

## EXECUTIVE SUMMARY

### 0.1 Objective

The President of India acting through the Ministry of Road Transport & Highways (MoRT&H), Government of India, represented by the Director General (Road Development) & Special Secretary is engaged in the development of National Highways and as part of this endeavor, MoRT&H has decided to undertake 2-laning with paved shoulder and/or strengthening of the various sections of National Highways and it has entrusted NHIDCL for the execution of the DPR. National Highways and Infrastructure Development Corporation is a fully owned company of the Ministry of Road Transport & Highways, Government of India. National Highways & Infrastructure Development Corporation Limited (NHIDCL), Government of India has decided to implement the Two Laning of Joram–Koloriang Road (NH-713) from Km 20.00 to Km 70.00 & Km 138.00 to Km 158.000 (total length 70km) in the state of Arunachal Pradesh on EPC mode. Accordingly NHIDCL intends to take up the preparation of the feasibility and detailed project report for same.

Joram to Koloriang section (length about 70km) of NH- 713 is a part of such National Highways, project preparation for 2laning with paved shoulder which is taken by MoRTH on priority basis.

In order to access the financial and technical feasibility **M/s Voyants Solutions Private Limited** have been entrusted by MoRT&H the task of carrying out the Joram to Koloriang section (length about 70km) of NH- 713 as a part of such National Highways, project preparation for 2 laning/2laning with paved shoulder which is taken by MoRTH on priority basis.

### 0.2 Project Road Description

The project road takes off from NH-229 at Joram Junction very near to Joram church. Joram is about 14 km south of the location Ziro in the district of Lower Subansiri. However, the first 20 km (From km 0.00 to km 20.000) is being implemented by the BRO and outside the scope of this project and comes under the district of Lower Subansiri. Km 20.00 to km 70.00 is the first stage of this subject project and under districts of Lower Subasiri as well as Kra Daadi. New Palin town is the last point of this project. Then again km 70.00 to km 138.00 is under the scope of a different agency, being under project preparation stage through MORTH and falls in the district of Kurung Kumey. The last stage under this contract begins at km 138.00 and end at km 158.00 at Koloriang which is the district Head Quarter of Kurung Kumey district.

The existing length of the project road is 70 kms and it traverses through the districts of Lower Subansiri, Kra Daadi and Kurung Kumey.

The project road is not continuous. The first part is of length 50.0km (from km 20.00 to km 70.00

near New Palin town) and the second part is of length 20.00km (from km 138.00 to km 158.00).

### **0.3 Abutting Land Use Pattern**

A considerable part of the corridor passes through forest stretches. The existing abutting land use pattern for the balance reaches is predominantly agricultural. Besides, at few stretches it is found built up and open/hilly in nature.

### **0.4 Geology**

Geology plays an important role in shaping the seismicity, vegetation, surface and groundwater scenario of an area. So, it becomes imperative to know the geology of the project districts. The Geological formation of the Project districts is described as follows:

In Arunachal Pradesh, two young belts E - W Eastern Himalayas and N - S Indo – Myanmar mobile belts exist, which meet almost at right angles to each other. The region has been divided into four physiographic segments, with major tectonic features lineaments separating each segment as given below.

#### **(i) Eastern Himalayan Mobile Belt:**

It rises abruptly from the Brahmaputra plain and merges with Tibetan plateau in the north. This belt covers about 350 km of Eastern part of Himalayas, known as the Arunachal Himalayas and extends from Eastern Nepal in the west to the West Siang district of Arunachal Pradesh in the east, terminating against N – W trending parametamorphites and diorite - granodiorite complex of Mishmi block of Lohit district of Arunachal Pradesh. The eastern mobile belt embodies a succession of northerly dipping thrust sheets covering almost the whole of Arunachal Pradesh. Deep erosion along these thrust contact brings about the four well known E – W trending physiographic units of the eastern Himalayas namely Sub - Himalayas, Lesser Himalayas, Higher Himalayas and Tethyan belt or Tibetan Himalayas. North of it lies zone of Indus - Tsangpo suture. Upper part of Subansiri basin falls in this belt.

