SCHEDULES

Construction of Balance Work of 2 Lane with Paved Shoulders of Joram-Koloriang road (NH 713) on EPC basis from existing Km 138.00 to Km 158.000 (Design Km 122.353 to Km 138.389)[Design length-16.036 Km] in the State of Arunachal Pradesh under SARDP-NE

Schedule - A

(See Clauses 2.1 and 8.1)

SITE OF THE PROJECT

1. The Site

1.1 Site of the Two-Laning of Existing Joram-Koloriang Road on EPC basis from design km 122+353 to km 138+389 (Existing km 138+000 to km 158+000) in the state of Arunachal Pradesh under SARDP-NE, Project Highway shall include the land, buildings, structures and road works as described in **Annex-1** of this **Schedule-A**.

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

1.3 An inventory of the Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority's Representative and the Contractor, and such inventory shall form part of the memorandum referred to in Clause 8.2.1 of this Agreement.

1.4 The alignment plans of the Project Highway are specified in Annex-Ill. 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

Site of the Two-Laning of Existing Joram-Koloriang Road on EPC basis from design km 122+353 to km 138+389 (Existing km 138+000 to km 158+000) in the state of Arunachal Pradesh under SARDP-NE. The road is of sub-standard single lane with poor road surface, passing through mountainous terrain, in general. The road is deficient in geometric features at almost all locations. The stretch lies within Kurung-kumey district.

The project corridor i.e.,Joram-Koloriang passes through settlements of one major settlement Koloriang.

The Index Map is appended at the end of this Schedule-A.

2. Chainage References (Existing vs Design)

"Existing Chainage" means Km Stones existing on the Project Highway. During topography survey, observations are made to these Km stones and after finalization of alignment by improving the existing geometry the chainage has been referred to "Design Chainage". The relationship between the " Existing Chainage" and the" Design Chainage" as per field surveys of the location of existing Km stones for the "Project Highway" is given below:

Sl. No.	Existing Chainage (Km)	Design chainage (Km)	Remarks
1	138+000	122+353	
2	138+500	122+833	
3	139+000	123+253	
4	139+500	123+683	
5	140+000	124+153	
6	140+500	124+613	
7	141+000	125+193	
8	141+500	125+573	
9	142+000	125+993	
10	142+500	126+493	
11	143+000	126+968	
12	143+500	127+383	
13	144+000	127+753	
14	144+500	128+253	
15	145+000	128+738	
16	145+500	129+213	

17	146+000	129+543	
18	146+500	130+018	
19	147+000	130+328	
20	147+500	130+733	
21	148+000	131+173	
22	148+500	131+543	
23	149+000	131+933	
24	149+500	132+283	
25	150+000	132+778	
26	150+500	133+253	
27	151+000	133+743	
28	151+500	134+153	
29	152+000	134+553	
30	152+500	135+053	
31	153+000	135+543	
32	153+500	135+953	
33	154+000	136+303	
34	154+500	136+683	
35	155+000	137+143	
36	155+500	137+533	
37	156+000	137+858	
38	156+500	138+053	
39	157+000	138+253	
40	157+500	138+323	
41	158+000	138+389	

3. Land

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

Sl. No.	Existing Chainage (Km)		Design chainage (Km)		Length In m (Design)	Existing/Available ROW (m)	Remarks
	From	To	From	To			
1	138+000	158+000	122+353	138+389	16036	24m	

4. Carriageway

The present carriageway of the Project Highway is substandard single lane configuration except on chainages mentioned in below table.

Sl. No.	Existing Chainage (Km)		Design chainage (Km)		Length In m (Design)	Lane Width (m)	Remarks
	From	To	From	To			
1	138+000	158+000	122+353	138+389	16036		
2			122+850	122+866	16	12.00	Landslide may have occurred at few locations
3			123+600	124+000	400	12.00	Landslide may have occurred at few locations
4			124+200	124+400	200	12.00	Landslide may have occurred at few locations
6			124+400	124+900	500	12.00	Landslide may have occurred at few locations
7			124+900	125+300	400	12.00	Landslide may have occurred at few locations
8			125+500	126+200	700	12.00	Landslide may have occurred at few locations
9			126+200	126+400	200	12.00	Landslide may have occurred at few locations
10			126+400	126+600	200	12.00	Landslide may have occurred at few locations

11			126+600	126+950	350	12.00	Landslide may have occurred at few locations
12			127+000	127+400	400	12.00	Landslide may have occurred at few locations
			127+400	127+900	500	12.00	Landslide may have occurred at few locations
13			128+500	130+950	2450	12.00	Landslide may have occurred at few locations
14			131+350	131+700	350	12.00	Landslide may have occurred at few locations
15			132+550	133+304	754	12.00	Landslide may have occurred at few locations
16			133+304	135+100	1796	12.00	Landslide may have occurred at few locations
17			135+100	135+967	867	12.00	Landslide may have occurred at few locations
18			136+120	136+748	628	12.00	Landslide may have occurred at few locations
19			137+000	137+480	480	12.00	Landslide may have occurred at few locations
20			137+580	138+389	809	12.00	Landslide may have occurred at few locations

Lane width as mentioned in above table is approximate assessment.The Contractor shall be responsible for accurate assessment of the lane width. Any reduction in width will not be responsibility of Authority.

Length and chainages as mentioned in above table is approximate assessment. The Contractor shall be responsible for accurate assessment of the length of road. Any reduction in length will not be responsibility of Authority.

The Contractor shall be responsible for accurate assessment of the actual Landslide which have occurred. Any reduction in width of lane due to landslide or any other reason will not be responsibility of Authority.

5. Granular Sub Base:

The present "Granular Sub-Base layer" is laid on the following chainages only as mentioned in below table:

Sl. No.	Existing Chainage (Km)		Design chainage (Km)		Length In m (Design)	Remarks
	From	To	From	To		
1	138+000	158+000	129+353	129+900	547	
2			130+000	130+150	150	
3			133+400	133+700	300	
4			133+800	134+050	250	
6			134+650	135+103	459	
7			135+550	135+820	270	
8			135+850	135+874	24	
9			137+000	137+300	300	
Total Length of GSB					2300	

Thickness of GSB layer, length, profiling/levelling and chainages as mentioned in above table are approximate assessment. The Contractor shall be responsible for accurate assessment. Any reduction in thickness of GSB layer, length, profiling/levelling and chainageswill not be responsibility of Authority.

6. *Wet Mix Macadam (WMM) layer has not been laid yet in any stretch of project highway.*

7. Breast wall

The present "Breast Wall" is Constructed on the following chainages only as mentioned in below table:

S.N	Design Chainage (Km)		Total Length of Breast wall in Rmtr	Remarks
	From	To		
1	134840	134865	25	
2	134800	134810	10	
3	134890	134920	30	

4	134960	134970	10	
5	134950	134960	10	
6	134760	134780	20	
7	134700	134718	18	
8	134670	134700	30	
9	134735	134745	10	
10	134025	134035	10	
11	133990	134000	10	
12	133800	133810	10	
13	133560	133590	30	
14	132720	132730	10	
15	132600	132620	20	
16	130610	130640	30	
17	130580	130600	20	
18	130540	130550	10	
19	130030	130090	60	
20	129940	129950	10	
21	129780	129860	80	
22	129680	129730	50	
23	129460	129490	30	
24	129530	129540	10	
25	129410	129440	30	
26	129300	129370	70	
27	128980	129010	30	
28	129040	129070	30	
29	135550	135560	10	
30	135715	135730	15	
31	135740	135800	60	
32	136140	136170	30	
33	136170	136180	10	
34	136380	136390	10	
35	136450	136470	20	
36	136990	137000	10	
37	137060	137110	50	
38	137330	137370	40	
39	137750	137760	10	
40	137800	137830	30	
41	137950	138030	80	
42	138070	138112	42	
43	138165	138185	20	
44	138200	138240	40	
45	138275	138325	50	
46	138330	138340	10	
47	138405	138435	30	

48	133462	133472	10	
49	133510	133520	10	
50	133840	133900	60	
51	133980	134020	40	
52	133930	133940	10	
53	126770	126900	130	
54	126745	126755	10	
55	126540	126560	20	
56	126380	126430	50	
57	126230	126250	20	
58	126040	126070	30	
59	125565	125585	20	
60	125555	125565	10	
Total			1700	

Design and stabilityof already constructed Breast Wall are approximate assessment. The Contractor shall be responsible for accurate assessment of thestability and Design of Breast Wall. Any issue of instability and failed design of Breast Wall will not be responsibility of Authority.
Chainages and length as mentioned in above table are approximate assessment. The Contractor shall be responsible for accurate assessment of theChainages and length of Constructed Breast Wall. Any variation in chainages and length of Breast Wall will not be responsibility of Authority.

8. Retaining Wall

No Retaining Wall has been constructed in this project highway.

9. Major Bridges

The Site includes the following Major Bridges:

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

10. Railway over-bridges (ROB)

The Site includes the following Railway Over Bridges

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

NIL

11. Grade Separators

The Site includes the following Grade separators

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

12. Minor Bridges

The Site includes the following minor Bridges:

Sl. No.	Design Chainage (km)	Type of Structures			No. of Spans with span length (m)	Total Width (m)
		Foundation	Sub-Structure	Super Structure		
1	124+583	Open	Wall type	PSC I Girder	Single span, L=34.0m	5.50
2	127+283	Open	Stone Masonry wall type	RCC Box Type	Single span, L=10.0m	6.00
3	128+423	Open	Stone Masonry wall type	PSC I Girder	Single span, L=39.0m	5.50

4	130+383	Open	Stone Masonry wall type	RCC Box Type	Single span, L = 6.50m	5.75
5	135+183	Open	Stone Masonry wall type	RCC T Girder	Single span, L =25.0m	5.75
6	124+243	Only A2 foundation completed	Remaining	Remaining	Single span, L =34.0m	16
7	127+050	Both Abutments completed	Completed	Completed but approach slab and all protection works are remaining	Single span, L 10.0m	16
8	135+253	A1 abutment completed	Remaining	Remaining	Single span, L =25.0m	16

13. Railway level crossings / Railway Track

The Site includes the following railway level crossings:

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

14. Underpasses (vehicular, Non-Vehicular)

The Site includes the following underpasses:

Sl. No.	Road Segment	Existing Chainage (km)	Type of Structures	No. of Spans with span length (m)	Total Width (m)
NIL					

15. Culverts

The Site includes the 95 Nos of culverts at the following locations and types:

