Technical Schedules

FOR

"Widening & Upgradation to 2 lane with paved shoulder of NH-301 Kargil Zanskar Road from Design km 0.000 (Ex. km 0.000) to km 30.040 (Ex. km 30.000) of 30.040 Km length in the Union Territory of Ladakh on EPC mode (Pkg–I)"

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.

(NHIDCL)

SCHEDULES

Schedule-A

(See Clauses 2.1 and 8.1)

Site of the Project

1. The Site

(i) Site of the 2-lane project highway shall include land, buildings, structures and road works as described in **Annex-I** of thisSchedule-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.** The proposed profile of the Project Highways shall be followed by the contractor with minimum FRL as indicated in the alignment plan. The Contractor, however, improve/upgrade the Road Profile as 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

1. Site

The site of the 2-lane project highway comprises section of National Highway-301 Kargil to Zanskar commencing from km 0+000 to km 30+040 of length 30.040 km i.e. Package I of Kargil -Zanskar Section in the Union Territory of Ladakh. The land, carriageway and structures comprising the Site are described below.

2. Land

The Site of the Project Highway comprises the land (sum of land already in possession and land to be possessed) as described below:

Sr.No.	Design Chainage in km		Length in m	EROW in m
	From	To		
1	0+000	30+040	30040	4.2

3. Carriageway

The existing carriage way of the Project Highway is Single lane. The type of the existing pavement is flexible.

4. Major Bridges

The Site includes the following Major Bridges:

Sr. No.	Ex Chainage (km)	Type of Structure			No. of Spans with span length (m)	Overall Width (m)
		Foundation	Sub-structure	Super-structure		
Nil						

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

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

Sr. No.	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:

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

7. Minor bridges

The Site includes the following minor bridges:

Sr. No.	Ex Chainage (km)	Type of Structure			No. of Spans with span length (m)	Overall Width (m)
		Foundation	Sub- structure	Super- structure		
Nil						

8. Railway level crossings

The Site includes the following railway level crossings:

Sr. No.	Location (km)	Remarks
Nil		

9. Underpasses (vehicular, non-vehicular)

The Site includes the followingunderpasses:

Sr. No.	Chainage (km)	Type of Structure	No. of Spans with span length (m)	Width (m)
Nil				

10. Culverts

The Site has the following culverts:

Pipe Culverts

Sl. No.	Existing Chainage.	Skew Angle in deg. (L/R)	Span Arrangement	Type of Superstructure	Carriageway Width (m)	Total Deck Width (m)
1	3.790	-	1 X 0.3Ø	Pipe	8	8.00
2	4.500	31	1 X 0.3Ø	Pipe Skew	6.7	7.60
3	4.590	28	1 X 0.3Ø	Pipe Skew	6.7	7.60
4	4.690	31	1 X 0.3Ø	Pipe Skew	6.7	7.60
5	4.990	-	1 X 0.3Ø	Pipe	9.2	-
6	5.090	-	1 X 0.3Ø	Pipe	6.5	7.70
7	6.850	-	1 X 0.2Ø	Pipe	7.5	9.20
8	7.980	62	1 X 0.3Ø	Pipe Skew	5.2	6.00
9	8.230	-	1 X 0.3Ø	Pipe	5	5.00
10	8.290	-	1 X 0.3Ø	Pipe	7.3	7.30
11	8.380	-	1 X 0.3Ø	Pipe	5	5.00
12	8.520	-	1 X 0.2Ø	Pipe	5.5	6.00
13	8.610	41	1 x 0.3Ø	Pipe Skew	6.9	7.00
14	9.010	45	1 x 0.3Ø	Pipe Skew	6.5	6.90
15	9.410	-	1 x 0.3Ø	Pipe	6.9	8.25
16	9.610	-	1 x 0.3Ø	Pipe	7.6	9.20
17	10.110	-	1 x 0.3Ø	Pipe	7	10.00
18	10.160	-	1 x 0.3Ø	Pipe	7.5	10.50
19	10.300	-	1 x 0.3Ø	Pipe	7.4	10.50
20	10.400	-	1 x 0.3Ø	Pipe	7.5	9.40
21	10.490	-	1 x 0.3Ø	Pipe	7.4	8.70
22	10.690	-	1 x 0.3Ø	Pipe	7.5	10.00
23	10.830	-	1 x 0.3Ø	Pipe	6.2	6.20
24	10.990	-	1 x 0.3Ø	Pipe	6.2	6.80
25	11.190	-	1 x 0.3Ø	Pipe	7	9.00

