NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

(Ministry of Road, Transport & Highways)

Government of India

Schedules

FOR

"Construction of Balance work of Two-lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km70.000 [Design Km. 44.000 to Km. 59.363] (Design Length - 15.363Km)in the state of Arunachal Pradesh under SARDP-NE"

Engineering, Procurement & Construction (EPC) Mode

BID DOCUMENT

May-2020

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 **Construction of Balance work of Two-lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km70.000 [Design Km. 44.000 to Km. 59.363] (Design Length - 15.363Km)in the state of Arunachal Pradesh under SARDP-NE**, Project Highway shall include the land, buildings, structures and road works as described in Annex-1 of this Schedule-A. 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-ll** of this **Schedule-A.**

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

1.4 The alignment plans of the Project Highway are specified in Annex-Ill. In the case of sections where no modification in the existing alignment of the Project Highway is contemplated, the alignment plan has not been provided. Alignment plans have only been given for sections where the existing alignment is proposed to be modified.

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

Annex-I
(Schedule-A)

1. Site

The Site of the **Construction of Balance work of Two-lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km70.000 [Design Km. 44.000 to Km. 59.363] (Design Length - 15.363Km)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 stretch lies within Kra daadi district.

The project corridor i.e Joram-Koloriang passes through settlements of Shakti and New Palin.

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	**50+050**	**44+000**	
2	50+500	44+350	
3	51+000	45+000	
4	51+500	45+190	
5	52+000	45+430	
6	52+500	45+820	
7	53+000	46+270	
8	53+500	46+700	
9	54+000	47+000	
10	54+500	47+310	
11	55+000	47+710	
12	55+500	48+020	
13	56+000	48+350	
14	56+500	48+810	
15	57+000	49+250	
16	57+500	49+600	
17	58+000	50+050	
18	58+500	50+390	
19	59+000	50+750	
20	59+500	51+300	

21	60+000	51+750	
22	60+500	52+160	
23	61+000	52+610	
24	61+500	53+000	
25	62+000	53+420	
26	62+500	53+900	
27	63+000	54+400	
28	63+500	54+720	
29	64+000	55+050	
30	64+500	55+400	
31	65+000	55+720	
32	65+500	56+100	
33	66+000	56+515	
34	66+500	56+940	
35	67+000	57+400	
36	67+500	57+800	
37	68+000	58+150	
38	68+500	58+660	
39	69+000	59+115	
40	69+500	59+220	
41	70+000	59+363	

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
1	50+050	70+000	44+000	59+363	15363	9 m to 15 m	

4. Carriageway

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

Sl. No.	Design chainage (Km)		Length In m (Design)	Lane Width (m)	Remarks
	From	To			
1	44+000	44+080	80	12	Realignment
2	44+080	44+100	20	12	Widening
3	44+100	44+180	80	12	Realignment
4	44+180	44+200	20	12	Widening
5	44+200	44+230	30	12	Realignment
6	44+230	44+340	110	12	Widening
7	44+340	44+420	80	12	Realignment
8	44+420	44+540	120	12	Widening
9	44+540	44+580	40	12	Realignment
10	44+580	44+600	20	12	Widening
11	44+600	44+640	40	12	Widening
12	44+640	44+720	80	12	Realignment
13	44+720	44+790	70	12	Widening
14	44+790	44+800	10	12	Realignment
15	44+800	44+960	160	12	Realignment
16	44+960	45+070	110	12	Widening
17	45+070	45+310	240	12	Realignment

18	45+310	45+400	90	12	Widening
19	45+400	45+430	30	12	Widening
20	45+430	45+480	50	12	Realignment
21	45+480	45+510	30	12	Realignment
22	45+510	45+590	80	12	Widening
23	45+590	45+620	30	12	Realignment
24	45+620	45+640	20	12	Widening
25	45+640	45+730	90	12	Widening
26	45+730	45+800	70	12	Realignment
27	45+800	45+830	30	12	Widening
28	45+830	45+880	50	12	Realignment
29	45+880	45+920	40	12	Realignment
30	45+920	46+000	80	12	Widening
31	46+000	46+100	100	12	Realignment
32	46+100	46+110	10	12	Realignment
33	46+110	46+190	80	12	Widening
34	46+190	46+230	40	12	Realignment
35	46+230	46+280	50	12	Widening
36	46+280	46+360	80	12	Widening
37	46+360	46+500	140	12	Realignment

38	46+500	46+530	30	12	Realignment
39	46+530	46+560	30	12	Realignment
40	46+560	46+580	20	12	Widening
41	46+580	46+600	20	12	Realignment
42	46+600	46+700	100	12	Realignment
43	46+700	46+900	200	12	Realignment
44	46+900	46+960	60	12	Widening
45	46+960	47+000	40	12	Realignment
46	47+000	47+350	350	3.0-3.25	Realignment
47	47+350	47+780	430	12	Realignment
48	47+780	47+880	100	12	Widening
49	47+880	48+000	120	12	Realignment
50	48+000	48+320	320	12	Widening
51	48+320	48+450	130	12	Widening
52	48+450	48+500	50	12	Widening
53	48+500	48+600	100	12	Realignment
54	48+600	48+800	200	12	Realignment
55	48+800	48+850	50	12	Realignment
56	48+850	48+880	30	12	Widening
57	48+880	48+885	5	12	Realignment

58	48+885	48+950	65	3.0-3.25	Realignment
59	48+950	49+230	280	3.0-3.25	Widening
60	49+230	49+250	20	12	Realignment
61	49+250	49+370	120	3.0-3.25	Widening
62	49+370	49+390	20	3.0-3.25	Realignment
63	49+390	49+420	30	3.0-3.25	Widening
64	49+420	49+430	10	3.0-3.25	Realignment
65	49+430	49+630	200	12	Realignment
66	49+630	49+650	20	3.0-3.25	Realignment
67	49+650	49+690	40	3.0-3.25	Widening
68	49+690	49+980	290	3.0-3.25	Realignment
69	49+980	50+000	20	3.0-3.25	Widening
70	50+000	50+230	230	3.0-3.25	Realignment
71	50+230	50+270	40	3.0-3.25	Widening
72	50+270	50+290	20	3.0-3.25	Realignment
73	50+290	50+310	20	3.0-3.25	Widening
74	50+310	50+340	30	3.0-3.25	Realignment
75	50+340	50+400	60	3.0-3.25	Widening
76	50+400	50+460	60	12	Widening
77	50+460	50+580	120	12	Realignment

78	50+580	50+600	20	12	Widening
79	50+600	50+630	30	12	Widening
80	50+630	50+670	40	12	Realignment
81	50+670	50+690	20	12	Widening
82	50+690	50+700	10	12	Realignment
83	50+700	50+960	260	12	Realignment
84	50+960	51+080	120	12	Realignment
85	51+080	51+180	100	12	Widening
86	51+180	51+270	90	12	Realignment
87	51+270	51+300	30	12	Widening
88	51+300	51+390	90	12	Widening
89	51+390	51+460	70	12	Realignment
90	51+460	51+590	130	12	Widening
91	51+590	51+630	40	12	Widening
92	51+630	52+000	370	12	Realignment
93	52+000	52+310	310	12	Realignment
94	52+310	52+360	50	12	Widening
95	52+360	52+675	315	12	Realignment
96	52+675	52+685	10	12	Widening
97	52+685	52+840	155	12	Realignment

98	52+840	52+870	30	12	Widening
99	52+870	52+900	30	12	Realignment
100	52+900	52+950	50	3.0-3.25	Realignment
101	52+950	53+020	70	3.0-3.25	Widening
102	53+020	53+070	50	12	Realignment
103	53+070	53+160	90	3.0-3.25	Widening
104	53+160	53+190	30	12	Widening
105	53+190	53+230	40	3.0-3.25	Widening
106	53+230	53+300	70	12	Widening
107	53+300	53+346	46	12	Widening
108	53+346	53+400	154	12	Realignment
109	53+400	53+500		12	Realignment
110	53+500	53+700	200	12	Widening
111	53+700	54+000	300	12	Realignment
112	54+000	54+720	720	12	Realignment
113	54+720	54+770	50	3.0-3.25	Realignment
114	54+770	55+250	480	12	Realignment
115	55+250	55+400	150	12	Widening
116	55+400	56+400	1000	12	Realignment
117	56+400	56+800	400	12	Realignment

118	56+800	56+870	70	12	Realignment
119	56+870	57+200	330	12	Realignment
120	57+200	57+600	400	12	Widening
121	57+600	59+363	1763	3.0-3.25	Widening

5. Major Bridges

The Site includes the following Major Bridges:

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

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	Type of Structures	No. of	Width

	(km)	Foundation	Sub-Structure	Superstructure	Spans with span length (m)	(m)
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	Superstructure		
1	56+350	**Open**	**Wall type**	**RCC Single Cell Box Type**	Single span, L= 7M	6.60
2	56+420	**Open**	**Wall type**	**RCC Single Cell Box Type**	Single span, L=6.75 M	5.50
3	62+150	**Open**	**Wall type**	**RCC T Girder**	Single span, L=15.5 M	5.00
4	69+200	**Open**	**Wall type**	**PSC Girder**	Single span, L=33 M	4.50

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-Vehiclar)

The Site includes the following underpasses:

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

11. Culverts

The Site includes the 64 Nos of culverts at the following locations and types:

Sl. No.	Existing Chainage (m)	Type of Culvert	Span/Dia (m)	Width (m)	Remarks
1	50160	SLAB	1 X 1	5.0	
2	50290	Not visible	-	5.1	
3	50360	SLAB	1 X 1	5.0	
4	50500	SLAB	1 X 1	5.5	
5	50830	SLAB	1 X 1	5.0	
6	51450	Pipe	Not visible	5.5	
7	51500	SLAB	-	5.0	
8	51860	SLAB	1 X 1	5.5	
9	52255	Pipe	1 X .6	5.0	
10	52475	Pipe	1 X .6	5.5	
11	52710	SLAB	1 X 1	5.0	
12	53475	SLAB	1 X 1	5.0	
13	53550	SLAB	1 X .6	5.0	
14	53870	SLAB	1 X 1	5.2	
15	53920	SLAB	1 X 1	5.0	
16	54020	Pipe	1 X .35	5.2	
17	54050	SLAB	1 X 1	5.0	
18	54620	Pipe	1 X .9	5.3	
19	55550	Not visible	-	5.0	
20	55530	BOX	2 X 2	7.5	
21	55610	SLAB	1 X 1	5.0	
22	55700	SLAB	1 X 1	5.0	
23	55732	BOX	2 X 2	7.5	
24	56270	SLAB	1 X 1	5.0	
25	56570	SLAB	1 X 1	5.0	
26	56524	BOX	2 X 2	7.5	
27	56639	BOX	2 X 2	7.5	
28	56895	SLAB	1 X 1	5.0	
29	56973	BOX	2 X 2	7.5	
30	57030	SLAB	1 X 1	5.0	
31	57160	Not visible	-	5.0	
32	57260	SLAB	1 X 1	5.0	
33	57320	SLAB	1 X 1	5.5	

