SCHEDULES

[CONSTRUCTION OF BALANCE WORK OF TWO – LANE WITH HARD SHOULDERS OF EXISTING HAYULIANG – HAWAI ROAD (NH-113) FROM DESIGN KM 51.825 TO KM 63.131 (EXISTING KM 45.050 OF HAYULIANG – HAWAI ROAD TO HAWAI TOWN)(11.306 KM) ON EPC BASIS IN THE STATE OF ARUNACHAL PRADESH PACKAGE OF SARDP –NE (GREEN FIELD ALIGNMENT)]

SCHEDULE - A

(See Clauses 2.1 and 8.1)

SITE OF THE PROJECT

1 The Site

1.1 Site of the Two-Laning of Hayuliang– Hawai Road on EPC basis from design Km. 51.825 to Km. 63.131 [Existing Km 45.050 (Hayuliang – Hawai road) to Hawai Town] in the state of Arunachal Pradesh under SARDP-NE, Project Highway shall include the land, buildings, structures and road works as described in Annex-I of this Schedule-A.
The Project alignment is approachable only from Hawai town (End of Project Road) for execution works.

1.2 The dates of handing over the Right of Way to the Contractor are specified in Annex-II of this Schedule-A.

1.3 AninventoryoftheSiteincludingtheland,buildings,structures,roadworks,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 8.2.1of this Agreement.

1.4 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.

1.5 The status of the environment clearances obtained or awaited is given in Annex IV.

Annex - I
(Schedule-A)

1. Site

The site of the two lane Project Highway comprises the section of Hawai bypass road commencing from existing Km 45.050 (Hayuliang – Hawai road) to Hawai Town [from Km 51.825 to Km 63.131, Design] in the State of Arunachal Pradesh. The land, carriageway and structures comprising the Site are described below.

2. Chainage References (Topographical vsDesign)

"Topographical Chainage" means survey done at site on final approved alignment because no any alignment exists there presently". After finalization of alignment by improving the existing geometry the Chainage has been referred to "Design Chainage". The relationship between the "Topographical Chainage" and the "Design Chainage" as per field surveys for the "Project Highway" is given below.

Sl. No.	Topo / Existing Chainage	Design Chainage (km)
1	0	51.825
2	500	52.335
3	1000	52.845
4	1500	53.365
5	2000	53.855
6	2500	54.355
7	3000	54.855
8	3500	55.410
9	4000	55.905
10	4500	56.425
11	5000	56.895
12	5500	57.385
13	6000	58.055
14	6500	58.580
15	7000	59.065
16	7500	59.545
17	8000	60.040
18	8500	60.525
19	9000	61.025
20	9500	61.515
21	10000	62.025
22	10500	62.525
23	11000	63.025
24	11112	63.131

3. Land

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

Sl. No.	Existing Chainage (Km)		Design Chainage (km)		Length in Km (Design)	ROW (m)	Remarks
	From	To	From	To			
1	0.000	0.230	51.825	52.055	0.230	24	
2	0.550	1.000	52.375	52.825	0.450	18	
3	2.500	2.600	54.325	54.425	0.100	24	
4	2.950	3.340	54.775	55.165	0.390	24	
6	5.040	5.160	56.865	56.985	0.120	16	
7	5.160	5.390	56.985	57.215	0.230	24	
8	5.800	5.830	57.625	57.655	0.030	24	
9	6.800	11.306	58.625	63.131	4.506	24	
				Total	**6.056**		

4. Carriageway

The present carriageway detail is shown in the table below:

Sl. No.	Existing Chainage (Km)		Design Chainage (m)		Length in m (Design)	Lane Width (m)	Remarks
	From	To	From	To			
1	0.000	6.800	51825	58455	6800	Nil	
2	6.800	11.112	58455	63131	4676	3-8	Non-motorized Earthen track

5. Earthwork done as per 2Laning in following stretches upto top of Subgrade

(Rectification work needs to be carried out in some chainages vide Schedule-B).

Chainage (km)		Side	Formation Width available	Length (Km)
From	To			
62+590	62+900	B/S	12m	**0.310**
62+120	62+590	B/S		**0.470**
62+000	62+120	B/S		**0.120**
61+850	62+000	B/S		**0.150**
61+550	61+850	B/S		**0.300**
61+420	61+550	B/S		**0.130**
61+180	61+420	B/S		**0.240**
59+000	59+300	B/S		**0.300**
58+750	59+000	B/S		**0.250**

62+900	63+000	B/S		**0.100**
63+000	63+080	B/S		**0.080**
61+050	61+180	B/S		**0.130**
59+580	59+740	B/S		**0.160**
58+660	58+740	B/S		**0.080**
59+310	59+430	B/S		**0.120**
			Total =	**2.94 Km**

6. Major Bridges

The Site includes the following Major Bridges:

Sl. No.	Existing Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-structure	Superstructure		
NIL						

7. Road over-bridges(ROB)

The Site includes the following ROB (road over railway line)

Sl. No.	Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)	ROB
		Foundation	Superstructure			
NIL						

8. Grade separators

The Site includes the following grade separators:

Sl. No.	Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)
		Foundation	Superstructure		
NIL					

9. Minor bridges

The Site includes the following minor bridges:

Sl. No.	Existing (m)	Type of Structure			Span length (m)	Width (m)
		Foundation	Sub-structure	Super Structure		
1		NIL				

10. Railway level crossings / Railway Track

The Site includes the following railway level crossings / Track:

Sl. No.	Location (km)	Remarks
NIL		

11. Underpasses (Vehicular, Non Vehicular)

The Site includes the following underpasses:

Sl. No.	Chainage (km)	Type of Structure	No. of Spans with	Width (m)
NIL				

12. Culverts

The Site has the following culverts falling in Non-motorized earthen track (As shown in clause 4 of Schedule A:

Sl. NO	Existing Chainage	Design Chainage	Span
1	6+670	58+725	1x1.5
2	6+930	59+000	1x2.1
3	7+010	59+075	1x2.0
4	7+180	59+225	1x3.0
5	7+275	59+335	1x2.0
6	7+350	59+410	1x2.0
7	7+480	59+525	1x1.5
8	7+600	59+640	1x2.0
9	7+810	59+850	1x3.0
10	8+305	60+335	1x2.1
11	8+840	60+870	1x2.8
12	8+955	60+985	1x2.4
13	10+755	62+775	1x1.5
14	10+850	62+865	1x1.6
15	10+905	62+925	1x1.5

13. Bus bays

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

Sl. No.	Chainage (km)	Length (m)	Left Hand Side	Right Hand Side
NIL				

14. Truck Lay byes

The details of truck lay byes are as follows:

Sl. No.	Chainage (km)	Length (m)	Left Hand Side	Right Hand Side
NIL				

15. Road sidedrains

The details of the roadside drains are as follows:

Sl. No.	Location (km)		Side	Type	
	From	To		Masonry/cc (Pucca)	Earthen (Kutcha)
NIL					

16. Major junctions

The details of major junctions are as follows:

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

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

17. Minor junctions

The details of the minor junctions are as follows:

Sl. No.	Existing Chainage (Km)	Design Chainage (m)	Type of Junction	Side	Remarks
NIL					

18. Bypass

The details of Bypasses on the Site are as follows:

Sl. No.	Chainage (m)	Length (m)	Left Hand Side	Right Hand Side
This complete alignment is proposed as bypass.				

19. Other structures / Details

The details are :

Sl. No.	Existing Chainage (m)		Design Chainage (m)		Length in m (Design)	Remarks
	From	To	From	To		
NiL						

Annex - II

(Schedule-A)

Dates 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	Width (m)	Date of Providing ROW
	From	To			
(i) Full Right of way (full width)	51.825	63.131	11.306	16-24 (as shown in Schedule B, clause 2.4)	90% at appointed date
(ii) Balance Right of way (width)	51.825	63.131	11.306	24 (as shown in Schedule B, clause 2.4)	100% Within 90 days after the appointed Date as per clause 8.2 of DCA

Annex - III
(Schedule-A)

Alignment Plans

The proposed alignment of the Project Highway is indicated below:

Annex - IV
(Schedule-A)

Environment Clearances

The Project Highway does not required Environment Clearance as per MoEF corrigendum dated 22 Aug 2013.

In addition, the AIP for the project has been received. The Final approval is yet to be received through temporary working provision will be ensured before appointed date. FC final approved conditions and AIP conditions are to be compliance in totality during construction stage and after construction stage.

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"

SCHEDULE -B
(See Clause2.1)

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.

2 Rehabilitation and augmentation

Rehabilitation and augmentation shall include Two-Laning 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.

Annex - I

(SCHEDULE-B)

DESCRIPTION OF TWO-LANING

1 WIDENING OF THE EXISTINGHIGHWAY

1.1 The Project Highway shall follow the proposed alignment as specified by the Authority and shown in the alignment plans specified in Annex III of Schedule-A. Geometric deficiencies, if any, in the existing horizontal and vertical profiles shall be corrected as per the prescribed standards for hilly terrain to the extent land is available.

1.2 WIDTH OFCARRIAGEWAY

1.2.1 Construction of Two-Lane pavement without paved shoulders shall be undertaken. The paved carriageway shall be 7 m wide with hard shoulders in accordance with the typical cross sections drawings.

1.2.2 Except as otherwise provided in this Agreement, the width of the paved carriageway and cross-sectional features shall conform to paragraph1.1above.

2 GEOMETRIC DESIGN AND GENERALFEATURES

2.1 General

Geometric design and general features of the Project Highway shall be in accordance with Section 2 of the Two Lane Manual (IRC : SP 73 -2018).

2.2 Design speed

The design speed shall be the minimum design speed of 30 km per hour and ruling design speed of 50 km / per hour for hilly terrain.

2.3 Improvement of the existing road geometrics

Improvement of the existing alignment geometrics shall be carried out as per section 2 of the Two Lane Manual (IRC : SP 73 -2018).

