

Executive Summary

EXECUTIVE SUMMARY

0.1 Project Background

The General Manager (Tech), National Highways and Infrastructure Development Corporation Limited (NHIDCL) under MoRTH, Govt. of India has been entrusted with the assignment of preparation of Detailed Project Report for development of Economic Corridors, Inter Corridors and Feeder Routes to improve the efficiency of freight movement in India under Bharatmala Pariyojana (Lot-1).

In view of the above work General Manager (Tech), NHIDCL has appointed M/s Voyants Solutions Pvt. Ltd. for Package II of Lot-1 to carry out the preparation of Detailed Project Report including field investigations, road inventory, structure inventory, Pavement Investigation, road crust sample (trial pits), material investigation, secondary data collection and traffic survey (classified traffic volume count, O-D, intersection counts, axle load survey, animal/pedestrian crossing counts and speed-delay survey). The Letter of Commencement has been issued vide Letter No. NHIDCL/Bharatmala/DPR/Phase-I/Lot-1/Package II/2017/80 dt. 13.04.2018.

In addition, a supplementary agreement was signed on 19th June 2019 between NHIDCL and M/s Voyants Solutions Pvt. Ltd. for preparation of Feasibility Study and DPR for Dergaon Town Section on NH-37 from Km 426.800 to Km. 437.800 in the state of Assam.

0.2 Project Road Description

The road segment of the project road stretch is mentioned below in **Table 0.1**.

Table 0.1 : List of Road Segments as per RFP

Segment	Description	Chainage (km)		Length (km)
		Start	End	
Dergaon Stretch				
1	From Km 426+800 to Km 437+800	426+800	437+800	11.000
Total Length =				11.000

Project location on state and district maps are presented on **Figure 1.1** and **1.2** respectively.

The project road follows NH-37. It starts at existing Km. 426+800 (26°41'36.76"N, 93°56'29.23"E) and ends at existing Km. 437+800 (26°43'29.62"N, 94° 2'27.11"E) on NH-37. It passes through Dergaon Village in Golaghat District.

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0.3 Existing Characteristics of the Project Road

The salient features of the existing project road are given in **Table 0.3**.

Table 0.3 : Salient Features of the Existing Project Road

Sl No.	Items	Details
		Dergaon Town Section (NH 37)
1	Design Length	10.600 KM
2	Districts Enroute	Golaghat
3	Important Settlements	Dergaon, Baliyan
4	Terrain	100% Plain
5	Landuse	Agricultural-35%, Open-25%, Residential/Commercial-40%
6	National Park	Nil
7	Existing ROW	12m – 30m
8	Forest Stretches	Nil
9	Present Road Condition	Fair to Poor (2-Lane c/w)
10	Bypass/Realignment to be Involved	Nil
11	Built Up Stretches	About 4km
12	Carriageway Width	7.0m – 10.0m
13	Average Journey Speed	30-40kmph,
14	Requirement of Bypasses	Nil
15	Horizontal Geometry	Fair-Good
16	Vertical Geometry	Fair-Good
17	No. of Existing Structures	18 (MNB-3, Culvert-15)
18	No. of Level Crossings	Nil
19	No. of Intersections	Major-1, Minor-16
20	Roadside Trees	1431 nos.
21	Major Rivers	Nil
22	Water Logging Area	-
23	Roadside Utility	HT/LT lines, OFCs, Water Pipe Line, tube wells, wells
24	Road Safety	Sub-standard and Negligible

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0.4 Traffic

The summary of Average Daily Traffic (ADT) is shown in **Table 0.4a**.

Table 0.4: Average Daily Traffic at Count Locations for Dergaon Town Section (NH 37)

Vehicle Type	At Km 435+700 of NH37
Car	4838
2-Wheeler	2804
3-Wheeler	42
SCV	956
LCV	669
2 Axle Truck/Bus	923
3 Axle Truck/Bus	446
MAV	526
Tractor	5
Tractor with Trailer	3
Cycle	592
Cycle Rickshaw	16
Others	1
Total (numbers)	11821
Total (PCU)	15070

Projected traffic is presented in **Table 0.5**.

