

VOLUME-I

EXECUTIVE Summary

Introduction

MORTH is the Government Organization to develop the National Highways and other important Roads of India, by way of planning, preparation of feasibility reports, detailed project reports and execution. National Highways Infrastructural Development Corporation Limited (NHIDCL) has been created as an autonomous body under MORTH to develop roads in North Eastern States and other hilly states.

SARDP-NE Program is a Special Accelerated Road Development Program, a major road development program for North Eastern States. The objective of this project is to upgrade to two/ four lanes, the National Highways connecting state capitals and to connect the 88 district headquarter towns by at least two lanes roads. Also the objectives include improvement of strategic roads in the border areas.

The Akajan – Likabali - Bame road falls in state roads of Arunachal Pradesh package of the program, which comprises total 2319 km, including 1472 km of NHs and 847 Km of state roads and strategic roads. Akajan – Likabali-Bame Road is part of SARDP-NE project, which starts from NH-52 at Akajan in Assam and enters in to Arunachal Pradesh at Likabali, traverses through district West Siang of the state.

Theotech Project Services (P) Ltd in association with AIAID, (the Consultant) have been awarded the above mentioned services through competitive bidding. The Consultancy Contract Agreement is signed between the Consultant and the National Highways Infrastructure Development Corporation Ltd. (NHIDCL) Govt. of India Company, under Ministry of Road Transport and Highways (MORTH), as the NHIDCL is entrusted with the implementation and execution of the project.

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Project Back Ground:

The bid for the subject project was invited and awarded to M/s. Theotech Project Sevices Pvt. Ltd. by the Ministry vide LoA no. NH-12037/116/2014/SARDP-NE dated 24.06.2015. Consequent to the entrustment of the subject project to NHIDCL vide LoA mentioned above, the contract for the consultancy services for subject project covering total length of 32 km (from Km 65 to Km 97) was signed between NHIDCL and M/s. Theotech Project Services Pvt. Ltd.

The alignment of the project road was approved by NHIDCL at the submission of final feasibility report, From km 65 to km 97. The road beyond km 99 is under execution by BRO, leaving the stretch of road from km 97 – km 99 without two Laning and any improvement. So as to leave no road portion of Akajan – Likabali - Bame road without two Laning, Detailed Project Report of additional two kms. from Km 97 to Km 99 is also undertaken by M/S Theotech Project Services Pvt. Ltd. Though km 97 – km99 as additional work.

Further the work of Akajan - Likabali - Bame Package-II Existing Km 33.00 to Existing Km 65.00 has been awarded for execution of civil work and that section has been extended upto existing Km 71.00 and the same work is under execution. The design chainage at the end of package II is km 65.810, hence to maintain the continuity, the start design chainage of the subject project is kept as 65.810.

PRESENT STATUS:

The project road section starts from km 71 passes through villages Ego, Dali, Padi and Basar at Km 99. During discussions at the time of submission of draft report it is given to understand that the execution for widening and improvement of road section before Km 65 has been awarded for civil works and that section has been extended up to Km 71 in the same contract package.

Road section beyond Km 97 up to Km 99 is not included in the road under execution by BRO.

REQUIREMENT OF ROW:

Total land width required for ROW is 24mts. While the available ROW is ranging from 12 mt to 15 m which requires land acquisition to the tune of 12 m To 15 m

Scope of the project:

Widening along with geometric improvement of existing road to Two-Lane standard having 7 m wide paved carriageway with hard shoulders.

Construction of 1 Major Bridge and 10 Minor Bridges

Construction of 96 nos RCC Slab / Box culverts

Construction of 15 nos (minor junctions)

Construction of 16 nos. of bus bays and 5 truck lay byes.

Adequate Slope protection in terms of Retaining wall with PCC, Breast wall, and Parapet wall and Hydro seeding & plantation on hill slopes etc

Provisions of road marking, traffic sign boards, roadside furniture, road safety works, crash barrier, delineators, boundary/ hectometre /kilometre, pedestrian facilities have been proposed in the scope of work.