2.4 Right of Way

Sl. No.	Design Chainage (m)		Length	Proposed Width (m)	Remarks
	From	To			
1	51825	63131	11306	24	

2.5 Rectification of earthwork upto top of subgrade required in following chainages.

Chainage (Km)		Side	Length (Km)
From	To		
59+310	59+430	B/S	0.120
59+716	59+740	B/S	0.024
59+580	59+620	B/S	0.040
62+300	62+520	B/S	0.220
58+672		LHS	0.057
58+680		LHS	
58+700		LHS	
58+720		LHS	
58+725		LHS	
58+733		LHS	
58+740		LHS	
58+760		LHS	
58+775		LHS	
58+830		LHS	
58+860		LHS	
58+873		LHS	
58+883		LHS	
58+885		LHS	
58+900		LHS	
58+975		LHS	
58+987		LHS	
58+990		LHS	
58+995		LHS	
59+005		LHS	
59+010		LHS	
59+018		LHS	
59+020		LHS	
59+025		LHS	
59+185		LHS	
59+190		LHS	
59+200		LHS	
59+280		LHS	
59+290		LHS	
59+300		LHS	
61+190		LHS	
61+450		LHS	
61+660		LHS	
61+720		LHS	
61+760		LHS	
61+820		LHS	

61+830	LHS	
61+840	LHS	
61+970	LHS	
61+980	LHS	
62+050	LHS	
62+100	LHS	
62+145	LHS	
62+150	LHS	
62+170	LHS	
62+175	LHS	
62+180	LHS	
62+190	LHS	
62+239	LHS	
62+570	LHS	
62+590	LHS	
62+600	LHS	
62+620	LHS	
62+670	LHS	
62+775	LHS	
62+790	LHS	
Total=		0.461

2.5 Type ofshoulder

The shoulder shall be hard granular shoulder (with locally available material) on both sides of the carriageway as per typical Cross Sections provided in para 2.11 of this Schedule B.

2.6 Lateral and vertical clearances at underpasses

2.6.1 Lateral and vertical clearances at underpasses and provision of guardrails / crash barriers shall be as per paragraph 2.11 of the Two Lane Manual (IRC : SP 73-2018).

2.6.2 Lateral clearance: The width of the opening at the Vehicle Underpasses shall be asfollows.

Sl. No.	Location (Chainage)	Span/opening (m)	Remarks
NIL			

2.7 Lateral and vertical clearances at overpasses

2.7.1 Lateral and vertical clearances at overpasses shall be as per paragraph 2.12 of the Two Lane Manual (IRC : SP 73-2018).

2.7.2 Lateral clearance: The width of the opening at the overpasses shall be asfollows:

Sl. No.	Location (Chainage)	Span/opening (m)	Remarks
NIL			

2.8 Service Roads

Service roads shall be constructed at the locations and for the lengths indicated below:

Sl. No.	Existing Location of Service road (from km to km)	Proposed Location of Service road (from km to km)	Right hand side (RHS)/Left hand side (LHS)/ or Both sides	Length (km) of Service road
NIL				

2.9 Grade separated structures

2.9.1 Grade separated structures shall be provided as per paragraph 2.14 of the Two Lane Manual (IRC: SP 73 -2015). The requisite particulars are given below and GADs are annexed at Annexure"D":

Sl. No.	Existing Chainage of the structure	Design Chainage of structure	Length (m)	Number and length of spans (m)	Approach gradient	Remarks, if any
NiL						

2.10 Cattle and Pedestrian Underpass/Overpass

Cattle and pedestrian underpass/ overpass shall be constructed as follows: [Refer to paragraphs 2.14.3 of the Two Lane Manual (IRC: SP 73 -2015) and specify the requirements of cattle and pedestrian underpass/ overpass]

Sl. No.	Location	Span/opening (m)	Type of crossing
NiL			

2.11 Typical cross-sections of the Project Highway

Typical Cross-Sections of the Project Highway are tabulated below –

Sl. No.	Design Chainage (Km)		Length (in m, after structure length deduction)	TCS Type	Widening Details	Shoulder
	From	To				
1	51.825	63.131	10.846	TCS I	New Two lane in Open areas	1.5 m Hard Shoulder on hill side and 1.9 m on Valley side

3 INTERSECTIONS AND GRADESEPARATORS

All intersections and grade separators shall be as per Section 3 of the Two Lane Manual (IRC: SP 73 - 2015).

Existing intersections which are deficient shall be improved to the prescribed standards.

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

(a) At-gradeintersections

Sl. No.	Existing Chainage (Km)	Design Chainage (m)	Type of Junction	Side	Remarks
1	0.00	51825	T	RHS	Start of Bypass
2	6.400	58455	Y	LHS	
3	10.900	62925	Y	LHS	
4	11.112	63131	T	LHS	End of Bypass

(b) Grade separated intersection with/*without* ramps

Sl. No.	Location	Salient Features	Minimum length of Viaduct to be Provided	Road to be carried over / under the structures
NIL				

4 ROAD EMBANKMENT AND CUTSECTION

4.1 Widening of the existing alignment and construction of new road embankment/ cuttings shall conform to the Specifications and Standards given in section 4 of the Two Lane Manual (IRC: SP 73 -2015) and the specified cross sectional details. Deficiencies in the plan and profile of the existing road shall be corrected.

4.2 The proposed road including raising shall be constructed as per FRL mentioned in Plan & Profile as attached in annex 3 of schedule A.

5 PAVEMENTDESIGN

5.1 Pavement design shall be carried out in accordance with Section 5 of the Two Lane Manual (IRC: SP 73-2015).

5.2 Type of pavement

Flexible pavement shall be adopted for Project Highway in accordance with Clause 2.2 of IRC:37-2012 identifies four type 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 EPC mode can use any type of four flexible pavements mentioned Clause 2.2 of IRC:37-2012, they may carry out their own diligence to arrive at project cost before submitting bids.

5.3 Design requirements

5.3.1 Design Period and Strategy

The pavement shall be designed for a minimum design period of 15 years. Stage construction shall not be permitted.

5.3.2 Design Traffic

Notwithstanding anything to the contrary contained in this Agreement or the Two Lane Manual (IRC : SP 73 -2015), the Contractor shall design the pavement for entire Project Highway for design traffic of not less than 20 million standards axles (msa).

5.4 Reconstruction / Realignment / Bypass of stretches

5.4.1 The following stretches of the existing road shall be realigned. These shall be designed as new pavement.

Sl. No.	Existing Chainage (m)		Design Chainage (m)		Design Length (m)	Remarks
	From	To	From	To		
1	0	11112	51825	63131	11306	Complete alignment is proposed as Bypass

5.4.2 The existing alignment shall be constructed as per FRL mentioned in Plan & Profile (Annex III of Schedule A).

6 ROADSIDEDRAINAGE

Drainage system including surface and subsurface drains for the Project Highway shall be provided as per Section 6 of the Two Lane Manual (IRC : SP 73 -2015). How above, Line drains shall be provided in the following stretches –

Sl. No.	Design Chainage (Km)		Length (in m, after structure length deduction)	TCS Type	Drain Type
	From	To			
1	51.825	63.131	10846	TCS I	Rectangular drain on HillSide

7 DESIGN OFSTRUCTURES

7.1 General

7.1.1 All bridges, culverts and structures shall be designed and constructed in accordance with section 7 of the Two Lane Manual (IRC : SP 73 -2015) and shall conform to the cross- sectional features and other details specified therein.

7.1.2 Width of the carriageway of new bridges and structures shall be as per figure 7.2 and figure 7.3 of the Two Lane Manual (IRC: SP 73-2015).

7.1.3 The following structures shall be provided with footpaths:

NIL

7.1.4 All bridges shall be high-level bridges.

7.1.5 The following structures shall be designed to carry utility services specified in tablebelow:

Sl. No.	Bridge at Design km	Utility service to be carried	Remarks
1	51.825 (start of Hawai Bypass)	Water Pipe	Nil

7.1.6 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 Two Lane Manual (IRC : SP 73-2018).

7.2 Culverts

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

7.2.2 Reconstruction of existing culverts:

Existing Culverts at the following locations shall be re-constructed as new culverts:

Sl. No.	Existing Chainage	Design Chainage	Type of Culvert	Width (m)
1	6+670	58+725	Slab/Box	3
2	6+930	59+000	Slab/Box	3
3	7+010	59+075	Slab/Box	3
4	7+180	59+225	Slab/Box	3
5	7+275	59+335	Slab/Box	3
6	7+350	59+410	Slab/Box	3
7	7+480	59+525	Slab/Box	3
8	7+600	59+640	Slab/Box	3
9	7+810	59+850	Slab/Box	3
10	8+305	60+335	Slab/Box	3
11	8+840	60+870	Slab/Box	3

Sl. No.	Existing Chainage	Design Chainage	Type of Culvert	Width (m)
12	8+955	60+985	Slab/Box	3
13	10+755	62+775	Slab/Box	3
14	10+850	62+865	Slab/Box	3
15	10+905	62+925	Slab/Box	3

7.2.3 Widening of existing culverts **-NIL**

7.2.4 Additional new culverts shall be constructed as per particulars given in the table below:

Sl. No.	Design Chainage	Type of Culvert	Width (m)
1	52135	Slab/Box	3
2	52435	Slab/Box	3
3	52570	Slab/Box	3
4	52760	Slab/Box	3
5	53015	Slab/Box	3
6	53170	Slab/Box	3
7	53320	Slab/Box	3
8	53515	Slab/Box	3
9	53775	Slab/Box	3
10	53995	Slab/Box	3
11	54095	Slab/Box	3
12	54255	Slab/Box	3
13	54575	Slab/Box	3
14	54705	Slab/Box	3
15	54800	Slab/Box	3
16	55090	Slab/Box	3
17	55220	Slab/Box	3

Sl. No.	Design Chainage	Type of Culvert	Width (m)
18	55445	Slab/Box	3
19	55575	Slab/Box	3
20	55705	Slab/Box	3
21	55800	Slab/Box	3
22	56035	Slab/Box	3
23	56145	Slab/Box	3
24	56365	Slab/Box	3
25	56530	Slab/Box	3
26	56640	Slab/Box	3
27	56750	Slab/Box	3
28	56865	Slab/Box	3
29	56980	Slab/Box	3
30	57145	Slab/Box	3
31	57285	Slab/Box	3
32	57440	Slab/Box	3
33	57610	Slab/Box	3
34	57750	Slab/Box	3
35	57910	Slab/Box	3
36	58335	Slab/Box	3
37	58620	Slab/Box	3
38	59335	Slab/Box	3
39	59530	Slab/Box	3
40	59850	Slab/Box	3
41	59990	Slab/Box	3
42	60335	Slab/Box	3
43	60440	Slab/Box	3

Sl. No.	Design Chainage	Type of Culvert	Width (m)
44	60870	Slab/Box	3
45	60990	Slab/Box	3
46	61170	Slab/Box	3
47	61365	Slab/Box	3
48	61485	Slab/Box	3
49	61640	Slab/Box	3
50	61750	Slab/Box	3
51	61850	Slab/Box	3
52	61970	Slab/Box	3
53	62160	Slab/Box	3
54	62440	Slab/Box	3
55	62865	Slab/Box	3

7.2.5 Repairs/replacements of railing/parapets, flooring and protection works of the existing culverts shall be undertaken as follows:

NIL

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

7.3 Minor Bridges

7.3.1 Existing bridges to be re-constructed/widened

(i) Theexistingbridgesatthefollowinglocationsshallbereconstructedasnewstructures **(Minor Bridges)–**

Sl. No.	Existing Chainage (Km)	Design Chainage (m)	Proposed Span in m	Proposed Width in m	Remark
NiL					

GAD is attached at Annex B of annex 1 of this Schedule.

