National Highways & Infrastructure Development Corporation Limited

BUILDING INFRASTRUCTURE - BUILDING THE NATION

EPC Schedules

FOR

Improvement and Widening to two lane with Paved Shoulder of NH-13 & 15 (Old NH-52) from Existing Km 745.60 (Design Km 0.000) to Existing km 770.600 (Design Km 24.819) (Brahmakund T-junction to Kamlang T-Junction, Existing Length: 25.00 Km, Design Length: 24.819 Km, Pkg-01) in the state of Arunachal Pradesh on EPC mode.

Package-I (Brahmakund T-junction to Kamlang T- Junction from existing km 745.600 to km 770.600 of NH-13 & NH-15 Old NH-52

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD

(MINISTRY OF ROAD TRANSPORT & HIGHWAYS, GOVT. OF INDIA)

OCTOBER 2023

NHIDCL, 3RD FLOOR, PRESS TRUST OF INDIA BUILDING, 4, PARLIAMENT STREET,
NEW DELHI – 110001

SCHEDULE - A

(See Clauses 2.1 and 8.1)

SITE OF THE PROJECT

1 The Site

(i) Site of the Project Highway shall include the land, buildings, structures and road works as described in **Annex-I** of this **Schedule-A**.

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

(iii) An inventory of the Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority Representative and the Contractor, and such inventory shall form part of the memorandum referred to in Clause 8.2 (i) of this Agreement.

(iv) The alignment plans of the Project Highway are specified in **Annex-III**. In the case of sections where no modification in the existing alignment of the Project Highway is contemplated, the alignment plan has not been provided. Alignment plans have only been given for sections where the existing alignment is proposed to be upgraded. The proposed profile of the Project Highway shall be followed by the contractor with minimum FRL as indicated in the alignment plan. The Contractor, however, improve/upgrade the road profile indicated in **Annex-III** based on site/design requirement.

(v) The status of the environment clearances obtained or awaited is given in **Annex IV**.

Annex-I

(Schedule-A)

SITE

Note: Through suitable drawings and description in words, the land, buildings, structures and road works comprising the Site shall be specified briefly but precisely in this Annex-I. All the chainages/ location referred to in Annex-I to Schedule-A shall be existing chainages.

1. Site

The Package-I of the project road is part of old NH-52 (New NH -13) starts from Existing chainage Km 745.600 of Old NH-52 at "Brahmkumkund-T junction and terminates at Existing chainage 770.600 of Old NH-52 (New NH 15) near Kamlang T- junction. The project road covers a total existing length of 25.000 km. The Project Road traverses through Lohit District in the State of Arunachal Pradesh.

The Latitude and longitude of start and end of the project corridor is 27°53.190'N, 96° 22.333'E and 27° 45.510'N, 96° 21.011'E respectively.

The land, carriageway and structures comprising the Site are described below. The land, carriageway and structures comprising the site are described below.

2. Land

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

S. No.	Existing Chainage		Length (m)	Existing Right of way (m)	PROW (m)	Remarks
	From (Km)	To (Km)				
1	745+600	746+165	565	Nil	100	
2	746+165	750+675	4510		36	
3	750+675	753+805	3130		30	
4	753+805	755+035	1230		36	
5	755+035	761+717	6682		30	
6	761+717	763+142	1425		36	
7	763+142	768+026	4884		30	
8	767+026	768+266	1240		36	
	768+266	770+600	2334		30	

3. Carriageway

The present carriageway of the Project Highway consists of Single Lane configuration. The type of the existing pavement of the section is flexible.

4. Major Bridges

The Site includes the following Major Bridges:

Sr. No.	Existing Chainage (km)	No. of Spans with span length (m)	Foundation	Type of Structure	Width (m)
1	750.000	1X40+3X110+1X40	Pile Foundation	PSC Balance Cantilever	11.0
2	754.150	4X60	Pile Foundation	PSC BOX Girder	11.0
3	759.580	2x10.5+4x10	Pile Foundation	RCC BOX	11.0
4	763.100	1x67.0	Pile Foundation	PSC BOX Girder	11.0
5	765.500	1x65	Pile Foundation	PSC BOX Girder	11.0
6	769+650	1x30+1x65	Pile Foundation	PSC BOX Girder	11.0

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

The Site includes the following ROB (road over railway line)/RUB (road under railway line):

S. No.	Existing Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)	ROB/ RUB
		Foundation	Superstructure			
NIL						

6. Grade separators

The Site includes the following grade separators:

S. No.	Existing Chainage (Km)	Type of Structure		Span Arrangement (m)	Width (m)
		Foundation	Super structure		
Nil					

7. Minor bridges

The Site includes the following minor bridges:

Sr. No.	Existing Chainage (km)	Design Chainage (km)	Foundation	No. of Spans with span length (m)	Width (m)	Remarks
1	748.600	3+027	Open Foundation	1 x 36.0	5.2	
2	766.970	21+639	Pile Foundation	1x50	8.5	

8. Railway level crossings

The Site includes the following railway level crossings:

S. No.	Location (km)	Remarks
NIL		

9. Underpasses (vehicular, non-vehicular)

The Site includes the following underpasses:

S. No.	Existing Chainage (Km)	Type of structure	No. of span with Span Arrangement (m)	width (m)
Nil				

10. Culverts

The Site has the following culverts:

S.NO.	Existing Chainage	Existing Type	Span	Condition
1	745+863	RCC SLAB	1X2.0	POOR
2	745+925	RCC SLAB	1X3.0	POOR
3	746+259	RCC SLAB	1X1.2	POOR
4	746+341	RCC SLAB	1X1.25	POOR
5	746+608	RCC SLAB	1X1.2	POOR
6	746+693	RCC SLAB	1X1.5	POOR
7	747+665	RCC SLAB	1X6.0	POOR
8	750+488	RCC SLAB	1X1.5	FAIR
9	750+678	RCC SLAB	1X1.2	POOR
10	751+052	BLOCKED	-	POOR
11	751+273	RCC SLAB	1X1.2	POOR
12	751+590	RCC SLAB	1X3.0	FAIR
13	751+844	RCC SLAB	1X1.2	FAIR
14	752+107	RCC SLAB	1X1.25	FAIR
15	752+436	RCC SLAB	1X1.25	FAIR
16	752+833	RCC SLAB	1X1.25	POOR
17	752+996	RCC SLAB	1X1.25	POOR
18	753+093	RCC SLAB	1X3.0	FAIR
19	753+158	RCC SLAB	1X3.0	FAIR
20	753+197	RCC SLAB	1X1.8	POOR
21	753+298	RCC SLAB	1X1.1	FAIR
22	753+367	RCC SLAB	1X3.0	FAIR
23	753+544	RCC SLAB	1X1.3	FAIR
24	753+690	BLOCKED	_	-
25	754+263	RCC BOX	_	POOR
26	754+317	RCC BOX	_	POOR
27	754+566	RCC SLAB	1X1.25	FAIR
28	754+765	RCC SLAB	1X1.2	POOR
29	754+993	RCC BOX	1X1.2	GOOD
30	755+243	RCC SLAB	1X1.2	FAIR
31	755+349	RCC SLAB	1X1.25	GOOD
32	755+446	RCC SLAB	1X1.25	POOR
33	755+905	RCC SLAB	1X1.25	FAIR
34	756+177	RCC SLAB	1X1.2	POOR
35	756+554	RCC SLAB	1X1.25	POOR
36	756+602	RCC SLAB	1X1.25	FAIR
37	757+191	RCC SLAB	1X1.3	POOR
38	757+373	BLOCKED	_	POOR
39	757+685	RCC SLAB	1X3.0	POOR

S.NO.	Existing Chainage	Existing Type	Span	Condition
40	758+226	RCC SLAB	1X1.2	POOR
41	758+302	RCC SLAB	1X1.25	POOR
42	758+391	RCC SLAB	---	POOR
43	758+736	RCC SLAB	1X1.5	POOR
44	758+92	RCC SLAB	1X1.2	POOR
45	759+051	BLOCKED	---	POOR
46	759+300	RCC SLAB	1X1.25	POOR
47	759+768	RCC SLAB	1X1.25	POOR
48	759+904	RCC SLAB	1X1.25	POOR
49	760+012	RCC SLAB	1X1.25	POOR
50	760+228	RCC SLAB	1X1.3	POOR
51	760+443	RCC SLAB	1X1.2	POOR
52	760+746	RCC SLAB	1X1.25	POOR
53	760+984	RCC SLAB	1X1.2	POOR
54	761+073	RCC SLAB	1X1.0	POOR
55	761+267	RCC SLAB	1X1.25	POOR
56	761+779	RCC SLAB	1X1.25	FAIR
57	762+022	RCC SLAB	1X1.25	POOR
58	762+268	RCC SLAB	1X1.25	POOR
59	762+616	RCC SLAB	1X1.25	POOR
60	762+787	RCC SLAB	1X1.25	FAIR
61	763+376	RCC SLAB	1X1.3	FAIR
62	763+884	RCC SLAB	1X3.0	POOR
63	763+988	RCC SLAB	1X1.25	POOR
64	764+189	RCC SLAB	1X2.0	POOR
65	764+541	RCC SLAB	1X1.2	POOR
66	764+624	RCC SLAB	1X1.25	POOR
67	764+871	BLOCKED	---	POOR
68	765+156	RCC SLAB	1X4.5	FAIR
69	765+675	RCC SLAB	1X1.25	POOR
70	765+908	RCC SLAB	1X1.2	POOR
71	765+996	RCC SLAB	1X1.2	POOR
72	766+241	RCC SLAB	1X1.2	POOR
73	766+502	RCC SLAB	1X1.25	_
74	766+661	RCC SLAB	1X1.25	VERY POOR
75	766+978	RCC SLAB	1X1.8	VERY POOR
76	767+224	RCC SLAB	1X1.25	FAIR
77	768+551	BLOCKED	_	POOR
78	768+935	RCC SLAB	1X1.8	POOR
79	768+732	RCC SLAB	1X1.2	POOR
80	769+356	RCC SLAB	1X1.2	POOR
81	769+968	BLOCKED	_	POOR
82	770+210	RCC SLAB	1X1.0	POOR
83	770+419	HP	1X0.9	POOR

11. Bus shelters

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

S.N.	Existing Chainage	Side
Nil		

12. Truck Lay byes

The details of truck lay byes are as follows:

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

13. Roadside drains

The details of the road side drains are as follows:

S. No.	Existing Chainage		Type & Side		Length (Km)
	From (Km.)	To (Km.)	Masonry/cc (Pucca)	Earthen (Kutcha)	
1	745.600	770.600		Earthen	25.000

14. Major junctions

The details of major junctions are as follows:

S. No.	Location		At grade	Separated	Category of Cross Road			
	Existing Chainage	Design Chainage			NH	SH	MDR	Others
1	745.600	0+000	At grade (T)		NH-13			
2	750.450	4+750	At grade (Y)					

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

15. Minor junctions

The details of the minor junctions/Subways (all at grade) are as follows:

S. No.	Ex. Chainage	Type of Intersection	Side	Category
1	749.654	T	LHS	Village Road
2	749.85	X	Both side	Village Road
3	750.44	Y	RHS	Village Road
4	751.461	T	LHS	Village Road
5	751.631	Y	RHS	Village Road
6	754.455	y	LHS	Village Road
7	755.232	T	LHS	Village Road
8	755.932	Y	LHS	Village Road
9	758.000	T	RHS	Village Road
10	758.120	T	RHS	Village Road
11	758.980	y	RHS	Village Road

S. No.	Ex. Chainage	Type of Intersection	Side	Category
12	760.188	y	RHS	Village Road
13	760.200	T	LHS	Village Road
14	761.026	Y	RHS	Village Road
15	762.450	Y	LHS	Village Road
16	762.950	Y	LHS	Village Road
17	763.566	T	LHS	Village Road
18	763.818	T	LHS	Village Road
19	764.253	y	LHS	Village Road
20	764.353	T	LHS	Village Road
21	764.862	T	LHS	Village Road
22	756.990	Y	RHS	Village Road
23	765.335	Y	LHS	Village Road
24	765.585	T	LHS	Village Road
25	765.600	T	RHS	Village Road
26	765.715	T	RHS	Village Road
27	765.742	T	LHS	Village Road
28	765.784	T	RHS	Village Road
29	765.851	T	RHS	Village Road
30	766.090	T	RHS	Village Road
31	766.100	Y	LHS	Village Road
32	766.300	X	LHS	Village Road
33	766.455	T	RHS	Village Road
34	766.622	T	LHS	Village Road
35	766.887	T	RHS	Village Road
36	767.054	T	RHS	Village Road
37	767.100	T	RHS	Village Road
38	767.200	X	Both side	Village Road
39	767.435	Y	RHS	Village Road
40	769.310	Y	LHS	Village Road

16. Bypasses

The details of the bypasses are as follows:

S. No.	Name of bypass (town)	Existing Chainage (km) From km to km	Length (in Km)
NIL			

17. Existing Utilities

(a) Extra High-Tension lines (EHT Lines)

S No.	Design Chainage (Km)		Length (in Km) (Existing Length Between Crossing Locations)					Crossings					No of Towers obstructing/in fringing ROW
	From	To	400 KV	220 KV	132 KV	110 KV	66 KV	400 KV	220 KV	132 KV	110 KV	66 KV	
1	NIL												

(b) High Tension/Low tension (HT/LT) lines

S. NO	Design Chainage (in Km)		Length of Conductor (in m)				Crossings				Transformer		Mandal
	From	To	33 KV LINE	11 KV LINE	LT LINE	AB CABLE	33 KV LINE	11 KV LINE	LT LINE	AB CABLE	No	Capacity	
1	750+328	767+895			18699				2701		5	Single phase 16 KVA	

(ii) PHE

Sr. No.	Chainage		Length (in Km)		Crossing	
	From	To	Water Supply line		Water Supply line	
			With Pumping	With Gravity Flow	With Pumping	With Gravity Flow
1	770+590	774+052	3.462			

18. Other structures

S. No.	Type of Structure	Existing Chainage (km) From km to km	Length (in Km)
NIL			

Annex – II

(See Clauses 8.3 (i))

(Schedule-A)

Dates for providing Right of Way of Construction Zone

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

S. No.	Existing Chainage		Length (m)	Existing Right of way (m)	PROW (m)	Date of Providing proposed ROW
	From (Km)	To (Km)				
1	745+600	746+165	565	Nil	100	90% of ROW At Appointment Date. Balance Right of way Within 150 days after the Appointed Date
2	746+165	750+675	4510		36	
3	750+675	753+805	3130		30	
4	753+805	755+035	1230		36	
5	755+035	761+717	6682		30	
6	761+717	763+142	1425		36	
7	763+142	768+026	4884		30	
8	767+026	768+266	1240		36	
	768+266	770+600	2334		30	

Annex - III

(Schedule-A)

Alignment Plans

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

(i) The alignment of the Project Highway is enclosed in alignment plan. Finished road level indicated in the alignment plan shall be followed by the contractor as minimum FRL in any case, the finished road level of the project highway shall not be less than those indicated in the alignment plan for the filling section and not be more than those indicated in the alignment plan for the cutting section. The contractor shall, however, improve/upgrade the Road profile as indicated in Annex-III based on site/design requirement.

(ii) Traffic Signage plan of the Project Highway showing numbers & locations of traffic signs is enclosed. The contractor shall, however, improve/upgrade upon the traffic signage plan as indicated in Annex-III based on site/design requirement as per the relevant specifications/IRC Codes/Manual.

Annex - IV

(Schedule-A)

Environment Clearances

1. **Environment Clearance**

   Environmental Clearance (EC) is not required for the Project Highway under Schedule 7(f) as per S.O. 2559 (E), MoEF Notification of 22nd August 2013 (as amendment of 14th September 2006) i.e., Expansion of National Highways greater than 100 km involving additional right of way or land acquisition greater than 40 m on the existing alignments and 60 m on re-alignment or bypasses.

2. **Wild Life clearances:**

   Not Applicable.

3. **Forest Clearances**:

   Forest Clearance will be Obtained from the Forest Department.

Annex - V

(Schedule-A)

Existing Chainage and Design Chainage of the Project Road

Part- A – Road Part of Major Junction at Km 0+000 towards Demwe		
Sr.No	**Design Chainage**	**Existing Chainage**
1	0+585	745+100
2	0+500	745+210
3	0+400	745+310
4	0+300	745+410
5	0+200	745+510
6	0+100	745+600
7	0+000	745+685
Part -B, Brahmakund to Kamlang Road		
Sr. No	**Design Chainage**	**Existing Chainage**
1	0+000	745.660
2	0+100	745.760
3	0+200	745.840
4	0+300	745.952
5	0+400	746.065
6	0+500	746.168
7	0+600	746.280
8	0+700	746.393
9	0+800	746.492
10	0+900	746.592
11	1+000	746.710
12	1+100	746.811
13	1+200	746.911
14	1+300	747.014
15	1+400	747.115
16	1+500	747.220
17	1+600	747.324
18	1+700	747.430
19	1+800	747.525
20	1+900	747.630
21	2+000	747.732
22	2+100	747.845
23	2+200	747.925
24	2+300	748.065
25	2+400	748.163
26	2+500	748.268
27	2+600	748.365
28	2+700	748.430
29	2+800	748.530
30	2+900	748.632
31	3+000	748.730
32	3+100	748.833
33	3+200	748.933
34	3+300	749.040
35	3+400	749.142
36	3+500	749.245
37	3+600	749.345
38	3+700	749.447
39	3+800	749.545
40	3+900	749.645
41	4+000	749.716
42	4+100	749.815
43	4+200	749.915
44	4+300	750.015
45	4+400	750.115
46	4+500	750.215
47	4+600	750.315
48	4+700	750.415
49	4+800	750.512
50	4+900	750.618
51	5+000	750.720
52	5+100	750.820
53	5+200	750.930
54	5+300	751.025
55	5+400	751.122
56	5+500	751.230
57	5+600	751.347
58	5+700	751.465
59	5+800	751.565
60	5+900	751.648
61	6+000	751.744
62	6+100	751.846
63	6+200	751.947
64	6+300	752.050
65	6+400	752.145
66	6+500	752.245
67	6+600	752.350
68	6+700	752.447
69	6+800	752.547

70	6+900	752.647		116	11+500	757.605
71	7+000	752.747		117	11+600	757.707
72	7+100	752.850		118	11+700	757.805
73	7+200	752.950		119	11+800	757.905
74	7+300	753.050		120	11+900	758.010
75	7+400	753.150		121	12+000	758.110
76	7+500	753.250		122	12+100	758.210
77	7+600	753.347		123	12+200	758.302
78	7+700	753.453		124	12+300	758.400
79	7+800	753.557		125	12+400	758.500
80	7+900	753.658		126	12+500	758.600
81	8+000	753.753		127	12+600	758.700
82	8+100	753.852		128	12+700	758.800
83	8+200	753.953		129	12+800	758.918
84	8+300	754.047		130	12+900	759.030
85	8+400	754.142		131	13+000	759.130
86	8+500	754.240		132	13+100	759.228
87	8+600	754.345		133	13+200	759.330
88	8+700	754.435		134	13+300	759.430
89	8+800	754.532		135	13+400	759.532
90	8+900	754.633		136	13+500	759.630
91	9+000	754.731		137	13+600	759.730
92	9+100	754.832		138	13+700	759.830
93	9+200	754.932		139	13+800	759.930
94	9+300	755.033		140	13+900	760.030
95	9+400	755.145		141	14+000	760.130
96	9+500	755.244		142	14+100	760.230
97	9+600	755.343		143	14+200	760.330
98	9+700	755.447		144	14+300	760.430
99	9+800	755.552		145	14+400	760.530
100	9+900	755.655		146	14+500	760.630
101	10+000	755.828		147	14+600	760.730
102	10+100	755.937		148	14+700	760.830
103	10+200	756.050		149	14+800	760.930
104	10+300	756.215		150	14+900	761.030
105	10+400	756.322		151	15+000	761.130
106	10+500	756.442		152	15+100	761.230
107	10+600	756.560		153	15+200	761.330
108	10+700	756.670		154	15+300	761.420
109	10+800	756.880		155	15+400	761.570
110	10+900	756.975		156	15+500	761.666
111	11+000	757.075		157	15+600	761.764
112	11+100	757.205		158	15+700	761.865
113	11+200	757.305		159	15+800	761.965
114	11+300	757.405		160	15+900	762.065
115	11+400	757.505		161	16+000	762.164