34	57450	SLAB	1 X 1	5.3	
35	57600	SLAB	1 X 1	5.0	
36	57650	SLAB	1 X 3	5.0	
37	57750	Pipe	1 X .9	5.0	
38	57900	SLAB	1 X 1.5	5.5	
39	58320	SLAB	1 X 2.0	5.3	
40	58325	SLAB	1 X 1	5.5	
41	58500	SLAB	1 X 1	5.0	
42	58625	SLAB	1 X 1	5.0	
43	58750	Not visible	-	5.4	
44	59000	SLAB	1 X 1	5.0	
45	59150	SLAB	1 X 1	5.0	
46	59270	SLAB	1 X 1	5.0	
47	59494	SLAB	1 X 1.5	5.5	
48	59550	Pipe	1 X .9	5.3	
49	59640	SLAB	1 X 1	5.0	
50	59825	SLAB	1 X 1	5.0	
51	60160	SLAB	1 X 1	5.0	
52	60350	SLAB	1 X 1	5.0	
53	60600	SLAB	1 X 1	5.0	
54	61080	SLAB	1 X 1	5.0	
55	61190	SLAB	1 X 1	5.0	
56	61330	SLAB	1 X 6.0	6.0	
57	61510	SLAB	1 X 1	5.0	
58	61700	SLAB	1 X 1	5.0	
59	61810	Not visible	-	5.1	
60	61950	SLAB	1 X 1	6.0	
61	62280	SLAB	1 X 1.5	6.1	
62	62410	SLAB	1 X 1	5.0	
63	62510	SLAB	1 X 1	5.0	
64	62650	SLAB	1 X 1	5.0	
65	62745	SLAB	1 X 1	5.0	
66	62810	SLAB	1 X 1	5.0	
67	63125	SLAB	1 X 1	5.0	
68	63260	SLAB	1 X 1.5	5.5	
69	63280	SLAB	1 X 1.5	5.3	
70	63560	SLAB	1 X 1	5.0	
71	63650	SLAB	1 X 1	5.0	
72	63750	SLAB	1 X 1	5.0	
73	63820	SLAB	1 X 1	5.0	
74	64125	SLAB	1 X 1	5.0	
75	64358	SLAB	1 X 1	5.0	
76	64455	SLAB	1 X 1	5.0	

77	64560	SLAB	1 X 1	5.0	
78	64610	SLAB	1 X 1	5.0	
79	64740	SLAB	1 X 1	5.0	
80	64800	SLAB	1 X 1	5.0	
81	64990	SLAB	1 X 1	5.0	
82	65300	SLAB	1 X 1	5.0	
83	65575	SLAB	1 X 1	5.0	
84	65740	SLAB	1 X 1	5.0	
85	65810	SLAB	1 X 1.5	5.2	
86	65950	SLAB	1 X 1.5	5.3	
87	66150	Not visible	Not visible	5.2	
88	66350	SLAB	1 X 1	5.0	
89	66400	SLAB	1 X 1	5.0	
90	66480	SLAB	1 X 1.5	5.4	
91	66790	SLAB	1 X 2.2	5.3	
92	67480	SLAB	1 X 3.0	5.2	
93	67660	SLAB	1 X 2.0	5.6	
94	68000	SLAB	1 X 1	5.0	
95	68440	SLAB	1 X 1.5	5.5	
96	68680	SLAB	1 X 1.5	5.1	
97	68870	SLAB	1 X 1.5	5.4	
98	69110	SLAB	1 X 1	5.0	

12. Bus Shelters

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

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

13. Truck Lay Bye

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

Sl. 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)	From (Km)		Masonry/CC (Pucca)	Earthen (Kutcha)
1	51.120	51.128	Right	-	Yes
2	51.175	53.128	Right	-	Yes
3	530175	53.280	**Left**	-	Yes
4	54.590	54.800	Right	-	Yes
5	54.855	55.075	Left	-	Yes
6	55.100	55.610	Left	-	Yes
7	55.625	55.975	Left	-	Yes
8	56.000	56.275	Right	-	Yes
9	56.444	56.575	Right	-	Yes
10	56.580	56.860	Right	-	Yes
11	56.880	57.025	Right	-	Yes
12	57.050	57.150	Right	-	Yes
13	57.200	57.450	Right	-	Yes
14	57.520	57.580	Right	-	Yes
15	57.605	57.650	Right	-	Yes
16	57.700	57.750	Right	-	Yes
17	57.760	57.800	Right	-	Yes
18	58.325	58.450	Right	-	Yes
19	58.503	58.555	Right	-	Yes
20	58.655	58.730	Right	-	Yes
21	58.750	59.000	Right	-	Yes
22	59.005	59.145	Right	-	Yes
23	59.150	59.480	Right	-	Yes
24	59.510	59.530	Right	-	Yes
25	59.560	59.610	Right	-	Yes
26	59.650	59.830	Right	-	Yes
27	59.835	60.150	Right	-	Yes
28	60.160	60.250	Right	-	Yes
29	60.855	60.925	Right	-	Yes
30	62.375	62.502	Right	-	Yes
31	62.525	62.560	Right	-	Yes
32	62.575	63.640	Right	-	Yes
33	63.652	64.125	Right	-	Yes
34	64.150	65.010	Right	-	Yes
35	65.050	65.078	Right	-	Yes

36	65.140	65.200	Right	-	Yes
37	65.275	65.290	Right	-	Yes
38	65.550	65.575	Right	-	Yes
39	65.700	65.790	Right	-	Yes
40	65.850	65.940	Right	-	Yes
41	66.050	66.090	Right	-	Yes
42	66.130	66.185	Right	-	Yes
43	66.275	66.350	Right	-	Yes
44	66.375	66.470	Right	-	Yes
45	66.520	66.625	Right	-	Yes
46	66.700	66.780	Right	-	Yes
47	66.820	67.205	Right	-	Yes
48	67.260	67.475	Right	-	Yes
49	67.500	67.750	Right	-	Yes

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	NH
NIL								

16. Minor Junctions

The details of major junctions are as follows:

SL. No.	Existing Chainage (Km)	Design Chainage (Km)	Type	
			'T' Junction	Cross Road both sides
1	50.450	44.000	Yes	-
2	56.875	49.185	Yes	-

3	60.300	52.055	Yes	-
4	65.025	55.980	Yes	-
5	68.300	58.480	Yes	-

17. Bypasses

The details of bypasses are as follows:

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

18. Other Structures/Details

The details of other structures are as follows:

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

SI. No	**Design Chainage**		**Length in km**	**Existing ROW**	**Proposed ROW Width (m)**	**Date of Providing proposed ROW**
	From	**To**				

100% RoW	44.000	59.363	15.363	24.0 mtr	24.0 mtr	100% RoW width is available

Annex-III
(Schedule-A)
Alignment Plans

It is enclosed.

Annex-IV
(Schedule-A)

Environmental Clearances

The following Forest clearance has been obtained:
The project highway does notrequiredenvironment clearance as per MoEF corrigendum dated 22.08.2013.

Forest Clearance (Stage II) has been issued by Ministry of Environment and Forest vide their letter no FOR.3-204/Cons/2016/1756-61 dated 16th January 2018 (Copy enclosed) after fulfilment of all the stipulated conditions of Stage – I approval. The Contractor is to comply with all stipulations pertaining to

execution to execution at site during construction as stated in approval in totality.

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

SCHEDULE – B

(See 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.

“Construction of Balance work of Two-lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km 70.000 [Design Km. 44.000 to Km.59.363] (Design Length - 15.363 Km)in the state of Arunachal Pradesh under SARDP-NE”

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. Minimize the occurrence and adverse effects of accidents and ensure that all accidents and emergencies are responded to as quickly as possible;

g. Minimize the risk of damage, destruction or disturbance to third party property;

h. Ensure that members of the public are treated with all due courtesy and consideration;

i. Provide a safe, clear and informative system of road signs;

j. Comply with any specified programme requirements, including for the completion of the new road;

k. Enable standards 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. WIDENING OF THE EXISTING HIGHWAY

2.1 Notwithstanding the basic alignment plans enclosed with this document the Construction Contractor shall himself carryout and be responsible for engineering surveys, investigation and detailed engineering designs and prepare the working drawings for all the components relevant for the improvement and up-gradation of the Project Highway to fulfill the scope of the project as envisaged 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.

2.2 Width of Carriageway

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

2.2.2 Except as otherwise provided in this Agreement, the width of the paved carriageway and cross-sectional features shall conform to paragraph 2.1 above.