(ii) The following bridges shall bewidened:

NIL

7.3.2 Additional New **MinorBridges**

New minor bridges at the following locations on the Project Highway shall be constructed

Sl. No.	Existing Chainage (Km)	Design Chainage (m)	Proposed Span in mt	Proposed Width in mt	Proposed / Remark
NiL					

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

Sl. No.	Location at km	Remarks
Nil		

7.3.4 Repairs/replacement of railing/parapets of the existing bridges shall be undertaken asfollows:

Sl. No.	Location at km	Remarks
Nil		

7.3.5 Drainage system for bridge decks

An effective drainage system for bridge decks shall be provided as specified in the Two Lane Manual (IRC : SP 73 -2018)

7.3.6 Structures in marine environment

NIL

7.4. Rail-road bridges

7.4.1 Design, construction and detailing of ROB/RUB shall be as specified in section 7 of the Two Lane Manual (IRC : SP 73-2018).

NIL

7.4.2 Roadover-bridges

Road over-bridges (road over rail) shall be provided at the following level crossings, as per GAD drawings attached at Annexure – "C" to this schedule :

Sl. No.	Existing Location of Level crossing / Railway Track (Chainage km)	Proposed Location of Level crossing / Railway Track (Chainage km)	Length of bridge (m)
NiL			

7.4.3 Roadunder-bridges

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

Sl. No.	Location of Level Crossing (Chainage km)	Number and length of span (m)
NIL		

7.5 Grade separated structures

NiL

7.6 Repairs and strengthening of bridges and structures

A. Bridges

The existing bridges and structures to be repaired/strengthened are given below:

NiL

B. ROB /RUB

Nil

C. Overpasses/Underpasses and other structures

Nil

7.7 List of Major Bridges andStructures

7.7.1 The following is the list of the **Major Bridges** and Structures:

(i) Theexistingbridgesatthefollowinglocationsshallbeconstructedasnewstructures **(Major Bridges) -**

Sl. No.	Existing Chainage (Km)	Design Chainage (m)	Proposed Span in m	Proposed Width in m	Proposed/Remark
NiL					

7.7.2 Additional **New Major Bridges**

New major bridges at the following locations on the Project Highway shall be constructed as per 2 Laning ManualSection 7 of the Two Lane Manual (IRC: SP 73 -2018)

Sl. No.	Design Chainage (m)	Proposed Span in m	Proposed Width in m	Proposed/Remark
1	51939	230	As per IRC :SP 73-2018	Steel/RCC /Bow String Girder / Suspended Superstructure with well/pile/rock bolt foundation

8 TRAFFIC CONTROL DEVICES AND ROAD SAFETYWORKS

8.1 Traffic control devices and road safety works shall be provided in accordance with Section 9 of the Two Lane Manual (IRC: SP 73 -2018). (Polymer rumble strips (min. 1700 RM) on hazardous locations specially on shoulders of valley side curves).

8.2 Specifications of the reflecting sheeting: As per the Clause 9.3 of the Two Lane Manual (IRC : SP 73 -2018) of Specification and Standards.

The Tentative quantity of Traffic signages and pavement marking are as tabulated below –

Traffic Signages, Road Marking and other appurtenances			
1	Road Marking: - Lane, Centre Line, Pedestrian crossing		
	Centre line on straight portion	Sqm	448
	Centre line on curve portion	Sqm	170
	Edge Line at Paved Shoulder	Sqm	2261
	Add 15% for Misc. including Pedestrian X-ingsetc	Sqm	432
	Total	Sqm	3311
2	Directional Arrows, letter marking etc.	Nos.	60
3	Advance Direction signs size 1800X1200 mm	Nos.	25
4	Village name boards size 600X900mm	Sqm	8.1
5	Place Identification signs size 1200X900 mm	Sqm	2.88
6	90 cm Triangle	Nos.	30
7	90 cm Octagon	Nos.	30
8	Hazard plate 300X900 mm	Sqm	103.95
9	800 x 600 mm Size	Nos.	35
10	60 Cm circular	Nos.	35
11	Supply and fixing of Micro Prismatic type Retro-Reflective sign plate which is to be fixed on Overhead/ Cantilever structures with the help of G.I. nut bolts	Sqm	51.36
12	Over Head Sign Truss	MT	5.5
13	Boundary Stone (taken 10% of Qty)	Nos.	As per IRC SP :73 2018
14	5th Km Stone -New	Nos.	
15	Ordinary Km Stone	Nos.	
16	Hectometer Stone	Nos.	
17	Delineator	Nos.	250
18	Bollards	Nos.	As per IRC SP :73 2018
19	RCC Guard Post	Nos.	
20	Enamel Paint	Sqm	

9 ROADSIDEFURNITURE

9.1 Roadside furniture shall be provided in accordance with the provisions of Section 9 of the Two Lane Manual (IRC : SP 73-2018).

9.2 The Overhead traffic signs: location and size

Full width overhead sign:1no.

Cantilever overhead signs :2nos. (Locations to be finalized in consultation with Authority's Engineer.)

10 COMPULSORY AFFORESTATION

The number of trees which are required to be planted by the contractor as compulsory afforestation shall be as per Forest Conservation Act and as per the Two Lane Manual (IRC : SP 73 -2018).

In addition Hydro seeding/plantation or similar on hill slopes as slope protection works for minimum 64500Sqm)

11 HAZARDOUSLOCATIONS

The safety barriers, Protective works shall also be provided at the following hazardous locations / lengths:

Sl. No.	Type of Protection works	Minimum Length (m)	Height (range in m)	Remarks
1	Parapet Wall on Valley side	3252		As per manual and codes
2	W-Beam Crash Barrier	2814		
3	Breast Wall	3525	2 – 6 m	
4	RCC Retaining Wall	3797	2 - 4 m	
5	Gabion Wall	1085	2 - 4 m	

12 SPECIAL REQUIREMENTS FOR HILLROADS

All special features shall be provided as per Two Lane Manual (IRC : SP 73 -2018).
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 protection work are listed in "Annex B" and the typical sections for the protection works are given in "Annex A".

No any major land slide location is identified along the Project alignment, however Contractor shall identify other areas if found after excavation and provide the suitable protection measures to stabilize all the landslide zones. A report on the land slide zones shall be furnished along with the design for the review of the Authority Engineer. No change of scope shall be considered for the additional protection measures, if any.

13 Utilities

Provision of accommodating utilities shall be made both over as well as underground wherever required.

14 Change of Scope

The length of Structures and bridges specified hereinabove shall be treated as an 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 Article13.

15.0 Slope Protection Measures

15.1.1 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 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 55^0 (0.7H to 1V).

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

15.1.3 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.

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SCHEDULE - C

(See Clause 2.1)

PROJECT FACILITIES

1 Project Facilities

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

(a) Toll plaza[s];

(b) Roadside furniture;

(c) Pedestrian facilities;

(d) Tree plantation;

(e) Truck lay-byes;

(f) bus-bays and bus shelters;

(g) rest areas; and

(h) others to be specified

2 Description of Project Facilities

(a) Toll Plaza

NIL

(b) Road side Furniture

Roadside furniture shall be provided in accordance with the provisions of Section 9 of the Two Lane Manual (IRC: SP 73 -2018).

(c) Pedestrian Facilities

Pedestrians facilities in the form of guard rails, footpath, at grade pedestrian crossing etc. shall be provided wherever required as per section 9 of the Two Lane Manual (IRC : SP 73 -2018).

(d) Tree Plantation:

NIL

(e) Truck lay-byes:

The locations of proposed truck lay byes are as under -

Sl. No.	Existing Km	Design Km	Side	Remarks
NiL				

(f) Bus-byes and Bus Shelter,

The locations of proposed Bus bays are as under -

Sl. No.	Existing Chainage (Km)	Design Chainage (m)	Side	Remarks
1		**7600**	Left	Location may change according to approach road to village
2		**9300**	Left	

(g) Rest areas:

NIL

(h) Others to bespecified:

NIL

SCHEDULE -D

(See Clause2.1)

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 conform to design requirements set out in the following documents:

Two Lane Manual (IRC : SP 73 -2018) of Specifications and Standards for Two Laning Published by Indian Roads Congress.

Annex - I
(Schedule-D)

Specifications and Standards for Construction

1 Specifications and Standards

All Materials, works and construction operations shall conform to the Two Lane Manual (IRC: SP 73 -2018) of Specifications and Standards for Two- Laning (IRC:SP:73-2018), referred to as the Two Lane Manual (IRC : SP 73 - 2018), 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 -2018) 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

(i) The Contractor shall, at all times maintain the Project Highway in accordance with the provisions of this Agreement, Applicable Laws and Applicable Permits.

(ii) 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.

(iii) 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.

[Specify all the relevant documents]

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 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 wilful 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.