Sl. No.	Design Chainage (km)	Type of Culvert	Span/Dia (m)	Width (m)	Remarks
1	122+900	BOX Culvert	3.00	12.00	Protection work is remaining
2	123+323	BOX Culvert	2.0	12.00	Protection work is remaining
3	123+934	BOX Culvert	2.0	12.00	Protection work is remaining
4	124+057	BOX Culvert	3.0	12.00	Protection work is remaining
5	125+039	BOX Culvert	2.0	12.00	Protection work is remaining
6	125+732	BOX Culvert	2.0	12.00	Protection work is remaining
7	125+786	BOX Culvert	2.0	12.00	Protection work is remaining
8	125+884	BOX Culvert	2.0	12.00	Protection work is remaining
9	126+017	BOX Culvert	2.0	12.00	Protection work is remaining
10	126+180	BOX Culvert	2.0	12.00	Protection work is remaining
11	126+330	BOX Culvert	2.0	12.00	Protection work is remaining
12	126+383	BOX Culvert	3.0	12.00	Protection work is remaining
13	126+477	BOX Culvert	2.0	12.00	Protection work is remaining
14	126+667	BOX Culvert	4.0	12.00	Protection work is remaining
15	128+631	BOX Culvert	3.0	12.00	Protection work is remaining
16	128+780	BOX Culvert	3.0	12.00	Protection work is remaining
17	129+200	BOX Culvert	2.0	12.00	Protection work is remaining
18	129+563	BOX Culvert	2.0	12.00	Protection work is remaining
19	129+830	BOX Culvert	2.0	12.00	Protection work is remaining
20	129+900	BOX Culvert	3.0	12.00	Protection work is remaining
21	130+150	BOX Culvert	3.0	12.00	Protection work is remaining
22	130+457	BOX Culvert	6.0	12.00	Protection work is remaining
23	**130+600**	BOX Culvert	2.0	12.00	Protection work is remaining
24	130+865	BOX Culvert	3.0	12.00	Protection work is remaining
25	132+642	BOX Culvert	3.0	12.00	Protection work is remaining
26	133+180	BOX Culvert		12.00	Protection work is remaining
27	133+237	BOX Culvert	2.0	12.00	Protection work is remaining
28	133+304	BOX Culvert		12.00	Protection work is remaining
29	133+381	BOX Culvert	2.0	12.00	Protection work is remaining
30	133+430	BOX Culvert		12.00	Protection work is remaining
31	133+469	BOX Culvert	2.0	12.00	Protection work is remaining
32	133+558	BOX Culvert	2.0	12.00	Protection work is remaining
33	133+592	BOX Culvert	2.0	12.00	Protection work is remaining

34	134+016	BOX Culvert		12.00	Protection work is remaining
35	134+197	BOX Culvert	2.0	12.00	Protection work is remaining
36	134+390	BOX Culvert		12.00	Protection work is remaining
37	134+494	BOX Culvert	2.0	12.00	Protection work is remaining
38	134+560	BOX Culvert	2.0	12.00	Protection work is remaining
39	134+618	BOX Culvert	4.0	12.00	Protection work is remaining
40	134+735	BOX Culvert		12.00	Protection work is remaining
41	134+794	BOX Culvert		12.00	Protection work is remaining
42	134+838	BOX Culvert	2.0	12.00	Protection work is remaining
43	134+940	BOX Culvert		12.00	Protection work is remaining
44	134+977	BOX Culvert		12.00	Protection work is remaining
45	135+537	BOX Culvert	2.0	12.00	Protection work is remaining
46	135+804	BOX Culvert	2.0	12.00	Protection work is remaining
47	136+137	BOX Culvert		12.00	Protection work is remaining
48	136+242	BOX Culvert	2.0	12.00	Protection work is remaining
49	136+364	BOX Culvert	3.0	12.00	Protection work is remaining
50	136+526	BOX Culvert	3.0	12.00	Protection work is remaining
51	137+058	BOX Culvert		12.00	Protection work is remaining
52	137+207	BOX Culvert	2.0	12.00	Protection work is remaining
53	137+407	BOX Culvert		12.00	Protection work is remaining
54	137+789	BOX Culvert		12.00	Protection work is remaining
55	137+900	BOX Culvert	2.0	12.00	Protection work is remaining

Chainages and no of culverts as mentioned in above table is approximate.The Contractor shall be responsible for accurate assessment of the no and chainages of culverts. Any reduction in no will not be responsibility of Authority.

16. Bus Shelters

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

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

17. Truck Lay Bye

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

Sl.	Road	Existing Chainage	Length	Left Hand	Right Hand

No.	Segment	(km)	(m)	Side	Side
NIL					

18. Road side drains

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

Sl. No.	Design chainage (Km)		Length in Running meter	Remarks
	From (Km)	TO (Km)		
1	129680	129785	105	
2	133560	133685	85	
3	134025	134060	35	
4	134785	134805	20	
5	134880	134900	20	
6	135545	135570	25	
7	135740	135810	70	
8	137000	137020	20	
9	137030	137050	20	
10	137060	137250	190	
11	137330	137370	40	
Total Length of Line Drain			**630**	

Chainages and length of lined drain as mentioned in above table is approximate. TheContractor shall be responsible for accurate assessment of the length and chainages of culverts. Any reduction in length will not be responsibility of Authority.

19. Major Junctions

The details of major junctions are as follows:

Sl. No.	Location		At Grade	Separated	Category of Cross Roads			
	Existing Ch.	Design Ch.			NH	SH	MDR Others	NH
1	158.000	138+389		-	-	-	-	

20. Minor Junctions

The details of major junctions yet to be done are as follows:

SL. No.	Existing Chainage (Km)	Design Chainage (Km)	Type	
			'T' Junction	Cross Road both sides
1	142+953	126+956		-
2	144+700	128+448		-
3	149+560	132+383		-
4	149+950	132+773		-
5	152+070	134+683		-
6	154+300	136+613		-
7	156+000	137+853		-
8	156+100	137+953		-
9	156+250	138+103		-
10	156+300	138+153		-

21. Bypasses

The details of bypasses are as follows:

SL. No.	Name of Bypass (Town)	Road Segment	Existing Chainage		Length (m)	Carriageway	Type
			From (Km)	To (Km)		Width (m)	
NIL							

22. Other Structures/Details

The details of other structures are as follows:

SL. No.	Type	Existing Chainage (Km)	Length (m)	Width (m)
NIL				

Annex-11

Schedule – A

Details for Providing Right of Way

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

SI. No	Design Chainage		Length in km	Existing ROW	Proposed ROW Width (m)	Date of Providing proposed ROW
	From	To				
(i) 90% of ROW (Full width)	122.353	138.389	16.036	9-12 m	18m - 35 m	At appointed date
(ii) Balance ROW (Full width)						Within 90 days after the appointed Date as per clause 8.2 of DCA

Annex-III

(Schedule-A)

Alignment Plans

It is enclosed.

Annex-IV

(Schedule-A)

Environmental Clearances

The following Forest clearance has been obtained:

The project highway does not require environment clearance as per MoEF corrigendum dated 22.08.2013.

Final stage Forest Clearance for the project has been obtained.

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"

Annex 1 *(Schedule-B)*

Project is construction, improvement of the existing single lane road to two lane with paved shoulder in accordance with IRC-SP: 73:2015, IRC-SP: 48:1998 and other relevant codes including standard good practice of the road construction. -

1. SCOPE OF THE PROJECT

1.1 GENERAL

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

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

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

the new road;

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

2. GEOMETRIC DESIGN AND GENERAL FEATURES

2.1.1 General

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

2.1.2 WIDENING OF THE EXISTING HIGHWAY

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

The Project Highway shall follow the existing alignment unless otherwise 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 [plain/rolling] terrain to the extent land is available.

2.1.3 Improvement of the existing road geometries

[Refer to paragraph 2.1 (v) of the Manual and provide details]

The hilly gradients shall be corrected in such a way so as to attain a limiting gradient of 6% in order to achieve longitudinal drainage. Also, vertical curves shall be improved/introduced so that' the vertical curves meet IRC: 5P-73 - 2015 standards.

The horizontal alignment of the Project Highway shall be improved as per the standards set out in **Schedule-D,**

The improvement shall be done in consultation with the independent consultant *I* Project Company ensuring that the proposed improvements are accommodated within the land width available as far as practical otherwise action to acquire more land shall be resorted to through NHIDCL.

In the following sections, where improvement of the existing road geometries to the prescribed standards is not possible, the existing road geometrics shall be improved to the extent possible within the given right of way and proper road signs and safety measures shall be provided:

Improvement due to Realignments: (PKG-VIII)

SL.NO	DESIGN CHAINAGE		LENGTH
	FROM	TO	(m)
1.	122+353	122+850	500
2.	122+866	123+600	734
3.	124+000	124+200	200
4.	125+300	125+500	200
5.	126+950	127+000	50
6.	127+900	128+180	280
7.	128+180	128+500	320
8.	130+950	131+350	400
9.	131+700	132+270	570
10.	132+270	132+550	280
11.	135+967	136+120	153
12.	136+748	137+000	252
13.	137+480	137+580	100

Probable location of Sharp Curves: Package-IV

Sl. No	Design Chainage (m)		Remarks
	From	To	
1.	122373.195	122387.986	Radius < 300
2.	122479.065	122516.706	Radius < 300
3.	122607.693	122632.68	Radius < 300
4.	122804.636	122834.587	Radius < 300
5.	122949.789	122962.15	Radius < 300
6.	123061.464	123101.462	Radius < 300
7.	123182.641	123247.983	Radius < 300
8.	123310.407	123345.053	Radius < 300
9.	123680.934	123723.009	Radius < 300
10.	123837.383	123886.162	Radius < 300
11.	124023.444	124057.684	Radius < 300
12.	124139.679	124338.459	Radius < 300
13.	124526.149	124567.869	Radius < 300
14.	124614.423	124660.268	Radius < 300
15.	124766.319	124794.529	Radius < 300
16.	124948.236	124988.569	Radius < 300
17.	125075.901	125125.594	Radius < 300
18.	125441.568	125463.391	Radius < 300
19.	125544.37	125556.908	Radius < 300
20.	125668.369	125678.911	Radius < 300
21.	125779.616	125827.358	Radius < 300
22.	125912.187	125953.209	Radius < 300
23.	126212.291	126239.593	Radius < 300
24.	126300.61	126327.302	Radius < 300
25.	126595.379	126656.207	Radius < 300
26.	126748.936	126779.069	Radius < 300
27.	126943.329	127011.484	Radius < 300
28.	127111.084	127186.868	Radius < 300
29.	127237.645	127367.732	Radius < 300
30.	127422.445	127504.26	Radius < 300
31.	127534.074	127605.236	Radius < 300
32.	127764.396	127784.981	Radius < 300
33.	128367.591	128373.081	Radius < 300
34.	128441.906	128464.693	Radius < 300
35.	128978.625	129019.122	Radius < 300
36.	129150.694	129183.305	Radius < 300
37.	129495.516	129574.451	Radius < 300
38.	129674.097	129696.394	Radius < 300
39.	129788.262	129827.965	Radius < 300