Sl. No.	Existing Chainage.	Skew Angle in deg. (L/R)	Span Arrangement	Type of Superstructure	Carriageway Width (m)	Total Deck Width (m)
26	11.300	-	1 x 0.3Ø	Pipe	7.5	9.00
27	11.360	40.0	1 x 0.3Ø	Pipe Skew	7.2	8.30
28	11.480	-	1 x 0.3Ø	Pipe	6.3	6.90
29	11.580	-	1 x 0.3Ø	Pipe	7.3	9.00
30	11.955	-	1 x 0.3Ø	Pipe	7	7.50
31	12.150	-	1 x 0.3Ø	Pipe	6.2	6.20
32	12.260	-	1 x 0.3Ø	Pipe	5.6	5.60
33	12.340	28.0	1 x 0.3Ø	Pipe Skew	7	9.20
34	12.600	52.0	1 x 0.3Ø	Pipe Skew	6.2	6.20
35	12.700	37.0	1 x 0.3Ø	Pipe Skew	7.2	7.20
36	12.800	37.0	1 x 0.3Ø	Pipe Skew	7.2	7.20
37	12.900	-	1 x 0.3Ø	Pipe	7	9.20
38	12.950	-	1 x 0.3Ø	Pipe	7	9.40
39	13.080	-	1 x 0.3Ø	Pipe	7	9.40
40	13.170	-	1 x 0.3Ø	Pipe	6.9	10.00
41	13.410	-	1 x 0.3Ø	Pipe	7	10.00
42	13.800	34.0	1 x 0.3Ø	Pipe Skew	7	9.70
43	13.840	34.0	1 x 0.3Ø	Pipe Skew	7	9.70
44	14.200	-	1 x 0.3Ø	Pipe	7	9.40
45	14.200	-	1 x 0.3Ø	Pipe	7	9.40
46	14.300	40.0	1 x 0.3Ø	Pipe Skew	6	6.00
47	14.380	-	1 x 0.3Ø	Pipe	7	9.50
48	15.800	-	1 x 0.3Ø	Pipe	7	11.30
49	16.000	-	1 x 0.25Ø	Pipe	7.2	13.30
50	16.100	-	1 x 0.25Ø	Pipe	7	9.70
51	16.300	-	1 x 0.25Ø	Pipe	7.5	13.30
52	16.500	-	1 x 0.25Ø	Pipe	7.4	10.00
53	16.540	-	1 x 0.25Ø	Pipe	7.4	10.00
54	16.600	28.0	1 x 0.25Ø	Pipe Skew	7.4	8.70
55	16.710	-	1 x 0.25Ø	Pipe	7.4	8.70
56	16.790	30.0	1 x 0.25Ø	Pipe Skew	7.5	8.70
57	16.890	-	1 x 0.25Ø	Pipe	7.5	8.70
58	17.050	-	1 x 0.25Ø	Pipe	7.5	8.70
59	17.140	-	1 x 0.25Ø	Pipe	7.5	8.70
60	17.232	-	1 x 0.25Ø	Pipe	7.5	9.00
61	17.360	-	1 x 0.25Ø	Pipe	7.5	9.00
62	17.500	-	1 x 0.25Ø	Pipe	7.5	9.00
63	17.600	-	-	Pipe	7.5	8.70
64	17.700	-	1 x 0.3Ø	Pipe	7.5	8.70
65	17.800	-	1 x 0.3Ø	Pipe	7.5	8.70
66	17.872	-	1 x 0.3Ø	Pipe	7.5	8.70
67	18.020	-	1 x 0.3Ø	Pipe	7.5	8.70
68	18.080	-	1 x 0.3Ø	Pipe	7.4	8.70
69	18.170	-	1 x 0.3Ø	Pipe	7.4	9.00
70	18.270	-	1 x 0.3Ø	Pipe	7.4	9.30
71	18.370	-	1 x 0.3Ø	Pipe	7.4	9.70
72	18.552	-	1 x 0.3Ø	Pipe	7.5	8.80
73	18.580	-	1 x 0.3Ø	Pipe	7.5	11.00
74	18.600	-	1 x 0.3Ø	Pipe	7.5	11.00

Sl. No.	Existing Chainage.	Skew Angle in deg. (L/R)	Span Arrangement	Type of Superstructure	Carriageway Width (m)	Total Deck Width (m)
75	18.700	46.0	1 x 0.3Ø	Pipe Skew	7.5	11.00
76	18.800	40.0	1 x 0.3Ø	Pipe Skew	7.5	9.30
77	18.900	47.0	-	Pipe Skew	7.5	9.30
78	19.200	47.0	1 x 0.3Ø	Pipe Skew	7.5	9.30
79	19.350	-	1 x 0.3Ø	Pipe Skew	7	7.00
80	19.400	-	1 x 0.3Ø	Pipe Skew	7	7.10
81	19.540	-	1 x 0.3Ø	Pipe	5.9	9.00
82	19.600	-	-	Pipe	6.5	9.00
83	19.800	47.0	1 x 0.3Ø	Pipe Skew	7.5	11.00
84	23.400	-	1 x 0.3Ø	Pipe	6.8	8.50
85	23.500	-	1 x 0.3Ø	Pipe	6.8	8.50
86	23.700	-	1 x 0.3Ø	Pipe	6.8	9.00
87	23.800	-	1 x 0.3Ø	Pipe	6.7	9.00
88	23.900	-	1 x 0.3Ø	Pipe	6.7	9.00
89	25.800	-	1 x 0.3Ø	Pipe	6.6	11.30
90	26.665	-	1 x 0.3Ø	Pipe	6.5	11.20
91	27.803	-	1 x 0.3Ø	Pipe	6.5	10.20
92	27.900	-	1 x 0.3Ø	pipe	6.5	10.00
93	28.000	-	1 x 0.3Ø	Pipe	6.5	9.00
94	28.745	-	1 x 0.3Ø	Pipe	6.2	8.00
95	28.848	-	1 x 0.3Ø	Pipe	6.5	8.00
96	28.900	-	1 x 0.3Ø	Pipe	6.5	8.20
97	29.100	-	1 x 0.3Ø	Pipe	6.5	8.20
98	29.200	41.0	1 x 0.3Ø	Pipe Skew	6.5	8.20
99	29.300	37.0	1 x 0.3Ø	Pipe Skew	6.5	8.20
100	29.400	-	1 x 0.3Ø	Pipe	6.5	9.20
101	29.450	-	1 x 0.3Ø	Pipe	6.5	9.50
102	29.500	-	1 x 0.3Ø	Pipe	6.5	9.50
103	29.745	-	1 x 0.3Ø	Pipe	6.5	10.50
104	29.990	-	1 x 0.3Ø	Pipe	7.5	8.20

Slab Culverts:

