

Schedules

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

SCHEDULE – A
(See Clauses 2.1 and 8.1)

SITE OF THE PROJECT

1 The Site

- 1.1 The existing Meka-Roing-Hunli road having length of 89.7 kms is presently has CI-9 (MDR) surfaced specification. The entire road passes through hilly terrain in Lower Dibang Valley district of Arunachal Pradesh. The Project Highway i.e. “Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE” shall include the land, buildings, structures and road works as described in Annex-I of this Schedule-A and is a Greenfield alignment to be constructed new.
- 1.2 The takeoff point is km 16.00 of RoingHunli road section and ends at Km 21.5 of Hunli-Anini Road. The Project alignment is approachable from both sides for execution works.
- 1.3 The dates of handing over the Right of Way to the Contractor are specified in Annex-II of this Schedule-A.
- 1.4 An inventory of the Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority Representative and the Contractor, and such inventory shall form part of the memorandum referred to in Clause 8.2.1 of this Agreement.
- 1.5 The alignment plans of the Project Highway are specified in Annex-III. In the case of sections where no modification in the existing alignment of the Project Highway is contemplated, the alignment plan has not been provided. Alignment plans have only been given for sections where the existing alignment is proposed to be modified.
- 1.6 The status of the environment clearances obtained or awaited is given in Annex-IV.

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

Annex I
(Schedule-A)

1. Site

The Site of the [Two-Lane] Project Highway comprises the existing road of CL-9 standard which is to be developed to two lane with paved shoulder (NH) standard from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313). An index map and location plan of the project highway is given at Appendix A-1

2. Land

The Site of the Project Highway comprises the land described below:

Sl. No.	Existing Chainage (km)		Design Chainage (km)		Length in m (Design)	ROW (m)	Remarks
	From	To	From	To			
	-Nil-						

3. Carriageway

Sl. No.	Existing Chainage (km)		Design Chainage (km)		Length in m (Design)	Remarks
	From	To	From	To		
	-Nil-					

4. Major Bridges

The Site includes no major bridges.

The site includes no major bridges.						
Sl. No.	Chainage (km)	Type of Structures			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-Structure	Superstructure		
NIL						

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

5. Road over-bridges (ROB)/Road under Bridges

The Site includes no ROB (road over railway line)

The site includes the following (road over/under/along)						
Sl. No.	Chainage (km)	Type of Structures			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-Structure	Superstructure		
NIL						

6. Grade Separators

The Site includes no grade separators

The site includes no grade separators						
Sl. No.	Chainage (km)	Type of Structures			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-Structure	Super structure		
NIL						

7. Minor Bridges

The Site includes the following minor Bridges:

Sl. No.	Road Segment	Existing Chainage (km)	Type of Structures			No. of Spans with Span Length (m)	Total Width (m)
			Foundation	Sub-Structure	Super Structure		
NIL							

8. Railway level crossings / Railway Track

The Site includes the following railway level crossings:

Sl. No.	Road Segment	Existing Chainage (km)	Remarks
Nil			

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

9. Underpasses (vehicular, Non Vehicular)

The Site includes the following underpasses:

Sl. No.	Road Segment	Existing Chainage (km)	Type of Structure	No. of Spans with Span Length (m)	Width (m)
Nil					

10. Culverts

The Site includes the following culverts:

SI no.	Existing Chainage	Type of Culvert	Span/Dia (m)	Width (m)	Remarks
1	Nil				

11. Bus Shelters/bus Bays

The details of bus shelters on the Site are as follows:

S. No.	Road Segment	Existing Chainage (km)	Length (m)	Left Hand Side	Right Hand Side
Nil					

12. Truck Lay Bye

The details of truck lay byes on the Site are as follows:

S. No.	Road Segment	Existing Chainage (km)	Length (m)	Left Hand Side	Right Hand Side
Nil					

13. Road side drains

The details of the road side drains on the Site are as follows:

Sl. No.	Existing Location		Side	Type	
	From (km)	From (km)		Masonry/CC (Pucca)	Earthen (Kutcha)

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

Sl. No.	Existing Location		Side	Type	
	From (km)	From (km)		Masonry/CC (Pucca)	Earthen (Kutcha)
1	Nil				

14. Major Junctions

The details of major junctions are as follows:

Sl. No.	Location		At Grade	Separated	Category of Cross Roads			
	Existing Ch.	Design Ch.			NH	SH	MDR	Others
NIL								

(NH: National Highway, SH: State Highway, MDR: Major District Road)

15. Minor Junctions

The details of major junctions are as follows:

S. No.	Existing Chainage	Design Chainage	Type	
	(Km)	(Km)	'T' Junction	Cross Road both sides
1	Nil			

16. Bypasses

The details of bypasses are as follows:

S. No.	Name of Bypass (Town)	Road Segment	Existing Chainage		Length (km)	Carriageway	
			From (km)	To (km)		Width m)	Type
Nil							

17. Other Structures/Details

The details of other structures are as follows:

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S No.	Type	Existing Chainage (km)	Length (m)	Width
Nil				

Annex-II
(Schedule-A)

Details for Providing Right of Way

The dates on which the Authority shall provide Right of Way to the Contractor on Different stretches of the Site are stated below:

Sl. No	Design Chainage		Length(km)	Width (m)	Date of Providing ROW
	From	To			
(i) Full Right of way (full width)	0.000	74.863	74.863	18-24 (as shown in Schedule B, clause 2.4)	90 % at appointed date
(ii) Balance Right of way (width)	0.000	74.863	74.863	18-24 (as shown in Schedule B, clause 2.4)	Within 90 days after the appointed Date as per clause 8.2 of DCA

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

Annex-III
(Schedule-A)

Alignment Plans

The existing alignment of the Project Highway shall be modified in the following sections as per the alignment plan indicated below:

The alignment plan is enclosed

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

Annex-IV
(Schedule-A)

Environmental Clearances

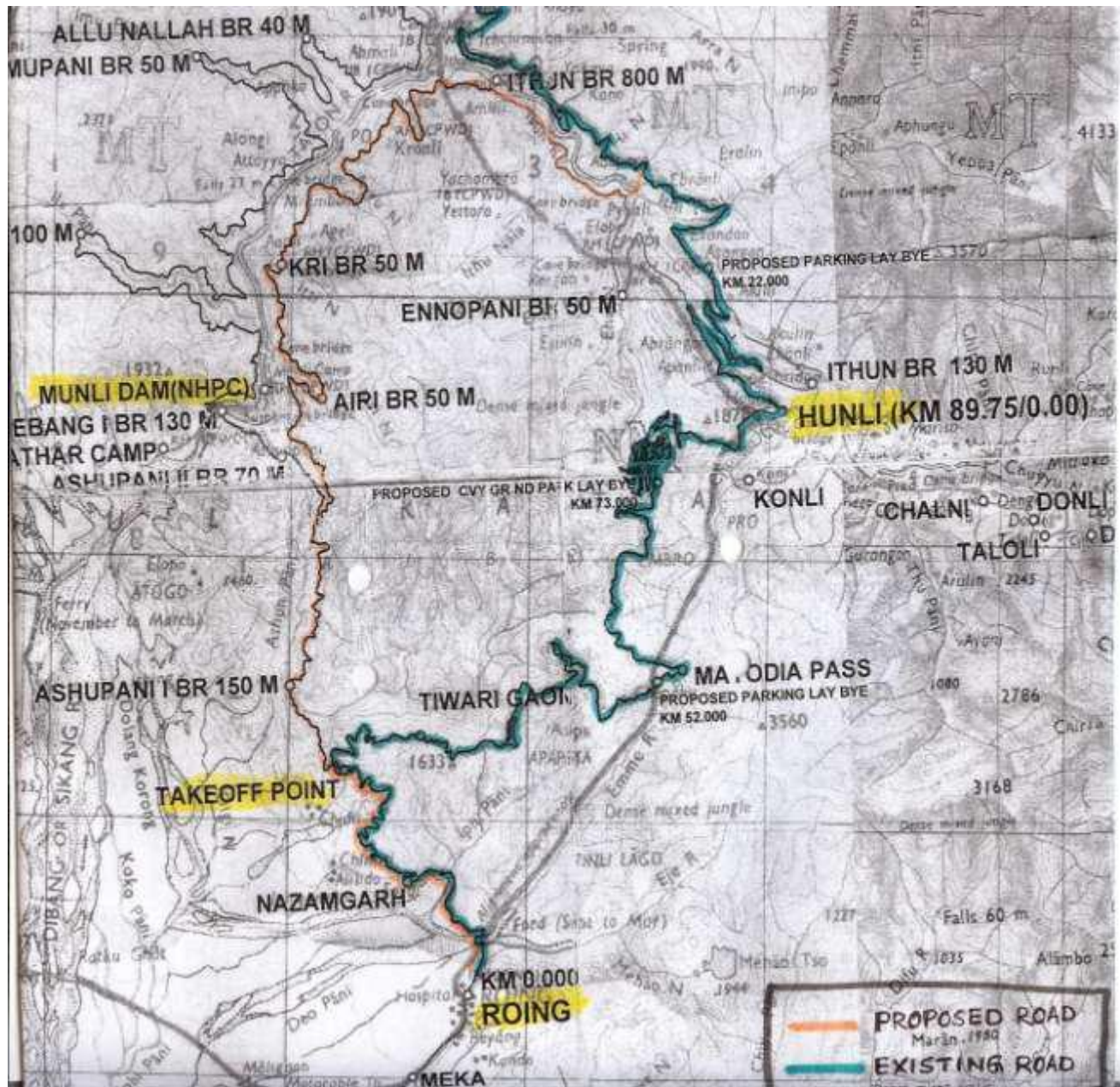
The project Highway does not required Environment Clearance as per MoEF corrigendum dated 22.08.2013.

In addition, the AIP for the forest clearance i.e Stage-I Clearance project for the project has been received for Km 47.00 to Km 62.00 and applied online for balance stretches which is expected shortly. The Second stage clearance is yet to be received. Temporary working provision will be ensured before appointed date. All conditions imposed by MoEF while issuing the Approval in Principle(AIP) and final forest clearance(FC) to be adhered during construction stage and after construction stage are to be complied with..

The muck dumping sites in forest area stand identified and freezed by Forest department to be abided by agency during dumping of muck as stated in Schedule 'F'

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

Index Map of Project Highway



Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

SCHEDULE – B
(See Clause 2.1)

DEVELOPMENT OF THE PROJECT HIGHWAY

1 Development of the Project Highway

Development of the Project Highway shall include design and construction of the Project Highway as described in this Schedule-B and in Schedule-C. The project Highway is a new alignment which is to be developed to 2 lane with paved shoulder (NH standard)

2 Rehabilitation and augmentation

Rehabilitation and augmentation shall include [Two-Laning and strengthening] of the Project Highway as described in Annex-I of this Schedule-B and in Schedule-C.

3 Specifications and Standards

The Project Highway shall be designed and constructed in conformity with the Specifications and Standards specified in Annex-I of Schedule-D.

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

Annex I
(Schedule-B)

Description of Two Laning

[Note: Description of the Project Highway shall be given by the Authority in detail together with explanatory drawings (where necessary) to explain the Authority's requirements precisely in order to avoid subsequent changes in the Scope of the Project. The particulars that must be specified in this Schedule-B are listed below as per the requirements of the Manual of Standards and Specifications for Two Laning of Highways (IRC: SP: 73-2015), referred to as the Manual. If any standards, specifications or details are not given in the Manual, the minimum design/construction requirements shall be specified in this Schedule. In addition to these particulars, all other essential project specific details, as required, should be provided in order to define the Scope of the Project clearly and precisely.]

1. SCOPE OF THE PROJECT

1.1 GENERAL

The following sections of this schedule briefly highlight the scope of the work of the 'Project'. The descriptions of the requirements for the various elements of the Project Highway given hereinunder are the bare minimum requirements for the 'Project'.

In the planning, design and execution of the works and other works in connection with the repair, maintenance or improvement of the Project Highway and functions associated with the construction of the Project Highway and roadside facilities, the Construction Contractor shall take all such actions and do all such things (including, but not limiting to, organizing itself, adopting measures and standards, executing procedures, including inspection procedures and highway patrols, and engaging and managing agents and employees) as will;

- a. enable the NHIDCL to provide an acceptably safe highway in respect of its condition (structural safety) and use (road safety);
- b. enable the NHIDCL to fulfill its statutory and common law obligations;
- c. enable the NHIDCL to provide a congestion free uninterrupted flow of traffic on the Project Highway;
- d. enable the NHIDCL to provide a level of highway service to the public not inferior to that provided on the trunk road during construction or improvement works;
- e. enable the police, local authorities, and others with statutory duties or functions in relation to the Project Highway or adjoining roads to fulfill those duties and functions;
- f. minimize the occurrence and adverse effects of accidents and ensure that all accidents and emergencies are responded to as quickly as possible;
- g. minimize the risk of damage, destruction or disturbance to third party property;

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

- h. ensure that members of the public are treated with all due courtesy and consideration;
- i. provide a safe, clear and informative system of road signs;
- j. comply with any specified programme requirements, including for the completion of the new road;
- k. enable standards of reliability, durability, accessibility, maintainability, quality control and assurance, and fitness for purpose appropriate to a highway of the character of the Project Highway to be achieved throughout the Contract Period;
- l. ensure adequate off-street parking facilities for both passenger and goods vehicles;
- m. provide adequate bus bays for stopping of buses and bus shelters for commuters to wait under protection;
- n. achieve a high standard in the appearance and aesthetic quality of the Project Highway and achieve integration of the Project Highway with the character of the surrounding landscape through both sensitive design and sensitive management of all visible elements including those on the existing road;
- o. Undertake proper safety audit through an appropriate consultant (i.e. apart from the Authority Engineer).
- p. Carry out accident recording and reporting (to NHIDCL) by type on regular basis; and
- q. Ensure adequate safety of the Project Workers on the work site.

2. Construction of the Highway

2.1 Notwithstanding the basic alignment plans enclosed with this document the Construction Contractor shall himself carryout and be responsible for engineering surveys, investigation and detailed engineering designs and prepare the working drawings for all the components relevant for the improvement and up-gradation of the Project Highway to fulfill the scope of the project as envisaged hereinunder. These shall comply with design specifications and standards given in **Schedule–D**. The designs for different project facilities shall follow the locations and indicative designs given in **Schedule–C** and shall comply with design specifications and standards outlined in **Schedule–D**. All the designs and drawings shall be reviewed by the Authority Engineer prior to execution.

2.2 Width of Carriageway

2.2.1 Two-Laningwithpaved shoulders shall be undertaken. The paved carriageway shall be [7(seven) m] wide in accordance with the typical cross sections drawings otherwise as per the two lane Manual.[IRC:SP:73:2015]. In addition, Paved shoulders as per manual is to be provided.

2.2.2 Except as otherwise provided in this Agreement, the width of the paved

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

carriageway and cross-sectional features shall conform to paragraph 2.1 above.

3. GEOMETRIC DESIGN AND GENERAL FEATURES

3.1 General

Geometric design and general features of the Project Highway shall be in accordance with Section 2 of the Manual.

3.2 Design speed

The design speed shall be as per IRC:SP:73:2015, however, in exceptional cases the minimum design speed of [30 km per hr for hilly and mountainous terrain] is to be followed.

3.3 Improvement of the existing road geometries

3.4 Right of Way

[Refer to paragraph 2.3 of the Manual]. Details of the existing Right of Way are given in Annex-II of Schedule-A.

3.5 Type of Shoulders

- (a) In open country, paved shoulders of 1.5m in width shall be provided on Hill side and 1.5 m Paved shoulder +2.0m earthen shoulder shall be provided on valley side.
- (b) In built up areas and approached to grade separated structures/ bridges.

	Width	Type	Total
Hill Side	0.25 m +1.5 m (Raised)	Paved	1.75 m
Valley Side	0.25 m +1.5 m (Raised)	Paved	1.75 m

- (c) Design and specifications of shall conform to the requirements specified in the Manual.

3.6 Lateral and vertical clearances at underpasses

3.6.1 Lateral and vertical clearances at underpasses and provision of guardrails/crash barriers shall be as per paragraph 2.11 of the Manual.

3.6.2 *Lateral clearance*: The width of the opening at the underpasses shall be as follows:

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

Sl No.	Location [Chainage (km)]		Span/Opening (m)	Remarks
	From	To		
Nil				

3.7 Lateral and vertical clearances at overpasses

3.7.1 Lateral and vertical clearances at overpasses shall be as per paragraph 2.12 of the Manual.

3.7.2 *Lateral clearance:* The width of the opening at the overpasses shall be as follows:

Sl No.	Location [Chainage (km)]		Span/Opening (m)	Remarks
	From	To		
Nil				

3.8 Service roads

Service roads shall be constructed at the locations and for the lengths indicated below:[Refer to paragraph 2.13 of the Manual and provide details]

Sl No.	Location of Service Road (km)		Right Hand Side (RHS) / Left Hand Side (LHS) / Both Sides	Length (km) of Service Road
	From	To		
Nil				

3.9 Grade Separated Structures

3.9.1 Grade separated structures shall be provided as per paragraph 2.14 of the Manual. The requisite particulars are given below:

[Refer to paragraphs 2.14.1 of the Manual and provide details]

Sl No.	Location of Structure	Length (m)	Number and Length of Spans (m)	Approach Gradient	Remarks, if any
Nil					

3.9.2 In the case of grade separated structures, the type of structure and the level of the Project Highway and the cross roads shall be as follows: [Refer to paragraphs 2.14.2 of the Manual and specify the type of vehicular under pass/ overpass structure and whether the cross road is to be carried at the existing level, raised or lowered].

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

SlNo.	Location	Type of Structure/Length (m)	Cross Road at			Remarks, if any
			Existing Level	Raised Level	Lowered Level	
Nil						

3.10 Cattle and pedestrian underpass / Overpass

Cattle and pedestrian underpass/overpass shall be constructed as follows: [Refer to paragraph 2.14.3 of the Manual and specify the requirements of cattle and pedestrian underpass/overpass.

Sl No.	Location	Type of Crossing
Nil		

3.11 Typical cross-sections of the Project Highway

Typical cross-sections to be followed as per IRC: SP-73-2015 and in addition the proposed cross section for various situations are given in the TCS III,IV,V(A) ,VI,VII & VIII. These illustrate the widening proposals for the project highway. The Project Highway (length 74.863 km) shall be 2-lane carriageway with paved shoulder.

Note: The Earthen shoulders mentioned in the TCS & drawings are to be read as Paved Shoulders

The cross section schedule shall be as follows:

Sl.NO.	DESIGN CHAINAGE		LENGTH (km)	TYPE TCS	Remarks / Location
	FROM	TO			
1	0.000	74.863	74.863	Type III,IV,V,VI,VII,VIII	Type of Cross Section shall be provided as per the profile & site condition

Note: The extent of cross section type is indicative and shall be reviewed in consultation with the Authority Engineer at the time of construction as per the site condition.