162	16+100	762.265		208	20+700	766.920
163	16+200	762.361		209	20+800	767.020
164	16+300	762.450		210	20+900	767.118
165	16+400	762.531		211	21+000	767.220
166	16+500	762.630		212	21+100	767.320
167	16+600	762.735		213	21+200	767.420
168	16+700	762.830		214	21+300	767.690
169	16+800	762.930		215	21+400	767.810
170	16+900	763.033		216	21+500	767.900
171	17+000	763.133		217	21+600	767.955
172	17+100	763.233		218	21+700	768.061
173	17+200	763.333		219	21+800	768.160
174	17+300	763.434		220	21+900	768.265
175	17+400	763.534		221	22+000	768.367
176	17+500	763.635		222	22+100	768.467
177	17+600	763.741		223	22+200	768.568
178	17+700	763.885		224	22+300	768.663
179	17+800	763.988		225	22+400	768.765
180	17+900	764.087		226	22+500	768.865
181	18+000	764.190		227	22+600	768.965
182	18+100	764.290		228	22+700	769.067
183	18+200	764.393		229	22+800	769.165
184	18+300	764.490		230	22+900	769.265
185	18+400	764.590		231	23+000	769.366
186	18+500	764.690		232	23+100	769.465
187	18+600	764.790		233	23+200	769.570
188	18+700	764.890		234	23+300	769.668
189	18+800	764.990		235	23+400	769.760
190	18+900	765.118		236	23+500	769.860
191	19+000	765.213		237	23+600	769.960
192	19+100	765.314		238	23+700	770.060
193	19+200	765.418		239	23+800	770.160
194	19+300	765.518		240	23+900	770.261
195	19+400	765.618		241	24+000	770.360
196	19+500	765.718		242	24+100	770.460
197	19+600	765.818		243	24+200	770.560
198	19+700	765.918		244	24+234	770.594
199	19+800	766.020		208	20+700	766.920
200	19+900	766.118		209	20+800	767.020
201	20+000	766.220		210	20+900	767.118
202	20+100	766.318		211	21+000	767.220
203	20+200	766.420		212	21+100	767.320
204	20+300	766.520		213	21+200	767.420
205	20+400	766.620		214	21+300	767.690
206	20+500	766.720		215	21+400	767.810
207	20+600	766.820		216	21+500	767.900

217	21+600	767.955				
218	21+700	768.061				
219	21+800	768.160				
220	21+900	768.265				
221	22+000	768.367				
222	22+100	768.467				
223	22+200	768.568				
224	22+300	768.663				
225	22+400	768.765				
226	22+500	768.865				
227	22+600	768.965				
228	22+700	769.067				
229	22+800	769.165				
230	22+900	769.265				
231	23+000	769.366				
232	23+100	769.465				
233	23+200	769.570				
234	23+300	769.668				
235	23+400	769.760				
236	23+500	769.860				
237	23+600	769.960				
238	23+700	770.060				
239	23+800	770.160				
240	23+900	770.261				
241	24+000	770.360				
242	24+100	770.460				
243	24+200	770.560				
244	24+234	770.594				

Schedule B

SCHEDULE - B

(See Clause 2.1)

DEVELOPMENT OF THE PROJECT HIGHWAY

1 Development of the Project Highway

Development of the Project Highway shall include design and construction of the Project Highway as described in this **Schedule-B** and in **Schedule-C**.

2 Rehabilitation and augmentation

The Package-I of the project road is part of Old NH-52 (New NH-13) starts from Existing chainage Km 745.600 of Old NH-52 at "Brahmkumkund-T junction and terminates at Existing chainage 770.600 of Old NH-52 (New NH 15) near Kamlang T- junction. The project road covers a total existing length of 25.000 km (Design KM 0.00 to Km 0.585 and KM 0.00 to KM 24.234, Total Length 24.849 Km). The Project Road traverses through Lohit District in the State of Arunachal Pradesh and proposed for construction on EPC mode

3 Specifications and Standards

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

Annex - I

(Schedule-B)

DESCRIPTION OF TWO-LANE WITH PAVED SHOULDER

BRAHMKUND T- JUNCTION TO KAMLANG T- JUNCTION – (PACKAGE-1)

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

1 Widening of Existing Highway.

(i) 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 Mountainous and Steep terrain to the extent land is available.

(ii) Width of Carriageway

Width of the carriageway shall be as per proposed typical cross section specified at the end of this schedule B.

(a) The paved carriageway shall be two lanes with hard shoulder in accordance with IRC: SP: 73-2018.The paved carriageway shall be 7.00 m wide having 1.5 m Paved shoulder in rural Section on hill side and 2.5 m hard shoulder on valley side. As per Typical cross section drawing.

Sr. No.	Built-up Stretch Design Chainage		Length (m)	Paved Width (m)	Typical Cross Section
	From	To			
1	5+200	5+450	250	2.5	TCS 2
2	19+320	21+200	1880		
3	23+850	24+234	384		

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

2 Geometric Design and General Features

(i) **General**

Geometric design and general features of the Project Highway shall be in accordance with Section 2 of the OF IRC SP: 73.2018.

(ii) **Design speed**

The design speed shall be minimum Design speed of 40 kmph for Mountainous and Steep terrain, as per Manual of Specifications and Standards for Two Laning of Highways (IRC: SP: 73-2018).

(iii) **Improvement of the existing road geometrics**

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 as per IRC: SP:73-2018:

S. No.	Stretch Design Chainage (from km to km)	Type of deficiency	Remarks
Nil			

(iv) Right of Way

The details of the ROW are given in **Annex-II of Schedule-A.**

(v) Type of shoulders

(a) In built-up sections, 2.5m paved shoulder on either side shall be provided as per TCS Schedule (Appendix-BII.

Sr. No.	Built-up Stretch Design Chainage		Length (m)	Paved Width (m)	Typical Cross Section
	From	To			
1	5+200	5+450	250	2.5	TCS 2
2	19+320	21+200	1880		
3	23+850	24+234	384		

(b) In open Area, 1.5 m Paved Shoulder on both sides and 1.0 m earthen shoulders on Both sides shall be provided as per TCS Schedule (Appendix-BI). The earthen shoulder shall be covered with granular material in full depth up to GSB layer as shown in typical cross section.

(c) Design and specifications of earthen shoulders and granular material shall conform to the requirements specified in the relevant manual.

(vi) Lateral and vertical clearances at underpasses

(a) Lateral and vertical clearances at underpasses and provision of guardrails/crash barriers shall be as per paragraph 2.10 of the Manual.

(b) Lateral & Vertical clearance: The width of the opening and vertical clearances at underpasses shall be as follows:

Sl. No.	Location (Design Chainage Km)	Span/ opening (m)	Remarks
Nil			

(viii) Service Roads

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

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

(ix) Grade separated structures

(a) Grade separated structures shall be provided as per provision of the relevant Manual. The requisite particulars are given below:

SL No.	Location of Structure	Length (m)	Number and length of spans (m)	Approach gradient	Remarks, if any
			NIL		

(b) 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:

Sl. No.	Location	Type of structure Length (m)	Cross Road Level*			Remarks, if any
			Existing Level	Raised Level	Lowered Level	
NIL						

(x) Cattle and pedestrian under pass / over pass

Cattle and pedestrian underpass/ overpass shall be constructed as follows:

Sl. No.	Location	Type of crossing
NIL		

(xi) Typical cross-sections of the Project Highway

The schedule of typical cross-sections is given in the table below. Drawings of typical cross-sections are given in **Appendix B-II**.

S.No	Start Chainage	End Chainage	Length (m)	TCS. No	Remarks
Part -A, Road part of Major Junction at Km 0+000 towards Demwe.					
1	745+100	745+680	585	TCS 5A	
Part-B, Brahmakund to Kamlang Road					
1	0+00	0+500	500	TCS 5A	
2	0+500	1+978	1478	TCS 4	
3	1+978	1+994	16	TCS 7	
4	1+994	2+198	204	TCS 4	
5	2+198	2+243	45	TCS 7	
6	2+243	2+400	157	TCS 4	
7	2+400	2+840	440	TCS 5	

S.No	Start Chainage	End Chainage	Length (m)	TCS. No	Remarks
8	2+840	2+995	155	TCS 4	
9	2+995	3+065	70	TCS 7	
10	3+065	3+272	207	TCS 4	
11	3+272	3+302	30	TCS 7	
12	3+302	3+750	448	TCS 4	
13	3+750	4+125	375	TCS 5	
14	4+125	4+535	410	TCS 7	
15	4+535	5+200	665	TCS 4	
16	5+200	5+450	250	TCS 2	
17	5+450	6+000	550	TCS 1A	
18	6+000	8+000	2000	TCS 3	
19	8+000	8+265	265	TCS 4	
20	8+265	8+505	240	TCS 7	
21	8+505	9+000	495	TCS 4	
22	9+000	9+100	100	TCS 1B	
23	9+100	9+350	250	TCS 4	
24	9+350	9+870	520	TCS 1A	
25	9+870	10+200	330	TCS 3	
26	10+200	10+650	450	TCS 4	
27	10+650	11+075	425	TCS 6	
28	11+075	11+165	90	TCS 1B	
29	11+165	11+210	45	TCS 7	
30	11+210	12+700	1490	TCS 1B	
31	12+700	13+415	715	TCS 3	
32	13+415	13+476	61	TCS 7	
33	13+476	15+100	1624	TCS 1B	
34	15+100	15+550	450	TCS 1A	
35	15+550	16+000	450	TCS 1B	
36	16+000	16+500	500	TCS 1A	
37	16+500	16+930	430	TCS 1B	
38	16+930	16+997	67	TCS 7	
39	16+997	17+500	503	TCS 1B	
40	17+500	17+700	200	TCS 1A	
41	17+700	18+750	1050	TCS 1B	
42	18+750	18+950	200	TCS 1A	
43	18+950	19+255	305	TCS 1B	
44	19+255	19+320	65	TCS 7	
45	19+320	21+200	1880	TCS 2	
46	21+200	21+600	400	TCS 6	
47	21+600	21+650	50	TCS 7	
48	21+650	22+050	400	TCS 4	
49	22+050	22+300	250	TCS 4 A	
50	22+300	23+100	800	TCS 1B	
51	23+100	23+215	115	TCS 3	
52	23+215	23+310	95	TCS 7	
53	23+310	23+500	190	TCS 1B	

S.No	Start Chainage	End Chainage	Length (m)	TCS. No	Remarks
54	23+500	23+850	350	TCS 3	
55	23+850	24+234	384	TCS 2	

Summary of TCS

S. No	TCS No.	TCS Description	Length (m)
1	TCS 1A	Typical Cross Section for New Construction of 2 Lane with Paved Shoulders in Rural Section	2420
2	TCS 1B	Typical Cross Section for Re- Construction of 2 Lane with Paved Shoulders in Rural Section	7032
3	TCS 2	Typical Cross Section for Re- Construction of Existing Road to 2 Lane with Paved Shoulders with Covered drains cum Footpath in Urban Section	2514
4	TCS 2A	RCC Covered Drains cum Footpath near Connecting Road to Parsuramkund Temple Parking	125
5	TCS 3	Typical Cross Section for Re- Construction of Existing Road to 2 Lane with Paved Shoulders in Rural Section with cutting up to 8m	3510
6	TCS 4	Typical Cross Section for New Construction of 2 Lane with Paved Shoulders with Retaining wall and Breast wall in Rural Section in Hilly Terrain	5174
7	TCS 4 A	Typical Cross Section for New Construction of 2 Lane with Paved Shoulders with Retaining wall and Breast wall of more than 6m height in Rural Section in Hilly Terrain	250
8	TCS 5	Typical Cross Section for New Construction of 2 Lane with Paved Shoulders with 2 side Retaining wall and 1 side Breast wall in Rural Section in Hilly Terrain	815
9	TCS 5A	Typical Cross Section for New Construction of 2 Lane with Paved Shoulders with 2 side Retaining wall and 1 side Breast wall in Rural Section in Hilly Terrain (At start Point PROW 100m)	1085
10	TCS 6	Typical Cross Section for New Construction of 2 Lane with Paved Shoulders with both side Breast wall in Rural Section in Hilly Terrain	825
11	TCS 7	Typical Cross Section for Bridge Deck of New Bridge	1194

3. Intersections and Grade Separators

All intersections and grade separators shall be as per section 3 of the Manual. Existing intersections which are deficient shall be improved to the prescribed standards.

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

(i) At grade Intersections

All intersections as per the site requirement shall be designed and constructed in accordance with the manual. A list of intersections is given in below table**.** Draft layout of major junctions is given in indicative Plan & Profile drawings for reference.

Major Intersection

Sl. No.	Location of intersection (Design Chainage)	Type of intersection	Category of Road
1	0+00	T	NH-13 & NH-113
2	4+750	Y	Parsuram Kund Temple

- **Junction should be constructed as per drawing attached.**

Minor Intersection

S. No.	Design Chainage	Type of Intersection	Side	Category of Road
1	3+900	T	LHS	VR
2	4+135	X	Both side	VR
3	4+720	Y	RHS	VR
4	5+700	T	LHS	VR
5	5+880	Y	RHS	VR
6	8+700	y	LHS	VR
7	9+490	T	LHS	VR
8	10+005	Y	LHS	VR
9	11+890	T	RHS	VR
10	12+000	T	RHS	VR
11	12+855	y	RHS	VR
12	14+055	y	RHS	VR
13	14+071	T	LHS	VR
14	14+895	Y	RHS	VR
15	16+310	Y	LHS	VR
16	16+826	Y	LHS	VR
17	17+431	T	LHS	VR
18	17+640	T	LHS	VR
19	18+060	y	LHS	VR
20	18+165	T	LHS	VR
21	18+673	T	LHS	VR
22	18+800	Y	RHS	VR
23	19+122	Y	LHS	VR
24	19+270	T	LHS	VR
25	19+288	T	RHS	VR
26	19+500	T	RHS	VR
27	19+525	T	LHS	VR
28	19+567	T	RHS	VR
29	19+633	T	RHS	VR
30	19+870	T	RHS	VR
31	19+890	Y	LHS	VR
32	20+078	X	LHS	VR
33	20+237	T	RHS	VR
34	20+400	T	LHS	VR
35	20+468	T	RHS	VR
36	20+835	T	RHS	VR
37	20+880	T	RHS	VR
38	20+985	X	Both side	VR
39	21+220	Y	RHS	VR
40	22+945	Y	LHS	VR

(ii) Grade separated intersection with/without ramps

Sl. No.	Location	Salient features	Minimum length of viaduct to be provided	Road to be carried over/under the structures
Nil				

4. Road Embankment and Cut Section

(i) 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 IRC: SP: 73-2018 and the specified cross-sectional details. Deficiencies in the plan and profile of the existing road shall be corrected.

(ii) Raising of the existing road/New carriageway

Sl. No.	Section (From km to km)	Length	Extent of raising [Top of finished road level]
Nil			

5. Pavement Design

(i) Pavement design shall be carried out in accordance with Section 5 of the Manual.

(ii) Type of pavement

Flexible pavement shall be adopted for the project road.

(iii) Design requirements

(a) Design Period and strategy

Flexible Pavement shall be design period of 20 years as per IRC:58-2015 and IRC:37-2018.

(b) Design Traffic

Flexible Pavement: Notwithstanding anything to the contrary contained in this Agreement or the Manual, the Contractor shall design the pavement for design traffic of minimum 20 MSA. The road section proposed for development with Flexible pavement including paved shoulders in rural section shall be constructed after scarifying /dismantling the existing bituminous layers.

(iii) Reconstruction of Stretches

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

S.No.	Stretch From km to km	Remarks
1	Km 745.685 to Km 745.100	Junction Improvement
2	Km 0+500 to km 0+850	Major Realignment
3	Km 0+900 to km 1+000	Minor Realignment
4	Km 1+180 to km 2+700	Minor Realignment & Hair Pin Band
5	Km 2+980 to km 3+070	Minor Realignment

S.No.	Stretch From km to km	Remarks
6	Km 3+800 to km 4+000	Minor Realignment, Hair Pin Band
7	Km 5+550 to km 5+900	Curve Improvement
8	Km 8+050 to km 8+270	Curve Improvement
9	Km 9+870 to km 11+100	Major Realignment
10	Km 15+100 to km 15+500	Minor Realignment, Hair Pin Band
11	Km 16+050 to km 16+500	Minor Realignment, Hair Pin Band
12	Km 17+500 to km 17+700	Minor Realignment
13	Km 18+750 to km 18+870	Minor Realignment
14	Km 21+200 to km 21+600	Major Realignment

6 Road Side Drainage

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

Longitudinal drain shall be provided in the following stretches:

S. No	Start Chainage	End Chainage	Length	TCS No.	Side
1	0+00	0+585	585	TCS 5A	Both Side
2	0+00	0+500	500	TCS 5A	Both Side
3	0+500	1+978	1478	TCS 4	One Side
4	1+994	2+198	204	TCS 4	One Side
5	2+243	2+400	157	TCS 4	One Side
6	2+400	2+840	440	TCS 5	Both Side
7	2+840	2+995	155	TCS 4	One Side
8	3+065	3+272	207	TCS 4	One Side
9	3+302	3+750	448	TCS 4	One Side
10	3+750	4+125	375	TCS 5	Both Side
11	4+535	5+200	665	TCS 4	One Side
12	6+000	8+000	2000	TCS 3	One Side
13	8+000	8+265	265	TCS 4	One Side
14	8+505	9+000	495	TCS 4	One Side
15	9+100	9+350	250	TCS 4	One Side
16	9+870	10+200	330	TCS 3	One Side
17	10+200	10+650	450	TCS 4	One Side
18	10+650	11+075	425	TCS 6	Both Side
19	12+700	13+415	715	TCS 3	One Side
20	21+200	21+600	400	TCS 6	Both Side
21	21+650	22+050	400	TCS 4	One Side
22	22+050	22+300	250	TCS 4 A	One Side
23	23+100	23+215	115	TCS 3	One Side
24	23+500	23+850	350	TCS 3	One Side

Footpath cum RCC Covered Drain in Built-ups

S. No	Start Chainage	End Chainage	Length	TCS No.	Drain	Side	Remarks
1	5+200	5+450	250	TCS 2	RCC Covered Drains cum Footpath	Both Side	
2	19+320	21+200	1880	TCS 2	RCC Covered Drains cum Footpath	Both Side	
3	23+850	24+234	384	TCS 2	RCC Covered Drains cum Footpath	Both Side	
4	5+030	Towards Parking	125	TCS 2A	RCC Covered Drains cum Footpath	Both Side	Connecting road to Parsuramkund Temple Parking

7 Designs of Structures

(i) General

(a) All bridges, culverts and other structures shall be designed and constructed in accordance with section 7 of the Manual and shall conform the cross-sectional features and other details specified therein.

(b) Width of the carriageway of new bridges and structures shall be as per proposed Typical cross section presented in this schedule.

Sl. No.	Bridge at km	Width of carriageway and cross-sectional features*
1	1+987	18 M (13 M incl. Shyness & PS 2.5 m footpath incl. Crash Barrier)
2	2+220	
3	3+028	
4	3+278	
5	11+189	

(c) The following structures shall be provided with footpaths:

Sl. No.	Bridge at km	Remarks
1	1+987	Minor Bridge
2	2+220	
3	3+028	Major Bridge
4	3+278	
5	11+189	Minor Bridge

(d) All bridges shall be high level bridges.

(e) The following structures shall be designed to carry utility services specified in table below:

S. No.	Bridge at km	Utility service to be carried	Remarks
Nil			

(f) 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.

(ii) Culverts

(a) Overall minimum width of all culverts shall be more than 12.00m and transitions to be matched with the roadway width of the approaches.