Table 0.5 : Projected Total Traffic AADT

Vehicle Type	At Km 435+700 of NH 37
Car	4541
2 Wheeler	2592
3 Wheeler	39
SCV	911
LCV	637
2 Axle Truck/Bus	879
3 Axle Truck/Bus	425
MAV	502
Tractor	5
Tractor with Trailer	3
Cycle	592
Cycle Rickshaw	16
Others	1
Total (numbers)	11142
Total (PCU)	14264

0.5 Survey and Investigations

The following engineering survey and investigations were conducted at this stage of project preparation:

- a) Reconnaissance Survey: to assess the quality and quantity of features along the alignment, the data was used to finalize the most preferred alignment.
- b) Road Inventory: to assess the characteristics of existing road, this was used to finalize plan and profile drawings as well as extent of widening required.
- c) Road Condition Survey: to assess condition of existing pavement, the data has helped to assess the usability of existing pavement along with extent of repair work needed.
- d) Inventory and Condition Survey of Existing Bridges, Culverts and Other Structures: to check the dimensions and conditions of existing structures, the information obtained has guided to finalize the improvement proposals of existing structures.
- e) Topographic Survey: to exactly identify locations of all existing features along the alignment, this survey will dictate the final plan & profile drawings, BOQ etc. This survey will be conducted at the next stage of project preparation.
- f) Traffic Survey: To assess possible traffic intensity along the proposed road along with its future projection, this survey is the basic of the entire study. The data has been used to finalize lane configuration, tolling strategy and the viability of the project.
- g) Axle Load Survey: to assess possible loading over proposed pavement. The data was used to determine the VDF which ultimately guided the pavement design.
- h) FWD Survey: to assess the existing pavement composition from deflection point of view, the data was used to finalize overlay thickness.
- i) Pavement Investigation: to assess characteristics of existing pavement, the data was used for pavement design.
- j) Material Investigation: to assess possible sources of construction materials and their suitability, distance of sources from project road was used to calculate the lead distance which is ultimately used for rate analysis.
- k) Sub Soil Exploration: to assess the quality and nature of soil underneath, at major structure locations, the data will be used to finalize type/dimensions of foundation and substructures. This investigation will be conducted at the next stage of project preparation.

0.6 Development Proposals

The salient proposals for up-gradation and improvement of the project road are classified into the following engineering aspects:

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- In general, in this section of proposed stretches follows existing NH-37 (from Km 426+800 to 437+400).
- Widening of the project road based on traffic capacity/requirement.
- Improving the horizontal geometry of the existing road based on the design standards as per IRC: SP: 84-2019.
- Design of new pavement for widening and realignment of the existing road.
- Provision of overlay at strengthening stretches.
- Improvement of all major and minor intersections.
- Rehabilitation and widening of the existing structures including bridges, culverts etc. and design of new ones as per requirement.
- Provision of comprehensive road furniture for complete road safety measures.

The general design standards for improvement are enumerated in **Table 0.6**.

Table 0.6: Geometric Design Standards for Road Works (Plain/Rolling Terrain)

SI No.	Attributes	Geometric Design Standards
1	Design Speed	
	Plain and Rolling Terrain (Cross slope of the ground up to 25per cent)	Ruling: 100 kmph Minimum: 80 kmph
2	Carriageway Width	For four lanes: 2 x 7.0m
3	Width of Shoulder	
	a) Paved Shoulder b) Earthen Shoulder	2 x 2.5 m 1.5 m
4	Footpath width at built-up areas	2 x 1.5 m drain cum footpath
5	Camber	
	a) Carriageway b) Shoulder	2.5% 3.0%
6	Maximum and Minimum Super-elevation	Maximum limited to 7.0% (for Radius less than Desirable minimum) Minimum limited to 5% (for Radius more than Desirable minimum)
7	Minimum Radius of Horizontal Curves	
	a) Plain and rolling Terrain	Desirable Minimum: 400m Absolute Minimum: 250m
8	Sight Distances for Various Speeds	180m – 360m
9	Longitudinal Gradient	
	a) Plain and Rolling Terrain	Ruling: 2.5%, Limiting: 3.3%
10	Extra Width of Pavement	
	Radius of Curve	Extra Width

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SI No.	Attributes	Geometric Design Standards
	75-100m	0.9m
	101-300m	0.6m

Total 4 nos. typical cross sections are envisaged for the project as mentioned below:

TYPE –1 : Typical Cross Section of 4-Lane Divided Carriageway With 0.5m Wide Crash Barrier Median and with 7.5m (including Kerb Shyness) Service Road on Both Sides in Built-Up Area

TYPE –2 : Typical Cross Section Of 4-Lane Divided Carriageway With 4.0m Wide Raised Median in Rural Area (Concentric Widening)

TYPE –3A : Typical Cross Section Of 4-Lane Divided Carriageway With 4.0m Wide Raised Median in Rural Area (Left Side Eccentric Widening)

TYPE –3B : Typical Cross Section Of 4-Lane Divided Carriageway With 4.0m Wide Raised Median in Rural Area (Right Side Eccentric Widening)

Cross Section summary is provided in **Table 0.7**.