The alternative cross section of the Project Highway at the cross drainage structures shall follow the typical cross section in consultation with the Authority Engineer at the time of construction. The utility services, including optical fiber cables, shall be provided in the utility corridor earmarked for this purpose on the side where it is convenient to the NHIDCL or the fiber cable shall be relocated by the respective owner at a safe place as indicated by NHIDCL in such a way that it causes least hindrances to the execution of project. In urban sections the utility connection, the utility services shall be carried through the nearest cross drainage structure/cattle crossing below its deck slab and above HFL. In absence of such a structure in the vicinity of the purposed location, it shall pass through separate underground ducts. Location and design of the cross utility ducts shall be finalized at the detailed design stage in consonance with the Authority Engineer and NHIDCL.

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

3.12 Longitudinal Section

As a minimum, the Construction Contractor shall achieve the proposed finished road level as indicated in the plan and profile drawings. However, the final finished road levels (FRL) will be finalized as per site conditions in consultation with NHIDCL.

4. INTERSECTIONS AND GRADE SEPARATORS

All intersections shall be as per Section 3 of the Manual.

[Refer to paragraphs 3.1.1, 3.1.2 and 3.3 of the Manual and specify the requirements. Explain where necessary with drawings/sketches/general arrangement].

There are no intersections with cross roads having bituminous surfacing. The cross roads fall into the category VRs. The Construction Contractor has to construct the following:

- i) Typical junction treatments as specified in Final Project Report shall be applied. Design types of intersections are as given below:

Properly designed intersections shall be provided at the locations and of the types and features given in the tables below:

- (a) At-grade Intersections

Major Intersections

SI No.	Location of Intersection	Intersection Towards	Existing Configurations				Type of Intersection	Figure No.	Other Features
			Location	Type	Width (m)	Surface			
Requirement as per the manual									

Details of junction improvements shall be as per IRC SP: 73-2015.

Minor Intersections:

SI No.	Location of Intersection	Type of Intersection
1	0.000	As per the 2 Lane Manual i.e IRC SP: 73-2015.
2	27.363	As per the 2 Lane Manual i.e IRC SP: 73-2015.
3	53.363	As per the 2 Lane Manual i.e IRC SP: 73-2015.
4	74.863	As per the 2 Lane Manual i.e IRC SP: 73-2015.

Construction of 2 Lane road from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

(b) Grade Separated Intersections with/without Ramps

SI No.	Location (km)	Salient Features	Minimum Length of Viaduct to be Provided (m)	Road to be Carried Over/Under the Structures
Nil				

5. ROAD EMBANKMENT AND CUT SECTION

- 5.1** Widening and improvement of the existing road embankment/cuttings and construction of new road embankment/ cuttings shall conform to the Specifications and Standards given in section 4 of the Manual and the specified cross sectional details. Deficiencies in the plan and profile of the existing road shall be corrected.
- 5.2** Raising of the existing road [Refer to paragraph 4.2.2 of the Manual and specify sections to be raised].

The existing road shall be raised in the following sections:

Sl No.	Section (km)		Length (km)	Extent of Raising*	Remarks
	From	To			
Nil					

* Difference between levels at proposed c/l and existing road/ground below proposed c/l

6. PAVEMENT DESIGN

- 6.1** Pavement design shall be carried out in accordance with section 5 of the Manual. The detailed pavement design including overlay and pavement characteristics requirements of the Project Highway shall be done in accordance with Schedule D. Flexible pavement shall be considered for the project road. Flexible pavement design shall be carried out in accordance with the section 5 of the Manual. (IRC: SP 73:2015)

6.2 Type of pavement

Flexible pavement shall be adopted for Project Highway in accordance with the IRC:37:2012 clause 2.2 . IRC:37:2012 identifies five types of flexible pavements. The estimated cost of civil works is based on flexible pavements consisting of Granular base, sub-base, DBM and BC. Since the successful bidders under the EPC mode can use any type of flexible pavements mentioned in clause 2.2 of IRC :37:2012, they may carry out their own diligence to arrive at project cost before submitting bids.

Construction of 2 Lane road from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

6.3 Design requirements

[Refer to paragraph 5.4, 5.9 and 5.10 of the Manual and specify design requirements and strategy]

6.3.1 Design Period and strategy

Flexible pavement for new pavement or for widening and strengthening of the existing pavement shall be designed for a minimum design period of 15 years. Stage construction shall not be permitted.

6.3.2 Design Traffic

Notwithstanding anything to the contrary contained in this Agreement or the Manual, the Contractor shall design the pavement for design traffic of 20 million standard axles as follows.

SL No	Design Chainage (km)		Length (km)	15Year MSA*
	From	To		
1	0.000	74.863	74.80	20

*As per 5.4.1 of IRC:SP:73-2015

6.3.3 Design Parameters

The flexible pavement for the main carriageway is a 2-lane carriageway having 1.5 m wide paved shoulder and 1.0 m wide earthen shoulder in some stretches. This shall be designed using the IRC 37: 2012 Method for the projected traffic levels and the following indicative design input parameters:

Indicative Design Parameters

(i)	Performance Period	15 years + Construction Period of 26 months
(ii)	Traffic on Design Lane	Minimum 20msa as per IRC-SP-73. Design should take care of the maximum wheel load derived from the axle load survey on the design lane
(iii)	Design serviceability Loss	2.0
(iv)	Reliability	90%
(v)	Overall Standard Deviation	0.49
(vi)	Effective Roadblock Soil Resilient Modulus	Corresponding to 4-day soaked CBR value of 8.0% to 10.0%

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(vii)	Layer Coefficients	As per the IRC 37 : 2012 procedures
(viii)	Drainage quality of Pavement	Good

6.3.4 The Project highway will be a light-trafficked section connecting the major arterial network of the country. The design exercise should therefore duly take into account the importance of the road, the performance level and the maintenance requirements during the performance period. The provision of Wet Mix Macadam (granular base)/cement-treated base/ sub-base (crushed stone only)/ subgrade layer(s) and the use of 60/70 Bitumen in bituminous base layers and preferably polymer modified bitumen in wearing course shall be considered while deciding about the composition of the pavement structure. The design should also accompany the Quality Assurance Plan (QAP) along with its implementation scheme for the construction of the pavement structure.

6.3.5 However, in case of a change in the pavement design at the detailed engineering stage, the same shall not be considered as a change in scope of work nor shall qualify for a variation order.

6.3.6 Paved shoulders of 1.5 m width shall have same thickness of the pavement as that of the main carriageway with same composition as that of main carriageway for monolithic construction.

6.3.7 Contractor shall design the pavement for design traffic of 20 million standard axles corresponding subgrade CBR.

6.3.8 Rigid Pavement

No rigid pavement has been considered for the Project Highway.

6.4 Reconstruction / Realignment / Bypass of sections

[Refer to paragraph 5.9.7 of the Manual and specify the sections, if any, to be reconstructed.]

The following sections of the existing road shall be reconstructed. These shall be designed as new pavement.

Sl No.	Section (km)		Remarks
	From	To	
1			Nil

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

7. ROADSIDE DRAINAGE

Drainage system including surface and subsurface drains for the Project Highway shall be provided as per section 6 of the Manual.

The improvements in the drainage and the slope erosion shall be made as per the following norms:

7.1 Drainage Measures

Following measures shall be adopted:

- i) Open side Trapezoidal drains at the hill side for widening at hill sides.
- ii) Open side Trapezoidal drains at both sides in realignment stretches by hill cut.

Open side trapezoidal cross section drain shall be provided on hill sides of the project highway in order to intercept surface water from the carriageway, shoulders and hill slopes. RCC Lined drains have slopes also been proposed in urban/semi urban/intersection stretches. The concrete drains shall be covered in reaches along commercial establishments and intersections. The drains outfall into the natural water courses i.e. either in culverts or bridges. Table below gives the location of lined drains.

Trapezoidal section for the drain/ditch has been proposed as it is more economical and efficient as compared to rectangular cross section V-Shaped. These road side drains have been designed of adequate capacity to carry 100% surface runoff of the drainage area of highway ROW and the adjoining land. The side slopes have been kept as 1H:1V in case of unlined drain/ditches.

Lined drain to be provided in complete length on hill side, at junctions and on both sides on embankment portions/proposed built up areas. Minimum length of the drains to be constructed is **99500 Rm.**

7.2 Slope Protection Measures

Breast Wall and Retaining Wall

Following measures shall be adopted:

Slope protection along hill slope side shall be with breast walls with PCC minimum M15 grade concrete. However, at the zones prone to sliding breast walls will be of sausage type (by stone-mesh gabions). Retaining wall has been considered at valley

Construction of 2 Lane road from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

sides. The height of breast walls is varying from 1.5 m to 3m as per site requirement and to be finalized by consultation with Authority Engineers. The breast wall of height 3m has been considered if the height of hill cut is more than 9m and in this circumstances 3m berm with catch water drain is required to be provided. The maximum cut slope at hill side is 550 (0.7H to 1V).

Embankment less than 3m in height shall be turfed as per MoRTH Specifications.

Vetiver Plantation, Hydro Seeding and Hydro Mulching etc or similar works is to be done for slope protection and site mitigation measure upto a height of 12-15 m all along the slopes in each cutting locations except hard rock location which needs to be protected with appropriate applicable technologies, if required.

8. DESIGN OF STRUCTURES

8.1 General

The Project road from Roing to Hunli, includes provision of 3 Nos major bridges (span \geq 60m), and 7 Nos minor bridges (span $<$ 60m) and 447 Nos Slab/box culverts. 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. New bridges and culverts shall be constructed wide enough to accommodate the adjacent road cross section as given in this Schedule-B.

The details of culverts shall be provided by the EPC Contractor and locations are given in Clause 8.2 of Schedule-B.

All the cross-drainage structures and other structures shall be designed in accordance with the design standards set out in **Schedule-D**.

The following guidelines shall be followed:

- i) All the cross drainage structures for the new carriageway shall be designed in such way so that the outer most face of railing/parapet shall be in line with the out most edge of shoulder.
- ii) The existing culverts shall be extended to match the new road cross sections.
- iii) The adequacy of the vent size for all culverts/bridges shall be ascertained through detailed hydrological surveys and finalized in consultation with the IC/Project Company. The highest flood level/maximum supply level shall be properly assessed

Construction of 2 Lane road from Km 16.00 of Roing-Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

after collecting flood histories from local authorities/interviews with locals/irrigation authorities.

- iv) For drainage purpose the new/to be reconstructed Slab/box culverts of minimum span 2.0 m shall be provided.
- v) Suitable river training works, bank protection and embankment protection works ensuring safety of bridge structure and its approaches against damage by flood water / rain water shall be provided.

The cross drainage plan of the highway shall be finalized in consultation with Authority Engineer/NHIDCL and if required additional culverts shall be provided.

Cross-section of the new culverts and bridges at deck level for the Project Highway shall conform to the typical cross-sections given in section 7 of the Manual.

8.2 Culverts

8.2.1 Overall width of all culverts shall be equal to the roadway width of the approaches.

8.2.2 New Culverts to be provided at following locations. In addition, if required provisions for additional culverts to be constructed as per the manual.

Sl No	Culvert Location (m)	Type (Proposed)	Span (in mts)		Sl No	Culvert Location (m)	Type (Proposed)	Span (in mts)
1	200	Box/Slab	2		225	37103	Box/Slab	2
2	330	Box/Slab	2		226	37253	Box/Slab	4
3	410	Box/Slab	2		227	37313	Box/Slab	2
4	500	Box/Slab	2		228	37563	Box/Slab	2
5	750	Box/Slab	2		229	37913	Box/Slab	2
6	880	Box/Slab	2		230	38033	Box/Slab	2
7	960	Box/Slab	6		231	38213	Box/Slab	2
8	1300	Box/Slab	2		232	38423	Box/Slab	2
9	1480	Box/Slab	2		233	38593	Box/Slab	2
10	1660	Box/Slab	2		234	38883	Box/Slab	2
11	1700	Box/Slab	2		235	38963	Box/Slab	2
12	1780	Box/Slab	2		236	39083	Box/Slab	2
13	1850	Box/Slab	3		237	39263	Box/Slab	2
14	2270	Box/Slab	2		238	39733	Box/Slab	2

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

15	2360	Box/Slab	6		239	40043	Box/Slab	2
16	2500	Box/Slab	2		240	40113	Box/Slab	2
17	2600	Box/Slab	2		241	40263	Box/Slab	2
18	2785	Box/Slab	4		242	40828	Box/Slab	2
19	2880	Box/Slab	2		243	40963	Box/Slab	2
20	3160	Box/Slab	2		244	41083	Box/Slab	2
21	3270	Box/Slab	2		245	41213	Box/Slab	2
22	3410	Box/Slab	4		246	41443	Box/Slab	2
23	3550	Box/Slab	2		247	41613	Box/Slab	3
24	3650	Box/Slab	2		248	41718	Box/Slab	2
25	3800	Box/Slab	3		249	41853	Box/Slab	2
26	3940	Box/Slab	2		250	42223	Box/Slab	6
27	4100	Box/Slab	2		251	42313	Box/Slab	2
28	4340	Box/Slab	2		252	42473	Box/Slab	2
29	4420	Box/Slab	2		253	42703	Box/Slab	2
30	4590	Box/Slab	2		254	42813	Box/Slab	2
31	4670	Box/Slab	2		255	43023	Box/Slab	2
32	4740	Box/Slab	2		256	43113	Box/Slab	2
33	4770	Box/Slab	2		257	43233	Box/Slab	2
34	5020	Box/Slab	2		258	43343	Box/Slab	6
35	5150	Box/Slab	2		259	43463	Box/Slab	2
36	5360	Box/Slab	3		260	43663	Box/Slab	2
37	5460	Box/Slab	2		261	43763	Box/Slab	2
38	5520	Box/Slab	2		262	43983	Box/Slab	2
39	5670	Box/Slab	2		263	44063	Box/Slab	2
40	5750	Box/Slab	2		264	44183	Box/Slab	3
41	5850	Box/Slab	2		265	44243	Box/Slab	2
42	6070	Box/Slab	2		266	44683	Box/Slab	2
43	6320	Box/Slab	3		267	44963	Box/Slab	2
44	6620	Box/Slab	2		268	45113	Box/Slab	2
45	6740	Box/Slab	2		269	45163	Box/Slab	2
46	7010	Box/Slab	2		270	45263	Box/Slab	2
47	7120	Box/Slab	2		271	45463	Box/Slab	2
48	7230	Box/Slab	4		272	45743	Box/Slab	2
49	7430	Box/Slab	2		273	45913	Box/Slab	2
50	7725	Box/Slab	2		274	46163	Box/Slab	2
51	7995	Box/Slab	4		275	46298	Box/Slab	2
52	8075	Box/Slab	2		276	46513	Box/Slab	2
53	8285	Box/Slab	2		277	46588	Box/Slab	2

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

54	8445	Box/Slab	2		278	46763	Box/Slab	2
55	8525	Box/Slab	2		279	46963	Box/Slab	2
56	8615	Box/Slab	2		280	47113	Box/Slab	2
57	8675	Box/Slab	2		281	48063	Box/Slab	2
58	8825	Box/Slab	2		282	48163	Box/Slab	2
59	8975	Box/Slab	2		283	48313	Box/Slab	2
60	9135	Box/Slab	2		284	48493	Box/Slab	2
61	9375	Box/Slab	2		285	48623	Box/Slab	2
62	9560	Box/Slab	3		286	48803	Box/Slab	2
63	9655	Box/Slab	2		287	48893	Box/Slab	2
64	9775	Box/Slab	2		288	48993	Box/Slab	2
65	9975	Box/Slab	2		289	49163	Box/Slab	2
66	10075	Box/Slab	2		290	49333	Box/Slab	2
67	10225	Box/Slab	2		291	49433	Box/Slab	2
68	10325	Box/Slab	2		292	49563	Box/Slab	3
69	10580	Box/Slab	2		293	49943	Box/Slab	2
70	10835	Box/Slab	2		294	50013	Box/Slab	2
71	10995	Box/Slab	3		295	50283	Box/Slab	2
72	11075	Box/Slab	2		296	50548	Box/Slab	2
73	11135	Box/Slab	2		297	50613	Box/Slab	2
74	11375	Box/Slab	2		298	50953	Box/Slab	4
75	11455	Box/Slab	2		299	51023	Box/Slab	2
76	11585	Box/Slab	2		300	51123	Box/Slab	2
77	11690	Box/Slab	3		301	51248	Box/Slab	2
78	11845	Box/Slab	2		302	51343	Box/Slab	2
79	12075	Box/Slab	2		303	51433	Box/Slab	2
80	12125	Box/Slab	2		304	51533	Box/Slab	2
81	12370	Box/Slab	2		305	51813	Box/Slab	4
82	12485	Box/Slab	2		306	51963	Box/Slab	2
83	12600	Box/Slab	2		307	52093	Box/Slab	4
84	12675	Box/Slab	2		308	52223	Box/Slab	4
85	12810	Box/Slab	2		309	52553	Box/Slab	3
86	13915	Box/Slab	2		310	52613	Box/Slab	2
87	14065	Box/Slab	2		311	52763	Box/Slab	2
88	14225	Box/Slab	2		312	52933	Box/Slab	2
89	14305	Box/Slab	4		313	53033	Box/Slab	3
90	14555	Box/Slab	2		314	53163	Box/Slab	2
91	14675	Box/Slab	2		315	53273	Box/Slab	2
92	14975	Box/Slab	2		316	53413	Box/Slab	2

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

93	15055	Box/Slab	2		317	53593	Box/Slab	2
94	15225	Box/Slab	3		318	53713	Box/Slab	2
95	15525	Box/Slab	2		319	53873	Box/Slab	4
96	15640	Box/Slab	2		320	54063	Box/Slab	2
97	15750	Box/Slab	2		321	54163	Box/Slab	2
98	15825	Box/Slab	2		322	54228	Box/Slab	2
99	15975	Box/Slab	2		323	54443	Box/Slab	2
100	16475	Box/Slab	2		324	54563	Box/Slab	2
101	16555	Box/Slab	2		325	54753	Box/Slab	2
102	16835	Box/Slab	2		326	54813	Box/Slab	2
103	17055	Box/Slab	6		327	55013	Box/Slab	2
104	17105	Box/Slab	2		328	55138	Box/Slab	2
105	17295	Box/Slab	2		329	55313	Box/Slab	2
106	17510	Box/Slab	2		330	55453	Box/Slab	2
107	17655	Box/Slab	2		331	55603	Box/Slab	2
108	17890	Box/Slab	3		332	55693	Box/Slab	2
109	18305	Box/Slab	2		333	55838	Box/Slab	2
110	18455	Box/Slab	2		334	55963	Box/Slab	2
111	18555	Box/Slab	2		335	56283	Box/Slab	2
112	19525	Box/Slab	2		336	56463	Box/Slab	2
113	19645	Box/Slab	2		337	56548	Box/Slab	2
114	19775	Box/Slab	2		338	56673	Box/Slab	2
115	19835	Box/Slab	2		339	56813	Box/Slab	2
116	19975	Box/Slab	2		340	57063	Box/Slab	2
117	20035	Box/Slab	2		341	57213	Box/Slab	2
118	20325	Box/Slab	2		342	57293	Box/Slab	2
119	20525	Box/Slab	2		343	57463	Box/Slab	2
120	20635	Box/Slab	2		344	57563	Box/Slab	2
121	20760	Box/Slab	3		345	57713	Box/Slab	2
122	20865	Box/Slab	2		346	57823	Box/Slab	2
123	20915	Box/Slab	2		347	58093	Box/Slab	2
124	21055	Box/Slab	2		348	58213	Box/Slab	2
125	21215	Box/Slab	2		349	58333	Box/Slab	2
126	21415	Box/Slab	2		350	58453	Box/Slab	6
127	21605	Box/Slab	6		351	58643	Box/Slab	2
128	21725	Box/Slab	2		352	58863	Box/Slab	2
129	21825	Box/Slab	2		353	58973	Box/Slab	2
130	21890	Box/Slab	4		354	59113	Box/Slab	2
131	22085	Box/Slab	2		355	59263	Box/Slab	2