(b) Reconstruction /New Construction of culverts:

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

S.NO.	Existing Chainage	Design Chainage	Proposal	Span
1	745+863	0+189	RCC BOX	1X3.0/12.0/3.0
2	745+925	0+249	RCC BOX	1X3.0/13.2/2.0
3	746+259	0+574	RCC BOX	1X2.0/13.5/2.0
4	746+341	0+650	RCC BOX	1X2.0/13.2/2.0
5	746+608	0+912	RCC BOX	1X2.0/12.6/2.0
6	746+693	0+977	RCC BOX	1X4.0/12.6/4.0
7	747+665	1+931	RCC BOX	1X2.0/13.0/3.0
8	750+488	4+776	RCC BOX	1X4.0/12.6/4.0
9	750+678	4+957	RCC BOX	1X2.0/12.0/2.0
10	751+052	5+325	RCC BOX	1X2.0/12.6/2.0
11	751+273	5+540	RCC BOX	1X2.0/12.0/2.0
12	751+590	5+839	RCC BOX	1X3.0/12.6/2.0
13	751+844	6+096	RCC BOX	1X2.0/12.0/2.0
14	752+107	6+361	RCC BOX	1X2.0/12.6/2.0
15	752+436	6+687	RCC BOX	1X2.0/12.4/2.0
16	752+833	7+082	RCC BOX	1X2.0/12.5/2.0
17	752+996	7+244	RCC BOX	1X2.0/12.0/2.0
18	753+093	7+343	RCC BOX	1X3.0/12.8/2.0
19	753+158	7+408	RCC BOX	1X3.0/12.0/2.0
20	753+197	7+447	RCC BOX	1X3.0/12.0/3.0
21	753+298	7+548	RCC BOX	1X2.0/12.0/2.0
22	753+367	7+617	RCC BOX	1X3.0/12.6/2.0
23	753+544	7+786	RCC BOX	1X2.0/12.5/2.0
24	753+690	7+937	RCC BOX	1X2.0/12.0/2.0
25	754+263	8+519	RCC BOX	1X2.0/12.0/2.0
26	754+317	8+576	RCC BOX	1X2.0/12.0/2.0
27	754+566	8+830	RCC BOX	1X2.0/12.0/2.0
28	754+765	9+029	RCC BOX	1X2.0/12.0/2.0
29	754+993	9+255	RCC BOX	1X2.0/12.0/2.0
30	755+243	9+494	RCC BOX	1X2.0/12.4/2.0
31	755+349	9+600	RCC BOX	1X2.0/12.0/2.0
32	755+446	9+694	RCC BOX	1X2.0/13.0/2.0
33	755+905	10+065	RCC BOX	1X2.0/12.6/2.0
34	756+177	10+260	RCC BOX	1X4.0/12.5/6.0
35	756+554	10+632	RCC BOX	1X2.0/12.5/2.0

S.NO.	Existing Chainage	Design Chainage	Proposal	Span
36	756+602	10+726	RCC BOX	1X3.0/12.6/3.0
37	757+191	11+083	RCC BOX	1X2.0/12.7/2.0
38	757+373	11+266	RCC BOX	1X2.0/12.6/2.0
39	757+685	11+576	RCC BOX	1X3.0/12.0/3.0
40	758+226	12+120	RCC BOX	1X2.0/12.6/2.0
41	758+302	12+198	RCC BOX	1X2.0/12.6/2.0
42	758+391	12+288	RCC BOX	1X2.0/12.6/2.0
43	758+736	12+633	RCC BOX	1X2.0/13.0/2.0
44	758+92	12+798	RCC BOX	1X2.0/13.0/2.0
45	759+051	12+922	RCC BOX	1X2.0/12.0/2.0
46	759+300	13+169	RCC BOX	1X2.0/13.0/2.0
47	759+768	13+637	RCC BOX	1X2.0/12.0/2.0
48	759+904	13+772	RCC BOX	1X2.0/12.0/2.0
49	760+012	13+882	RCC BOX	1X2.0/12.0/2.0
50	760+228	14+097	RCC BOX	1X2.0/12.0/2.0
51	760+443	14+312	RCC BOX	1X2.0/12.6/2.0
52	760+746	14+614	RCC BOX	1X2.0/12.0/2.0
53	760+984	14+853	RCC BOX	1X2.0/12.0/2.0
54	761+073	14+942	RCC BOX	1X2.0/12.0/2.0
55	761+267	15+136	RCC BOX	1X2.0/12.0/2.0
56	761+779	15+614	RCC BOX	1X2.0/12.0/2.0
57	762+022	15+857	RCC BOX	1X2.0/12.2/2.0
58	762+268	16+106	RCC BOX	1X2.0/12.0/2.0
59	762+616	16+484	RCC BOX	1X2.0/12.6/2.0
60	762+787	16+655	RCC BOX	1X2.0/12.2/2.0
61	763+376	17+244	RCC BOX	1X2.0/12.0/2.0
62	763+884	17+696	RCC BOX	1X3.0/12.0/3.0
63	763+988	17+800	RCC BOX	1X2.0/12.0/2.0
64	764+189	18+000	RCC BOX	1X2.0/12.0/2.0
65	764+541	18+351	RCC BOX	1X2.0/12.0/2.0
66	764+624	18+434	RCC BOX	1X2.0/12.0/2.0
67	764+871	18+681	RCC BOX	1X2.0/12.0/2.0
68	765+156	18+944	RCC BOX	1X4.5/12.0/3.0
69	765+675	19+457	RCC BOX	1X2.0/14.0/2.0
70	765+908	19+690	RCC BOX	1X2.0/14.0/2.0
71	765+996	19+778	RCC BOX	1X2.0/14.0/2.0
72	766+241	20+023	RCC BOX	1X2.0/14.0/2.0
73	766+502	20+283	RCC BOX	1X2.0/14.0/2.0
74	766+661	20+443	RCC BOX	1X2.0/14.0/2.0
75	766+978	20+760	RCC BOX	1X2.0/14.0/2.0
76	767+224	21+005	RCC BOX	1X2.0/14.0/2.0
77	768+551	22+186	RCC BOX	1X3.0/12.5/3.0
78	768+935	22+570	RCC BOX	1X2.0/12.0/2.0
79	768+732	22+666	RCC BOX	1X2.0/12.0/2.0
80	769+356	22+990	RCC BOX	1X2.0/12.0/2.0
81	769+968	23+607	RCC BOX	1X2.0/12.0/2.0
82	770+210	23+849	RCC BOX	1X2.0/12.0/2.0
83	770+419	24+058	RCC BOX	1X2.0/12.0/2.0

(c) Widening of existing culverts

All existing culverts which are not to be reconstructed shall be widened to the roadway width of the Project Highway as per the typical cross section given in section 7 of the Manual. Repairs and strengthening of existing structures where required shall be carried out.

Sl. No.	Culvert location (Design Chainage)	Type, span height and width of existing culvert(m)	Repairs to be carried out
Nil			

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

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	No. of Spans x Clear Span (m)/Opening (m)	Remarks (Proposed Type) *
1	749+190	3+442	1X2.0/12.0/2.0	RCC BOX
2	755+733	9+938	1X3.0/12.7/3.0	RCC BOX
3	756+064	10+176	1X3.0/12.0/3.0	RCC BOX
4	756+306	10+383	1X3.0/13.2/3.0	RCC BOX
5	756+468	10+585	1X3.0/12.0/3.0	RCC BOX
6	756+686	10+832	1X2.0/12.0/2.0	RCC BOX
7	757+009	10+934	1X2.0/12.3/2.0	RCC BOX
8	761+404	15+276	1X4.0/13.2/5.0	RCC BOX
9	763+771	17+595	1X6.0/13.0/6.0	RCC BOX
10	767+727	21+344	1X4.0/13.0/4.0	RCC BOX
11	768+732	22+367	1X2.0/12.0/2.0	RCC BOX
12	769+823	23+462	1X4.0/12.0/6.0	RCC BOX

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

Sl. No.	Culvert Location (Design Chainage)	Type	No. of Spans x Clear Span (m)/Opening (m)	Repairs to be carried out specify*
Nil				

(f) Floor protection works shall be as specified in the relevant IRC Codes and Specifications.

(iii) Bridges

(a) Existing bridges to be re-constructed/widened

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

Sl. No.	Design Chainage(km)	Existing bridge	Proposed Span Arrangement
1	3+028	1 X 36.5	1 X 72.0

- The following narrow bridges shall be widened:

Sl. No	Design Chainage(km)	Existing width (m)	Extent of widening (m)	Cross-section at deck level for widening @
Nil				

(b) **Additional New bridges**

- Major Bridge

Sl. No.	Design Chainage (km)	Total length (m)	Structure Type	Remarks, if any (Total width in m)
			Nil	

New bridges at the following locations on the Project Highway shall be constructed. GADs for the new bridges are attached in the drawings folder.

Minor Bridge

Sl. No.	Design Chainage(km)	Total length (m)	Structure Type	Remarks, if any (Total width in m)
1	1+987	1X16.0	RCC T Beam	18 m (Causeway)
2	2+220	1x45.0	Steel Composite	18 m (Causeway)
3	3+278	1x30.0	Steel Composite	18 m (Causeway)
4	11+189	3x15.0	RCC T Beam	18 m (Causeway)

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

Sl. No.	Location at Chainage	Remarks
NIL		

(d) Repairs/replacements of railing/parapets of the existing bridges shall be undertaken as follows:

Sl. No.	Location at Chainage	Remarks
NIL		

(e) Drainage system for bridge decks

An effective drainage system for bridge decks shall be provided as specified in the Manual.

(f) Structures in marine environment

Following is the list of structures to be constructed.

Sr. No.	Design Chainage (Km)	No. of Spans with Span Length (m)	Structure
-NIL-			

(iv) Rail-road bridges

(a) Design, construction and detailing of ROB/RUB shall be as specified in the provision of relevant Manual.

(b) 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 (Chainage km)	Length of Structure (m)	Remarks
-NIL-			

(c) 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 (Chainage km)	Length of Structure (m)	Remarks
-NIL-			

(v) **Grade separated structures**

The grade separated structures shall be provided at the locations and of the type and length specified in paragraphs 2 (x) and 3 of this Annex-I.

(vi) Repairs and strengthening of bridges and structures

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

(a) Bridges

The following Major bridges shall be retained with repairs:

S. No.	Design Chainage	Existing Details	Proposed Details
		Type of Superstructure	**Proposal**
1	4+331	PSC Balance Cantilever	Retained with Major Repair of all piers and Rehabilitation
2	8+408	PSC Box Girder	Retained with Minor Repair and Rehabilitation
3	13+448	RCC Box	
4	16+966	PSC Box Girder	
5	19+285	PSC Box Girder	
6	23+282	PSC Box Girder	

Note: All the retained bridges are to be painted as per Manual or relevant codes.

(b) ROB / RUB

SL. No.	Location of ROB/RUB (km)	Nature and extent of repairs /strengthening to be carried out
-NIL-		

(c) Overpasses/Underpasses and other structures

Sl. No.	Location of Structure (Ch)	Nature and extent of repairs/strengthening to be carried out
-NIL-		

(vii) List of Major Bridges and Structures

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

Sl. No.	Location
1	3+028

8. Traffic Control Devices and Road Safety Works

(i) Traffic control devices and road safety works shall be provided in accordance with the provision of Section-9 of relevant Manual as specified in Schedule-D.

(ii) Specifications of the reflecting sheeting

Retro reflective sheeting should be of high intensity grade with encapsulated lens or with micro prismatic retro reflective element in accordance with ASTM Standard D 4956-04 in accordance with Clause 9.2.3 of the Manual.

9. Roadside Furniture

(i) Roadside furniture shall be provided in accordance with the provisions of the Manual.

(ii) Overhead traffic signs: -

Sl. No.	Design Chainage	Remarks
1	0+000	
2	24+234	

10. Compulsory Afforestation

The trees should be planted by the Agency as compensatory afforestation according to The Forest Conservation Act, decided by Forest Department.

11. Hazardous Locations

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

Semi rigid Thrie-beam crash barriers shall be installed all along the project highway on earthen shoulders on either side of main carriageway throughout the project length.

12. Special requirements for hill roads

(a) Slope Protection Structures

As the project involve cutting of existing hill slopes, it is imperative that slopes are stabilized for insuring longevity of the slopes and the roads.

Structures to be constructed for slope protection shown in the following Table:

- **RCC Retaining wall (Height 5 m)**

S. No	Start Chainage	End Chainage	Length (m)	Side
1	0+00	0+585	585	**Both Side**
2	0+00	0+500	500	**Both Side**
3	0+500	1+978	1478	One Side
4	1+994	2+198	204	One Side
5	2+243	2+400	157	One Side
6	2+400	2+840	440	**Both Side**
7	2+840	2+995	155	One Side
8	3+065	3+272	207	One Side
9	3+302	3+750	448	One Side
10	3+750	4+125	375	**Both Side**
11	4+535	5+200	665	One Side
12	8+000	8+265	265	One Side
13	8+505	9+000	495	One Side
14	9+100	9+350	250	One Side
15	10+200	10+650	450	One Side
16	21+650	22+050	400	One Side
17	22+050	22+300	250	One Side
Total Length(m) (Including Both Side Length)			**9224**	

- **RCC Breast wall (Height 3m)**

S. No	Start Chainage	End Chainage	Length (m)	Side
1	0+00	0+585	1085	One Side
2	0+00	0+500	1085	One Side
3	0+500	1+978	1478	One Side
4	1+994	2+198	204	One Side
5	2+243	2+400	157	One Side
6	2+400	2+840	440	One Side
7	2+840	2+995	155	One Side
8	3+065	3+272	207	One Side
9	3+302	3+750	448	One Side
10	3+750	4+125	375	One Side
11	4+535	5+200	665	One Side
12	6+000	8+000	2000	One Side
13	8+000	8+265	265	One Side
14	8+505	9+000	495	One Side
15	9+100	9+350	250	One Side
16	9+870	10+200	330	Both Side
17	10+200	10+650	450	Both Side
18	10+650	11+075	425	Both Side
19	12+700	13+415	715	One Side
20	21+200	21+600	400	Both Side
21	21+650	22+050	400	One Side
22	22+050	22+300	250	One Side
23	23+100	23+215	115	One Side
24	23+500	23+850	350	One Side

S. No	Start Chainage	End Chainage	Length (m)	Side
Total Length(m) (Including Both Side Length)			**12484**	

Shore Erosion Control

Sr. No.	Design chainage (From)	Design chainage (To)	Length (m)	Side	Avg. Height(m)
Nil					

Locations for proposed Thrie Beam Crash Barrier

S.No	Start Chainage	End Chainage	Length (m)	Side
1	5+450	6+000	550	Both Side
2	6+000	8+000	2000	One Side
3	9+000	9+100	100	Both Side
4	9+350	9+870	520	Both Side
5	9+870	10+200	330	One Side
6	11+075	11+165	90	Both Side
7	11+210	12+700	1490	Both Side
8	12+700	13+415	715	One Side
9	13+476	15+100	1624	Both Side
10	15+100	15+550	450	Both Side
11	15+550	16+000	450	Both Side
12	16+000	16+500	500	Both Side
13	16+500	16+930	430	Both Side
14	16+997	17+500	503	Both Side
15	17+500	17+700	200	Both Side
16	17+700	18+750	1050	Both Side
17	18+750	18+950	200	Both Side
18	18+950	19+255	305	Both Side
19	22+300	23+100	800	Both Side
20	23+100	23+215	115	One Side
21	23+310	23+500	190	Both Side
22	23+500	23+850	350	Both Side
Total Length(m) (Including Both Side Length)			**22614**	

13. Change of Scope

The length of Structures, bridges, culverts, underpasses, flyovers etc. specified hereinabove shall be treated as an approximate assessment. The actual lengths as required based on 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 Articled 13.

14. Utility Shifting

Shifting of obstructing existing utilities indicated in Schedule-A to an appropriate location in accordance with the standards and specifications of concerned utility Owning Department is part of the scope of work of the Concessionaire. The Bidders may visit the site and assess the quantum of shifting of utilities for the project before submission of their bid. Copy of utility relocation plan is enclosed. The specifications of the concerned Utility Owning Department shall be applicable and followed.

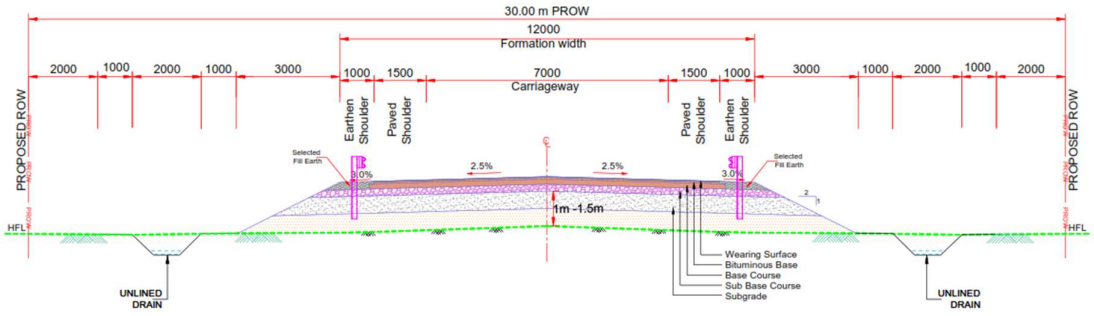
Note I:

(a) The type/spacing/size/specifications of poles/towers/line/cables to be used in shifting work are as per the guidelines of utility owning department and it is to be agreed solely between the Concessionaire and the Utility owning department. No change of scope shall be admissible and no cost shall be paid for using different type/spacing/size/specifications in shifted work in comparison to those in the existing work or for making any overhead crossings to underground as per requirement of utility owning department and/or construction of project highway. The Concessionaire shall carry out joint inspection with utility owning department and get the estimates from utility owning department. The assistance of the Authority is limited to giving forwarding letter on the proposal of Concessionaire to utility owning department whenever asked by the Concessionaire. The decision/approval of utility owning department shall be binding on the Concessionaire.

(b) The supervision charges at the rates/charges applicable of the utility owning department shall be paid directly by the Authority to the Utility owning department as and when Concessionaire furnishes demand of Utility Owning Department along with a copy of estimated cost given by the latter.

(c) The dismantled material/scrap of existing Utility to be shifted/dismantled shall belong to the Concessionaire who would be free to dispose-off the dismantled material as deemed fit by them unless the Concessionaire is required to deposit the dismantled material to Utility owning department as per the norms and practice and, in that case the amount of credit for dismantled material may be availed by the concessionaire as per the estimate agreed between them.

(d) The utilities shall be handed over after shifting work is completed to Utility Owning Department to their entire satisfaction. The maintenance liability shall rest with the Utility Owning Department after handing over process is complete as far as utility shifting works are concerned.

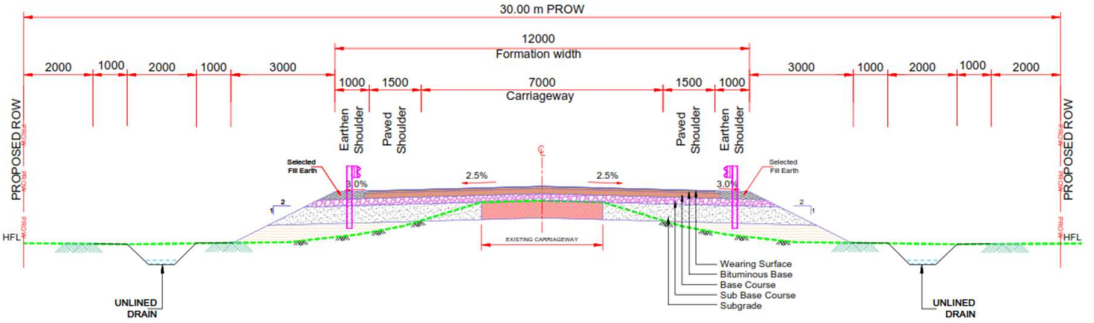


TCS-1A: New Construction of 2-Lane With Paved Shoulder
(Open Country - Plain/Rolling Terrain)

S.No	Start Chainage	End Chainage	Length	TCS .No
1	5450	6000	550	TCS 1A
2	9350	9870	520	TCS 1A
3	15100	15550	450	TCS 1A
4	16000	16500	500	TCS 1A
5	17500	17700	200	TCS 1A
6	18750	18950	200	TCS 1A
			2420	

NOTE:-
1. All dimensions are in mm unless otherwise specified.