Table -1: Maintenance Criteria for Pavements:

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
Flexible Pavement (Pavement of MCW, Service Road, approache	Potholes	Nil	< 0.1 % of area and subject to limit of 10 mm in depth	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC 82: 2015 and Distress Identification Manual for Long Term Pavement Performance Program, FHWA 2003 (http://www.tfhrc.com/pavement/lttp/reports/03031/)	24-48 hours	MORT&H Specification 3004.2

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
s of Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	Cracking	Nil	< 5 % subject to limit of 0.5 sqm for any 50 m length	Daily			7-15 days	MORT&H Specification 3004.3
	Rutting	Nil	< 5 mm	Daily	Straight Edge		15 -30 days	MORT&H Specification 3004.2
	Corrugations and Shoving	Nil	< 0.1 % of area	Daily	Length Measurement Unit like		2-7 days	IRC:82-2015

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
	Bleeding	Nil	< 1 % of area	Daily	Scale, Tape, odometer etc.		3-7 days	MORT&H Specification 3004.4
	Ravelling / Stripping	Nil	< 1 % of area	Daily			7-15 days	IRC:82-2015 read with IRC SP 81
	Edge Deformation/ Breaking	Nil	< 1 m for any 100 m section and width < 0.1 m at any location, restricted	Daily			7- 15 days	IRC:82-2015

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
			d to 30 cm from the edge					
	Roughness BI	2000 mm/km	2400 mm/km	Bi-Annually	Class I Profilometer SCRIM (Sideway-force Coefficient Routine Investigation Machine or equivalent)	Class I Profilometer : ASTM E950 (98) :2004 –Standard Test Method for measuring Longitudinal Profile of Travelled Surfaces with Accelerometer Established Inertial Profiling Reference ASTM E1656 -94: 2000- Standard Guide for Classification of Automatic Pavement Condition Survey Equipment	180 days	IRC:82-2015
	Skid Number	60SN	50SN	Bi-Annually			180 days	BS: 7941-1: 2006
	Pavement Condition Index	3	2.1	Bi-Annually			180 days	IRC:82-2015

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
	Other Pavement Distresses			Bi-Annually			2-7 days	IRC:82-2015
	Deflection/ Remaining Life			Annually	Falling Weight Deflectometer	IRC 115: 2014	180 days	IRC:115-2014
Rigid Pavement (Pavement of MCW, Service Road, Grade structure,	Roughness BI	2200mm/km	2400mm/km	Bi-Annually	Class I Profilometer	ASTM E950 (98) :2004 and ASTM E1656 - 94: 2000	180 days	IRC:SP:83 - 2008
	Skid	Skid Resistance no. at different speed of vehicles		Bi-Annually	SCRIM (Sideway-force	IRC:SP:83-2008	180 days	IRC:SP:83 - 2008

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
approaches of connecting roads, slip roads, lay byes etc. as applicable)		Minimum SN	Traffic Speed (Km/h)		Coefficient Routine Investigation Machine or equivalent)			
		36	50					
		33	65					
		32	80					
		31	95					
		31	110					

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
Embankment/ Slope	Edge drop at shoulders	Nil	40mm	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC	7-15 days	MORT&H Specification 408.4
	Slope of camber/cross fall	Nil	<2% variation in prescribed slope of camber /cross fall	Daily			7-15 days	MORT&H Specification 408.4
	Embankment Slopes	Nil	<15 % variation in prescribe	Daily			7-15 days	MORT&H Specification 408.4

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	**Acceptable**					
			side slope					
	Embankment Protection	Nil	Nil	Daily	NA		7-15 days	MORT&H Specification
	Rain Cuts/ Gullies in slope	Nil	Nil	Daily Specially During Rainy Season	NA		7-15 days	MORT&H Specification

In addition to the above performance criterion, the contractor shall strictly maintain the rigid pavements as per requirements in the following table Table -2:

Maintenance Criteria for Rigid Pavements:

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
CRACKING						
1	**Single Discrete Cracks Not intersecting with any joint**	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	Not applicable
			1	w < 0.2 mm. hair cracks		
			2	w = 0.2 - 0.5 mm, discernible from slow-moving car	Seal without delay	Seal, and stitch if L > lm.
			3	w = 0.5 - 1.5 mm, discernible from fast-moving car		Within 7days

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	**For the case d > D/2**
			4	w = 1.5 - 3.0 mm	Seal, and stitch if L > l m. Within 7 days	Staple or Dowel Bar Retrofit, FDR for affected portion. Within 15days
			5	w > 3 mm.		
2	**Single Transverse (or Diagonal) Crack intersecting with one or more joints**	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.2 mm, hair cracks	Route and seal with epoxy. Within 7 days	Staple or Dowel Bar Retrofit. Within 15days
			2	w = 0.2 - 0.5 mm, discernible from slow vehicle		
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route, seal and stitch, if L > 1 m. Within 7 days	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
			4	w = 3.0 - 6.0 mm	Dowel Bar Retrofit. Within 15 days	Full Depth Repair Dismantle and reconstruct affected. Portion with norms and specifications - See Para 5.5 & 9.2 Within 15days
			5	w > 6 mm, usually associated with spalling, and/or slab rocking under traffic	Not Applicable, as it may be full depth	
3	**Single Longitudinal Crack intersecting with one or more joints**	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.5 mm, discernable from slow moving vehicle	Seal with epoxy, if L > 1 m. Within 7 days	Staple or dowel bar retrofit. Within 15days

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
			2	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route seal and stitch, if L > l m. Within 15 days	-
			3	w = 3.0 - 6.0 mm	Staple, if L > 1 m. Within 15 days	Partial Depth Repair with stapling. Within 15 days
			4	w = 6.0 - 12.0 mm, usually associated with spalling	Not Applicable, as it may be full depth	
			5	w > 12 mm, usually associated with spalling, and/or slab rocking under traffic		Full Depth Repair Dismantle and reconstruct affected portion as per norms and specifications -

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	**For the case d > D/2**
						See Para 5.6.4 Within 15 days
4	**Multiple Cracks intersecting with one or more joints**	**w = width of crack**	0	Nil, not discernible	No Action	-
			1	w < 0.2 mm, hair cracks	Seal, and stitch if L > l m. Within 15 days	
			2	w = 0.2 - 0.5 mm. discernible from slow vehicle		
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Full depth repair within 15 days	Dismantle, Reinstate subbase, Reconstruct whole slab as per specifications within 30 days
			4	w = 3.0 - 6.0 mm panel broken into 2 or 3 pieces		
			5	w > 6 mm and/or panel broken		

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
				into more than 4 pieces		
5	**Corner Break**	w = width of crack L = length of crack	0	Nil, not discernible	No Action	-
			1	w < 0.5 mm; only 1 corner broken	Seal with low viscosity epoxy to secure broken parts Within 7 days	Seal with epoxy seal with epoxy Within 7days
			2	w < 1.5 mm; L < 0.6 m, only one corner broken		
			3	w < 1.5 mm; L < 0.6 m, two corners broken	Partial Depth (Refer Figure 8.3 of IRC:SP: 83-2008) Within 15 days	Full depth repair
			4	w > 1.5 mm; L > 0.6 m or three corners broken		
			5	ree or four corners broken		Reinstate sub-base, and reconstruct the

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
						slab as per norms and specifications within 30days
6	**Punchout (Applicable to Continuous Reinforced Concrete Pavement (CRCP) only)**	w = width of crack L = length (m/m2)	0	Nil, not discernible		No Action
			1	w < 0.5 mm; L < 3 m/m^2	Not Applicable, as it may be full depth	Seal with low viscosity epoxy to secure broken parts. Within 15days
			2	either w > 0.5 mm or L < 3 m/m^2		
			3	w > 1.5 mm and L < 3 m/m^2		
			4	w > 3 mm, L < 3 m/m^2 and deformation		Full depth repair - Cut out and replace damaged area taking care not to damage reinforcement. Within 30days
			5	w > 3 mm, L > 3 m/m^2 and deformation		

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
Surface Defects						
7	Ravelling or Honeycomb type surface	r = area damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	**Short Term**	**Long Term**
					No action.	Not Applicable
			1	r < 2 %	Local repair of areas damaged	
			2	r = 2 - 10 %	and liable to be damaged. Within 15 days	
			3	r = 10-25%	Bonded Inlay, 2 or 3 slabs if	
			4	r = 25 - 50 %	affecting.	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	**For the case d > D/2**
					Within 30 days	
			5	r > 50% and h > 25 mm	Reconstruct slabs, 4 or more slabs if affecting. Within 30 days	
8	**Scaling**	r = damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	**Short Term**	**Long Term**
					No action.	Not Applicable
			1	r < **2 %**	Local repair of areas damaged and liable to be damaged. Within 7days	
			2	r = 2 - 10 %		

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
			3	r = 10 - 20%	Bonded Inlay within 15 days	
			4	r = 20 - 30 %		
			5	r > 30 % and h > 25 mm	Reconstruct slab within 30 days	
9	**Polished Surface/Glazing**	t = texture depth, sand patch test	0		No action.	Not Applicable
			1	t > 1 mm		
			2 '	t = 1 - 0.6 mm	Monitor rate of deterioration	
			3	t = 0.6 - 0.3 mm		
			4	t = 0.3 - 0.1 mm		

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	**For the case d > D/2**
			5	t < 0.1 mm	Diamond Grinding if affecting 50% or more slabs in a continuous stretch of minimum 5 km. Within 30 days	
10	**Popout (Small Hole), Pothole Refer Para 8.4**	n = number/m^2 d = diameter h = maximum depth	0	d < 50 mm; h < 25 mm; n < 1 per 5 m^2	No action.	Not Applicable
			1	d = 50 - 100 mm; h < 50 mm; n < 1 per 5 m^2	Partial depth repair 65 mm deep. Within 15 days	
			2	d = 50 - 100 mm; h > 50 mm; n < 1 per 5 m^2		

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
			3	d = 100 - 300 mm; h < 100 mm n < 1 per 5 m^2	Partial depth repair 110mm i.e.10 mm more than the depth of the hole. Within 30 days	
			4	d = 100 - 300 mm; h > 100 mm; n < 1 per 5 m^2		
			5	d > 300 mm; h > 100 mm: n > 1 per 5 m^2	Full depth repair. Within 30 days	

Joint Defects						
11	**Joint Seal Defects**	loss or damage L = Length as % total joint length	0	Difficult to discern.	**Short Term**	**Long Term**
					No action.	Not Applicable
			1	Discernible, L< 25% but of little immediate consequence with regard to ingress of water or trapping incompressible material.	Clean joint, inspect later.	
			3	Notable. L > 25% insufficient protection against ingress of water and trapping incompressible material.	Clean and reapply sealant in selected locations. Within 7 days	
			5	Severe; w > 3 mm negligible protection against ingress of water	Clean, widen and reseal the joint. Within 7 days	

				and trapping incompressible material.		
12	**Spalling of Joints**	w = width on either side of the joint L = length of spalled portion (as % joint length)	0	Nil, not discernible	No action.	Not Applicable
			1	w < 10 mm	Apply low viscosity epoxy resin/ mortar in cracked portion.	
			2	w = 10 - 20 mm, L < 25%	Within 7 days	
			3	w = 20 - 40 mm, L > 25%	Partial Depth Repair. Within 15 days	
			4	w = 40 - 80 mm, L > 25%	30 - 50 mm deep, h = w + 20% of w, within 30 days	
			5	w > 80 mm, and L > 25%	50 - 100 mm deep repair. H = w + 20% of w. Within 30 days	
13	**Faulting (or Stepping)**	f = difference of level	0	not discernible, < 1 mm	No action.	No action.