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

132	22215	Box/Slab	2		356	59443	Box/Slab	2
133	22365	Box/Slab	2		357	59563	Box/Slab	2
134	22475	Box/Slab	2		358	59713	Box/Slab	2
135	22685	Box/Slab	2		359	59863	Box/Slab	2
136	22865	Box/Slab	2		360	59963	Box/Slab	2
137	22975	Box/Slab	2		361	60148	Box/Slab	2
138	23335	Box/Slab	2		362	60313	Box/Slab	2
139	23515	Box/Slab	2		363	60463	Box/Slab	2
140	23605	Box/Slab	2		364	60563	Box/Slab	2
141	23775	Box/Slab	2		365	60753	Box/Slab	2
142	23825	Box/Slab	2		366	60863	Box/Slab	4
143	24015	Box/Slab	2		367	61013	Box/Slab	2
144	24265	Box/Slab	2		368	61193	Box/Slab	2
145	24325	Box/Slab	2		369	61283	Box/Slab	2
146	24425	Box/Slab	2		370	61463	Box/Slab	2
147	24600	Box/Slab	2		371	61713	Box/Slab	2
148	24695	Box/Slab	2		372	61913	Box/Slab	2
149	24850	Box/Slab	2		373	62003	Box/Slab	2
150	25125	Box/Slab	2		374	62073	Box/Slab	2
151	25325	Box/Slab	2		375	62313	Box/Slab	2
152	25475	Box/Slab	2		376	62738	Box/Slab	2
153	25575	Box/Slab	2		377	62913	Box/Slab	2
154	25805	Box/Slab	2		378	63083	Box/Slab	2
155	25925	Box/Slab	2		379	63213	Box/Slab	2
156	26075	Box/Slab	2		380	63353	Box/Slab	4
157	26315	Box/Slab	2		381	63443	Box/Slab	2
158	26400	Box/Slab	2		382	63683	Box/Slab	2
159	26590	Box/Slab	2		383	63863	Box/Slab	2
160	26660	Box/Slab	2		384	63913	Box/Slab	2
161	26800	Box/Slab	2		385	64033	Box/Slab	2
162	26975	Box/Slab	2		386	64163	Box/Slab	2
163	27125	Box/Slab	2		387	64263	Box/Slab	2
164	27225	Box/Slab	2		388	64398	Box/Slab	2
165	27463	Box/Slab	2		389	64613	Box/Slab	2
166	27643	Box/Slab	2		390	64713	Box/Slab	4
167	27783	Box/Slab	2		391	64983	Box/Slab	2
168	27988	Box/Slab	2		392	65133	Box/Slab	2
169	28083	Box/Slab	2		393	65313	Box/Slab	2
170	28203	Box/Slab	2		394	65433	Box/Slab	2

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

171	28313	Box/Slab	2		395	65543	Box/Slab	2
172	28403	Box/Slab	2		396	65723	Box/Slab	2
173	28543	Box/Slab	2		397	65993	Box/Slab	2
174	28698	Box/Slab	2		398	66113	Box/Slab	2
175	28813	Box/Slab	2		399	66213	Box/Slab	2
176	28953	Box/Slab	2		400	66313	Box/Slab	2
177	29063	Box/Slab	2		401	66513	Box/Slab	2
178	29323	Box/Slab	2		402	66973	Box/Slab	2
179	29483	Box/Slab	3		403	67263	Box/Slab	2
180	29643	Box/Slab	2		404	67313	Box/Slab	2
181	29763	Box/Slab	2		405	67403	Box/Slab	2
182	29893	Box/Slab	2		406	67513	Box/Slab	2
183	30113	Box/Slab	2		407	67713	Box/Slab	2
184	30263	Box/Slab	2		408	67863	Box/Slab	2
185	30523	Box/Slab	2		409	68013	Box/Slab	2
186	30653	Box/Slab	2		410	68163	Box/Slab	2
187	31173	Box/Slab	2		411	68313	Box/Slab	2
188	31243	Box/Slab	2		412	68433	Box/Slab	6
189	31393	Box/Slab	2		413	68563	Box/Slab	2
190	31723	Box/Slab	2		414	68753	Box/Slab	2
191	31973	Box/Slab	2		415	68863	Box/Slab	2
192	32113	Box/Slab	2		416	68988	Box/Slab	2
193	32213	Box/Slab	2		417	69213	Box/Slab	2
194	32313	Box/Slab	2		418	69313	Box/Slab	4
195	32423	Box/Slab	2		419	69378	Box/Slab	2
196	32613	Box/Slab	2		420	69443	Box/Slab	2
197	32713	Box/Slab	2		421	69763	Box/Slab	2
198	32953	Box/Slab	2		422	69943	Box/Slab	2
199	33113	Box/Slab	2		423	70143	Box/Slab	2
200	33313	Box/Slab	2		424	70253	Box/Slab	2
201	33538	Box/Slab	3		425	70353	Box/Slab	2
202	33613	Box/Slab	2		426	70463	Box/Slab	2
203	33788	Box/Slab	4		427	70623	Box/Slab	2
204	33993	Box/Slab	2		428	70683	Box/Slab	2
205	34143	Box/Slab	2		429	70813	Box/Slab	2
206	34263	Box/Slab	2		430	71108	Box/Slab	4
207	34363	Box/Slab	2		431	71253	Box/Slab	2
208	34493	Box/Slab	2		432	71883	Box/Slab	2
209	34733	Box/Slab	4		433	72028	Box/Slab	2

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

210	34943	Box/Slab	2		434	72163	Box/Slab	2
211	35113	Box/Slab	2		435	72323	Box/Slab	2
212	35213	Box/Slab	2		436	72493	Box/Slab	2
213	35303	Box/Slab	2		437	72858	Box/Slab	2
214	35513	Box/Slab	2		438	72963	Box/Slab	2
215	35673	Box/Slab	2		439	73088	Box/Slab	2
216	35783	Box/Slab	2		440	73203	Box/Slab	2
217	35893	Box/Slab	2		441	73613	Box/Slab	2
218	35993	Box/Slab	2		442	73653	Box/Slab	2
219	36123	Box/Slab	2		443	73973	Box/Slab	2
220	36223	Box/Slab	2		444	74483	Box/Slab	2
221	36463	Box/Slab	2		445	74663	Box/Slab	2
222	36613	Box/Slab	2		446	74703	Box/Slab	2
223	36763	Box/Slab	4		447	74853	Box/Slab	4
224	36838	Box/Slab	2					

8.2.3 Floor protection works shall be as specified in the relevant IRC Codes and Specifications.

8.3 Bridges

8.3.1 The existing bridges to be reconstructed/widened

- (i) The existing bridges at the following locations shall be reconstructed as new structures(Minor Bridge)

Sl No.	Existing Chainage	Design Chainage	Proposed Span(m)	Proposed Width(m)	Remarks
Nil					

Sl No	Bridge Location (km)	Salient Details of Existing Bridge					Adequacy or Otherwise of the Existing Waterway, Vertical Clearance etc.	Remarks
		Span Arrangement (m)	Carriageway Width (m)	Total Width (m)	Type of Superstructure	Type of Foundation		
Nil								

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

8.3.2 The following structures shall be provided with footpaths:

Sl No.	Location (km)	Remarks
Nil		

8.3.3 New Minor Bridges

New minor bridges at the following locations on the project highways shall be constructed as per Manual.

S. No.	Location, DesignChainage (km)	Span length (m) and numbers	Total length (m)	Remarks
1	16.233	2x10	20	
2	18.983	1x30	30	
3	30.970	2x30	60	AiriNala
4	40.572	1x40	40	Litti
5	47.706	3x10	30	Ayyu
6	56.053	2x30	60	Bi Nala
7	66.500	1x40	40	IthunNala

8.3.4 New Major Bridges

New major bridges at the following locations on the project highways shall be constructed as per Manual

S. No.	Location, DesignChainage (km)	Span length (m) and numbers	Total length (m)	Remarks
1.	13.228	6x40	240	Asupani
2.	71.543	1x15.5+1X150+1X15.5	181	Special High Level Bridge at River Eha
3.	74.178	1x15.5+1X130+1X15.5	161	Special High Level Bridge at River Ithun

8.3.5 The railings of existing bridges shall be replaced by crash barriers at the following locations:

[Refer to paragraph 7.18 (iv) of the Manual and provide details]

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

SI No.	Location (km)	Remarks
Nil		

- 8.3.6 Repairs/replacements of railings/parapets of the existing bridges shall be undertaken as follows:

[Refer to paragraph 7.18 (v) of the Manual and provide details]

SI No.	Location (km)	Remarks
Nil		

- 8.3.7 Drainage system for bridge decks

An effective drainage system for bridge decks shall be provided as specified in paragraph 7.21 of the Manual

- 8.3.8 Structures in marine environment

[Refer to paragraph 7.22 of the Manual and specify the necessary measures / treatments for protecting structures in marine environment, where applicable]

8.4 Rail-road Bridges

- 8.4.1 Design, construction and detailing of ROB/RUB shall be as specified in section 7 of the Manual. [Refer to paragraph 7.19 of the Manual and specify modification, if any]

8.4.2 Road over-bridges

Road over-bridges (road over rail) shall be provided at the following level crossings, as per GAD drawings attached:

SI No.	Location of Level Crossing (km)	Length of Bridge (m)
Nil		

8.4.3 Road under-bridges

Road under-bridges (road under railway line) shall be provided at the following level crossings, as per GAD drawings attached:

SI No.	Location of Level Crossing (km)	Number and Length of Span (m)
Nil		

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

8.5 Grade Separated Structures

[Refer to paragraph 7.20 of the Manual]

The grade separated structures shall be provided at the locations and of the type and length specified in paragraphs 2.9 and 3 of this Annex-I.

8.6 Underpasses/Overpasses

There is no Underpass/Overpass proposed on the Project Highway.

8.7 Repairs and strengthening of bridges and structures

[Refer to paragraph 7.23 of the Manual and provide details]

The existing bridges and structures to be repaired/strengthened, and the nature and extent of repairs/strengthening required are given below:

A. Bridges

Sl No.	Location of Bridge (km)	Nature and Extent of Repairs/Strengthening to be Carried out
Nil		

B. ROB / RUB

Sl No.	Location of Bridge (km)	Nature and Extent of Repairs/Strengthening to be Carried out
Nil		

C. Overpasses / Underpasses and Other Structures

Sl No.	Location of Bridge (km)	Nature and Extent of Repairs/Strengthening to be Carried out
Nil		

9. TRAFFIC CONTROL DEVICES AND ROAD SAFETY WORKS**9.1 General**

Traffic control devices and road safety works shall be provided in accordance with Section 9 of the Manual.

Specifications of the reflective sheeting [Refer to paragraph 9.3 of the Manual and specify]

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

Traffic signs and pavements markings shall include roadside signs, overhead signs, curve amount signs and road marking along the Project Highway. The design and marking for the project Highway shall be as per design standards indicated in **Schedule-D** and the location for various treatments shall be finalized in consultation with the Authority Engineer and Project Company.

The road markings shall be applied to lane lines, road center lines, edge lines, continuity line, stop lines, give way lines, directional arrows, diagonal/chevron markings, and Zebra crossings at parking areas.

PCC kerbs (duly painted) approximately 460 MM (minimum) shall be provided by EPC Contractor in busbays and Islands.

9.2 Traffic Signs

- (i) A complete range of permanent retro-reflective traffic signs as per the requirements defined in but not limited to the FPR, for the safe and efficient movement of traffic. These signs are to be of regulatory, warning and informatory types and placed on the roadside except at the start and end of the project road and start and end of two bypasses where overhead directional and lane designation signs shall be mounted on the steel portals.
- (ii) Temporary traffic and construction signs are to be provided during construction and maintenance operations for traffic diversion and pedestrian safety.

9.3 Pavement Marking

- i) Retro-reflective thermoplastic paint is proposed for use. The road markings shall be applied to lane lines, road center lines, edge lines, continuity line, stop lines, give way lines, diagonal/chevron markings, Zebra crossings and at parking areas.
- ii) Delineators bollards and other safety devices shall be provided on entire project Highway and other locations as directed by NHIDCL.
- iii) All signs shall be the reflectorized type with high intensity retro-reflective sheeting conforming to ASTM D 4956-01, type VIII and /or type IX of micro prismatic type. All sign boards of size more than 1.2 m and less than 0.9 m shall be provided at the locations finalized in consultation with NHIDCL.

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

- iv) Cautionary sign boards (900mm Equilateral Triangle), stop sign (900mm Octagonal) mandatory sign boards(600mm dia), Village name boards (600X900mm), Hazard Plate (300X900mm), chevron signboard (600X750mm), Facility information sign (600X800mm), Advance direction sign (1800X1200mm), Place identification sign (1200X900mm) shall be provided by the Construction Contractor with suitable interval in consultation with NHIDCL.

The minimum quantity of Traffic signages and pavement marking are tabulated here

Traffic Signages, Road Marking and other appurtenances	Unit	Minimum Quantity
Octagonal stop sign 900mm size.	Nos	48
Octagonal stop sign 600mm size.	Nos	2
Triangular sign 900 side.	Nos	878
Circular sign 900 dia.	Nos	12
Circular sign 600 dia.	Nos	60
Facility information signs 800mm x 600mm	Nos	18
Facility information signs 600mm x 450mm	Nos	42
Place identification 600mm x800mm	Nos	12
Place identification 1500mm x2400mm	Nos	12
Overhead signboard	Nos	6
Directional arrow	Nos	3
200 m stone	Nos	299
Km stone	Nos	74
5 th Km Stone	Nos	14
Triangular Object Marker 300mm side with four red reflector	Nos	31
Rectangular hazard marker 600mm x 300mm	Nos	20
Roadway Indicators 1000mm high made with 80mm dia	Nos	1471
Route Marker sign boards size 600mmx450mm	Nos	300

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

Traffic Signages, Road Marking and other appurtenances	Unit	Minimum Quantity
R. C. boundary stone/ pillars	Nos	2994
Unidirectional reflective pavement marker(road studs) at every 25 m	Nos	352
25 mm thick M20 grade cement concrete precast chequered tiles	Sqm	300
Painting of kerbs& concrete crash barrier with two coats of road marking paint	Sqm	46
Lane/centreline / edge marking / transverse and any other marking.	Sqm	23764

10. ROADSIDE FURNITURE

10.1.1 Roadside furniture shall be provided in accordance with the provisions of Section 11 of the Manual.

10.1.2 Overhead traffic signs: location and size

[Refer to paragraph 11.5 of the Manual and provide details]

The overhead signs shall be the reflectorized type with high intensity retro-reflective sheeting conforming to ASTM D 4956-01, type VIII and /or type IX of micro prismatic type. The retro reflected sheets of Engineering Grade and high intensity grade (ordinary) shall not be used. The height, lateral clearance, location and installation shall be as per relevant clauses of MoRTH specifications. Overhead sign shall be installed ahead of major intersections and urban areas as per detailed design requirements. **The minimum number of overhead signs shall be 06.**

11. COMPULSORY AFFORESTATION

[Refer to paragraph 12.1 of the Manual and specify the number of trees which are required to be planted by the Contractor as compensatory afforestation.]

Minimum 2000 nos. trees are required to be planted.

12. HAZARDOUS LOCATIONS

Metal Beam crash barrier length of minimum 36011 m (single runner, heavy duty and W-shape) shall be provided at the locations of bridge approaches and high embankments (3.0m and more), at sharp curves on both sides. Heavy duty metal beam crash barriers shall be provided on this project by the Construction Contractor at

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

the locations finalized in consultation with NHIDCL. Typical details of metal crash barrier are given in as per manual.

The safety barriers shall also be provided at the following hazardous locations:

Sno	From Chainage (m)	To Chainage (m)	Distance (m)		Sno	From Chainage (m)	To Chainage (m)	Distance (m)
1	31	82	51		238	35229	35298	69
2	85	115	30		239	35341	35385	44
3	133	163	30		240	35593	35721	128
4	176	257	80		241	35795	35870	75
5	299	368	69		242	35917	35978	61
6	456	543	86		243	36056	36109	53
7	594	677	84		244	36202	36290	88
8	744	803	58		245	36418	36594	176
9	807	870	63		246	36719	36875	156
10	915	980	65		247	36974	37066	92
11	1162	1241	79		248	37174	37268	94
12	1273	1344	71		249	37403	37487	84
13	1468	1498	30		250	37595	37751	156
14	1600	1660	60		251	37873	38067	194
15	1680	1741	61		252	38277	38403	126
16	2083	2113	30		253	38487	38567	80
17	2130	2160	30		254	38628	38670	42
18	2206	2275	69		255	38816	38833	17
19	2310	2413	102		256	39093	39173	80
20	2425	2489	63		257	39281	39347	66
21	2525	2617	92		258	39422	39447	25
22	2618	2686	67		259	39513	39552	39
23	2722	2842	119		260	39620	39638	18
24	2859	2936	77		261	39743	39809	66
25	3025	3104	79		262	39945	40010	65
26	3198	3259	60		263	40047	40167	120
27	3285	3371	86		264	40326	40401	75
28	3503	3586	83		265	40485	40548	63
29	3599	3717	118		266	40610	40647	37
30	3751	3890	139		267	40739	40794	55

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

31	4077	4178	102		268	40862	40873	11
32	4211	4297	86		269	40920	40938	18
33	4306	4379	72		270	40991	41026	35
34	4385	4489	104		271	41067	41087	20
35	4625	4721	96		272	41129	41174	45
36	4753	4820	67		273	41197	41210	13
37	4821	4882	61		274	41313	41369	56
38	4927	5023	96		275	41391	41426	35
39	5030	5110	80		276	41519	41526	7
40	5124	5185	61		277	41591	41629	38
41	5214	5454	239		278	41781	41825	44
42	5338	5583	245		279	41843	41923	80
43	5520	5771	251		280	41959	41985	26
44	5763	6002	239		281	42089	42159	70
45	6090	6308	217		282	42194	42248	54
46	6399	6614	214		283	42294	42314	20
47	6639	6853	215		284	42409	42432	23
48	7810	7892	82		285	42537	42547	10
49	7936	8040	104		286	42602	42616	14
50	8263	8358	95		287	42666	42734	68
51	8475	8560	85		288	42815	42838	23
52	8621	8695	74		289	42887	42982	95
53	8768	8851	82		290	43025	43116	91
54	8901	8984	83		291	43261	43288	27
55	9172	9239	67		292	43301	43378	77
56	9262	9373	111		293	43400	43429	29
57	9489	9724	235		294	43516	43544	28
58	9787	9916	129		295	43600	43621	21
59	10015	10114	99		296	43704	43733	29
60	10135	10231	96		297	43833	43877	44
61	10271	10342	70		298	43995	44041	46
62	10433	10511	78		299	44136	44202	66
63	10522	10610	88		300	44356	44382	26
64	10685	10781	95		301	44474	44492	18
65	10935	11032	97		302	44589	44614	25
66	11055	11121	66		303	44715	44743	28