CLIENT:- National Highways and Infrastructure Development Corporation Limited
CONSULTANT:- Chaitanya Projects Consultancy Pvt. Ltd. C-5, 2ND FLOOR, R.K.TOWER PLOT NO.- 21-22, SECTOR-4, VAISHALI, GHAZIABAD PH.: 0120-3223419, 4120472, FAX: 0120-4110472
PROJECT:- Consultancy services for preparation of Feasibility Study and Detailed Project Report for Two Laning of NH-52 from Km. 745.60 to Km. 806.75 (Brahmakund-T-Junction-Chowkham) (Length 61.15 Km.) for execution on EPC Mode in the state of Arunachal Pradesh
SCALE :- AS SHOWN
DWG TITLE:- TYPICAL CROSS SECTION Package-I (Brhamakund to Kamlang Junction) TCS-1A
DRAWING No :- NHDCL/CPC/PDP/NH-15/BRHAM-KAMLANG/HWY/TCS/ 01
DATE : JULY-2020 Revision: R4
PREPARED BY : SAUWAR | DESIGNED BY : S. CHAUHAN | CHECKED BY : P.MISHRA | APPROVED BY : S.K. SINHA

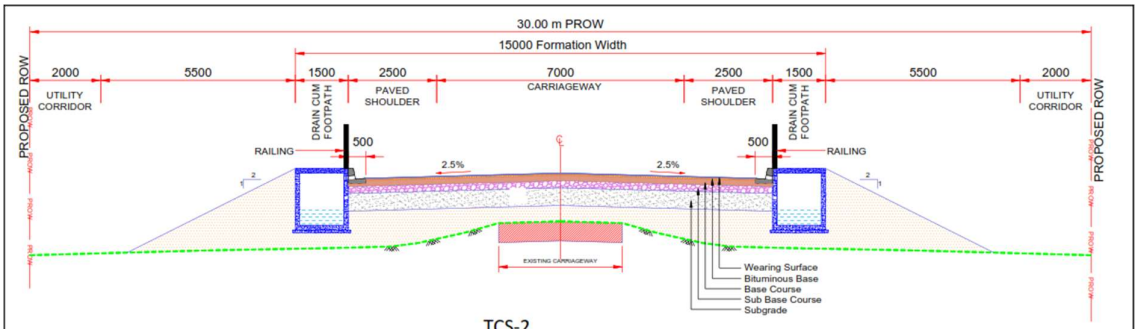


TCS-1B: Re-Construction of Existing Road to 2-Lane With Paved Shoulder
(Open Country - Plain/Rolling Terrain)

S.No	Start Chainage	End Chainage	Length	TCS .No
1	9000	9100	100	TCS 1B
2	11075	11165	90	TCS 1B
3	11210	12700	1490	TCS 1B
4	13476	15100	1624	TCS 1B
5	15550	16000	450	TCS 1B
6	16500	16930	430	TCS 1B
7	16997	17500	503	TCS 1B
8	17700	18750	1050	TCS 1B
9	18950	19255	305	TCS 1B
10	22300	23100	800	TCS 1B
11	23310	23500	190	TCS 1B
			7032	

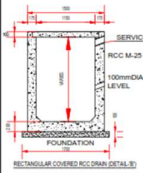
NOTE:-
1. All dimensions are in mm unless otherwise specified.

CLIENT:- National Highways and Infrastructure Development Corporation Limited
CONSULTANT:- Chaitanya Projects Consultancy Pvt. Ltd. C-5, 2ND FLOOR, R.K.TOWER PLOT NO.- 21-22, SECTOR-4, VAISHALI, GHAZIABAD PH.: 0120-3223419, 4120472, FAX: 0120-4110472
PROJECT:- Consultancy services for preparation of Feasibility Study and Detailed Project Report for Two Laning of NH-52 from Km. 745.60 to Km. 806.75 (Brahmakund-T-Junction-Chowkham) (Length 61.15 Km.) for execution on EPC Mode in the state of Arunachal Pradesh
SCALE :- AS SHOWN
DWG TITLE:- TYPICAL CROSS SECTION Package-I (Brhamakund to Kamlang Junction) TCS-1B
DRAWING No :- NHDCL/CPC/PDP/NH-15/BRHAM-KAMLANG/HWY/TCS/ 02
DATE : JULY-2020 Revision: R4
PREPARED BY : SAUWAR | DESIGNED BY : S. CHAUHAN | CHECKED BY : P.MISHRA | APPROVED BY : S.K. SINHA



TCS-2

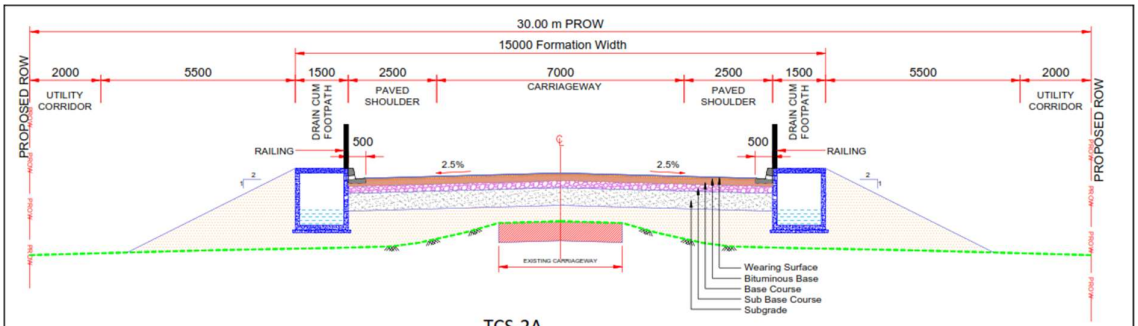
Typical Cross Section for Re-Construction of Existing Road to 2 Lane with Paved Shoulders with Covered Drain cum Footpath in Built-up Section



S.No	Start Chainage	End Chainage	Length	TCS .No
1	5200	5450	250	TCS 2
2	19320	21200	1880	TCS 2
3	23850	24234	384	TCS 2
			2514	

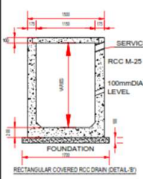
NOTE:-
1. All dimensions are in mm unless otherwise specified.
2. Existing Bituminous Surface shall be Scarified off

CLIENT:-	CONSULTANT:-	PROJECT:-	SCALE :-	DWG TITLE:-	DRAWING No :-
National Highways and Infrastructure Development Corporation Limited	Chaitanya Projects Consultancy Pvt. Ltd. C-5, 2ND FLOOR, R.K.TOWER PLOT NO.- 21-22, SECTOR-4, VAISHALI, GHAZIABAD PH.: 0120-3223419, 4120472, FAX: 0120-4110472	Consultancy services for preparation of Feasibility Study and Detailed Project Report for Two Laning of NH-52 from Km. 745.60 to Km. 806.75 (Brahmakund-T-Junction-Chowkham) (Length 61.15 Km.) for execution on EPC Mode in the state of Arunachal Pradesh	AS SHOWN	TYPICAL CROSS SECTION Package-I (Brhamakund to Kamlang Junction) TCS-2	NHDCL/CPO/TDP/NH-15/BRHAMAKAMLANG/HWT/CS/ 03 DATE : JULY-2023 Revision: R4 PREPARED BY: SAUMAR DESIGNED BY: S. CHAUHAN CHECKED BY: P.MISHRA APPROVED BY: S.K. SINHA



TCS-2A

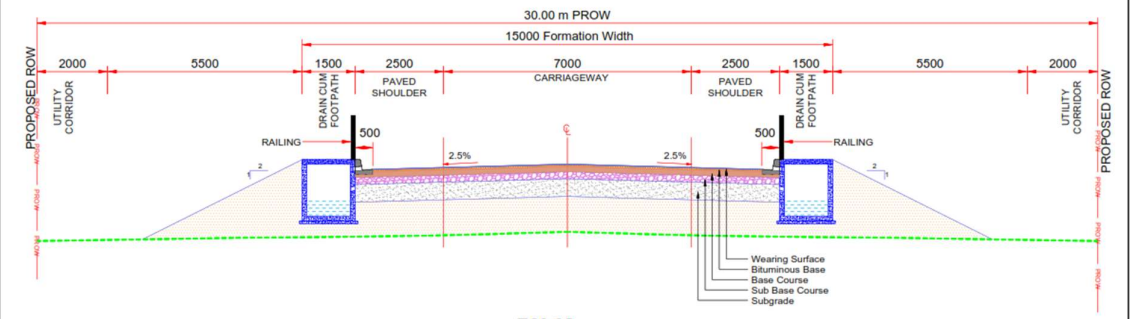
Typical Cross Section for Re-Construction of Existing Road to 2 Lane with Paved Shoulders with Covered Drain cum Footpath in Built-up Section



S.No	Start Chainage	End Chainage	Length	TCS .No
1	5200	5450	250	TCS 2
2	19320	21200	1880	TCS 2
3	23850	24234	384	TCS 2
			2514	

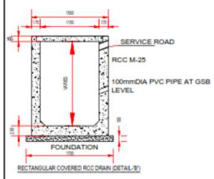
NOTE:-
1. All dimensions are in mm unless otherwise specified.
2. Existing Bituminous Surface shall be Scarified off

CLIENT:-	CONSULTANT:-	PROJECT:-	SCALE :-	DWG TITLE:-	DRAWING No :-
National Highways and Infrastructure Development Corporation Limited	Chaitanya Projects Consultancy Pvt. Ltd. C-5, 2ND FLOOR, R.K.TOWER PLOT NO.- 21-22, SECTOR-4, VAISHALI, GHAZIABAD PH.: 0120-3223419, 4120472, FAX: 0120-4110472	Consultancy services for preparation of Feasibility Study and Detailed Project Report for Two Laning of NH-52 from Km. 745.60 to Km. 806.75 (Brahmakund-T-Junction-Chowkham) (Length 61.15 Km.) for execution on EPC Mode in the state of Arunachal Pradesh	AS SHOWN	TYPICAL CROSS SECTION Package-I (Brhamakund to Kamlang Junction) TCS-2	NHDCL/CPO/TDP/NH-15/BRHAMAKAMLANG/HWT/CS/ 03 DATE : JULY-2023 Revision: R4 PREPARED BY: SAUMAR DESIGNED BY: S. CHAUHAN CHECKED BY: P.MISHRA APPROVED BY: S.K. SINHA



TCS-2B

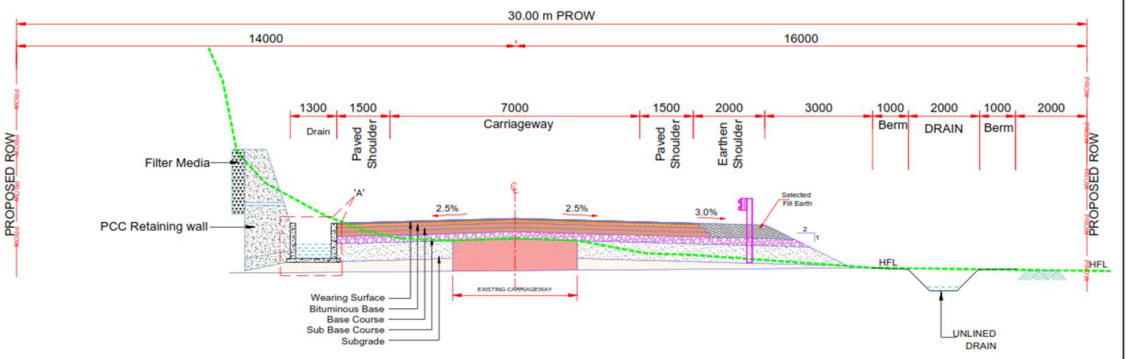
Typical Cross Section for New Construction to 2 lane with Paved shoulders with Covered drain cum footpath in Urban section (Connecting road to parking)



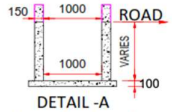
NOTE:-
1. All dimensions are in mm unless otherwise specified.
2. Existing Bituminous Surface shall be Scarified off

CLIENT:-	CONSULTANT:-	PROJECT:-	SCALE :-	DWG TITLE:-	DRAWING No :-
National Highways and Infrastructure Development Corporation Limited	Chaitanya Projects Consultancy Pvt. Ltd. C-5, 2ND FLOOR, R.K.TOWER PLOT NO.- 21-22, SECTOR-4, VAISHALI, GHAZIABAD PH.: 0120-3223419, 4120472, FAX: 0120-4110472	Consultancy services for preparation of Feasibility Study and Detailed Project Report for Two Laning of NH-52 from Km. 745.60 to Km. 806.75 (Brahmakund-T-Junction-Chowkham) (Length 61.15 Km.) for execution on EPC Mode in the state of Arunachal Pradesh	AS SHOWN	TYPICAL CROSS SECTION Package-I (Behamakund to Kamlang Junction) TCS-2B	NHDCL/CPC/PDPR/NH-15/BRHAMAKAMLANGHWY/TCS/ 03A

DATE : JULY-2023			Revision: R4
PREPARED BY : GAUHAR	DESIGNED BY : L. CHAUHAN	CHECKED BY : FARSHRA	APPROVED BY : S.K. SINHA



TCS-3: 2-Lane Carriageway with Paved Shoulder in Cutting (open country -Rolling terrain)



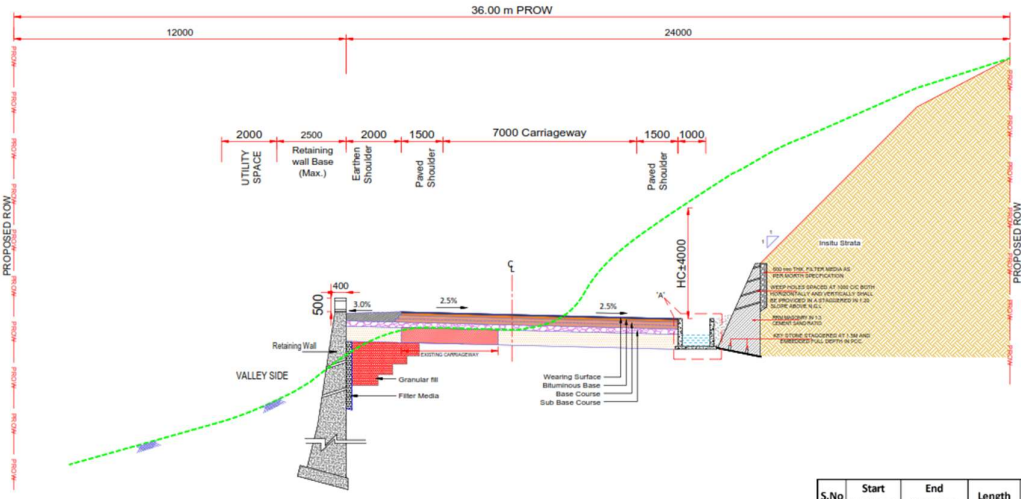
DETAIL -A
Cross Section of Longitudinal Drain

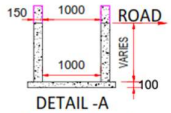
S.No	Start Chainage	End Chainage	Length	TCS .No
1	6000	8000	2000	TCS 3
2	9870	10200	330	TCS 3
3	12700	13415	715	TCS 3
4	23100	23215	115	TCS 3
5	23500	23850	350	TCS 3
			3510	

NOTE:-
1. All dimensions are in mm unless otherwise specified.
2. Cut slope shall be provided as per site requirements.

CLIENT:-	CONSULTANT:-	PROJECT:-	SCALE :-	DWG TITLE:-	DRAWING No :-
National Highways and Infrastructure Development Corporation Limited	Chaitanya Projects Consultancy Pvt. Ltd. C-5, 2ND FLOOR, R.K.TOWER PLOT NO.- 21-22, SECTOR-4, VAISHALI, GHAZIABAD PH.: 0120-3223419, 4120472, FAX: 0120-4110472	Consultancy services for preparation of Feasibility Study and Detailed Project Report for Two Laning of NH-52 from Km. 745.60 to Km. 806.75 (Brahmakund-T-Junction-Chowkham) (Length 61.15 Km.) for execution on EPC Mode in the state of Arunachal Pradesh	AS SHOWN	TYPICAL CROSS SECTION Package-I (Behamakund to Kamlang Junction) TCS-3	NHDCL/CPC/PDPR/NH-15/BRHAMAKAMLANGHWY/TCS/ 04

DATE : JULY-2023			Revision: R4
PREPARED BY : GAUHAR	DESIGNED BY : L. CHAUHAN	CHECKED BY : FARSHRA	APPROVED BY : S.K. SINHA





DETAIL -A
Cross Section of Longitudinal Drain

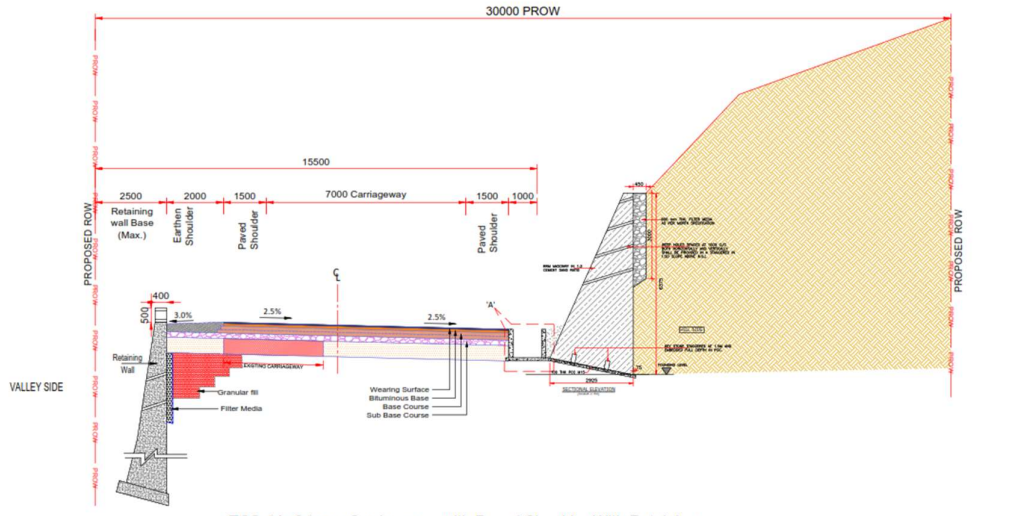
TCS-4: 2-Lane Carriageway with Paved Shoulder With Retaining wall in Mountainous Terrain

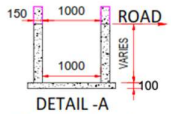
NOTE:-
1. All dimensions are in mm unless otherwise specified.
2. Cut slope shall be provided as per site requirements.
3. Breast wall shall be provided wherever required for Detail of Breast wall refer fig. 9.4 in IRC SP-48-1998 (Hill Road Manual)

S.No	Start Chainage	End Chainage	Length	TCS .No
1	500	1978	1478	TCS 4
2	1994	2198	204	TCS 4
3	2243	2400	157	TCS 4
4	2840	2995	155	TCS 4
5	3065	3272	207	TCS 4
6	3302	3750	448	TCS 4
7	4535	5200	665	TCS 4
8	8000	8265	265	TCS 4
9	8505	9000	495	TCS 4
10	9100	9350	250	TCS 4
11	10200	10650	450	TCS 4
12	21650	22050	400	TCS 4
			5174	

CLIENT:-	CONSULTANT:-	PROJECT:-	SCALE :-	DWG TITLE:-	DRAWING No :-
National Highways and Infrastructure Development Corporation Limited	Chaitanya Projects Consultancy Pvt. Ltd. C-5, 2ND FLOOR, R.K.TOWER PLOT NO.- 21-22, SECTOR-4, VAISHALI, GHAZIABAD PH.: 0120-3223419, 4120472, FAX: 0120-4110472	Consultancy services for preparation of Feasibility Study and Detailed Project Report for Two Laning of NH-52 from Km. 745.60 to Km. 806.75 (Brahmakund-T-Junction-Chowkham) (Length 61.15 Km.) for execution on EPC Mode in the state of Arunachal Pradesh	AS SHOWN	TYPICAL CROSS SECTION Package-I (Behamakund to Kamlang Junction) TCS-4	NHDCL/CPC/PDPR/NH-15/BRHAMAKAMLANGHWY/TCS/ 05