3. GEOMETRIC DESIGN AND GENERAL FEATURES

3.1 General

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

3.2 Design speed

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

3.3 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-III)

S.NO.	DESIGN CHAINAGE		EXISTING CHAINAGE		LENGTH
	FROM	TO	FROM	TO	(m)
1	44000	44080	50050	50180	80
2	44100	44180	50190	50300	80
3	44200	44230	50330	50360	30
4	44340	44420	50485	50610	80
5	44540	44580	50725	50760	40
6	44640	44720	50830	50950	80
7	44790	44960	51010	51270	170
8	45070	45310	51370	51850	240
9	45430	45510	51970	52130	80
10	45590	45620	52200	52225	30
11	45730	45800	52375	52440	70
12	45830	45920	52490	52675	90
13	46000	46110	52745	52850	110
14	46190	46230	52930	52975	40
15	46360	46560	53100	53305	200
16	46580	46900	53350	53890	320
17	46960	47780	53950	55150	820
18	47880	48000	55330	55460	120
19	48500	48850	56160	56550	350
20	48880	48950	56580	56640	70
21	49230	49250	56930	57000	20
22	49370	49390	57110	57150	20
23	49420	49650	57200	57550	230
24	49690	49980	57595	57900	290
25	50000	50230	57920	58330	230
26	50270	50290	58350	58370	20
27	50310	50340	58400	58480	30
28	50460	50580	58590	58700	120
29	50630	50670	58800	58820	40

S.NO.	DESIGN CHAINAGE		EXISTING CHAINAGE		LENGTH
	FROM	TO	FROM	TO	(m)
30	50960	51080	59150	59250	120
31	51180	51270	59350	59450	90
32	51390	51460	59630	59700	70
33	51630	52310	59900	60650	680
34	52360	52675	60705	61060	315
35	52685	52840	61070	61250	155
36	52870	52950	61270	61400	80
37	53020	53070	61510	61600	50
38	53346	53500	61910	62070	154
39	53700	55250	62270	64350	1550
40	55400	57200	64505	66790	1800
				Total	**9164**

Improvement due to Sharp Curves: Package-III

SL. No	Design Chainage(m)		Remarks
	From	To	
1	44+051.935	44+073.767	Radius <300
2	44+193.046	44+233.364	Radius <300
3	44+237.643	44+290.896	Radius <300
4	44+337.680	44+359.738	Radius <300
5	44+416.098	44+418.401	Radius <300
6	44+494.462	44+496.453	Radius <300
7	44+627.873	44+700.472	Radius <300
8	44+865.704	44+922.997	Radius <300
9	45+054.176	45+061.945	Radius <300
10	45+116.610	45+388.887	Radius <300
11	45+600.351	45+744.950	Radius <300
12	45+803.918	45+820.887	Radius <300
13	45+945.545	45+957.870	Radius <300
14	46+038.854	46+261.710	Radius <300
15	46+333.750	46+365.868	Radius <300
16	46+439.359	46+512.559	Radius <300
17	46+583.952	46+620.103	Radius <300

SL. No	Design Chainage(m)		Remarks
18	46+762.252	46+845.550	Radius <300
19	46+992.731	47+034.304	Radius <300
20	47+195.257	47+216.697	Radius <300
21	47+319.166	47+362.793	Radius <300
22	47+440.372	47+481.175	Radius <300
23	47+588.173	47+602.319	Radius <300
24	47+707.991	47+860.556	Radius <300
25	47+969.991	48+043.245	Radius <300
26	48+152.301	48+190.465	Radius <300
27	48+292.963	48+330.984	Radius <300
28	48+404.716	48+426.534	Radius <300
29	48+493.047	48+499.370	Radius <300
30	48+526.436	48+543.285	Radius <300
31	48+561.674	48+599.478	Radius <300
32	48+646.294	48+655.202	Radius <300
33	48+715.774	48+731.167	Radius <300
34	48+746.820	48+767.151	Radius <300
35	48+798.746	48+800.771	Radius <300
36	48+845.362	48+858.560	Radius <300
37	48+920.674	48+982.233	Radius <300
38	49+058.405	49+214.279	Radius <300
39	49+264.489	49+297.811	Radius <300
40	49+479.784	49+508.122	Radius <300
41	49+611.920	49+613.019	Radius <300
42	49+655.070	49+686.670	Radius <300
43	49+726.742	49+730.563	Radius <300
44	49+802.164	49+854.846	Radius <300
45	49+896.313	49+916.713	Radius <300
46	49+951.298	49+970.980	Radius <300
47	50+012.938	50+018.722	Radius <300
48	50+090.384	50+107.606	Radius <300
49	50+167.691	50+257.177	Radius <300
50	50+355.729	50+408.361	Radius <300
51	50+475.076	50+503.111	Radius <300
52	50+588.928	50+730.554	Radius <300
53	50+844.870	50+861.598	Radius <300

SL. No	Design Chainage(m)		Remarks
54	50+933.471	50+960.881	Radius <300
55	51+055.293	51+178.211	Radius <300
56	51+236.079	51+240.196	Radius <300
57	51+318.890	51+353.597	Radius <300
58	51+426.875	51+449.333	Radius <300
59	51+581.921	51+608.274	Radius <300
60	51+659.131	51+700.996	Radius <300
61	51+776.737	51+798.148	Radius <300
62	51+855.048	51+892.041	Radius <300
63	51+962.566	51+972.589	Radius <300
64	52+070.918	52+073.296	Radius <300
65	52+155.528	52+158.609	Radius <300
66	52+286.155	52+292.783	Radius <300
67	52+336.215	52+351.699	Radius <300
68	52+383.617	52+419.043	Radius <300
69	52+477.663	52+483.116	Radius <300
70	52+558.930	52+582.359	Radius <300
71	52+646.647	52+662.344	Radius <300
72	52+732.641	52+743.225	Radius <300
73	52+807.137	52+850.579	Radius <300
74	52+889.610	52+968.638	Radius <300
75	53+089.239	53+101.634	Radius <300
76	53+283.432	53+396.166	Radius <300
77	53+480.514	53+512.802	Radius <300
78	53+625.359	53+641.155	Radius <300
79	53+748.282	53+868.088	Radius <300
80	54+042.876	54+049.363	Radius <300
81	54+294.758	54+325.996	Radius <300
82	54+404.778	54+449.960	Radius <300
83	54+481.691	54+498.586	Radius <300
84	54+584.061	54+628.058	Radius <300
85	54+718.454	54+780.872	Radius <300
86	54+874.078	54+885.037	Radius <300
87	54+929.833	54+949.569	Radius <300
88	54+993.152	55+041.864	Radius <300
89	55+075.223	55+152.896	Radius <300

SL. No	Design Chainage(m)		Remarks
90	55+242.454	55+301.515	Radius <300
91	55+479.230	55+497.833	Radius <300
92	55+566.486	55+598.650	Radius <300
93	55+634.142	55+696.470	Radius <300
94	55+759.982	55+789.503	Radius <300
95	55+856.269	55+874.914	Radius <300
96	55+932.126	55+952.228	Radius <300
97	55+995.608	55+997.804	Radius <300
98	56+078.264	56+140.683	Radius <300
99	56+218.857	56+297.862	Radius <300
100	56+352.298	56+376.159	Radius <300
101	56+415.813	56+424.054	Radius <300
102	56+444.811	56+463.932	Radius <300
103	56+545.377	56+634.775	Radius <300
104	56+673.682	56+699.451	Radius <300
105	56+783.481	56+802.961	Radius <300
106	56+872.316	56+975.984	Radius <300
107	57+020.747	57+060.431	Radius <300
108	57+094.302	57+100.808	Radius <300
109	57+142.369	57+180.522	Radius <300
110	57+185.657	57+212.974	Radius <300
111	57+269.589	57+303.459	Radius <300
112	57+366.656	57+399.879	Radius <300
113	57+454.981	57+469.703	Radius <300
114	57+504.635	57+545.318	Radius <300
115	57+557.241	57+600.308	Radius <300
116	57+704.158	57+719.562	Radius <300
117	57+856.278	57+884.964	Radius <300
118	57+981.144	58+070.569	Radius <300
119	58+130.081	58+148.896	Radius <300
120	58+210.963	58+221.769	Radius <300
121	58+279.262	58+305.610	Radius <300
122	58+365.362	58+416.154	Radius <300
123	58+428.851	58+450.568	Radius <300
124	58+595.493	58+621.347	Radius <300
125	58+670.013	59+330	Radius <300

3.4 Proposed Right of Way

[Refer to paragraph 2.3 of the Manual]. Details of the Right of Way are given in are tabulated below.

Sl. No	Design Chainage		Length	Width (m)
	From	To		
1.	44.000	59.363	15.363	18m – 35m

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

3.5 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.

3.6 Lateral and vertical clearances at underpasses

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

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

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

3.7 Lateral and vertical clearances at overpasses

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

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

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

3.8 Service roads

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

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

3.9 Grade Separated Structures

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

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

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

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

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

3.10 Cattle and pedestrian underpass / overpass

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

Sl No.	Location	Type of Crossing
Nil		

3.11 Typical cross-sections of the Project Highway

Typical cross-sections to be followed as per IRC: SP-73-2015 and in addition the proposed cross section for various situations are given in Fig.B-1 to B-4. These illustrate the widening proposals for the project highway. The Project Highway (length 15.363km) 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:

S.NO.	DESIGN CHAINAGE		LENGTH	TYPE	Remarks / Location
	FROM	TO	(m)	TCS	
1	44000	44080	80	3	Realignment
2	44080	44100	20	2	Reconstruction and widening
3	44100	44180	80	3	Realignment
4	44180	44200	20	2	Reconstruction and widening
5	44200	44230	30	3	Realignment
6	44230	44340	110	2	Reconstruction and widening
7	44340	44420	80	3	Realignment
8	44420	44540	120	2	Reconstruction and widening

S.NO.	DESIGN CHAINAGE		LENGTH	TYPE	Remarks / Location
9	44540	44580	40	3	Realignment
10	44580	44640	60	2	Reconstruction and widening
11	44640	44720	80	3	Realignment
12	44720	44790	70	1	Reconstruction and widening with Retaining wall
13	44790	44960	170	3	Realignment
14	44960	45070	110	2	Reconstruction and widening
15	45070	45310	240	3	Realignment
16	45310	45430	120	2	Reconstruction and widening
17	45430	45510	80	3	Realignment
18	45510	45590	80	2	Reconstruction and widening
19	45590	45620	30	3	Realignment
20	45620	45730	110	2	Reconstruction and widening
21	45730	45800	70	3	Realignment
22	45800	45830	30	2	Reconstruction and widening
23	45830	45920	90	3	Realignment
24	45920	46000	80	2	Reconstruction and widening
25	46000	46110	110	3	Realignment
26	46110	46190	80	2	Reconstruction and widening
27	46190	46230	40	3	Realignment
28	46230	46360	130	2	Reconstruction and widening
29	46360	46560	200	3	Realignment
30	46560	46580	20	2	Reconstruction and widening
31	46580	46900	320	3	Realignment
32	46900	46960	60	2	Reconstruction and widening
33	46960	47780	820	3	Realignment
34	47780	47810	30	2	Reconstruction and widening
35	47810	47830	20	1	Reconstruction and widening with Retaining wall