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

67	11185	11258	73		304	44873	44891	18
68	11266	11320	54		305	44981	44992	11
69	11322	11377	55		306	45035	45059	24
70	11387	11443	56		307	45261	45290	29
71	11468	11549	81		308	45511	45539	28
72	11638	11727	89		309	45646	45667	21
73	11805	11835	30		310	45727	45738	11
74	11871	11937	66		311	45911	45959	48
75	11992	12067	75		312	46089	46113	24
76	12073	12153	80		313	46282	46317	35
77	12175	12263	88		314	46392	46410	18
78	12312	12403	91		315	46503	46531	28
79	12457	12534	78		316	46563	46598	35
80	12543	12633	90		317	46685	46703	18
81	12652	12727	75		318	46802	46835	33
82	12841	12922	81		319	46955	46976	21
83	13010	13072	62		320	47103	47119	16
84	13354	13522	169		321	47272	47305	33
85	13547	13641	95		322	47575	47629	54
86	13784	13850	66		323	47775	47843	68
87	13987	14116	129		324	48043	48080	37
88	14155	14225	70		325	48227	48268	41
89	14259	14310	51		326	48468	48504	36
90	14320	14385	65		327	48655	48715	60
91	14419	14459	40		328	48758	48782	24
92	14562	14628	67		329	48810	48825	15
93	14847	14883	36		330	48906	48929	23
94	14926	14986	60		331	48980	49007	27
95	15071	15137	66		332	49019	49041	22
96	15168	15226	58		333	49050	49075	25
97	15235	15337	103		334	49099	49124	25
98	15453	15545	91		335	49191	49226	35
99	15603	15693	90		336	49261	49323	62
100	15833	15923	89		337	49329	49351	22
101	15977	16062	85		338	49361	49421	60
102	16146	16181	36		339	49444	49492	48

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

103	16274	16330	57		340	49638	49819	181
104	16386	16464	78		341	49894	49947	53
105	16485	16619	134		342	50037	50071	34
106	16671	16743	73		343	50153	50173	20
107	16793	16875	81		344	50190	50211	21
108	16961	17008	46		345	50264	50301	37
109	17098	17151	52		346	50341	50376	35
110	17209	17264	54		347	50386	50426	40
111	17323	17432	109		348	50483	50494	11
112	17464	17520	56		349	50541	50570	29
113	17544	17592	47		350	50597	50628	31
114	17606	17663	58		351	50736	50769	33
115	17719	17799	80		352	50898	50949	51
116	17819	17935	116		353	51079	51098	19
117	17947	18027	80		354	51173	51199	26
118	18137	18207	70		355	51240	51255	15
119	18245	18273	28		356	51307	51343	36
120	18373	18403	30		357	51378	51423	45
121	18414	18502	88		358	51437	51509	72
122	18616	18740	124		359	51679	51714	35
123	18921	18967	46		360	51747	51771	24
124	19018	19060	42		361	51824	51840	16
125	19105	19187	81		362	51906	51943	37
126	19252	19348	96		363	52010	52021	11
127	19486	19610	124		364	52055	52114	59
128	19631	19711	81		365	52121	52177	56
129	19764	19811	48		366	52203	52252	49
130	19941	20040	99		367	52349	52397	48
131	20164	20243	79		368	52416	52483	67
132	20310	20392	82		369	52496	52524	28
133	20531	20631	100		370	52591	52625	34
134	20673	20818	145		371	52659	52712	53
135	20864	20957	94		372	52721	52745	24
136	20997	21082	85		373	52814	52826	12
137	21179	21277	97		374	52881	52891	10
138	21397	21493	95		375	53004	53021	17

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

139	21532	21678	145		376	53042	53086	44
140	21706	21781	76		377	53155	53164	9
141	21879	22015	136		378	53276	53302	26
142	22107	22187	81		379	53409	53529	120
143	22212	22286	74		380	53553	53653	100
144	22404	22458	54		381	53874	54024	150
145	22523	22597	75		382	54182	54262	80
146	22647	22722	75		383	54353	54433	80
147	22756	22825	69		384	54573	54713	140
148	22899	23045	146		385	54813	54903	90
149	23227	23315	88		386	54953	55093	140
150	23323	23391	68		387	55126	55226	100
151	23484	23571	87		388	55298	55438	140
152	23746	23825	79		389	55525	55645	120
153	23864	23922	58		390	55774	55894	120
154	23966	24047	81		391	55945	56025	80
155	24093	24167	75		392	56082	56182	100
156	24223	24297	75		393	56235	56355	120
157	24425	24498	73		394	56461	56541	80
158	24528	24589	61		395	56698	56898	200
159	24642	24700	58		396	57082	57182	100
160	24768	24954	186		397	57198	57278	80
161	25072	25160	88		398	57286	57406	120
162	25225	25313	87		399	57447	57517	70
163	25487	25619	132		400	57648	57788	140
164	25786	25907	121		401	57859	57934	75
165	26022	26119	97		402	58086	58166	80
166	26264	26342	79		403	58344	58464	120
167	26344	26442	98		404	58489	58569	80
168	26473	26553	81		405	58647	58887	240
169	26609	26698	88		406	58923	59023	100
170	26745	26857	112		407	59229	59309	80
171	26895	26979	84		408	59695	59795	100
172	27007	27079	72		409	59942	60092	150
173	27095	27267	173		410	60142	60262	120
174	27499	27532	33		411	60406	60506	100

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

175	27563	27621	58		412	60671	60741	70
176	27661	27685	24		413	60759	60879	120
177	27759	27789	30		414	61036	61116	80
178	27829	27894	65		415	61338	61488	150
179	27921	28019	98		416	61541	61661	120
180	28084	28122	38		417	61691	61771	80
181	28180	28208	28		418	61861	62001	140
182	28258	28294	36		419	62116	62216	100
183	28348	28382	34		420	62353	62453	100
184	28421	28471	50		421	62514	62664	150
185	28529	28559	30		422	62754	62854	100
186	28615	28648	33		423	62951	63071	120
187	28711	28740	29		424	63233	63333	100
188	28806	28915	109		425	63387	63507	120
189	29084	29161	77		426	63537	63657	120
190	29214	29249	35		427	63687	63757	70
191	29298	29326	28		428	63833	63913	80
192	29379	29396	17		429	63948	64108	160
193	29472	29520	48		430	64117	64197	80
194	29611	29653	42		431	64240	64440	200
195	29747	29798	51		432	64571	64671	100
196	29925	29994	69		433	64840	64930	90
197	30096	30169	73		434	65016	65116	100
198	30207	30302	95		435	65365	65565	200
199	30344	30426	82		436	65682	65762	80
200	30499	30560	61		437	65829	66049	220
201	30635	30669	34		438	66135	66335	200
202	30739	30767	28		439	66413	66493	80
203	30858	30914	56		440	66565	66665	100
204	31018	31052	34		441	66757	66897	140
205	31163	31194	31		442	66938	67038	100
206	31231	31259	28		443	67140	67210	70
207	31307	31333	26		444	67346	67456	110
208	31409	31439	30		445	67497	67577	80
209	31474	31534	60		446	67659	67779	120
210	31586	31631	45		447	67912	68032	120

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

211	31695	31810	115		448	68239	68379	140
212	31878	31906	28		449	68441	68521	80
213	31959	31983	24		450	68640	68780	140
214	32045	32063	18		451	68833	68903	70
215	32109	32134	25		452	68976	69076	100
216	32202	32266	64		453	69176	69296	120
217	32307	32333	26		454	69323	69503	180
218	32376	32389	13		455	69661	69766	105
219	32426	32461	35		456	69779	69899	120
220	32508	32602	94		457	69961	70081	120
221	32705	32771	66		458	70107	70287	180
222	32945	33021	76		459	70371	70471	100
223	33126	33163	37		460	70572	70732	160
224	33215	33242	27		461	70838	70938	100
225	33363	33399	36		462	71075	71215	140
226	33433	33508	75		463	71288	71408	120
227	33529	33587	58		464	71658	71758	100
228	33635	33698	63		465	71975	72075	100
229	33775	33826	51		466	72408	72658	250
230	33918	33939	21		467	72784	72884	100
231	33992	34013	21		468	73104	73304	200
232	34070	34110	40		469	73489	73629	140
233	34155	34179	24		470	73778	73898	120
234	34222	34288	66		471	73996	74076	80
235	34404	34459	55		472	74291	74371	80
236	34758	34912	154		473	74391	74491	100
237	35042	35140	98		474	74574	74724	150

The safety barriers, protective works shall also be provided at the hazardous location/lengths. The minimum quantity of protection work is presented in the following table:

13. ROAD LAND BOUNDARY

As per the Clause 12.2 of Manual (IRC: SP: 73:2015).

Road land (ROW) boundary shall be demarcated by putting RCC boundary pillars of size 60cm x 15cm x 15 cm embedded in concrete (as per IRC:25) along the Project Highway at 200 m interval on both

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

sides. All the components used in delineating road land boundary shall be aesthetically pleasing, sturdy and vandal proof. The road land boundary shall be demarcated in consultation with NHIDCL.

14. SPECIAL REQUIREMENT FOR HILL ROADS

14.1 All special features shall be provided as per Manual.

14.2 The side slope shall be protected by using suitable slope protection measures all along the highway on Hill side and Valley side. The details of the minimum protection work as tabulated below

		Height										
Sr. No	Protection Work	Upto 4 m	5 m	6 m	7 m	8 m	9 m	10 m	11 m	12 m	Standard	Total (in m)
1	RR Masonry				243	187	261	176	94	317		1278
2	Gabion Wall		532	1198	1074	15904	0	0	0	0		18708
3	Toe Wall		0	0	0	0	0	0	0	0	442	442
4	Retaining Wall	8791	1437	1052	336	0	0	0	0	0		11616
5	Breast wall		0	0	0	0	0	0	0	0	17599	17599

14.3 The chainage wise details of Protection works are given in Annexure II.

14.4 Contractor shall identify areas and provide the suitable protection measures to stabilize the entire landslide area along with the design for the review of the Authority Engineer. No change of scope shall be considered for t be dealt properly and adequate safety /Protection measures with proper design shall be provided.

14.5 Slide Mitigation: All hill slope having tendency for future slide needs to be arrested by special slope protection measures and plantation shall be carried out to arrest barren slope

15. CHANGE OF SCOPE

The length of Structures and bridges specified hereinabove shall be treated as an

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

approximate assessment. The actual lengths as required on the basis of detailed investigations shall be determined by the Contractor in accordance with the Specifications and Standards. Any variations in the lengths specified in this Schedule-B shall not constitute a Change of Scope, save and except any variations in the length arising out of a Change of Scope expressly undertaken in accordance with the provisions of Article 13 of DCA.

16. LANDSCAPING

The finished road facility shall exhibit adequate landscaping of aesthetically pleasing view. All the borrow areas shall be properly dressed maintaining drain ability outward from the road facility. The side slopes shall be turfed.

Planting along the highway shall follow a variety of schemes depending upon location requirement as per the IRC and MoRTH guidelines. On island, planting of dust and gaseous substance absorbing shrubs such as aneurism oleander album is recommended. To ensure survival from herbivorous animals, shrubs/plants containing latex shall only be planted. Trees shall be provided with tree guards.

The treatment of highway embankment slopes shall be with vegetative turfing, hydro seeding and hydro mulching as per IRC:56-2011, depending on the soil types involved. Pitching works along with filter material on slopes shall be as per MoRTH specifications.

17. ENVIRONMENT

The Project Highway during design, engineering, construction, operation and maintenance shall conform to the environmental rules and regulations in force. The Construction Contractor shall be responsible for the same. However this does not absolve the Construction Contractor from performance according to the laws on environment.

18. Fixed Parameters for Design

- (i) The Construction Contractor shall consider the following fixed parameters for design
 - (a) In general Drawings are provided for reference. The Construction Contractor can follow the same as it is with the review of Authority Engineer. The Construction Contractor can also follow the alternate Design/Drawings with the prior approval of NHIDCL. However the Construction Contractor shall be responsible for all design and Drawings and not be absolved from their liabilities even if they follow the DPR Drawings without any change.

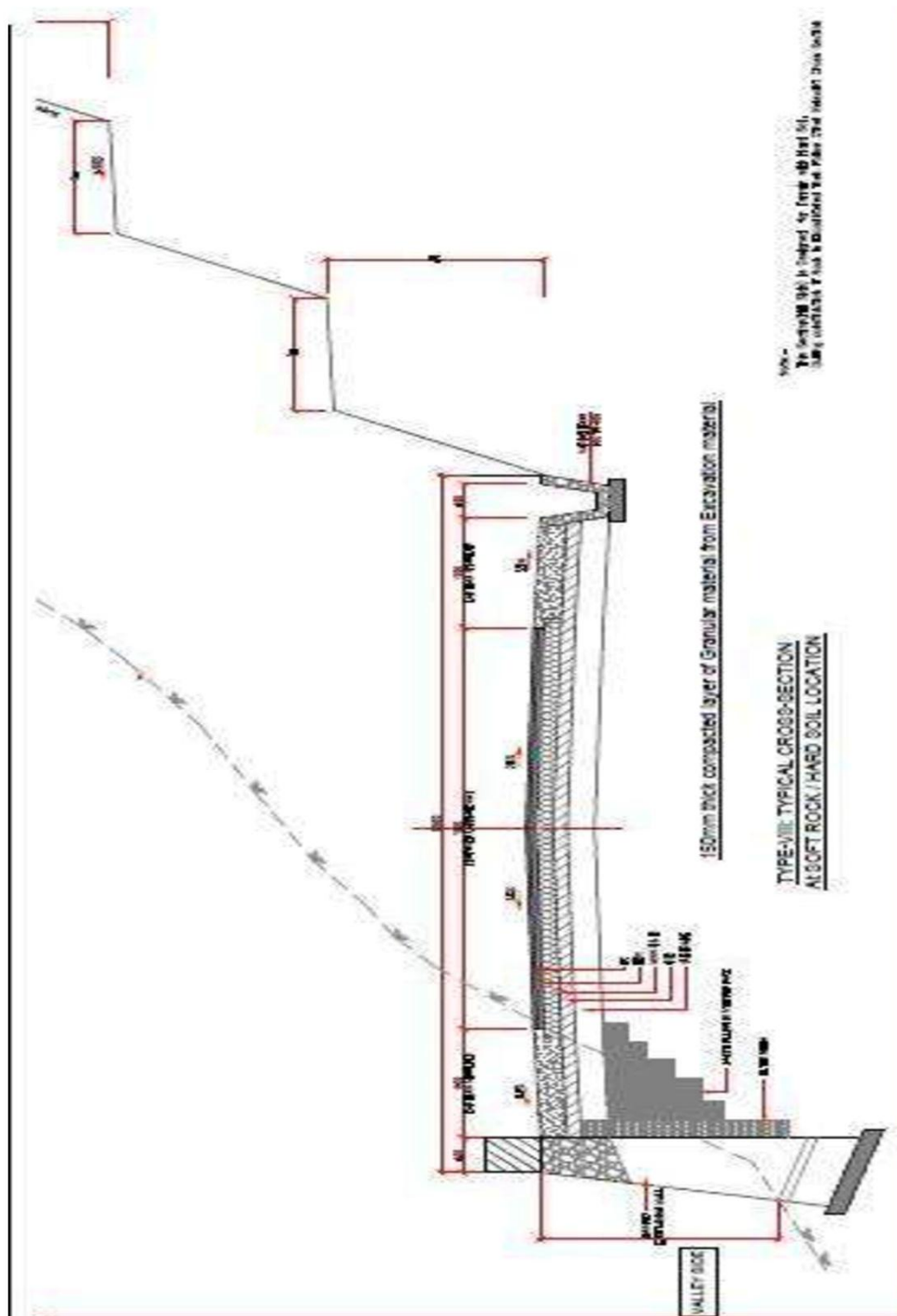
- (b) The scope of work shall be as specified in **Schedule–B** together with the provision of Project facilities as given in **Schedule–C** and in conformity with the specifications & standards set forth in **Schedule–D**.
- (c) The finished top level of the road (Formation level) as shown in the P&P (Plan & Profile) drawing shall not be reduced/lowered unless there are some apparent errors / deficiencies in the DPR and the Construction Contractor is able to demonstrate sound and durable design by lowering the formation levels with proper geometry as recommended in IRC: SP:73-2015 or other codes as applicable to the National Highways but no portion of Road should be allowed under submergence.
- (d) The numbers and sizes of the culverts as well as waterway as provided in the FFSR shall not be reduced in any case, however the locations can be suitably modified in consultation & approval of the Authority Engineer if required. Any additional requirement of culverts as per site conditions or increase in size due to hydrologic requirement should be assessed by the Construction Contractor and incorporated accordingly.
- (e) Alternative design for structures i.e. bridges, culverts, and retaining walls etc. can be adopted by the Construction Contractor in accordance with Design Requirements subject to review of the same by Consultant. However, the span length (total clear span/water way) as shown in the drawings shall be considered as minimum requirement and cannot be reduced.
- (f) The length and/or the nos. of various project facilities like Drain, Bus bays, etc. as mentioned in Schedule B and Schedule C shall be minimum, however the locations can be suitably modified in consultation with the Authority Engineer.
- (g) The Geometric Design Standards for the Project/Project Facilities shall be as per IRC: 73:2015 or other latest codes as applicable to the National Highways. These should be adhered to and minimum requirements should be maintained for the Project Highway. The Construction Contractor may adopt better standards for enhancing the requirements of safety and mobility.
- (h) *Pavement Design*
 - i) The typical cross sections shall be followed as far as possible. Alternate cross sections shall be accepted subjected to approval from the Authority Engineer without altering the pavement widths and subject to the restriction of ROW widths. Pavement of the main carriageway has been designed for a period of 20 years

- ii) The composition of Pavement Layers of the paved shoulders shall not be lower than the adjacent flexible pavement of the mainline project highway.
- (i) All the slopes having embankment height more than 1.0m shall be protected by vegetation mulching. Filter material shall be provided below the pitching where ever embankment is exposed to water bodies.
- (j) W- Beam crash barrier shall be provided on sections of the road
 - i) sharp curves having radius less than 300m
- (k) All pipe culverts shall be replaced by box culverts.
- (l) Reinforced Earth/RCC Retaining Wall type shall be liberally provided through areas for high fill/embankment with aesthetically pleasing appearance. These shall be of varying height constructed of several sections, located mainly between main line and where land constraint exists. Design life of reinforcing elements for earth retaining structures shall be 100 years minimum.
- (m) Riprap protection to be provided at the valley side.
- (n) All road signs shall be with retro-reflective sheet of high intensity grade conforming to ASTM D-4957-01/ (type VIII and type IX) and as per clause 801 of MoRTH specifications. The retro reflective sheet with engineering grade shall not be used and instead micro-prismatic shall be used.