Sl. No.	Existing Chainage	Skew Angle in deg. (L/R)	Span Arrangement	Type of Superstructure	Carriageway Width (m)	Total Deck Width (m)
1	3.73	-	1 x 1.3	RCC Solid Slab	8.10	8.10
2	3.80	-	1 x 1.0	RCC Solid Slab	9.50	9.50
3	3.90	-	1 x 1.9	RCC Solid Slab	8.30	8.30
4	4.43	-	1 x 1.0	RCC Solid Slab	8.00	8.00
5	4.79	-	1 x 1.4	RCC Solid Slab	9.20	7.60
6	4.83	-	1 x 0.7	RCC Solid Slab	9.20	7.50
7	4.89	-	1 x 0.6	RCC Solid Slab	9.20	7.50
8	5.10	-	1 x 1.3	RCC Solid Slab	7.50	9.20
9	6.85	-	1 x 2.2	Slab (skew)	7.6 (Skew), 6.2 (Sqr.)	7.60
10	7.34	-	1 x 0.8	RCC Solid Slab	7.80	7.80
11	7.72	-	1 x 0.6	RCC Solid Slab	7.50	9..1
12	8.44	55	1 x 1.8	RCC Solid Slab	7.70	9.30

Sl. No.	Existing Chainage	Skew Angle in deg. (L/R)	Span Arrangement	Type of Superstructure	Carriageway Width (m)	Total Deck Width (m)
13	8.79	15°	1 x 0.9	RCC Solid Slab	7.00	10.70
14	8.83	-	1 x 0.8	RCC Solid Slab	7.00	10.70
15	9.51	57	1 x 1.2	Slab (skew)	8.00	9.20
16	9.81	-	1 x 1.2	RCC Solid Slab	7.20	8.00
17	11.10	-	1 x 1.8	RCC Solid Slab	7.00	9.00
18	12.06	39.1	1 x 1.4	Slab/Skew	7.50	9.70
19	12.58	39	1 x 1.5	Slab/Skew	7.00	8.90
20	12.59	-	1 x 0.9	RCC Solid Slab	6.90	8.90
21	12.60	-	1 x 1.3	RCC Solid Slab	7.20	8.90
22	14.47	-	1 x 3.1	RCC Solid Slab	7.20	9.50
23	15.70	-	1 x 1.2	RCC Solid Slab	7.00	11.30
24	18.13	-	1 x 1.2	RCC Solid Slab	7.40	9.00
25	19.30	51	1 x 3.0	RCC Solid Slab	5.90	6.90
26	19.50	-	1 x 1.5	RCC Solid Slab	5.90	5.90
27	19.70	40	1 x 2.1	RCC Solid Slab	7.20	9.00
28	19.72	-	1 x 1.1	RCC Solid Slab	7.20	11.00
29	19.90	45	1 x 1.1	RCC Solid Slab	7.10	9.00
30	19.95	-	1 x 3.1	RCC Solid Slab	7.20	8.00
31	20.20	-	1 x 2.0	RCC Solid Slab	6.20	8.00
32	20.30	41	1 x 1.3	RCC Solid Slab	7.50	7.50
33	20.40	-	1 x 1.9	RCC Solid Slab	8.20	8.20
34	21.62	32	1 x 1.1	RCC Solid Slab	8.50	8.50
35	22.09	32	1 x 1.4	RCC Solid Slab	8.50	8.50
36	22.40	-	1 x 1.2	RCC Solid Slab	8.20	8.20
37	22.70	48	1 x 1.5	RCC Solid Slab	8.90	8.90
38	23.20	31	1 x 1.3	RCC Solid Slab	7.10	8.50
39	24.20	-	1 x 1.2	RCC Solid Slab	6.60	11.30
40	24.30	65	1 x 2.1	RCC Solid Slab	6.60	11.30
41	24.96	60	1 x 1.5	RCC Solid Slab	6.60	11.30
42	26.75	-	1 x 1.0	RCC Solid Slab	6.50	11.30
43	28.50	59	1 x 2.6	RCC Solid Slab	6.50	8.10
44	28.62	-	1 x 3.2	RCC Solid Slab	5.90	9.10
45	29.00	-	1 x 1.0	RCC Solid Slab	6.50	9.00
46	29.81	51	1 x 2.0	RCC Solid Slab	7.60	7.60

11. Bus bays

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

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

12. Truck Lay byes

The details of truck lay byes are as follows:

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

13. Roadside drains

The details of the roadside drains are as follows:

Sr. No.	Location		Type	
	From km	to km	Masonry/cc (Pucca)	Earthen (Kutcha)
Nil				

14. Major junctions

The details of major junctions are as follows:

Sr. No.	Location		At grade	Separated	Category of Cross Road			
	From km	to km			NH	SH	MDR	Others
Nil								

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

15. Minor junctions

The details of the minor junctions are as follows:

SI. No.	Location (Km) Existing Chainage	Side	Type of Junction	Remarks
1	3+350	LHS	T	Minor Junction
2	7+495	LHS	T	Minor Junction
3	8+395	LHS	Y	Minor Junction
4	9+610	LHS	Y	Minor Junction
5	9+780	RHS	Y	Minor Junction
6	10+620	RHS	T	Minor Junction
7	17+395	LHS	T	Minor Junction
8	18+950	LHS	T	Minor Junction
9	19+130	LHS	T	Minor Junction
10	19+585	LHS	T	Minor Junction
11	20+010	LHS	Y	Minor Junction
12	20+478	LHS	T	Minor Junction
13	21+167	LHS	T	Minor Junction
14	21+465	LHS	T	Minor Junction
15	22+287	RHS	T	Minor Junction
16	24+364	RHS	Y	Minor Junction
17	24+585	RHS	T	Minor Junction

16. Bypasses

The details of the existing road sections proposed to be bypassed are as follows:

Sr. No.	Name of bypass (town)	Chainage (km) From km to km	Length (in Km)
Nil			

17. Others

Nil

Annex – II

(As per Clause 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:

Sl. No.	**From (Km)**	**To (Km)**	**Length (Km)**	**Width (m)**	**Date of providing Right of Way***
1	**2**		**3**	**4**	**5**
(i) Full Right of Way (Full Width)					
1	0.000	30+040	30+040	18.0	150 (One hundred and fifty) days after the Appointed Date
(ii) Part Right of Way(Part Width)					
Nil					
(iii) Balance Right of Way					
Nil					

