NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

(Ministry of Road, Transport & Highways)

Government of India

Schedules

FOR

"Construction of two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 to Km 158.00 [Design Km. 122.353 to Km. 138.389] (Design Length – 16.036 Km)in the state of Arunachal Pradesh under SARDP-NE"

Engineering, Procurement & Construction
(EPC) Mode

BID DOCUMENT

December-2016

National Highways & Infrastructure Development Corporation Ltd
(A Government of India Undertaking)

SCHEDULE – A

(See Clauses 2.1 and 8.1)

SITE OF THE PROJECT

1 The Site

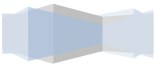
1.1 Site of the Two-Laning of Existing Joram – Koloriang Road on EPC basis from design km 122+353 to km 138+389 (Existing km 138+000 to km 158+000) in the state of Arunachal Pradesh under SARDP-NE, Project Highway shall include the land, buildings, structures and road works as described in **Annex-I**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

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

1.3 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-III**. In the case of sections where no modification in the existing alignment of the Project Highway is contemplated, the alignment plan has not been provided. Alignment plans have only been given for sections where the existing alignment is proposed to be modified.

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



Annex I

(Schedule-A)

1. Site

The Site of the [Two-Lane] Project Highway comprises the section of Joram – Koloriang road commencing from design km 122+353 to km 138+389 (Existing km 138.000 to km 158.000) i.e km 138.000 - Koloriang Section in the State of Arunachal Pradesh. The road is of sub-standard two 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 Lower Subansiri and Kra Daadi districts.

The project corridor i.e. Joram - Koloriang passes through 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	

Sl No.	Existing Chainage (Km)	Design chainage (Km)	Remarks
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	9m to 12m	No ROW available in realignment stretch of total 14036m as given in para 3.3 of Annexure – I of Schedule B

4. Carriageway

The present carriageway of the Project Highway is substandard single lane configuration. The type of the existing pavement is flexible.

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	3.0-3.25	Lane width other than realignment portion

5. Major Bridges

The Site includes no major bridges.

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

"Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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"

6. 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						

7. 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						

8. Minor Bridges

The Site includes the following minor Bridges:

Sl. No.	Existing Chainage (km)	Type of Structures			No. of Spans with Span Length (m)	Total Width (m)
		Foundation	Sub-Structure	Super Structure		
1	140+450	Open	Wall type	PSC I Girder	Single span, L = 34.0m	5.50
2	143+400	Open	Stone masonry wall type	RCC Box Type	Single span, L = 10.0m	6.00
3	144+640	Open	Stone masonry	PSC I Girder	Single span, L = 39.0m	5.50

Sl. No.	Existing Chainage (km)	Type of Structures			No. of Spans with Span Length (m)	Total Width (m)
		Foundation	Sub-Structure	Super Structure		
			wall type			
4	147+100	Open	Stone masonry wall type	RCC Box Type	Single span, L = 6.5m	5.75
5	152+640	Open	Stone masonry wall type	RCC T Girder	Single span, L = 25.0m	5.75

9. Railway level crossings/ Railway Track

The Site includes the following railway level crossings:

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

10. Underpasses (vehicular, non vehicular)

The Site includes the following underpasses:

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

11. Culverts

The Site includes the 98 Nos of culverts at the following locations and types:

Sl no.	Existing Chainage	Type of Culvert	Span/Dia (m)	Width (m)	Remarks
1	138+020	Slab	1x2.6	6.7	
2	138+760	Slab	1x1.5	7.0	
3	138+800	Slab	1x1.0	6.2	
4	138+900	Slab	1x1.5	6.3	
5	139+090	Slab	1x1.6	6.1	

Sl no.	Existing Chainage	Type of Culvert	Span/Dia (m)	Width (m)	Remarks
6	139+125	Slab	1x1.5	6.3	
7	139+310	Slab	1x1.6	6.5	
8	139+490	Slab	1x1.5	6.3	
9	139+540	Slab	1x1.5	5.9	
10	139+910	Slab	1x1.5	6.3	
11	140+970	Slab	1x3.0	6.3	
12	141+000	Not visible	-	6.2	
13	141+135	Slab	1x1.5	6.1	
14	141+300	Slab	1x2.8	8.2	
15	141+450	Slab	1x2.0	6.4	
16	141+500	Slab	1x1.8	6.0	
17	141+770	Slab	1x3.0	6.6	
18	142+045	Slab	1x1.8	6.0	
19	142+100	Slab	1x1.8	6.0	
20	142+320	Slab	1x2.0	6.0	
21	142+590	Slab	1x2.5	6.0	
22	142+640	Slab	1x2.0	6.0	
23	142+695	Slab	1x2.0	6.0	
24	142+795	Slab	1x2.0	6.0	
25	143+020	Slab	1x2.0	6.0	
26	143+120	Slab	1x1.5	6.3	
27	143+455	Slab	1x1.8	5.8	
28	143+820	Slab	1x2.0	6.0	
29	144+010	Slab	1x1.8	6.0	
30	144+150	Slab	1x2.0	6.0	
31	144+315	Not visible	-	5.9	
32	144+840	Slab	1x3.0	5.9	
33	145+090	Slab	1x1.5	6.3	
34	145+445	Slab	1x2.8	6.0	
35	145+495	Slab	1x1.0	6.8	
36	146+165	Slab	1x1.0	6.0	
37	146+440	Slab	1x1.5	6.0	
38	146+520	Slab	1x3.4	6.0	
39	146+930	Slab	1x6.0	6.0	
40	147+280	Slab	1x4.3	6.0	
41	147+900	Slab	1x5.0	5.9	

Sl no.	Existing Chainage	Type of Culvert	Span/Dia (m)	Width (m)	Remarks
42	147+590	Slab	1x1.6	5.9	
43	147+820	Slab	1x1.6	5.9	
44	148+155	Slab	1x3.5	6.0	
45	148+730	Slab	1x1.5	5.8	
46	149+175	Slab	1x3.9	6.0	
47	149+240	Slab	1x6.0	6.0	
48	149+290	Slab	1x2.1	6.0	
49	149+405	Slab	1x3.0	6.0	
50	149+500	Slab	1x2.8	6.0	
51	149+575	Slab	1x2.0	6.0	
52	149+720	Slab	1x4.5	6.0	
53	149+960	Slab	1x2.7	6.0	
54	150+180	Slab	1x2.7	6.0	
55	150+420	Slab	1x2.5	6.0	
56	150+455	Slab	1x3.8	6.0	
57	150+520	Slab	1x2.2	6.0	
58	150+585	Slab	1x2.3	6.0	
59	150+650	Slab	1x2.0	6.0	
60	150+750	Slab	1x1.5	6.0	
61	150+775	Slab	1x2.0	6.0	
62	150+850	Slab	1x1.6	5.8	
63	151+070	Slab	1x2.7	6.0	
64	151+100	Slab	1x1.5	5.8	
65	151+350	Slab	1x2.7	6.0	
66	151+410	Slab	1x3.0	6.0	
67	151+490	Slab	1x1.5	6.0	
68	151+580	Slab	1x2.8	6.0	
69	151+720	Slab	1x1.5	6.0	
70	151+765	Slab	1x3.0	6.0	
71	151+810	Slab	1x2.3	6.0	
72	151+870	Slab	1x2.0	6.0	
73	152+080	Slab	1x2.7	6.0	
74	152+205	Slab	1x2.6	6.0	
75	152+260	Slab	1x2.4	6.0	
76	152+305	Slab	1x3.2	6.0	
77	152+890	Slab	1x2.7	6.0	
78	153+070	Slab	1x5.7	6.0	
79	153+180	Slab	1x3.7	6.0	

Sl no.	Existing Chainage	Type of Culvert	Span/Dia (m)	Width (m)	Remarks
80	153+310	Slab	1x3.7	6.0	
81	153+450	Slab	1x4.0	6.0	
82	153+775	Slab	1x4.6	6.0	
83	153+960	Slab	1x5.7	6.0	
84	154+020	Slab	1x2.4	6.0	
85	154+085	Slab	1x3.8	6.0	
86	154+205	Slab	1x3.7	6.0	
87	154+340	Slab	1x2.5	6.0	
88	154+400	Slab	1x2.4	6.0	
89	154+575	Slab	1x2.3	6.0	
90	154+760	Slab	1x4.0	6.0	
91	154+900	Slab	1x2.5	6.0	
92	155+100	Slab	1x6.0	6.0	
93	155+420	Slab	1x2.0	6.0	
94	155+370	Slab	1x2.1	6.0	
95	155+600	Slab	1x2.1	6.0	
96	155+850	Slab	1x2.1	6.0	
97	156+180	Slab	1x5.9	6.0	
98	156+400	Slab	-	5.8	

12. Bus Shelters

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

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

13. Truck Lay Bye

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

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

14. Road side drains

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

Sl. No.	Existing Location		Side	Type	
	From (km)	To (km)		Masonry/CC (Pucca)	Earthen (Kutcha)
1	138.00	138.80	Left	-	✓
2	138.25	138.892	Left	-	✓
3	138.91	138.892	Left	-	✓
4	139.073	139.300	Left	-	✓
5	139.318	139.491	Left	-	✓
6	139.500	139.724	Left	-	✓
7	139.975	140.425	Left	-	✓
8	140.450	140.767	Left	-	✓
9	141.000	141.300	Left	-	✓
10	141.350	141.450	Left	-	✓
11	141.450	142.000	Left	-	✓
12	142.000	142.410	Left	-	✓
13	142.500	142.550	Left	-	✓
14	142.675	142.800	Left	-	✓
15	144.113	144.640	Left	-	✓
16	144.700	144.800	Right	-	✓
17	144.850	145.390	Right	-	✓
18	145.450	145.580	Right	-	✓
19	145.810	146.150	Right	-	✓

Sl. No.	Existing Location		Side	Type	
	From (km)	To (km)		Masonry/CC (Pucca)	Earthen (Kutcha)
20	146.198	146.325	Right	-	✓
21	146.513	146.910	Right	-	✓
22	146.982	147.025	Right	-	✓
23	146.982	147.600	Right	-	✓
24	146.982	147.900	Right	-	✓
25	148.000	148.150	Right	-	✓
26	148.175	148.700	Right	-	✓
27	148.750	148.900	Right	-	✓
28	148.750	148.900	Right	-	✓
29	149.176	149.250	Right	-	✓
30	149.580	150.100	Right	-	✓
31	151.110	151.325	Right	-	✓
32	151.450	151.510	Right	-	✓
33	151.510	152.200	Right	-	✓
34	152.205	152.225	Right	-	✓
35	152.650	152.300	Right	-	✓
36	152.650	152.900	Right	-	✓
37	153.000	153.100	Right	-	✓
38	153.212	153.300	Right	-	✓

Sl. No.	Existing Location		Side	Type	
	From (km)	To (km)		Masonry/CC (Pucca)	Earthen (Kutcha)
39	153.312	153.725	Right	-	✓
40	153.780	153.800	Right	-	✓
41	153.875	154.030	Right	-	✓
42	154.400	154.525	Right	-	✓
43	154.812	154.900	Right	-	✓
44	154.900	155.125	Right	-	✓
45	155.190	155.210	Right	-	✓
46	155.450	155.975	Right	-	✓
47	156.090	156.300	Right	-	✓
48	156.405	156.425	Right	-	✓

15. 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
1	158.000	138+389	√	-	-	-	-	√

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

16. Minor Junctions

The details of minor junctions are as follows:

S. 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	√	-

17. Bypasses

The details of bypasses are as follows:

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

18. Other Structures

The details of other structures are as follows:**S No.**	**Type**	**Existing Chainage (km)**	**Length (m)**	**Width**
Nil				

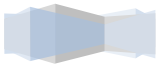
Annex-II

(Schedule-A)

Details for Providing Right of Way

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

Sl. No	Design Chainage		Length	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

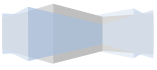


Annex-III

(Schedule-A)

Alignment Plans

It is enclosed.