DATE : JULY-2023			Revision: R4
PREPARED BY	DESIGNED BY	CHECKED BY	APPROVED BY
GAUHAR	S. CHAUHAN	FARSHRA	S.K. SINHA





DETAIL -A
Cross Section of Longitudinal Drain

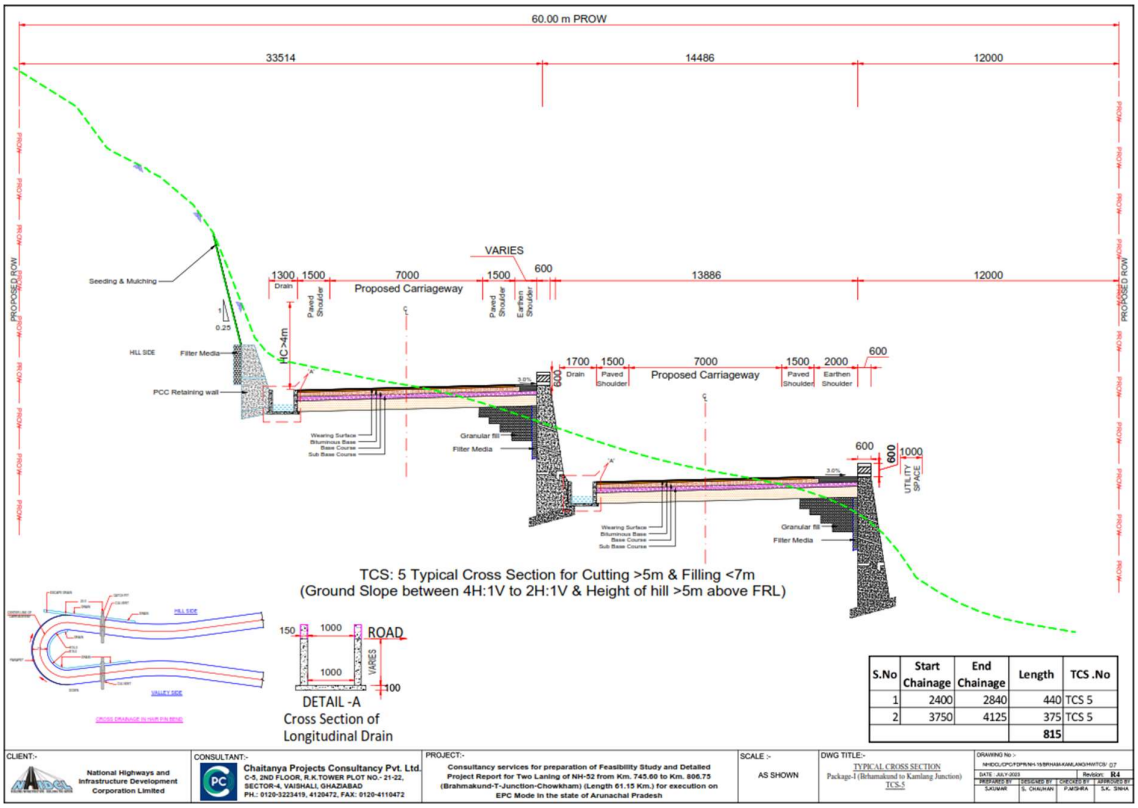
TCS-4A: 2-Lane Carriageway with Paved Shoulder With Retaining wall in Mountainous Terrain

S.No	Start Chainage	End Chainage	Length	TCS .No
1	22050	22300	250	TCS 4 A

NOTE:-
1. All dimensions are in mm unless otherwise specified.
2. Cut slope shall be provided as per site requirements.
3. Breast wall shall be provided wherever required for Detail of Breast wall refer fig. 9.4 in IRC SP-48-1998 (Hill Road Manual)

CLIENT:-	CONSULTANT:-	PROJECT:-	SCALE :-	DWG TITLE:-	DRAWING No :-
National Highways and Infrastructure Development Corporation Limited	Chaitanya Projects Consultancy Pvt. Ltd. C-5, 2ND FLOOR, R.K.TOWER PLOT NO.- 21-22, SECTOR-4, VAISHALI, GHAZIABAD PH.: 0120-3223419, 4120472, FAX: 0120-4110472	Consultancy services for preparation of Feasibility Study and Detailed Project Report for Two Laning of NH-52 from Km. 745.60 to Km. 806.75 (Brahmakund-T-Junction-Chowkham) (Length 61.15 Km.) for execution on EPC Mode in the state of Arunachal Pradesh	AS SHOWN	TYPICAL CROSS SECTION Package-I (Behamakund to Kamlang Junction) TCS-4A	NHDCL/CPC/PDPR/NH-15/BRHAMAKAMLANGHWY/TCS/ 05

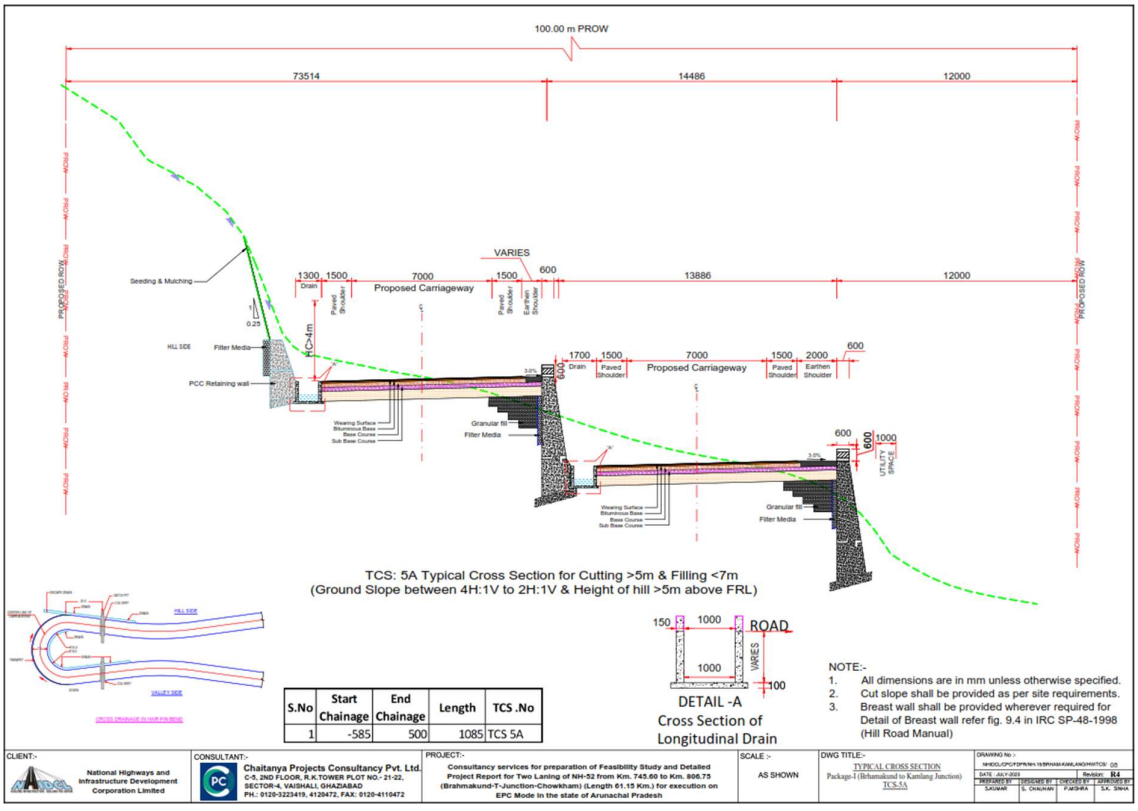
DATE : JULY-2023			Revision: R4
PREPARED BY	DESIGNED BY	CHECKED BY	APPROVED BY
GAUHAR	S. CHAUHAN	FARSHRA	S.K. SINHA



S.No	Start Chainage	End Chainage	Length	TCS .No
1	2400	2840	440	TCS 5
2	3750	4125	375	TCS 5
			815	

CLIENT:-	CONSULTANT:-	PROJECT:-	SCALE :-	DWG TITLE:-	DRAWING No :-
National Highways and Infrastructure Development Corporation Limited	Chaitanya Projects Consultancy Pvt. Ltd. C-5, 2ND FLOOR, R.K.TOWER PLOT NO.- 21-22, SECTOR-4, VAISHALI, GHAZIABAD PH.: 0120-3223419, 4120472, FAX: 0120-4110472	Consultancy services for preparation of Feasibility Study and Detailed Project Report for Two Laning of NH-52 from Km. 745.60 to Km. 806.75 (Brahmakund-T-Junction-Chowkham) (Length 61.15 Km.) for execution on EPC Mode in the state of Arunachal Pradesh	AS SHOWN	TYPICAL CROSS SECTION Package-I (Behamakund to Kamlang Junction) TCS-5	NHDCL/CPC/PDP/NH-15/BRHAMAKAMLANGHAT/TCS/ 07

DATE : JULY-2023			Revision: R4
PREPARED BY : GAUHAR	DESIGNED BY : S. CHAUHAN	CHECKED BY : FAIZAHEA	APPROVED BY : S.K. SINHA

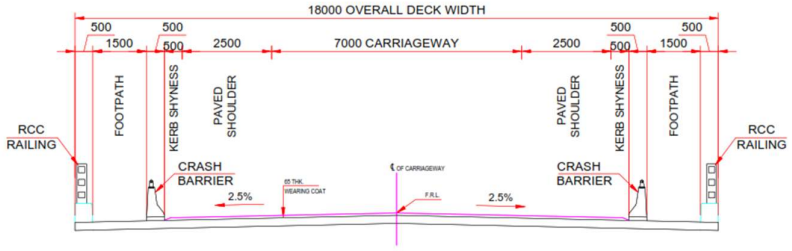


S.No	Start Chainage	End Chainage	Length	TCS .No
1	-585	500	1085	TCS 5A

NOTE:-
1. All dimensions are in mm unless otherwise specified.
2. Cut slope shall be provided as per site requirements.
3. Breast wall shall be provided wherever required for Detail of Breast wall refer fig. 9.4 in IRC SP-48-1998 (Hill Road Manual)

CLIENT:-	CONSULTANT:-	PROJECT:-	SCALE :-	DWG TITLE:-	DRAWING No :-
National Highways and Infrastructure Development Corporation Limited	Chaitanya Projects Consultancy Pvt. Ltd. C-5, 2ND FLOOR, R.K.TOWER PLOT NO.- 21-22, SECTOR-4, VAISHALI, GHAZIABAD PH.: 0120-3223419, 4120472, FAX: 0120-4110472	Consultancy services for preparation of Feasibility Study and Detailed Project Report for Two Laning of NH-52 from Km. 745.60 to Km. 806.75 (Brahmakund-T-Junction-Chowkham) (Length 61.15 Km.) for execution on EPC Mode in the state of Arunachal Pradesh	AS SHOWN	TYPICAL CROSS SECTION Package-I (Behamakund to Kamlang Junction) TCS-5A	NHDCL/CPC/PDP/NH-15/BRHAMAKAMLANGHAT/TCS/ 05

DATE : JULY-2023			Revision: R4
PREPARED BY : GAUHAR	DESIGNED BY : S. CHAUHAN	CHECKED BY : FAIZAHEA	APPROVED BY : S.K. SINHA



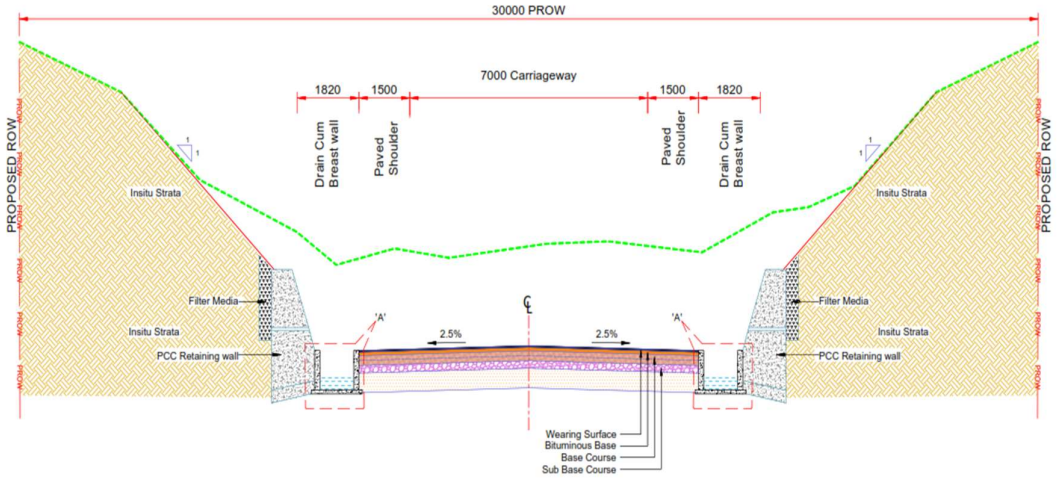
TCS-7
TYPICAL CROSS-SECTION AT BRIDGE
(FOR NEW CONSTRUCTION BRIDGE ONLY)

S.No	Start Chainage	End Chainage	Length	TCS .No
1	1978	1994	16	TCS 7
2	2198	2243	45	TCS 7
3	2995	3065	70	TCS 7
4	3272	3302	30	TCS 7
5	4125	4535	410	TCS 7
6	8265	8505	240	TCS 7
7	11165	11210	45	TCS 7
8	13415	13476	61	TCS 7
9	16930	16997	67	TCS 7
10	19255	19320	65	TCS 7
11	21600	21650	50	TCS 7
12	23215	23310	95	TCS 7
			1194	

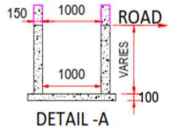
NOTE:-
1. All dimensions are in mm unless otherwise specified.

CLIENT:-	CONSULTANT:-	PROJECT:-	SCALE :-	DWG TITLE:-	DRAWING No :-
National Highways and Infrastructure Development Corporation Limited	Chaitanya Projects Consultancy Pvt. Ltd. C-5, 2ND FLOOR, R.K.TOWER PLOT NO.- 21-22, SECTOR-4, VAISHALI, GHAZIABAD PH.: 0120-3223419, 4120472, FAX: 0120-4110472	Consultancy services for preparation of Feasibility Study and Detailed Project Report for Two Laning of NH-52 from Km. 745.60 to Km. 806.75 (Brahmakund-T-Junction-Chowkham) (Length 61.15 Km.) for execution on EPC Mode in the state of Arunachal Pradesh	AS SHOWN	TYPICAL CROSS SECTION Package-I (Brhamakund to Kamlang Junction) TCS-7	NHDCL/CPC/PD/PR/NH-15/BRHAMAKAMLANG/HWTCS/ 02

DATE : JULY-2023				Revision : R4
PREPARED BY	DESIGNED BY	CHECKED BY	APPROVED BY	
SAKAR	S. CHAUHAN	P.MISHRA	S.K. SINHA	



TCS-6: 2-Lane Carriageway with Paved Shoulder in Cutting in Mountainous Terrain



DETAIL -A
Cross Section of Longitudinal Drain

S.No	Start Chainage	End Chainage	Length	TCS .No
1	10650	11075	425	TCS 6
2	21200	21600	400	TCS 6
			825	

NOTE:-
1. All dimensions are in mm unless otherwise specified.
2. Cut slope shall be provided as per the site requirements.
3. Breast wall shall be Provided wherever Required for detail of Breast wall refer fig. 9.4 in IRC SP-48-1998 (Hill Road Manual)

CLIENT:-	CONSULTANT:-	PROJECT:-	SCALE :-	DWG TITLE:-	DRAWING No :-
National Highways and Infrastructure Development Corporation Limited	Chaitanya Projects Consultancy Pvt. Ltd. C-5, 2ND FLOOR, R.K.TOWER PLOT NO.- 21-22, SECTOR-4, VAISHALI, GHAZIABAD PH.: 0120-3223419, 4120472, FAX: 0120-4110472	Consultancy services for preparation of Feasibility Study and Detailed Project Report for Two Laning of NH-52 from Km. 745.60 to Km. 806.75 (Brahmakund-T-Junction-Chowkham) (Length 61.15 Km.) for execution on EPC Mode in the state of Arunachal Pradesh	AS SHOWN	TYPICAL CROSS SECTION Package-I (Brhamakund to Kamlang Junction) TCS-6	NHDCL/CPC/PD/PR/NH-15/BRHAMAKAMLANG/HWTCS/ 03

DATE : JULY-2023				Revision : R4
PREPARED BY	DESIGNED BY	CHECKED BY	APPROVED BY	
SAKAR	S. CHAUHAN	P.MISHRA	S.K. SINHA	

Schedule-C

SCHEDULE – C

(See Clause 2.1)

Project Facilities

1 Project Facilities

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

a) Toll plazas;
b) Roadside furniture;
c) Pedestrian facilities;
d) Land Scaping and Tree Plantation;
e) Truck lay-byes;
f) Way-side amenities;
g) Bus-bays and Passenger shelters;
h) Others;
   1. Highway Patrol Units
   2. Highway lighting
   3. Emergency Medical Services
   4. Crane Services
   5. Communication System
   6. Operation and Maintenance Center

2 Description of Project Facilities

2.1 Toll Plazas

Toll Plaza shall be provided as per as stipulated in section 10 of the Manual. Canopy of Toll Plaza should be designed to withstand load of solar panels in addition to other design loads. Location of toll plaza is as per the following details.

Sl. No.	Toll Plaza ID	Design Chainage	Side	Min Number of Lanes
NIL				

Note:

- Installation of two number dedicated ETC lane (one lane in each direction) and Hybrid ETC System with provision of medium speed WIM with bending plate technology in each lane, and Static Weigh Bridge (one lane in each direction) at Toll Plaza and Configuration with Advance Traffic Management System.
- Above mentioned toll lanes are indicative. However, the actual requirement of toll lanes shall be assessed by Contractor as per actual site condition and Manual. The increase in number of toll lanes shall not be treated as change of scope.
- Solar panels shall be erected over the Toll Plaza Canopy to generate the green energy. Same shall be utilized for toll plaza lighting and other energy requirement within toll plaza area along with conventional lighting.

2.2 Road side furniture

2.2.1 Kilometer and Hectometer Stones

Kilometer and Hectometer stones shall be provided on both side of project highway.

The design and specifications of Kilometer and Hectometer stones shall conform to IRC:8 and IRC:26 respectively.

2.2.2 Road Signs

The Road Signs on project highway shall be provided in accordance with IRC: 67 2022 and as per schedule D. Locations of road signs are indicated in Appendix B-II (Traffic Signage Plan) of Schedule- B.

2.2.3 Road Marking

The Road Marking on project highway shall be provided in accordance with IRC: 35 and clause 9.3 of IRC: SP:73.

2.2.4 Road Delineators

The Road Delineators on project highway shall be provided in accordance with IRC: 79 and clause 9.4 of IRC: SP:73.

2.2.5 Solar Studs

The Solar Studs shall be provided throughout the project highway in accordance with table 5.2 of IRC: 35 and clause 9.5 of IRC: SP:73. Color of road studs shall be provided as per clause 5.4 of IRC 35.

2.2.6 Emergency Medical Services

Two ambulances shall be provided as per section 12 of IRC: SP:73. All facilities and equipment shall be provided as indicated in Annexure- D of section 12 of IRC: SP:73.

2.2.7 Crane Services

Two numbers of Cranes shall be provided of minimum 20MT capacity with all necessary equipment and fitted with GPS based tracking system as per clause 12.12 of IRC: SP:73.

2.2.8 Boundary Pillars

RCC Boundary Pillar of 1.5m height shall be provided along the extreme outer edge of ROW on both side in the entire length of project highway at 50m interval in accordance with the provision of manual and IRC 25.

2.2.9 Crash Barrier

Thrie Beam crash barrier shall be provided along the project highway of minimum length of 22414m.