* The dates specified herein shall in no case be beyond 150 (One hundred and fifty) days after the Appointed Date

Annex - III

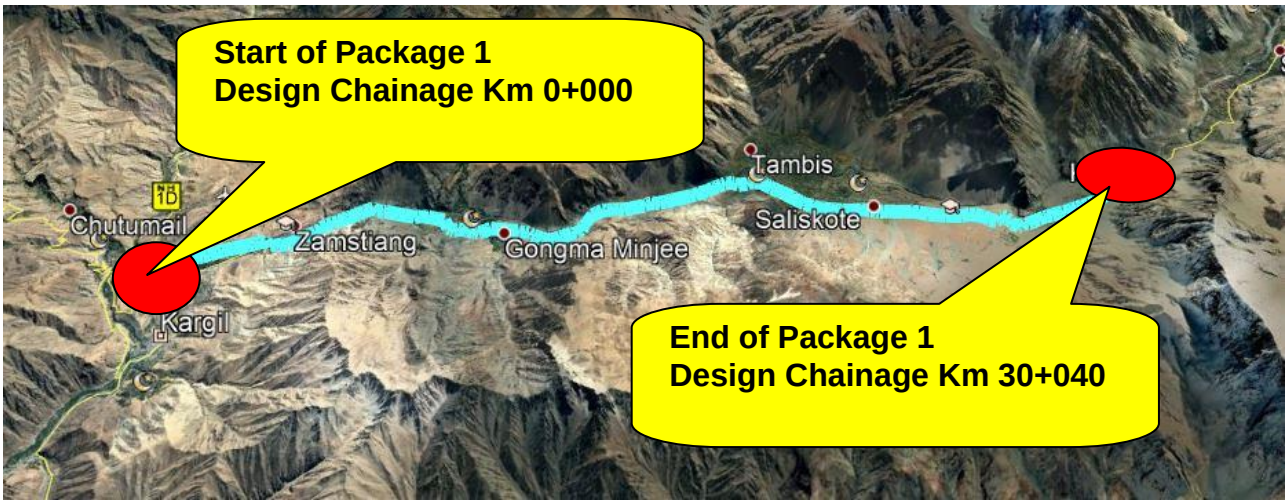
(Schedule-A)

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 and indicated below. 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. 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 & location 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.



Key Plan

Annex – IV

(Schedule-A)

Environment Clearances

Not Applicable for this project

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

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

3. Specifications and Standards

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

Annex – I

(Schedule-B)

Description of the Project

Widening & Up-Gradation to 2 Lane with Paved shoulder of NH-301 Kargil Zanskar Road from Design Km 0.000 (Ex. Km. 0.000) to Km 30.040 (Ex. Km 30.000) of 30.040 km length in the Union Territory of Ladakh on EPC mode (Pkg-I).

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 hill/mountainous terrain to the extent land is available.

Sl.No.	Design Chainage (Km)		Length	Remarks
	From	To		
1	0.000	3.303	3.303	New construction
2	3.303	3.358	0.055	Minor Bridge Location
3	3.358	3.450	0.093	Reconstruction in Rural Area
4	3.450	3.780	0.330	Concentric Widening with Overlay in Builtup Area
5	3.780	6.070	2.290	Reconstruction
6	6.070	6.490	0.420	Concentric Widening with Overlay in Builtup Area
7	6.490	6.910	0.420	Reconstruction in Rural Area
8	6.910	9.030	2.120	Concentric Widening with Overlay in Builtup Area
9	9.030	9.500	0.470	Reconstruction in Rural Area
10	9.500	9.830	0.330	Concentric Widening with Overlay in Builtup Area
11	9.830	10.020	0.190	Reconstruction in Rural Area
12	10.020	11.550	1.530	Concentric Widening with Overlay in Builtup Area
13	11.550	12.200	0.650	Reconstruction in Rural Area
14	12.200	12.530	0.330	Reconstruction in Builtup Area
15	12.530	14.160	1.630	Reconstruction in Rural Area
16	14.160	14.330	0.170	Reconstruction in Builtup Area
17	14.330	17.350	3.020	Reconstruction in Rural Area
18	17.350	17.600	0.250	Reconstruction in Builtup Area
19	17.600	17.660	0.060	Reconstruction in Rural Area
20	17.660	20.000	2.340	Concentric Widening with Overlay in Builtup Area
21	20.000	20.310	0.310	Reconstruction in Rural Area
22	20.310	22.180	1.870	Concentric Widening with Overlay in Builtup Area
23	22.180	24.390	2.210	Reconstruction in Rural Area
24	24.390	25.280	0.890	Reconstruction in Builtup Area
25	25.280	26.560	1.280	Reconstruction in Rural Area
26	26.560	26.710	0.150	Reconstruction in Builtup Area
27	26.710	26.930	0.220	Reconstruction in Rural Area
28	26.930	27.230	0.300	Reconstruction in Builtup Area
29	27.230	27.480	0.250	Reconstruction in Rural Area
30	27.480	27.630	0.150	Reconstruction in Builtup Area

Sl.No.	Design Chainage (Km)		Length	Remarks
	From	To		
31	27.630	27.750	0.120	Reconstruction in Rural Area
32	27.750	29.130	1.380	Reconstruction in Rural Area
33	29.130	29.830	0.700	Reconstruction in Builtup Area
34	29.830	30.040	0.210	Reconstruction in Rural Area

ii. Width of Carriageway

(a) 2-Laning with paved shoulders shall be undertaken for main road. The paved carriageway shall be 10m wide accordance with the typical cross section's drawings attached along with Schedule B.

(b) Except as otherwise provided in this agreement, the width of the paved carriageway and cross-sectional features shall confirm to paragraph 1.1 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 Manual.