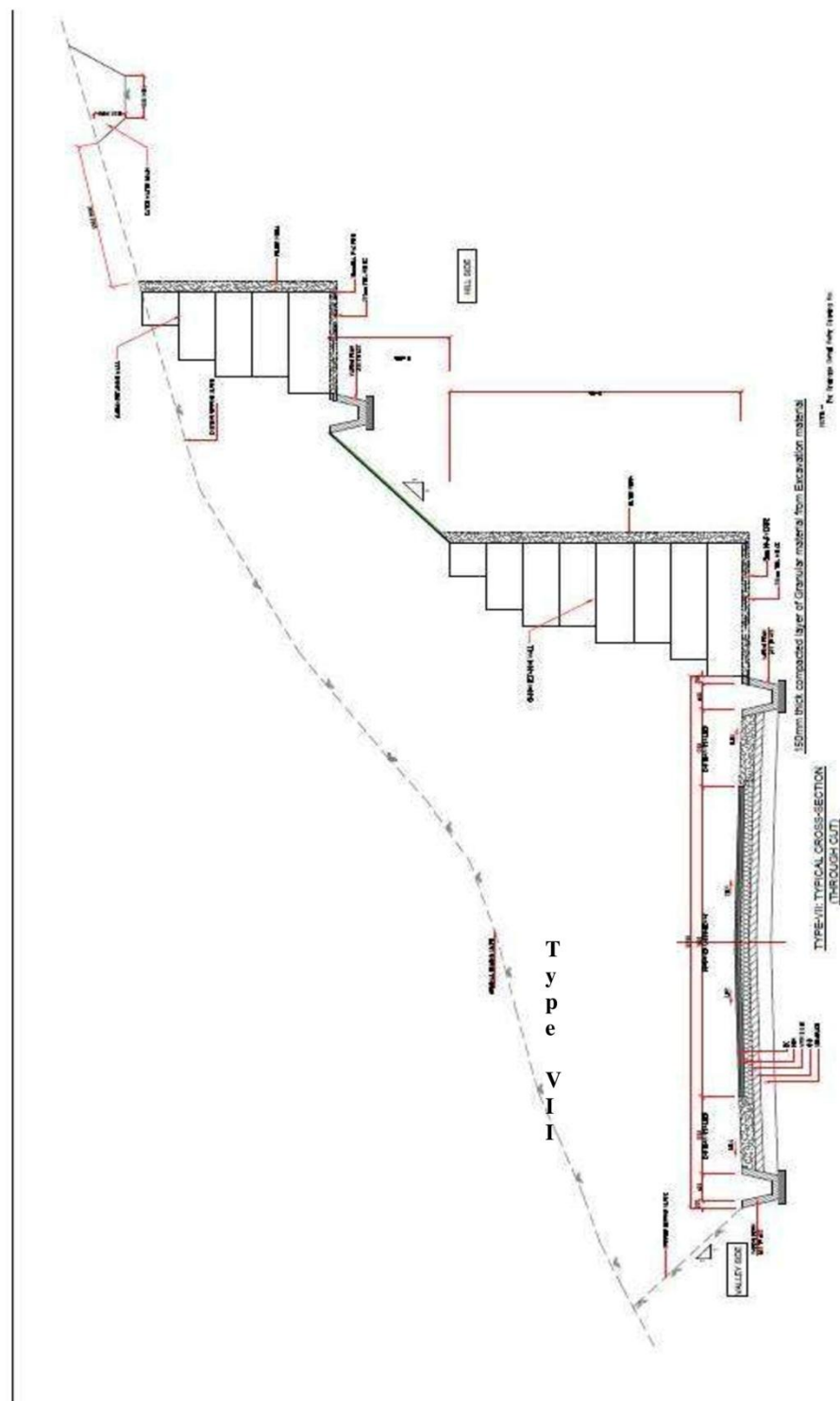
Following Typical Cross Sections are indicated in the Table below.

S. No.	Proposed Chainage		Design Length in KM	C/S-Type	Remark
	From	To			
1	0	74.863	74.863	Type III, IV, V, VI, VII, VIII	Type of Cross Section shall be provided as per the profile & side Condition.

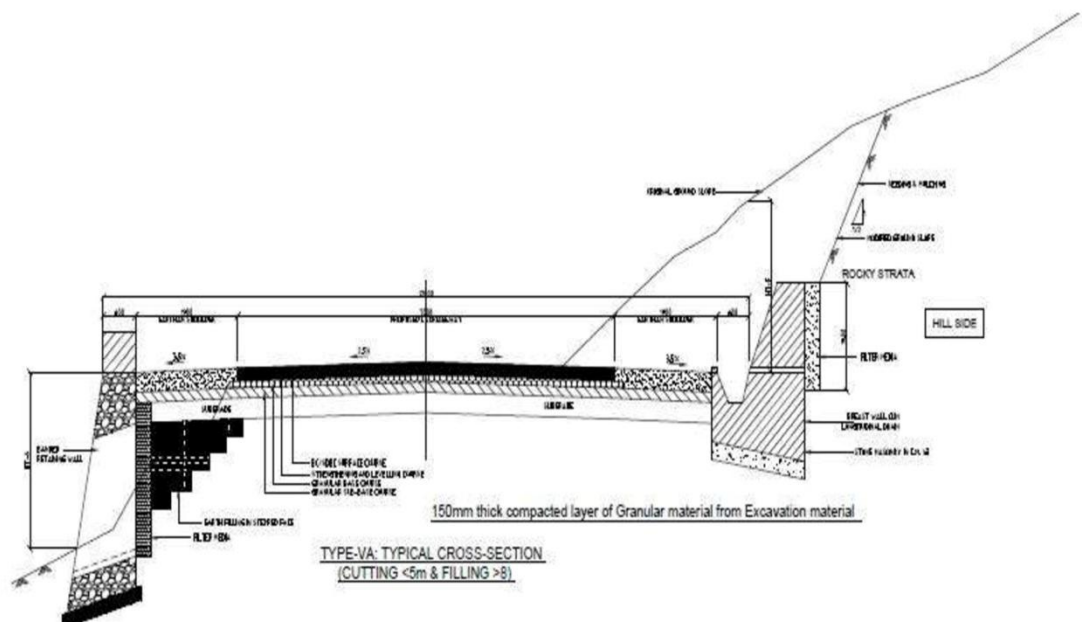
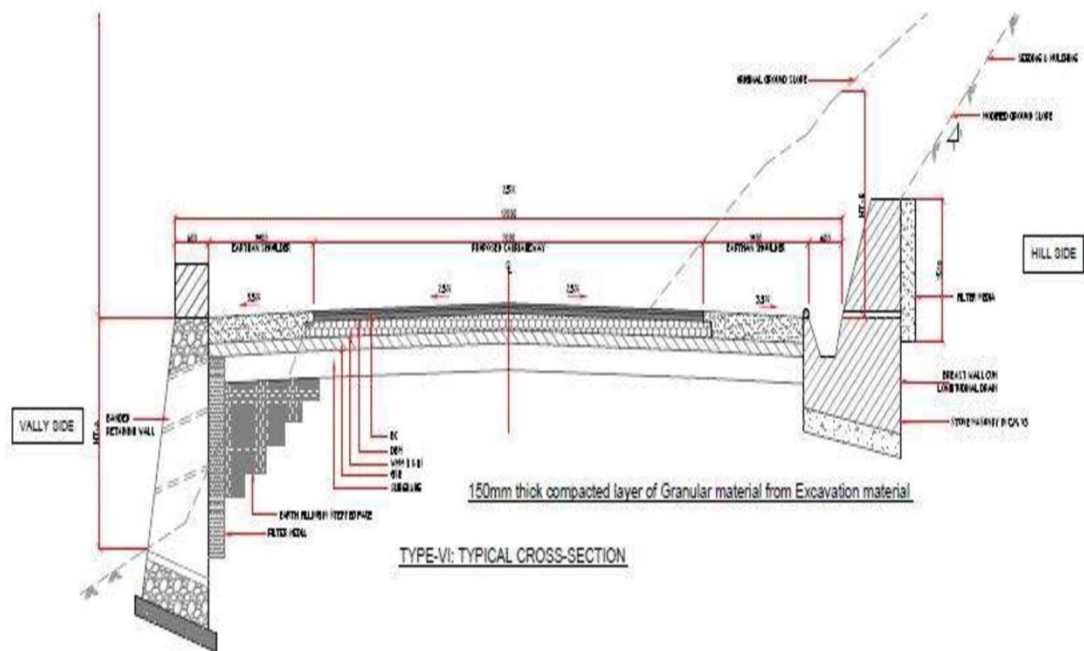
Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE



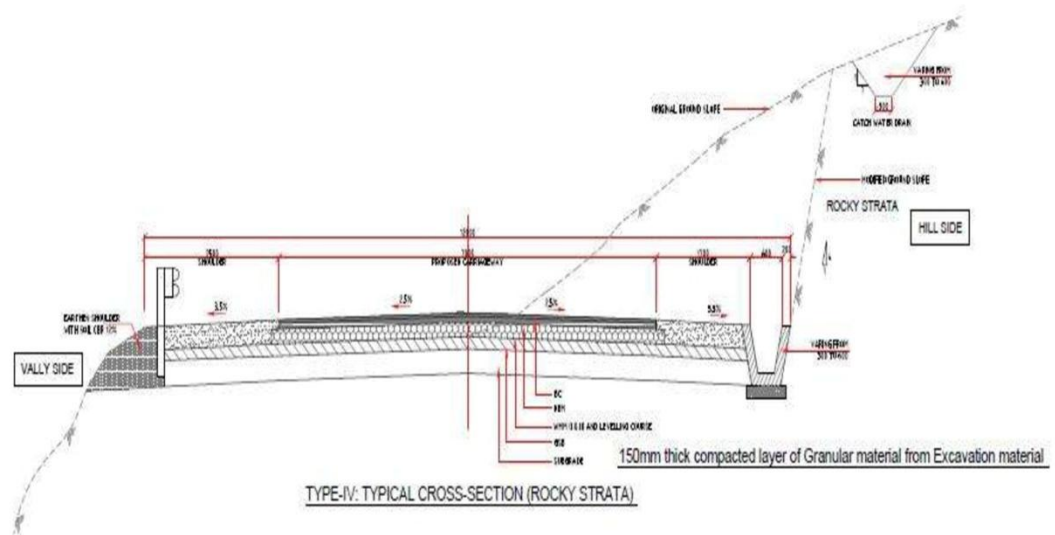
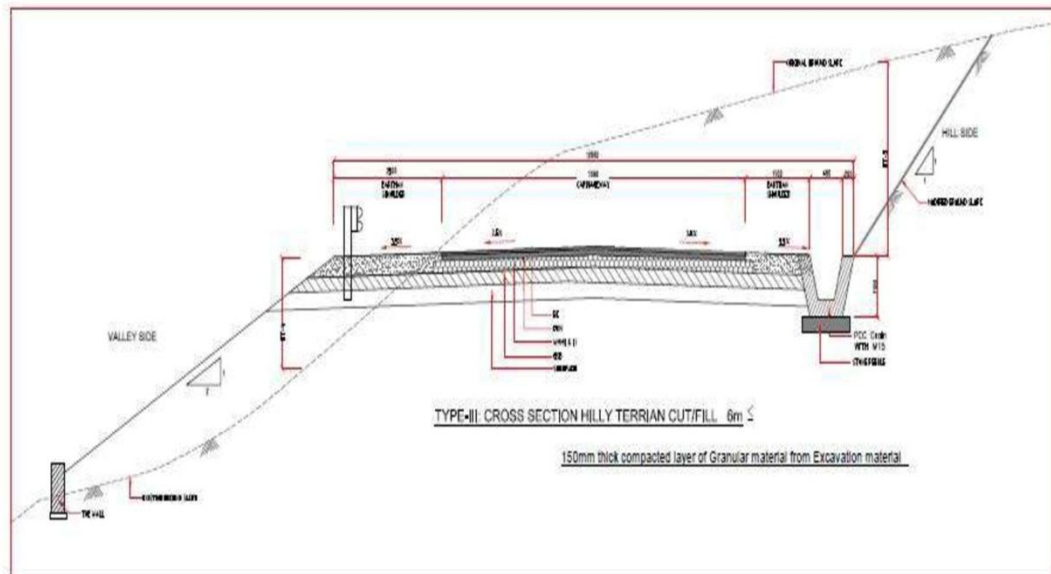
Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE



Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE



Drawings



SCHEDULE – C
(See Clause 2.1)**PROJECT FACILITIES****1 Project Facilities**

This schedule indicates the minimum spatial and functional requirements of the facilities to be provided on the Project Highway Package No. **NHIDCL/Ar.Pr./Civil Works/Roing-Hunli**, “Construction of 2 Lane road from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE” with an aim to cater to the envisaged demand till the end of the concession period.

The Contractor shall construct the Project Facilities in accordance with the provisions of this Agreement. Such Project Facilities shall include:

- (a) Roadside furniture;
- (b) Pedestrian facilities;
- (c) Tree plantation;
- (d) Bus bays and bus shelters-7 Nos
- (e) Passing Places
- (f) One truck lay bye .
- (g) others to be specified

2 Description of Project Facilities**Toll Plaza**

NIL

Bus Shelters

To ensure orderly movement of the through traffic, bus shelters have been proposed outside the residential area, away from bridges, and high embankments and not too close to the road intersections. The bus stops have been proposed on one side of the road.

Bus shelters shall be provided on the Project Highway at 3(three) locations as mentioned

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

hereinunder. Bus shelters shall be constructed as per Manual on both sides of the Project Highway. These bus shelters will also have passenger shelter.

Details of Bus Bays & Bus shelters

Sl No.	Project Facility	Location (km)
1	Bus Shelter	Chainage (km.) 0.00
2	Bus Shelter	Chainage (km.) 5.150
3	Bus Shelter	Chainage (km.) 9.250
4	Bus Shelter	Chainage (km.) 13.700
5	Bus Shelter	Chainage (km.) 16.900
6	Bus Shelter	Chainage (km.) 22.000
7	Bus Shelter	Chainage (km.) 27.300 (Munli Camp)

Truck Lay bye

Sl No.	Project Facility	Location (km)
1	Truck Lay Bye	Chainage (km.) 12.900

Pedestrian Facilities

Pedestrian facilities shall be provided at the locations of urban sections in order to ensure safety of pedestrians while crossing in consultation with NHIDCL. This should include (a) minimum Zebra Crossing with flashing Beacon or (b) Zebra Crossing with separate pedestrian phase or (c) any other provision as approved by NHIDCL.

Administrative, Operation and Maintenance Base Camp

There shall be one base camp preferred as the center of the stretch.

The main administrative base camp shall be provided to cater to the requirement of the project implementation unit having offices of Independent Consultant, Project Company, its Supervision Consultant and representative of NHIDCL associated with the Project.

The Administrative building shall primarily house the Main Offices in addition to other secondary facilities such as computer room, office space, stores, sanitary facilities, canteen etc. The main base camp shall have adequate parking space for staff and visitors.

The camps shall have adequate lighting during dark periods and night.

The base camps shall not have more than one entry and one exit point. Both of these shall be manned by security personnel at all times.

The camps shall be landscaped so as to protect the area from dust and noise from the Project Highway.

The laboratory facility to be established for testing of various materials related to road construction and maintenance during implementation period shall be located at the main base camp.

Landscaping

Landscape treatment of the Project Highway shall be undertaken through planting of trees and ground cover of appropriate varieties and landscaping on surplus land in the ROW. The Construction Contractor should plant at least 800 nos. of trees of minimum 6 ft. height with tree guard made up of MS sections.

Plantation scheme shall be prepared in consultation with the Forest Department of the Government of Arunachal Pradesh, and the Independent Consultant/ NHIDCL.

Environment

The Project Highway during design, construction and maintenance during implementation period shall conform to the environmental rules and regulations in force. The Construction Contractor shall be responsible for the same.

SCHEDULE – D

(See Clause 2.1)

SPECIFICATIONS AND STANDARDS

1. Construction

The Contractor shall comply with the Specifications and Standards set forth in Annex – I of this Schedule – D for construction of the Project Highway.

2. Design Standards

The Project Highway including Project Facilities shall confirm to design requirements set out in the following documents:

Two Lane Manual (IRC: SP 73 – 2015) of Specifications and Standards for Two Laning published by IRC and Hill Road Manual IRC SP 48:1998

Annex – I
(Schedule – D)

Specifications and Standards for Construction

1 Specifications and Standards

All materials, works and construction operations shall confirm to the Two Lane Manual (IRC: SP 73 – 2015) of Specifications and Standards for Two Laning (IRC: SP: 73 – 2015), referred as the Two Lane Manual (IRC: SP: 73 – 2015), and MORTH Specifications for Road and Bridge Works. Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Authority's Engineer.

2 Deviations from the Specifications and Standards

2.1 The terms 'Concessionaire', 'Independent Engineer' and 'Concession Agreement' used in the Two Lane Manual (IRC: SP 73- 2015) shall be deemed to be substituted by the terms '**Contractor**', '**Authority's Engineer**' and '**Agreement**' respectively.

2.2 NIL

SCHEDULE - E
(See Clauses 2.1 and 14.2)

MAINTENANCE REQUIREMENTS

1 Maintenance Requirements

- 1.1 The Contractor shall, at all times maintain the Project Highway in accordance with the provisions of this Agreement, Applicable Laws and Applicable Permits.
- 1.2 The Contractor shall repair or rectify any Defect or deficiency set forth in Paragraph 2 of this Schedule-E within the time limit specified therein and any failure in this behalf shall constitute non-fulfillment of the Maintenance obligations by the Contractor. Upon occurrence of any breach hereunder, the Authority shall be entitled to effect reduction in monthly lump sum payment as set forth in Clause 14.6 of this Agreement, without prejudice to the rights of the Authority under this Agreement, including Termination thereof.
- 1.3 All Materials, works and construction operations shall conform to the MORTH Specifications for Road and Bridge Works, and the relevant IRC publications. Where the specifications for a work are not given, Good Industry Practice shall be adopted.

2 Repair/rectification of Defects and deficiencies

The obligations of the Contractor in respect of Maintenance Requirements shall include repair and rectification of the Defects and deficiencies specified in Annex - I of this Schedule-E within the time limit set forth therein.

3 Other Defects and deficiencies

In respect of any Defect or deficiency not specified in Annex - I of this Schedule-E, the Authority's Engineer may, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards, and any deviation or deterioration beyond the permissible limit shall be repaired or rectified by the Contractor within the time limit specified by the Authority's Engineer.

4 Extension of time limit

Notwithstanding anything to the contrary specified in this Schedule-E, if the nature and extent of any Defect or deficiency justifies more time for its repair or rectification than the time specified herein, the Contractor shall be entitled to additional time in conformity with Good Industry Practice. Such additional time shall be determined by the Authority's Engineer and conveyed to the Contractor and the Authority with reasons thereof.

5 Emergency repairs/restoration

Notwithstanding anything to the contrary contained in this Schedule-E, if any Defect, deficiency or deterioration in the Project Highway poses a hazard to safety or risk of damage to property, the Contractor shall promptly take all reasonable measures for eliminating or minimizing such danger.