S.NO.	DESIGN CHAINAGE		LENGTH	TYPE	Remarks / Location
36	47830	47880	50	1	Reconstruction and widening with Retaining wall
37	47880	48000	120	3	Realignment
38	48000	48450	450	2	Reconstruction and widening
39	48450	48490	40	2	Reconstruction and widening with Retaining wall
40	48490	48500	10	2	Reconstruction and widening
41	48500	48850	350	3	Realignment
42	48850	48880	30	2	Reconstruction and widening
43	48880	48950	70	3	Realignment
44	48950	49000	50	2	Reconstruction and widening
45	49000	49200	200	1	Reconstruction and widening with Retaining wall
46	49200	49230	30	1	Reconstruction and widening with Retaining wall
47	49230	49250	20	3	Realignment
48	49250	49370	120	2	Reconstruction and widening
49	49370	49390	20	3	Realignment
50	49390	49420	30	2	Reconstruction and widening
51	49420	49650	230	3	Realignment
52	49650	49690	40	1	Reconstruction and widening with Retaining wall
53	49690	49980	290	3	Realignment
54	49980	50000	20	1	Reconstruction and widening with Retaining wall
55	50000	50230	230	3	Realignment
56	50230	50270	40	2	Reconstruction and widening
57	50270	50290	20	3	Realignment
58	50290	50310	20	2	Reconstruction and widening
59	50310	50340	30	3	Realignment
60	50340	50460	120	2	Reconstruction and widening
61	50460	50580	120	3	Realignment

S.NO.	DESIGN CHAINAGE		LENGTH	TYPE	Remarks / Location
62	50580	50630	50	1	Reconstruction and widening with Retaining wall
63	50630	50670	40	3	Realignment
64	50670	50960	290	2	Reconstruction and widening
65	50960	51080	120	3	Realignment
66	51080	51180	100	2	Reconstruction and widening
67	51180	51270	90	3	Realignment
68	51270	51390	120	2	Reconstruction and widening
69	51390	51460	70	3	Realignment
70	51460	51630	170	1	Reconstruction and widening with Retaining wall
71	51630	52310	680	3	Realignment
72	52310	52360	50	1	Reconstruction and widening with Retaining wall
73	52360	52675	315	3	Realignment
74	52675	52685	10	2	Reconstruction and widening
75	52685	52840	155	3	Realignment
76	52840	52870	30	2	Reconstruction and widening
77	52870	52950	80	3	Realignment
78	52950	53020	70	2	Reconstruction and widening
79	53020	53070	50	3	Realignment
80	53070	53346	276	2	Reconstruction and widening
81	53346	53500	154	3	Realignment
82	53500	53700	200	2	Reconstruction and widening
83	53700	55250	1550	3	Realignment
84	55250	55400	150	2	Reconstruction and widening
85	55400	57200	1800	3	Realignment
86	57200	59363	2163	4	Built up area
		Total	**15363**		

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

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

3.12 Longitudinal Section

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

3.13 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	New Palin	58+200

4. 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:

(a) At-grade Intersections

Major Intersections

Sl No.	Location of Intersection	Existing Configurations				Figure No.	Other Features
			Type				
Nil							

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

Minor Intersections

Sl No.	Location of Intersection	Type of Intersection	Side
1	44+300	3-Legged	Left side
2	49+360	3-Legged	Left side
3	52+040	3-Legged	Left side
4	56+810	3-Legged	Left side
5	57+200	3-Legged	Right side
6	57+765	3-Legged	Right side
7	58+080	3-Legged	Right side
8	58+135	3-Legged	Right side
9	58+460	3-Legged	Right side

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

(b) **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				

5. ROAD EMBANKMENT AND CUT SECTION

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

5.2 Raising of the existing road [Refer to paragraph 4.2.2 of the Manual and specify sections to be raised].

The existing road shall be raised in the following sections:

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

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

6. PAVEMENT DESIGN

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

6.2 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.

6.3 Design requirements

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

6.3.1 Design Period and strategy

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

6.3.2 Design Traffic

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

PACKAGE	Design Chainage (km)		Length (km)	15 Year MSA*
	From	To		
III	44+000	59+363	15.363	20

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

6.3.3 Design Parameters

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

Indicative Design Parameters

(i)	Performance Period	15 years + Construction Period of 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)	Design serviceability Loss	2.0
(iv)	Reliability	90%
(v)	Overall Standard Deviation	0.49
(vi)	Effective Roadblock Soil Resilient Modulus	Corresponding to 4-day soaked CBR value of 8.0% to 10.0%
(vii)	Layer Coefficients	As per the IRC 37 : 2012 procedures
(viii)	Drainage quality of Pavement	Good

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

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

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

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

6.3.8 Rigid Pavement

No rigid pavement has been considered for the Project Highway.

6.4 Reconstruction / Realignment / Bypass of sections

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

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

Sl No.	Section (km)		Remarks
	From	To	
1	44+000	59+363	Poor condition of existing pavement

7. ROADSIDE DRAINAGE

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

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

7.1 Drainage Measures

Following measures shall be adopted:

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

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

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

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

Details of Lined Drains

SL.NO.	Package	DESIGN CHAINAGE		LENGTH	SIDE	Remarks / Location
		FROM	TO	(m)		
1	PKG-3	44000	44080	160	Both	Realignment
2	PKG-3	44080	44100	20	One	Widening
3	PKG-3	44100	44180	160	Both	Realignment
4	PKG-3	44180	44200	20	One	Widening
5	PKG-3	44200	44230	60	Both	Realignment
6	PKG-3	44230	44340	110	One	Widening
7	PKG-3	44340	44420	160	Both	Realignment
8	PKG-3	44420	44540	120	One	Widening
9	PKG-3	44540	44580	80	Both	Realignment

10	PKG-3	44580	44640	60	One	Widening
11	PKG-3	44640	44720	160	Both	Realignment
12	PKG-3	44720	44790	70	One	widening
13	PKG-3	44790	44960	340	Both	Realignment
14	PKG-3	44960	45070	110	One	Widening
15	PKG-3	45070	45310	480	Both	Realignment
16	PKG-3	45310	45430	120	One	Widening
17	PKG-3	45430	45510	160	Both	Realignment
18	PKG-3	45510	45590	80	One	Widening
19	PKG-3	45590	45620	60	Both	Realignment
20	PKG-3	45620	45730	110	One	Widening
21	PKG-3	45730	45800	140	Both	Realignment
22	PKG-3	45800	45830	30	One	Widening
23	PKG-3	45830	45920	180	Both	Realignment
24	PKG-3	45920	46000	80	One	Widening
25	PKG-3	46000	46110	220	Both	Realignment
26	PKG-3	46110	46190	80	One	Widening
27	PKG-3	46190	46230	80	Both	Realignment
28	PKG-3	46230	46360	130	One	Widening
29	PKG-3	46360	46560	400	Both	Realignment
30	PKG-3	46560	46580	20	One	Widening
31	PKG-3	46580	46900	640	Both	Realignment
32	PKG-3	46900	46960	60	One	Widening
33	PKG-3	46960	47780	1640	Both	Realignment
34	PKG-3	47780	47810	30	One	Widening

35	PKG-3	47810	47830	20	One	widening
36	PKG-3	47830	47880	50	One	widening
37	PKG-3	47880	48000	240	Both	Realignment
38	PKG-3	48000	48450	450	One	Widening
39	PKG-3	48450	48490	40	One	widening
40	PKG-3	48490	48500	10	One	Widening
41	PKG-3	48500	48850	700	Both	Realignment
42	PKG-3	48850	48880	30	One	Widening
43	PKG-3	48880	48950	140	Both	Realignment
44	PKG-3	48950	49000	50	One	Widening
45	PKG-3	49000	49200	200	One	widening
46	PKG-3	49200	49230	30	One	widening
47	PKG-3	49230	49250	40	Both	Realignment
48	PKG-3	49250	49370	120	One	Widening
49	PKG-3	49370	49390	40	Both	Realignment
50	PKG-3	49390	49420	30	One	Widening
51	PKG-3	49420	49650	460	Both	Realignment
52	PKG-3	49650	49690	40	One	widening
53	PKG-3	49690	49980	580	Both	Realignment
54	PKG-3	49980	50000	20	One	widening
55	PKG-3	50000	50230	460	Both	Realignment

56	PKG-3	50230	50270	40	One	Widening
57	PKG-3	50270	50290	40	Both	Realignment
58	PKG-3	50290	50310	20	One	Widening
59	PKG-3	50310	50340	60	Both	Realignment
60	PKG-3	50340	50460	120	One	Widening
61	PKG-3	50460	50580	240	Both	Realignment
62	PKG-3	50580	50630	50	One	widening
63	PKG-3	50630	50670	80	Both	Realignment
64	PKG-3	50670	50960	290	One	Widening
65	PKG-3	50960	51080	240	Both	Realignment
66	PKG-3	51080	51180	100	One	Widening
67	PKG-3	51180	51270	180	Both	Realignment
68	PKG-3	51270	51390	120	One	Widening
69	PKG-3	51390	51460	140	Both	Realignment
70	PKG-3	51460	51630	170	One	widening
71	PKG-3	51630	52310	1360	Both	Realignment
72	PKG-3	52310	52360	50	One	widening
73	PKG-3	52360	52675	630	Both	Realignment
74	PKG-3	52675	52685	10	One	Widening
75	PKG-3	52685	52840	310	Both	Realignment
76	PKG-3	52840	52870	30	One	Widening
77	PKG-3	52870	52950	160	Both	Realignment
78	PKG-3	52950	53020	70	One	Widening
79	PKG-3	53020	53070	100	Both	Realignment

80	PKG-3	53070	53346	276	One	Widening
81	PKG-3	53346	53500	308	Both	Realignment
82	PKG-3	53500	53700	200	One	Widening
83	PKG-3	53700	55250	3100	Both	Realignment
84	PKG-3	55250	55400	150	One	Widening
85	PKG-3	55400	57200	3600	Both	Realignment
86	PKG-3	57200	59363	4326	Both	Built up area
Total				**26690**		

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.

7.2 Slope Protection Measures

7.2.1 Breast Wall and Retaining Wall

Following measures shall be adopted:

Slope protection along hill slope side shall be with breast walls with PCC minimum M15 grade concrete. However, at the zones prone to sliding breast walls will be of sausage type (by stone-mesh gabions) or specialized treatment as per good engineering practices. Retaining wall has been considered at valley sides. The height of breast walls is varying from 1.5 m to 3m as per site requirement and to be finalized by consultation with Authority Engineers. The breast wall of height 3m has been considered if the height of hill cut is more than 9m and in this circumstances 3m berm with catch water drain is required to be provided. The maximum cut slope at hill side is 55^0 (0.7H to 1V). Slide prone zones is from Km 48+300 to Km 48+900 and Km 49+400 to Km 49+800.