Annex-IV

(Schedule-A)

Environmental Clearances

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

In addition, the Stage-I Clearance is applied online dated 05.10.2016 which is likely to be received shortly. The Money will be deposited with MoEF for final approval on receipt of Stage-I clearance. Temporary working provision will be ensured before appointed date. All conditions imposed by MoEF while issuing the Approval in Principle(AIP) and final forest clearance(FC) to be adhered during construction stage and after construction stage are to be complied with.

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

INDEX MAP OF PROJECT HIGHWAY SECTIONS

It is enclosed.

SCHEDULE – B

(See Clause 2.1)

DEVELOPMENT OF THE PROJECT HIGHWAY

1 Development of the Project Highway

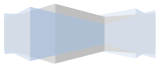
Development of the Project Highway shall include design and construction of the 2 Lane with Paved Shoulder Project Highway as described in this Schedule-B and in Schedule-C.

2 Rehabilitation and augmentation

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

3 Specifications and Standards

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



Annex I

(Schedule-B)

Description of Two Laning

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. minimise 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 of reliability, durability, accessibility, maintainability, quality control and assurance, and fitness for purpose appropriate to a highway of the character of the Project Highway to be achieved throughout the Contract Period;

l. ensure adequate off-street parking facilities for both passenger and goods vehicles;

m. provide adequate bus bays for stopping of buses and bus shelters for commuters to wait under protection;

n. achieve a high standard in the appearance and aesthetic quality of the Project Highway and achieve integration of the Project Highway with the character of the surrounding landscape through both sensitive design and sensitive management of all visible elements including those on the existing road;

o. Undertake proper safety audit through an appropriate consultant (i.e. apart from the Authority engineer);

p. Carry out accident recording and reporting (to NHIDCL) by type on regular basis; and

q. Ensure adequate safety of the Project Workers on the work site.

2. 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: SP-73 - 2015 standards.

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

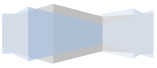
The improvement shall be done in consultation with the Authority engineer / Project Company ensuring that the proposed improvements are accommodated within the land width available as far as practical otherwise action to acquire more land shall be resorted to through NHIDCL.

In the following sections, where improvement of the existing road geometrics 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:

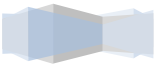
Improvement due to Realignments: (PKG-IV)

Sl. No.	DESIGN CHAINAGE		EXISTING CHAINAGE		LENGTH
	FROM	TO	FROM	TO	(m)
1	122503	122513	138165	138175	10
2	122513	122553	138175	138220	40
3	122553	122653	138220	138320	100
4	122653	122703	138320	138370	50
5	122753	122763	138420	138430	10
6	122763	122853	138430	138530	90
7	122903	123053	138580	138750	150
8	123053	123063	138750	138760	10
9	123063	123263	138760	139020	200

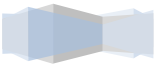
Sl. No.	DESIGN CHAINAGE		EXISTING CHAINAGE		LENGTH
	FROM	TO	FROM	TO	(m)
10	123263	123293	139020	139060	30
11	123293	123343	139060	139115	50
12	123343	123353	139115	139125	10
13	123353	123393	139125	139180	40
14	123393	123513	139180	139305	120
15	123513	123563	139305	139360	50
16	123563	123853	139360	139690	290
17	123853	123973	139690	139800	120
18	123973	124803	139800	140685	830
19	124803	124863	140685	140750	60
20	124863	124903	140750	140800	40
21	125153	125313	140060	141215	160
22	125313	125363	141215	141270	50
23	125363	125443	141270	141350	80
24	125443	125453	141350	141360	10
25	125553	125593	141470	141520	40
26	125593	125853	141520	141830	260
27	126003	126703	142005	142730	700
28	126753	126853	142780	142885	100
29	126853	126903	142885	142935	50
30	126903	127563	142935	143803	660
31	127563	127573	143803	143813	10
32	127573	127753	143813	144000	180
33	128003	128053	144253	144305	50
34	128053	128123	144305	144380	70
35	128123	128223	144380	144475	100
36	128223	128453	144475	144710	230
37	128853	128903	145120	145170	50
38	128903	129013	145170	145280	110
39	129013	129073	145280	145340	60
40	129073	129193	145340	145450	120
41	129193	129253	145450	145660	60
42	129353	129373	145790	145810	20
43	129373	129473	145810	145910	100
44	129473	129573	145910	146030	100



Sl. No.	DESIGN CHAINAGE		EXISTING CHAINAGE		LENGTH
	FROM	TO	FROM	TO	(m)
45	129573	129603	146030	146060	30
46	129603	129693	146060	146150	90
47	129693	129713	146150	146170	20
48	129713	129903	146170	146370	190
49	129903	129963	146370	146440	60
50	129963	130023	146440	146660	60
51	130023	130063	146660	146560	40
52	130063	130553	146560	147290	490
53	130603	130803	147350	147600	200
54	130803	130813	147600	147610	10
55	130813	131253	147610	148100	440
56	131353	131443	148190	148410	90
57	131443	131523	148410	148480	80
58	131523	131583	148480	148550	60
59	131583	131603	148550	148570	20
60	131603	131723	148570	148690	120
61	131723	131763	148690	148730	40
62	131763	132753	148730	149940	990
63	132753	132793	149940	149970	40
64	132793	132903	149970	150100	110
65	132903	132923	150100	150115	20
66	132923	133183	150115	150405	260
67	133183	133213	150405	150435	30
68	133213	133293	150435	150550	80
69	133293	133353	150550	150615	60
70	133353	133453	150615	150720	100
71	133453	133533	150720	150805	80
72	133533	133603	150805	150880	70
73	133603	133623	150880	150900	20
74	133623	133663	150900	150940	40
75	133663	133703	150940	150980	40
76	133703	133783	150980	151050	80
77	133783	133803	151050	151070	20
78	133803	134073	151070	151405	270
79	134073	134123	151405	151455	50



Sl. No.	DESIGN CHAINAGE		EXISTING CHAINAGE		LENGTH
	FROM	TO	FROM	TO	(m)
80	134123	134153	151455	151500	30
81	134153	134163	151500	151510	10
82	134163	134343	151510	151700	180
83	134343	134363	151700	151720	20
84	134363	134433	151720	151795	70
85	134433	134453	151795	151820	20
86	134453	134653	151820	151060	200
87	134753	134763	152170	152180	10
88	134763	134823	152180	152245	60
89	134823	134843	152245	152265	20
90	134843	135103	152265	152550	260
91	135203	135653	152660	153100	450
92	135753	135973	153200	153420	220
93	135973	135993	153420	153450	20
94	135993	136153	153450	153750	160
95	136153	136163	153750	153760	10
96	136163	136453	153760	154195	290
97	136453	136463	154195	154200	10
98	136463	136573	154200	154370	110
99	136573	136613	154370	154410	40
100	136613	136653	154410	154455	40
101	136653	136693	154455	154495	40
102	136693	136893	154495	154715	200
103	136893	136923	154715	154745	30
104	136923	137023	154745	154870	100
105	137023	137043	154870	154900	20
106	137043	137676	154900	155810	633
107	137676	138389	155810	156535	713
				Total	**14036**



Probable Location of Sharp Curves: Package-IV

SL. No	Design Chainage(Km)		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

SL. No	Design Chainage(Km)		Remarks
	From	To	
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

SL. No	Design Chainage(Km)		Remarks
	From	To	
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 hr for 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.

Sl. No	Design Chainage		Length	Width (m)
	From	To		
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 paved shoulders with footpath have been considered as 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 150mm thick compacted layer of granular material.

(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.

2.5.1 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 clearance*: 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 lengths indicated below:[Refer to paragraph 2.13 of the Manual and provide details]

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

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-4. These illustrate the widening proposals for the project highway. The Project Highway (length 16.036 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	TYPE	Remarks / Location
	FROM	TO	(m)	TCS	
1	122353	122503	150	2	Reconstruction and 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 and widening
7	122743	122753	10	1	Reconstruction and widening with retaining wall
8	122753	122763	10	1	Realignment with Retaining wall

Sl.NO.	DESIGN CHAINAGE		LENGTH	TYPE	Remarks / Location
	FROM	TO	(m)	TCS	
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 and widening
27	124993	125013	20	1	Reconstruction and widening with retaining wall
28	125013	125143	130	2	Reconstruction and widening
29	125143	125153	10	1	Reconstruction and 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 and widening
35	125513	125553	40	1	Reconstruction and 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 and widening
39	126003	126703	700	3	Realignment
40	126703	126753	50	2	Reconstruction and widening
41	126753	126853	100	3	Realignment
42	126853	126903	50	1	Realignment with Retaining wall
43	126903	127563	660	3	Realignment

Sl.NO.	DESIGN CHAINAGE		LENGTH	TYPE	Remarks / Location
	FROM	TO	(m)	TCS	
44	127563	127573	10	1	Realignment with Retaining wall
45	127573	127753	180	3	Realignment
46	127753	128003	250	2	Reconstruction and 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 and widening
52	128673	128783	110	1	Reconstruction and widening with retaining wall
53	128783	128853	70	2	Reconstruction and 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 and 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 and 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 and widening
76	131283	131353	70	1	Reconstruction and widening with retaining wall
77	131353	131443	90	3	Realignment

Sl.NO.	DESIGN CHAINAGE		LENGTH	TYPE	Remarks / Location
	FROM	TO	(m)	TCS	
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 and widening
109	134733	134753	20	1	Reconstruction and 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

Sl.NO.	DESIGN CHAINAGE		LENGTH	TYPE	Remarks / Location
	FROM	TO	(m)	TCS	
113	134843	135103	260	3	Realignment
114	135103	135203	100	2	Reconstruction and widening
115	135203	135653	450	3	Realignment
116	135653	135753	100	2	Reconstruction and 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
		Total	**16036**		

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(km)	Name of Village/town etc
1	**138+350**	**Koloriang**

3 INTERSECTIONS AND GRADE SEPARATORS

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:

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

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

3.1 At-grade Intersections

(a) Major Intersections

Sl 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

Sl 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/without Ramps

Sl No.	Location (km)	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:

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

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

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

5 PAVEMENT DESIGN

5.1 Pavement design shall be carried out in accordance with section 5 of the Manual. The detailed pavement design including overlay and pavement characteristics requirements of the Project Highway shall be done in accordance with Schedule D. Flexible pavement shall be considered for the project road. Flexible Pavement design shall be carried out in accordance with 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: 37-2012, 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

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

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. 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% 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)

with 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.