6 Daily inspection by the Contractor

The Contractor shall, through its engineer, undertake a daily visual inspection of the Project Highway and maintain a record thereof in a register to be kept in such form and manner as the Authority's Engineer may specify. Such record shall be kept in safe custody of the Contractor and shall be open to inspection by the Authority and the Authority's Engineer at any time during office hours.

7. Pre-monsoon inspection / Post-monsoon inspection

The Contractor shall carry out a detailed pre-monsoon inspection of all bridges, culverts and drainage system before [1st June] every year in accordance with the guidelines contained in IRC: SP35. Report of this inspection together with details of proposed maintenance works as required on the basis of this inspection shall be sent to the Authority's Engineer before the [10th June] every year. The Contractor shall complete the required repairs before the onset of the monsoon and send to the Authority's Engineer a compliance report. Post monsoon inspection shall be done by

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

the [30th September] and the inspection report together with details of any damages observed and proposed action to remedy the same shall be sent to the Authority's Engineer.

8. Repairs on account of natural calamities

All damages occurring to the Project Highway on account of a Force Majeure Event or default or neglect of the Authority shall be undertaken by the Authority at its own cost. The Authority may instruct the Contractor to undertake the repairs at the rates agreed between the Parties.

Annex - I
(Schedule-E)

Repair/rectification of Defects and deficiencies

The Contractor shall repair and rectify the Defects and deficiencies specified in this Annex-I of Schedule-E within the time limit set forth in the table below.

Nature of Defect or deficiency		Time limit for repair/rectification
ROADS		
(a)	Carriageway and paved shoulders	
(i)	Breach or blockade	Temporary restoration of traffic within 24 hours; permanent restoration within 15 (fifteen) days
(ii)	Roughness value exceeding 2,200 mm in a stretch of 1 km (as measured by a calibrated bump integrator)	120 (one hundred and twenty) days
(iii)	Pot holes	24 hours
(iv)	Any cracks in road surface	15 (fifteen) days
(v)	Any depressions, rutting exceeding 10 mm in road surface	30 (thirty) days
(vi)	Bleeding/skidding	7 (seven) days
(vii)	Any other defect/distress on the road	15 (fifteen) days
(viii)	Damage to pavement edges	15 (fifteen) days
(ix)	Removal of debris, dead animals	6 hours
(b)	Granular earth shoulders, side slopes, drains and culverts	
(i)	Variation by more than 1 % in the prescribed slope of camber/cross fall (shall not be less than the camber on the main carriageway)	7 (seven) days

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

Nature of Defect or deficiency		Time limit for repair/rectification
(ii)	Edge drop at shoulders exceeding 40 mm	7 (seven) days
(iii)	Variation by more than 15% in the prescribed side (embankment) slopes	30 (thirty) days
(iv)	Rain cuts/gullies in slope	7 (seven) days
(v)	Damage to or silting of culverts and side drains	7 (seven) days
(vi)	Desilting of drains in urban/semi-urban areas	24 hours
(vii)	Railing, parapets, crash barriers	7 (seven) days (Restore immediately if causing safety hazard)
(c)	Road side furniture including road sign and pavement marking	
(i)	Damage to shape or position, poor visibility or loss of retro-reflectivity	48 hours
(ii)	Painting of km stone, railing, parapets, crash barriers	As and when required/Once every year
(iii)	Damaged/missing road signs requiring replacement	7 (seven) days
(iv)	Damage to road mark ups	7 (seven) days
(d)	Road lighting	
(i)	Any major failure of the system	24 hours
(ii)	Faults and minor failures	8 hours
(e)	Trees and plantation	
(i)	Obstruction in a minimum head-room of 5 m above carriageway or obstruction in visibility of road signs	24 hours
(ii)	Removal of fallen trees from carriageway	4 hours

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

(iii)	Deterioration in health of trees and bushes	Timely watering and treatment
Nature of Defect or deficiency		Time limit for repair/rectification
(iv)	Trees and bushes requiring replacement	30 (thirty) days
(v)	Removal of vegetation affecting sight line and road structures	15 (fifteen) days
(f)	Rest area	
(i)	Cleaning of toilets	Every 4 hours
(ii)	Defects in electrical, water and sanitary installations	24 hours
(g)	[Toll Plaza]	
(h)	Other Project Facilities and Approach roads	
(i)	Damage in approach roads, pedestrian facilities, truck lay-byes, bus-bays, bus-shelters, cattle crossings, [Traffic Aid Posts, Medical Aid Posts] and service roads	15 (fifteen) days
(ii)	Damaged vehicles or debris on the road	4 (four) hours
(iii)	Malfunctioning of the mobile crane	4 (four) hours
Bridges		
(a)	Superstructure	
(i)	Any damage, cracks, spalling/ scaling Temporary measures Permanent measures	within 48 hours within 15 (fifteen) days or as specified by the Authority's Engineer
(b)	Foundations	
(i)	Scouring and/or cavitation	15 (fifteen) days
(c)	Piers, abutments, return walls	

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

	and wing walls	
(i)	Cracks and damages including settlement and tilting, spalling, scaling	30 (thirty) days
Nature of Defect or deficiency		Time limit for repair/rectification
(d)	Bearings (metallic) of bridges	
(i)	Deformation, damages, tilting or shifting of bearings	15 (fifteen) days Greasing of metallic bearings once in a year
(e)	Joints	
(i)	Malfunctioning of joints	15 (fifteen) days
(f)	Other items	
(i)	Deforming of pads in elastomeric bearings	7 (seven) days
(ii)	Gathering of dirt in bearings and joints; or clogging of spouts, weep holes and vent-holes	3 (three) days
(iii)	Damage or deterioration in kerbs, parapets, handrails and crash barriers	3 (three) days (immediately within 24 hours if posing danger to safety)
(iv)	Rain-cuts or erosion of banks of the side slopes of approaches	7 (seven) days
(v)	Damage to wearing coat	15 (fifteen) days
(vi)	Damage or deterioration in approach slabs, pitching, apron, toes, floor or guide bunds	30 (thirty) days
(vii)	Growth of vegetation affecting the structure or obstructing the waterway	15 (fifteen) days
(g)	Hill Roads	
(i)	Damage to retaining wall/breast wall	7 (seven) days
(ii)	Landslides requiring clearance	12 (twelve) hours
(iii)	Snow requiring clearance	24 (twenty four) hours

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

[Note: Where necessary, the Authority may modify the time limit for repair/rectification, or add to the nature of Defect or deficiency before issuing the bidding document, with the approval of the competent authority.]

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

SCHEDULE - F
(See Clause 3.1.7(a))

APPLICABLE PERMITS

1 Applicable Permits

- 1.1 The Contractor shall obtain, as required under the Applicable Laws, the following Applicable Permits:
- (a) Permission of the State Government for extraction of boulders from quarry;
 - (b) Permission of Village Panchayats and Pollution Control Board for installation of crushers;
 - (c) Licence for use of explosives;
 - (d) Permission of the State Government for drawing water from river/reservoir;
 - (e) Licence from inspector of factories or other competent Authority for setting up batching plant;
 - (f) Clearance of Pollution Control Board for setting up batching plant;
 - (g) Clearance of Village Panchayats and Pollution Control Board for setting up asphalt plant;
 - (h) Permission of Village Panchayats and State Government for borrow earth; and
 - (i) Any other permits or clearances required under Applicable Laws.
- 1.2 Applicable Permits, as required, relating to environmental protection and conservation shall have been procured by the Authority in accordance with the provisions of this Agreement.
2. The agency need to ensure compliance of AIP and FC stated in Schedule 'A' Annexure-IV. The necessary certifications need to be obtained from competent local forest department.
3. Muck dumping locations in forest area to be freezed in consultation with the forest department, the necessary certifications from local competent forest department is to be submitted.

SCHEDULE – G

(See Clauses 7.1.1, 7.5.3 and 19.2)

FORM OF BANK GUARANTEE

Annex-I

(See Clause 7.1.1)

[Performance Security/Additional Performance Security]

Managing Director,
National Highways & Infrastructure
Development Corporation Limited, New Delhi

WHEREAS:

-
- (A) _____ [name and address of contractor] (hereinafter called the “**Contractor**”) and [name and address of the authority], (hereinafter called the “**Authority**”) have entered into an agreement (hereinafter called the “**Agreement**”) for the “**Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis**” on Engineering, Procurement and Construction (the “**EPC**”) basis, subject to and in accordance with the provisions of the Agreement
- (B) The Agreement requires the Contractor to furnish a Performance Security for due and faithful performance of its obligations, under and in accordance with the Agreement, during the { Construction Period/ Defects Liability Period and Maintenance Period } (as defined in the Agreement) in a sum of Rs..... cr. (Rupees crore) (the “**Guarantee Amount**”).
- (C) We, through our branch at (the “**Bank**”) have agreed to furnish this bank guarantee (*hereinafter called the “**Guarantee**”*) by way of Performance Security.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor's obligations during the {Construction Period/ Defects Liability Period and Maintenance Period} under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of [General Manager in the National Highways Authority of India], that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.
3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfillment and/ or performance of all or any of the obligations of the Contractor contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Agreement or for the fulfillment, compliance and/or performance of all or any of the obligations of the Contractor under the Agreement.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect on ****^{\$}. Unless a demand or claim under this Guarantee is made in writing before expiry of the Guarantee, the Bank shall be discharged from its liabilities hereunder.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.
12. This guarantee shall also be operatable at our..... Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.

^{\$} Insert date being 2 (two) years from the date of issuance of this Guarantee (in accordance with Clause 7.2 of the Agreement).

13. Bank Guarantee has been sent to authority's bank through SFMS gateway as per the details below:-

S.no.	Particulars	Details
1	Name of Beneficiary	National Highways & Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Syndicate Bank transport Bhawan, 1st Parliament Street, New Delhi-110001

Signed and sealed this day of, 20..... at

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

Annex – II
(Schedule - G)
(See Clause 7.5.3)

Form for Guarantee for Withdrawal of Retention Money

Managing Director,
National Highways & Infrastructure
Development Corporation Limited, New Delhi

WHEREAS:

- (A) [name and address of contractor] (hereinafter called the “**Contractor**”) has executed an agreement (hereinafter called the “**Agreement**”) with the [name and address of the authority], (hereinafter called the “**Authority**”) for the “**Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis**”, subject to and in accordance with the provisions of the Agreement.
- (B) In accordance with Clause 7.5.3 of the Agreement, the Contractor may withdraw the retention money (hereinafter called the “**Retention Money**”) after furnishing to the Authority a bank guarantee for an amount equal to the proposed withdrawal.
- (C) We, through our branch at (the “**Bank**”) have agreed to furnish this bank guarantee (hereinafter called the “**Guarantee**”) for the amount of Rs. ----- cr. (Rs.-----crore) (the “**Guarantee Amount**”).

NOW, THEREFORE, the Bank hereby unconditionally and irrevocably guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of [General Manager in the National Highways Authority of India], that the Contractor has committed default in the due and faithful performance of all or any of its obligations for under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final, and binding on the Bank, notwithstanding any differences

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Retention Money and any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Retention Money.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect 90 (ninety) days after the date of the Completion Certificate specified in Clause 12.4 of the Agreement.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.
12. This guarantee shall also be operatable at our..... Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.
13. Bank Guarantee has been sent to authority's bank through SFMS gateway as per the details below:-

S.no.	Particulars	Details
1	Name of Beneficiary	National Highways & Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Syndicate Bank transport Bhawan, 1st Parliament Street, New Delhi-110001

Signed and sealed this day of, 20..... at

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.

Annex – III
(Schedule - G)
(See Clause 19.2)

Form for Guarantee for Advance Payment

Managing Director,
National Highways & Infrastructure
Development Corporation Limited, New Delhi

WHEREAS:

- (A) [name and address of contractor] (hereinafter called the “**Contractor**”) has executed an agreement (hereinafter called the “**Agreement**”) with the [name and address of the authority], (hereinafter called the “**Authority**”) for the “**Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis**” subject to and in accordance with the provisions of the Agreement
- (B) In accordance with Clause 19.2 of the Agreement, the Authority shall make to the Contractor an interest bearing (@ Bank Rate) advance payment (herein after called “**Advance Payment**”) equal to 10% (ten per cent) of the Contract Price; and that the Advance Payment shall be made in two installments subject to the Contractor furnishing an irrevocable and unconditional guarantee by a scheduled bank for an amount equivalent to 110% (one hundred and ten percent) of such installment to remain effective till the complete and full repayment of the installment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of {first/second} installment of the Advance Payment is Rs. - ----- cr. (Rupees ----- crore) and the amount of this Guarantee is Rs. ----- cr. (Rupees ----- crore) (the “**Guarantee Amount**”)§.
- (C) We, through our branch at (the “**Bank**”) have agreed to furnish this bank guarantee (*hereinafter called the “**Guarantee**”*) for the Guarantee Amount.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful repayment on time of the aforesaid instalment of the Advance Payment under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse,

§ The Guarantee Amount should be equivalent to 110% of the value of the applicable instalment.

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.

2. A letter from the Authority, under the hand of an officer not below the rank of [General Manager in the National Highways Authority of India], that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the instalment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.
3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Advance Payment or to extend the time or period of its repayment or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Advance Payment.

7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect on ****.^{\$} Unless a demand or claim under this Guarantee is made in writing on or before the aforesaid date, the Bank shall be discharged from its liabilities hereunder.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.
12. This guarantee shall also be operatable at our..... Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.
13. Bank Guarantee has been sent to authority's bank through SFMS gateway as per the details below:-

S.no.	Particulars	Details
1	Name of Beneficiary	National Highways & Infrastructure Development Corporation Limited

^{\$} Insert a date being 90 (ninety) days after the end of one year from the date of payment of the Advance payment to the Contractor (in accordance with Clause 19.2 of the Agreement).

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Syndicate Bank transport Bhawan, 1st Parliament Street, New Delhi-110001

Signed and sealed this day of, 20..... at

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

SCHEDULE - H

(See Clauses 10.1.4 and 19.3)

Contract Price Weightages

1.1 The Contract Price for this Agreement is Rs./-

1.2 Proportions of the Contract Price for different stages of Construction of the Project Highway shall be as specified below:

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE	PERCENTAGE WEIGHTAGE vis a vis OVERALL PROJECT
1	2	3	4	5
Road works including culverts, minor bridges, underpasses, overpasses, approaches to ROB/RUB/ Major Bridges/ Structures (but excluding service roads)	57.09%	A- Widening and strengthening of existing road		
		(1) Earthwork up to top of the sub-grade including excavation in soil, soft rock and hard rock including Cleaning & grubbing with required site clearance etc.	0.00%	0
		(2) Granular work (sub- base, shoulders)	0.00%	0
		(3) Bituminous work	0.00%	0
		a)DBM With Prime coat & Tack coat.	0.00%	0
		b)BC with Tack coat.	0.00%	0
		(4) Rigid Pavement	0.00%	0
		(5)Widening and repair of culvert	0.00%	0
		(6)Protection of existing works	0.00%	0
		(7)Widening and repair of minor bridges	0.00%	0
		B - New 2-Lane alignment	0.00%	0
		Earthwork up to top of the sub-grade including excavation in soil, soft rock and hard rock including Cleaning & grubbing with required site clearance etc.	56.33%	32.16
		(2) Granular work (sub- base, shoulders)	14.19%	8.1
		(3) Bituminous work	0.00%	
		a)DBM With Prime coat & Tack coat.	5.34%	3.05

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

		b) BC with Tack coat.	4.38%	2.5
		(4) Rigid Pavement	0.00%	0
		(5) Protection work	0.00%	0
		(6) RCC/Reinf. Earth retaining Wall in approaches of ROB	0.00%	0
		(7) Drainage Works	0.00%	0
		(8) Protection Work	0.00%	0
		C- New culverts, minor bridges, underpasses, overpasses on existing road, realignments, bypasses:	0.00%	
		(1) Box / Slab Culverts	15.50%	8.85
		(2) HP Culvert	0.00%	0.00%
		(3) Embankment Protection(New Lane)	0.00%	0.00%
		(4) Grade separated structures	0.00%	0.00%
		(5) Overpass	0.00%	0.00%
		(6) Elephant Underpass	0.00%	0.00%
		(7) Approaches to ROB and Viaduct	0.00%	0.00%
		(8) Minor Bridges	4.26%	2.43
		(9) Cattles/Pedestrian Underpasses	0.00%	0.00%
		(10) Vehicular Underpass	0.00%	0.00%
Major Bridge works and ROB/RUB	7.16%	A- Widening and repairs of Major Bridges	0.00%	0.00%
		(1) Foundation	0.00%	0.00%
		(2) Sub-structure	0.00%	0.00%
		(3) Super-structure(including wearing coat, crash barrier etc. complete in all respect)	0.00%	0.00%
		B- Widening and repair of	0.00%	0.00%
		(a) ROB	0.00%	0.00%
		(b) RUB	0.00%	0.00%
		C- New Major Bridges	0.00%	0.00%
		(1) other Miscellaneous Items	0.00%	0.00%
		(2) Guide Bundh	0.00%	0.00%
		(3) Foundation	3.07%	0.22
		(4) Sub structure	30.45%	2.18
		(5) Super-structure (including wearing coats, crash barriers etc. complete)	66.48%	4.76
		(6) Protection works	0.00%	0.00%
		D- New rail-road bridges including viaduct	0.00%	0.00%
		(a) ROB	0.00%	0.00%

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

		(b) RUB	0.00%	0.00%
Structures(Elevated sections, reinforced earth)	0%	(1) Foundation	0.00%	0.00%
		(2) Sub-structure	0.00%	0.00%
		(3) Super-structure (including crash barriers etc. complete)	0.00%	0.00%
		(4) Reinforced Earth Wall (includes Approaches of ROB, Underpasses, Overpasses, Flyover etc.)	0.00%	0.00%
Other Works	35.75%	Other Engineering Works	0.00%	0.00%
		Major Junction	0.00%	0.00%
		Road Marking	0.48%	0.17
		Road Appurtenances	0.08%	0.03
		Road side plantation	0.00%	0.00%
		Protection Work (Provision of Rip-Rap or similar work in valley side of the curves as special safety features)	0.00%	0.00%
		Service roads/Slip roads	0.00%	0.00%
		Toll Plaza	0.00%	0.00%
		Road side drain & toe wall	10.91%	3.9
		Project facilities	0.00%	0.00%
		Safety and traffic management during const.	0.00%	0.00%
		Traffic Signages	0.08%	0.03
		Pavement Marking	0.00%	0
		Crash barrier/W metal crash barrier	3.64%	1.3
		Road Boundary stone, km Stone, 5th km stone and hectometer stone	0.03%	0.01
		Traffic blinker LED delineator, stud, reflective payment marker, tree reflector	0.03%	0.01
		Traffic Island	0.00%	0.00%
		Median Kerb	0.00%	0.00%
		Bus bays and Bus Shelter	1.82%	0.65
		Road side plantation and median plantation	0.00%	0.00%
		Protective work of guide bund including construction of flexible aprons, boulder pitching and filter media on slope	0.00%	0.00%
		Minor Junction	0.03%	0.01%
		Median filling shrub plantation and maintenance for 1 year	0.00%	0.00%
		Overhead signboard	0.06%	0.02