Table 0.7 : Summary of Cross Sections

TCS No.	Description	No. of Locations	Length (m)
1	Typical Cross Section Of 4-Lane Divided Carriageway With 0.5m Wide Crash Barrier Median and with 7.5m (including Kerb Shyness) Service Road on Both Sides in Built-Up Area	3	4300
3A	Typical Cross Section Of 4-Lane Divided Carriageway With 4.0m Wide Raised Median in Rural Area (Left Side Eccentric Widening)	5	3484
3B	Typical Cross Section Of 4-Lane Divided Carriageway With 4.0m Wide Raised Median in Rural Area (Right Side Eccentric Widening)	6	2772
Structure	Bridge	3	44
Total =			10600

- (i) In built-up also areas narrower cross section (45.0m ROW for 4-Lane) considered to minimize LA.
- (ii) 12.512 km unlined trapezoidal drain and 8.6 km RCC covered drain are proposed.
- (iii) A no. of structures proposed for cross drainage purpose and safe movement of road users as summarized in **Table 0.8**.

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Table 0.8 : Summary of Structures

Structure Type	Total	Remarks
Major Bridge	0	-
Minor Bridge	3	3 nos. Widened
Box Culvert	33	15 nos. Reconstruction 18 nos. New Construction
Total	36	

- (i) Provision of slope protection with stone pitching & filter media for high embankment stretches.
- (ii) Provision of 3 nos. major and 14 nos. minor intersections.
- (iii) Provision of 6 nos. bus bays (both side total).
- (iv) Provision of 2 nos. truck laybys.
- (v) Flexible pavement has been proposed all through. Proposed pavement compositions (in mm) are stated below:
 - Flexible Pavement (4 lane) - 50 BC, 120 DBM, 250 WMM, 200 GSB, 500 SG
- (vi) Provision of traffic guidance, regulation, control and safety measures like traffic signs, road markings, road studs, pedestrian guard rails, guard posts etc.
- (vii) Provision of pedestrian facilities like footpaths, pedestrian crossings etc.
- (viii) Provision of illumination.
- (ix) Provision of landscaping and arboriculture including tree plantation

0.7 Existing & Proposed ROW and Land Acquisition

During reconnaissance and Inventories, no definite ROW pillars were found at site. However, as discussed with the local authorities and as available at site, the existing ROW is varying from 12m to 30m. The revenue maps are collected from the concerned offices and the detailed information obtained will be utilized for the preparation of the Land Acquisition Plans.

Various proposed ROW options were considered for accommodating codal provisions with minimum land acquisition under this stage as mentioned below:

- Existing Rural Stretches - 45.0m
- Built-Up Stretches - 45.0m

As per mouza map land acquisition is assessed of the order of 22.04 ha.

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0.8 Summary Environmental Screening and Issues

Environmental Protection Act, Forest Conservation Act, Wild Life Protection Act, Water (prevention and control of pollution) Act, The Air (prevention and control of pollution) Act, Noise Pollution Rules, EIA Notification, Fly Ash Notification, National Highway Act, Right to Fair Compensation in Transparency in Land Acquisition and Rehabilitation and Resettlement Act, E waste management Rule, Construction & Demolition Rule, Hazardous & Other Wastes Rules, Solid Waste Management Rules, Plastic Waste Management Rules are considered for Environmental Screening of the Project.

Climate

Assam has a Tropical Monsoon Rainforest Climate. The average annual rainfall is 2818mm. The monsoon starts late in June and generally lasts up-to September. 90% of the rainfall received from July to September

Water Resources and Drainage System

The State of Assam comprised of two valleys namely the Brahmaputra and Barak Valley and it is situated in between 90° to 96° North Latitude and 24° to 28° East Longitude. The geographical area of Assam is 78,438.00 Sq. Km out of which 56,194.00 Sq. Km and 22,244.00 Sq. Km fall under the Brahmaputra and Barak Valley including 2 (Two) hill districts respectively. The flood prone area of the state is 31,500.00 Sq Km as assessed by the Rastriya Barh Ayog which is about 39.58 % of the total land area of Assam. This is about 9.40% of total flood prone area of the whole country. The flood prone area of the country as a whole stand at about 10.2 % of the total area of the country, but flood prone area of Assam is 39.58 % of the area of the state. It signifies that the flood prone area of Assam is four times the national mark of the flood prone area of the country. Records show that average annual area affected by flood is 9.31 Lakh Hectares. The flood protected area of the state is 16500.00 Sq. Km till date.