40.	129906.523	130043.892	Radius < 300
41.	130095.003	130154.049	Radius < 300
42.	130238.257	130272.384	Radius < 300
43.	130338.1	130345.397	Radius < 300
44.	131329.404	131378.035	Radius < 300
45.	131609.277	131626.458	Radius < 300
46.	131800.373	131903.916	Radius < 300
47.	132088.23	132227.971	Radius < 300
48.	132280.003	132369.211	Radius < 300
49.	132447.418	132504.331	Radius < 300
50.	132580.528	132588.85	Radius < 300
51.	132666.117	132695.51	Radius < 300
52.	132772.247	132788.219	Radius < 300
53.	132846	132856.951	Radius < 300
54.	133029.049	133035.236	Radius < 300
55.	133182.905	133192.66	Radius < 300
56.	133307.652	133329.008	Radius < 300
57.	133504.153	133509.855	Radius < 300
58.	133628.324	133672.755	Radius < 300
59.	133749.588	133852.157	Radius < 300
60.	133939.973	133995.542	Radius < 300
61.	134081.699	134119.374	Radius < 300
62.	134272.674	134300.751	Radius < 300
63.	134837.168	134862.338	Radius < 300
64.	134937.8	134995.481	Radius < 300
65.	135065.641	135072.659	Radius < 300
66.	135123.911	135151.647	Radius < 300
67.	135204.801	135267.307	Radius < 300
68.	135338.925	135355.111	Radius < 300
69.	135408.239	135417.998	Radius < 300
70.	135465.264	135488.452	Radius < 300
71.	135545.67	135665.532	Radius < 300
72.	135666.72	135700.758	Radius < 300
73.	135781.362	135796.429	Radius < 300
74.	135972.11	136000.371	Radius < 300
75.	136094.983	136167.774	Radius < 300
76.	136271.612	136348.362	Radius < 300
77.	136403.113	136430.837	Radius < 300
78.	136545.881	136616.315	Radius < 300
79.	136723.868	136800.264	Radius < 300
80.	136855.851	136889.359	Radius < 300
81.	136972.506	137045.901	Radius < 300
82.	137128.878	137144.006	Radius < 300
83.	137221.571	137326.636	Radius < 300
84.	137403.61	137470.595	Radius < 300
85.	137526.566	137607.317	Radius < 300
86.	137640.591	137717.355	Radius < 300

87.	137787.059	137817.849	Radius < 300
88.	137874.542	137897.978	Radius < 300
89.	138060.973	138086.787	Radius < 300
90.	138212.684	138221.34	Radius < 300
91.	138261.445	138268.141	Radius < 300
92.	138293.487	138323.199	Radius < 300
93.	138364.338	138369.807	Radius < 300

2.2 Design speed

The design speed shall be as per IRC 73 : 2015 however in exceptional cases the minimum design speed of (30 km per hrfor hilly and mountainous terrain).

2.3 Proposed Right of Way

(Refer to paragraph 2.3 of the Manual). Details of the proposed Right of Way are tabulated below.

SI.No.	Design Chainage		Length	Width (m)
	From	To	KM	
1.	122.353	138.389	16.036	18m – 35m

2.3.1 The Scheduled date on which the Authority shall provide ROW to the contractor is given in Annexure-II of Schedule A

2.4 Type of Shoulders

[Refer to paragraph 2.6.1 of the Manual and specify]

a) In built-up sections, 1.5m wide Solid footpath has been considered as TCS-1 for normal camber and TCS-4.
b) In open country, paved shoulders of 1.5m in width shall be provided and 1.0m earthen shoulder shall be covered with 200mm thick compacted layer of granular material as TCS-2 for normal camber, as TCS-4 for super elevation, as TCS-5 for pick up Bus stop & passenger shelter and as TCS-6 for Gabion wall and super elevation,
c) Design and specifications of paved shoulders and granular material shall conform to the requirements specified in paragraphs 5.9.9 and 5.9.10 of the Manual.

2.5 Width of Carriageway/Roadway width

2.5.1 Two-Laning with paved shoulders shall be undertaken. The paved carriageway shall be [7(seven) m) wide and paved shoulder in accordance with the typical cross sections drawings in the Manual.

2.5.2 Except as otherwise provided in this Agreement, the width of the paved carriageway and cross-sectional features shall conform to Para 2.7 of the manual.

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 Manual.

2.6.2 *Lateral clearanc*e: The width of the opening at the underpasses shall be as follows:

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

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

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

2.8 Service roads

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

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

			Both Sides	Road
Nil				

2.9 Grade Separated Structures

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

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

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

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

Sl.No	Location	Type of Structure /Length (m)	Cross Road at			Remarks, if any
			Existing Level	Raised Level	Lowered Level	
Nil						

2.9.3 Cattle and pedestrian underpass / Overpass

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

Sl.No	Location	Type of Crossing
Nil		

2.10 Typical cross-sections of the Project Highway

Typical cross-sections to be followed as per IRC: SP-73-2015 and in addition the proposed cross section for various situations are given in Fig. B-1 to B-6. These illustrate the widening proposals for the project highway. The Project Highway (length 14.990 km) shall be 2-lane carriageway with 1.5m wide paved and 1.0m wide earthen shoulders facility.

Following typical cross sections shall be provided for the Project Highway:

TCS – 1 : Typical cross section of 2 – lane carriageway with retaining wall
TCS – 2 : Typical cross section of 2 – lane carriageway without retaining wall
TCS – 3 : Typical cross section of 2 – lane carriageway at realignment stretches in hill cutting
TCS – 4 : Typical cross section of 2 – lane carriageway at built up areas

The cross-section schedule shall be as follows:

SL.NO	DESIGN CHAINAGE		LENGTH (m)	TCS TYPE	Remarks / Location
	FROM	TO			
1.	122353	122503	150	2	Reconstruction & widening
2.	122503	122513	10	3	Realignment
3.	122513	122553	40	1	Realignment with Retaining wall
4.	122553	122653	100	1	Realignment with Retaining wall
5.	122653	122703	50	3	Realignment
6.	122703	122743	40	2	Reconstruction & widening
7.	122743	122753	10	1	Reconstruction & widening with retaining wall
8.	122753	122763	10	1	Realignment with Retaining wall
9.	122763	122853	90	3	Realignment
10.	122853	122883	30	1	Reconstruction and widening with retaining wall
11.	122883	122903	20	2	Reconstruction and widening
12.	122903	123053	150	3	Realignment
13.	123053	123063	10	3	Realignment
14.	123063	123263	200	3	Realignment
15.	123263	123293	30	1	Realignment with Retaining wall
16.	123293	123343	50	3	Realignment
17.	123343	123353	10	1	Realignment with Retaining wall
18.	123353	123393	40	1	Realignment with Retaining wall
19.	123393	123513	120	3	Realignment
20.	123513	123563	50	1	Realignment with Retaining wall
21.	123563	123853	290	3	Realignment
22.	123853	123973	120	1	Realignment with Retaining wall
23.	123973	124803	830	3	Realignment
24.	124803	124863	60	3	Realignment
25.	124863	124903	40	3	Realignment
26.	124903	124993	90	2	Reconstruction & widening
27.	124993	125013	20	1	Reconstruction & widening with retaining wall
28.	125013	125143	130	2	Reconstruction & widening
29.	125143	125153	10	1	Reconstruction & widening with retaining wall
30.	125153	125313	160	1	Realignment with Retaining wall
31.	125313	125363	50	3	Realignment
32.	125363	125443	80	1	Realignment with Retaining wall
33.	125443	125453	10	3	Realignment
34.	125453	125513	60	2	Reconstruction & widening

35.	125513	125553	40	1	Reconstruction & widening with retaining wall
36.	125553	125593	40	1	Realignment with Retaining wall
37.	125593	125853	260	3	Realignment
38.	125853	126003	150	2	Reconstruction & widening
39.	126003	126703	700	3	Realignment
40.	126703	126753	50	2	Reconstruction & widening
41.	126753	126853	100	3	Realignment
42.	126853	126903	50	1	Realignment with Retaining wall
43.	126903	127563	660	3	Realignment
44.	127563	127573	10	1	Realignment with Retaining wall
45.	127573	127753	180	3	Realignment
46.	127753	128003	250	2	Reconstruction & widening
47.	128003	128053	50	3	Realignment
48.	128053	128123	70	3	Realignment
49.	128123	128223	100	1	Realignment with Retaining wall
50.	128223	128453	230	3	Realignment
51.	128453	128673	220	2	Reconstruction & widening
52.	128673	128783	110	1	Reconstruction & widening with retaining wall
53.	128783	128853	70	2	Reconstruction & widening
54.	128853	128903	50	3	Realignment
55.	128903	129013	110	3	Realignment
56.	129013	129073	60	3	Realignment
57.	129073	129193	120	3	Realignment
58.	129193	129253	60	3	Realignment
59.	129253	129353	100	2	Reconstruction & widening
60.	129353	129373	20	3	Realignment
61.	129373	129473	100	1	Realignment with Retaining wall
62.	129473	129573	100	3	Realignment
63.	129573	129603	30	1	Realignment with Retaining wall
64.	129603	129693	90	3	Realignment
65.	129693	129713	20	1	Realignment with Retaining wall
66.	129713	129903	190	3	Realignment
67.	129903	129963	60	1	Realignment with Retaining wall
68.	129963	130023	60	3	Realignment
69.	130023	130063	40	3	Realignment
70.	130063	130553	490	3	Realignment
71.	130553	130603	50	2	Reconstruction & widening
72.	130603	130803	200	3	Realignment
73.	130803	130813	10	1	Realignment with Retaining wall
74.	130813	131253	440	3	Realignment
75.	131253	131283	30	2	Reconstruction & widening
76.	131283	131353	70	1	Reconstruction & widening with retaining wall
77.	131353	131443	90	3	Realignment
78.	131443	131523	80	3	Realignment
79.	131523	131583	60	3	Realignment
80.	131583	131603	20	3	Realignment
81.	131603	131723	120	3	Realignment
82.	131723	131763	40	1	Realignment with Retaining wall
83.	131763	132753	990	3	Realignment
84.	132753	132793	40	1	Realignment with Retaining wall
85.	132793	132903	110	3	Realignment
86.	132903	132923	20	1	Realignment with Retaining wall
87.	132923	133183	260	3	Realignment