2.2.9 Railing

Stainless steel railing shall be provided along the project highway in Urban section of minimum length of 5278m.

2.3 Operation and Maintenance centers

Dedicated operation and maintenance center shall be provided in accordance to Schedule D

2.4 Overhead Signs

Traffic sign boards as per details given below including the signage plan indicated in this Schedule shall be provided in the project highway in accordance to manual.

Sl. No.	Type of Sign
1	One Way Object Hazard Marker (OHM)
2	Two Way Object Hazard Marker (OHM)
3	Height restriction (Regulatory Sign)

Sl. No.	Type of Sign
4	Speed Limit Signs (Regulatory Sign)
5	Merging Traffic Ahead (Cautionary Sign)
6	Compulsory Keep Left Sign (Regulatory Sign)
7	Compulsory Ahead Sign (Regulatory Sign)
8	U-Turn Prohibited Sign (Regulatory Sign)
9	Give way sign (Regulatory Sign)
10	Chevron Marker (At Curves)
11	Triple Chevron Marker (At roundabout)
12	Reassurance Sign (Direction & Place Identification Sign)
13	Roundabout Sign (Cautionary Sign)
14	Left/ Right Hand Curve (Cautionary Sign)
15	Highway Route Marker Sign
16	Entry/ Exit Highway Sign (Information Sign)
17	End of Highway Sign
18	Map type Advance Direction Sign
19	Flag type Advance Direction Sign
20	Advance Directional Sign (Overhead Cantilever/ Gantry)
21	Rest Area Information Sign (Overhead Cantilever/ Gantry)
22	Slogan Gantry

Note:

1. The actual numbers and location of Traffic Signages shall be determined by the Concessionaire in accordance with manual requirements with approval from the Independent Engineer.

2. Any increase in the number and type of road sign shall not constitute a Change of Scope.

3. Adequate signs for toll plaza shall be provided as given in this schedule and

4. manual.

2.5 Pedestrian facilities;

Pedestrian Guard rails shall be provided at junctions, Truck lay byes, bus bays and near schools and hospitals as per provisions in section 9.8 of the Manual

i. Pedestrian guardrail: Provide pedestrian guardrail at each bus stop location and at other locations as per manual.

ii. Pedestrian Crossings: Provide pedestrian crossing facilities on locations as recommended in Schedule D.

2.6 Land Scaping and Tree Plantation;

Land Scaping and tree plantation of the highway shall be provided as per section 11 of the manual. The locations for these provisions shall be finalized in consultation with Authority Engineer. Total 4200 nos. of trees (approx.) are identified to be affected in the proposed ROW, new trees to be planted by the EPC Contractor as per applicable law/guidelines. Any variation in no. of trees shall not constitute a change of scope.

2.7 Truck lay-byes

Truck Lay bye shall be provided at the following locations in accordance with section 12.5 of the manual at 2 locations.

Sl. No.	Design Chainage (m)	Side
Nil		

2.8 Way-side Amenities

As stipulated in section 12.10 of the manual, Way-side Amenities shall be provided at the following locations:

S. No.	Design Chainage	Side	Remarks
Nil			

2.9 Bus- shelters

No bus shelter shall be provided

2.10 Public Toilet-12 Nos. proposed.

Public toilet shall be finalized in consultation with Authority as per suitability of location near proposed parking near Parsurm kund temple with all facilities (Like Toilet building, Toilet sheet, wash basin, lighting etc.). Any change in location shall not treated as change of scope.

2.11 High Mast Lighting

High Mast Lighting shall be provided at all Major Junctions (Brahmkund T Junction and Parsuramkund junction) as per clause 12.4.3 of IRC SP 73-2018. Minimum 2 Nos. of High Mast shall be provided as per location given below.

Sr.No	Design Chainage	Location	Height of HM (m)	Quantity (Nos)
1	0+000	Brahmkind T-Junction	25	1
2	4+750	Parsuramkund Temple Junction	25	1

2.11 Others

1. Highway Patrol unit – as per manual
2. Highway LED Lighting: LED Lighting shall be provided at the following locations:
   a. LED Traffic Beacons at all Major/Minor Junctions & Lighting on Bridges shall be provided at approach to bridges, built up areas, bus stops, truck Lay-byes and rest areas as per manual recommended in Schedule D.
   b. Lighting in habitations **(minimum 86 Nos.)** shall be provided.
   c. Apart from above locations lighting shall be provided at underpasses and ROB/RUB and as per site condition in consultation with Engineer and shall not be treated as change of scope.

3. Communication System: Communication System shall be provided as per provisions of the manual.

4. Operation and Maintenance Centre: Operation and Maintenance Centre shall be provided as per provisions of the manual.

j) **Traffic Diversion during Construction**

The traffic diversion plan during construction shall be prepared by Contractors per IRC: SP: 55 for the entire project highway. Separate traffic diversion plan shall be prepared for structures and CD works.

The Contractor shall provide necessary Men Power for guiding and regulation of Traffic during construction

Schedule-D

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 conform to design requirements set out in the following documents:

Manual of Specifications and Standards for Two Laning of Highways (IRC: SP: 73-2018), Hill Road manual IRC: SP:48-1998 and Specification of roads and bridges work (fifth revision), MoRTH referred to herein as the Manual.

Annex - I

(Schedule-D)

Specifications and Standards for Construction

1 Specifications and Standards

All Materials, works and construction operations shall conform to the Guidelines for the Alignment Survey and Geometric Design of Hill Roads (IRC:52-2019) and Manual of Specifications and Standards for Two-Laning of Highways with Earthen Shoulder (IRC: SP:73-2018), referred to as the Manual and Indian Road Congress (IRC) Codes and Standards and MORTH Specifications for Road and Bridge Works. Where the aforesaid Manuals, guidelines, codes, standards and specifications are silent on any aspect, 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 Manual shall be deemed to be substituted by the terms "Contractor", "Authority's Engineer" and "Agreement" respectively.

2.2 Notwithstanding anything to the contrary contained in the aforesaid Manual, the following Specifications and Standards shall apply to the Project Highway, and for purposes of this Agreement, the aforesaid Manual shall be deemed to be amended to the extent set forth below;

1) IRC Class Special Vehicle loading shall be taken into account in the structural design of bridges/Flyover/VUP.

2) TCS of 2-Lane with paved shoulder, Width of bridges & Locations of Utility Duct

Sl. No.	Item	Clause reference of Manual	Description of Deviation
(1)	(2)	(3)	(4)
1	Design Speed	Clause 2.2.1 & Table 2.1 of IRC SP-73 2018	As per Manual
2	Extra Widening	Clause 2.7 & Table 2.4 of IRC SP-73 2018	Extra Widening may be provided at the curves for radius below 75 m, (para 6.8.5.2 of Hill Road manual may be referred for this purpose). Radius up to 20 m =extra width 1.5 m Radius 21-40m=1.5m Radius 41-60m=1.2m Radius 60-100m=0.90m Radius 101-300 m=0.60m Note: Extra Widening shall be provided at curves up to 75m radius as per IRC SP 73 2018 & extra widening for the curves with radius below 75 m shall be provided as per Hill Road manual IRC SP 48.

Sl. No.	Item	Clause reference of Manual	Description of Deviation
(1)	(2)	(3)	(4)
3	Super elevation	Clause 2.9.3 of IRC SP-73 2018	The Super elevation shall be as per Clause 6.8.2 of IRC: 52, 2019 Guidelines for the Alignment Survey and Geometric Design of Hill Roads (Third Revision). L
4	Typical Cross-sections	Clause 2.16 of IRC SP-73 2018	Typical Cross-sections shall be as per Schedule B,
5	Flexible pavement - design period and strategy	Clause 5.4.1 of IRC: SP:73-2018	Flexible pavement shall be designed for a minimum design period of 20 years, subject to the condition that design traffic shall not be less than 20 million Standards Axles (MSA) as per Clause 5.2 of Schedule-B, Annex-I.
6	Width of the Minor Bridges	Clause 7.3 iv) IRC: SP:73-2018	Width of the structures at deck Level for Minor Bridge shall be as per TCS provided in Schedule-B.
7	Drain	Section 6 of Manual	Types of drains shall be provided as indicated as per TCS provided in Schedule-B.

Schedule - E

(See Clauses 2.1 and 14.2)

Maintenance Requirements

1. Maintenance Requirements

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

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

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

[Specify all the relevant documents]

2. Repair/rectification of Defects and deficiencies

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

3. Other Defects and deficiencies

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

4. Extension of time limit

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

5. Emergency repairs/restoration

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

6. Daily inspection by the Contractor

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

7. Pre-monsoon inspection / post-monsoon inspection

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

8. Repairs on account of natural calamities

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

Asset Types of Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
	Cracking	Nil	< 5 % subject to limit of 0.5 sqm for any50 m length	Daily			7-15 days	MORT&H Specification 3004.3
	Rutting	Nil	< 5 mm	Daily	Straight Edge		15 -30 days	MORT&H Specification 3004.2
	Corrugations andShoving	Nil	< 0.1 % of area	Daily	Length Measurementt Unit like		2-7 days	IRC:82-2015

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/ Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
	Bleeding	Nil	< 1 % of area	Daily	Scale, Tape, odometer etc.		3-7 days	MORT&H Specification 3004.4
	Ravelling / Stripping	Nil	< 1 % of area	Daily			7-15 days	IRC:82-2015 read with IRC SP81
	Edge Deformation/ Breaking	Nil	< 1 m for any 100 m section and width < 0.1 m at any location, restricted	Daily			7- 15 days	IRC:82-2015

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

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

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

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

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

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

Table -2: **Maintenance Criteria for Rigid Pavements:**

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

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

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

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

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

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

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

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

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

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

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	**For the case d > D/2**
			5	t < 0.1 mm	Diamond Grinding if affecting 50% or more slabs in a continuous stretch of minimum 5 km. Within 30 days	
10	**Popout (Small Hole), Pothole Refer Para 8.4**	n = number/m² d = diameter h = maximum depth	0	d < 50 mm; h < 25 mm; n < 1 per 5 m²	No action.	Not Applicable
			1	d = 50 - 100 mm; h < 50 mm; n < 1 per 5 m²	Partial depth repair 65 mm deep. Within 15 days	
			2	d = 50 - 100 mm; h > 50 mm; n < 1 per 5 m²		

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

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

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

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

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

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

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

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

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

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

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

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

<table>
<tr><th>Asset Type</th><th>Performance Parameter</th><th colspan="3">Level of Service (LOS)</th><th>Frequency of Measurement</th><th>Testing Method</th><th>Recommended Remedial measures</th><th>Time limit for Rectification</th><th>Specifications and Standards</th></tr>
<tr><td rowspan="10"></td><td>Day time Visibility</td><td colspan="3">During expected life Service Time
Cement Road - 130mcd/m²/lux
Bituminous Road - 100mcd/m²/lux</td><td>Monthly</td><td>As per Annexure-D of IRC:35-2015</td><td>Re - painting</td><td>Cat-1 Defect – within 24 hours
Cat-2 Defect – within 2 months</td><td>IRC:35-2015</td></tr>
<tr><td rowspan="9">Night Time Visibility</td><td colspan="3"><u>Initial and Minimum Performance for Dry Retro reflectivity during night time:</u></td><td rowspan="9">Bi-Annually</td><td rowspan="9">As per Annexure-E of IRC:35-2015</td><td rowspan="9">Re - painting</td><td rowspan="9">Cat-1 Defect – within 24 hours
Cat-2 Defect – within 2 months</td><td rowspan="9">IRC:35-2015</td></tr>
<tr><td>Design Speed</td><td colspan="2">(RL) Retro Reflectivity (mcd/m²/lux)</td></tr>
<tr><td></td><td>Initial (7 days)</td><td>Minimum Threshold level (TL) & warranty period required up to 2 years</td></tr>
<tr><td>Up to 65</td><td>200</td><td>80</td></tr>
<tr><td>65 - 100</td><td>250</td><td>120</td></tr>
<tr><td>Above 100</td><td>350</td><td>150</td></tr>
<tr><td colspan="3"><u>Initial and Minimum Performance for Night Visibility under wet condition (Retro reflectivity):</u></td></tr>
</table>

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		Initial 7 days Retro reflectivity: 100 mcd/m^2/lux Minimum Threshold Level: 50 mcd/m^2/lux					
	Skid Resistance	Initial and Minimum performance for Skid Resistance: Initial (7days): 55BPN Min. Threshold: 44BPN *Note: shall be considered under urban/city traffic condition encompassing the locations like pedestrian crossings, bus bay, bus stop, cycle track intersection delineation, transverse bar markings etc	Bi-Annually	As per Annexure-G of IRC:35-2015		Within 24 hours	IRC:35-2015
Road Signs	Shape and Position	Shape and Position as per IRC:67-2012. Signboard should be clearly visible for the design speed of the section.	Daily	Visual with video/image backup	Improvement of shape, in case if shape is damaged. Relocation as per requirement	48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs) 15 Days in case of Gantry/Cantilever Sign boards	IRC:67-2012
	Retro reflectivity	As per specifications in IRC:67-2012	Bi-Annually	Testing of each	hange of ignboard	48 hours in case of Mandatory	RC:67-2012

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

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

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

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

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

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

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

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

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

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

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

Table 4: Maintenance Criteria for Structures and Culverts:

Table 5: Maintenance Criteria for Hill Roads

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

Hill Roads		
(i)	Damage to Retaining wall/ Breast wall	7 (Seven) days
(ii)	Landslides requiring clearance	12 (Twelve) hours
(iii)	Snow requiring clearance	24 (Twenty-Four) hours

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

A. Flexible Pavement

Nature of Defect or deficiency		Time limit for repair/ rectification
(b)	**Granular earth shoulders, side slopes, drains and culverts**	
(i)	Variation by more than 1 % in the prescribed slope of camber/cross fall (shall not be less than the camber on the main carriageway)	7 (seven) days
(ii)	Edge drop at shoulders exceeding 40 mm	7 (seven) days
(iii)	Variation by more than 15% in the prescribed side (embankment) slopes	30 (thirty) days
(iv)	Rain cuts/gullies in slope	7 (seven) days
(v)	Damage to or silting of culverts and side drains	7 (seven) days
(vi)	Desilting of drains in urban/semi- urban areas	24 (twenty four) hours
(vii)	Railing, parapets, crash barriers	7 (seven) days (Restore immediately if causing safety hazard)
(c)	**Road side furniture including road sign and pavement marking**	
(i)	Damage to shape or position, poor visibility or loss of retro- reflectivity	48 (forty eight) hours
(ii)	Painting of km stone, railing, parapets, crash barriers	As and when required/ Once every year
(iii)	Damaged/missing signs road requiring replacement	7 (seven) days
(iv)	Damage to road mark ups	7 (seven) days
(d)	**Road lighting**	
(i)	Any major failure of the system	24 (twenty four) hours
(ii)	Faults and minor failures	8 (eight) hours
(e)	**Trees and plantation**	

Nature of Defect or deficiency		Time limit for repair/ rectification
(i)	Obstruction in a minimum head- room of 5 m above carriageway or obstruction in visibility of road signs	24 (twenty four) hours
(ii)	Removal of fallen trees from carriageway	4 (four) hours
(iii)	Deterioration in health of trees and bushes	Timely watering and treatment
(iv)	Trees and bushes requiring replacement	30 (thirty) days
(v)	Removal of vegetation affecting sight line and road structures	15 (fifteen) days
(f)	**Rest area**	
(i)	Cleaning of toilets	Every 4 (four) hours
(ii)	Defects in electrical, water and sanitary installations	24 (twenty four) hours
(g)	**[Toll Plaza]**	
(h)	**Other Project Facilities and Approach roads**	
(i)	Damage in approach roads, pedestrian facilities, truck lay- byes, bus-bays, bus-shelters, cattle crossings, [Traffic Aid Posts, Medical Aid Posts] and service roads	15 (fifteen) days
(ii)	Damaged vehicles or debris on the road	4 (four) hours
(iii)	Malfunctioning of the mobile crane	4 (four) hours
Bridges		
(a)	**Superstructure**	
(i)	Any damage, cracks, spalling/ scaling Temporary measures Permanent measures	within 48 (forty eight) hours within 15 (fifteen) days or as specified by the Authority's Engineer
(b)	**Foundations**	

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

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

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

Schedule - F

(See Clause 4.1 (vii)(a))

Applicable Permits

1. Applicable Permits

(i) The Contractor shall obtain, as required under the Applicable Laws, the following Applicable Permits:

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

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

(c) Licence for use of explosives;

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

(e) Licence from inspector of factories or other competent Authority for setting up batching plant;

(f) Clearance of Pollution Control Board for setting up batching plant;

(g) Clearance of Village Panchayats and Pollution Control Board for setting up asphalt plant;

(h) Permission of Village Panchayats and State Government for borrow earth; and

(i) Any other permits or clearances required under Applicable Laws.

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

Schedule - G

(See Clauses 7.1 and 19.2)

Annex-I: Form of Bank Guarantee

(See Clause 7.1)

[Performance Security /Additional Performance Security]

To

_____[name of Authority]

_____ [address of Authority]

WHEREAS_____[name and address of Contractor] (hereafter called the "Contractor") has undertaken, in pursuance of Letter of Acceptance (LOA) _ No. Dated _ for construction of [name of the Project] (hereinafter called the "Contract")

AND WHEREAS the Contract requires the Contractor to furnish an {Performance Security/ Additional Performance Security} for due and faithful performance of its obligations, under and in accordance with the Contract, during the {Construction Period/ Defects Liability Period and Maintenance Period} in a sum of Rs….. cr. (Rupees ……..…..

crore) (the **"Guarantee Amount"**[1]).

AND WHEREAS we, …….. through our branch at .....
.....(the **"Bank"**) have agreed to furnish this Bank Guarantee (hereinafter called the **"Guarantee"**) by way of Performance Security.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees andaffirms 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 Contract, 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 of National Highways & Infrastructure Development Corporation Limited], 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 Contract 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 Contract 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 Contract 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 Contract 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 Contract 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 Contract or for the fulfillment, compliance and/or performance of all or any of the obligations of the Contractor under the Contract.

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

Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

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

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and

declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorized 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 Contract.

12. This Guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

13. 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.

14. The guarantor/bank hereby confirms that it is on the SFMS (Structural Finance Messaging System) platform & shall invariably send an advice of this Bank Guarantee to the designated bank of NHIDCL, details of which is as under:

$Insert date at least 2 (two) years from the date of issuance of this Guarantee (in accordance with Clause 2.21 of the RFP). The Contractors can submit the BG for periods of two years at one time and keep on renewing the same till the DLP is over if they have problems in getting the BG in one go for the entire DLP.

S.No.	Particulars	Details
1	Name of Beneficiary	National Highways & Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch IFSC	CNRB0019062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Canara Bank (erstwhile Syndicate Bank) transport Bhawan, 1st Parliament Street, New Delhi-110001

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

SIGNED, SEALED AND DELIVERED
For and on behalf of the Bank by:
(Signature)
(Name) (Designation) (Code Number)
(Address)

NOTES:

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

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

Annex - II
(Schedule - G)
(See Clause 19.2)

Annex – II: Form for Guarantee for Advance Payment

To

_____ [name of Authority]

_____ [address of Authority]

WHEREAS:

(A) [name and address of contractor] (hereinafter called the "**Contractor**") has executed an agreement (hereinafter called the "**Agreement**") with the [name and address of the authority], (hereinafter called the "**Authority**") for the construction of the ***** section of [National Highway No. **] on Engineering, Procurement and Construction (the "**EPC**") basis, subject to and in accordance with the provisions of the Agreement.

(B) In accordance with Clause 19.2 of the Agreement, the Authority shall make to the Contractor an interest bearing @Bank Rate + 3% advance payment (herein after called "**Advance Payment**") equal to 10% (ten per cent) of the Contract Price; and that the Advance Payment shall be made in two installments subject to the Contractor furnishing an irrevocable and unconditional guarantee by a scheduled bank for an amount equivalent to 110% (one hundred and ten percent) of such installment to remain effective till the complete and full repayment of the installment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of {first/second} installment of the Advance Payment is Rs. _____cr. (Rupees _____ crore) and the amount of this Guarantee is Rs._____cr. (Rupees_____crore) (the "**Guarantee Amount**")[2].