The severity of flood problem of the state has been further aggravated by the acuteness of erosion on both banks of river Brahmaputra and its tributaries. Study reveals that an area of 4.27 Lakh Hectare of the state has been eroded by the rivers since 1950, which is 7.40 % of area of the state. The average annual rate of erosion is 8000.00 Ha. The world's largest river island Majuli is also under the grip of erosion by river Brahmaputra and about 60 % of its original area has already been engulfed by the river

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0.9 Summary of Social Screening and Issues

One of the most crucial and difficult works in implementing a road project is land/property acquisition and resettlement of households thereof, particularly in towns and semi-urban areas. Anticipating this problem, the Consultant has started identifying various social issues all along the project road. During the field visit no ROW (Right-of-Way) pillars were observed or else road boundaries are appreciated along the project road stretches. However, the Consultant has collected the same details from the concerned offices.

At this junction, social issues gathered from the site are rather approximate but will help in taking tentative decisions on various aspects related to improvement. During field visits social issues (types of land, affected buildings etc.) are collected with an idea of proposed widening schemes which are also generally guided by the presence of roadside utilities and residential/commercial structures in semi-urban/urban areas.

0.10 Preliminary Cost Estimate

Total Civil Cost of the project comes out to be 130.34 crore (Rs. 11.85 crore per km). Cost summary has been given in **Table 0.9** and the item wise breakup is provided in Volume-VII of this submission. The Total Project Cost including pre-construction activities has been arrived at Rs. 287.63 crore.

Table 0.9: Summary of Project Cost

ABSTRACT OF COST			
Item	Bill Description	Rate (Rs.)	Amount (Rs)
BILL# 01	Site Clearance & Dismantling	Rs.	25,45,360
BILL# 02	Earthwork	Rs.	8,86,27,201
BILL# 03	Base & Sub Base	Rs.	30,46,78,500
BILL# 04	Pavement (Flexible)	Rs.	38,43,77,100
BILL# 05	Drainage & Protection	Rs.	10,25,31,825
BILL# 06	Landscaping	Rs.	74,40,909
BILL# 07	Junction	Rs.	2,67,16,655
BILL# 08	Bus Bay	Rs.	78,34,894
BILL# 09	Truck Lat Bye	Rs.	60,58,373
BILL# 10	Illumination	Rs.	2,15,51,380
BILL# 11	Road Furniture	Rs.	14,66,15,561
A.	Civil Cost for Highways	Rs.	1,09,89,77,758
BILL# 12	Box Culvert	Rs.	15,36,35,216

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ABSTRACT OF COST			
Item	Bill Description	Rate (Rs.)	Amount (Rs)
BILL# 13	Bridge	Rs.	5,01,82,859
BILL# 14	Repair & Rehabilitation	Rs.	5,98,911
B.	Civil Cost for Structures	Rs.	20,44,16,987
C.	Total Civil Cost (A+B)	Rs.	1,30,33,94,745
	Civil cost per Km (in Cr.)		12.35
D.	GST @ 12% of civil cost	Rs.	15,64,07,369
E.	Contingency Charges @ 2.8% of civil cost	Rs.	3,64,95,053
F.	Supervision Charges @ 3% of civil cost	Rs.	3,91,01,842
G.	Administrative charges @3% of civil cost	Rs.	3,91,01,842
H.	Maintenance charge @ 2.5% of Civil cost	Rs.	3,25,84,869
I.	Total Cost (C+D+E+F+G)		1,60,70,85,720
J.	Cost for Pre-Construction Activities		
1	Cost of Land Acquisition	Rs	1,01,30,17,345
2	Cost of R&R	Rs	21,00,00,000
3	Shifting of Utility Service	Rs	3,62,58,673
4	Environment Cost	Rs	99,00,000
K.	Total Project Cost	Rs	2,87,62,61,738

0.12 Conclusions and Recommendations

Conclusions

- (i) The road is a section of 10.600 Km
- (ii) Concession period of the road project is 30 years including 18 months construction period.
- (iii) All the traffic moving on the project road is through traffic.
- (iv) Due to absence of Toll Plaza, the project cannot be proposed under Build, Own and Transfer (BOT). Hence, it can be evaluated for private participation under Annuity Method.