88.	133183	133213	30	1	Realignment with Retaining wall
89.	133213	133293	80	3	Realignment
90.	133293	133353	60	1	Realignment with Retaining wall
91.	133353	133453	100	3	Realignment
92.	133453	133533	80	1	Realignment with Retaining wall
93.	133533	133603	70	3	Realignment
94.	133603	133623	20	1	Realignment with Retaining wall
95.	133623	133663	40	3	Realignment
96.	133663	133703	40	1	Realignment with Retaining wall
97.	133703	133783	80	3	Realignment
98.	133783	133803	20	3	Realignment
99.	133803	134073	270	3	Realignment
100.	134073	134123	50	3	Realignment
101.	134123	134153	30	3	Realignment
102.	134153	134163	10	1	Realignment with Retaining wall
103.	134163	134343	180	3	Realignment
104.	134343	134363	20	1	Realignment with Retaining wall
105.	134363	134433	70	3	Realignment
106.	134433	134453	20	1	Realignment with Retaining wall
107.	134453	134653	200	3	Realignment
108.	134653	134733	80	2	Reconstruction & widening
109.	134733	134753	20	1	Reconstruction & widening with retaining wall
110.	134753	134763	10	1	Realignment with Retaining wall
111.	134763	134823	60	3	Realignment
112.	134823	134843	20	1	Realignment with Retaining wall
113.	134843	135103	260	3	Realignment
114.	135103	135203	100	2	Reconstruction & widening
115.	135203	135653	450	3	Realignment
116.	135653	135753	100	2	Reconstruction & widening
117.	135753	135973	220	3	Realignment
118.	135973	135993	20	1	Realignment with Retaining wall
119.	135993	136153	160	3	Realignment
120.	136153	136163	10	1	Realignment with Retaining wall
121.	136163	136453	290	3	Realignment
122.	136453	136463	10	1	Realignment with Retaining wall
123.	136463	136573	110	3	Realignment
124.	136573	136613	40	1	Realignment with Retaining wall
125.	136613	136653	40	3	Realignment
126.	136653	136693	40	1	Realignment with Retaining wall
127.	136693	136893	200	3	Realignment
128.	136893	136923	30	1	Realignment with Retaining wall
129.	136923	137023	100	3	Realignment
130.	137023	137043	20	1	Realignment with Retaining wall
131.	137043	137676	633	3	Realignment
132.	137676	138389	713	4	Built up

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

The alternative cross section of the Project Highway at the cross-drainage structures shall follow the typical cross section in consultation with the Authority Engineer at the time of construction.

2.11 Longitudinal Section

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

2.12 Built-Up Areas

The alignment passes through Built up areas as tabulated below.

Sl.No	Location/Design Chainage	Name of Village / Town etc
1.	138+350	Koloriang

3 INTERSECTIONS AND GRADE SEPARATORS

3.1 Introduction

All intersections shall be as per Section3 of the Manual. Existing intersections which are deficient shall be improved to the prescribed standards.

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

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

1) Typical junction treatments as specified in Final Project Report shall be applied. Design types of intersections are as given belo*w:*

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

3.2 At-grade Intersections

(a) Major Intersections

SI.No	Location of Intersection	Intersection Towards	Existing Configurations				Type of Intersection
			Location	Type	Width (m)	Surface	
1.	138+389	Three sides	**Koloriang**	**SH-17**	**3.5/4**	**BT**	4-Legged

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

(b) Minor Intersections

SI.No	Location of Intersection	Type of Intersection	Side
1.	126+393	3-Legged	Right side
2.	126+933	3-Legged	Left side
3.	128+453	3-Legged	Right side
4.	132+763	3-Legged	Left side
5.	134+633	3-Legged	Right side
6.	135+063	3-Legged	Right side
7.	137+983	3-Legged	Right side
8.	138+113	3-Legged	Right side
9.	138+203	3-Legged	Right side
10.	138+313	3-Legged	Right side

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

3.3 Grade Separated Intersections with/*w*ithout Ramps

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

4 ROAD EMBANKMENT AND CUT SECTION

4.1 Widening and improvement of the existing road embankment/cuttings and construction of new road embankment/ cuttings shall conform to the Specifications and Standards given in section 4 of the Manual and the specified cross sectional details. Deficiencies in the plan and profile of the existing road shall be corrected.

4.2 Raising of the existing road (Refer to paragraph 4.2.2 of the Manual and specify sections to be raised).

The existing road shall be raised in the following sections:

SI.No	Section (Km)		Length (Km)	Extent of Raising*	Remarks
	From	To			
Nil					

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

5 PAVEMENT DESIGN

5.1 General

Pavement design shall be carried out in accordance with section 5 of the Manual. The detailed pavement design including overlay and pavement characteristics requirements of the Project Highway shall be done in accordance with Schedule D. Flexible pavement shall be considered for the project road. Flexible Pavement design shall be carried out in accordance with 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 IRC: 37-2012. Clause 2.2 of IRC:37-2012 identifies five type of flexible pavements. The estimated cost of civil works is based on flexible pavements consisting of Granular base, Sub base, DBM and Be. Since, the successful bidders under EPC mode can use any type of five flexible pavements mentioned Clause 2.2 of IRC: *3*7-2012, they may carry out their own diligence to arrive at project cost before submitting bids.

5.3 Design requirements

(Refer to paragraph 5.4, 5.9 and 5.10 of the Manual and specify design requirements and strategy)

5.3.1 Design Period and strategy

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

5.4 Design Traffic

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

PACKAGE	Design Chainage (Km)		Length (Km)	15 Year MSA*
	From	To		
III	122+353	138+389	16.036	20

5.5 Design Parameters

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

Indicative Design Parameters

I.	Performance Period	15 years + Construction Period of 24 months
II.	Traffic on Design Lane	Minimum 20msa as per IRC-SP-73. Design should take care of the maximum wheel load derived from the axle load survey on the design lane
III.	Reliability	90%
IV.	Effective Roadblock Soil Resilient Modulus	corresponding to 4-day soaked CBR value of 8.0% Modulus to 10.0%
V.	Layer Coefficients	As per the IRC 37: 2012 procedures
VI.	Drainage quality of Pavement	Good

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

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

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

5.5.4 Contractor shall design the pavement for design traffic of 20 million standard axles (msa) corresponding subgrade CBR

5.5.5: Rigid Pavement

No rigid pavement has been considered for the Project Highway.

5.6 Reconstruction / Realignment / Bypass of sections

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

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

pavement.

SI.No	Section (Km)		Remarks
	From	To	
1.	122+353	138+389	Poor condition of exiting pavement

6 ROADSIDE DRAINAGE

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

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

6.1 Drainage Measures

Following measures shall be adopted:

i. Open side Trapezoidal drains at the hill side for widening at hill sides.

ii. Open side Trapezoidal drains at both sides in realignment stretches by hill cut.

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

These are guidelines for minimum provisions. However, contractor has to design as per requirement of road in accordance with manual.

Details of Lined Drains

SI.No	Design Chainage (m)			Side	Remarks
	From	To	Length (m)		
1.	122353	122503	150	One	Widening

2.	122503	122513	20	Both	Realignment
3.	122513	122553	40	One	Realignment
4.	122553	122653	100	One	Realignment
5.	122653	122703	100	Both	Realignment
6.	122703	122743	40	One	Widening
7.	122743	122753	10	One	Widening
8.	122753	122763	10	One	Realignment
9.	122763	122853	180	Both	Realignment
10.	122853	122883	30	One	Widening
11.	122883	122903	20	One	Widening
12.	122903	123053	300	Both	Realignment
13.	123053	123063	20	Both	Realignment
14.	123063	123263	400	Both	Realignment
15.	123263	123293	30	One	Realignment
16.	123293	123343	100	Both	Realignment
17.	123343	123353	10	One	Realignment
18.	123353	123393	40	One	Realignment
19.	123393	123513	240	Both	Realignment
20.	123513	123563	50	One	Realignment
21.	123563	123853	580	Both	Realignment

22.	123853	123973	120	One	Realignment
23.	123973	124803	1660	Both	Realignment
24.	124803	124863	120	Both	Realignment
25.	124863	124903	80	Both	Realignment
26.	124903	124993	90	One	Widening
27.	124993	125013	20	One	Widening
28.	125013	125143	130	One	Widening
29.	125143	125153	10	One	Widening
30.	125153	125313	160	One	Realignment
31.	125313	125363	100	Both	Realignment
32.	125363	125443	80	One	Realignment
33.	125443	125453	20	Both	Realignment
34.	125453	125513	60	One	Widening
35.	125513	125553	40	One	Widening
36.	125553	125593	40	One	Realignment
37.	125593	125853	520	Both	Realignment
38.	125853	126003	150	One	Widening
39.	126003	126703	1400	Both	Realignment
40.	126703	126753	50	One	Widening
41.	126753	126853	200	Both	Realignment

42.	126853	126903	50	One	Realignment
43.	126903	127563	1320	Both	Realignment
44.	127563	127573	10	One	Realignment
45.	127573	127753	360	Both	Realignment
46.	127753	128003	250	One	Widening
47.	128003	128053	100	Both	Realignment
48.	128053	128123	140	Both	Realignment
49.	128123	128223	100	One	Realignment
50.	128223	128453	460	Both	Realignment
51.	128453	128673	220	One	Widening
52.	128673	128783	110	One	Widening
53.	128783	128853	70	One	Widening
54.	128853	128903	100	Both	Realignment
55.	128903	129013	220	Both	Realignment
56.	129013	129073	120	Both	Realignment
57.	129073	129193	240	Both	Realignment
58.	129193	129253	120	Both	Realignment
59.	129253	129353	100	One	Widening
60.	129353	129373	40	Both	Realignment
61.	129373	129473	100	One	Realignment

62.	129473	129573	200	Both	Realignment
63	129573	129603	30	One	Realignment
64	129603	129680	154	Both	Realignment
65	129680	129693	13	One	Realignment
66	129713	129785	72	One	Realignment
67	129785	129903	236	Both	Realignment
68	129903	129963	60	One	Realignment
69	129963	130023	120	Both	Realignment
70	130023	130063	80	Both	Realignment
71	130063	130553	980	Both	Realignment
72	130553	130603	50	One	Widening
73	130603	130803	400	Both	Realignment
74	130803	130813	10	One	Realignment
75	130813	131253	880	Both	Realignment
76	131253	131283	30	One	Widening
77	131283	131353	70	One	Widening
78	131353	131443	180	Both	Realignment
79	131443	131523	160	Both	Realignment
80	131523	131583	120	Both	Realignment
81	131583	131603	40	Both	Realignment