#### **(ii) Mishmi Block:**

Mishmi block lies adjacent to the Naga - Patkai ranges of Arakan – Youma Mountains to the south along another tectonic plate - the Mishmi thrust. The Himalayas at the eastern end gets terminated along the Tidding suture and meets another chain of mountains - the Mishmi hills, which are the part of Mishmi block mobile belt. These mountain ranges, trending NW - SE are said to be a continuation of the hill ranges of northern Myanmar (Burma), but are also considered to be in continuation of the Ladakh ranges lying to the north of Indus – Tsangpo suture.

These are made up of diorite - granodiorite complex with a frontal belt of high grade schists and migmatites, and inner belt of low grade schist with crystalline limestone and serpentinite lenses. The important tectonic activities in this block are Mishmi thrust, Tidding Suture, Lohit thrust and Pochu fault.

**(iii) Indo - Myanmar (Burmese Belt) Mobile Belt:**

The Patkoi - Naga - Manipur - Chil Hills – Arkan Yoma region forms a westerly convex arcuate belt in the eastern part of the Arunachal Pradesh, which is an eastern portion of the Indo - Myanmar (Burmese) mobile belt and is made up of Paleogene - Neogene sediments.

**(iv) Brahmaputra Plains:**

This is an ENE - WSW trending relatively narrow valley bounded by two young mountain belts to the north and south east, Mishmi block to the north east and Meghalaya plateau to the south. The valley is filled by thick alluvium with a few inselbergs of basement rocks from Tezpur west wards. Almost flat lying tertiary shelf sediments overlie the basement whose thickness increases from south to north towards Himalayas.

Geological features in the project districts show marked variation ranging from Higher / Lesser Himalayas, foothills and plains falling in Bomdila group, Miri Group, Gondwana Group and Siwalik Group as well as Alluvium.

**0.5 Important Settlements**

There are two important towns along the alignment. These are (1) New Palin near km 69.00, (2) Koloriang near km 158.00. The other settlements in general are villages with scattered kutcha houses. These are (1) New Pania near km 24.00, (2) Neelum near km 32.00, (3) Deed near km 35.200, (4) Daam near km 42.00, (5) Shakti near km 58.00.

**0.6 Right of Way**

The road land boundary pillars are not found along the road as dense forests abut either side of the existing road. According to site observations, the width from the road shoulder edge adjoining the valley side to the shoulder edge along the hill face varies from 6m to 12m.

The proposed ROW is taken as 35m, in general, except at built up areas where 15m total ROW has been considered.

**0.7 Traffic**

To establish the traffic characteristics along the project road, Consultants have carried out 7 days Classified Traffic Volume Counts at a couple of locations.

The Average Annual Daily Traffic (AADT) in the base year 2016 for the two packages is presented in **Table 0.1**.

**Table 0.1: The AADT in the Year 2016 on the Two Packages**

Homogeneous Section	From (km)	To (km)	Length (km)	AADT ( No )	AADT (PCU)
KM 20.000 To KM 58.716	20.000	70.00/59.363	39.363	560	595
KM 138.000 To KM 154.036	138.000	158.00/154.036	16.036	528	607

Projected traffic are given in **Table 0.2** for two homogeneous section.

**Table 0.2: Projected Traffic**

Year	At km 67+500		At km 155+200	
	Nos	PCU	Nos	PCU
2016	560	595	527	575
2017	588	624	553	603
2018	617	656	581	633
2019	788	951	743	965
2020	827	998	781	1013
2021	869	1048	820	1063
2022	912	1100	861	1117
2023	958	1155	904	1172
2024	1006	1213	949	1231
2025	1056	1274	996	1293
2026	1109	1338	1046	1357
2027	1164	1404	1098	1425
2028	1222	1475	1153	1496
2029	1283	1548	1211	1571
2030	1348	1626	1271	1650
2031	1415	1707	1335	1732
2032	1486	1793	1402	1819
2033	1560	1882	1472	1910
2034	1638	1976	1545	2005
2035	1720	2075	1623	2105

From the projected traffic it is thus recommended to provide 2-lane wide carriageway with paved shoulders.

## 0.8 Pavement Design

The pavement composition to be considered is given below:

**(a) New Construction and Widening Stretches**

The adopted pavement thicknesses for new and widened pavement are given in **Table 0.3**.