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

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

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful repayment on time of the aforesaid instalment of the Advance Payment under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.

   A letter from the Authority, under the hand of an officer not below the rank of [General Manager in the National Highways Authority of India], that the Contractor has committed default in the due and faithful performance

of all or any of its obligations for the repayment of the 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

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

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

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

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

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

7. The Guarantee shall cease to be in force and effect on ****3 Unless a demand or claim under this Guarantee is made in writing on or before the aforesaid date, the Bank shall be discharged from its liabilities hereunder.

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

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

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

11. This Guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

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. The guarantor/bank hereby confirms that it is on the SFMS (Structural Finance Messaging System) platform & shall invariably send an advice of this Bank Guarantee to the designated bank of NHIDCL, details of which is as under:

S.No.	Particulars	Details
1	Name of Beneficiary	National Highways & Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch IFSC	CNRB0019062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Canara Bank (erstwhile Syndicate Bank) transport Bhawan, 1st Parliament Street, New Delhi-110001

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

SIGNED, SEALED AND DELIVERED
For and on behalf of the Bank by:
(Signature)
(Name) (Designation) (Code Number)
(Address)

NOTES:

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

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

SCHEDULE - H

(See Clause 10.1.4 and 19.3)

1.1 The Contract Price for this Agreement is Rs.

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

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage
1	2	3	4
Road works including culverts, widening and repair of culverts.	**27.68%**	**A- Widening and strengthening of existing road**	
		(1) Site Clearance	0.00%
		(2) Earthwork up to top of the sub-grade	0.00%
		(3) Sub-Base course	0.00%
		(4) Non-Bituminous Base Course	0.00%
		(5) Bituminous Base Course	0.00%
		(6) Wearing Coat	0.00%
		(7) Widening and repair of culverts	0.00%
		B-1 Reconstruction/New 2-lane realignment/bypass (Flexible pavement)	
		(1) Site Clearance	0.99%
		(2) Earthwork up to top of the sub-grade	19.16%
		(3) Sub-Base course	17.78%
		(4) Non-Bituminous Base Course	8.28%
		(5) Bituminous Base Course	16.12%
		(6) Wearing Coat	11.25%
		B-2 Reconstruction/New 2-lane	

		realignment/bypass (Rigid pavement)	
		(1) Earthwork up to top of the sub-grade	0.00%
		(2) Sub-base Course	0.00%
		(3) Dry Lean Concrete (DLC) Course	0.00%
		(4) Pavement Quality Control (PQC) Course	0.00%
		C-1 Reconstruction/New service road (Flexible pavement)	
		(1) Earthwork up to top of the sub-grade	0.00%
		(2) Sub-base Course	0.00%
		(3) Non-Bituminous Base Course	0.00%
		(4) Bituminous Base Course	0.00%
		(5) Wearing Coat	0.00%
		C-2 Reconstruction/New service road (Rigid pavement)	
		(1) Earthwork up to top of the sub-grade	0.00%
		(2) Sub-base Course	0.00%
		(3) Dry Lean Concrete (DLC) Course	0.00%
		(4) Pavement Quality Control (PQC) Course	0.00%
		D- Re-construction and New culverts on existing road, realignments, bypasses:	
		Culverts (Length < 6 m)	26.42%
Minor Bridges/Underpasses/Overpasses	**3.69%**	**A-1 Widening and repairs of Minor Bridges (Length > 6 m and < 60 m)**	
		Minor Bridges	
		A-2 New Minor Bridges (Length > 6 m and < 60 m)	

		(1) Foundation + Sub-structure: On completion of the foundation work including foundations for wing and return walls, abutments, piers upto the abutment/pier cap.	73.63%
		(2) Super-structure: On completion of the super-structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs & markings, tests on completion etc. complete in all respect.	24.89%
		(3) Approaches: On completion of approaches including retaining walls, stone pitching, protection works complete in all respect and fit for use.	1.48%
		(4) Guide Bunds and River Training Works: On completion of Guide Bunds and river training works complete in all respects	0.00%
		B.1- Widening and repair of underpasses/overpasses	
		Underpasses/Overpasses	0.00%
		B.2- New underpasses/overpasses	
		(1) Foundation + Sub-structure: On completion of the foundation work including foundations for wing and return walls, abutments, piers upto the abutment/pier cap.	0.00%

		(2) Super-structure: On completion of the super-structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs & markings, tests on completion etc. complete in all respect.	0.00%
		Wearing coat (a) in case of Overpass-wearing coat including expansion joints complete in all respects as specified and (b) in case of underpass-rigid pavement including drainage facility complete in all respects as specified.	
		(3) Approaches: On completion of approaches including retaining walls/Reinforced Earth Walls, stone pitching, protection works complete in all respect and fit for use.	0.00%
Major Bridge (length>60 m) works and ROB/RUB/elevated sections/flyovers including viaducts, if any	**1.63%**	**A.1- Repair and Rehabilitation of Major Bridge**	
		(1) Foundation	88.79%
		(2) Sub-structure	0.00%
		(3) Super-Structure (Including Bearings)	
		(4) Wearing Coat including expansion joints	4.69%
		(5) Miscellaneous Items like hand rails, Crash barriers, road markings etc.)	6.51%
		(6) Wing walls/return walls	0.00%
		(7) Guide Bunds, River Training Works etc.	0.00%
		(8) Approaches (including retaining	0.00%

		walls, stone pitching, protection works)	
Major Bridge (length>60 m) works and ROB/RUB/elevated sections/flyovers including viaducts, if any	**3.57%**	**A.2- New Major Bridges**	
		(1) Foundation	4.01%
		(2) Sub-structure	11.01%
		(3) Super-Structure (Including Bearings)	84.80%
		(4) Wearing Coat including expansion joints	0.00%
		(5) Miscellaneous Items like hand rails, Crash barriers, road markings etc.)	0.00%
		(6) Wing walls/return walls	0.00%
		(7) Guide Bunds, River Training Works etc.	0.00%
		(8) Approaches (including retaining walls, stone pitching, protection works)	0.18%
		B.1- Widening and repair of (a) ROB (b) RUB	
		(1) Foundation	0.00%
		(2) Sub-structure	0.00%
		(3) Super-Structure (Including Bearings)	0.00%
		(4) Wearing Coat (a) in case of ROB- wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB-rigid pavement under RUB including drainage facility complete in all respects as specified	0.00%

		(5) Miscellaneous Items like hand rails, Crash barriers, road markings etc.)	0.00%
		(6) Wing walls/return walls	0.00%
		(7) Approaches (including retaining walls, stone pitching, protection works	0.00%
		B.2- New ROB/RUB	
		(a) ROB **(b) RUB**	
		(1) Foundation	0.00%
		(2) Sub-structure	0.00%
		(3) Super-Structure (Including Bearings)	0.00%
		(4) Wearing Coat (a) in case of ROB- wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB-rigid pavement under RUB including drainage facility complete in all respects as specified	0.00%
		(5) Miscellaneous Items like hand rails, Crash barriers, road markings etc.)	0.00%
		(6) Wing walls/return walls	0.00%
		(7) Approaches (including retaining walls, stone pitching, protection works	0.00%
		C.1- Widening and repair of Elevated Sections/Flyover/Grade Separators	
		(1) Foundation	0.00%
		(2) Sub-structure	0.00%

		(3) Super-Structure (Including Bearings)	0.00%
		(4) Wearing Coat including expansion joints	0.00%
		(5) Miscellaneous Items like hand rails, Crash barriers, road markings etc.)	0.00%
		(6) Wing walls/return walls	0.00%
		(7) Approaches (including retaining walls/Reinforced Earth Wall, stone pitching, protection works)	0.00%
		C.2- New Elevated Sections/Flyover/Grade Separators	
		(1) Foundation	0.00%
		(2) Sub-structure	0.00%
		(3) Super-Structure (Including Bearings)	0.00%
		(4) Wearing Coat including expansion joints	0.00%
		(5) Miscellaneous Items like hand rails, Crash barriers, road markings etc.)	0.00%
		(6) Wing walls/return walls	0.00%
		(7) Approaches (including retaining walls/Reinforced Earth Wall, stone pitching, protection works)	0.00%
Utility Shifting	**7.41%**	Shifting of Electrical Utilities and PHE	100.00%
Other Works	**44.33%**	**1. Protection Works**	
		i) Retaining Wall	64.98%
		ii) Breast Wall	15.93%
		iii) Thrie Beam Crash Barier	5.11%
		iv) Parapet Wall	1.32%

		v)Tubular steel Railing	1.80%
		2. Toll Plaza	0.00%
		3. Road side drains and drains cum footpath	8.62%
		4. Road signs, markings, km stones, safety devices.	0.55%
		5. Project facilities	
		a. Bus Bays	0.00%
		b. Truck lay-byes	0.00%
		c. Rest areas	0.00%
		d. Site Clearance	0.00%
		e. Boundary Pillars	0.05%
		f. Junctions and connecting road with covered drain to Parking	1.65%
		6. Others	0.00%
		7. Road side plantation	0.00%
		8. Safety and traffic management during construction	0.00%
Start Point Junction Improvement	**11.69%**	(1) Earthwork up to top of the sub-grade	82.93%
		(2) Sub-Base course	0.53%
		(3) Non-Bituminous Base Course	4.76%
		(4) Bituminous Base Course	3.00%
		(5) Wearing Coat	5.56%
		(6) Widening and repair of culverts	3.22%

1.3 Procedure of estimating the value of work done

1.3.1 Road Works

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

Table 1.3.1

Stage of Payment	**Percentage - weightage**	**Payment Procedure**
A-Widening and strengthening of existing road		If existing road length (excluding bypasses, re-alignment, structure) is say **'L' km** and the unencumbered length along the existing road as handed over on the appointed date is
(1) Site Clearance	0.99%	
(2) Earthwork up to top of the sub-grade	19.16%	

(3) Sub-Base course	17.78%	**'L1' km** and the balance length i.e. **'L2' km (L - L1)** is to be handed over on a later date as per the memorandum signed under provision of Clause 8.2.1 of the Contract Document, then the stage payment shall be worked out for the **'L1' km** length handed over on the appointed date. The stage payment for the remaining **'L2'** km length shall be worked out on prorata basis from the date of handing over of such length.
(4) Non-Bituminous Base Course	8.28%	
(5) Bituminous Base Course	16.12%	
(6) Wearing Coat	11.25%	
(6) Widening and repair of culverts	0.00%	Cost of completed culverts shall be determined pro rata basis with respect to the total no. of culverts. The payment shall be made on the completion of at least five culverts.
B.1- Reconstruction/New 2-lane realignment/ bypass (Flexible Pavement)		Unit of measurement is linear length of each bypass/re-alignment (excluding structures) and payment of each stage shall be made on prorata basis on completion of a stage in full length or 5 (five) km length of each bypass/re-alignment taken separately.
(1) Earthwork up to top of the sub-grade	0.00%	
(2) Sub-Base Course	0.00%	
(3) Non-Bituminous Base Course	0.00%	
(4) Bituminous Base Course	0.00%	
(5) Wearing Coat	0.00%	
B.2- Reconstruction/New 2-lane realignment/bypass (Rigid Pavement)		Unit of measurement is linear length of each bypass/re-alignment (excluding structures) and payment of each stage shall be made on prorata basis on completion of a stage in full length or 5 (five) km length of each bypass/re-alignment taken separately.
(1) Earthwork up to top of the sub-grade	0.00%	
(2) Sub-Base Course	0.00%	
(3) Dry Lean Concrete (DLC) Course	0.00%	
(4) Pavement Quality Control (PQC) Course	0.00%	
C-1 Reconstruction/New service road (Flexible pavement)		Unit of measurement is linear length. Payment of each stage shall be made on prorata basis on completion of a stage in full length or 5(five) Km. length whichever is less.
(1) Earthwork up to top of the sub-grade	0.00%	
(2) Sub-base Course	0.00%	

(3) Non-Bituminous Base Course	0.00%	
(4) Bituminous Base Course	0.00%	
(5) Wearing Coat	0.00%	
C-2 Reconstruction/New service road (Rigid pavement)		Unit of measurement is linear length. Payment of each stage shall be made on prorata basis on completion of a stage in full length or 5(five) Km. length whichever is less.
(1) Earthwork up to top of the sub-grade	0.00%	
(2) Sub-base Course	0.00%	
(3) Dry Lean Concrete (DLC) Course	0.00%	
(4) Pavement Quality Control (PQC) Course	0.00%	
D- Re-construction and New culverts on existing road, realignments, bypasses:		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 at least five culverts.
Culverts (Length < 6 m)	26.42%	

@. 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 road work x weightage for bituminous work x (1/L)

Where P= Contract Price

L = Total length in km

Similarly, the rates per km for other stages shall be worked out accordingly

Note: The length affected due to law-and-order problems or litigation during execution due to which the Contractor is unable to execute the work, may be deducted from the total project length for payment purposes. The total length calculated here is only for payment purposes and will not affect and referred in other clauses of the Contract Agreement.

1.3.2 Minor Bridges and Underpasses/Overpasses.

Procedure for estimating the value of Minor bridge and Underpasses/Overpasses shall be as stated in table 1.3.2

Table 1.3.2

Stage of Payment	Weightage	Payment Procedure
1	**2**	**3**
A.1- Widening and repairs of Minor Bridges (Length > 6 m and < 60 m)	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 widening & repair works of a minor bridge.
A.2- New Minor Bridges		

(i) Foundation + Sub-structure: On completion of the foundation work including foundations for wing and return walls, abutments, piers upto the abutment/pier cap.	73.63%	**(i) Foundation+Sub-Structure:** Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length (m) of the minor bridges. Payment against foundation + sub-structure shall be made on pro-rata basis on completion of a stage i.e., not less than 25% of the scope of foundation+ sub-structure of each bridge subject to completion of atleast two foundations along with sub-structure upto abutment/pier cap level of each bridge. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(ii) Super-structure: On completion of the super-structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs & markings, tests on completion etc. complete in all respect.	24.89%	**(ii) Super-structure:** Payment shall be made on prorata basis on completion of a stage i.e. completion of super• structure of atleast one span in all respects as specified in the column of "Stage of Payment" in this sub-clause.
(iii) Approaches: On completion of approaches including retaining walls, stone pitching, protection works complete in all respect and fit for use.	1.48%	**(iii) Approaches:** Payment shall be made on pro-rata basis on completion of a stage i.e. completion of approaches in all respect as specified in the column of "Stage of Payment" in this sub-clause.
(iv) Guide Bunds and River Training Works: On completion of Guide Bunds and river training works complete in all respects	0.00%	**(iv) Guide Bonds and River Training Works:** Payment shall be made on prorata basis on completion of a stage i.e. completion of Guide Bunds and River training Works in all respects as specified.
B.1- Widening and repair of underpasses/overpasses	0.00%	Cost of each underpass/overpass shall be determined on prorata basis with respect to the total linear length of the underpasses/overpasses. Payment shall be made on the completion of widening & repair works of a underpass/overpass.
B.2- New underpasses/overpasses		**(i) Foundation +Sub-Structure:** Cost of each Underpass/Overpass

(i) Foundation + Sub-structure: On completion of the foundation work including foundations for wing and return walls, abutments, piers upto the abutment/pier cap.	0.00%	shall be determined on pro rata basis with respect to the total linear length (m) of the Underpasses/ Overpasses. Payment against foundation + sub-structure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation+sub-structure of each Underpasses/Overpasses subject to completion of atleast two foundations along with sub-structure upto abutment/pier cap level each underpass/overpass. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(ii) Super-structure: On completion of the super-structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs & markings, tests on completion etc. complete in all respect.	0.00%	**(ii) Super-structure:** Payment shall be made on prorata basis on completion of a stage i.e., completion of super-structure of atleast one span in all respects as specified in the column of "Stage of Payment" in this sub-clause.
Wearing coat (a) in case of Overpass-wearing coat including expansion joints complete in all reaspects as specified and (b) in case of underpass- rigid pavement including drainage facility complete in all respects as specified.		
(iii) Approaches: On completion of approaches including retaining walls/Reinforced Earth Walls, stone pitching, protection works complete in all respect and fit for use.	0.00%	**(iii) Approaches:** Payment shall be made on pro-rata basis on completion of a stage i.e., completion of approaches in all respect as specified.

1.3.3 Major Bridge Works, ROB/RUB and Structures.

Procedure for estimating the value of Major Bridge Works, ROB/RUB and Structures shall be as stated in table 1.3.3

Table 1.3.3

Stage of Payment	Weightage	Payment Procedure
1	**2**	**3**

A.1- Widening and repairs of Major Bridges		
(i) Foundation	88.79%	**(i) Foundation:** Cost of each Major Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridge. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of the major Bridge subject to completion of atleast two foundations of the major Bridge. In case where load testing is required for foundation. the trigger of first payment shall include load testing also where specified.
(ii) Sub-structure	0.00%	**(ii) Sub-Structurer:** Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e. not Jess than 25% of the scope of sub-structure of the major bridge subject to completion of atleast two sub-structures of abutments/piers upto abutment/pier cap level of the major bridge.
(iii) Super-Structure (Including Bearings)	0.00%	**(iii) Super-structure:** Payment shall be made on prorata basis on completion of a stage i.e., completion of super-structure including bearings of atleast one span in all respects as specified.
(iv) Wearing Coat including expansion joints	4.69%	**(iv) Wearing Coat:** Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified.
(v) Miscellaneous Items like hand rails, Crash barriers, road markings etc.)	6.51%	**(v) Miscellaneous:** Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified
(vi) Wing walls/return walls	0.00%	**(vi) Wing walls/return walls:** Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
(vii) Guide Bunds, River Training Works etc.	0.00%	**(vii) Guide Bonds, River Training works:** Payments shall be made on completion of all guide bunds/river

		training works etc. complete in all respects as specified.
(viii) Approaches (including retaining walls, stone pitching, protection works)	0.00%	**(viii) Approaches:** Payments shall be made on completion of both approaches including stone pitching. protection works, etc. complete in all respects as specified.
A.2- New Major Bridges		
(i) Foundation	4.01%	**(i) Foundation:** Cost of each Major Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridge. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of the major Bridge subject to completion of atleast two foundations of the major Bridge. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(ii) Sub-structure	11.01%	**(ii) Sub-Structurer:** Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e., not less than 25% of the scope of sub-structure of the major bridge subject to completion of atleast two sub-structures of abutments/piers upto abutment/pier cap level of the major bridge.
(iii) Super-Structure (Including Bearings)	84.80%	**(iii) Super-structure:** Payment shall be made on prorata basis on completion of a stage i.e., completion of super-structure including bearings of at least one span in all respects as specified.
(iv) Wearing Coat including expansion joints	0.00%	**(iv) Wearing Coat:** Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified.
(v) Miscellaneous Items like hand rails, Crash barriers, road markings etc.)	0.00%	**(v) Miscellaneous:** Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified.

(vi) Wing walls/return walls	0.00%	**(vi) Wing walls/return walls:** Payments shall be made on completion of all wing walls/return walls complete in al) respects as specified.
(vii) Guide Bunds, River Training Works etc.	0.00%	**(vii) Guide Bunds, River Training works:** Payments shall be made on completion of all guide bunds/river training works etc. complete in all respects as specified.
(viii) Approaches (including retaining walls, stone pitching, protection works)	0.18%	**(viii) Approaches:** Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified.
B.1- Widening and repair of (a)ROB (b) RUB		
(i) Foundation	0.00%	**(i) Foundation:** Cost of each ROB/RUB shall be determined on pro rata basis with respect to the total linear length (m) of the ROBs/RUBs. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of the ROB/RUB subject to completion of atleast two foundations of the ROB/RUB.In case where load testing is required for foundation, the trigger of first payment shall include load testing also wherespecified.
(ii) Sub-structure	0.00%	**(ii) Sub-Structure:** Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of sub-structure of the ROB/RUB subject to completion of atleast two sub-structures of abutments/piers upto abutment/pier cap level of the ROB/RUB.
(iii) Super-Structure (Including Bearings)	0.00%	**(iii) Super-structure:** Payment shall be made on prorata basis on completion of a stage i.e., completion of super-structure including bearings of atleast one span in all respects as specified.