(ii) Design speed

The design speed shall be the maximum design speed of 50 Km/hr. and minimum design speed of 30 km/hr. for mountainous/hilly terrain.

(iii) Improvement of the existing road geometrics

In the following sections, where improvement of the existing road geometrics to the prescribed standards.

Sl. No.	Stretch (from km to km)	Type of deficiency	Remarks
1	Km 11+000 to Km 11+500	Sharp curve	
2	Km 25+600 to Km 26+600	Sharp curve	

(iv) Right of Way

Details of the Right of Way are given in Annex II of Schedule-A.

(v) Type of shoulders

(a) In built-up sections, footpaths/fully paved shoulders shall be provided as shown in corresponding Typical cross sections given at para (xii) of Annexure I of Schedule B.

(b) In open country/hilly areas, paved shoulders of 1.5m width shall be provided on either side and balance 1.0m width earthen shoulder at valley side only shall be covered with 150 mm thick compacted layer of granular material for main road.

(c) Design and specifications of paved 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 the provision of relevant Manual.

(b) Lateral clearance: The width of the opening at the underpasses shall be as follows:

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

(vii) Lateral and vertical clearances at overpasses

(a) Lateral and vertical clearances at overpasses shall be as per the provision of relevant Manual.

(b) Lateral clearance: The width of the opening at the overpasses shall be as follows:

Sl.No.	Location (Chainage) (from km to 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 (m) of service road
NIL			

(ix) Grade separated structures/Viaduct

(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					

In the case of grade separated structures, the type of structure and the level of the Project Highway and the crossroads shall be as follows:

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

(x) Cattle and pedestrian underpass/overpass

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

Sl. No.	Location	Type of crossing
Nil		

(xi) Viaduct

Viaduct shall be constructed as follows:

Sl. No.	Design Chainage Km	Span Arrangement (No. x length) in m	Width (m)	Remarks
Nil				

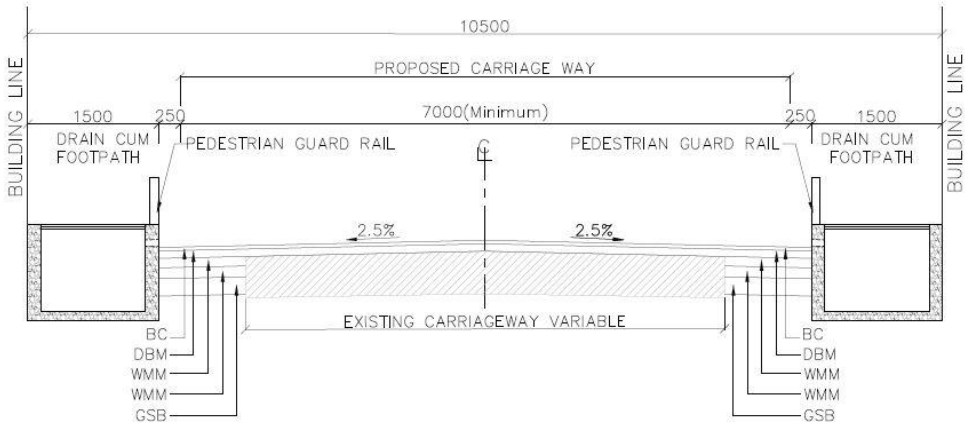
(xii) **Typical cross-sections of the Project Highway**

As per drawing enclosed below:

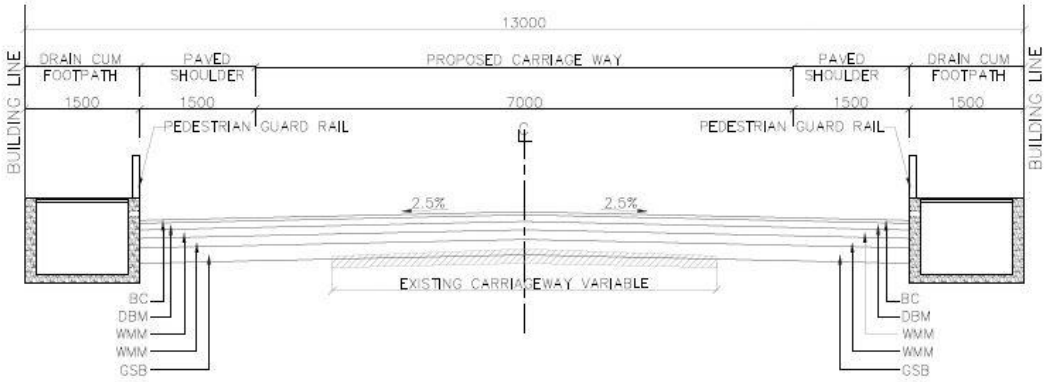
Following typical cross sections shall be provided for the Project Highway However to be designed as per manual.

Design Chainage		Design Length	TCS No	Description of Widening
From	To			
0.000	3.303	3.303	3	TCS-3 : 2 Lane New construction in Realignment
3.303	3.358	0.055	4	TCS- 4 : Minor Bridge Location
3.358	3.450	0.093	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
3.450	3.780	0.330	2	TCS- 2: 2 Lane Concentric Widening with Overlay in Builtup Area with side drain
3.780	6.070	2.290	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
6.070	6.490	0.420	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
6.490	6.910	0.420	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
6.910	9.030	2.120	2	TCS- 2: 2 Lane Concentric Widening with Overlay in Builtup Area with side drain
9.030	9.500	0.470	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
9.500	9.830	0.330	2	TCS- 2: 2 Lane Concentric Widening with Overlay in Builtup Area with side drain
9.830	10.020	0.190	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
10.020	11.550	1.530	2	TCS- 2: 2 Lane Concentric Widening with Overlay in Builtup Area with side drain
11.550	12.200	0.650	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
12.200	12.530	0.330	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
12.530	14.160	1.630	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
14.160	14.330	0.170	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
14.330	17.350	3.020	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
17.350	17.600	0.250	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
17.600	17.660	0.060	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
17.660	20.000	2.340	2	TCS- 2: 2 Lane Concentric Widening with Overlay in Builtup Area with side drain
20.000	20.310	0.310	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
20.310	22.180	1.870	2	TCS- 2: 2 Lane Concentric Widening with Overlay in Builtup Area with side drain
22.180	24.390	2.210	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
24.390	25.280	0.890	2B	TCS 2B : 2 Lane Reconstruction in Builtup