	in Cracks or Joints		1	f < 3 mm		
			2	f = 3 - 6 mm	Determine cause and observe, take action for diamond grinding	Replace the slab as appropriate. Within 30days
			3	f = 6 - 12 mm	Diamond Grinding	
			4	f= 12 - 18 mm	Raise sunken slab.	Replace the slab as appropriate. Within 30days
			5	f> 18 mm	Strengthen subgrade and sub-base by grouting and raising sunken slab	
14	**Blowup or Buckling**	h = vertical displacement from normal profile	0	Nil, not discernible	**Short Term**	**Long Term**
			1	h < 6 mm	No Action	
			2	h = 6 - 12 mm	Install Signs to Warn Traffic	

			3	h = 12 - 25 mm	within 7 days	
			4	h > 25 mm	Full Depth Repair. Within 30 days	
			5	shattered slabs, ie 4 or more pieces	Replace broken slabs. Within 30 days	
15	**Depression**	h = negative vertical displacement from normal profile L =length	0	Not discernible, h < 5 mm	No action.	Not Applicable
			1	h = 5 - 15 mm		
			2	h = 15-30 mm, Nos <20% joints	Install Signs to Warn Traffic within 7 days	
			3	h = 30 - 50 mm		
			4	h > 50 mm or > 20% joints	Strengthen subgrade. Reinstate pavement at normal level	

			5	h > 100 mm	if L < 20 m. Within 30 days	
16	**Heave**	h = positive vertical displacement from normal profile. L = length	0	Not discernible. h < 5 mm	**Short Term**	**Long Term**
					No action.	scrabble
			1	h = 5 - 15 mm	Follow up.	
			2	h = 15 - 30 mm, Nos <20% joints	Install Signs to Warn Traffic within 7 days	
			3	h = 30 - 50 mm		
			4	h > 50 mm or > 20% joints	Stabilise subgrade. Reinstate pavement at normal level if length < 20 m. Within 30 days	
			5	h > 100 mm		
17	**Bump**	h = vertical	0	h < 4 mm	No action	

		displacement from normal profile	1	h = 4 - 7 mm	Grind, in case of new construction within 7 days	Construction Limit for New Construction.
			3	h = 7 - 15 mm	Grind, in case of ongoing Maintenance within 15 days	Replace in case of new construction. Within 30days
			5	h > 15 mm	Full Depth Repair. Within 30 days	Full Depth Repair. Within 30days
18	**Lane to Shoulder Dropoff**	f = difference of level	0	Nil, not discernible < 3mm	**Short Term**	**Long Term**
					No action.	
			1	f = 3 - 10 mm	Spot repair of shoulder within 7 days	
			2	f = 10 - 25 mm		
			3	f = 25 - 50 mm	Fill up shoulder	

			4	f = 50 - 75 mm	within 7 dayss	For any 100 m stretch Reconstruct shoulder, if affecting 25% or more of stretch. Within 30days
			5	f > 75 mm		
Drainage						
19	**Pumping**	quantity of fines and water expelled through open joints and cracks Nos	0	not discernible	No Action	
			1 to 2	slight/ occasional Nos < 10%	Repair cracks and joints Without delay.	Inspect and repair sub-drainage at distressed sections and upstream.
			3 to 4	appreciable/ Frequent 10 - 25%	Lift or jack slab within 30 days.	
		Nos/100 m stretch	5	abundant, crack development > 25%	Repair distressed pavement sections. Strengthen subgrade and subbase. Replace slab. Within 30 days	

20	**Ponding**	Ponding on slabs due to blockage of drains	0-2	No discernible problem	No action.	
			3 to 4	Blockages observed in drains, but water flowing	Clean drains etc within 7 days, Follow up	Action required to stop water damaging foundation within 30 days.
			5	Ponding, accumulation of water observed	-do-	

Table -3: Maintenance Criteria for Safety Related Items and Other Furniture Items:

<table>
<tr><th>Asset Type</th><th>Performance Parameter</th><th colspan="3">Level of Service (LOS)</th><th>Frequency of Measurement</th><th>Testing Method</th><th>Recommended Remedial measures</th><th>Time limit for Rectification</th><th>Specifications and Standards</th></tr>
<tr><td rowspan="5">Highway</td><td rowspan="5">Availability of Safe Sight Distance</td><td colspan="3">As per IRC SP :84-2014, a minimum of safe stopping sight distance shall be available throughout.</td><td rowspan="5">Monthly</td><td rowspan="5">Manual Measurements with Odometer along with video/ image backup</td><td colspan="2" rowspan="5">Removal of obstruction within 24 hours, in case of sight line affected by temporary objects such as trees, temporary encroachments.

In case of permanent structure or design deficiency:
Removal of obstruction/improvement of deficiency at the earliest
Speed Restriction boards and suitable traffic calming measures such as transverse bar marking, blinkers, etc. shall be applied during the period of rectification.</td><td rowspan="5">IRC:SP 84-2014</td></tr>
<tr><td>Design Speed, kmph</td><td>Desirable Minimum Sight Distance (m)</td><td>Safe Stopping Sight Distance (m)</td></tr>
<tr><td>100</td><td>360</td><td>180</td></tr>
<tr><td>80</td><td>260</td><td>130</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td><td>Visual</td><td>Re - painting</td><td>Cat-1 Defect – within 24 hours
Cat-2 Defect within 2 months</td><td>-</td><td>IRC:35-2015</td></tr>
<tr><td>Pavement Marking</td><td>Wear</td><td colspan="3"><70% of marking remaining</td><td>Bi-Annually</td><td>Assessment as per Annexure-F of IRC:35-2015</td><td></td><td></td><td></td></tr>
</table>

Asset Type	Performance Parameter	Level of Service (LOS)			Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Day time Visibility	During expected life Service Time Cement Road - 130mcd/m²/lux Bituminous Road - 100mcd/m²/lux			Monthly	As per Annexure-D of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect – within 2 months	IRC:35-2015
		Initial and Minimum Performance for Dry Retro reflectivity during night time:				As per Annexure-E of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect – within 2 months	IRC:35-2015
		Design Speed	(RL) Retro Reflectivity (mcd/m²/lux)						
			Initial (7 days)	Minimum Threshold level (TL) & warranty period required up to 2 years	Bi-Annually				
	Night Time Visibility								
		Up to 65	200	80					
		65 - 100	250	120					
		Above 100	350	150					
		Initial and Minimum Performance for Night Visibility under wet condition (Retro reflectivity):							

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		Initial 7 days Retro reflectivity: 100 mcd/m²/lux Minimum Threshold Level: 50 mcd/m²/lux					
	Skid Resistance	Initial and Minimum performance for Skid Resistance: Initial (7days): 55BPN Min. Threshold: 44BPN *Note: shall be considered under urban/city traffic condition encompassing the locations like pedestrian crossings, bus bay, bus stop, cycle track intersection delineation, transverse bar markings Etc	Bi-Annually	As per Annexure-G of IRC:35-2015		Within 24 hours	IRC:35-2015
Road Signs	Shape and Position	Shape and Position as per IRC:67- 2012. Signboard should be clearly visible for the design speed of the section.	Daily	Visual with video/image backup	Improvement of shape, in case if shape is damaged. Relocation as per requirement	48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs) 15 Days in case of	IRC:67-2012
						Gantry/Cantilever Sign boards	
	Retro reflectivity	As per specifications in IRC:67-2012	Bi-Annually	Testing of each	hange of ignboard	48 hours in case of Mandatory	RC:67-2012

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
				signboard using Retro Reflectivity Measuring Device. In accordance with ASTM D 4956-09.		Signs, Cautionary and Informatory Signs (Single and Dual post signs) 1 Month in case of Gantry/Cantilever Sign boards	
Kerb	Kerb Height	As per IRC 86:1983 depending upon type of Kerb	Bi-Annually	Use of distance measuring tape	Raising Kerb Height	Within 1 Month	RC 86:1983
	Kerb Painting	Functionality: Functioning of Kerb painting as intended	Daily	Visual with video/image backup	Kerb Repainting	Within 7-days	RC 35:2015
Other Road Furniture	Reflective Pavement Markers (Road Studs)	Numbers and Functionality as per specifications in IRC:SP:84-2014 and IRC:35-2015, unless specified in Schedule-B.	Daily	Counting	New Installation	Within 2 months	IRC:SP:84-2014, IRC:35-2015
	Pedestrian Guardrail	Functionality: Functioning of guardrail as intended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:SP:84 - 2014
	Traffic Safety Barriers	Functionality: Functioning of Safety Barriers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84 - 2014, IRC:119-2015
	End Treatment of	Functionality: Functioning of End Treatment as intended	Daily	Visual with video/image	Rectification	Within 7 days	IRC:SP:84 - 2014,

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Traffic Safety Barriers			backup			IRC:119-2015
	Attenuators	Functionality: Functioning of Attenuators as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP-2014, IRC:119-2015
	Guard Posts and Delineators	Functionality: Functioning of Guard Posts and Delineators as intended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC: 79 - 1981
	Overhead Sign Structure	Overhead sign structure shall be structurally adequate	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:67-2012
	Traffic Blinkers	Functionality: Functioning of Traffic Blinkers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84 - 2014
Highway Lighting System	Highway Lights	Illumination: Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC:SP:84 - 2014
		No major failure in the lighting system	Daily	-	Rectification of failure	24 hours	IRC:SP:84 - 2014
		No minor failure in the lighting system	Monthly	-	Rectification of failure	8 hours	IRC:SP:84 - 2014
	Toll Plaza Canopy Lights	Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC:SP:84 - 2014
		No major/minor failure in the lighting system	Daily	-	Rectification of failure	8 hours	IRC:SP:84 - 2014