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

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

7.3 Rip Rap Protection:

The 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	44080	44100	20
2	44180	44200	20
3	44230	44340	110
4	44420	44540	120
5	44580	44640	60
6	44720	44790	70
7	44960	45070	110
8	45310	45430	120
9	45510	45590	80
10	45620	45730	110
11	45800	45830	30
12	45920	46000	80
13	46110	46190	80
14	46230	46360	130
15	46560	46580	20
16	46900	46960	60
17	47780	47810	30
18	47810	47830	20
19	47830	47880	50
20	48000	48450	450
21	48450	48490	40
22	48490	48500	10
23	48850	48880	30
24	48950	49120	170
25	49120	49200	80

Sl. No	Chainage		Length(m)
	From (km)	To(km)	
26	49200	49230	30
27	49250	49370	120
28	49390	49420	30
29	49650	49690	40
30	49980	50000	20
31	50230	50270	40
32	50290	50310	20
33	50340	50460	120
34	50580	50630	50
35	50670	50960	290
36	51080	51180	100
37	51270	51390	120
38	51460	51630	170
39	52310	52360	50
40	52675	52685	10
41	52840	52870	30
42	52950	53020	70
43	53070	53346	276
44	53500	53700	200
45	55250	55400	150

8. DESIGN OF STRUCTURES

8.1 General

The Project road from Dam to New Palin, includes provision of no major bridges (span>=60m), 4 no minor bridge (span<60m) and 93 box culverts. All culverts and other structures shall be designed and constructed in accordance with section 7 of the Manual and shall conform to the cross-sectional features and other details specified therein. New bridges and culverts shall be constructed wide enough to accommodate the adjacent road cross section as given in this Schedule-B. The details of 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.

8.2 Culverts

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

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

Sl. No.	Existing Chainage (km)	Design Chainage (km)	Proposal	Proposed Span
1	50+160	44+080	RCC Box/ Slab	2.0

2	50+360	44+230	RCC Box/ Slab	2.0
3	50+500	44+370	RCC Box/ Slab	2.0
4	50+830	44+640	RCC Box/ Slab	2.0
5	52+710	45+980	RCC Box/ Slab	2.0
6	53+475	46+690	RCC Box/ Slab	2.0
7	53+870	46+890	RCC Box/ Slab	2.0
8	54+020	47+030	RCC Box/ Slab	2.0
9	54+050	47+070	RCC Box/ Slab	2.0
10	55+700	48+150	RCC Box/ Slab	2.0
11	56+270	48+230	RCC Box/ Slab	2.0
12	57+260	49+490	RCC Box/ Slab	2.0
13	57+750	49+860	RCC Box/ Slab	2.0
14	58+625	50+500	RCC Box/ Slab	2.0
15	58+750	50+600	RCC Box/ Slab	2.0
16	59+640	51+400	RCC Box/ Slab	2.0
17	59+825	51+570	RCC Box/ Slab	2.0
18	60+350	52+110	RCC Box/ Slab	2.0
19	62+650	54+050	RCC Box/ Slab	2.0
20	62+745	54+150	RCC Box/ Slab	2.0
21	62+810	54+210	RCC Box/ Slab	2.0
22	64+990	55+710	RCC Box/ Slab	2.0
23	65+810	56+390	RCC Box/ Slab	2.0
24	65+950	56+490	RCC Box/ Slab	2.0
25	66+150	56+640	RCC Box/ Slab	2.0
26	66+400	56+850	RCC Box/ Slab	2.0
27	66+480	56+930	RCC Box/ Slab	2.0
28	67+480	57+760	RCC Box/ Slab	3.0
29	67+660	57+920	RCC Box/ Slab	2.0
30	68+440	58+600	RCC Box/ Slab	2.0
31	68+870	59+000	RCC Box/ Slab	2.0

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

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

Sl. No.	Existing	Design	Proposal	Span

	Chainage (km)	Chainage (km)		
1	50+290	44+160	RCC Box/ Slab	2.0
2	51+450	45+130	RCC Box/ Slab	2.0
3	51+500	45+170	RCC Box/ Slab	2.0
4	51+860	45+330	RCC Box/ Slab	2.0
5	52+255	45+640	RCC Box/ Slab	2.0
6	52+475	45+810	RCC Box/ Slab	2.0
7	53+550	46+800	RCC Box/ Slab	2.0
8	53+920	46+930	RCC Box/ Slab	2.0
9	54+620	47+410	RCC Box/ Slab	2.0
10	55+550	47+740	RCC Box/ Slab	2.0
11	55+610	48+080	RCC Box/ Slab	2.0
12	56+570	48+890	RCC Box/ Slab	2.0
13	56+895	49+190	RCC Box/ Slab	2.0
14	57+030	49+280	RCC Box/ Slab	2.0
15	57+160	49+400	RCC Box/ Slab	2.0
16	57+320	49+530	RCC Box/ Slab	2.0
17	57+450	49+570	RCC Box/ Slab	2.0
18	57+900	49+980	RCC Box/ Slab	2.0
19	58+320	50+250	RCC Box/ Slab	2.0
20	58+325	50+310	RCC Box/ Slab	2.0
21	58+500	50+360	RCC Box/ Slab	2.0
22	59+000	50+850	RCC Box/ Slab	2.0
23	59+150	50+980	RCC Box/ Slab	2.0
24	59+270	51+090	RCC Box/ Slab	2.0
25	59+494	51+280	RCC Box/ Slab	2.0
26	59+550	51+330	RCC Box/ Slab	2.0
27	60+160	51+910	RCC Box/ Slab	2.0
28	60+600	52+280	RCC Box/ Slab	2.0
29	61+080	52+680	RCC Box/ Slab	2.0
30	61+190	52+790	RCC Box/ Slab	2.0
31	61+330	52+910	RCC Box/ Slab	6.0
32	61+510	52+980	RCC Box/ Slab	2.0
33	61+700	53+140	RCC Box/ Slab	2.0
34	61+810	53+270	RCC Box/ Slab	2.0
35	61+950	53+370	RCC Box/ Slab	2.0
36	62+280	53+700	RCC Box/ Slab	2.0

37	62+410	53+810	RCC Box/ Slab	2.0
38	62+510	53+920	RCC Box/ Slab	2.0
39	63+125	54+410	RCC Box/ Slab	2.0
40	63+260	54+440	RCC Box/ Slab	2.0
41	63+280	54+570	RCC Box/ Slab	2.0
42	63+560	54+740	RCC Box/ Slab	2.0
43	63+650	54+820	RCC Box/ Slab	2.0
44	63+750	54+910	RCC Box/ Slab	2.0
45	63+820	54+970	RCC Box/ Slab	2.0
46	64+125	55+190	RCC Box/ Slab	2.0
47	64+355	55+270	RCC Box/ Slab	2.0
48	64+455	55+330	RCC Box/ Slab	2.0
49	64+560	55+460	RCC Box/ Slab	2.0
50	64+610	55+500	RCC Box/ Slab	2.0
51	64+740	55+600	RCC Box/ Slab	2.0
52	64+800	55+640	RCC Box/ Slab	2.0
53	65+300	55+900	RCC Box/ Slab	2.0
54	65+575	56+150	RCC Box/ Slab	2.0
55	65+740	56+320	RCC Box/ Slab	2.0
56	66+350	56+790	RCC Box/ Slab	2.0
57	66+790	57+200	RCC Box/ Slab	2.0
58	68+000	58+160	RCC Box/ Slab	2.0
59	68+680	58+820	RCC Box/ Slab	2.0
60	69+110	59+250	RCC Box/ Slab	2.0

8.2.4 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	57+600	49+690	RCC Box/ Slab	2.0
2	57+650	49+750	RCC Box/ Slab	3.0

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

8.3 Bridges

8.3.1 The existing bridges to be reconstructed/widened

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

Sl No.	Existing Chainage	Design Chainage	Proposed Span(m)	Proposed Width(m)	Remarks
1	56+350	48+657	1 x 7	16.0	Reconstruction
2	56+420	48+740	1 x 7	16.0	Reconstruction
3	62+150	53+574	1 x 16	16.0	Reconstruction
4	69+200	59+346	1 x 33	16.0	Reconstruction

Sl No	Bridge Location (km)	Salient Details of Existing Bridge					Adequacy or Otherwise of the Existing Waterway, Vertical Clearance etc.	Remarks
				Total Width(m)	Type of construction			
1	56+350	1x7.0	6.1	6.6	RCC Slab	Open	Vertical Clearance~3.0m	Narrow Bridge
2	56+420	1x6.75	5.0	5.5	RCC Slab	Open	Vertical Clearance~3.2m	Narrow Bridge
3	62+150	1 X 15.5	3.5	5.0	DS type Bailey bridge	Open	Vertical Clearance~5.3m	Narrow Bridge
4	69+200	1 X 33.0	3.3	4.5	TS type bailey bridge	Open	Vertical Clearance~8.6m	Narrow Bridge

8.3.2 The following structures shall be provided with footpaths:

Sl No.	Location (km)	Remarks
1	48+657	Footpath on both sides

2	48+740	Footpath on both sides
3	53+574	Footpath on both sides
4	59+346	Footpath on both sides

8.3.3 Additional New Minor Bridges

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

Sl No.	Bridge at km	Utility Services to be Carried	Remarks
Nil			

8.3.4 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			

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

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

Sl No.	Location (km)	Remarks
Nil		

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

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

Sl No.	Location (km)	Remarks
Nil		

8.3.7 Drainage system for bridge decks

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

8.3.8 Structures in marine environment

[Refer to paragraph 7.22 of the Manual and specify the necessary measures / treatments for

protecting structures in marine environment, where applicable]

8.4 Rail-road Bridges

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

8.4.2 Road over-bridges

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

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

8.1.1 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		

8.5 Grade Separated Structures

[Refer to paragraph 7.20 of the Manual]

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

8.6 Underpasses/Overpasses

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

8.7 Repairs and strengthening of bridges and structures

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

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

A. Bridges

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

B. ROB / RUB

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

C. Overpasses / Underpasses and Other Structures

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

8.8 List of Major Bridges and Structures

The following is the list of Major Bridges

Sl No.	Location (km)
Nil	

9. TRAFFIC CONTROL DEVICES AND ROAD SAFETY WORKS

9.1 General

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

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

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.