REPORTS TO BE SUMMITTED:

- Stage-1: Inception Report
- Stage-2 Feasibility Report
- Stage-3: Preliminary Project Report
- Stage-4: Detailed Project Report (DPR)

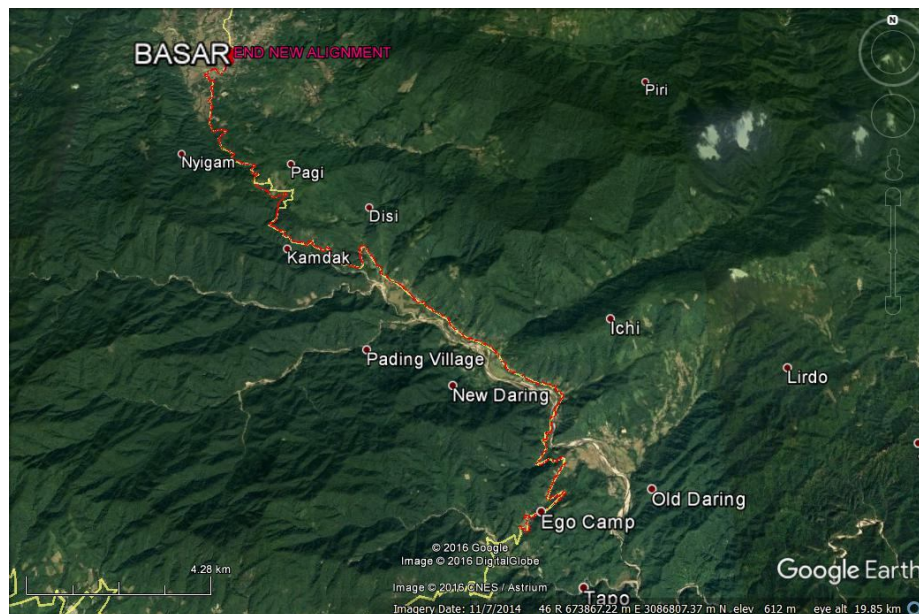
The present report pertains to Draft Detailed Project Report (DPR) with the following volumes:

- Volume I: Main Report
- Volume II: Design Report
- Volume III: Material Report
- Volume IV: Environment Assessment Report
- Volume V: Technical Specification
- Volume VI: Rate Analysis
- Volume VII: Cost Estimate
- Volume VIII: Bill of Quantities
- Volume IX: Drawing
- Volume X: Civil Work Contract Agreement
- Volume XI: Project Clearance

Main report consist of the following details after carrying out Reconnaissance survey;

- Traffic surveys and analysis
- Condition survey of Road and bridges & CD Work
- Inventorization of Road, bridges, CD works and other Structures
- Preliminary Socio Economic Profile of Project area
- Topographical survey , Strip plan
- Soil & Material Investigation, Sub grade investigation & pavement investigation.
- Geo tech and subsoil investigation.
- Evolving design standards and technical specifications.
- Environmental screening
- Hydraulic Investigation
- Initial social assessment preliminary land acquisition & resettlement plan.
- BOQ and cost estimation
- Economic analysis.

Realignment: Realignment proposed and accepted by client as option3. Via Everest village falling on left hand side of the existing road (Likabali to Basar) between KM 85- KM 89 reduces the overall project length. The realignment from Km 85 to Km 89 of project road has reduced about two kilometres of the existing road. The existing sharp curves have been improved and road brought to within geometric norms with two lane specification.



*Two Laning of Akajan – Likabali – Bame Road on EPC basis from Existing Km71+000 To Km99+000
(Design km 65+810 to km 91+928 in the State of Arunachal Pradesh under SARDP-NE)*

Salient Features of Proposed Alignment:

Terrain: The alignment of proposed road passes through hilly and mountainous terrain as per DPR.

Alignment: The alignment of the proposed road has been approved by Competent Authority of NHIDCL.