82	131603	131723	240	Both	Realignment
83	131723	131763	40	One	Realignment
84	131763	132753	1980	Both	Realignment
85	132753	132793	40	One	Realignment
86	132793	132903	220	Both	Realignment
87	132903	132923	20	One	Realignment
88	132923	133183	520	Both	Realignment
89	133183	133213	30	One	Realignment
90	133213	133293	160	Both	Realignment
91	133293	133353	60	One	Realignment
92	133353	133453	200	Both	Realignment
93	133453	133533	80	One	Realignment
94	133533	133560	54	Both	Realignment
95	133560	133603	43	One	Realignment
96	133623	133645	22	One	Realignment
97	133645	133663	36	Both	Realignment
98	133663	133703	40	One	Realignment
99	133703	133783	160	Both	Realignment
100	133783	133803	40	Both	Realignment
101	133803	134025	444	Both	Realignment

102	134025	134060	35	one	Realignment
103	134060	134073	26	Both	Realignment
104	134073	134123	100	Both	Realignment
105	134123	134153	60	Both	Realignment
106	134153	134163	10	One	Realignment
107	134163	134343	360	Both	Realignment
108	134343	134363	20	One	Realignment
109	134363	134433	140	Both	Realignment
110	134433	134453	20	One	Realignment
111	134453	134653	400	Both	Realignment
112	134653	134733	80	One	Widening
113	134733	134753	20	One	Widening
114	134753	134763	10	One	Realignment
115	134763	134785	44	Both	Realignment
116	134785	134805	20	One	Realignment
117	134805	134823	36	Both	Realignment
118	134823	134843	20	One	Realignment
119	134843	134880	74	Both	Realignment
120	134880	134900	20	One	Realignment
121	134900	135103	406	Both	Realignment

122	135103	135203	100	One	Widening
123	135203	135545	684	Both	Realignment
124	135545	135570	25	One	Widening
125	135570	135653	166	Both	Realignment
126	135653	135740	87	One	Widening
127	135753	135810	57	One	Widening
128	135810	135973	326	Both	Realignment
129	135973	135993	20	One	Realignment
130	135993	136153	320	Both	Realignment
131	136153	136163	10	One	Realignment
132	136163	136453	580	Both	Realignment
133	136453	136463	10	One	Realignment
134.	136463	136573	220	Both	Realignment
135	136573	136613	40	One	Realignment
136	136613	136653	80	Both	Realignment
137	136653	136693	40	One	Realignment
138	136693	136893	400	Both	Realignment
139	136893	136923	30	One	Realignment
140	136923	137000	154	Both	Realignment
141	137000	137020	20	One	Realignment

142	137020	137023	6	Both	Realignment
143	137023	137030	7	One	Realignment
144	137043	137050	7	One	Realignment
145	137050	137060	20	Both	Realignment
146	137060	137250	190	One	Realignment
147	137250	137330	160	Both	Realignment
148	137330	137370	40	One	Realignment
149	137370	137676	612	Both	Realignment
150	137676	138389	1426	Both	Built up
Total=			27802Mtrs		

Note: (The above locations shall be reviewed in consultation with the Authority Engineer at the time of construction as per the site condition).

Trapezoidal section for the drain/ditch has been proposed as it is more economical and efficient as compared to rectangular cross section V-Shaped. These road side drains have been designed of adequate capacity to carry 100% surface runoff of the drainage area of highway ROW and the adjoining land. The side slopes have been kept as 1H:1V in case of unlined drain/ditches. However, successful bidder may adopt any type of PCC drain as per RC and accordingly they may carry out their own diligence to arrive at project cost before submitting the bid. Also the catch water drain for the project stretch is 1634 Rm.

7 DESIGN OF STRUCTURES

7.1 General

The Project road includes provision of no major bridges (span>=60m), **6 nos minor bridge** (span<60m) and **98 RCC box/Slab culverts**. All culverts and other structures shall be

designed and constructed in accordance with section 7 of the Manual and shall conform to the cross-sectional features and other details specified therein. New bridges and culverts shall be constructed wide enough to accommodate the adjacent road cross section as given in this Schedule-B. The details of existing culverts are given in **Schedule-A.**

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

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

The following guidelines shall be followed:

I) All the cross-drainage structures for the new carriageway shall be designed in such a way so that the outer most face of railing/parapet shall be in line with the out most edge of shoulder.

ii) The existing culverts shall be extended to match the new road cross sections.

iii) The adequacy of the vent size for all culverts/bridges shall be ascertained through detailed hydrological surveys and finalized in consultation with the IC/Project Company. The highest flood level/maximum supply level shall be properly assessed after collecting flood histories form local authorities/interviews with locals/irrigation authorities.

iv) For drainage purpose the new/tobe reconstructed box culverts of minimum span 2.0m shall be provided.

v) Suitable river training works, bank protection and embankment protection works ensuring safety of bridge structure and its approaches against damage by flood water / rain water shall be provided.

The cross-drainage plan of the highway shall be finalized in consultation with IC/Project Company and if required additional culverts shall be provided.

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

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

The existing culverts at the following locations shall be re-constructed as new culverts:

[Refer to paragraph 7.3 (i) of the Manual and provide details).

SI.No	Existing Chainage (Km)	Design Chainage (Km)	Proposal	Proposed span (m)
1.	138+760	123+053	RCC Slab/Box	2.0
2.	138+800	123+083	RCC Slab/Box	2.0
3.	141+135	125+233	RCC Slab/Box	2.0
4.	143+455	127+353	RCC Slab/Box	2.0
5.	151+410	134+073	RCC Slab/Box	3.0
6.	151+580	134+278	RCC Slab/Box	3.0

* Specify modifications, if any, required in the road level etc.

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

SI.No	**Existing Chainage (Km)**	**Design Chainage (Km)**	**Proposal**	**Span (m)**
1.	138+900	123+163	RCC Slab/Box	2.0
2.	139+125	123+333	RCC Slab/Box	2.0
3.	139+310	123+523	RCC Slab/Box	2.0
4.	139+490	123+673	RCC Slab/Box	2.0
5.	141+300	125+393	RCC Slab/Box	3.0
6.	142+795	126+758	RCC Slab/Box	2.0
7.	143+020	126+993	RCC Slab/Box	2.0
8.	143+120	127+093	RCC Slab/Box	2.0
9.	143+820	127+583	RCC Slab/Box	2.0
10.	144+010	127+763	RCC Slab/Box	2.0
11.	144+150	127+903	RCC Slab/Box	2.0
12.	144+315	128+063	RCC Slab/Box	2.0
13.	147+590	131+003	RCC Slab/Box	2.0
14.	147+820	131+333	RCC Slab/Box	2.0
15.	148+155	131+763	RCC Slab/Box	3.5
16.	148+730	132+053	RCC Slab/Box	2.0
17.	149+175	132+143	RCC Slab/Box	4.0
18.	149+240	132+153	RCC Slab/Box	6.0
19.	149+290	132+203	RCC Slab/Box	2.5

20.	149+405	132+293	RCC Slab/Box	3.0
21.	149+500	132+338	RCC Slab/Box	3.0
22.	149+575	132+413	RCC Slab/Box	2.0
23.	149+960	132+783	RCC Slab/Box	3.0
24.	150+180	132+983	RCC Slab/Box	3.0
25.	150+585	133+323	RCC Slab/Box	2.5
26.	152+890	135+413	RCC Slab/Box	3.0
27.	153+310	135+863	RCC Slab/Box	4.0
28.	153+450	135+993	RCC Slab/Box	4.0
29.	154+085	136+393	RCC Slab/Box	4.0
30.	154+205	136+463	RCC Slab/Box	4.0
31.	154+400	136+613	RCC Slab/Box	2.5
32.	154+575	136+773	RCC Slab/Box	2.5
33.	154+760	136+943	RCC Slab/Box	4.0
34.	156+400	138+263	RCC Slab/Box	2.0

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

(Refer to paragraph 7.23 of the Manual and provide details)

SI.No	Existing Chainage (Km)	Design Chainage (Km)	Proposal	Proposed Span
1.	140+970	125+073	RCC Slab/Box	3.0
2.	155+850	137+638	RCC Slab/Box	2.1
3.	156+180	137+883	RCC Slab/Box	5.9

And newly constructed culverts

Sl. No.	Design Chainage (km)	Type of Culvert	Span/Dia (m)	Width (m)	Remarks
1	122+900	BOX Culvert	3.00	12.00	Protection work is remaining
2	123+323	BOX Culvert	2.0	12.00	Protection work is remaining
3	123+934	BOX Culvert	2.0	12.00	Protection work is remaining
4	124+057	BOX Culvert	3.0	12.00	Protection work is remaining
5	125+039	BOX Culvert	2.0	12.00	Protection work is remaining
6	125+732	BOX Culvert	2.0	12.00	Protection work is remaining
7	125+786	BOX Culvert	2.0	12.00	Protection work is remaining

8	125+884	BOX Culvert	2.0	12.00	Protection work is remaining
9	126+017	BOX Culvert	2.0	12.00	Protection work is remaining
10	126+180	BOX Culvert	2.0	12.00	Protection work is remaining
11	126+330	BOX Culvert	2.0	12.00	Protection work is remaining
12	126+383	BOX Culvert	3.0	12.00	Protection work is remaining
13	126+477	BOX Culvert	2.0	12.00	Protection work is remaining
14	126+667	BOX Culvert	4.0	12.00	Protection work is remaining
15	128+631	BOX Culvert	3.0	12.00	Protection work is remaining
16	128+780	BOX Culvert	3.0	12.00	Protection work is remaining
17	129+200	BOX Culvert	2.0	12.00	Protection work is remaining
18	129+563	BOX Culvert	2.0	12.00	Protection work is remaining
19	129+830	BOX Culvert	2.0	12.00	Protection work is remaining
20	129+900	BOX Culvert	3.0	12.00	Protection work is remaining
21	130+150	BOX Culvert	3.0	12.00	Protection work is remaining
22	130+457	BOX Culvert	6.0	12.00	Protection work is remaining
23	**130+600**	BOX Culvert	2.0	12.00	Protection work is remaining
24	130+865	BOX Culvert	3.0	12.00	Protection work is remaining
25	132+642	BOX Culvert	3.0	12.00	Protection work is remaining
26	133+180	BOX Culvert		12.00	Protection work is remaining
27	133+237	BOX Culvert	2.0	12.00	Protection work is remaining
28	133+304	BOX Culvert		12.00	Protection work is remaining
29	133+381	BOX Culvert	2.0	12.00	Protection work is remaining
30	133+430	BOX Culvert		12.00	Protection work is remaining
31	133+469	BOX Culvert	2.0	12.00	Protection work is remaining
32	133+558	BOX Culvert	2.0	12.00	Protection work is remaining
33	133+592	BOX Culvert	2.0	12.00	Protection work is remaining
34	134+016	BOX Culvert		12.00	Protection work is remaining
35	134+197	BOX Culvert	2.0	12.00	Protection work is remaining
36	134+390	BOX Culvert		12.00	Protection work is remaining
37	134+494	BOX Culvert	2.0	12.00	Protection work is remaining
38	134+560	BOX Culvert	2.0	12.00	Protection work is remaining
39	134+618	BOX Culvert	4.0	12.00	Protection work is remaining
40	134+735	BOX Culvert		12.00	Protection work is remaining
41	134+794	BOX Culvert		12.00	Protection work is remaining
42	134+838	BOX Culvert	2.0	12.00	Protection work is remaining
43	134+940	BOX Culvert		12.00	Protection work is remaining
44	134+977	BOX Culvert		12.00	Protection work is remaining
45	135+537	BOX Culvert	2.0	12.00	Protection work is remaining
46	135+804	BOX Culvert	2.0	12.00	Protection work is remaining
47	136+137	BOX Culvert		12.00	Protection work is remaining
48	136+242	BOX Culvert	2.0	12.00	Protection work is remaining