9.2 Traffic Signs

(i) A complete range of permanent retro-reflective traffic signs as per the requirements defined in but not limited to the FPR, for the safe and efficient movement of traffic. These 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.

9.3 Pavement Marking

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

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

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

(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	1216.750
Centre line on curve portion	sqm	460.890
Edge Line at Paved Shoulder	sqm	6145.200
Add 15% for Misc. including Pedestrian X-ings etc	sqm	1173.426
Directional Arrows, letter marking etc.	Nos.	56
Advance Direction signs size 1800X1200 mm	Nos.	7
Village name boards size 600X900 mm	Nos.	60
Place Identification signs size 1200X900 mm	Nos.	5
90 cm Triangle	Nos.	9
90 cm Octagon	Nos.	9
60 cm circuler	Nos	75
Hazard plate 300X900 mm	Nos.	45
800 x 600 mm Size	Nos.	17
Boundary Stone (Clause 13 herein under)	Nos.	155
5th km stone	Nos.	3
Km stone	Nos.	12
Enamel Paint	sqm	965
Delineator	Nos	1345
Rip Rap	Rm	4036
Convex Mirror	Nos	40
W Type metal Crash Barrier	Rm	2683

10. ROADSIDE FURNITURE

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

10.1.2 Overhead traffic signs: location and size

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

The overhead signs shall be the reflectorised 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 (1 No. of Gantry & 1 no. of Cantilever) as per this manual.

Sl No.	Location (km)	Size	Remarks
1	50+030	5.5m x 2.1m	Cantilever
2	59+363	12m x 2.1m	Overhead Gantry

11. COMPULSORY AFFORESTATION

[Refer to paragraph 12.1 of the Manual and specify the number of trees which are required to be planted by the Contractor as compensatory afforestation.]
Minimum 1155 nos. trees are required to be planted.

12. HAZARDOUS LOCATIONS

Metal Beam crash barrier length of minimum 10050m (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 NHIDCL. 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	44+051.935	44+073.767	21.83	Radius<300m
2	44+416.098	44+418.401	02.30	Radius<300m
3	44+494.462	44+496.453	01.99	Radius<300m
4	44+627.873	44+700.472	72.60	Radius<300m
5	44+865.704	44+922.997	57.29	Radius<300m
6	45+054.176	45+061.945	07.77	Radius<300m
7	45+116.610	45+388.887	272.28	Radius<300m
8	45+600.351	45+744.950	144.60	Radius<300m
9	45+803.918	45+820.887	16.97	Radius<300m
10	45+945.545	45+957.870	12.33	Radius<300m
11	46+038.854	46+261.710	222.86	Radius<300m
12	46+333.750	46+365.868	32.12	Radius<300m
13	46+439.359	46+512.559	73.20	Radius<300m
14	46+583.952	46+620.103	36.15	Radius<300m
15	46+762.252	46+845.550	83.30	Radius<300m
16	46+992.731	47+034.304	41.57	Radius<300m
17	47+195.257	47+216.697	21.44	Radius<300m
18	47+319.166	47+362.793	43.63	Radius<300m
19	47+440.372	47+481.175	40.80	Radius<300m
20	47+588.173	47+602.319	14.15	Radius<300m
21	47+707.991	47+860.556	152.56	Radius<300m
22	47+969.991	48+043.245	73.25	Radius<300m
23	48+152.301	48+190.465	38.16	Radius<300m
24	48+292.963	48+330.984	38.02	Radius<300m
25	48+404.716	48+426.534	21.82	Radius<300m
26	48+493.047	48+499.370	06.32	Radius<300m
27	48+646.294	48+655.202	08.91	Radius<300m
28	48+845.362	48+858.560	13.20	Radius<300m
29	48+920.674	48+982.233	61.56	Radius<300m
30	49+058.405	49+214.279	155.87	Radius<300m
31	49+264.489	49+297.811	33.32	Radius<300m
32	49+479.784	49+508.122	28.34	Radius<300m
33	49+611.920	49+613.019	01.10	Radius<300m
34	49+726.742	49+730.563	03.82	Radius<300m

Sl No.	Location		Length (m)	Remarks
	From	To		
35	49+951.298	49+970.980	19.68	Radius<300m
36	50+012.938	50+018.722	05.78	Radius<300m
37	50+090.384	50+107.606	17.22	Radius<300m
38	50+167.691	50+257.177	89.49	Radius<300m
39	50+355.729	50+408.361	52.63	Radius<300m
40	50+475.076	50+503.111	28.03	Radius<300m
41	50+588.928	50+730.554	141.63	Radius<300m
42	50+844.870	50+861.598	16.73	Radius<300m
43	50+933.471	50+960.881	27.41	Radius<300m
44	51+055.293	51+178.211	122.92	Radius<300m
45	51+236.079	51+240.196	04.12	Radius<300m
46	51+318.890	51+353.597	34.71	Radius<300m
47	51+426.875	51+449.333	22.46	Radius<300m
48	51+581.921	51+608.274	26.35	Radius<300m
49	51+659.131	51+700.996	41.86	Radius<300m
50	51+776.737	51+798.148	21.41	Radius<300m
51	51+855.048	51+892.041	36.99	Radius<300m
52	51+962.566	51+972.589	10.02	Radius<300m
53	52+070.918	52+073.296	02.38	Radius<300m
54	52+155.528	52+158.609	03.08	Radius<300m
55	52+286.155	52+292.783	06.63	Radius<300m
56	52+336.215	52+351.699	15.48	Radius<300m
57	52+383.617	52+419.043	35.43	Radius<300m
58	52+477.663	52+483.116	05.45	Radius<300m
59	52+558.930	52+582.359	23.43	Radius<300m
60	52+646.647	52+662.344	15.70	Radius<300m
61	52+732.641	52+743.225	10.58	Radius<300m
62	52+807.137	52+850.579	43.44	Radius<300m
63	53+089.239	53+101.634	12.39	Radius<300m
64	53+283.432	53+396.166	112.73	Radius<300m
65	53+480.514	53+512.802	32.29	Radius<300m
66	53+625.359	53+641.155	15.80	Radius<300m
67	53+748.282	53+868.088	119.81	Radius<300m
68	54+042.876	54+049.363	06.49	Radius<300m
69	54+294.758	54+325.996	31.24	Radius<300m

Sl No.	Location		Length (m)	Remarks
	From	To		
70	54+404.778	54+449.960	45.18	Radius<300m
71	54+481.691	54+498.586	16.90	Radius<300m
72	54+584.061	54+628.058	44.00	Radius<300m
73	54+718.454	54+780.872	62.42	Radius<300m
74	54+874.078	54+885.037	10.96	Radius<300m
75	54+929.833	54+949.569	19.74	Radius<300m
76	54+993.152	55+041.864	48.71	Radius<300m
77	55+075.223	55+152.896	77.67	Radius<300m
78	55+242.454	55+301.515	59.06	Radius<300m
79	55+479.230	55+497.833	18.60	Radius<300m
80	55+566.486	55+598.650	32.16	Radius<300m
81	55+634.142	55+696.470	62.33	Radius<300m
82	55+759.982	55+789.503	29.52	Radius<300m
83	55+995.608	55+997.804	02.20	Radius<300m
84	56+078.264	56+140.683	62.42	Radius<300m
85	56+218.857	56+297.862	79.00	Radius<300m
86	56+545.377	56+634.775	89.40	Radius<300m
87	56+872.316	56+975.984	103.67	Radius<300m
88	57+366.656	57+399.879	33.22	Radius<300m
89	57+856.278	57+884.964	28.69	Radius<300m
90	57+981.144	58+070.569	89.43	Radius<300m
91	58+130.081	58+148.896	18.82	Radius<300m
92	58+210.963	58+221.769	10.81	Radius<300m
93	58+279.262	58+305.610	26.35	Radius<300m
94	58+595.493	58+621.347	25.85	Radius<300m
95	54+584.061	54+628.058	44.00	Radius<300m
96	54+718.454	54+780.872	62.42	Radius<300m
97	54+874.078	54+885.037	10.96	Radius<300m
98	54+929.833	54+949.569	19.74	Radius<300m
99	54+993.152	55+041.864	48.71	Radius<300m
100	55+075.223	55+152.896	77.67	Radius<300m
101	55+242.454	55+301.515	59.06	Radius<300m
102	55+479.230	55+497.833	18.60	Radius<300m
103	55+566.486	55+598.650	32.16	Radius<300m
104	55+634.142	55+696.470	62.33	Radius<300m

Sl No.	Location		Length (m)	Remarks
	From	To		
105	55+759.982	55+789.503	29.52	Radius<300m
106	55+995.608	55+997.804	02.20	Radius<300m
107	56+078.264	56+140.683	62.42	Radius<300m
108	56+218.857	56+297.862	79.00	Radius<300m
109	56+545.377	56+634.775	89.40	Radius<300m
110	56+872.316	56+975.984	103.67	Radius<300m
111	57+366.656	57+399.879	33.22	Radius<300m
112	57+856.278	57+884.964	28.69	Radius<300m
113	57+981.144	58+070.569	89.43	Radius<300m
114	58+130.081	58+148.896	18.82	Radius<300m
115	58+210.963	58+221.769	10.81	Radius<300m
116	58+279.262	58+305.610	26.35	Radius<300m
117	58+595.493	58+621.347	25.85	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:

Type of Protection Work		
Protection Work	**Unit**	**Quantity**
1.Parapet	Rm	3336
2.Breast wall by PCC		
a)1.5 m height	Rm	1420
b) 2.0m height	Rm	3740
c) 3.0m height	Rm	3316
3. Breast wall sausage type by gabion/ specialized treatment for slide protection	Rm	500
4.Retaining Wall		
a) 2m Height	Rm	490
b)3m Height	Rm	70
c)4m Height	Rm	10

13. 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.

14. SPECIAL REQUIREMENT FOR HILL ROADS

[Refer to paragraphs 14.5 and 14.8 of the Manual and provide details where relevant and required.]