- a. The consultant has carried out land acquisition for additional length of road from km 63.90 to 65.00 and km 97.00 to Km 99.00
- b. The revised design chainage is from km 65.810 to km 91.928 (existing road chainage km stone 71 to 99) that makes length as 26.118 kms., which includes realignment section from existing km 85.35 to 87.526 (joining at 89 km stone of existing road) In addition there are 2.151 kilometres from existing km 97 to km 99 which are included for widening under the current package for execution.
- c. ROW taken 24 m
- d. CW 7 M
- e. Formation width 12 m
- f. Realignment start from km 85.35 and end at 87.526
- g. Complete design (proposed) length of road under current package works out as 26.118 km from existing km 71 to km stone 99 including realignment stretch and improvement of curves in between.

TBM: During the Topographical survey, TBM marked and erected with the help of DGPS on PCC pillars.

Soil & Material Investigation, Sub grade investigation & pavement investigation

For Soil Test, pits as per requirement of IRC SP 19 and TOR are prepared along the road to understand the composition of the existing pavement and to carryout soil test of the sub grade soil and to know the CBR value, so that appropriate pavement structure can be designed. Road construction material like aggregate and fill material, from various sources in the area are tested for their suitability for the road construction. Sub soil geotechnical investigation is required to be carried out for design of the proposed bridges/structures.

As CBR of the sub grade soil is reasonably good that is above 8% and flexible pavement of 575mm thickness is proposed, with composition of 40 mm BC, 85mm DBM, 250mm WMM and 200mm GSB. Soil and material testing report is presented of volume III.

Geo tech and subsoil investigation: Geo tech investigation carried out for Minor and Major bridge and bore log data obtained and result attached in material report of Volume-III

Environmental screening and preliminary Social Assessment: Are carried out to assess the impacts and to propose the mitigation measures. The improvements and up gradations are proposed with minimum impacts on the environmental and social issues. Reports on environmental screening and Preliminary Social Assessment are given in main report.

Technical Details/Specification

Geometric design: All geometric features of the proposed road have been designed as per IRC:SP-73:2005 for mountainous / steep terrain including pavement design.

Design speed: The design speed for mountainous terrain proposed as minimum design speed of 30 kmph and ruling design speed of 50 kmph.

Pavement Design: The pavement has been designed for 20 MSA (as per IRC:SP 73 -2015) & 8% CBR as per IRC:37:2012. The proposed crust composition are as follows:-

Layer	Thickness (mm)
BC	40
DBM	85
WMM	250
GSB	200

Earthwork Quantity

The average earthwork per km is commensurate to standard engineering practices in Hilly area.

Package	Quantity		Average Quantity/km	
	Cutting (cum)	Filling (cum)	Cutting (cum)	Filling (cum)
Single	3028196	708484	115943	27126

6.6 Slip/Service Road: NIL

6.7 Culverts:

Construction of existing 96 nos, RCC Slab / Box culverts with details as given below:

Type of culvert	Additional
RCC slab / Box	96

Culverts of varying span from 2.0 m to 3.0 m has been proposed. However, all culverts and other structures shall be designed and constructed in accordance with section 7 of the Manual and shall conform to the cross-sectional features and other details specified therein.

6.8 Bridges:

- (i) 1 New Major Bridges at the following locations on the Project Highway shall be constructed.

Sl No.	Existing Chainage	Location Designed (km)	Total Length (m)	Width (m)
1		80+052	102.000	14

- (ii) New Minor Bridges: New minor bridges at the following locations on the project highways shall be constructed:

Sr. No.	Designed Chainage (km)	Type of Structure	River/ Nallah Name	Proposed Span Arrangement (m)
1	65.89	RCC Slab	Nallah	1x 10
2	68.16	RCC Slab	Nallah	1x 10
3	70.785	RCC Slab	Nallah	1x 10
4	71.271	RCC Slab	Nallah	1x 10
5	72.258	RCC Slab	Nallah	1x 10
6	74.923	RCC Slab	Nallah	1x 10
7	77.75	RCC Slab	Nallah	1x 10
8	90.975	RCC Slab	Nallah	1x 10
9	91.418	RCC Slab	Nallah	1x 10

- (i) The existing minor bridge at the following locations shall be reconstructed as new structures.