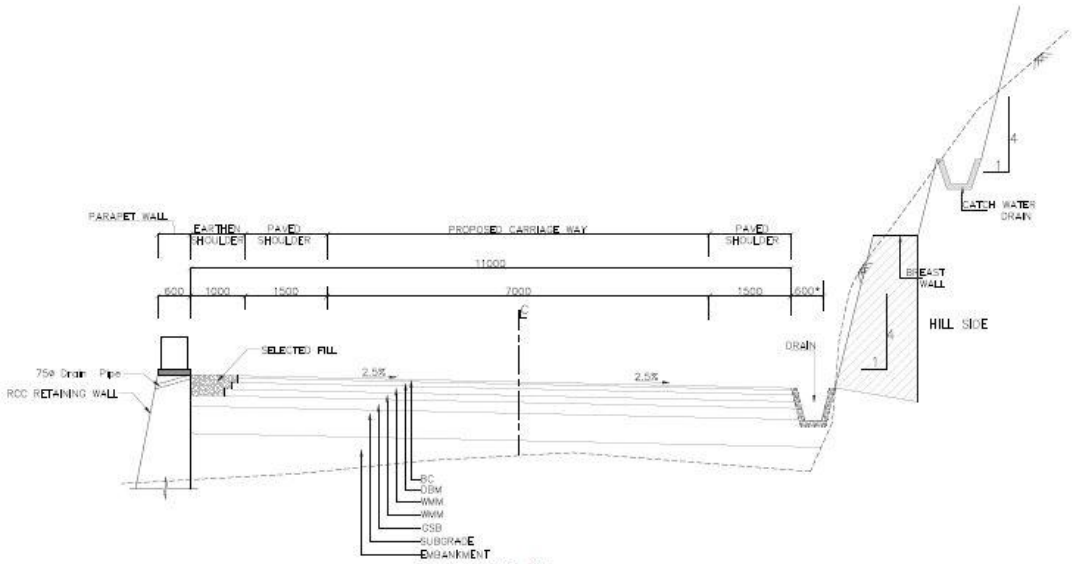
Design Chainage		Design Length	TCS No	Description of Widening
From	To			
				Area with Side Drain Cum Footpath
25.280	26.560	1.280	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
26.560	26.710	0.150	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
26.710	26.930	0.220	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
26.930	27.230	0.300	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
27.230	27.480	0.250	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
27.480	27.630	0.150	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
27.630	27.750	0.120	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
27.750	29.130	1.380	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
29.130	29.830	0.700	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
29.830	30.040	0.210	3A	TCS-3A : 2 Lane Reconstruction in Rural Area



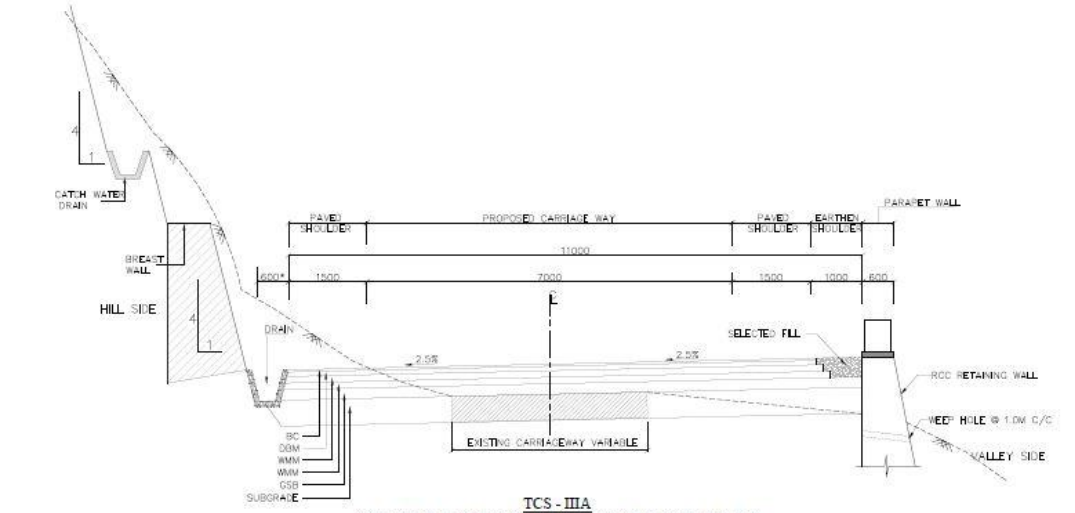
TCS - II
TWO LANE CONCENTRIC WIDENING WITH OVERLAY IN BUILTUP AREA WITH SIDE DRAIN



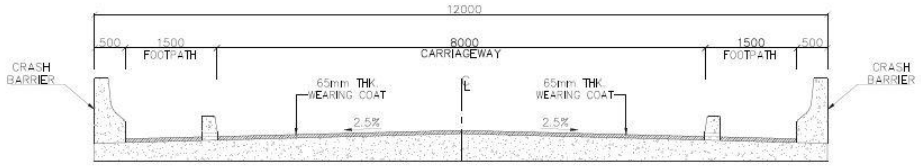
TCS - IIB
TWO LANE RECONSTRUCTION IN BUILTUP AREA



TCS - III
TWO LANE NEW CONSTRUCTION IN REALIGNMENT / RAISING / BRIDGE APPROACH / RURAL / BYPASS



TCS - IIIA
RECONSTRUCTION OF EXISTING CARRIAGEWAY WITH INTERMEDIATE SECTION IN RURAL SECTION



TCS -IV
MAJOR/MINOR BRIDGE LOCATION

3. Intersections and Grade Separators

All intersections and grade separators shall be as per the provision of relevant Manual.