Sl No.	Section (km)		Remarks
	From	To	
1	122+353	138+389	Poor condition of existing 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

S.NO.	DESIGN CHAINAGE		LENGTH	SIDE	Remarks / Location
	FROM	TO	(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

S.NO.	DESIGN CHAINAGE		LENGTH	SIDE	Remarks /
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	129693	180	Both	Realignment
65	129693	129713	20	One	Realignment
66	129713	129903	380	Both	Realignment
67	129903	129963	60	One	Realignment
68	129963	130023	120	Both	Realignment
69	130023	130063	80	Both	Realignment
70	130063	130553	980	Both	Realignment
71	130553	130603	50	One	Widening
72	130603	130803	400	Both	Realignment
73	130803	130813	10	One	Realignment

S.NO.	DESIGN CHAINAGE		LENGTH	SIDE	Remarks /
74	130813	131253	880	Both	Realignment
75	131253	131283	30	One	Widening
76	131283	131353	70	One	Widening
77	131353	131443	180	Both	Realignment
78	131443	131523	160	Both	Realignment
79	131523	131583	120	Both	Realignment
80	131583	131603	40	Both	Realignment
81	131603	131723	240	Both	Realignment
82	131723	131763	40	One	Realignment
83	131763	132753	1980	Both	Realignment
84	132753	132793	40	One	Realignment
85	132793	132903	220	Both	Realignment
86	132903	132923	20	One	Realignment
87	132923	133183	520	Both	Realignment
88	133183	133213	30	One	Realignment
89	133213	133293	160	Both	Realignment
90	133293	133353	60	One	Realignment
91	133353	133453	200	Both	Realignment
92	133453	133533	80	One	Realignment
93	133533	133603	140	Both	Realignment
94	133603	133623	20	One	Realignment
95	133623	133663	80	Both	Realignment
96	133663	133703	40	One	Realignment
97	133703	133783	160	Both	Realignment
98	133783	133803	40	Both	Realignment
99	133803	134073	540	Both	Realignment
100	134073	134123	100	Both	Realignment
101	134123	134153	60	Both	Realignment
102	134153	134163	10	One	Realignment
103	134163	134343	360	Both	Realignment
104	134343	134363	20	One	Realignment
105	134363	134433	140	Both	Realignment
106	134433	134453	20	One	Realignment
107	134453	134653	400	Both	Realignment
108	134653	134733	80	One	Widening
109	134733	134753	20	One	Widening
110	134753	134763	10	One	Realignment
111	134763	134823	120	Both	Realignment
112	134823	134843	20	One	Realignment

S.NO.	DESIGN CHAINAGE		LENGTH	SIDE	Remarks /
113	134843	135103	520	Both	Realignment
114	135103	135203	100	One	Widening
115	135203	135653	900	Both	Realignment
116	135653	135753	100	One	Widening
117	135753	135973	440	Both	Realignment
118	135973	135993	20	One	Realignment
119	135993	136153	320	Both	Realignment
120	136153	136163	10	One	Realignment
121	136163	136453	580	Both	Realignment
122	136453	136463	10	One	Realignment
123	136463	136573	220	Both	Realignment
124	136573	136613	40	One	Realignment
125	136613	136653	80	Both	Realignment
126	136653	136693	40	One	Realignment
127	136693	136893	400	Both	Realignment
128	136893	136923	30	One	Realignment
129	136923	137023	200	Both	Realignment
130	137023	137043	20	One	Realignment
131	137043	137676	1266	Both	Realignment
132	137676	138389	1426	Both	Built up
		Total	**28432**		

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 IRC and accordingly they may carry out their own diligence to arrive at project cost before submitting the bid.

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 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/to be reconstructed box culverts of minimum span2.0 m shall be provided.
v) Suitable river training works, bank protection and embankment protection works ensuring safety of bridge structure and its approaches against damage by flood water / rain water shall be provided.

The cross drainage plan of the highway shall be finalized in consultation with 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]

Sl. No.	Existing Chainage (km)	Design Chainage (km)	Proposal	Proposed Span
1	138+020	122+381	RCC Box/ Slab	3.0
2	138+760	123+053	RCC Box/ Slab	2.0
3	138+800	123+083	RCC Box/ Slab	2.0
4	141+000	125+103	RCC Box/ Slab	2.0
5	141+135	125+233	RCC Box/ Slab	2.0
6	141+500	125+583	RCC Box/ Slab	2.0
7	142+100	126+093	RCC Box/ Slab	2.0
8	142+320	126+313	RCC Box/ Slab	2.0
9	143+455	127+353	RCC Box/ Slab	2.0
10	145+090	128+823	RCC Box/ Slab	2.0
11	145+445	129+163	RCC Box/ Slab	3.0
12	146+165	129+703	RCC Box/ Slab	2.0
13	151+410	134+073	RCC Box/ Slab	3.0
14	151+490	134+193	RCC Box/ Slab	2.0
15	151+580	134+278	RCC Box/ Slab	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:

Sl. No.	Existing Chainage (km)	Design Chainage (km)	Proposal	Span
1	138+900	123+163	RCC Box/ Slab	2.0
2	139+090	123+313	RCC Box/ Slab	2.0
3	139+125	123+333	RCC Box/ Slab	2.0
4	139+310	123+523	RCC Box/ Slab	2.0
5	139+490	123+673	RCC Box/ Slab	2.0
6	139+540	123+713	RCC Box/ Slab	2.0
7	139+910	124+073	RCC Box/ Slab	2.0
8	141+300	125+393	RCC Box/ Slab	3.0

Sl. No.	Existing Chainage (km)	Design Chainage (km)	Proposal	Span
9	141+450	125+533	RCC Box/ Slab	2.0
10	141+770	125+808	RCC Box/ Slab	3.0
11	142+045	126+033	RCC Box/ Slab	2.0
12	142+590	126+553	RCC Box/ Slab	2.5
13	142+640	126+623	RCC Box/ Slab	2.0
14	142+695	126+668	RCC Box/ Slab	2.0
15	142+795	126+758	RCC Box/ Slab	2.0
16	143+020	126+993	RCC Box/ Slab	2.0
17	143+120	127+093	RCC Box/ Slab	2.0
18	143+820	127+583	RCC Box/ Slab	2.0
19	144+010	127+763	RCC Box/ Slab	2.0
20	144+150	127+903	RCC Box/ Slab	2.0
21	144+315	128+063	RCC Box/ Slab	2.0
22	144+840	128+563	RCC Box/ Slab	3.0
23	145+495	129+353	RCC Box/ Slab	2.0
24	146+440	129+963	RCC Box/ Slab	2.0
25	146+520	130+033	RCC Box/ Slab	3.5
26	146+930	130+253	RCC Box/ Slab	6.0
27	147+280	130+553	RCC Box/ Slab	4.5
28	147+400	130+803	RCC Box/ Slab	5.0
29	147+590	131+003	RCC Box/ Slab	2.0
30	147+820	131+333	RCC Box/ Slab	2.0
31	148+155	131+763	RCC Box/ Slab	3.5
32	148+730	132+053	RCC Box/ Slab	2.0
33	149+175	132+143	RCC Box/ Slab	4.0
34	149+240	132+153	RCC Box/ Slab	6.0
35	149+290	132+203	RCC Box/ Slab	2.5
36	149+405	132+293	RCC Box/ Slab	3.0
37	149+500	132+338	RCC Box/ Slab	3.0
38	149+575	132+413	RCC Box/ Slab	2.0
39	149+720	132+553	RCC Box/ Slab	4.5
40	149+960	132+783	RCC Box/ Slab	3.0
41	150+180	132+983	RCC Box/ Slab	3.0
42	150+420	133+183	RCC Box/ Slab	2.5

Sl. No.	Existing Chainage (km)	Design Chainage (km)	Proposal	Span
43	150+455	133+223	RCC Box/ Slab	4.0
44	150+520	133+273	RCC Box/ Slab	2.5
45	150+585	133+323	RCC Box/ Slab	2.5
46	150+650	133+383	RCC Box/ Slab	2.0
47	150+750	133+483	RCC Box/ Slab	2.0
48	150+775	133+513	RCC Box/ Slab	2.0
49	150+850	133+573	RCC Box/ Slab	2.0
50	151+070	133+793	RCC Box/ Slab	3.0
51	151+100	133+833	RCC Box/ Slab	2.0
52	151+350	134+003	RCC Box/ Slab	3.0
53	151+720	134+363	RCC Box/ Slab	2.0
54	151+765	134+403	RCC Box/ Slab	3.0
55	151+810	134+443	RCC Box/ Slab	2.5
56	151+870	134+505	RCC Box/ Slab	2.0
57	152+080	134+673	RCC Box/ Slab	3.0
58	152+205	134+783	RCC Box/ Slab	3.0
59	152+260	134+843	RCC Box/ Slab	2.5
60	152+305	134+883	RCC Box/ Slab	3.5
61	152+890	135+413	RCC Box/ Slab	3.0
62	153+070	135+643	RCC Box/ Slab	6.0
63	153+180	135+743	RCC Box/ Slab	4.0
64	153+310	135+863	RCC Box/ Slab	4.0
65	153+450	135+993	RCC Box/ Slab	4.0
66	153+775	136+173	RCC Box/ Slab	5.0
67	153+960	136+273	RCC Box/ Slab	6.0
68	154+020	136+333	RCC Box/ Slab	2.5
69	154+085	136+393	RCC Box/ Slab	4.0
70	154+205	136+463	RCC Box/ Slab	4.0
71	154+340	136+543	RCC Box/ Slab	2.5
72	154+400	136+613	RCC Box/ Slab	2.5
73	154+575	136+773	RCC Box/ Slab	2.5
74	154+760	136+943	RCC Box/ Slab	4.0
75	154+900	137+043	RCC Box/ Slab	2.5
76	155+100	137+203	RCC Box/ Slab	6.0