49	136+364	BOX Culvert	3.0	12.00	Protection work is remaining
50	136+526	BOX Culvert	3.0	12.00	Protection work is remaining
51	137+058	BOX Culvert		12.00	Protection work is remaining
52	137+207	BOX Culvert	2.0	12.00	Protection work is remaining
53	137+407	BOX Culvert		12.00	Protection work is remaining
54	137+789	BOX Culvert		12.00	Protection work is remaining
55	137+900	BOX Culvert	2.0	12.00	Protection work is remaining

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

7.3 Bridges

7.3.1 The existing bridges to be reconstructed/widened

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

SI.No.	**Existing Chainage**	**Design Chainage**	**Proposed Span (m)**	**Proposed Width (m)**	**Remarks**
1.	140+450	124+583	1 x 34	16.0	Reconstruction
2.	143+400	127+050	1 x 10	16.0	Protection works, railing and Approach slab work are balance
3.	144+640	128+423	1 x 52	16.0	Reconstruction
4.	147+100	130+383	1 x 7	16.0	Reconstruction
5.	152+640	135+253	1 x 25	16.0	Only A1 foundation is constructed

SI.No	Bridge Location (km)	Salient Details of Existing Bridge					Adequacy or Otherwise of the Existing Waterway, Vertical Clearance etc.	Remarks
		Span Arrangement (m)	Carriageway Width (m)	Total Width (m)	Type of Superstructure	Type of Foundation		
1.	140+450	1 x 34.0	3.5	5.5	DS type Bailey Bridge	Open	Vertical Clearance~8.5 m	Narrow Bridge
2.	143+400	1 x 10.0	5.5	6	RCC Slab	Open	Vertical Clearance~4.0 m	Narrow Bridge
3.	144+640	1 x 52.0	3.5	5.5	TS type Bailey	Open	Vertical Clearance~17.	Narrow Bridge

					Bridge		0m	
4.	147+100	1 x 6.5	5.3	5.8	RCC Slab	Open	Vertical Clearance~6.0 m	Narrow Bridge
5.	152+640	1 x 25.0	3.5	5.5	DS type Bailey Bridge	Open	Vertical Clearance~8.5 m	Narrow Bridge

7.3.2 The following structures shall be provided with footpaths:

SI.No	Design Ch. (Km)	Remarks
1.	124+583	Footpath on both sides
2.	127+283	Footpath on both sides
3.	128+423	Footpath on both sides
4.	130+383	Footpath on both sides
5.	135+183	Footpath on both sides
6.	137+568	Footpath on both sides

7.3.3 Additional New Minor Bridges

New minor bridges at the following locations on the project highways shall be constructed

SI.No	Bridge at KM	Span Arrangement (m)	Carriageway Width (m)	Total Width (m)	Type of Superstructure	Type of Foundation
1.	137+568	1 x 30.0m	11.0m	16.0m	PSC Girder	Open

7.3.4 Additional new bridges

(Specify additional new bridges if required, and attach GAD]

One new bridges at the following locations on the Project Highway shall be constructed.

SI.No	Location (Km)	Total Length (m)	Remarks
Nil			

7.3.5 The railings of existing bridges shall be replaced by crash barriers at the following locations:
[Refer to paragraph 7.18 (iv) of the Manual and provide details]

SI.No	Location (Km)	Remarks
Nil		

7.3.6 Repairs/replacements of railings/parapets of the existing bridges shall be undertaken as follows:
[Refer to paragraph 7.18 (V) of the Manual and provide details)

SI.No	Location (Km)	Remarks
Nil		

7.3.7 Drainage system for bridge decks

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

7.3.8 Structures in marine environment

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

7.4 Rail-road Bridges

7.4.1 Design, construction and detailing of ROB/RUB shall be as specified in section 7of the Manual. (Refer to paragraph 7.19 of the Manual and specify modification, if any)

7.4.2 Road over-bridges

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

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

7.4.3 Road under-bridges

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

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

7.5 Grade Separated Structures

(Refer to paragraph 7.20 of the Manual]

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

7.6 Underpasses/Overpasses

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

7.7 Repairs and strengthening of bridges and structures

(Refer to paragraph 7.23 of the Manual and provide details] The existing bridges and structures to be repaired/strengthened, and the nature and extent of repairs/strengthening required are given below:

A. Bridges

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

B. ROB / RUB

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

C. Overpasses / Underpasses and Other Structures

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

7.8 List of Major Bridges and Structures

The following is the list of Major Bridges

SI.No	Location (Km)
Nil	

8 TRAFFIC CONTROL DEVICES AND ROAD SAFETY WORKS

8.1 General

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

Specifications of the reflective sheeting (Refer to paragraph 9.3 of the Manual and specify)

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

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

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

8.2 Road/Traffic Signs

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

ii) Temporary traffic and construction signs are to be provided during construction and maintenance operations for traffic diversion and pedestrian safety.

8.3 Pavement Marking

I. Retro-reflective thermoplastic paint is proposed for use. The road markings shall be applied to lane lines, road center lines, edge lines, continuity line, stop lines, give way lines, diagonal/chevron markings, *Z*ebra crossings and at parking areas.

II. Delineators bollards and other safety devices shall be provided on entire project Highway and other locations as directed by NHIDCL.

III. All signs shall be the reflectorized type with high intensity retro-reflective sheeting conforming to ASTM D 4956-01, type Villand/or type IX of micro prismatic type. All sign boards of size

more than 1.2 m and less than 0.9 m shall be provided at the locations finalized in consultation with NHIDCL.

IV. Cautionary sign boards (900mm Equilateral Triangle), stop sign (900mm Octagonal) mandatory sign boards (600mm dia), Village name boards (600X900mm), Hazard Plate (300X900mm), chevron signboard (600x750mm), Facility information sign (600x800mm), Advance direction sign (1800X1200mm), Place identification sign (1200x900mm) shall be provided by the Construction Contractor with suitable interval in consultation with NHIDCL.

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

Traffic Signages, Road Marking and other appurtenances	**Unit**	**Quantity**
Centre line on straight portion	Sqm	1270
Centre Line on curve portion	Sqm	481
Edge line at paved Shoulder	Sqm	6415
Add 15% for Misc. including pedestrian X-ingsetc	Sqm	1225
Directional Arrows, letter marking etc.	Nos.	146
Advance Direction signs sixe 1800 x 1200 mm	Nos.	17
Village name boards size 600 x 900 mm	Nos.	152
Place identification signs size 1200 x 900	Nos.	11
90 cm Triangle	Nos.	23
90 cm Octagon	Nos.	21
Hazard plate 300 x 900 mm	Nos.	113
800 x 600 mm Size	Nos.	45
60 cm Circular	Nos.	75
Boundary Stone (Clause 13 herein under)	Nos.	163
5^{th} Km Stone – new	Nos.	3
Ordinary Km stone	Nos.	15
Hectometer Stone	Nos.	62
Delineator	Nos.	1214
Rip Rap	Rm	3640
Convex Mirror	Nos.	60
W Type metal Crash barrier	Rm	4311

9 ROADSIDE FURNITURE

9.1.1 Roadside furniture shall be provided in accordance with the provisions of Section 11 of theManual IRC: SP:73-2007.

9.1.2 Overhead traffic signs: location and size

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

The overhead signs shall be the reflectorized type with high intensity retro-reflective sheeting conforming to ASTM D 4956-01, type VIII and /or type IX of micro prismatic type. The retro reflected sheets of Engineering Grade and high intensity grade (ordinary) shall not be used. The height, lateral clearance, location and instillation shall be as per relevant clauses of MORTH specifications. Overhead sign shall be installed ahead of major intersections and urban areas as per detailed design requirements. The minimum number of overhead signs shall be (02 No. of gantry) as per this manual.

SI.No	Location (Km)	Size	Remarks
1	122+353	12.0m x 2.1m	Overhead Gantry
2.	138+389	12.0m x 2.1m	Overhead Gantry

10 COMPULSORY AFFORESTATION

[Refer to paragraph 12.1 of the Manual and specify the number of trees which are required to be planted by the Contractor as compensatory afforestation.) Minimum 1160nos, trees are required to be planted.

11 HAZARDOUS LOCATIONS

Metal Beam crash barrier length of minimum 10050m (single runner, heavy duty and W shape) shall be provided at the focations of bridge approaches and high embankments (3.0m and more), at sharp curves on both sides. Heavy duty metal beam crash barriers shall be provided on this project by the Construction Contractor at the locations finalized in consultation with NHIDCL. Typical details of metal crash barrier are given in as per manual.