**Table 0.3: Pavement Composition for New/Widened Pavement**

Pavement Composition	Thickness (mm)
BC	40
DBM	80
WMM	250
GSB	200
Sub-grade	500

20 MSA and Sub-grade CBR of 10% (4 Days Soaked) has been considered for the above pavement design as per IRC: SP:73-2015 of Paragraph 5.4.1

Life Cycle cost analysis was done to compare the financial impact between both the flexible and the rigid pavements. **Considering low traffic road, use of rigid pavement will not be economical.**

**0.9 Road Junctions / Intersections**

There is one major junctions (as shown in **Table 0.4**) and 61 minor Junctions along the project road.

**Table 0.4: List of Major Junctions**

Sl.No	Name	Ex. Chainage (km)	Side		Type of Junction	Type of Road	Remarks
			LHS	RHS			
1	Koloriang	158.000	IB Bungalow, Kurung Kumey Town	Circuit House	4-Arm	BT	NH-713

**0.10 Cross Drainage Works**

There are no major bridges, and 10 minor bridges existing along the project road. Depending on the condition of bridges they are recommended for retained, widening and reconstruction. 323 culverts exist along the project road and most of them need to be reconstructed.

**0.11 Cost Estimates**

Unit rates were primarily estimated by using the MoRTH, Standard Data Book of Rate Analysis and PWD SOR – Arunachal Pradesh (2014) by providing the necessary cost inputs related to labour, material and equipment. Unit rates for other items of work were finalized after considering the

current market rates or from information or other major projects of similar standards.

The basic rates of machinery, materials, labour have been escalated for the current year by 5% /year.

The total cost of project is 196.70 averaging 12.80 crore per km details are shown in Table 0.5

<b>Table 0.5: ABSTRACT OF COST : PACKAGE</b>				
<b>Item</b>	<b>Description</b>	<b>Percentage Weightage vis a vis overall project</b>	<b>Amount (in RS)</b>	<b>percentage Weightage vis a vis Overall Project Cost</b>
	<b>Civil Cost</b>		<b>1683178812</b>	<b>168.32</b>
	<b>Cost/KM at Civil Cost</b>		<b>109560555</b>	<b>10.96</b>
	<b>Escalation @ 5% (Considering 1 year time between project preparation and appointed date)</b>	<b>5.0%</b>	<b>8.42</b>	<b>6.36</b>
	<b>Contingency Charges @ 2.8% of Civil Cost (I+II)</b>	<b>2.8%</b>	<b>4.95</b>	<b>3.74</b>
	<b>Total Cost With Contingency (EPC Cost = I+II+III)</b>		<b>181.68</b>	<b>137.26</b>
	<b>Agency Charges</b>	<b>3.0%</b>	<b>5.45</b>	<b>4.12</b>
	<b>Quality Control</b>	<b>0.25%</b>	<b>1.82</b>	<b>1.37</b>
	<b>Road Safety</b>	<b>0.25%</b>	<b>1.82</b>	<b>1.37</b>
	<b>Supervision</b>	<b>3.0%</b>	<b>0.05</b>	<b>0.04</b>
	<b>Estimated Project Cost (IV+VIII)</b>		<b>190.82</b>	<b>144.16</b>
	<b>Cost of Land Acquisition etc.</b>		<b>0.84</b>	<b>0.65</b>
	<b>Solatum Charges @ 30% on land value</b>			
	<b>Establishment Charges @ 8% on land value</b>			
	<b>Contingency Charges @ 2% on land value</b>			
	<b>Total Cost of Land Acquisition etc.</b>			
	<b>Total Cost of R&amp;R</b>			
	<b>Shifting of Utility Service</b>		<b>0.61</b>	<b>0.61</b>
	<b>Environment Cost</b>		<b>0.61</b>	<b>0.61</b>
	<b>Greenery Charge @</b>	<b>1.0%</b>	<b>1.82</b>	<b>1.37</b>
	<b>Total Cost</b>		<b>1966977149</b>	<b>196.70</b>
	<b>Cost/KM at Total Cost</b>		<b>128033402</b>	<b>12.80</b>