Sl. No.	Existing Chainage (km)	Design Chainage (km)	Proposal	Span
77	155+420	137+273	RCC Box/ Slab	2.0
78	155+370	137+343	RCC Box/ Slab	2.5
79	155+600	137+613	RCC Box/ Slab	2.5
80	156+400	138+263	RCC Box/ Slab	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]

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

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

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

Sl No.	Existing Chainage	Design Chainage	Proposed Span(m)	Proposed Width(m)	Remarks
1	140+450	124+583	1 x34	16.0	Reconstruction
2	143+400	127+283	1 x 10	16.0	Reconstruction
3	144+640	128+423	1 x 39	16.0	Reconstruction
4	147+100	130+383	1 x 7	16.0	Reconstruction
5	152+640	135+183	1 x 25	16.0	Reconstruction

Sl No	Bridge Location (km)	Salient Details of Existing Bridge					Adequacy or Otherwise of the Existing Waterway, Vertical Clearance etc.	Remarks
		Span Arrangement (m)	Carriage way 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~8.5m	Narrow Bridge
2	143+400	1 X 10.0	5.5	6	RCC Slab	Open	Vertical Clearance~4.0m	Narrow Bridge
3	144+640	1 X 39.0	3.5	5.5	TS type bailey bridge	Open	Vertical Clearance~17.0m	Narrow Bridge
4	147+100	1 X 6.5	5.3	5.8	RCC Slab	Open	Vertical Clearance~6.0m	Narrow Bridge
5	152+640	1 X 25.0	3.5	5.5	DS type Bailey bridge	Open	Vertical Clearance~8.5m	Narrow Bridge

7.3.2 The following structures shall be provided with footpaths:

Sl 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

Sl. No.	Bridge Location (Km)	Span Arrangement (m)	Carriageway Width (m)	Total Width (m)	Type of Superstucture	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]

No new bridges at the following locations on the Project Highway shall be constructed.

Sl 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]

Sl 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]

Sl 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 7 of 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:

Sl 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:

Sl 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

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

B. ROB / RUB

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

C. Overpasses / Underpasses and Other Structures

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

7.8 List of Major Bridges and Structures

The following is the list of Major Bridges

Sl 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 the Manual.

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 170 RM (minimum) shall be provided by EPC Contractor in bus bays 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, Zebra crossings and at parking areas.

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

(iii) All signs shall be the reflectorized type with high intensity retro-reflective sheeting conforming to ASTM D 4956-01, type VIII and /or type IX of micro prismatic type. All sign boards of size more than 1.2 m and less than 0.9 m shall be provided at the locations finalized in consultation with NHIDCL.

(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-ings etc	sqm	1225
Directional Arrows, letter marking etc.	Nos.	146
Advance Direction signs size 1800X1200 mm	Nos.	17
Village name boards size 600X900 mm	Nos.	152
Place Identification signs size 1200X900 mm	Nos.	11
90 cm Triangle	Nos.	23
90 cm Octagon	Nos.	21
Hazard plate 300X900 mm	Nos.	113
800 x 600 mm Size	Nos.	45
60 Cm circular	Nos.	75
Boundary Stone (Clause 13 herein under)	Nos.	163
5th Km Stone -New	Nos.	3
Ordinary Km Stone	Nos.	15
Hectometer Stone	Nos.	62
Delinator	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 the Manual 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 (overhead gantry) as per this manual.

Sl 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 1160 nos. trees are required to be planted.

11 HAZARDOUS LOCATIONS

i) Metal Beam crash barrier length of minimum 4310m (single runner, heavy duty and W-shape) shall be provided at the locations of bridge approaches and high embankments (3.0m and more), at sharp curves on both sides. Heavy duty metal beam crash barriers shall be provided on this project by the Construction Contractor at the locations finalized in consultation with NHIDC L. Typical details of metal crash barrier as per manual.

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

Sl 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

Sl No.	Location		Length (m)	Remarks
	From	To		
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

Sl No.	Location		Length (m)	Remarks
	From	To		
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

Sl No.	Location		Length (m)	Remarks
	From	To		
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

13. 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	1690
2.Breast wall with PCC	Rm	10750
3. Breast wall sausage type by gabion/ Specialized treatment for slide protection as specified above-	Rm	2000
4. Retaining Wall with PCC	Rm	1950
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-

Sl No.	Design Chainage		Length (m)	Remarks
	From	To		
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*

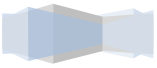
shall make thorough investigation at site and assess the requirement of slope protection and slide prone zone and other safety features at his own before submission of bid.

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.

Sl. No	Chainage		Length(m)
	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

Sl. No	Chainage		Length(m)
	From(km)	To(km)	
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



Sl. No	Chainage		Length(m)
	From(km)	To(km)	
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 Package No**. DPR/J-K/AR-4/SARDP-NE**, 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) Roadside furniture;

(b) Pedestrian facilities;

(c) Tree plantation;

(d) Bus shelters

(e) Passing Places - 2nos on hilly side

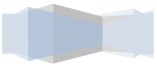
(f) One truck lay by and

(g) Others to be specified

2 Description of Project Facilities

Toll Plaza
NIL

Bus Shelters



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

Bus shelters shall be provided on the Project Highway at 1(one) location as mentioned herein under. Bus shelters shall be constructed as per Manual on both sides of the Project Highway. These bus shelters will also have passenger shelter.

Details of Bus shelters

Sl No.	Project Facility	Location (km)
1	Bus Shelter	137+773

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 Clause 2.1)

SPECIFICATIONS AND STANDARDS

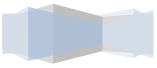
1. Construction

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

2. Design Standards

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

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



Annex – I

(Schedule – D)

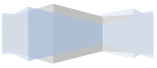
Specifications and Standards for Construction

1 Specifications and Standards

All materials, works and construction operations shall confirm to the Two Lane Manual (IRC: SP 73 – 2015) of Specifications and Standards for Two Laning (IRC: SP: 73 – 2015), referred as the Two Lane Manual (IRC: SP: 73 – 2015), and MORTH Specifications for Road and Bridge Works, IRC: SP: 48-1998 and IRC 56-2011. 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

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



SCHEDULE - E
(See Clauses 2.1 and 14.2)
MAINTENANCE REQUIREMENTS

1 **Maintenance Requirements**

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

1.2 The Contractor shall repair or rectify any Defect or deficiency set forth in Paragraph 2 of this Schedule-E within the time limit specified therein and any failure in this behalf shall constitute non-fulfillment of the Maintenance obligations by the Contractor. Upon occurrence of any breach hereunder, the Authority shall be entitled to effect reduction in monthly lump sum payment as set forth in Clause 14.6 of this Agreement, without prejudice to the rights of the Authority under this Agreement, including Termination thereof.

1.3 All Materials, works and construction operations shall conform to the MORTH Specifications for Road and Bridge Works, and the relevant IRC publications. Where the specifications for a work are not given, Good Industry Practice shall be adopted.

2 **Repair/rectification of Defects and deficiencies**

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

3 **Other Defects and deficiencies**

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

Engineer.

4 **Extension of time limit**

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

5 **Emergency repairs/restoration**

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

6 **Daily inspection by the Contractor**

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

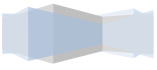
7. Pre-monsoon inspection / Post-monsoon inspection

The Contractor shall carry out a detailed pre-monsoon inspection of all bridges, culverts and drainage system before [1st June] every year in accordance with the guidelines contained in IRC: SP35. Report of this inspection together with details of proposed maintenance works as required on the basis of this inspection shall be sent to the Authority's Engineer before the [10th June] every year. The Contractor shall complete the required repairs before the onset of the monsoon and send to the Authority's Engineer a compliance report. Post monsoon inspection shall be done by the [30th September] and the inspection report together with details of any damages observed

and proposed action to remedy the same shall be sent to the Authority's Engineer.

8. Repairs on account of natural calamities

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



Annex - I
(Schedule -E)

Repair/rectification of Defects and deficiencies

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

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

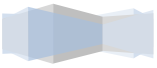
Nature of Defects or deficiency		Time limit for repair/rectification
	camber on the main carriageway)	
Nature of defects or deficiency		**Time limit for repair/rectificaation**
II	Edge drop at shoulders exceeding 40mm	7 (seven) days
III	Variation by more than 15% in the prescribed side (embankment) slopes	30 (thirty) days
IV	Rain cuts/gullies in slope	7 (seven) days
V	Damage to or silting of culverts and side drains	7 (seven) days
VI	Desilting of drains in urban/semi-urban areas	24 hours
VII	Railing, parapets, crash barrier	7 (seven) days (restore immediately if causing safety hazard.
c	**Road side furniture including road sign and pavement marking**	
I	Damage to shape or position, poor visibility or loss of retro-reflectivity	48 hours
II	Painting of km stone, railing, parapets/crash barrier	As and when required /once every year
III	Damaged/missing road signs requiring replacement	7 (seven) days
IV	Damage to road mark ups	7 (seven) days
d	**Road lighting**	
I	Any major failure of the system	24 hours
II	Faults and minor failures	8 hours
e	**Trees and plantation**	
I	Obstruction in a minimum head-room of 5 m above carriageway or obstruction in visibility of road	24 hours

Nature of Defects or deficiency		Time limit for repair/rectification
	signs	
II	Removal of fallen trees from carriageway	4 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 hours
II	Defects in electrical, water and sanitary installations	24 hours
g	**Toll Plazas**	
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 crane	4 (Four) hours
BRIDGES		
a	**Superstructures**	
I	Any damage, cracks, spalling/scaling Temporary measures Permanent measures	 within 48 hours within 15 (fifteen) days or as specified by the Authority's Engineer
b	**Foundation**	
I	Scouring and/or cavitation	15 (fifteen) days

Nature of Defects or deficiency		Time limit for repair/rectification
c	**Piers, abutments, return walls and wing walls**	
I	Cracks and damages including settlement and tilting, spalling, scaling	30 (thirty) days
d	**Bearing (metallic) of bridges**	
I	Deformation, damages, tilting or shifting of bearings	14 (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 Defects 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.



"Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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 - F
(See Clause 3.1.7(a))

APPLICABLE PERMITS

1 **Applicable Permits**

1.1 The Contractor shall obtain, as required under the Applicable Laws, the following Applicable Permits:

(a) Permission of the State Government for extraction of boulders from quarry;

(b) Permission of Village Panchayats and Pollution Control Board for installation of crushers;

(c) License for use of explosives;

(d) Permission of the State Government for drawing water from river/reservoir;

(e) License 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.

11.1 Applicable Permits, as required, relating to environmental protection and conservation shall have been procured by the Authority in accordance with the provisions of this Agreement.

2.0 The agency need to ensure compliance of AIP and FC stated in schedules 'A' Annexure - IV The necessary certifications need to be obtained from competent local forest department.

3.0 Muck dumping locations in forest area to be freezed in consultation with the forest

department, the necessary certfications from local competent forest department is to be submitted.

SCHEDULE - G

(See Clauses 7.1.1, 7.5.3 and 19.2)

FORM OF BANK GUARANTEE

Annex-I
(See Clause 7.1.1)
[Performance Security/Additional Performance Security]

The Managing Director,
National Highways & Infrastructural Development Corporation Ltd.
PTI Building, 3rd Floor,
4, Parliament Street
New Delhi - 110001

WHEREAS:

(A) _____ [name and address of contractor] (hereinafter called the "Contractor") and National Highways and Infrastructure Development Corporation Ltd. , (hereinafter called the "Authority") have entered into an agreement (hereinafter called the "Agreement") for the construction of **"Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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

"Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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"

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 National Highways Authority of India, that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.
3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this

Guarantee.

5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfillment and/ or performance of all or any of the obligations of the Contractor contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

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

"Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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"

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.

[$] Insert date being 2 (two) years from the date of issuance of this Guarantee (in accordance with Clause 7.2 of the Agreement).

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

12. This guarantee shall also be operatable at our…….. Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.

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

details below: -

Sl. No	Particulars	Details
1	Name of the Beneficiary	National Highways and Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Syndicate Bank, Transport Bhawan, 1st Parliament street, New Delhi-110001

Signed and sealed this ……. day of ……., 20…… at …….
SIGNED , SEALED AND DELIVERED

For and on behalf of the bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Adress)

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 7.5.3)

Form for Guarantee for Withdrawal of Retention Money

The Managing Director,
National Highways & Infrastructural Development Corporation Ltd.
PTI Building, 3rd Floor,
4, Parliament Street
New Delhi - 110001

WHEREAS:

(A) [name and address of contractor] (hereinafter called the "Contractor") has executed an agreement (hereinafter called the "Agreement") with the National Highways and Infrastructure Development Corporation Ltd., (hereinafter called the "Authority") for the "**Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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 7.5.3 of the Agreement, the Contractor may withdraw the retention money (hereinafter called the "Retention Money") after furnishing to the Authority a bank guarantee for an amount equal to the proposed withdrawal.

(C) We, …….. through our branch at ……. (the "Bank") have agreed to furnish this bank guarantee (hereinafter called the "Guarantee") for the amount of Rs. ----------

- cr. (Rs.----------crore) (the "**Guarantee Amount**").

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

"Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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"

1. The Bank hereby unconditionally and irrevocably undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of General Manager in the National Highways Authority of India, that the Contractor has committed default in the due and faithful performance of all or any of its obligations for under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final, and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.
3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Retention Money and any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and

conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Retention Money.

7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

8. The Guarantee shall cease to be in force and effect 90 (ninety) days after the date of the Completion Certificate specified in Clause 12.4 of the Agreement.

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a

certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

12. This guarantee shall also be operatable at our…….. Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.

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

Sl. No	Particulars	Details
1	Name of the Beneficiary	National Highways and Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Syndicate Bank, Transport Bhawan, 1st Parliament street, New Delhi-110001

Signed and sealed this ……. day of ……., 20…… at …….
SIGNED , SEALED AND DELIVERED

For and on behalf of the bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

Notes:

(iii) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.

(iv) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch

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

Form for Guarantee for Advance Payment

The Managing Director,
National Highways & Infrastructural Development Corporation Ltd.
PTI Building, 3rd Floor,
4, Parliament Street
New Delhi - 110001

WHEREAS:

(A) [name and address of contractor] (hereinafter called the "Contractor") has executed an agreement (hereinafter called the "Agreement") with the National Highways and

Infrastructure Corporation Ltd., (hereinafter called the "Authority") for the **"Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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

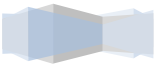
(B) In accordance with Clause 19.2 of the Agreement, the Authority shall make to the Contractor an interest bearing (@ Bank Rate) advance payment (herein after called " Advance Payment") equal to 10% (ten per cent) of the Contract Price; and that the Advance Payment shall be made in two installments 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")[$] .

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

(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 Authority, upon its mere first written demand, and without any demur, reservation, recourse,



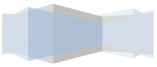
contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.

2. A letter from the Authority, under the hand of an officer not below the rank of General Manager in the National Highways Authority of India, that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the instalment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.

4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.

5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Advance Payment or to extend the time or period of its repayment or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents



by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Advance Payment.

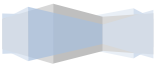
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

8. The Guarantee shall cease to be in force and effect on ****.[$] Unless a demand or claim under this Guarantee is made in writing on or before the aforesaid date, the Bank shall be discharged from its liabilities hereunder.

[$] 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).

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if



sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

12. This guarantee shall also be operatable at our…….. Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment there under 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:-

Sl. No	Particulars	Details
1	Name of the Beneficiary	National Highways and Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Syndicate Bank, Transport Bhawan, 1st Parliament street, New Delhi-110001

Signed and sealed this ……. day of ……., 20…… at …….
SIGNED , SEALED AND DELIVERED

For and on behalf of the bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Adress)

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.

SCHEDULE - H

(See Clauses 10.1.4 and 19.3)

Contract Price Weightages

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

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

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE	PERCENTAGE WEIGHTAGE vis a vis OVERALL PROJECT
1	2	3	4	5
Road works including culverts, minor bridges, underpasses, overpasses, approaches to ROB/RUB/ Major Bridges/ Structures (but excluding service roads)	72.23%	**A- Widening and strengthening of existing road**		
		(1) Earthwork up to top of the sub-grade including excavation in soil, soft rock and hard rock including Cleaning & grubbing with required site clearance etc.	11.17%	8.07%
		(2) Granular work (sub-base, shoulders)	3.11%	2.24%
		(3) Bituminous work		
		a)DBM With Prime coat & Tack coat.	3.53%	2.55%
		b) BC with Tack coat.	1.93%	1.39%
		(4) Rigid Pavement	0.00%	0.00%
		(5)Widening and repair of culvert	0.00%	0.00%
		(6)Protection of existing works	0.00%	0.00%
		(7)Widening and repair of minor bridges	0.00%	0.00%

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE	PERCENTAGE WEIGHTAGE vis a vis OVERALL PROJECT
1	2	3	4	5
		B - New 2-Lane alignment		
		Earthwork up to top of the sub-grade including excavation in soil, soft rock and hard rock including Cleaning & grubbing with required site clearance etc.	29.51%	21.32%
		(2) Granular work (sub-base, shoulders)	7.72%	5.57%
		(3) Bituminous work		
		a)DBM With Prime coat & Tack coat.	8.73%	6.31%
		b) BC with Tack coat.	4.78%	3.45%
		(4) Rigid Pavement	0.00%	0.00%
		(5)Protection work	0.00%	0.00%
		(6)RCC/Reinf. Earth retaining Wall in approaches of ROB	0.00%	0.00%
		(7)Drainage Works	0.00%	0.00%
		(8)Protection Work	0.00%	0.00%
		C- New culverts, minor bridges, underpasses, overpasses on existing road, realignments, bypasses:		
		(1)Box / Slab Culverts	19.30%	13.94%
		(2) HP Culvert	0.00%	0.00%
		(3) Embankment Protection(New Lane)	0.00%	0.00%
		(4) Grade separated structures	0.00%	0.00%
		(5) Overpass	0.00%	0.00%
		(6) Elephant Underpass	0.00%	0.00%

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE	PERCENTAGE WEIGHTAGE vis a vis OVERALL PROJECT
1	2	3	4	5
		(7) Approaches to ROB and Viaduct	0.00%	0.00%
		(8) Minor Bridges	10.24%	7.39%
		(9) Cattles/Pedestrian Underpasses	0.00%	0.00%
		(10) Vehicular Underpass	0.00%	0.00%
Major Bridge works and ROB/RUB	0.00%	**A- Widening and repairs of Major Bridges**		
		(1) Foundation	0.00%	0.00%
		(2) Sub-structure	0.00%	0.00%
		(3)Super-structure(including wearing coat,crash barrier etc. complete in all respect)	0.00%	0.00%
		B- Widening and repair of		
		(a) ROB	0.00%	0.00%
		(b) RUB	0.00%	0.00%
		C- New Major Bridges		
		(1) other Miscellaneous Items	0.00%	0.00%
		(2) Guide Bundh	0.00%	0.00%
		(3) Foundation	0.00%	0.00%
		(4) Sub structure	0.00%	0.00%
		(5) Super-structure (including wearing coats, crash barriers etc. complete)	0.00%	0.00%
		(6) Protection works	0.00%	0.00%
		D- New rail-road bridges including viaduct		
		(a) ROB	0.00%	0.00%
		(b) RUB	0.00%	0.00%

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE	PERCENTAGE WEIGHTAGE vis a vis OVERALL PROJECT
1	2	3	4	5
Structures(Elevated sections, reinforced earth)	0.00%	(1) Foundation	0.00%	0.00%
		(2) Sub-structure	0.00%	0.00%
		(3) Super-structure (including crash barriers etc. complete)	0.00%	0.00%
		(4) Reinforced Earth Wall (includes Approaches of ROB, Underpasses, Overpasses, Flyover etc.)	0.00%	0.00%
Other Works	27.77%			
		(i)Service roads/Slip roads	0.00%	0.00%
		(ii)Toll Plaza	0.00%	0.00%
		(iii)(a)Road side drain & Toe wall	16.49%	4.58%
		(b)Catch water drain/Chute drain	6.84%	1.90%
		(iv)Road signs, marking, Km stones, Safety devices etc.		
		(a)Pavement Marking	1.30%	0.36%
		(b)Crash barrier/W metal crash barrier	3.50%	0.97%
		(c)Traffic Sign	0.68%	0.19%
		(d)Road Boundary stone, km Stone,5th km stone and hectometer stone	0.04%	0.01%
		(e)Traffic blinker LED delineator,stud,reflective payment marker, tree reflector	0.09%	0.03%
		(f)Solar stud and solar blinking LED	0.00%	0.00%
		(g)Traffic control devices and road safety works	0.00%	0.00%