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

SI.No	Location		Length (m)	Remarks
	From	To		
1.	122373.195	122387.986	14.79	Radius<300m
2.	122479.065	122516.706	37.64	Radius<300m
3.	122607.693	122632.68	24.99	Radius<300m
4.	122804.636	122834.587	29.95	Radius<300m
5.	122949.789	122962.15	12.36	Radius<300m
6.	123061.464	123101.462	40.00	Radius<300m
7.	123182.641	123247.983	65.34	Radius<300m
8.	123310.407	123345.053	34.65	Radius<300m
9.	123562.046	123572.875	10.83	Radius<300m

10.	123680.934	123723.009	42.07	Radius<300m
11.	123837.383	123886.162	48.78	Radius<300m
12.	124012.123	124038.426	26.30	Radius<300m
13.	124170.276	124220.796	50.52	Radius<300m
14.	124306.995	124320.054	13.06	Radius<300m
15.	124528.767	124574.612	45.85	Radius<300m
16.	124680.663	124708.873	28.21	Radius<300m
17.	124862.579	124902.913	40.33	Radius<300m
18.	124990.245	125039.938	49.69	Radius<300m
19.	125355.912	125377.734	21.82	Radius<300m
20.	125458.713	125471.252	12.54	Radius<300m
21.	125582.713	125593.254	10.54	Radius<300m
22.	125693.959	125741.702	47.74	Radius<300m
23.	125826.531	125867.553	41.02	Radius<300m
24.	126126.635	126153.936	27.30	Radius<300m
25.	126214.954	126241.646	26.69	Radius<300m
26.	126509.723	126570.551	60.83	Radius<300m
27.	126663.279	126693.412	30.13	Radius<300m
28.	126857.672	126925.828	68.16	Radius<300m
29.	127025.427	127101.212	75.79	Radius<300m
30.	127151.988	127282.075	130.09	Radius<300m
31.	127336.788	127418.603	81.82	Radius<300m
32.	127448.417	127519.579	71.16	Radius<300m
33.	127678.739	127699.325	20.59	Radius<300m
34.	127791.312	127880.97	89.66	Radius<300m
35.	128550.338	128771.557	221.22	Radius<300m
36.	128892.968	128933.466	40.50	Radius<300m
37.	129065.038	129097.648	32.61	Radius<300m
38.	129409.859	129488.794	78.93	Radius<300m
39.	129588.44	129610.738	22.30	Radius<300m
40.	129702.606	129742.309	39.70	Radius<300m
41.	129820.866	129958.235	137.37	Radius<300m
42.	130009.347	130068.392	59.04	Radius<300m
43.	130152.6	130186.728	34.13	Radius<300m
44.	130252.444	130259.74	07.30	Radius<300m
45.	131243.748	131292.379	48.63	Radius<300m
46.	131523.621	131540.801	17.18	Radius<300m
47.	131714.716	131818.259	103.54	Radius<300m
48.	132002.573	132142.314	139.74	Radius<300m
49.	132194.346	132283.554	89.21	Radius<300m
50.	132361.761	132418.674	56.91	Radius<300m
51.	132494.872	132503.194	08.32	Radius<300m
52.	132580.461	132609.853	29.39	Radius<300m
53.	132686.591	132702.562	15.97	Radius<300m
54.	132760.344	132771.295	10.95	Radius<300m

55.	132943.392	132949.579	06.19	Radius<300m
56.	133097.248	133107.003	09.76	Radius<300m
57.	133221.995	133243.351	21.36	Radius<300m
58.	133418.496	133424.198	05.70	Radius<300m
59.	133542.667	133587.098	44.43	Radius<300m
60.	133663.931	133766.5	102.57	Radius<300m
61.	133854.317	133909.886	55.57	Radius<300m
62.	133996.043	134033.717	37.67	Radius<300m
63.	134187.017	134215.094	28.08	Radius<300m
64.	134385.296	134434.529	49.23	Radius<300m
65.	134751.511	134776.681	25.17	Radius<300m
66.	134852.143	134909.825	57.68	Radius<300m
67.	134979.984	134987.003	07.02	Radius<300m
68.	135038.255	135065.991	27.74	Radius<300m
69.	135119.145	135181.65	62.51	Radius<300m
70.	135253.268	135269.455	16.19	Radius<300m
71.	135322.582	135332.342	09.76	Radius<300m
72.	135379.608	135402.796	23.19	Radius<300m
73.	135460.013	135579.876	119.86	Radius<300m
74.	135581.063	135615.101	34.04	Radius<300m
75.	135695.705	135710.772	15.07	Radius<300m
76.	135886.453	135914.714	28.26	Radius<300m
77.	136009.326	136082.117	72.79	Radius<300m
78.	136185.955	136262.706	76.75	Radius<300m
79.	136317.457	136345.18	27.72	Radius<300m
80.	136460.225	136530.658	70.43	Radius<300m
81.	136638.211	136714.607	76.40	Radius<300m
82.	136770.194	136803.703	33.51	Radius<300m
83.	136886.85	136960.245	73.39	Radius<300m
84.	137043.221	137058.349	15.13	Radius<300m
85.	137135.914	137240.98	105.07	Radius<300m
86.	137317.953	137384.938	66.98	Radius<300m
87.	137440.909	137521.66	80.75	Radius<300m
88.	137554.935	137631.699	76.76	Radius<300m
89.	137701.403	137732.192	30.79	Radius<300m
90.	137788.886	137812.322	23.44	Radius<300m
91.	137975.316	138001.131	25.82	Radius<300m
92.	138127.027	138135.684	08.66	Radius<300m
93.	138207.831	138237.543	29.71	Radius<300m
94.	138278.682	138284.151	05.47	Radius<300m

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

12. SPECIAL REQUIREMENT FOR HILL ROADS

In accordance with section 13 of the manual (from IRC: SP:73-2015), IRC: SP-1998 and Recommended practices for Treatment of Embankment and Roadside slopes for Erosion control (First Revision), IRC:56-2011 and relevant IRC codes,

12.1 Slope Protection As the project involves cutting of existing hill slopes, it is imperative that

slopes are stabilized for ensuring longevity of the slope and the road, Slope stability, erosion control and landslide correction shall be accomplished in accordance with IRC : SP: 48-1998. Reference may be drawn from IRC:56-2011.

(i) The minimum quantity of protection work may be taken as below:

Type of Protection Work		
Protection Work	**Unit**	**Quantity**
1. Parapet Wall	Rm	5640
2. Breast wall with PCC	Rm	9050
3. Breast wall sausage type by gabion Specialized treatment for slide protection as specified above	Rm	2000
4. Retaining Wall with PCC	Rm	1750
5. Catch water drain	Rm	7000
6. Vetiver Plantation, Hydro Seeding and Hydro Mulching etc. including nets if required or similar works are to be done for slope protection and site mitigation measure upto a height of 12-15 m all along the road on barren slopes except hard rock location which needs to be protected with appropriate applicable technologies, if required.		

(ii) Location of existing Slide prone zones

SI.No	Design Chainage		Length(m)	Remarks
	From (m)	To (m)		
1.	127+453	128+153	700	
2.	131+553	132+053	500	
3.	134+853	135+153	300	
4.	135+203	135+703	500	

Note- *The Contractor shall be responsible for accurate assessment of the actual requirement as per site situation & prepare designs for slope protection &stabilization as per the specifications &standards stipulated in schedule 'D' and submit the same to the AE for review through the proof consultant and implement it accordingly thereafter.*

Any increase in quantity over and above the tentative qty. ***as mentioned in above table or through change in specifications will not be considered as change of scope.*** *Therefore contractor shall make thorough investigation at site and assess the requirement of slope protection and slide prone zone and other safety features at his own before submission of bid.*

12.2 Rip rap Protection:

The minimum quantity of riprap protection or similar work to be provided at valley side shoulder in the following locations as special safety feature on valley side on curves.

SI.No	Chainage		Length
	From (km)	To (km)	
1.	122353	122503	150
2.	122513	122553	40
3.	122553	122653	100
4.	122703	122743	40
5.	122743	122753	10
6.	122753	122763	10
7.	122853	122883	30
8.	122883	122903	20
9.	123263	123293	30
10.	123343	123353	10
11.	123353	123393	40
12.	123513	123563	50
13.	123853	123973	120
14.	124903	124993	90
15.	124993	125013	20
16.	125013	125143	130
17.	125143	125153	10
18.	125153	125313	160
19.	125363	125443	80
20.	125453	125513	60
21.	125513	125553	40
22.	125553	125593	40
23.	125853	126003	150
24.	126703	126753	50
25.	126853	126903	50
26.	127563	127573	10
27.	127753	128003	250
28.	128123	128223	100
29.	128453	128673	220
30.	128673	128783	110
31.	128783	128853	70
32.	129253	129353	100

33.	129373	129473	100
34.	129573	129603	30
35.	129693	129713	20
36.	129903	129963	60
37.	130553	130603	50
38.	130803	130813	10
39.	131253	131283	30
40.	131283	131353	70
41.	131723	131763	40
42.	132753	132793	40
43.	132903	132923	20
44.	133183	133213	30
45.	133293	133353	60
46.	133453	133533	80
47.	133603	133623	20
48.	133663	133703	40
49.	134153	134163	10
50.	134343	134363	20
51.	134433	134453	20
52.	134653	134733	80
53.	134733	134753	20
54.	134753	134763	10
55.	134823	134843	20
56.	135103	135203	100
57.	135653	135753	100
58.	135973	135993	20
59.	136153	136163	10
60.	136453	136463	10
61.	136573	136613	40
62.	136653	136693	40
63.	136893	136923	30
64.	137023	137043	20

12.3 ROAD LAND BOUNDARY (Clause 12.2 IRC SP: 73 : 2015)

Road land (ROW) boundary shall be demarcated by putting RCC boundary pillars of size 60cm x 15cm x 15 cm embedded in concrete (as per IRC:25) along the Project Highway at 200 m interval on both sides. All the components used in delineating road land boundary shall be aesthetically pleasing, sturdy and vandal proof. The road land boundary shall be demarcated in consultation with NHIDCL.

12.4 Disposal of Debris: - As per Manual

13 CHANGE OF SCOPE

The length of Structures, bridges and slope protection works whatsoever in terms of retaining wall, breast wall, gabion wall or under special requirement of hill slope 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 and specifications in this Schedule-B shall not constitute a Change of Scope.

SCHEDULE - C

(See Clause 2.1)

PROJECT FACILITIES

1 Project Facilities

This schedule indicates the minimum spatial and functional requirements of the facilities to be provided on the Project Highway , start from design chainage km 122+353 of NH-713 to design chainage km 138+389 at Koloriang (total length of 16.036 km) with an aim to cater to the envisaged demand till the end of the concession period.

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

(a) Toll plaza[s];

(b) Roadside furniture;

(c) Pedestrian facilities;

(d) Tree plantation;

(e) Truck lay-bye -1 No ;

(f) bus-bays and bus shelters;

(g) Passing Places – 2nos on hilly side ; 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
One truck lay by as per site condition				

(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		**137+773**	Both Sides	Location may change according to approach road to village

(g) Rest areas:

NIL

(h) Others to be specified:

Pedestrian Facilities

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

Landscaping

Landscape treatment of the Project Highway shall be undertaken through planting of trees and ground cover of appropriate varieties and landscaping on surplus land in the ROW. The Construction Contractor should plant at least 980 nos. of trees of minimum 6 ft. height with tree guard made up of MS sections.