(iv) Wearing Coat (a) in case of ROB- wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB-rigid pavement under RUB including drainage facility complete in all respects as specified	0.00%	**(iv) Wearing Coat:** Payment shall be made on completion of (a) in case of ROB- wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB-rigid pavement under RUB including drainage facility complete in all respects as specified.
(v) Miscellaneous Items like hand rails, Crash barriers, road markings etc.)	0.00%	**(v) Miscellaneous:** Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified.
(vi) Wing walls/return walls	0.00%	(**vi) Wing walls/return walls:** Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
(vii) Approaches (including retaining walls, stone pitching, protection works	0.00%	**(vii) Approaches:** Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified.
B.2- New ROB/RUB		
(a)ROB **(b) RUB**		
(i) Foundation	0.00%	**(i) Foundation:** Cost of each ROB/RUB shall be determined on pro rata basis with respect to the total linear length (m) of the ROBs/RUBs. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of the ROB/RUB subject to completion of atleast two foundations of the ROB/RUB. In case where toad testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(ii) Sub-structure	0.00%	**(ii) Sub-Structure:** Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of sub-structure of the ROB/RUB subject to completion of atleast two sub-structures of abutments/piers

		upto abutment/pier cap level of the ROB/RUB.
(iii) Super-Structure (Including Bearings)	0.00%	**(iii) Super-structure:** Payment shall be made on prorata basis on completion of a stage i.e. completion of super-structure including bearings of atleast one span in all respects as specified.
(iv) Wearing Coat (a) in case of ROB- wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB-rigid pavement under RUB including drainage facility complete in all respects as specified	0.00%	**(iv) Wearing Coat:** Payment shall be made on completion of (a) in case of ROB- wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB- rigid pavement under RUB including drainage facility complete in all respects as specified as specified.
(v) Miscellaneous Items like hand rails, Crash barriers, road markings etc.)	0.00%	**(v) Miscellaneous:** Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified.
(vi) Wing walls/return walls	0.00%	**vi) Wing walls/return walls:** Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
(vii) Approaches (including retaining walls, stone pitching, protection works	0.00%	**(vii) Approaches:** Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified.
C.1- Widening and repair of Elevated Sections/Flyover/Grade Separators		
(i) Foundation	0.00%	**(i) Foundation:** Cost of each structure shall be determined on pro rata basis with respect to the total linear length (m) of the structures. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of the structure subject to completion of atleast two foundations of the structure. In case where load testing is required for foundation, the trigger of first

		payment shall include load testing also where specified.
(ii) Sub-structure	0.00%	**(ii) Sub-Structure:** Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e., not less than 25% of the scope of sub-structure of the structure subject to completion of atleast two sub-structures of abutments/piers upto abutment/pier cap level of the structure.
(iii) Super-Structure (Including Bearings)	0.00%	**(iii) Super-structure:** Payment shall be made on pro rata basis on completion of a stage i.e., completion of super-structure including bearings of at least one span in all respects as specified.
(iv) Wearing Coat including expansion joints	0.00%	**(iv) Wearing Coat:** Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified.
(v) Miscellaneous Items like hand rails, Crash barriers, road markings etc.)	0.00%	**(v) Miscellaneous:** Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified.
(vi) Wing walls/return walls	0.00%	**(vi) Wing walls/return walls**: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
(vii) Approaches (including retaining walls/Reinforced Earth Wall, stone pitching, protection works)	0.00%	**(vii) Approaches:** Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified.
C.2- New Elevated Sections/Flyover/Grade Separators		
(i) Foundation	0.00%	**(i) Foundation:** Cost of each structure shall be determined on pro rata basis with respect to the total linear length (m) of the structures. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e., not less than 25% of the scope of foundation of the structure subject to completion of atleast two foundations of the

		structure. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(ii) Sub-structure	0.00%	**(ii) Sub-Structure:** Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e., not less than 25% of the scope of sub-structure of the structure subject to completion of atleast two sub-structures of abutments/piers upto abutment/pier cap level of the structure.
(iii) Super-Structure (Including Bearings)	0.00%	**(iii) Super-structure:** Payment shall be made on prorata basis on completion of a stage i.e., completion of super structure including beanngs of atleast one span in all respects as specified.
(iv) Wearing Coat including expansion joints	0.00%	**(iv) Wearing Coat:** Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified.
(v) Miscellaneous Items like hand rails, Crash barriers, road markings etc.)	0.00%	**(v) Miscellaneous:** Payment shall be made on completion of miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified.
(vi) Wing walls/return walls	0.00%	**(vi) Wing walls/return walls:** Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
(vii) Approaches (including retaining walls/Reinforced Earth Wall, stone pitching, protection works)	0.00%	**(vii) Approaches:** Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified.
Note: (1) In case of innovate Major Bridge projects like cable suspension/cable stayed/ Extra Dozed and exceptionally long span bridges, the schedule may be modified as per site requirements before bidding with due approval of DG(RD) & SS, MoRT&H.		
(2) The Schedule for exclusive tunnel projects may be prepared as per site requirements before bidding with due approval of DG(RD) & SS, MoRT&H.		
1.3.4 Other Works & Utilities Shifting		
Procedure for estimating the value of Other Works shall be as stated in table 1.3.4		
Table 1.3.4		

Stage of Payment	Weightage	Payment Procedure
Protection Work		
Utility Shifting		
Shifting of Electrical Utilities and PHE	100.00%	Unit of measurement is as per completed activities. Cost per activity shall be determined on pro rata basis as per its weightage with reference to total Cost of LT/HT line & Pipe line. In Shifting of work is i. Erection of Poles -20% ii. Conductor stringing incl. laying of cables-30% In Shifting work is laying of pipe-50%.
Other Work		
Protection Work		
i) Retaining Wall	64.98%	Unit of measurement is linear length in km. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 50 m length.
ii) Breast Wall	15.93%	
iii) Thrie Beam Crash Barier	5.11%	
iv) Parapet Wall	1.32%	
v)Tubular steel Railing	1.80%	
(i) 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.
(ii) Road side drains and drains cum footpath	79.34%	Unit of measurement is linear length in km. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10 % (ten per cent) of the total length.
(iii) Road signs, markings, km stones, safety devices etc.	5.05%	
(v) Project facilities	0.00%	Payment shall be made on pro rata basis for completed facilities.
(a) Bus Bays	0.00%	
(b) Truck lay-byes	0.00%	
(c) Rest areas	0.00%	
(d) Site Clearance	0.00%	

(e) Boundary Pillars	0.43%	
(f) Junctions and connecting road with covered drain to Parking	15.18%	
(e) Others	0.00%	
(i) Road side plantation	0.00%	Unit of measurement is linear length.
(ii) Safety and traffic management during construction	0.00%	Payment shall be made on prorata basis every six months.
Stage of Payment	**Weightage**	**Payment Procedure**
Start Point Junction Improvement		Unit of measurement is linear length of each bypass/re-alignment (excluding structures) and payment of each stage shall be made on pro rata basis on completion of a stage in full length of each bypass/re-alignment taken separately.
(1) Earthwork up to top of the sub-grade	82.93%	
(2) Subgrade	0.53%	
(3) Sub-Base Course	4.76%	
(4) Non-Bituminous Base Course	3.00%	
(5) Bituminous Base Course	5.56%	
(6) Wearing Coat	3.22%	
2.1 The cost for maintenance shall be as stated in Clause 14.1.1.		
2.2 Payment for Maintenance shall be made in quarterly instalments in accordance with the provisions of Clause 19.7		

Schedule - I

(See Clause 10.2 (iv))

Drawings

1. Drawings

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

2. Additional Drawings

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

Annex – I

(Schedule - I)

List of Drawings

[**Note**: The Authority shall describe in this Annex-I, all the Drawings that the Contractor isrequired to furnish under Clause 10.2.]

Schedule - J

(See Clause 10.3 (ii))

Project Completion Schedule

1. Project Completion Schedule

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

2. Project Milestone-I

(i) Project Milestone-I shall occur on the date falling on the 255th days **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 438th **days from the Appointed Date (the "Project Milestone- II")** (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 621th **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 731th day from the Appointed Date.

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

6. Extension of time

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

Schedule - K

(See Clause 12.1 (ii))

Tests on Completion

1. Schedule for Tests

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

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

2. Tests

(i) Visual and physical test: The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include [***].

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

(iii) Tests for bridges: All major and minor bridges shall be subjected to the rebound hammer and ultrasonic pulse velocity tests, to be conducted in accordance with the procedure described in Special Report No. 17: 1996 of the IRC Highway Research Board on Nondestructive Testing Techniques, at two spots in every span, to be chosen at random by the Authority's Engineer. Bridges with a span of 15 (fifteen) metres or more shall also be subjected to load testing.

(iv) Other tests: The Authority's Engineer may require the Contractor to carry out or cause to be carried additional tests, in accordance with Good Industry Practice, for determining the compliance of the Project Highway with Specifications and Standards, except tests as specified in clause 5, but shall include measuring the reflectivity of road markings and road signs; and measuring the illumination level (lux) of lighting using requisite testing equipment.

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

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

3. Agency for conducting Tests

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

4. Completion Certificate

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

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

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

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

Schedule - L

(See Clause 12.2)

Completion Certificate

1 I, …… (Name of the Authority's Engineer), acting as the Authority's Engineer, under and in accordance with the Agreement dated (the "**Agreement**"), for **Improvement and Widening to two lane with Paved Shoulder of NH-13 & 15 (Old NH-52) from Existing Km 745.60 (Design Km 0.000) to Existing km 770.600 (Design Km 24.819) (Brahmakund T-junction to Kamlang T-Junction, Existing Length: 25.00 Km, Design Length: 24.819 Km, Pkg-01) in the state of Arunachal Pradesh on EPC mode (**the "**Project Highway**") on Engineering, Procurement and Construction (EPC) basis through(Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement, and I am satisfied that the Project Highway can be safely and reliably placed in service of the Users thereof.

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Authority's Engineer by:
(Signature)
(Name)(Designation) (Address)

Schedule - M

(See Clauses 14.6, 15.2 and 19.7)

Payment Reduction for Non-Compliance

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

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

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

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

2. Percentage reductions in lump sum payments on monthly basis

(i) The following percentages shall govern the payment reduction:

S. No.	Item/Defect/Deficiency	Percentage
(a)	**Carriageway/Pavement**	
(i)	Potholes, cracks, other surface defects	15%
(ii)	Repairs of Edges, Rutting	5%
(b)	**Road, Embankment, Cuttings, Shoulders**	
(i)	Edge drop, inadequate cross fall, undulations, settlement,potholes, ponding, obstructions	10%
(ii)	Deficient slopes, raincuts, disturbed pitching, vegetationgrowth, pruning of trees	5%
(c)	**Bridges and Culverts**	
(i)	Desilting, cleaning. vegetation growth, damaged pitching, flooring, parapets, wearing course, footpaths, any damage tofoundations	20%
(ii)	Any Defects in superstructures, bearings and sub-structures	10%
S. No.	**Item/Defect/Deficiency**	**Percentage**
(iii)	Painting, repairs/replacement kerbs, railings, parapets, guideposts/crash barriers	5%

(d)	**Roadside Drains**	
(i)	Cleaning and repair of drains	5%
(e)	**Road Furniture**	
(i)	Cleaning, painting, replacement of road signs, delineators, road markings, 200 m/km/5th km stones	5%
(f)	**Miscellaneous Items**	
(i)	Removal of dead animals, broken down/accidented vehicles, fallen trees, road blockades or malfunctioning of mobile crane	10%
(ii)	Any other Defects in accordance with paragraph 1.	5%
(g)	**Defects in Other Project Facilities**	5%

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

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

Where,

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

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

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

L1= non-complying length L = Total length of the road,

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

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

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

Schedule - N

(See Clause 18.1 (i))

Selection of Authority's Engineer

1. Selection of Authority's Engineer

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

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

2. Terms of Reference

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

3. Appointment of Government entity as Authority's Engineer

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

Annex – I

(Schedule - N)

Terms of Reference for Authority's Engineer

1. Scope

(i) These Terms of Reference (the "**TOR**") for the Authority's Engineer are being specified pursuant to the EPC Agreement dated ..... (the "**Agreement**), which has been entered into between the **National Highways & Infrastructure Development Corporation Ltd., Third Floor, PTI Building, 4 Sansad Marg, New Delhi-110001** (the "**Authority**") and (the "**Contractor**") for **Improvement and Widening to two lane with Paved Shoulder of NH-13 & 15 (Old NH-52) from Existing Km 745.60 (Design Km 0.000) to Existing km 770.600 (Design Km 24.819) (Brahmakund T-junction to Kamlang T-Junction, Existing Length: 25.00 Km, Design Length: 24.819 Km, Pkg-01) in the state of Arunachal Pradesh on EPC mode**, and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.

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

2. Definitions and interpretation

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

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

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

3. General

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

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

(a) any Time Extension;
(b) any additional cost to be paid by the Authority to the Contractor;
(c) the Termination Payment; or

(d) issuance of Completion Certificate or

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

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

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

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

(vi) In the event of any disagreement between the Parties regarding the meaning, scope and nature of Good Industry Practice, as set forth in any provision of the Agreement, the Authority's Engineer shall specify such meaning, scope and nature by issuing a reasoned written statement relying on good industry practice and authentic literature.

4. Construction Period

(i) During the Construction Period, the Authority's Engineer shall review and approve the Drawings furnished by the Contractor along with supporting data, including the geo-technical and hydrological investigations, characteristics of materials from borrow areas and quarry sites, topographical surveys, and the recommendations of the Safety Consultant in accordance with the provisions of Clause 10.1 (vi). The Authority's Engineer shall complete such review and approval and send its observations to the Authority and the Contractor within 15 (fifteen) days of receipt of such Drawings; provided, however that in case of a Major Bridge or Structure, the aforesaid period of 15 (fifteen) days may be extended upto 30 (thirty) days. In particular, such comments shall specify the conformity or otherwise of such Drawings with the Scope of the Project and Specifications and Standards.

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

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

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

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

(vi) The Authority's Engineer shall review the monthly progress report furnished by the Contractor and send its comments thereon to the Authority and the Contractor within 7 (seven) days of receipt of such report.

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

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

(ix) For determining that the Works conform to Specifications and Standards, the Authority's Engineer shall require the Contractor to carry out, or cause to be carried out, tests at such time and frequency and in such manner as specified in the Agreement and in accordance with Good Industry Practice for quality assurance. For purposes of this Paragraph 4 (ix), the tests specified in the IRC Special Publication-11 (Handbook of Quality Control for Construction of Roads and Runways) and the Specifications for Road and Bridge Works issued by MORTH (the "Quality Control Manuals") or any modification/substitution thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance.

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

(xi) The timing of tests referred to in Paragraph 4 (ix), and the criteria for acceptance/ rejection of their results shall be determined by the Authority's Engineer in accordance with the Quality Control Manuals. The tests shall be

undertaken on a random sample basis and shall be in addition to, and independent of, the tests that may be carried out by the Contractor for its own quality assurance in accordance with Good Industry Practice.

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

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

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

(xv) The Authority's Engineer shall obtain from the Contractor a copy of all the Contractor's quality control records and documents before the Completion Certificate is issued pursuant to Clause 12.2.

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

(xvii) In the event that the Contractor carries out any remedial measures to secure the safety of suspended works and Users, and requires the Authority's Engineer to inspect such works, the Authority's Engineer shall inspect the suspended works within 3 (three) days of receiving such notice, and make a report to the Authority forthwith, recommending whether or not such suspension may be revoked by the Authority.

(xviii) The Authority's Engineer shall carry out, or cause to be carried out, all the Tests specified in Schedule-K and issue a Completion Certificate, as the case

may be. For carrying out its functions under this Paragraph 4 (xviii) and all matters incidental thereto, the Authority's Engineer shall act under and in accordance with the provisions of Article 12 and Schedule-K.

5. Maintenance Period

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

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

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

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

(v) The Authority's Engineer shall examine the request of the Contractor for closure of any lane(s) of the Project Highway for undertaking maintenance/repair thereof, and shall grant permission with such modifications, as it may deem necessary, within 5 (five) days of receiving a request from the Contractor. Upon expiry of the permitted period of closure, the Authority's Engineer shall monitor the reopening of such lane(s), and in case of delay, determine the Damages payable by the Contractor to the Authority under Clause 14.5.

6. Determination of costs and time

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

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

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

7. Payments

(i) The Authority's Engineer shall withhold payments for the affected works for which the Contractor fails to revise and resubmit the Drawings to the Authority's Engineer in accordance with the provisions of Clause 10.2 (iv) (d).

(ii) Authority's Engineer shall -

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

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

Contractor, after adjustments in accordance with the provisions of Clause 19.10.

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

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

8. Other duties and functions

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

9. Miscellaneous

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

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

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

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

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

Schedule - O

(See Clauses 19.4 (i), 19.6 (i), and 19.8 (i))

Forms of Payment Statements

1. Stage Payment Statement for Works

The Stage Payment Statement for Works shall state:

(a) the estimated amount for the Works executed in accordance with Clause 19.3
   (i) subsequent to the last claim;

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

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

(d) amounts reflecting adjustment in price, if any, for (c) above in accordance with the provisions of Clause 13.2 (iii) (a);

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

(f) Deductions:

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

   ii. Any amount towards deduction of taxes; and

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

(g) Net claim: (e) – (f) (iii);

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

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

   ii. For Change of Scope Orders, and

   iii. Taxes deducted

2. Monthly Maintenance Payment Statement

The monthly Statement for Maintenance Payment shall state:

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

(b) the deductions for maintenance work not done;

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

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

(e) amount towards deduction of taxes

3. Contractor's claim for Damages

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

Schedule - P

(See Clause 20.1)

Insurance

1. Insurance during Construction Period

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

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

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

(ii) The insurance under sub para (a) and (b) of paragraph 1(i) above shall cover the Authority and the Contractor against all loss or damage from any cause arising underparagraph 1.1 other than risks which are not insurable at commercial terms.

2. Insurance for Contractor's Defects Liability

The Contractor shall effect and maintain insurance cover of not less than 15% of the Contract Price for the Works from the date of issue of the Completion Certificate until the end of the Defects Liability Period for any loss or damage for which the Contractor is liable and which arises from a cause occurring prior to the issue of the Completion Certificate. The Contractor shall also maintain other insurances for maximum sums as may be required under the Applicable Laws and in accordance with Good Industry Practice.

3. Insurance against injury to persons and damage to property

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

The insurance cover shall be not less than the value of the contract price

(ii) The insurance shall be extended to cover liability for all loss and damage to the

Authority's property arising out of the Contractor's performance of this Agreement excluding:

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

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

4. Insurance to be in joint names

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

Schedule-Q

(See Clause 14.10)

Tests on Completion of Maintenance Period

1. Riding Quality test:

   Riding quality test: Riding quality of each lane of the carriageway shall be checked with the help of a calibrated bump integrator and the maximum permissible roughness for purposes of this Test shall be [2,200 (two thousand and two hundred only)] mm for each kilometre.

2. Visual and physical test:

   The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include measurement of cracking, rutting, stripping and potholes and shall be as per the requirement of maintenance mentioned in Schedule-E.

Schedule-R

(See Clause 14.10)

Taking Over Certificate

I, …… (Name and designation of the Authority's Representative) under and in accordance with the Agreement dated …… (the "**Agreement**"), for " **Improvement and Widening to two lane with Paved Shoulder of NH-13 & 15 (Old NH-52) from Existing Km 745.60 (Design Km 0.000) to Existing km 770.600 (Design Km 24.819) (Brahmakund T-junction to Kamlang T-Junction, Existing Length: 25.00 Km, Design Length: 24.819 Km, Pkg-01) in the state of Arunachal Pradesh on EPC mode"** the "**Project Highway**" on Engineering, Procurement and Construction (EPC) basis through (Name of Contractor), hereby certify that the Tests on completion of Maintenance Period in accordance with Article 14 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement and I hereby certify that the Authority has taken over the Project highway from the Contractor on this day.....

SIGNED, SEALED AND DELIVERED

(Signature) (Name and designation of Authority's Representative)

(Address)

***** End of the Document *****