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE	PERCENTAGE WEIGHTAGE vis a vis OVERALL PROJECT
1	2	3	4	5
		(h)Road furniture (overhead signboard etc.)	0.13%	0.04%
		(i)Protection Work (Provision of Rip-Rap or similar work in valley side of the curves as special safety features)	0.48 %	0.13%
		(v)Project facilities	0.00%	0.00%
		(a)Truck lay-byes	0.00%	0.00%
		(b)Bus bays and Bus Shelter	0.06%	0.02%
		(c)Major Junction	0.49%	0.14%
		(d)Minor Junction	1.47%	0.41%
		(e)Median filling shrub plantation and maintanance for 1 year	0.00%	0.00%
		(f)Interlocking concrete block pavement	0.00%	0.00%
		(g)CC Kerb	0.00%	0.00%
		(h)Rest area with development of site including one no bus bay and bus shelter, landscaping and tree plantation	0.00%	0.00%
		(i) Others	0.52%	0.14%
		(j)Road Appurtenances	0.15%	0.04%
		(vi)Repairs to bridges/structures		
		(a)Providing wearing coat	0.00%	0.00%
		(b)Replacement of bearings, joints	0.00%	0.00%
		(c)Providing crash barrier	0.00%	0.00%
		(d)Other items	0.00%	0.00%

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE	PERCENTAGE WEIGHTAGE vis a vis OVERALL PROJECT
1	2	3	4	5
		(vii) Road Side Plantation & Median plantation	0.00%	0.00%
		(viii) Repair of protection works	0.00%	0.00%
		(ix) Traffic diversion, Safety and traffic management during construction	0.00%	0.00%
		(x)Miscellaneous item	0.00%	0.00%
		(xi)Slope Protection Works as special requirement for hill road		
		(a)Breast Wall	47.89%	13.30%
		(b)Retaining Wall/Gabion wall	13.06%	3.63%
		(c)Parapet	0.83%	0.23%
		(d)Plantation (Vetiver, Hydro seeding and Mulching or similar techniques etc.) for slope protection on exposed hill slopes as slide mitigation measure.	5.96%	1.65%
		Total %		**100.00%**

1.3 **Procedure of estimating the value of work done**

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

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

TABLE 1.3.1

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
A-Widening and Strengthening		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
(1) Earthwork up to top of the sub-grade including excavation in soil, soft rock and hard rock including Cleaning & grubbing with required site clearance etc.	8.07%	
(2) Granular work (sub- base, base, shoulders)	2.24%	
(3) Bituminous work		
a) DBM with prime coat and Tack coat	2.55%	
b) BC with Tack coat	1.39%	
(4) Concrete Pavement	0.00%	
(6) Widening and repair of culverts	0.00%	Cost of five completed culverts shall be determined pro rata with respect to the total number of culverts. Payment shall be made on the completion of five culverts.
(7) Protection of existing works	0.00%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
(8) Widening and repair of minor bridges	0.00%	Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length of the minor bridges. Payment shall be made on the completion of a minor bridge.
B- New 2-lane alignment		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
(1) Earthwork up to top of the sub-grade including excavation in soil, soft rock and hard rock including Cleaning & grubbing with required site	21.32%	

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
clearance etc.		
(2) Granular work (sub- base, base, shoulders)	5.57%	
(3) Bituminous work	0.00%	
a) DBM with prime coat and Tack coat	6.31%	
b) BC with Tack coat	3.45%	
(4) CC Pavement	0.00%	
(5) Protection Works	0.00%	
(6) RCC / Reinf. Earth ret wall in approaches of RoB	0.00%	
(7) Drainage Works	0.00%	
(8) Protection works	0.00%	
C- New culverts, minor bridges, underpasses, overpasses on existing road, realignments, bypasses:		
(1) Box / Slab Culverts	13.94%	Cost of each culvert shall be determined on pro rata basis with respect to the total number of culverts. Payment shall be made on the completion of five culverts.
(2) HP Culverts	0.00%	
(3) Embankment Protection (New Lane)	0.00%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
(4) Grade Separated structures	0.00%	Cost of each structure shall be determined on pro rata basis with respect to the total
(5) Overpasses	0.00%	

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
(6) Elephant underpasss	0.00%	number of structures. Payment shall be made on the completion of each number of structures specified.
(7) Approaches to ROB and Viaduct	0.00%	
(8) Minor bridges	7.39%	Cost of each minor bridge/Culvert shall be determined on pro rata basis with respect to the total linear length of the minor bridges/culvert. Payment shall be made on the completion of a minor bridge/culvert.
(9) Cattles/Pedestrian Underpasses	0.00%	Cost of each structure shall be determined on pro rata basis with respect to the total number of structures. Payment shall be made on the completion of each number of structures specified.
(10) Vehicular Underpasses	0.00%	

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

Cost per km = P x weightage for bituminous work x (1/L)

Where P= Contract Price

L = Total length in km

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

1.3 Procedure of estimating the value of work done

1.3.2 Major Bridge works and ROB/RUB.

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

TABLE 1.3.2

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

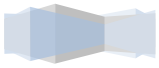
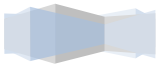


TABLE: 1.3.3

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



1.3.4 **Other works**.

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

TABLE 1.3.4

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
Other Engineering Works		
(i)Service roads/slip road	0.00%	Unit of measurement is linear length in km. Cost per km shall be determined on pro rata basis with respect to the total length of the service roads/slip roads. Payment shall be made for completed service roads/slip roads in a length of not less than 20 (twenty) percent of the total length of service roads/slip roads.
(ii)Toll Plaza	0.00%	Unit of measurement is each completed toll plaza. Payment of each toll plaza shall be made on pro rata basis with respect to the total of all toll plazas.
(iii)(a)Road side drain & Toe wall	4.58 %	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length
(b)Catch water drain/Chute drain	1.90 %	

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
(iv)Road signs, marking, Km stones, Safety devices etc.		Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
(a)Pavement Marking	0.36 %	
(b)Crash barrier/W metal crash barrier	0.97%	
(c)Traffic Sign	0.19%	
(d)Road Boundary stone, km Stone,5th km stone and hectometer stone	0.01%	
(e)Traffic blinker LED delineator,stud,reflective payment marker, tree reflector	0.03%	
(f)Solar stud and solar blinking LED	0.00%	
(g)Traffic control devices and road safety works	0.00%	
(h)Road furniture (overhead signboard etc.)	0.04%	
(i)Protection Work (Provision of Rip-Rap or similar work in valley side of the curves as special safety features)	0.13%	
(v)Project facilities	0.00%	
(a)Truck lay-byes	0.00%	

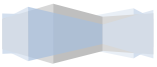
STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
(b)Bus bays and Bus Shelter	0.02%	Payment shall be made on pro rata basis for completed facilities.
(c)Major Junction	0.14%	
(d)Minor Junction	0.41%	
(e)Median filling shrub plantation and maintanance for 1 year	0.00%	
(f)Interlocking concrete block pavement	0.00%	
(g)CC Kerb	0.00%	
(h)Rest area with development of site including one no bus bay and bus shelter, landscaping and tree plantation	0.00%	
(i) Others	0.14%	
(j)Road Appurtenances	0.04%	
(vi)Repairs to bridges/structures		Payment shall be made for completed items.
(a)Providing wearing coat	0.00%	
(b)Replacement of bearings, joints	0.00%	
(c)Providing crash barrier	0.00%	
(d)Other items	0.00%	

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
(vii) Roadside Plantation & Median Plantation	0.00%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
(viii) Repair of protection works	0.00%	
(ix) Traffic diversion, Safety and traffic management during construction	0.00%	Payment shall be made on prorate basis every six months.
(x) Miscellaneous Items	0.00%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length
(xi) Slope Protection works as special requirement for hill roads		
(a)Breast wall	13.30%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
(b)Retaining wall/Gabion wall	3.63%	
(c)Parapet	0.23%	
(d)Plantation (Vetiver, Hydro seeding and Mulching etc.) for slope protection on exposed hill slopes as slide mitigation measure.	1.65%	

2 Procedure for payment for Maintenance

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

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



SCHEDULE - I

(See Clause 10.2.4)

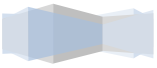
DRAWINGS

1 **Drawings**

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

2 **Additional Drawings**

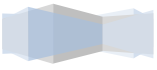
If the Authority's Engineer determines that for discharging its duties and functions under this Agreement, it requires any drawings other than those listed in Annex-I, it may by notice require the Contractor to prepare and furnish such drawings forthwith. Upon receiving a requisition to this effect,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



Annex - I
(Schedule - I)

List of Drawings

[Note : The Contractor is required to furnish all the drawings as per the manual and clause 10.2]



SCHEDULE - J
(See Clause 10.3.2)

PROJECT COMPLETION SCHEDULE

1 **Project Completion Schedule**

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

2 **Project Milestone-I**

2.1 Project Milestone-I shall occur on the date falling on the 180th (one hundred and eightieth) day from the Appointed Date (the"Project Milestone-I").

2.2 Prior to the occurrence of Project Milestone-I, the Contractor shall have commenced construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 10% (ten per cent) of the Contract Price.

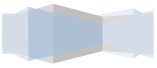
3 **Project Milestone-II**

3.1 Project Milestone-II shall occur on the date falling on the 550th (Five hundred and fiftieth) day from the Appointed Date (the "Project Milestone-II").

3.2 Prior to the occurrence of Project Milestone-II, the Contractor shall have continued with construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 40% (Fourty per cent) of the Contract Price.

4 **Project Milestone-III**

4.1 Project Milestone-III shall occur on the date falling on the 915th (Nine hundred and fifteenth) day from the Appointed Date (the "Project Milestone- III").



"Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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"

4.2 Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 80% (Eighty per cent) of the Contract Price.

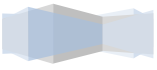
5 **Scheduled Completion Date**

5.1 The Scheduled Completion Date shall occur on the 1095th (one thousand ninety fifth) day from the Appointed Date.

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

6 **Extension of time**

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



SCHEDULE – K
(See Clause 12.1.2)

Tests on Completion

1 **Schedule for Tests**

1.1 The Contractor shall, no later than 30 (thirty) days prior to the likely completion of construction, notify the Authority's Engineer and the Authority of its intent to subject the Project Highway to Tests, and no later than 10 (ten) days prior to the actual date of Tests, furnish to the Authority's Engineer and the Authority detailed inventory and particulars of all works and equipment forming part of Works.

