Geo-technical and sub-soil explorations as per IRC:78	Yes ☐ No ☐ NA ☐	NA	
11.7	Review of geo-technical and sub-soil explorations by client	Yes ☐ No ☐ NA ☐	NA	
11.8	Field testing, soil sampling, laboratory testing in accordance with BIS/ AASHTO/ BS	Yes ☐ No ☐ NA ☐	NA	
11.9	Pavement composition and condition survey as per IRC:SP:19	Yes ☐ No ☐ NA ☐	NA	
11.10	Review of pavement composition and condition survey by client	Yes ☐ No ☐ NA ☐	NA	
11.11	Pavement roughness survey as per IRC:SP:16	Yes ☐ No ☐ NA ☐	NA	
11.12	Review of pavement roughness survey by client	Yes ☐ No ☐ NA ☐	NA	
11.13	Pavement structural strength survey as per IRC:81	Yes ☐ No ☐ NA ☐	NA	
11.14	Review of pavement structural strength survey by client	Yes ☐ No ☐ NA ☐	NA	
11.15	Water sample tests as per MoRTH specifications	Yes ☐ No ☐ NA ☐	NA	
11.16	Any other details relevant to the project	Yes ☐ No ☐ NA ☐	NA	
12	**Environmental Assessment Report/ Resettlement and Rehabilitation Plan**	Yes ☐ No ☐ NA ☐	NA	
12.1	Option for alignment alternatives considered and conclusions	Yes ☐ No ☐ NA ☐	NA	
12.2	Land environment data collection and details/ impact/ mitigation measures	Yes ☐ No ☐ NA ☐	NA	
12.3	Air environment data collection and details/ impact/ mitigation measures	Yes ☐ No ☐ NA ☐	NA	
12.4	Water resources details/ impact/ mitigation measures	Yes ☐ No ☐ NA ☐	NA	
12.5	Noise environment details/ impact/ mitigation measures	Yes ☐ No ☐ NA ☐	NA	
12.6	Biological environment details/ impact/ mitigation measures	Yes ☐ No ☐ NA ☐	NA	
12.7	Details of public consultation	Yes ☐ No ☐ NA ☐	NA	
12.8	Environment monitoring and management plan	Yes ☐ No ☐ NA ☐	NA	
12.9	Details of social impact assessment	Yes ☐ No ☐ NA ☐	NA	
12.10	Details of resettlement and rehabilitation action plan	Yes ☐ No ☐ NA ☐	NA	

12.11	Measures to minimize resettlement	Yes ☑ No ☐ NA ☐	NA	
12.12	Details of public consultation with stakeholders	Yes ☑ No ☐ NA ☐	NA	
12.13	Details of implementation arrangement / budget	Yes ☑ No ☐ NA ☐	NA	
12.14	Any other details relevant to the project	Yes ☑ No ☐ NA ☐	NA	
13	**Technical Specifications**	Yes ☑ No ☐ NA ☐	NA	
13.1	MoRTH technical specifications for Roads and Bridge works followed	Yes ☑ No ☐ NA ☐	NA	
13.2	Details of technical specifications	Yes ☑ No ☐ NA ☐	NA	
14	**Rate Analysis**	Yes ☑ No ☐ NA ☐	NA	
14.1	Rate analysis for all relevant items as per latest SoR	Yes ☑ No ☐ NA ☐	NA	
15	**Cost Estimates**	Yes ☑ No ☐ NA ☐	NA	
15.1	Cost estimates for all relevant items as per latest SoR	Yes ☑ No ☐ NA ☐	NA	
16	**Bill of quantities**	Yes ☑ No ☐ NA ☐	NA	
17	**Drawing Volume**	Yes ☑ No ☐ NA ☐	NA	
18	**Digital drawings of road**			
18.1	Highway cross sections	Yes ☑ No ☐ NA ☐		
18.2	3D engineered models of: • Road alignment geometry • Proposed highway • Proposed structures	Yes ☑ No ☐ NA ☐		