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Trees and Plantation including median plantation	Obstruction in a minimum head-room of 5.5 m above carriageway or obstruction in visibility of road signs	No obstruction due to trees	Monthly	Visual with video/image backup	Removal of trees	Immediate	IRC:SP:84 - 2014
	Deterioration in health of trees and bushes	Health of plantation shall be as per requirement of specifications & instructions issued by Authority from time to time	Daily	Visual with video/image backup	Timely watering and treatment. Or Replacement of Trees and Bushes.	Within 90 days	IRC:SP:84 - 2014
	Vegetation affecting sight line and road Structures	Sight line shall be free from obstruction by vegetation	Daily	Visual with video/image backup	Removal of Trees	Immediate	IRC:SP 84-2014
Rest Areas	Cleaning of Toilets	-	Daily	-	-	Every 4 hours	
	Defects in electrical, water and sanitary Installations	-	Daily	-	Rectification	24 hours	

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Other Project Facilities and Approach roads				-	Rectification	15 days	IRC:SP 84-2014
	Damage or deterioration in Approach Roads, pedestrian facilities, truck lay-bys, bus-bays, bus-		Daily				
	shelters, cattle crossings, Traffic Aid Posts, Medical						
	Aid Posts and other works						

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial Measures	Time limit for Rectification	Specifications and Standards
Pipe/box/slab culverts	Free waterway/ unobstructed flow section	85% of culvert normal flow area to available.	2 times in a year (before and after rainy season)	Inspection by Bridge Engineer as per IRC SP: 35-1990 and recording of depth of silting and area of vegetation.	Cleaning silt up soils and debris in culvert barrel after rainy season, removal of bushes and vegetation, U/s of barrel, under barrel and D/s of barrel before rainy season.	15 days before onset of monsoon and within 30 days after end of rainy season.	IRC 5-2015, IRC SP:40-1993 and IRC SP:13-2004
	Leak-proof expansion joints if any	No leakage through expansion joints	Bi-Annually	Physical inspection of expansion joints as per IRC SP: 35- 1990 if any, for leakage strains on walls at joints.	Fixing with sealant suitably	30 days or before onset of rains whichever comes earlier	IRC SP:40-1993 and IRC SP:69-2011
	Structurally sound	Spalling of concrete not more than 0.25 sqm	Bi-Annually	Detailed inspection of all components of culvert as per IRC SP:35-1990 and recording the defects	Repairs to spalling, cracking, delamination, rusting shall be followed as per IRC:SP:40-1993.	15 days	IRC SP 40-1993 and MORTH Specifications clause 2800
		Delamination of concrete not more than 0.25 sq.m.					
		Cracks wider than 0.3 mm not more than 1m aggregate length					

	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sqm, damage to solid apron (concrete apron) not more than 1 sqm	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier.	IRC: SP 40-1993 and IRC:SP:13-2004.
Bridges including ROBs Flyover etc. as applicable	Riding quality or user comfort	No pothole in wearing coat on bridge deck	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC or wearing coat	15 days	MORT&H Specification 2811
Bridge -Super Structure	Bumps	No bump at expansion joint	Daily	Visual inspection as per IRC SP:35- 1990	Repairs to BC on either side of expansion joints, profile correction course on approach slab in case of settlement to approach embankment	15 days	MORT&H Specification 3004.2 & 2811.
	User safety (condition of crash barrier and guard rail)	No damaged or missing stretch of crash barrier or pedestrian hand railing	Daily	Visual inspection and detailed condition survey as per IRC SP: 35-1990.	Repairs and replacement of safety barriers as the case may be	3days	IRC: 5-1998, IRC SP: 84-2014 and IRC SP: 40-1993.

	Rusted reinforcement	Not more than 0.25 sq.m	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out the repairs to affected concrete portion with epoxy mortar / concrete.	15 days	IRC SP: 40-1993 and MORTH Specification 1600.
	Spalling of concrete	Not more than 0.50 sq.m					
	Delamination	Not more than 0.50 sq.m					
	Cracks wider than 0.30 mm	Not more than 1m total length	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Grouting with epoxy mortar, investigating causes for cracks development and carry out necessary rehabilitation.	48 Hours	IRC SP: 40-1993 and MORTH Specification 2800.
	Rainwater seepage through deck slab	Leakage - nil	Quarterly	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Grouting of deck slab at leakage areas, waterproofing, repairs to drainage spouts	1 months	MORTH specifications 2600 & 2700.
	Deflection due to permanent loads and	Within design limits.	Once in every 10 years for spans more	Load test method	Carry out major rehabilitation works on bridge to retain original design loads capacity	6 months	IRC SP: 51-1999.

	live loads		than 40 m					
	Vibrations in bridge deck due to moving trucks	Frequency of vibrations shall not be more than 5 Hz	Once in every 5 years for spans more than 30m and every 10 years for spans between 15 to 30 m	Laser displacement sensors or laser vibro-meters	Strengthening of super structure		4 months	AASHTO LRFD specifications
	Leakage in Expansion joints	No damage to elastomeric sealant compound in strip seal expansion joint, no leakage of rain water through expansion joint in case of buried and asphalt plug and copper strip joint.	Bi-Annually	Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge Inspection Unit	Replace of seal in expansion joint		15 days	MORTH specifications 2600 and IRC SP: 40-1993.
	Debris and dust in strip seal	No dust or debris in expansion joint	Monthly	Detailed condition survey as per IRC SP:35-1990 using	Cleaning of expansion joint gaps thoroughly		3 days	MORTH specification s 2600 and

	expansion joint	gap.		Mobile Bridge Inspection Unit			IRC SP: 40-1993.
	Drainage spouts	No down take pipe missing/broken below soffit of the deck slab. No silt, debris, clogging of drainage spout collection chamber.	Monthly	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Cleaning of drainage spouts thoroughly. Replacement of missing/broken down take pipes with a minimum pipe extension of 500mm below soffit of slab. Providing sealant around the drainage spout if any leakages observed.	3 days	MORTH specification 2700.
Bridge-substructure	Cracks/spalling of concrete/ rusted steel	No cracks, spalling of concrete and rusted steel	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out repairs to substructure by grouting/guniting and micro concreting depending on type of defect noticed	30 days	IRC SP: 40-1993 and MORTH specification 2800.

	Bearings	Delamination of bearing reinforcement not more than 5%, cracking or tearing of rubber not more than 2 locations per side, no rupture of reinforcement or rubber	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	In case of failure of even one bearing on any pier/abutment, all the bearings on that pier/abutment shall be replaced, in order to get uniform load transfer on to bearings.	3 months	MORTH specificatio n 2810 and IRC SP: 40-199.
Bridge Foundations	Scouring around foundatio ns	Scouring shall not be lower than maximum scour level for the bridge	Bi-Annually	Condition survey and visual inspection as per IRC SP:35-1990 using Mobile Bridge Inspection Unit. In case of doubt, use Underwater camera for inspection of deep wells in major Rivers.	Suitable protection works around pier/abutment	1 month	IRC SP: 40-1993, IRC 83-2014, MORTH specificatio n 2500
	Protectio n works in good condition	Damaged of rough stone apron or bank revetment not more than 3	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching.	30 days after defect observatio n or2	IRC: SP 40-1993 and IRC:SP:13-2004.

		sq.m, damage to solid apron (concrete apron) not more than 1 sq.m				weeks before onset of rainy season whichever is earlier.	
Note: Any Structure during the entire contract period which is found that does not complies with all requirements of this Table will be prepared, rehabilitated or even reconstructed under the scope of the contractor.							

Table 4: Maintenance Criteria for Structures and Culverts:

Table 5: Maintenance Criteria for Hill Roads

In addition to above, for hill roads the following provisions for maintenance is also to done.

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

Note: For all tables 1 to 5 above, latest BIS & IRC standards (even those not indicated herewith) along with MoRTH specifications shall be binding for all maintenance activities.

A. Flexible Pavement

Nature of Defect or deficiency		Time limit for repair/ rectification
(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
(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 (twenty four) 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 (forty eight) hours
(ii)	Painting of km stone, railing, parapets, crash barriers	As and when required/ Once every year
(iii)	Damaged/missing signs road 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 (twenty four) hours
(ii)	Faults and minor failures	8 (eight) hours
(e)	**Trees and plantation**	

Nature of Defect or deficiency		Time limit for repair/ rectification
(i)	Obstruction in a minimum head- room of 5 m above carriageway or obstruction in visibility of road signs	24 (twenty four)hours
(ii)	Removal of fallen trees from carriageway	4 (four) hours
(iii)	Deterioration in health of trees and bushes	Timely watering and treatment
(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 (four) hours
(ii)	Defects in electrical, water and sanitary installations	24 (twenty four) 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 (forty eight) hours within 15 (fifteen) days or as specified by the Authority's Engineer
(b)	**Foundations**	

Nature of Defect or deficiency		Time limit for repair/ rectification
(i)	Scouring and/or cavitation	15 (fifteen) days
(c)	**Piers, abutments, return walls and wing walls**	
(i)	Cracks and damages including settlement and tilting, spalling, scaling	30 (thirty) days
(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

Nature of Defect or deficiency		Time limit for repair/ rectification
(iii)	Snow requiring clearance	24 (twenty four) hours

[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.]

Schedule - F *(See Clause 4.1 (vii)(a))*

Applicable Permits

1. Applicable Permits

(i) 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.

(ii) 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.

Schedule – G

(See Clauses 7.1 and 19.2)

Annex-I

(See Clause 7.1)

Form of Bank Guarantee

[Performance Security/Additional Performance Security]

[Managing Director,
NHIDCL, PTI Building, New Delhi]
WHEREAS:

(A) _____[name and address of contractor] (hereinafter called the "**Contractor**") and [NHIDCL, PTI Building, New Delhi], (hereinafter called the **"Authority"**) have entered into an agreement (hereinafter called the "**Agreement**") for **Construction of Balance work of Two – Lane with hard shoulders of Existing Hayuliang – Hawai Road (NH-113) from design km 51.825 to km 63.131 (Existing km 45.050 of Hayuliang – Hawai Road to Hawai town)(11.306 km) on EPC basis in the state of Arunachal Pradesh Package of SARDP –NE (Green Field Alignment)**, 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:

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 NHIDCL], 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.

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 operable 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: -

SI. No	Particulars	Details
1	Name of the Beneficiary	National Highways and
		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.