1.2 The Contractor shall notify the Authority's Engineer of its readiness to subject the Project Highway to Tests at any time after 10 (ten) days from the date of such notice, and upon receipt of such notice, the Authority's Engineer shall, in consultation with the Contractor, determine the date and time for each Test and notify the same to the Authority who may designate its representative to witness the Tests. The Authority's Engineer shall thereupon conduct the Tests itself or cause any of the Tests to be conducted in accordance with Article 12 and this Schedule-K.

2 **Tests**

2.1 Visual and physical test: The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include all the tests required for quality control or as decided in consultation with the Authority's Engineer at the time of physical tests as per relevant IRC code Manual .

2.2 Riding quality test: Riding quality of each lane of the carriageway shall be checked with the help of a calibrated bump integrator and the maximum permissible roughness for purposes of this Test shall be 2,000 (two thousand) mm for each kilometer.

2.3 Tests for bridges: All major and minor bridges shall be subjected to the rebound hammer and ultrasonic pulse velocity tests, to be conducted in accordance with the procedure described in Special Report No. 17: 1996 of the IRC Highway Research Board on Non

destructive Testing Techniques, at two spots in every span, to be chosen at random by the Authority's Engineer. Bridges with a span of 15 (fifteen) metres or more shall also be subjected to load testing.

2.4 Other tests: The Authority's Engineer may require the Contractor to carry out or cause to be carried additional tests, in accordance with Good Industry Practice, for determining the compliance of the Project Highway with Specifications and Standards.

2.5 Environmental audit: The Authority's Engineer shall carry out a check to determine conformity of the Project Highway with the environmental requirements set forth in Applicable Laws and Applicable Permits.

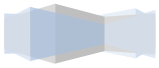
2.6 Safety Audit: The Authority's Engineer shall carry out, or cause to be carried out, a safety audit to determine conformity of the Project Highway with the safety requirements and Good Industry Practice.

3 **Agency for conducting Tests**

The Authority's Engineer or such other agency or person shall conduct all Tests set forth in this Schedule-K as it may specify in consultation with the Authority.

4 **Completion Certificate**

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



SCHEDULE - L
(See Clause 12.2 and 12.4)
PROVISIONAL CERTIFICATE

1 I, ……. (Name of the Authority's Engineer), acting as the Authority's Engineer, under and in accordance with the Agreement dated ……. (the "Agreement"), for **"Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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"** on Engineering, Procurement and Construction (EPC) basis through …… (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been undertaken to determine compliance of the Project Highway with the provisions of the Agreement.

2 Works that are incomplete on account of Time Extension have been specified in the Punch List appended hereto, and the Contractor has agreed and accepted that it shall complete all such works in the time and manner set forth in the Agreement. In addition, certain minor works are incomplete and these are not likely to cause material inconvenience to the Users of the Project Highway or affect their safety. The Contractor has agreed and accepted that as a condition of this Provisional Certificate, it shall complete such minor works within 30 (thirty) days hereof. These minor works have also been specified in the aforesaid Punch List.

3 In view of the foregoing, I am satisfied that the **"Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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"**, can be safely and reliably placed in service of the Users thereof, and in terms of the Agreement, the Project Highway is hereby provisionally declared fit for entry into operation on this the …… day of ……. 20……

ACCEPTED, SIGNED, SEALED And DELIVERED

SIGNED, SEALED and DELIVERED

"Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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"

For and on behalf of CONTRACTOR by:

For and on behalf of AUTHORITY ENGINEER by:

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 Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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"** on Engineering, Procurement and Construction (EPC) basis through …… (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement, and I am satisfied that the Project Highway can be safely and reliably placed in service of the Users thereof.

2 It is certified that, in terms of the aforesaid Agreement, all works forming part of Project Highway have been completed, and the Project Highway is hereby declared fit for entry into operation on this the …… day of …… 20…..

SIGNED, SEALED AND DELIVERED For and on

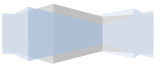
behalf of the Authority's Engineer by:

(Signature)

(Name)

(Designation)

(Address)



"Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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 - M
(See Clauses 14.6, 15.2 and 19.7)

PAYMENT REDUCTION FOR NON-COMPLIANCE

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

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

1.2 Any deduction made on account of non-compliance with the Maintenance Requirements shall not be paid even after compliance subsequently. The deductions shall continue to be made every month until compliance is done.

1.3 The Authority's Engineer shall calculate the amount of payment reduction on the basis of weightage in percentage assigned to non-conforming items as given in Paragraph 2.

2. Percentage reductions in lump sum payments

2.1 The following percentages shall govern the payment reduction:

Sl No	Item/Defect/Deficiency	Percentage (%)
a	**Carriageway/Pavement**	
I	Potholes, cracks, other surface defects	15
II	Repair of edges, rutting	5
b	**Road, Embankment, Cuttings,Shoulders**	
I	Edge drop, inadequate crossfall, undulations, settlement, potholes, ponding, obstructions	10
II	Deficient slopes, raincuts, disturbed pitching, vegetation growth, pruning of trees	5
c	**Bridges and Culverts**	
I	Desilting, Cleaning, vegetation, growth, damaged pitching,	20

Sl No	Item/Defect/Deficiency	Percentage (%)
	flooring, parapets, wearing course, footpaths, any damage to foundations	
II	Any Defects in superstructures, bearings and sub-structures	10
III	Painting, repairs/replacement kerbs, railings, parapets, guideposts/crash barriers.	5
d	**Roadside drains**	
I	Cleaning and repair of drains	5
e	**Road Furniture**	
I	Cleaning, painting, replacement of road signs, delineators, road markings, 200 m/km/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

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

R=P/IOO x M x L1/L

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

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

L1 = Non-complying Length

L = Total length of the road

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

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

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

SCHEDULE - N
(See Clause 18.1.1)

SELECTION OF AUTHORITY'S ENGINEER

1 **Selection of Authority's Engineer**

1.1 The provisions of the Model Request for Proposal for Selection of Technical Consultants, issued by the Ministry of Finance in May 2009, or any substitute thereof shall apply for selection of an experienced firm to discharge the functions and duties of an Authority's Engineer.

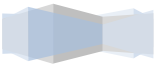
1.2 In the event of termination of the Technical Consultants appointed in accordance with the provisions of Paragraph 1.1, the Authority shall appoint another firm of Technical Consultants forthwith and may engage a government-owned entity in accordance with the provisions of Paragraph 3 of this Schedule -N.

2 **Terms of Reference**

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

3 **Appointment of Government entity as Authority's Engineer**

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



Annex – I
(Schedule - N)

TERMS OF REFERENCE FOR AUTHORITY'S ENGINEER

1 Scope

1.1 These Terms of Reference (the "TOR") for the Authority's Engineer are being specified pursuant to the EPC Agreement dated ..... (the "Agreement), which has been entered into between the National Highways and Infrastructure Development Corporation Ltd. (the "Authority") and ..... (the "Contractor") for the **"Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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"**, on Engineering, Procurement, Construction (EPC) basis, and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.

1.2 The TOR shall apply to construction and maintenance of the Project Highway.

2 Definitions and interpretation

2.1 The words and expressions beginning with or in capital letters and not defined herein but defined in the Agreement shall have, unless repugnant to the context, the meaning respectively assigned to them in the Agreement.

2.2 References to Articles, Clauses and Schedules in this TOR shall, except where the context otherwise requires, be deemed to be references to the Articles, Clauses and Schedules of the Agreement, and references to Paragraphs shall be deemed to be references to Paragraphs of this TOR.

2.3 The rules of interpretation stated in Clauses 1.2, 1.3 and 1.4 of the Agreement shall apply, mutatis mutandis, to this TOR.

"Construction of Two-Lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 138.000 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"

3. General

3.1 The Authority's Engineer shall discharge its duties in a fair, impartial and efficient manner, consistent with the highest standards of professional integrity and Good Industry Practice.

3.2 The Authority's Engineer shall perform the duties and exercise the authority in accordance with the provisions of this Agreement, but subject to obtaining prior written approval of the Authority before determining:

(a) any Time Extension;

(b) any additional cost to be paid by the Authority to the Contractor;

(c) the Termination Payment; or

(d) any other matter which is not specified in (a), (b) or (c) above and which creates an obligation or liability on either Party for a sum exceeding Rs. 5,000,000 (Rs. fifty lakh).

3.3 The Authority's Engineer shall submit regular periodic reports, at least once every month, to the Authority in respect of its duties and functions under this Agreement. Such reports shall be submitted by the Authority's Engineer within 10 (ten) days of the beginning of every month.

3.4 The Authority's Engineer shall inform the Contractor of any delegation of its duties and responsibilities to its suitably qualified and experienced personnel; provided, however, that it shall not delegate the authority to refer any matter for the Authority's prior approval in accordance with the provisions of Clause 18.2.

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

3.6 In the event of any disagreement between the Parties regarding the meaning, scope and nature of Good Industry Practice, as set forth in any provision of the Agreement, the

Authority's Engineer shall specify such meaning, scope and nature by issuing a reasoned written statement relying on good industry practice and authentic literature.

4 **Construction Period**

4.1 During the Construction Period, the Authority's Engineer shall review the Drawings furnished by the Contractor along with supporting data, including the geo-technical and hydrological investigations, characteristics of materials from borrow areas and quarry sites, topographical surveys, and the recommendations of the Safety Consultant in accordance with the provisions of Clause 10.1.6. The Authority's Engineer shall complete such review and send its observations to the Authority and the Contractor within 15 (fifteen) days of receipt of such Drawings; provided, however that in case of a Major Bridge or Structure, the aforesaid period of 15 (fifteen) days may be extended upto 30 (thirty) days. In particular, such comments shall specify the conformity or otherwise of such Drawings with the Scope of the Project and Specifications and Standards.

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

4.3 The Authority's Engineer shall review the Quality Assurance Plan submitted by the Contractor and shall convey its comments to the Contractor within a period of 21 (twenty-one) days stating the modifications, if any, required thereto.

4.4 The Authority's Engineer shall complete the review of the methodology proposed to be adopted by the Contractor for executing the Works, and convey its comments to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed methodology from the Contractor.

4.5 The Authority's Engineer shall grant written approval to the Contractor, where necessary, for interruption and diversion of the flow of traffic in the existing lane(s) of the Project Highway for purposes of maintenance during the Construction Period in accordance with the provisions of Clause 10.4.

4.6 The Authority's Engineer shall review the monthly progress report furnished by the

Contractor and send its comments thereon to the Authority and the Contractor within 7 (seven) days of receipt of such report.