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

	Painting on kerb	0.00%	0.00%
	Footpath and separator	0.00%	0.00%
	Interlocking concrete block pavement	0.00%	0.00%
	Junctions	0.00%	0.00%
	CC Kerb	0.00%	0.00%
	Painting	0.00%	0.00%
	cable duct	0.00%	0.00%
	Solar stud and solar blinking LED	0.00%	0.00%
	Rest area with development of site including one no bus bay and bus shelter, landscaping and tree plantation	0.00%	0.00%
	Plantation (Vetiver, Hydro seeding and Mulching or similar techniques etc.) for slope protection on exposed hill slopes as slide mitigation measure.	5.01%	1.79
	Traffic control devices and road safety works	0.00%	0.00%
	Road furniture	0.00%	0.00%
	Road side drain I/C chute drain	0.00%	0.00%
	Repair for protection work	0.00%	0.00%
	Traffic diversion, Safety and traffic management during construction	0.00%	0.00%
	Miscellaneous item	0.00%	0.00%
	Breast Wall and RCC retaining wall	0.00%	0.00%
	Junction improvement	0.00%	0.00%
	Site Clearance	0.00%	0.00%
	M-20 Kerb with channel	0.00%	0.00%
	Prefabricated railing over kerb in median	0.00%	0.00%
	safety barrier	0.00%	0.00%
		0.00%	0.00%
	(v)Project facilities	0.00%	0.00%
	(a)Truck lay-byes	0.36%	0.13
	(b) Others	0.00%	0.00%
	(vi)Repairs to bridges/structures	0.00%	0.00%
	Other items(Junctions)	0.00%	0.00%
	Providing wearing coat	0.00%	0.00%
	Replacement of bearing joints	0.00%	0.00%
	Providing crash barrier	0.00%	0.00%
	(vii)Protection Works	0.00%	0.00%
	Breast Wall	32.45%	11.6

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

		Retaining Wall	20.31%	7.26
		Gabion Wall	24.76%	8.85
		Parapet	0.00%	0.00%
		Total %		100.0

1.3 Procedure of estimating the value of work done

1.3.1 Road works including approaches to minor bridges, Major Bridges and Structures (excluding service roads).

Procedure for estimating the value of road work done shall be as follows:

TABLE 1.3.1

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
A-Widening and Strengthening		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
(1) Earthwork up to top of the sub-grade including excavation in soil, soft rock and hard rock including Cleaning & grubbing with required site clearance etc.	0.00	
(2) Granular work (sub- base, base, shoulders)	0.00	
(3)DBM With Prime coat & Tack coat.	0.00	
(4)BC with Tack coat.	0.00	
(5) Rigid Pavement	0.00	Cost of five completed culverts shall be determined pro rata with respect to the total number of culverts. Payment shall be made on the completion of five culverts.
(6) Widening and repair of culverts	0.00	
(7) Protection of existing works	0.00	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
(8) Widening and repair of minor bridges	0.00	Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length of the minor bridges. Payment shall be made on the completion of a minor bridge.
B- New 2-lane alignment		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
(1) Earthwork up to top of the sub-grade including excavation in soil, soft rock and hard rock including Cleaning & grubbing with required site clearance etc.	32.16%	
(2) Granular work (sub- base, base, shoulders)	8.1%	
(3)DBM With Prime coat & Tack coat.	3.05%	
(4)BC with Tack coat.	2.5%	

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
(5) Rigid Pavement	0.00%	
(5) Protection Works	0.00%	
(6) RCC / Reinf. Earth ret wall in approaches of RoB	0.00%	
(7) Drainage Works	0.00%	
(8) Protection works	0.00%	
C- New culverts, minor bridges, underpasses, overpasses on existing road, realignments, bypasses:		
(1) Box / Slab Culverts	8.85%	Cost of each culvert shall be determined on pro rata basis with respect to the total number of culverts. Payment shall be made on the completion of five culverts.
(2) HP Culverts	0.00%	
(3) Embankment Protection (New Lane)	0.00%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
(4) Grade Separated structures	0.00%	Cost of each structure shall be determined on pro rata basis with respect to the total number of structures. Payment shall be made on the completion of each number of structures specified.
(5) Overpasses	0.00%	
(6) Elephant underpass	0.00%	
(7) Approaches to ROB and Viaduct	0.00%	
(8) Minor bridges	2.43%	Cost of each minor bridge/Culvert shall be determined on pro rata basis with respect to the total linear length of the minor bridges/culvert. Payment shall be made on the completion of a minor bridge/culvert.
(9) Cattles/Pedestrian Underpasses	0.00%	Cost of each structure shall be determined on pro rata basis with respect to the total number of structures. Payment shall be made on the completion of each number of structures specified.
(10) Vehicular Underpasses	0.00%	

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

@. For example, if the total length of bituminous work to be done is 100 km, the cost per km of bituminous work shall be determined as follows:

Cost per km = $P \times \text{weightage for bituminous work} \times (1/L)$

Where P= Contract Price

L = Total length in km

Similarly, the rates per km for stages (1), (2) and (4) above shall be worked out.

1.3 Procedure of estimating the value of work done

1.3.2 Major Bridge works and ROB/RUB.

Procedure for estimating the value of Major Bridge works and of ROB/RUB shall be as stated in table **1.3.2**:

TABLE 1.3.2

STAGE OF PAYMENT	WEIGHTAGE	PAYMENT PROCEDURE
A- Widening and repairs of Major Bridges		Cost of each Major Bridge (widening and repairs) shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridges (widening and repairs). Payment shall be made on completion of each stage of a Major Bridge as per the weightage given in this table.
(1) Foundation	0.00%	
(2) Sub-structure	0.00%	
(3) Super-structure (including wearing coat, crash barriers etc. complete in all respect)	0.00%	
B- Widening and repair of		Cost of each ROB/RUB (widening and repairs) shall be determined on pro rata basis with respect to the total linear length (m) of the ROB/RUB (widening and repairs). Payment shall be made on completion of an ROB/RUB
(a) ROB	0.00%	
(b) RUB	0.00%	
C- New Major Bridges		Payment shall be made on pro rata basis on completion of 25 (twenty five) percent of each stage of a Major Bridge as per the weightage given in this table.
(1) Other Miscellaneous Items	0.00	
(2) Guide Bund	0.00	
(3) Foundation	0.22%	
(4) Sub-structure	2.18%	
(5) Super-structure (including wearing coat, crash barriers etc. complete in all respect)	4.76%	
(6) Protection Works	0.00%	Payment shall be made on pro rata basis on completion of 25 (twenty five) percent of each stage of a Major Bridge as per the weightage given in this table.
D-Structures(Elevated sections, reinforced earth)		
(1) Foundation	0.00%	
(2) Sub-structure	0.00%	
(3) Super-structure (including wearing coat, crash barriers etc. complete in all respect)	0.00%	
(4) Reinforced Earth Wall (includes Approaches of ROB, Underpasses, Overpasses, Flyover etc.)	0.00%	
D- New rail-road bridge		Payment shall be made on pro rata basis on completion of 25 (twenty five) percent of each stage of a ROB/RUB as per the weightage given in this table.
(a) ROB	0.00%	
(b) RUB	0.00%	

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

TABLE: 1.3.3

STAGE OF PAYMENT	WEIGHTAGE	PAYMENT PROCEDURE
(1) Foundation: On completion of the foundation works including foundations for wing and return walls	0.00%	Cost of each structure shall be determined on pro rata basis in respect to the total linear length (m) of all the structures. Payment shall be made on completion of each stage of a structure as per the weightage given in this table.
(2) Sub-structure: On completion of abutments, piers up to the abutment/pier cap	0.00%	
(3) Super-structure: On completion of the Structure along with super structure, including hand rails/crash barriers, wing walls, return walls, tests on completion etc., elevated structure complete in all respects and fit for use.	0.00%	
(4) Reinforced earth work	0.00%	Payment shall be made on pro rata basis on completion of 20 (twenty) percent of total area.

1.3.4 Other works.

Procedure for estimating the value of other works done shall be as stated in table 1.3.4:

TABLE 1.3.4

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
Other Engineering Works		
Junction	0.00%	Payment shall be made on pro rata basis for completed facilities.
Road Marking	0.17%	
Road Appurtenances	0.03%	
Road Side plantation	0.00%	Unit of measurement is linear length in km. Cost per km shall be determined on pro rata basis with respect to the total length of the service roads/slip roads. Payment shall be made for completed service roads/slip roads in a length of not less than 20 (twenty) percent of the total length of service roads/slip roads.
Protection works(Riprap)	0.00%	
Service roads/slip road	0.00%	
Toll Plaza	0.00%	Unit of measurement is each completed toll plaza. Payment of each toll plaza shall be made on pro rata basis with respect to the total of all toll plazas.
Road side drains & toe wall	3.9%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
Project facilities	0.00%	Payment shall be made for completed items.
Safety & traffic mgmt. During construction	0.00%	
Traffic Sign	0.03%	
Pavement marking	0.00%	
Crash barrier/ W metal crash barrier	1.3%	
Road Boundary stone, km stone, 5th km stone, & hectometre stones	0.01%	
Traffic blinker LED Delineator, stud, reflective payment marker, tree reflector	0.01%	

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
Traffic Island	0.00%	
Median Kerbs	0.00%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
Bus Bays & Bus shelter	0.65%	Payment shall be made for completed items.
Road side plantation & medium Plantation.	0.00%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
Protection works of guide bund including construction of flexible aprons , boulder pitching and filter media on slopes	0.00%	
Minor junction	0.01%	Payment shall be made for completed items.
Median filling shrub plantation & maintenance for 1 year	0.00%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
Overhead signboard	0.02%	
painting on kerb	0.00%	
Footpath & Separator	0.00%	
Plantation (Vetiver, Hydro seeding and Mulching etc.) for slope protection on exposed hill slopes as slide mitigation measure.	0.00%	
Interlocking concrete block payment	0.00%	
junctions	0.00%	
CC kerb	0.00%	
Painting	0.00%	
Cable duct	0.00%	
Solar stud & solar blinking LED	0.00%	
Rest area with development of site including One no Bus bay and Bus shelter, landscaping and tree plantation	0.00%	
Plantation (Vetiver, Hydro seeding and Mulching or similar	1.79%	

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
techniques etc.) for slope protection on exposed hill slopes as slide mitigation measure.		
Traffic control devices and road safety works	0.00%	
Road furniture	0.00%	
Roads side drains I/C Chute drain& toe wall	0.00%	
Repair of protections works	0.00%	
Traffic diversion, Safety and traffic management during construction	0.00%	
Miscellaneous items	0.00%	
Breast wall and RCC retaining wall	0.00%	
Junction improvement	0.00%	
Site Clearance	0.00%	
M-20 kerb with channel	0.00%	
Prefabricated railing over kerb in median	0.00%	
Safety Barrier	0.00%	
(v) Project facilities		
(a) Truck lay-byes	0.13%	Payment shall be made for completed items.
(b) others	0.00%	
(vi) Repairs to bridges/structures		
Other items (Junctions)	0.00%	Payment shall be made for completed items.
Providing wearing coat	0.00%	
Replacement of bearing joints	0.00%	
Providing crash barriers	0.00%	
(vii) Protection works		
Breast wall	11.6%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
Retaining wall	7.26%	
Gabion Wall	8.85%	
Parapet	0.00%	

2 Procedure for payment for Maintenance

2.1 The cost for maintenance shall be as stated in Clause 14.1.1.

2.2 Payment for Maintenance shall be made in quarterly installments in accordance with the provisions of Clause 19.7.

Construction of 2 Lane road from Km 16.00 of RoingHunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment having total length 74.863 Km) (NH-313) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE

SCHEDULE - I
(See Clause 10.2.4)

DRAWINGS

1 Drawings

In compliance of the obligations set forth in Clause 10.2 of this Agreement, the Contractor shall furnish to the Authority's Engineer, free of cost, all Drawings listed in Annex-I of this Schedule-I.

2 Additional Drawings

If the Authority's Engineer determines that for discharging its duties and functions under this Agreement, it requires any drawings other than those listed in Annex-I, it may by notice require the Contractor to prepare and furnish such drawings forthwith. Upon receiving a requisition to this effect, the Contractor shall promptly prepare and furnish such drawings to the Authority's Engineer, as if such drawings formed part of Annex-I of this Schedule-I.

Annex - I
(Schedule - I)

List of Drawings

[**Note:** The contractor is required to furnish all the Drawings as per the Manual and Clause 10.2.]

SCHEDULE - J
(See Clause 10.3.2)

PROJECT COMPLETION SCHEDULE

1 Project Completion Schedule

During Construction period, the Contractor shall comply with the requirements set forth in this Schedule-J for each of the Project Milestones and the **Scheduled Completion Date**. Within 15 (fifteen) days of the date of each Project Milestone, the Contractor shall notify the Authority of such compliance along with necessary particulars thereof.

2 Project Milestone-I

- 2.1 Project Milestone-I shall occur on the date falling on the 240th (one hundred and fortieth) day from the Appointed Date (the “**Project Milestone-I**”).
- 2.2 Prior to the occurrence of Project Milestone-I, the Contractor shall have commenced construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 10% (ten per cent) of the Contract Price.

3 Project Milestone-II

- 3.1 Project Milestone-II shall occur on the date falling on the 733rd (Seven Hundred Thirty Third) day from the Appointed Date (the “**Project Milestone-II**”).
- 3.2 Prior to the occurrence of Project Milestone-II, the Contractor shall have continued with construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 40% (Forty per cent) of the Contract Price.

4 Project Milestone-III

- 4.1 Project Milestone-III shall occur on the date falling on the [1220th (Twelve Hundred Twentieth)] day from the Appointed Date (the “**Project Milestone-III**”).
- 4.2 Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 80% (Eighty per cent) of the Contract Price.

5 Scheduled Completion Date

- 5.1 The Scheduled Completion Date shall occur on the [1460th (Fourteen Hundred Sixtieth)] day from the Appointed Date.

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

5.2 On or before the Scheduled Completion Date, the Contractor shall have completed construction in accordance with this Agreement.

6 Extension of time

Upon extension of any or all of the aforesaid Project Milestones or the Scheduled Completion Date, as the case may be, under and in accordance with the provisions of this Agreement, the Project Completion Schedule shall be deemed to have been amended accordingly.

SCHEDULE - K

(See Clause 12.1.2)

Tests on Completion

1 Schedule for Tests

- 1.1 The Contractor shall, no later than 30 (thirty) days prior to the likely completion of construction, notify the Authority's Engineer and the Authority of its intent to subject the Project Highway to Tests, and no later than 10 (ten) days prior to the actual date of Tests, furnish to the Authority's Engineer and the Authority detailed inventory and particulars of all works and equipment forming part of Works.
- 1.2 The Contractor shall notify the Authority's Engineer of its readiness to subject the Project Highway to Tests at any time after 10 (ten) days from the date of such notice, and upon receipt of such notice, the Authority's Engineer shall, in consultation with the Contractor, determine the date and time for each Test and notify the same to the Authority who may designate its representative to witness the Tests. The Authority's Engineer shall thereupon conduct the Tests itself or cause any of the Tests to be conducted in accordance with Article 12 and this Schedule-K.

2 Tests

- 2.1 Visual and physical test: The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include [***].
- 2.2 Riding quality test: Riding quality of each lane of the carriageway shall be checked with the help of a calibrated bump integrator and the maximum permissible roughness for purposes of this Test shall be [2,000 (two thousand)] mm for each kilometre.
- 2.3 Tests for bridges: All major and minor bridges shall be subjected to the rebound hammer and ultrasonic pulse velocity tests, to be conducted in accordance with the procedure described in Special Report No. 17: 1996 of the IRC Highway Research Board on Nondestructive Testing Techniques, at two spots in every span, to be chosen at random by the Authority's Engineer. Bridges with a span of 15 (fifteen) metres or more shall also be subjected to load testing.
- 2.4 Other tests: The Authority's Engineer may require the Contractor to carry out or cause to be carried additional tests, in accordance with Good Industry Practice, for determining the compliance of the Project Highway with Specifications and Standards.
- 2.5 Environmental audit: The Authority's Engineer shall carry out a check to determine conformity of the Project Highway with the environmental requirements set forth in Applicable Laws and Applicable Permits.
- 2.6 Safety Audit: The Authority's Engineer shall carry out, or cause to be carried out, a safety audit to determine conformity of the Project Highway with the safety requirements and Good

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

Industry Practice.

3 Agency for conducting Tests

All Tests set forth in this Schedule-K shall be conducted by the Authority's Engineer or such other agency or person as it may specify in consultation with the Authority.

4 Completion Certificate

Upon successful completion of Tests, the Authority's Engineer shall issue the Completion Certificate in accordance with the provisions of Article 12.

SCHEDULE - L
(See Clause 12.2 and 12.4)

PROVISIONAL CERTIFICATE

- 1 I, (Name of the Authority's Engineer), acting as the Authority's Engineer, under and in accordance with the Agreement dated (the "Agreement"), for **"Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis"** (the **"Project Highway"**) on Engineering, Procurement and Construction (EPC) basis through (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been undertaken to determine compliance of the Project Highway with the provisions of the Agreement.
- 2 Works that are incomplete on account of Time Extension have been specified in the Punch List appended hereto, and the Contractor has agreed and accepted that it shall complete all such works in the time and manner set forth in the Agreement. In addition, certain minor works are incomplete and these are not likely to cause material inconvenience to the Users of the Project Highway or affect their safety. The Contractor has agreed and accepted that as a condition of this Provisional Certificate, it shall complete such minor works within 30 (thirty) days hereof. These minor works have also been specified in the aforesaid Punch List.
- 3 In view of the foregoing, I am satisfied that the Project Highway from km ** to km ** can be safely and reliably placed in service of the Users thereof, and in terms of the Agreement, the Project Highway is hereby provisionally declared fit for entry into operation on this the day of 20.....

ACCEPTED, SIGNED, SEALED

SIGNED, SEALED AND

AND DELIVERED

DELIVERED

For and on behalf of

For and on behalf of

CONTRACTOR by:

AUTHORITY's ENGINEER by:

(Signature)

(Signature)

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

COMPLETION CERTIFICATE

- 1 I, (Name of the Authority's Engineer), acting as the Authority's Engineer, under and in accordance with the Agreement dated (the "**Agreement**"), for "**Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis**" (the "**Project Highway**") on Engineering, Procurement and Construction (EPC) basis through (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement, and I am satisfied that the Project Highway can be safely and reliably placed in service of the Users thereof.
- 2 It is certified that, in terms of the aforesaid Agreement, all works forming part of Project Highway have been completed, and the Project Highway is hereby declared fit for entry into operation on this the day of 20.....

SIGNED, SEALED AND DELIVERED

For and on behalf of

the Authority's Engineer by:

(Signature)

(Name)

(Designation)

(Address)

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

SCHEDULE - M
(See Clauses 14.6, 15.2 and 19.7)

PAYMENT REDUCTION FOR NON-COMPLIANCE

1. Payment reduction for non-compliance with the Maintenance Requirements

- 1.1 Monthly lump sum payments for maintenance shall be reduced in the case of non-compliance with the Maintenance Requirements set forth in Schedule-E.
- 1.2 Any deduction made on account of non-compliance with the Maintenance Requirements shall not be paid even after compliance subsequently. The deductions shall continue to be made every month until compliance is done.
- 1.3 The Authority's Engineer shall calculate the amount of payment reduction on the basis of weightage in percentage assigned to non-conforming items as given in Paragraph 2.