Annex – II

(Schedule - G)

(See Clause 19.2)

Form for Guarantee for Advance Payment

[Managing Director,

NHIDCL, PTI Building, New Delhi]

WHEREAS:

(A) [name and address of contractor] (hereinafter called the "**Contractor**") has executed an agreement (hereinafter called the "**Agreement**") with the [NHIDCL, PTI Building, New Delhi], (hereinafter called the "**Authority**") for the construction of the **Construction of Balance work of Two – Lane with hard shoulders of Existing Hayuliang – Hawai Road (NH-113) from design km 51.825 to km 63.131 (Existing km 45.050 of Hayuliang – Hawai Road to Hawai town)(11.306 km) on EPC basis in the state of Arunachal Pradesh Package of SARDP –NE (Green Field Alignment)**, 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 + 3%* 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 installment of the Advance Payment under and in accordance with the Agreement, and agrees and undertakes to pay to the

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

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.

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 installment 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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

9. 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.

10. 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.

11. This guarantee shall also be operable 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.

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

SI. No	Particulars	Details
1	Name of the Beneficiary	National Highways and 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

13.

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.

[$] 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).

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.

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 FOR 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/slip roads)	**72%**	**A-Widening and Strengthening**		
		(1) Earthwork up to top of the sub-grade including excavation in soil, soft rock and hard rock.	0.00%	0.0000%
		(2) Granular work (sub- base, base, shoulders)	0.00%	0.0000%
		(3) Bituminous work	0.00%	0.0000%
		a) DBM	0.00%	0.0000%
		b) BC	0.00%	0.0000%
		(4) Concrete Pavement	0.00%	0.0000%
		(5) Site Clearance	0.00%	0.0000%
		(6) Widening and repair of culverts	0.00%	0.0000%
		(7) Protection of existing works	0.00%	0.0000%
		(8) Widening and repair of minor bridges	0.00%	0.0000%
		B- New 2-lane alignment		
		1 (a) Earthwork up to top of the sub-grade including excavation in soil, soft rock and hard rock.	55.22%	39.7500%
		1(b) Rectification Work	2.97%	2.1384%
		(2) Granular work (sub- base, base, shoulders)	8.19%	5.9000%
		(3) Bituminous work		
		a) DBM	5.51%	3.9700%
		b) BC	3.03%	2.1800%
		(4) CC Pavement	0.00%	0.0000%
		(5) Protection Works	0.00%	0.0000%

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE FOR PAYMENT	PERCENTAGE WEIGHTAGE	PERCENTAGE WEIGHTAGE vis a vis overall Project
1	2	3	4	5
		(6) RCC / Reinf. Earth ret wall in approaches of RoB	0.00%	0.0000%
		(7) Drainage Works	0.00%	0.0000%
		(8) Clearing & Grubbing	0.01%	0.0100%
		(9) Protection works	0.00%	0.0000%
		C- New culverts, minor bridges, underpasses, overpasses on existing road, realignments, bypasses:		
		(1) Box / Slab Culverts	25.07%	18.0500%
		(2) HP Culverts	0.00%	0.0000%
		(3) Embankment Protection (New Lane)	0.00%	0.0000%
		(4) Grade Separated structures	0.00%	0.0000%
		(5) Overpasses	0.00%	0.0000%
		(6) Elephant underpasss	0.00%	0.0000%
		(7) Approaches to ROB and Viaduct	0.00%	0.0000%
		(8) Minor bridges	0.00%	0.0000%
		(9) Cattles/Pedestrian Underpasses	0.00%	0.0000%
		(10) Vehicular Underpasses	0.00%	0.0000%
Major Bridge works and ROB/RUB	**13.83%**	**A- Widening and repairs of Major Bridges**		
		(1) Foundation	0.00%	0.0000%
		(2) Sub-structure	0.00%	0.0000%
		(3) Super-structure (including wearing coat, crash barriers etc. complete in all respect)	0.00%	0.0000%
		B- Widening and repair of		
		(a) ROB	0.00%	0.0000%
		(b) RUB	0.00%	0.0000%
		C- New Major Bridges		
		(1) Other Miscellaneous Items	0.00%	0.0000%
		(2) Guide Bund	0.00%	0.0000%
		(3) Foundation	45.00%	6.2200%

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE FOR PAYMENT	PERCENTAGE WEIGHTAGE	PERCENTAGE WEIGHTAGE vis a vis overall Project
1	2	3	4	5
		(4) Sub-structure	25.00%	3.4600%
		(5) Super-structure (including wearing coat, crash barriers etc. complete in all respect)	30.00%	4.1500%
		(6) Protection Works	0.00%	0.0000%
		D- New rail-road		
		bridge including Viaduct		
		(a) ROB	0.00%	0.0000%
		(b) RUB	0.00%	0.0000%
Structures (elevated sections, reinforced earth)	**0.00%**	**(1) Foundation**	0.00%	0.0000%
		(2) Sub-structure	0.00%	0.0000%
		(3) Super-structure (including crash barriers etc. complete)	0.00%	0.0000%
		(4) Reinforced Earth	0.00%	0.0000%
Other Works	**14.17%**	**Other Engineering**		
		Works		
		Major Junction	0.00%	0.0000%
		Road Marking	0.00%	0.0000%
		Road Appurtenances	0.00%	0.0000%
		Road Side plantation	0.00%	0.0000%
		Protection works	0.00%	0.0000%
		Service roads/slip road	0.00%	0.0000%
		Toll Plaza	0.00%	0.0000%
		Road side drains & toe wall	4.54%	0.6433%
		Project facilities	0.09%	0.0129%
		Safety & traffic mgmt. During construction	0.00%	0.0000%
		Traffic Sign, KM Stone	0.36%	0.0510%
		Pavement marking, Painting	0.99%	0.1403%
		Crash barrier/ W metal crash barrier	4.13%	0.5852%
		Boundary stone, km stone,5th km stone, &hectometre stones	0.03%	0.0043%
		Traffic blinker LED Delineator, stud, reflective payment marker, tree	0.34%	0.0482%

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE FOR PAYMENT	PERCENTAGE WEIGHTAGE	PERCENTAGE WEIGHTAGE vis a vis overall Project
1	2	3	4	5
		reflector		
		Traffic Island	0.00%	0.0000%
		Median Kerbs	0.00%	0.0000%
		Bus Bays & Bus shelter	0.87%	0.1233%
		Road side plantation & medium Plantatio	0.00%	0.0000%
		Protection works of guide bund including construction of flexible aprons , boulder pitching and filter media on slopes	0.00%	0.0000%
		Minor junction	1.58%	0.2239%
		Median filling shrub plantation & maintenance for 1 year	0.00%	0.0000%
		Overhead signboard	0.43%	0.0609%
		painting on kerb	0.00%	0.0000%
		Footpath &Separater	0.00%	0.0000%
		Vetiver Plantation	0.00%	0.0000%
		Interlocking concrete block payment	0.00%	0.0000%
		CC kerb	0.00%	0.0000%
		Painting	0.00%	0.0000%
		Cable duct	0.00%	0.0000%
		Solar stud & solar blinking LED	0.00%	0.0000%
		Rest area with development of site including One no Bus bay and Bus shelter, landscaping and tree plantation	0.00%	0.0000%
		For Plantation (Hydro seeding & plantation on hill slopes as slope protection measures)	6.88%	0.9749%
		Traffic control devices and road safety works (Polymer rumble strips on hazardous locations specially valley side curves)	1.38%	0.1955%

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE FOR PAYMENT	PERCENTAGE WEIGHTAGE	PERCENTAGE WEIGHTAGE vis a vis overall Project
1	2	3	4	5
		Road furniture	0.00%	0.0000%
		Roads side drains I/C Chute drain	0.00%	0.0000%
		Repair of protections works	0.00%	0.0000%
		Traffic diversion, Safety and traffic management during construction	0.00%	0.0000%
		Retaining wall	0.00%	0.0000%
		Miscellaneous items	0.00%	0.0000%
		Breast wall and RCC retaining wall	0.00%	0.0000%
		Site Clearance	0.00%	0.0000%
		M-20 kerb with channel	0.00%	0.0000%
		Prefabricated railing over kerb in median	0.00%	0.0000%
		Safety Barrier	0.00%	0.0000%
		(v) Project facilities		
		(a) Truck lay-byes	0.00%	0.0000%
		(b) others	0.00%	0.0000%
		(vi) Repairs to bridges/structures		
		Other items (Junctions	0.00%	0.0000%
		Providing wearing coat	0.00%	0.0000%
		Replacement of bearing joints	0.00%	0.0000%
		Providing crash barriers	0.00%	0.0000%
				0.0000%
		(vii) Protection works		
		Breast wall	29.57%	4.1901%
		RCC Retaining wall	32.97%	4.6718%
		Gabion Wall	4.51%	0.6391%
		Parapet	6.01%	0.8516%
		Slope Protection at Land Slide locations.	5.33%	0.7553%
			300.00%	100.00%

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 5 (five) percent of the total length.
(1) Earthwork up to top of the sub-grade including excavation in soil, soft rock and hard rock.	0.00%	
(2) Granular work (sub- base, base, shoulders)	0.00%	
(3) Bituminous work		
a) Prime & Tack Coat	0.00%	
b) DBM	0.00%	
c) BC	0.00%	
(4) Concrete Pavement	0.00%	
(5) Site Clearance	0.00%	
(6) Widening and repair of culverts	0.00%	Cost of ten 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.
(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 5 (five) 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 05 (five) percent of total length.
1(a) Earthwork up to top of the sub-grade including excavation in soil, soft rock and hard rock.	39.7500%	
1(b) Rectification Work	2.1384%	
(2) Granular work (sub- base, base, shoulders)	5.9000%	
(3) Bituminous work	0.00%	
a) Prime & Tack Coat	0.00%	
b) DBM	3.9700%	
c) BC	2.1800%	
(4) CC Pavement	0.00%	
(5) Protection Works	0.00%	

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
(6) RCC / Reinf. Earth ret wall in approaches of RoB	0.00%	
(7) Drainage Works	0.00%	
(8) Clearing & Grubbing	0.0100%	
(9) Protection works	0.00%	
C- New culverts, minor bridges, underpasses, overpasses on existing road, realignments, bypasses:		
(1) Box / Slab Culverts	18.0500%	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 underpasses	0.00%	
(7) Approaches to ROB and Viaduct	0.00%	
(8) Minor bridges	0.00%	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%	

@. 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 x weightage for bituminous work x (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 at overall Project	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 crash barriers etc. complete)	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	6.2200%	
(4) Sub-structure	3.4600%	
(5) Super-structure (including crash barriers etc. complete)	4.1500%	
(6) Protection Works	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%	