15. CHANGE OF SCOPE

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

16. PRE-CONSTRUCTION ACTIVITIES

16.1 Land Acquisition (L.A.)

Existing Road is single lane road. Proposed ROW is varying from 18 m to 35m to accommodate 2-lane configuration as given in clause 3.4 above.

The land is to be acquired by NHIDCL and all related costs shall be borne by NHIDCL.

16.2 Compensatory Afforestation:

Refer Clause 11 of this Schedule-B.

17. LANDSCAPING

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

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

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

18. Fixed Parameters for Design

(i) The Construction Contractor shall consider the following fixed parameters for design

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

(b) The scope of work shall be as specified in **Schedule–B** together with the provision of Project facilities as given in **Schedule–C** and in conformity with the specifications & standards set forth in **Schedule–D**.

(c) The finished top level of the road (Formation level) as shown in the P&P (Plan & Profile) drawing shall not be reduced/lowered unless there are some apparent errors / deficiencies in the FFSR and the Construction Contractor is able to demonstrate sound and durable design by lowering the formation levels with proper geometry as recommended in IRC: SP:73-2015 or other codes as applicable to the National Highways but no portion of Road should be allowed under submergence.

(d) The numbers and sizes of the culverts as well as waterway as provided in the FFSR shall not be reduced in any case, however the locations can be suitably modified in consultation & approval of the IC if required. Any additional requirement of

culverts as per site conditions or increase in size due to hydrologic requirement should be assessed by the Construction Contractor and incorporated accordingly.

(e) Alternative design for structures i.e. bridges, culverts, and retaining walls etc. can be adopted by the Construction Contractor in accordance with Design Requirements subject to review of the same by Authority Engineer. However, the span length (total clear span/water way) as shown in the drawings shall be considered as minimum requirement and cannot be reduced.

(f) The length and/or the nos. of various project facilities like Drain, Bus bays, etc. as mentioned in Schedule B and Schedule C shall be minimum, however the locations can be suitably modified in consultation with the Authority Engineer.

(g) The Geometric Design Standards for the Project/Project Facilities shall be as per IRC: 73 or other codes as applicable to the National Highways. These should be adhered to and minimum requirements should be maintained for the Project Highway. The Construction Contractor may adopt better standards for enhancing the requirements of safety and mobility.

(h) Pavement Design

i) The typical cross sections shall be followed as far as possible. Alternate cross sections shall be accepted subjected to approval from the Authority Engineer without altering the pavement widths and subject to the restriction of ROW widths. Pavement of the main carriageway has been designed for a period of 15 years of construction period.

ii) The composition of Pavement Layers of the paved shoulders shall not be lower than the adjacent flexible pavement of the mainline project highway.

(i) All the slopes including of embankment height more than 1.0m shall be protected by vegetation mulching. Filter material shall be provided below the pitching where ever embankment is exposed to water bodies.

(j) W- Beam crash barrier shall be provided on sections of the road
i) sharp curves having radius less than 300m

(k) All culverts shall be replaced by box culverts.

(l) Reinforced Earth/RCC Retaining Wall type shall be liberally provided through areas for high cut/fill/embankment with aesthetically pleasing appearance. These shall be of varying height constructed of several sections, located mainly between main

line and where land constraint exists. Design life of reinforcing elements for earth retaining structures shall be 100 years minimum.

(m) Riprap protection to be provided at the valley side on curves as special safety features.

(n) All road signs shall be with retro-reflective sheet of high intensity grade conforming to ASTM D-4957-01/ (type VIII and type IX) and as per clause 801 of MoRTH specifications. The retro reflective sheet with engineering grade shall not be used and instead micro-prismatic shall be used.

SCHEDULE – C

(See Clause 2.1)

PROJECT FACILITIES

4 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-3/SARDP-NE**, start from design chainage km 44+000 at Dam to design chainage km 59+363 at New Palin (total length of 15.363 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

5 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 2(two) locations 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	49+400
2	Bus Shelter	57+500

Pedestrian Facilities

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

Administrative, Operation and Maintenance Base Camp(in Accordance with Clause 12.16 of IRC 73 : 2015)

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

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

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

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

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

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

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

Landscaping

Landscape treatment of the Project Highway shall be undertaken through planting of trees and ground cover of appropriate varieties and landscaping on surplus land in the ROW. The Construction Contractor should plant at least 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 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. Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Authority's Engineer.

2 Deviations from the Specifications and Standards

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

2.2 NIL

SCHEDULE - E
(See Clauses 2.1 and 14.2)

MAINTENANCE REQUIREMENTS

1 **Maintenance Requirements**

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

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

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

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

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

3 **Other Defects and deficiencies**

In respect of any Defect or deficiency not specified in Annex - I of this Schedule-E, the Authority's Engineer may, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and 69 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 signs	24 hours
II	Removal of fallen trees from	4 hours

Nature of Defects or deficiency		Time limit for repair/rectification
	carriageway	
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 inapproach 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
c	**Piers, abutments, return walls and wing walls**	
I	Cracks and damages including settlement and tilting, spalling,	30 (thirty) days

Nature of Defects or deficiency		Time limit for repair/rectification
	scaling	
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
III	Snow requiring clearance	24 (Twenty four) hours

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

of the competent authority.

SCHEDULE - F
(See Clause 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.

1.1 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 Balance work of Two-lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km 70.000[Design Km. 44.000 to Km. 59.363] (Design Length - 15.363 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

"Construction of Balance work of Two-lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km 70.000 [Design Km. 44.000 to Km.59.363] (Design Length - 15.363 Km)in the state of Arunachal Pradesh under SARDP-NE"

Performance Security.

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

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor's obligations during the {Construction Period/ Defects Liability Period and Maintenance Period} under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of General Manager in the 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 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 Balance work of Two-lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km 70.000[Design Km. 44.000 to Km. 59.363] (Design Length - 15.363 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:

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

"Construction of Balance work of Two-lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km 70.000 [Design Km. 44.000 to Km.59.363] (Design Length - 15.363 Km)in the state of Arunachal Pradesh under SARDP-NE"

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 82 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 Balance work of Two-lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km 70.000[Design Km. 44.000 to Km. 59.363] (Design Length - 15.363 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.*

"Construction of Balance work of Two-lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km 70.000 [Design Km. 44.000 to Km.59.363] (Design Length - 15.363 Km)in the state of Arunachal Pradesh under SARDP-NE"

(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 vis a vis OVERALL PROJECT
1	2	3	4
Road works including culverts, minor bridges, underpasses, overpasses, approaches to ROB/RUB/ Major Bridges/ Structures (but excluding service roads)		**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.	11.06%
		(2) Granular work (sub-base, shoulders)	
		GSB	2.04%
		WMM & Shoulder	2.88%
		(3) Bituminous work	
		a)DBM With Prime coat & Tack coat.	5.92%
		b)BC with Tack coat.	3.22%
		(4) Rigid Pavement	0.00%
		(5)Widening and repair of culvert	0.01%
		(6)Protection of existing works	0.00%
		(7)Widening and repair of minor bridges	0.00%

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis OVERALL PROJECT
1	2	3	4
		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.	3.53%
		(2) Granular work (sub-base, shoulders)	
		GSB	2.77%
		WMM & Shoulder	3.94%
		(3) Bituminous work	
		a)DBM With Prime coat & Tack coat.	7.92%
		b) BC with Tack coat.	4.32%
		(4) Rigid Pavement	0.00%
		(5)Protection work	0.00%
		(6)RCC/Reinf. Earth retaining Wall in approaches of ROB	0.00%
		(7)Drainage Works	0.00%
		(8)Protection Work	0.00%
		C- New culverts, minor bridges, underpasses, overpasses on existing road, realignments, bypasses:	
		(1)Box / Slab Culverts	9.90%
		(2) HP Culvert	0.00%
		(3) Embankment Protection(New Lane)	0.00%
		(4) Grade separated structures	0.00%
		(5) Overpass	0.00%
		(6) Elephant Underpass	0.00%

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis OVERALL PROJECT
1	2	3	4
		(7) Approaches to ROB and Viaduct	0.00%
		(8) Minor Bridges	
		(1) Foundation	1.86%
		(2) Sub-structure	1.65%
		(3)Super- structure	2.69%
		(10) Vehicular Underpass	0.00%
Major Bridge works and ROB/RUB	0.00%	**A- Widening and repairs of Major Bridges**	
		(1) Foundation	0.00%
		(2) Sub-structure	0.00%
		(3)Super-structure(including wearing coat,crash barrier etc. complete in all respect)	0.00%
		B- Widening and repair of	
		(a) ROB	0.00%
		(b) RUB	0.00%
		C- New Major Bridges	
		(1) other Miscellaneous Items	0.00%
		(2) Guide Bundh	0.00%
		(3) Foundation	0.00%
		(4) Sub structure	0.00%
		(5) Super-structure (including wearing coats, crash barriers etc. complete)	0.00%
		(6) Protection works	0.00%
		D- New rail-road bridges including viaduct	
		(a) ROB	0.00%
		(b) RUB	0.00%

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis OVERALL PROJECT
1	2	3	4
Structures(Elevated sections, reinforced earth)	0.00%	(1) Foundation	0.00%
		(2) Sub-structure	0.00%
		(3) Super-structure (including crash barriers etc. complete)	0.00%
		(4) Reinforced Earth Wall (includes Approaches of ROB, Underpasses, Overpasses, Flyover etc.)	0.00%
Other Works	25.82%	**Other Engineering Works**	
		Major Junction	0.00%
		Road Marking	0.00%
		Road Appurtenances	0.06%
		Road side plantation	0.00%
		Protection Work (Provision of Rip-Rap or similar work in valley side of the curves as special safety features)	0.22%
		Service roads/Slip roads	0.00%
		Toll Plaza	0.00%
		Road side drain & toe wall	8.73%
		Project facilities	
		Safety and traffic management during const.	0.00%
		Traffic Sign	0.06%
		Pavement Marking	0.52%
		Crash barrier/W metal crash barrier	0.91%
		Road Boundary stone, km Stone,5th km stone and hectometer stone	0.01%