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

(i) At-grade intersections

Sl. No.	Location of intersection	Type of intersection	Other features	Remarks
1	0+000	Y	LHS	Minor Junctions
2	3+400	Y	RHS	Minor Junctions
3	3+460	T	LHS	Minor Junctions
4	7+600	T	LHS	Minor Junctions
5	8+500	Y	LHS	Minor Junctions
6	9+720	Y	LHS	Minor Junctions
7	9+900	Y	RHS	Minor Junctions
8	10+740	T	RHS	Minor Junctions
9	17+525	T	LHS	Minor Junctions
10	19+073	T	LHS	Minor Junctions
11	19+240	T	LHS	Minor Junctions
12	19+700	T	LHS	Minor Junctions
13	20+136	Y	LHS	Minor Junctions
14	20+600	T	LHS	Minor Junctions
15	21+280	T	LHS	Minor Junctions
16	21+580	T	LHS	Minor Junctions
17	22+400	T	RHS	Minor Junctions
18	24+470	Y	RHS	Minor Junctions
19	24+700	T	RHS	Minor Junctions

(ii) Grade separated intersection with/with out 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 Manual 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.

The existing road shall be raised in the following sections:

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 the provision of relevant Manual.

(ii) Type of pavement

Main carriageway of entire length of project highway including bypasses, realignment, reconstruction, Truck Lay Byes, Rest Area and Bus Bays shall be constructed with Flexible pavement as per IRC:37-2018.

(iii) Design requirements

(a) Design Period and strategy

Flexible pavement for new pavement or for widening & strengthening of the existing pavement shall be designed for a minimum period of 20 years and rigid pavement shall be designed for a minimum design period of 30 years. Stage construction shall not be permitted.

(b) Design Traffic

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

Proposed Flexible Pavement Thickness (mm)				Total (mm)
BC	DBM	WMM	GSB	
40	115	250	200	605

The minimum thickness is to be provided at strengthening sections is given below.

Recommended overlay thickness (mm)		Remarks
BC	DBM	
40	115	

(iv) Reconstruction of stretches

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

Sl.No.	Design Chainage (Km)		Length (km)
	From	To	
1	3.358	3.450	0.093
2	3.780	6.070	2.290
3	6.490	6.910	0.420
4	9.030	9.500	0.470
5	9.830	10.020	0.190
6	11.550	12.200	0.650
7	12.200	12.530	0.330
8	12.530	14.160	1.630

Sl.No.	Design Chainage (Km)		Length (km)
	From	To	
9	14.160	14.330	0.170
10	14.330	17.350	3.020
11	17.350	17.600	0.250
12	17.600	17.660	0.060
13	20.000	20.310	0.310
14	22.180	24.390	2.210
15	24.390	25.280	0.890
16	25.280	26.560	1.280
17	26.560	26.710	0.150
18	26.710	26.930	0.220
19	26.930	27.230	0.300
20	27.230	27.480	0.250
21	27.480	27.630	0.150
22	27.630	27.750	0.120
23	27.750	29.130	1.380
24	29.130	29.830	0.700
25	29.830	30.040	0.210
Total Length in Km			18.163

6. Roadside Drainage

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

PCC Drain on Hill Side					
Sr. No.	Design Chainage in km		Length (m)	Side	Roadside Drain Length (m)
	From	To			
1	0	3303	3303	Hill Side	3303
2	3358	3450	93	Hill Side	93
3	3780	6070	2290	Hill Side	2290
4	6490	6910	420	Hill Side	420
5	9030	9500	470	Hill Side	470
6	9830	10020	190	Hill Side	190
7	11550	12200	650	Hill Side	650
8	12530	14160	1630	Hill Side	1630
9	14330	17350	3020	Hill Side	3020
10	17600	17660	60	Hill Side	60
11	20000	20310	310	Hill Side	310
12	22180	24390	2210	Hill Side	2210
13	25280	26560	1280	Hill Side	1280
14	26710	26930	220	Hill Side	220
15	27230	27480	250	Hill Side	250
16	27630	27750	120	Hill Side	120
17	27750	29130	1380	Hill Side	1380

PCC Drain on Hill Side					
Sr. No.	Design Chainage in km		Length (m)	Side	Roadside Drain Length (m)
	From	To			
18	29830	30040	210	Hill Side	210
Total Roadside PCC Drainage Length in m					**18105**

Catch Water Drainage List					
Sr. No.	Design Chainage in km		Length (m)	Side	Roadside Drain Length (m)
	From	To			
1	0	3303	3303	Hill Side	3303
2	3358	3450	93	Hill Side	93
3	3780	6070	2290	Hill Side	2290
4	6490	6910	420	Hill Side	420
5	9030	9500	470	Hill Side	470
6	9830	10020	190	Hill Side	190
7	11550	12200	650	Hill Side	650
8	12530	14160	1630	Hill Side	1630
9	14330	17350	3020	Hill Side	3020
10	17600	17660	60	Hill Side	60
11	20000	20310	310	Hill Side	310
12	22180	24390	2210	Hill Side	2210
13	25280	26560	1280	Hill Side	1280
14	26710	26930	220	Hill Side	220
15	27230	27480	250	Hill Side	250
16	27630	27750	120	Hill Side	120
17	27750	29130	1380	Hill Side	1380
18	29830	30040	210	Hill Side	210
Total Length in m					**18105**

7. Design of Structures

(i) General

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

(b) Width of the carriageway of new bridges and structures shall be as follows:

Sr. No.	Design Chainage in km	Width of carriageway and cross-sectional features*	Remarks
1	3+300	12.00 m	Minor Bridge
2	10+700	12.00 m	Minor Bridge

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

Sl. No.	Location at km	Span Arrangement No.x Length (m)	Remarks
Nil			

(d) All bridges shall be high-level bridges.