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

Environment

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

SCHEDULE -D

(See 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 > 1 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** No action.	**Long Term** Not Applicable
			1	r < 2 %	Local repair of areas damaged and liable to be damaged. Within 15 days	
			2	r = 2 - 10 %		
			3	r = 10-25%	Bonded Inlay, 2 or 3 slabs if affecting.	
			4	r = 25 - 50 %		

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/m² d = diameter h = maximum depth	0	d < 50 mm; h < 25 mm; n < 1 per 5 m²	No action.	Not Applicable
			1	d = 50 - 100 mm; h < 50 mm; n < 1 per 5 m²	Partial depth repair 65 mm deep.	
			2	d = 50 - 100 mm; h > 50 mm; n < 1 per 5 m²	Within 15 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
			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** No action.	**Long Term** 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** No action.	**Long Term**
			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:

Asset Type	Performance Parameter	Level of Service (LOS)			Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Highway	Availability of Safe Sight Distance	As per IRC SP :84-2014, a minimum of safe stopping sight distance shall be available throughout.			Monthly	Manual Measurements with Odometer along with video/ image backup	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.		IRC:SP 84-2014
		Design Speed, kmph	**Desirable Minimum Sight Distance (m)**	**Safe Stopping Sight Distance (m)**					
		100	360	180					
		80	260	130					
						Visual	Re - painting	Cat-1 Defect –	IRC:35-
Pavement Marking	Wear	<70% of marking remaining			Bi-Annually	Assessment as per Annexure-F of IRC:35-2015		within 24 hours Cat-2 Defect within 2 months -	2015

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					
	Night Time Visibility				Bi-Annually				
		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-shelters, cattle crossings, Traffic Aid Posts, Medical Aid Posts and other works		Daily				

Asset Type	Performance Parameter	Level of Service (LoS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	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
Pipe/box/slab culverts	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 2 Lane with Paved Shoulders of Joram-Koloriang road (NH 713) on EPC basis from existing Km 138.00 to Km 158.000 (Design Km 122.353 to Km 138.389)[Design length-16.036 Km] in the State of Arunachal Pradesh under SARDP-NE** , 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/CNRB0019062
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 2 Lane with Paved Shoulders of Joram-Koloriang road (NH 713) on EPC basis from existing Km 138.00 to Km 158.000 (Design Km 122.353 to Km 138.389)[Design length-16.036 Km] in the State of Arunachal Pradesh under SARDP-NE** , 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/CNRB0019062
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 Clauses10.1 (iv) and 19.3)

Contract Price Weightages

1. The Contract Price for this Agreement is Rs……../-

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

Table 2.1

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage to Particular item (col.2)
1	2	3	4
Road works including culverts widening and repair of culverts.	**51.19%**	**A- Widening and strengthening of existing road**	
		(1) Earthwork up to top of the sub-grade including excavation in soil/soft rock/ hard rock and clearing & grubbing	0.00%
		(2) Sub Base Course.	1.10%
		(3) Non-Bitumineous Base Course.	1.40%
		(4) Bituminous Base Course.	2.75%
		(5) Wearing Coat.	1.60%
		(6) Widening, reconstruction and repair of culverts	0.00%
		(7) Hard Shoulder	0.00%
		B.1 - Reconstruction/New 2 - lane realignment/ bypass - (Flexible pavement)	
		(1) Earthwork up to top of the sub-grade including excavation in soil/soft rock/ hard rock and clearing & grubbing	8.66%
		(2) Sub Base Course	3.26%
		(3) Non-Bitumineous Base Course	5.52%
		(4) Bituminous Base course	10.50%
		(5) Wearing Coat	5.60%
		(6) Landslide removal	2.00%
		D- Reconstruction and New culverts on existing road, realignment, bypasses.	0.00%
		(1) Culverts (length <6m)	8.80%

Minor Bridge / Underpasses / Over pass	**9.86%**	**A.1-Widening and repair of Minor Bridge ngth >6m <60m)**	
		(1) Minor bridge	
		A.2-New Minor Bridge (length >6m <60m)	
		(1) **Foundation:** On completion of the foundation of the foundation work including foundation for wing and return walls, abutment, piers up to the abutment/pier cap	2.36%
		(2) **substructure:** On completion of the foundation of the foundation work including foundation for wing and return walls, abutment, piers up to the abutment/pier cap	3.15%
		(3) **Super-structure :** On completion of the super structure in all respects including wearing coat, bearings, road signs & markings, tests in completion etc. complete in all respect.	4.36%
Other works	**38.94%**		
		(i) Toll Plaza	0.00%
		(ii) Road side drains	6.92%
		(iii) Road signs, markings, km stones, boundary stones, safety devices etc.	
		a) Pavement Marking	0.55%
		b) Crash Barrier/ W-metal crash barrier	1.48%
		c) Road / Traffic sign	0.29%
		d) Road boundary stone, km stone, 5th km stone, Hecto meter stone, rumble strips, other items etc.	0.02%
		e) Traffic blinker, LED delineators, studs, reflective pavement markers, tree reflectors	0.05%
		f) Road furniture (over head sign board etc.)	0.06%
		(iv) Project facilities	
		Rip Rap Protection	0.20%
		a) Bus bye / Bus shelter	0.03%
		b) Junctions - (Major)	0.21%
		c) Junctions - (Minor)	0.63%
		d) Others including cable duct & lighting on bridges, etc.	0.21%
		Road Appurtenances	0.06%
		(v) Road side Plantation	2.00%

		(vi) Slope protection works as special requirement for hill road	
		(a) Hydro seeding	0.00%
		(b) Seeding and Mulching with jute net	0.00%
		(c) Catch water drain	2.91%
		(d) Retaining Structure on valley side of PCC/RCC/Gabion/Cement Masonry of Varying height between 1 to 6 meter with parapet walls	5.40%
		(e) Reinforced earth wall	0.00%
		(f) Breast wall	17.57%
		(g) Sub surface drain with perforated pipe & Aggregate drain	0.00%
		(h) Parapet wall	0.35%

3. Procedure of estimating the value of work done

3.1 Road works including approaches to minor bridge, Major bridges and structures (excluding service roads)

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

Table 3.1

Stage For Payment	Weightage Percentage	PAYMENT PERCENTAGE
(1)	(2)	(3)
A. Widening /Strengthening of existing road		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) percentage of total length
(i) Earthwork upto top of the sub-grade including excavation in soil/soft rock/hard rock and clearing & grubbing	0.00%	
(ii) Granular work (sub base Course)		
(a) GSB	1.10%	
Profile correction of executed GSB		
(B) WMM	1.40%	
Profile correction of executed WMM		
(iii) Bituminous work (Dense Bituminous Macadam	2.75%	
(iv) Bituminous work (Bituminous Concrete)	1.60%	
B.1- Reconstruction/New 2-lane realignment/ bypass- (Flexible pavement)		
(i) Earthwork upto top of the sub-grade including excavation in soil/soft rock/hard rock and clearing & grubbing	8.66%	

(ii) Granular work (sub base Course)		
(b) GSB	3.26%	
Profile correction of executed GSB		
(B) WMM	5.52%	
Profile correction of executed WMM		
(iii) Bituminous work (Dense Bituminous Macadam	10.50%	
(iv) Bituminous work (Bituminous Concrete)	5.60%	
(v) Landslide removal	2.00%	
C. New culverts, minor bridges, underpasses, overpasses on existing road realignments, bypasses		
(i) Slab Culverts (length less than 6 m)	8.80%	Cost of one (01) completed culvert shall be determined pro rata with respect to the total number of culverts. Payment shall be made on completion of one culvert.

3.1.1 @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 = Project Price

L = Total length in Km

3.2 Value of estimating of Minor Bridge/Major Bridge is as:

Procedure for estimating the value of Minor/major bridge works shall be as stated in table

Table 3.2

Stage For Payment	**Weightage Percentage**	**PAYMENT PERCENTAGE**
(1)	(2)	(3)
(i) Minor bridges		
Foundation	2.36%	Cost of one (01) completed minor bridge shall be determined pro rata with respect to the total length of minor bridges. Payment shall be made on completion of each stage of minor bridge as per weightage given in the table.
Sub-Structure	3.15%	
Super Structure	4.36%	
(ii) Major bridges		
Foundation	0.00%	Cost of one (01) completed major bridge shall be determined pro rata with respect to the total length of major bridges. Payment shall be made on completion of each stage of major bridge as per weightage given in the table.
Sub-Structure.	0.00%	
Super Structure	0.00%	

3.3 Structures (Elevated sections, reinforced earth)

Procedure for estimating the value of Breast wall/Retaining wall shall be as stated in table

Table 3.3

Stage For Payment	**Weightage Percentage**	**PAYMENT PERCENTAGE**
(1)	(2)	(3)
Breast Wall	17.57%	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) percentage of total length
Retaining Wall	5.40%	
Parapet wall	0.35%	

3.4 other works

Procedure for estimating the value of Breast wall/Retaining wall shall be as stated in table

Table 3.4

Stage For Payment	**Weightage Percentage**	**PAYMENT PERCENTAGE**
(1) (a) Road side Drains & Toe Wall	6.92 %	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) percentage of total length
(2) Road signs, markings, km stones, delineator, boundary wall etc	0.55 %	
(b) Crash Barrier/ W metal crash barrier	1.48 %	
(3) Project facilities		
(a) Bus bays and Bus Shelter	0.03%	
(b) Road boundary stone, km stone, 5th km stone, Hecto meter stone, rumble strips, other items etc.	0.02%	
(c) Traffic blinker, LED delineators, studs, reflective pavement markers, tree reflectors	0.05%	
(d) Road furniture (over head sign board etc.)	0.06%	
(e) Road/Traffic sign	0.29 %	
Rip Rap Protection	0.20%	
a) Junctions - (Major)	0.21%	
b) Junctions - (Minor)	0.63%	
c) Others including cable duct & lighting on bridges, etc.	0.21%	

Road Appurtenances	0.06%	
(v) Road side Plantation	2.00%	
(vi) Slope protection works as special requirement for hill road		
(a) Hydro seeding	0.00%	
(b) Seeding and Mulching with jute net	0.00%	
(c) Catch water drain	2.91%	

4. Procedure for payment for maintenance

4.1 The cost for maintenance shall be stated in Clause 14.1.1.

1.1 4.2 Payment for maintenance shall be made in quarterly installments in accordance with the provisions of Clause 19.7

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
Project Completion Schedule

(See Clause 10.3 (ii))

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 192th 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 239th 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 467th 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 549th [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 2 Lane with Paved Shoulders of Joram-Koloriang road (NH 713) on EPC basis from existing Km 138.00 to Km 158.000 (Design Km 122.353 to Km 138.389)[Design length-16.036 Km] in the State of Arunachal Pradesh under SARDP-NE]** 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 2 Lane with Paved Shoulders of Joram-Koloriang road (NH 713) on EPC basis from existing Km 138.00 to Km 158.000 (Design Km 122.353 to Km 138.389)[Design length-16.036 Km] in the State of Arunachal Pradesh under SARDP-NE,** 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 2 Lane with Paved Shoulders of Joram-Koloriang road (NH 713) on EPC basis from existing Km 138.00 to Km 158.000 (Design Km 122.353 to Km 138.389)[Design length-16.036 Km] in the State of Arunachal Pradesh under SARDP-NE]** 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 ***