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis OVERALL PROJECT
1	2	3	4
		Traffic blinker LED delianeator,stud,reflective pavement marker, tree reflector	0.04%
		Traffic Island	0.00%
		Median Kerb	0.00%
		Bus bays and Bus Shelter	0.06%
		Road side plantation and median plantation	0.00%
		Protective work of guide bund including construction of flexible aprons, boulder pitching and filter media on slope	0.00%
		Minor Junction	1.18%
		Median filling shrub plantation and maintenance for 1 year	0.00%
		Overhead signboard	0.00%
		Painting on kerb	0.00%
		Footpath and separator	0.00%
		Interlocking concrete block pavement	0.00%
		Junctions	0.00%
		CC Kerb	0.00%
		Painting	0.00%
		cable duct	0.00%
		Solar stud and solar blinking LED	0.00%
		Rest area with development of site including one no bus bay and bus shelter, landscaping and tree	0.00%

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis OVERALL PROJECT
1	2	3	4
		plantation	
		Plantation (Vetiver, Hydro seeding and Mulching or similar techniques etc.) for slope protection on exposed hill slopes as slide mitigation measure.	2.60%
		Traffic control devices and road safety works	0.00%
		Road furniture	0.03%
		Road side Catch water drain / chute drain	1.53%
		Repair for protection work	0.00%
		Traffic diversion, Safety and traffic management during construction	0.00%
		Miscellaneous item	0.00%
		Breast Wall and RCC retaining wall	0.00%
		Junction improvement	0.00%
		Site Clearance	0.00%
		M-20 Kerb with channel	0.00%
		Prefabricated railing over kerb in median	0.00%
		safety barrier	0.00%
		(v)Project facilities	
		(a)Truck lay-byes	0.13%
		(b) Others	0.08%
		(vi)Repairs to bridges/structures	

ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis OVERALL PROJECT
1	2	3	4
		Other items(Junctions)	0.00%
		Providing wearing coat	0.00%
		Replacement of bearing joints	0.00%
		Providing crash barrier	0.00%
		(vii)Protection Works	
		Breast Wall	17.56%
		Retaining Wall	1.32%
		Gabion Wall	0.00%
		Parapet	1.25%
		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 5 (Five) percent of the total length.
(1) Earthwork up to top of the sub-grade including excavation in soil, soft rock and hard rock including Cleaning & grubbing with required site clearance etc.	11.06%	
(2) Granular work (sub- base, base, shoulders)		
GSB	2.04%	
WMM &Shoulders	2.88%	
(3) Bituminous work		
a) DBM with prime coat and Tack coat	5.92%	
b) BC with Tack coat	3.22%	
(4) Concrete Pavement	0.00%	
(6) Widening and repair of culverts	0.01%	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 Three culverts.
(7) Protection of existing works	0.00%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 5 (Five) percent of the total length.
(8) Widening and repair of minor bridges	0.00%	Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length of the minor bridges. Payment shall be made on the completion of a minor bridge.
B- New 2-lane alignment		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 5 (Five) percent of the total length.
(1) Earthwork up to top of the sub-grade including excavation in soil, soft rock and hard rock including Cleaning & grubbing with required site	3.53%	

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
clearance etc.		
(2) Granular work (sub- base, base, shoulders)		
GSB	2.77%	
WMM & Shoulders	3.94%	
(3) Bituminous work		
a) DBM with prime coat and Tack coat	7.92%	
b) BC with Tack coat	4.32%	
(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	9.90%	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 Three 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 5 (Five) percent of the total length.
(4) Grade Separated structures	0.00%	Cost of each structure shall be

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
(5) Overpasses	0.00%	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.
(6) Elephant underpasss	0.00%	
(7) Approaches to ROB and Viaduct	0.00%	
(8) Minor bridges		**Foundation:** Cost of Foundation of each minor bridge shall be determined on pro rata basis with respect to total linear length of minor bridges payment shall be made on completion of foundation of one minor bridge. **Sub-structure**: Cost of Sub Structure of each minor bridge shall be determined on pro rate basis with respect to total linear length of minor bridges payment shall be made on completion of sub structure of one minor bridge. **Super-structure:** Cost of Super structure of each minor bridge shall be determined on pro rata basis with respect to total linear length of minor bridge payment shall be made on completion of super structure including approaches of one minor bridge.
Foundation	1.86%	
Sub-Structure	1.65%	
Super Structure	2.69%	
(9) Cattles/Pedestrian Underpasses	0.00%	Cost of each structure shall be determined on pro rata basis with respect to the total number of structures. Payment shall be made on the completion of each number of structures specified.
(10) Vehicular Underpasses	0.00%	

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

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

Where P= Contract Price

L = Total length in km

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

1.3 Procedure of estimating the value of work done

1.3.2 Major Bridge works and ROB/RUB.

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

TABLE 1.3.2

STAGE OF PAYMENT	WEIGHTAGE	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		
Major Junction	0.00%	Payment shall be made on pro rata basis for completed facilities.
Road Marking	0.00%	
Road Appurtenances	0.06%	
Road Side plantation	0.00%	Unit of measurement is linear length in km. Cost per km shall be determined on pro rata basis with respect to the total length of the service roads/slip roads. Payment shall be made for completed service roads/slip roads in a length of not less than 20 (twenty) percent of the total length of service roads/slip roads.
Service roads/slip road	0.00%	
Toll Plaza	0.00%	Unit of measurement is each completed toll plaza. Payment of each toll plaza shall be made on pro rata basis with respect to the total of all toll plazas.
Road side drains & toe wall	8.73%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5 (Five) percent of the total length.
Project facilities		Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5 (Five) percent of the total length
Safety & traffic mgmt. During construction	0.00%	
Traffic Sign	0.06%	
Pavement marking	0.52%	

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
Protection works(Riprap)	0.22%	
Crash barrier/ W metal crash barrier	0.91%	
Boundary stone, km stone,5th km stone, & hectometre stones	0.01%	
Traffic blinker LED Delineator, stud, reflective payment marker, tree reflector	0.04%	
Traffic Island	0.00%	
Median Kerbs	0.00%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5 (Five) percent of the total length.
Bus Bays & Bus shelter	0.06%	Payment shall be made for completed items.
Road side plantation & medium Plantation.	0.00%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5 (Five) percent of the total length.
Protection works of guide bund including construction of flexible aprons , boulder pitching and filter media on slopes	0.00%	
Minor junction	1.18%	Payment shall be made for completed items.
Median filling shrub plantation & maintenance for 1 year	0.00%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5 (Five) percent of the total length.
Overhead signboard	0.00%	
painting on kerb	0.00%	
Footpath &Separator	0.00%	

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
Plantation (Vetiver, Hydro seeding and Mulching etc.) for slope protection on exposed hill slopes as slide mitigation measure.	0.00%	
Interlocking concrete block payment	0.00%	
junctions	0.00%	
CC kerb	0.00%	
Painting	0.00%	
Cable duct	0.00%	
Solar stud & solar blinking LED	0.00%	
Rest area with development of site including One no Bus bay and Bus shelter, landscaping and tree plantation	0.00%	
Plantation	2.60%	
Traffic control devices and road safety works	0.00%	
Road furniture	0.03%	
Roads side drains I/C Chute drain & toe wall	1.53%	
Repair of protections works	0.00%	
Traffic diversion, Safety and traffic management during construction	0.00%	
Miscellaneous items	0.00%	
Breast wall and RCC retaining wall	0.00%	

STAGE OF PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project	PAYMENT PROCEDURE
Junction improvement	0.00%	
Site Clearance	0.00%	
M-20 kerb with channel	0.00%	
Prefabricated railing over kerb in median	0.00%	
Safety Barrier	0.00%	
(v) Project facilities	0.00%	
(a) Truck lay-byes	0.13%	Payment shall be made for completed items.
(b) others	0.08%	
(vi) Repairs to bridges/structures		
Other items (Junctions)	0.00%	Payment shall be made for completed items.
Providing wearing coat	0.00%	
Replacement of bearing joints	0.00%	
Providing crash barriers	0.00%	
(vii) Protection works		
Breast wall	17.56%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5 (Five) percent of the total length.
Retaining wall	1.32%	
Suasage type Breast Wall	0.00%	
Parapet	1.25%	

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 (ii))

Project Completion Schedule

1 Project Completion Schedule

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

2. Project Milestone-I

(i) Project Milestone-I shall occur on the date falling on the **[192nd]** day from the Appointed Date (the "**Project Milestone- I**").

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

3. Project Milestone-II

(i) Project Milestone-II shall occur on the date falling on the **[329th]** day from the Appointed Date (the "**Project Milestone- II**").

(ii) Prior to the occurrence of Project Milestone-II, the Contractor shall have continued with construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 35% (thirty five per cent) of the Contract Price **and should have started construction of all bridges**

4. Project Milestone-III

(i) Project Milestone-III shall occur on the date falling on the **[467th]** day from the Appointed Date (the "**Project Milestone- III**").

(ii) Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 70% (seventy per cent) of the Contract Price and **should have** started construction of all project facilities.

5. Scheduled Completion Date

(i) The Scheduled Completion Date shall occur on the [549 th] day from the Appointed Date.

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

6. Extension of time

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

SCHEDULE – K
(See Clause 12.1.2)

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

"Construction of Balance work of Two-lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km 70.000 [Design Km. 44.000 to Km.59.363] (Design Length - 15.363 Km)in the state of Arunachal Pradesh under SARDP-NE"

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 Balance work of Two-lane with paved shoulders of Joram –Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km 70.000[Design Km. 44.000 to Km. 59.363] (Design Length - 15.363 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 Balance work of Two-lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050**

"Construction of Balance work of Two-lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km 70.000 [Design Km. 44.000 to Km.59.363] (Design Length - 15.363 Km)in the state of Arunachal Pradesh under SARDP-NE"

to Km 70.000[Design Km. 44.000 to Km. 59.363] (Design Length - 15.363 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	SIGNED, SEALED and
And DELIVERED	DELIVERED
For and on behalf of	For and on behalf of
CONTRACTOR by:	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 Balance work of Two-lane with paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km 70.000[Design Km. 44.000 to Km. 59.363] (Design Length - 15.363 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)

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

Sl No	Item/Defect/Deficiency	Percentage (%)
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, flooring, parapets, wearing course, footpaths, any damage to foundations	20
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;

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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 Balance work of Two-lane with**
paved shoulders of Joram – Koloriang Road (NH-713) on EPC basis from existing Km 50.050 to Km 70.000[Design Km. 44.000 to Km. 59.363] (Design Length - 15.363 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

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references to Paragraphs of this TOR.

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

3. General

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

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

(a) any Time Extension;

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

(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 121 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 lastclaim

(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.