TABLE: 1.3.3

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	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		
Major Junction	0.00%	Payment shall be made on pro rata basis for completed facilities.
Road Marking	0.00%	
Road Appurtenances	0.00%	
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
Protection works	0.00%	

Service roads/slip road	0.00%	service roads/slip roads in a length of not less than 20 (twenty) percent of the total length of service roads/slip roads.
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	0.6433%	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 5 (five) percent of the total length.
Project facilities	0.0129%	Payment shall be made for completed items.
Safety & traffic mgmt. During construction	0.00%	
Traffic Sign	0.0510%	
Pavement marking	0.1403%	
Crash barrier/ W matel crash barrier	0.5852%	
Boundary stone, km stone,5th km stone, &hectometre stones	0.0043%	
Traffic blinker LED Delineator, stud, reflective payment marker,	0.0482%	

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
tree reflector		
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	0.1233%	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	0.2239%	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 5 (five) percent of the total length.
Overhead signboard	0.0609%	
painting on kerb	0.00%	
Footpath &Separater	0.00%	
Vetiver Plantation	0.00%	
Interlocking concrete block payment	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%	
For Plantation (Hydro seeding & plantation on hill slopes as slope protection measures)	0.9749%	
Traffic control devices and road safety works (Polymer rumble strips on hazardous locations specially valley side curves)	0.1955%	

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
Road furniture	0.00%	
Roads side drains I/C Chute drain	0.00%	
Repair of protections works	0.00%	
Traffic diversion, Safety and traffic management during construction	0.00%	
Retaining wall	0.00%	
Miscellaneous items	0.00%	
Breast wall and RCC retaining wall	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	0.00%	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	4.1901%	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 5 (five) percent of the total length.
Retaining wall	4.6718%	
Gabion Wall	0.6391%	
Parapet	0.8516%	
Slope Protection at Land Slide locations.	0.7553%	

1 Procedure for payment forMaintenance

1.1 The cost for maintenance shall be as stated in Clause14.1.1.

1.2 Payment for Maintenance shall be made in quarterly installments in accordance with the provisions of Clause19.7.

Schedule - I

(See Clause 10.2 (iv))

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 Authority shall describe in this Annex-I, all the Drawings that the Contractor is required to furnish under Clause 10.2.]

Schedule - J

(See Clause 10.3 (ii))

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

(i) Project Milestone-I shall occur on the date falling on the 256th day from the Appointed Date (the "**Project Milestone- I**").

(ii) 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

(i) Project Milestone-II shall occur on the date falling on the 439th day from the Appointed Date (the "**Project Milestone- II**").

(ii) 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 35% (thirty five per cent) of the Contract Price and should have started construction of all bridges

4. Project Milestone-III

(i) Project Milestone-III shall occur on the date falling on the 623th day from the Appointed Date (the "**Project Milestone- III**").

(ii) 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 70% (seventy per cent) of the Contract Price and should have started construction of all project facilities.

5. Scheduled Completion Date

(i) The Scheduled Completion Date shall occur on the 730th [Scheduled Construction Period] day from the Appointed Date.

(ii) 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 (ii))

Tests on Completion

1. Schedule for Tests

(i) 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.

(ii) 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

(i) 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 [***].

(ii) Riding quality test: Riding quality of each lane of the carriageway shall be checked with the help of a Network Survey Vehicle (NSV) fitted with latest equipments and the maximum permissible roughness for purposes of this Test shall be [2,000 (two thousand)] mm for each kilometre.

(iii) 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.

(iv) 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, except tests as specified in clause 5,but shall include measuring the reflectivity of road markings and road signs; and measuring the illumination level (lux) of lighting using requisite testing equipment.

(v) 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.

(vi) 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 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.

5. The Authority Engineer will carry out tests with following equipment at his own cost in the presence of contractor's representative.

Sr. No.	Key metrics of Asset	Equipment to be used	Frequency of condition survey
1	Surface defects of pavement	Network Survey Vehicle (NSV)	At least twice a year (As per survey months defined for the state basis rainy season)
2	Roughness of pavement	Network Survey Vehicle (NSV)	At least twice a year (As per survey months defined for the state basis rainy season)
3	Strength of pavement	Falling Weight Deflectometer (FWD)	At least once a year
4	Bridges	Mobile Bridge Inspection Unit (MBU)	At least twice a year (As per survey months defined for the state basis rainy season)
5	Road signs	Retro-reflectometer	At least twice a year (As per survey months defined for the state basis rainy season)

The first testing with the help of NSV shall be conducted at the time of issue of Completion Certificate.

Schedule - L

(See Clause 12.2)

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 Balance work of Two – Lane with hard shoulders of Existing Hayuliang – Hawai Road (NH-113) from design km 51.825 to km 63.131 (Existing km 45.050 of Hayuliang – Hawai Road to Hawai town)(11.306 km) on EPC basis in the state of Arunachal Pradesh Package of SARDP –NE (Green Field Alignment)]** 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… , Scheduled Completed Date for which was the …… day of ……20…..

SIGNED, SEALED AND DELIVERED

For and on behalf of the Authority's Engineer by:

(Signature)

(Name

) (Designation)

(Address)

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

(i) Monthly lump sum payments for maintenance shall be reduced in the case of non-compliance with the Maintenance Requirements set forth in Schedule-E.

(ii) 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.

(iii) 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 on monthly basis

(i) 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 cross fall, 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%
(ii)	Any Defects in superstructures, bearings and sub-structures	10%

S. No.	Item/Defect/Deficiency	Percentage
(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/5th km stones	5%
(f)	**Miscellaneous Items**	
(i)	Removal of dead animals, broken down/accidented 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%

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

$$R = {}^{P}/_{100} \times (M1 \text{ or } M2) \times {}^{L1}/_{L}$$

Where,

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

M1= Monthly lump-sum payment in accordance para 1.2 above of this

Schedule M2= Monthly lump-sum payment in accordance para 1.2 above of

this Schedule 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.

Schedule - N

(See Clause 18.1 (i))

Selection of Authority's Engineer

1. Selection of Authority's Engineer

(i) 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.

(ii) 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

(i) 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 [NHIDCL, PTI Building, New Delhi 110001] (the "**Authority**") and ..... (the "**Contractor**") for **Construction of Balance work of Two – Lane with hard shoulders of Existing Hayuliang – Hawai Road (NH-113) from design km 51.825 to km 63.131 (Existing km 45.050 of Hayuliang – Hawai Road to Hawai town)(11.306 km) on EPC basis in the state of Arunachal Pradesh Package of SARDP –NE (Green Field Alignment).**, and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.

 # - In case the bid of Authority**'s Engine**er's invited simultaneously with the bid of EPC project, then the status of bidding of EPC project only to be indicated

(ii) The TOR shall apply to construction and maintenance of the Project Highway.

2. Definitions and interpretation

(i) 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.

(ii) 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.

(iii) The rules of interpretation stated in Article 1 of the Agreement shall apply, mutatis mutandis, to this TOR.

3. General

(i) 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.

(ii) 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;

(c) the Termination Payment; or

(d) issuance of Completion Certificate or

(e) any other matter which is not specified in (a), (b), (c) or (d) above and which creates a financial liability on either Party.

(iii) 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.

(iv) 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.

(v) The Authority's Engineer shall aid and advise the Authority on any proposal for Change of Scope under Article 13.

(vi) 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

(i) During the Construction Period, the Authority's Engineer shall review and approve 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 (vi). The Authority's Engineer shall complete such review and approval 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.

(ii) The Authority's Engineer shall review and approve any revised Drawings sent to it by the Contractor and furnish its comments within 10 (ten) days of receiving such Drawings.

(iii) The Authority's Engineer shall review and approve 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.

(iv) The Authority's Engineer shall complete the review and approve 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 methodology from the Contractor.

(v) 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.

(vi) 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.

(vii) 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.

(viii) 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.

(ix) 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 (ix), 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.

(x) The Authority's Engineer shall test check at least 50 (fifty) percent of the quantity or number of tests prescribed for each category or type of test for quality control by the Contractor.

(xi) The timing of tests referred to in Paragraph 4 (ix), 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.

(xii) 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.

(xiii) The Authority's Engineer may instruct the Contractor to execute any work which is urgently 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.

(xiv) 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.

(xv) 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 12.2.

(xvi) 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.

(xvii) 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.

(xviii) 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, as the case may be. For carrying out its functions under this Paragraph 4 (xviii) 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

(i) 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.

(ii) 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.

(iii) 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.

(iv) 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.

(v) 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

(i) The Authority's Engineer shall determine the costs, and/or their reasonableness, that are required to be determined by it under the Agreement.

(ii) The Authority's Engineer shall determine the period of Time Extension that is required to be determined by it under the Agreement.

(iii) The Authority's Engineer shall consult each Party in every case of determination in accordance with the provisions of Clause 18.5.

7. Payments

(i) 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 (iv) (d).

(ii) 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 of Clause 19.10.

(iii) 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.

(iv) 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

(i) 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.

(ii) 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.

(iii) 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.

(iv) 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.

(v) 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 (i), 19.6 (i), and 19.8 (i))

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 (i) 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 (iii) (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

iii. 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

(i) 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.

(ii) The insurance under sub para (a) and (b) of paragraph 1(i) 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 of not less than 15% of the Contract Price 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

(i) 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: Rs. [*****]

(ii) 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.

Schedule-Q

(See Clause 14.10)

Tests on Completion of Maintenance Period

1. Riding Quality test:

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 [2,200 (two thousand and two hundred only)] mm for each kilometre.

2. 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 measurement of cracking, rutting, stripping and potholes and shall be as per the requirement of maintenance mentioned in Schedule-E.

Schedule-R

(See Clause 14.10)

Taking Over Certificate

I, ……. (Name and designation of the Authority's Representative) under and in accordance with the Agreement dated …… (the "**Agreement**"), for **[Construction of Balance work of Two – Lane with hard shoulders of Existing Hayuliang – Hawai Road (NH-113) from design km 51.825 to km 63.131 (Existing km 45.050 of Hayuliang – Hawai Road to Hawai town)(11.306 km) on EPC basis in the state of Arunachal Pradesh Package of SARDP –NE (Green Field Alignment)]** through (Name of Contractor), hereby certify that the Tests on completion of
Maintenance Period in accordance with Article 14 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement and I hereby certify that the Authority has taken over the Project highway from the Contractor on this day.....

SIGNED, SEALED AND
DELIVERED

(Signature)

(Name and designation of Authority's

Representative)

(Address)

**** End of the Document ***