Sl No.	Existing Chainage (KM)	Design Chainage (KM)	Proposed Span(m)	Proposed Width(m)	Remarks
1	74+840	69+590	1X22.5	12.00	As per Manual

- (ii) The existing Minor Bridges at three locations are to be retained as adequate for 2 lane traffic. The following are the details:

Sl No	Existing Bridge Location (km)	Design Bridge location (km)	Salient Details of Existing Bridge				Present Status
			Span Arrangement (m)	Carriageway Width (m)	Type of Superstructure	Vertical Clearance	
1	71+659		2 X 28.10	7.500	RCC Slab	5m	Condition is good except repair to railing with 2 lane width is required
2	96+600		1 X 53.00	7.500	RCC Slab	7.5m	Condition is good and to be retained.
3	98+075		1x 34.00	8.200	RCC Slab	5.50M	

6.9 Road over Bridges/Road under bridge: NIL

6.10 Junction Improvement: Junction improvement at 15 locations.

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6.11 Protection work:

Following protection work has been proposed.

Type of Protection Work		
Protection Work	Unit	Quantity
1. Parapet Wall	Rm	8140
2. Breast wall with R R Masonry		
a) 1.5m height	Rm	4490
b) 2.0m height	Rm	4640
3. Retaining Wall with R C C		
a) 2m Height	Rm	2360
b) 4m Height	Rm	5780

6.12 Drainage: Provision of lined drain of 33426 m which include both side drain provision at some locations as per ground requirement. Trapezoidal section for the drain/ditch has been proposed.

6.13 Other miscellaneous provisions:

- Traffic control devices and road safety works shall be provided in accordance with section 9 of Two Lane Manual (IRC: SP 73:2007).
- W-Beam Crash Barrier has been proposed in 7500 Rm.
- Safety barriers, protective works shall be provided at the hazardous locations.
- Road marking, Directional Arrows, letter markings, Advanced Direction sign, place identification signs, Micro prismatic type retro-reflective sign plate, boundary stones, roadside furniture, crash barrier, delineators, pedestrian facilities, Hydro seeding & plantation on hill slopes have also been proposed.

BUS STOP:

No bus stops exist not in good condition on the project road. Buses are parked on the main carriageway while picking up or disembarking the passengers, thereby causing obstruction to movement of through traffic. There are no bus 'Q' shelters. The bus stops shall be provided in accordance with IRC:80-1991 and IRC:SP:12-1998. It is proposed to provide bus stops with bus 'Q' shelters, at identified locations. The details of tentative bus stops on proposed along road are tabulated below:

Sl. No.	Existing Chainage (km)	Side	Village/Town
1	71+80	Left	Ego
2	75+00	Left	Dali
3	76+50	Left	Padi
4	77+00	Right	Padi
5	83+70	Left	Temple (Near Village Rimi Camp)
6	87+50	Left	Everest
7	97+975	Left	Basar Town
8	98+775	Right	Old Basar

*as per IRC SP-73:2015

Note: The location of Bus Stand may be changed in consultation with the client and local people during construction.

Finding: On acceptance of contract, reconnaissance survey was carried out and found the following :

- The width of road found 3.524 m, limiting the capacity to single lane roadway.
- Huge damages like potholes, revelling, rutting, and failed section noticed on existing road
- The riding surface was found very rough which is hindrance to normal speed of the road users and resulting into delays.
- The existing CD works found blocked and not functioning .
- Three bridges found on this road in good condition
- The road is full of sharp curves and needs improvement
- The gradient in certain stretches was very steep and needs improvements.
- Drainage on hill side found blocked.

Recommendation: The present Akajan – Likabali - Bame road is of national/ State importance and NHIDCL (MORT&H) has undertaken widening and improvement of this, to bring it to two lane configuration with hard shoulders.

Based on the above stated condition of the road, it has been considered for proposing two lane road by way of widening and improvements in curves and gradients. For steep gradient, sections, revised alignment option from Km 84.70 to Km 86.733 has been proposed and all existing sharp curve have been proposed for improvement as per IRC norms.

However, as the revised road section starts from km 71 and ends at km 99, the overall road length adds up to 26.118 kms., which includes realignment section from km 85 to km 89 and improvement/ realignment of sharp curves.