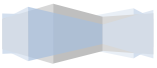
4.7 The Authority's Engineer shall inspect the Construction Works and the Project Highway and shall submit a monthly Inspection Report bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. In particular, the Authority's Engineer shall include in its Inspection Report, the compliance of the recommendations made by the Safety Consultant.

4.8 The Authority's Engineer shall conduct the pre-construction review of manufacturer's test reports and standard samples of manufactured Materials, and such other Materials as the Authority's Engineer may require.

4.9 For determining that the Works conform to Specifications and Standards, the Authority's Engineer shall require the Contractor to carry out, or cause to be carried out, tests at such time and frequency and in such manner as specified in the Agreement and in accordance with Good Industry Practice for quality assurance. For purposes of this Paragraph 4.9, the tests specified in the IRC Special Publication-11 (Handbook of Quality Control for Construction of Roads and Runways) and the Specifications for Road and Bridge Works issued by MORTH (the "Quality Control Manuals") or any modification/substitution thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance.

4.10 The Authority's Engineer shall test check at least 20 (twenty) percent of the quantity or number of tests prescribed for each category or type of test for quality control by the Contractor.

4.11 The timing of tests referred to in Paragraph 4.9, and the criteria for acceptance/ rejection of their results shall be determined by the Authority's Engineer in accordance with the Quality Control Manuals. The tests shall be undertaken on a random sample basis and shall be in addition to, and independent of, the tests that may be carried out by the Contractor for its own quality assurance in accordance with Good Industry Practice.



4.12 In the event that results of any tests conducted under Clause 11.10 establish any Defects or deficiencies in the Works, the Authority's Engineer shall require the Contractor to carry out remedial measures.

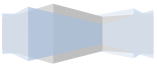
4.13 The Authority's Engineer may instruct the Contractor to execute any work which is urgently required for the safety of the Project Highway, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work required on account of a Force Majeure Event, the provisions of Clause 21.6 shall apply.

4.14 In the event that the Contractor fails to achieve any of the Project Milestones, the Authority's Engineer shall undertake a review of the progress of construction and identify potential delays, if any. If the Authority's Engineer shall determine that completion of the Project Highway is not feasible within the time specified in the Agreement, it shall require the Contractor to indicate within 15 (fifteen) days the steps proposed to be taken to expedite progress, and the period within which the Project Completion Date shall be achieved. Upon receipt of a report from the Contractor, the Authority's Engineer shall review the same and send its comments to the Authority and the Contractor forthwith.

4.15 The Authority's Engineer shall obtain from the Contractor a copy of all the Contractor's quality control records and documents before the Completion Certificate is issued pursuant to Clause 12.4.

4.16 Authority's Engineer may recommend to the Authority suspension of the whole or part of the Works if the work threatens the safety of the Users and pedestrians. After the Contractor has carried out remedial measure, the Authority's Engineer shall inspect such remedial measures forthwith and make a report to the Authority recommending whether or not the suspension hereunder may be revoked.

4.17 In the event that the Contractor carries out any remedial measures to secure the safety of suspended works and Users, and requires the Authority's Engineer to inspect such works, the Authority's Engineer shall inspect the suspended works within 3 (three) days



of receiving such notice, and make a report to the Authority forthwith, recommending whether or not such suspension may be revoked by the Authority.

4.18 The Authority's Engineer shall carry out, or cause to be carried out, all the Tests specified in Schedule-K and issue a Completion Certificate or Provisional Certificate, as the case may be. For carrying out its functions under this Paragraph 4.18 and all matters incidental thereto, the Authority's Engineer shall act under and in accordance with the provisions of Article 12 and Schedule-K.

5. Maintenance Period

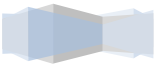
5.1 The Authority's Engineer shall aid and advise the Contractor in the preparation of its monthly Maintenance Programme and for this purpose carry out a joint monthly inspection with the Contractor.

5.2 The Authority's Engineer shall undertake regular inspections, at least once every month, to evaluate compliance with the Maintenance Requirements and submit a Maintenance Inspection Report to the Authority and the Contractor.

5.3 The Authority's Engineer shall specify the tests, if any, that the Contractor shall carry out, or cause to be carried out, for the purpose of determining that the Project Highway is in conformity with the Maintenance Requirements. It shall monitor and review the results of such tests and the remedial measures, if any, taken by the Contractor in this behalf.

5.4 In respect of any defect or deficiency referred to in Paragraph 3 of Schedule-E, the Authority's Engineer shall, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards and shall also specify the time limit for repair or rectification of any deviation or deterioration beyond the permissible limit.

5.5 The Authority's Engineer shall examine the request of the Contractor for closure of any lane(s) of the Project Highway for undertaking maintenance/repair thereof, and shall grant permission with such modifications, as it may deem necessary, within 5 (five) days



of receiving a request from the Contractor. Upon expiry of the permitted period of closure, the Authority's Engineer shall monitor the reopening of such lane(s), and in case of delay, determine the Damages payable by the Contractor to the Authority under Clause 14.5.

6 **Determination of costs and time**

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

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

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

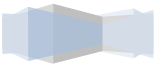
7. Payments

7.1 The Authority's Engineer shall withhold payments for the affected works for which the Contractor fails to revise and resubmit the Drawings to the Authority's Engineer in accordance with the provisions of Clause 10.2.4 (d).

7.2 Authority's Engineer shall -

(a) within 10 (ten) days of receipt of the Stage Payment Statement from the Contractor pursuant to Clause 19.4, determine the amount due to the Contractor and recommend the release of 90 (ninety) percent of the amount so determined as part payment, pending issue of the Interim Payment Certificate; and

(b) within 15 (fifteen) days of the receipt of the Stage Payment Statement referred to in Clause 19.4, deliver to the Authority and the Contractor an Interim Payment Certificate certifying the amount due and payable to the Contractor, after adjustments in accordance with the provisions of Clause 19.10.



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

7.4 The Authority's Engineer shall certify final payment within 30 (thirty) days of the receipt of the final payment statement of Maintenance in accordance with the provisions of Clause 19.16.

8. Other duties and functions

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

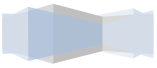
9 **Miscellaneous**

9.1 A copy of all communications, comments, instructions, Drawings or Documents sent by the Authority's Engineer to the Contractor pursuant to this TOR, and a copy of all the test results with comments of the Authority's Engineer thereon, shall be furnished by the Authority's Engineer to the Authority forthwith.

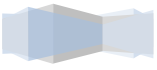
9.2 The Authority's Engineer shall retain at least one copy each of all Drawings and Documents received by it, including 'as-built' Drawings, and keep them in its safe custody.

9.3 Within 90 (ninety) days of the Project Completion Date, the Authority's Engineer shall obtain a complete set of as-built Drawings, in 2 (two) hard copies and in micro film form or in such other medium as may be acceptable to the Authority, reflecting the Project Highway as actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Project Highway and setback lines, if any, of the buildings and structures forming part of Project Facilities; and shall hand them over to the Authority against receipt thereof.

9.4 The Authority's Engineer, if called upon by the Authority or the Contractor or both, shall mediate and assist the Parties in arriving at an amicable settlement of any Dispute between the Parties.



9.5 The Authority's Engineer shall inform the Authority and the Contractor of any event of Contractor's Default within one week of its occurrence.



SCHEDULE - O

(*See Clauses 19.4.1, 19.6.1, and 19.8.1***)**

Forms of Payment Statements

1. Stage Payment Statement for Works

The Stage Payment Statement for Works shall state:

(a) The estimated amount for the Works executed in accordance with Clause 19.3.1 subsequent to the last claim;

(b) Amounts reflecting adjustments in price for the aforesaid claim;

(c) The estimated amount of each Change of Scope Order executed subsequent to the last claim

(d) Amounts reflecting adjustment in price, if any, for (c) above in accordance with the provisions of Clause 13.2.3 (a);

(e) Total of (a), (b), (c) and (d) above;

(f) Deductions:

(i) Any amount to be deducted in accordance with the provisions of the Agreement except taxes;

(ii) Any amount towards deduction of taxes; and

(iii) Total of (i) and (ii) above.

(g) Net claim: (e) – (f) (iii);

(h) The amounts received by the Contractor up to the last claim:

(i) For the Works executed (excluding Change of Scope orders);

(ii) For Change of Scope Orders, and

(iii) Taxes deducted

2. Monthly Maintenance Payment Statement

The monthly Statement for Maintenance Payment shall state:

(a) the monthly payment admissible in accordance with the provisions of the Agreement;

(b) the deductions for maintenance work not done;

(c) net payment for maintenance due, (a) minus (b);

(d) amounts reflecting adjustments in price under Clause 19.12; and

(e) amount towards deduction of taxes

3. **Contractor's claim for Damages**

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

SCHEDULE - P

(See Clause 20.1)

INSURANCE

1. Insurance during Construction Period

1.1 The Contractor shall effect and maintain at its own cost, from the Appointed Date till the date of issue of the Completion Certificate, the following insurances for any loss or damage occurring on account of Non Political Event of Force Majeure, malicious act, accidental damage, explosion, fire and terrorism:

(a) Insurance of Works, Plant and Materials and an additional sum of 15 (fifteen) per cent of such replacement cost to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature; and

(b) Insurance for the Contractor's equipment and Documents brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.

1.2 The insurance under paragraph 1.1 (a) and (b) above shall cover the Authority and the Contractor against all loss or damage from any cause arising under paragraph 1.1 other than risks which are not insurable at commercial terms.

2. Insurance for Contractor's Defects Liability

The Contractor shall effect and maintain insurance cover for the Works from the date of issue of the Completion Certificate until the end of the Defects Liability Period for any loss or damage

for which the Contractor is liable and which arises from a cause occurring prior to the issue of the Completion Certificate. The Contractor shall also maintain other insurances for maximum sums as may be required under the Applicable Laws and in accordance with Good Industry Practice.

3. Insurance against injury to persons and damage to property

3.1 The Contractor shall insure against its liability for any loss, damage, death or bodily injury, or damage to any property (except things insured under Paragraphs 1 and 2 of this Schedule or to any person (except persons insured under Clause 20.9), which may arise out of the Contractor's performance of this Agreement. This insurance shall be for a limit per occurrence of not less than the amount stated below with no limit on the number of occurrences. The insurance cover shall be not less than the project cost.

3.2 The insurance shall be extended to cover liability for all loss and damage to the Authority's property arising out of the Contractor's performance of this Agreement excluding:

(a) The Authority's right to have the construction works executed on, over, under, in or through any land, and to occupy this land for the Works; and

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

4. Insurance to be in joint names

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