2. Percentage reductions in lump sum payments

- 2.1 The following percentages shall govern the payment reduction:

S. No.	Item/Defect/Deficiency	Percentage
(a)	Carriageway/Pavement	
(i)	Potholes, cracks, other surface defects	15%
(ii)	Repairs of Edges, Rutting	5%
(b)	Road, Embankment, Cuttings, Shoulders	
(i)	Edge drop, inadequate crossfall, undulations, settlement, potholes, ponding, obstructions	10%
(ii)	Deficient slopes, raincuts, disturbed pitching, vegetation growth, pruning of trees	5%
(c)	Bridges and Culverts	
(i)	Desilting, cleaning, vegetation growth, damaged pitching, flooring, parapets, wearing course, footpaths, any damage to foundations	20%
S. No.	Item/Defect/Deficiency	Percentage

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

(ii)	Any Defects in superstructures, bearings and sub-structures	10%
(iii)	Painting, repairs/replacement kerbs, railings, parapets, guideposts/crash barriers	5%
(d)	Roadside Drains	
(i)	Cleaning and repair of drains	5%
(e)	Road Furniture	
(i)	Cleaning, painting, replacement of road signs, delineators, road markings, 200 m/km/5 th km stones	5%
(f)	Miscellaneous Items	
(i)	Removal of dead animals, broken down/accident vehicles, fallen trees, road blockades or malfunctioning of mobile crane	10%
(ii)	Any other Defects in accordance with paragraph 1.	5%
(g)	Defects in Other Project Facilities	5%

2.2 The amount to be deducted from monthly lump-sum payment for non compliance of particular item shall be calculated as under:

$$R = P/100 \times M \times L1/L$$

Where P = Percentage of particular item/Defect/deficiency for deduction

M = Monthly lump-sum payment in accordance with the Bid

L1 = Non-complying length

L = Total length of the road,

R = Reduction (the amount to be deducted for non compliance for a particular item/Defect/deficiency)

The total amount of reduction shall be arrived at by summation of reductions for such items/Defects/deficiency or non compliance.

For any Defect in a part of one kilometer, the non-conforming length shall be taken as one kilometer.

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

SCHEDULE - N
(See Clause 18.1.1)

SELECTION OF AUTHORITY'S ENGINEER

1 Selection of Authority's Engineer

- 1.1 The provisions of the Model Request for Proposal for Selection of Technical Consultants, issued by the Ministry of Finance in May 2009, or any substitute thereof shall apply for selection of an experienced firm to discharge the functions and duties of an Authority's Engineer.
- 1.2 In the event of termination of the Technical Consultants appointed in accordance with the provisions of Paragraph 1.1, the Authority shall appoint another firm of Technical Consultants forthwith and may engage a government-owned entity in accordance with the provisions of Paragraph 3 of this Schedule-N.

2 Terms of Reference

The Terms of Reference for the Authority's Engineer (the "TOR") shall substantially conform with Annex 1 to this Schedule N.

3 Appointment of Government entity as Authority's Engineer

Notwithstanding anything to the contrary contained in this Schedule, the Authority may in its discretion appoint a government-owned entity as the Authority's Engineer; provided that such entity shall be a body corporate having as one of its primary functions the provision of consulting, advisory and supervisory services for engineering projects; provided further that a government-owned entity which is owned or controlled by the Authority shall not be eligible for appointment as Authority's Engineer.

Annex – I
(Schedule - N)

TERMS OF REFERENCE FOR AUTHORITY’S ENGINEER

1 Scope

- 1.1 These Terms of Reference (the “**TOR**”) for the Authority’s Engineer are being specified pursuant to the EPC Agreement dated (the “**Agreement**”), which has been entered into between the [name and address of the Authority] (the “**Authority**”) and (the “**Contractor**”) for “**Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis**”, and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.
- 1.2 The TOR shall apply to construction and maintenance of the Project Highway.

2 Definitions and interpretation

- 2.1 The words and expressions beginning with or in capital letters and not defined herein but defined in the Agreement shall have, unless repugnant to the context, the meaning respectively assigned to them in the Agreement.
- 2.2 References to Articles, Clauses and Schedules in this TOR shall, except where the context otherwise requires, be deemed to be references to the Articles, Clauses and Schedules of the Agreement, and references to Paragraphs shall be deemed to be references to Paragraphs of this TOR.
- 2.3 The rules of interpretation stated in Clauses 1.2, 1.3 and 1.4 of the Agreement shall apply, *mutatis mutandis*, to this TOR.

3. General

- 3.1 The Authority’s Engineer shall discharge its duties in a fair, impartial and efficient manner, consistent with the highest standards of professional integrity and Good Industry Practice.
- 3.2 The Authority’s Engineer shall perform the duties and exercise the authority in accordance with the provisions of this Agreement, but subject to obtaining prior written approval of the Authority before determining:
- (a) any Time Extension;
- (b) any additional cost to be paid by the Authority to the Contractor;

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

- (c) the Termination Payment; or
 - (d) any other matter which is not specified in (a), (b) or (c) above and which creates an obligation or liability on either Party for a sum exceeding Rs. 5,000,000 (Rs. fifty lakh).
- 3.3 The Authority's Engineer shall submit regular periodic reports, at least once every month, to the Authority in respect of its duties and functions under this Agreement. Such reports shall be submitted by the Authority's Engineer within 10 (ten) days of the beginning of every month.
- 3.4 The Authority's Engineer shall inform the Contractor of any delegation of its duties and responsibilities to its suitably qualified and experienced personnel; provided, however, that it shall not delegate the authority to refer any matter for the Authority's prior approval in accordance with the provisions of Clause 18.2.
- 3.5 The Authority's Engineer shall aid and advise the Authority on any proposal for Change of Scope under Article 13.
- 3.6 In the event of any disagreement between the Parties regarding the meaning, scope and nature of Good Industry Practice, as set forth in any provision of the Agreement, the Authority's Engineer shall specify such meaning, scope and nature by issuing a reasoned written statement relying on good industry practice and authentic literature.

4 Construction Period

- 4.1 During the Construction Period, the Authority's Engineer shall review the Drawings furnished by the Contractor along with supporting data, including the geo-technical and hydrological investigations, characteristics of materials from borrow areas and quarry sites, topographical surveys, and the recommendations of the Safety Consultant in accordance with the provisions of Clause 10.1.6. The Authority's Engineer shall complete such review and send its observations to the Authority and the Contractor within 15 (fifteen) days of receipt of such Drawings; provided, however that in case of a Major Bridge or Structure, the aforesaid period of 15 (fifteen) days may be extended upto 30 (thirty) days. In particular, such comments shall specify the conformity or otherwise of such Drawings with the Scope of the Project and Specifications and Standards.
- 4.2 The Authority's Engineer shall review any revised Drawings sent to it by the Contractor and furnish its comments within 10 (ten) days of receiving such Drawings.
- 4.3 The Authority's Engineer shall review the Quality Assurance Plan submitted by the Contractor and shall convey its comments to the Contractor within a period of 21 (twenty-one) days stating the modifications, if any, required thereto.
- 4.4 The Authority's Engineer shall complete the review of the methodology proposed to be adopted by the Contractor for executing the Works, and convey its comments to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

methodology from the Contractor.

- 4.5 The Authority's Engineer shall grant written approval to the Contractor, where necessary, for interruption and diversion of the flow of traffic in the existing lane(s) of the Project Highway for purposes of maintenance during the Construction Period in accordance with the provisions of Clause 10.4.
- 4.6 The Authority's Engineer shall review the monthly progress report furnished by the Contractor and send its comments thereon to the Authority and the Contractor within 7 (seven) days of receipt of such report.
- 4.7 The Authority's Engineer shall inspect the Construction Works and the Project Highway and shall submit a monthly Inspection Report bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. In particular, the Authority's Engineer shall include in its Inspection Report, the compliance of the recommendations made by the Safety Consultant.
- 4.8 The Authority's Engineer shall conduct the pre-construction review of manufacturer's test reports and standard samples of manufactured Materials, and such other Materials as the Authority's Engineer may require.
- 4.9 For determining that the Works conform to Specifications and Standards, the Authority's Engineer shall require the Contractor to carry out, or cause to be carried out, tests at such time and frequency and in such manner as specified in the Agreement and in accordance with Good Industry Practice for quality assurance. For purposes of this Paragraph 4.9, the tests specified in the IRC Special Publication-11 (Handbook of Quality Control for Construction of Roads and Runways) and the Specifications for Road and Bridge Works issued by MORTH (the "Quality Control Manuals") or any modification/substitution thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance.
- 4.10 The Authority's Engineer shall test check at least 20 (twenty) percent of the quantity or number of tests prescribed for each category or type of test for quality control by the Contractor.
- 4.11 The timing of tests referred to in Paragraph 4.9, and the criteria for acceptance/ rejection of their results shall be determined by the Authority's Engineer in accordance with the Quality Control Manuals. The tests shall be undertaken on a random sample basis and shall be in addition to, and independent of, the tests that may be carried out by the Contractor for its own quality assurance in accordance with Good Industry Practice.
- 4.12 In the event that results of any tests conducted under Clause 11.10 establish any Defects or deficiencies in the Works, the Authority's Engineer shall require the Contractor to carry out remedial measures.
- 4.13 The Authority's Engineer may instruct the Contractor to execute any work which is urgently
Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

required for the safety of the Project Highway, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work required on account of a Force Majeure Event, the provisions of Clause 21.6 shall apply.

- 4.14 In the event that the Contractor fails to achieve any of the Project Milestones, the Authority's Engineer shall undertake a review of the progress of construction and identify potential delays, if any. If the Authority's Engineer shall determine that completion of the Project Highway is not feasible within the time specified in the Agreement, it shall require the Contractor to indicate within 15 (fifteen) days the steps proposed to be taken to expedite progress, and the period within which the Project Completion Date shall be achieved. Upon receipt of a report from the Contractor, the Authority's Engineer shall review the same and send its comments to the Authority and the Contractor forthwith.
- 4.15 The Authority's Engineer shall obtain from the Contractor a copy of all the Contractor's quality control records and documents before the Completion Certificate is issued pursuant to Clause 12.4.
- 4.16 Authority's Engineer may recommend to the Authority suspension of the whole or part of the Works if the work threatens the safety of the Users and pedestrians. After the Contractor has carried out remedial measure, the Authority's Engineer shall inspect such remedial measures forthwith and make a report to the Authority recommending whether or not the suspension hereunder may be revoked.
- 4.17 In the event that the Contractor carries out any remedial measures to secure the safety of suspended works and Users, and requires the Authority's Engineer to inspect such works, the Authority's Engineer shall inspect the suspended works within 3 (three) days of receiving such notice, and make a report to the Authority forthwith, recommending whether or not such suspension may be revoked by the Authority.
- 4.18 The Authority's Engineer shall carry out, or cause to be carried out, all the Tests specified in Schedule-K and issue a Completion Certificate or Provisional Certificate, as the case may be. For carrying out its functions under this Paragraph 4.18 and all matters incidental thereto, the Authority's Engineer shall act under and in accordance with the provisions of Article 12 and Schedule-K.

5. Maintenance Period

- 5.1 The Authority's Engineer shall aid and advise the Contractor in the preparation of its monthly Maintenance Programme and for this purpose carry out a joint monthly inspection with the Contractor.
- 5.2 The Authority's Engineer shall undertake regular inspections, at least once every month, to evaluate compliance with the Maintenance Requirements and submit a Maintenance Inspection Report to the Authority and the Contractor.

- 5.3 The Authority's Engineer shall specify the tests, if any, that the Contractor shall carry out, or cause to be carried out, for the purpose of determining that the Project Highway is in conformity with the Maintenance Requirements. It shall monitor and review the results of such tests and the remedial measures, if any, taken by the Contractor in this behalf.
- 5.4 In respect of any defect or deficiency referred to in Paragraph 3 of Schedule-E, the Authority's Engineer shall, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards and shall also specify the time limit for repair or rectification of any deviation or deterioration beyond the permissible limit.
- 5.5 The Authority's Engineer shall examine the request of the Contractor for closure of any lane(s) of the Project Highway for undertaking maintenance/repair thereof, and shall grant permission with such modifications, as it may deem necessary, within 5 (five) days of receiving a request from the Contractor. Upon expiry of the permitted period of closure, the Authority's Engineer shall monitor the reopening of such lane(s), and in case of delay, determine the Damages payable by the Contractor to the Authority under Clause 14.5.

6 Determination of costs and time

- 6.1 The Authority's Engineer shall determine the costs, and/or their reasonableness, that are required to be determined by it under the Agreement.
- 6.2 The Authority's Engineer shall determine the period of Time Extension that is required to be determined by it under the Agreement.
- 6.3 The Authority's Engineer shall consult each Party in every case of determination in accordance with the provisions of Clause 18.5.

7. Payments

- 7.1 The Authority's Engineer shall withhold payments for the affected works for which the Contractor fails to revise and resubmit the Drawings to the Authority's Engineer in accordance with the provisions of Clause 10.2.4 (d).
- 7.2 Authority's Engineer shall -
- (a) within 10 (ten) days of receipt of the Stage Payment Statement from the Contractor pursuant to Clause 19.4, determine the amount due to the Contractor and recommend the release of 90 (ninety) percent of the amount so determined as part payment, pending issue of the Interim Payment Certificate; and
 - (b) within 15 (fifteen) days of the receipt of the Stage Payment Statement referred to in Clause 19.4, deliver to the Authority and the Contractor an Interim Payment Certificate certifying the amount due and payable to the Contractor, after adjustments in accordance with the provisions

Construction of 2 Lane road with paved shoulders from Km 16.00 of Roing Hunli section to Km 21.500 of Hunli-Anini Road (Greenfield alignment) (NH-313)(Total length= 74.863 Km) in Arunachal Pradesh under Arunachal Pradesh package of SARDP-NE on Engineering Procurement and Construction (EPC) basis

of Clause 19.10.

- 7.3 The Authority's Engineer shall, within 15 (fifteen) days of receipt of the Monthly Maintenance Statement from the Contractor pursuant to Clause 19.6, verify the Contractor's monthly statement and certify the amount to be paid to the Contractor in accordance with the provisions of the Agreement.
- 7.4 The Authority's Engineer shall certify final payment within 30 (thirty) days of the receipt of the final payment statement of Maintenance in accordance with the provisions of Clause 19.16.

8. Other duties and functions

The Authority's Engineer shall perform all other duties and functions as specified in the Agreement.

9 Miscellaneous

- 9.1 A copy of all communications, comments, instructions, Drawings or Documents sent by the Authority's Engineer to the Contractor pursuant to this TOR, and a copy of all the test results with comments of the Authority's Engineer thereon, shall be furnished by the Authority's Engineer to the Authority forthwith.
- 9.2 The Authority's Engineer shall retain at least one copy each of all Drawings and Documents received by it, including 'as-built' Drawings, and keep them in its safe custody.
- 9.3 Within 90 (ninety) days of the Project Completion Date, the Authority's Engineer shall obtain a complete set of as-built Drawings, in 2 (two) hard copies and in micro film form or in such other medium as may be acceptable to the Authority, reflecting the Project Highway as actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Project Highway and setback lines, if any, of the buildings and structures forming part of Project Facilities; and shall hand them over to the Authority against receipt thereof.
- 9.4 The Authority's Engineer, if called upon by the Authority or the Contractor or both, shall mediate and assist the Parties in arriving at an amicable settlement of any Dispute between the Parties.
- 9.5 The Authority's Engineer shall inform the Authority and the Contractor of any event of Contractor's Default within one week of its occurrence.

SCHEDULE - O

(See Clauses 19.4.1, 19.6.1, and 19.8.1)

Forms of Payment Statements

1. Stage Payment Statement for Works

The Stage Payment Statement for Works shall state:

- (a) the estimated amount for the Works executed in accordance with Clause 19.3.1 subsequent to the last claim;
- (b) amounts reflecting adjustments in price for the aforesaid claim;
- (c) the estimated amount of each Change of Scope Order executed subsequent to the last claim;
- (d) amounts reflecting adjustment in price, if any, for (c) above in accordance with the provisions of Clause 13.2.3 (a);
- (e) total of (a), (b), (c) and (d) above;
- (f) Deductions:
 - (i) Any amount to be deducted in accordance with the provisions of the Agreement except taxes;
 - (ii) Any amount towards deduction of taxes; and
 - (i) Total of (i) and (ii) above.
- (g) Net claim: (e) – (f) (iii);
- (h) The amounts received by the Contractor upto the last claim:
 - (i) For the Works executed (excluding Change of Scope orders);
 - (ii) For Change of Scope Orders, and
 - (iii) Taxes deducted

2. Monthly Maintenance Payment Statement

The monthly Statement for Maintenance Payment shall state:

- (a) the monthly payment admissible in accordance with the provisions of the Agreement;
- (b) the deductions for maintenance work not done;
- (c) net payment for maintenance due, (a) minus (b);
- (d) amounts reflecting adjustments in price under Clause 19.12; and
- (e) amount towards deduction of taxes

3. Contractor's claim for Damages

Note: The Contractor shall submit its claims in a form acceptable to the Authority.

SCHEDULE - P
(See Clause 20.1)

INSURANCE

1. Insurance during Construction Period

- 1.1 The Contractor shall effect and maintain at its own cost, from the Appointed Date till the date of issue of the Completion Certificate, the following insurances for any loss or damage occurring on account of Non Political Event of Force Majeure, malicious act, accidental damage, explosion, fire and terrorism:
- (a) insurance of Works, Plant and Materials and an additional sum of [15 (fifteen)] per cent of such replacement cost to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature; and
 - (b) insurance for the Contractor's equipment and Documents brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.
- 1.2 The insurance under paragraph 1.1 (a) and (b) above shall cover the Authority and the Contractor against all loss or damage from any cause arising under paragraph 1.1 other than risks which are not insurable at commercial terms.

2. Insurance for Contractor's Defects Liability

The Contractor shall effect and maintain insurance cover for the Works from the date of issue of the Completion Certificate until the end of the Defects Liability Period for any loss or damage for which the Contractor is liable and which arises from a cause occurring prior to the issue of the Completion Certificate. The Contractor shall also maintain other insurances for maximum sums as may be required under the Applicable Laws and in accordance with Good Industry Practice.

3. Insurance against injury to persons and damage to property

- 3.1 The Contractor shall insure against its liability for any loss, damage, death or bodily injury, or damage to any property (except things insured under Paragraphs 1 and 2 of this Schedule or to any person (except persons insured under Clause 20.9), which may arise out of the Contractor's performance of this Agreement. This insurance shall be for a limit per occurrence of not less than the amount stated below with no limit on the number of occurrences.
- The insurance cover shall be not less than the project cost.
- 3.2 The insurance shall be extended to cover liability for all loss and damage to the Authority's property arising out of the Contractor's performance of this Agreement excluding:
- (a) the Authority's right to have the construction works executed on, over, under, in or through any land, and to occupy this land for the Works; and

- (b) damage which is an unavoidable result of the Contractor's obligations to execute the Works.

4. **Insurance to be in joint names**

The insurance under paragraphs 1 to 3 above shall be in the joint names of the Contractor and the Authority.