Refer to the provision of relevant Manual and state if there is any exception.

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

Sr. No.	Bridge at km	Utility service to be carried	Remarks
1	3+300	Electricity cables, OFC cables etc.	Minor Bridge
2	10+700	Electricity cables, OFC cables etc.	Minor Bridge

(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 the provision of relevant Manual.

(ii) Culverts

(a) Overall width of all culverts shall be equal to roadway width of the approaches.

(b) Reconstruction of existing culverts:

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

Reconstruction of Existing Culverts:

Sl. No.	Existing Location (Km)	Design Chainage (Ch.)	Proposed Span Arrangements/opening
1	3+730	3+868	1x2x2
2	3+800	3+938	1x2x2
3	3+900	4+037	1x2x2
4	4+430	4+568	1x2x2
5	4+790	4+927	1x2x2
6	4+830	4+966	1x2x2
7	4+890	5+027	1x2x2
8	5+100	5+237	1x2x2
9	6+850	6+985	1x2x2
10	7+340	7+472	1x2x2
11	7+720	7+852	1x2x2
12	8+440	8+572	1x2x2
13	8+790	8+921	1x2x2
14	8+830	8+961	1x2x2
15	9+510	9+635	1x2x2
16	9+810	9+937	1x2x2
17	11+095	11+223	1x2x2
18	12+060	12+185	1x2x2
19	12+580	12+704	1x2x2
20	12+590	12+714	1x2x2
21	12+600	12+724	1x2x2
22	14+470	14+589	1x2x2
23	15+700	15+817	1x2x2
24	18+130	18+24	1x2x2
25	19+300	19+405	1x2x2
26	19+500	19+605	1x2x2
27	19+700	19+804	1x2x2
28	19+720	19+824	1x2x2
29	19+900	20+004	1x2x2
30	19+950	20+054	1x2x2
31	20+200	20+304	1x2x2
32	20+300	20+404	1x2x2
33	20+400	20+504	1x2x2

Sl. No.	Existing Location (Km)	Design Chainage (Ch.)	Proposed Span Arrangements/opening
34	21+616	21+718	1x2x2
35	22+093	22+195	1x2x2
36	22+400	22+502	1x2x2
37	22+700	22+801	1x2x2
38	23+200	23+301	1x2x2
39	24+200	24+301	1x2x2
40	24+300	24+401	1x2x2
41	24+960	25+059	1x2x2
42	26+745	26+825	1x2x2
43	28+500	28+577	1x2x2
44	28+620	28+696	1x2x2
45	29+000	29+076	1x2x2
46	29+808	29+882	1x2x2

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

(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 the provision of relevant Manual. Repairs and strengthening of existing structures where required shall be carried out.

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

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

Box Culverts:

S. No.	Design Chainage (Ch.)	Proposed Span arrangement/ opening	Remarks
1.	0+323	1x1.0x1.0	RCC Box (Bypass)
2.	0+489	1x1.0x1.0	RCC Box (Bypass)
3.	0+654	1x1.0x1.0	RCC Box (Bypass)
4.	0+820	1x1.0x1.0	RCC Box (Bypass)
5.	0+986	1x1.0x1.0	RCC Box (Bypass)
6.	1+153	1x1.0x1.0	RCC Box (Bypass)
7.	1+323	1x1.0x1.0	RCC Box (Bypass)
8.	1+489	1x1.0x1.0	RCC Box (Bypass)
9.	1+655	1x1.0x1.0	RCC Box (Bypass)
10.	1+821	1x1.0x1.0	RCC Box (Bypass)
11.	1+987	1x1.0x1.0	RCC Box (Bypass)
12.	2+151	1x1.0x1.0	RCC Box (Bypass)
13.	2+321	1x1.0x1.0	RCC Box (Bypass)
14.	2+487	1x1.0x1.0	RCC Box (Bypass)
15.	2+654	1x1.0x1.0	RCC Box (Bypass)
16.	2+820	1x1.0x1.0	RCC Box (Bypass)
17.	2+986	1x1.0x1.0	RCC Box (Bypass)
18.	3+152	1x1.0x1.0	RCC Box (Bypass)
19.	5+169	1x1.0x1.0	RCC Box

S. No.	Design Chainage (Ch.)	Proposed Span arrangement/ opening	Remarks
20.	5+966	1x1.0x1.0	RCC Box
21.	6+081	1x1.0x1.0	RCC Box
22.	8+018	1x1.0x1.0	RCC Box
23.	8+680	1x1.0x1.0	RCC Box
24.	9+003	1x1.0x1.0	RCC Box
25.	9+302	1x1.0x1.0	RCC Box
26.	9+463	1x1.0x1.0	RCC Box
27.	9+799	1x1.0x1.0	RCC Box
28.	10+656	1x1.0x1.0	RCC Box
29.	10+681	1x1.0x1.0	RCC Box
30.	11+073	1x1.0x1.0	RCC Box
31.	11+082	1x1.0x1.0	RCC Box
32.	11+090	1x1.0x1.0	RCC Box
33.	11+606	1x1.0x1.0	RCC Box
34.	11+843	1x1.0x1.0	RCC Box
35.	11+936	1x1.0x1.0	RCC Box
36.	11+987	1x1.0x1.0	RCC Box
37.	12+096	1x1.0x1.0	RCC Box
38.	13+301	1x1.0x1.0	RCC Box
39.	15+044	1x1.0x1.0	RCC Box
40.	16+182	1x1.0x1.0	RCC Box
41.	16+229	1x1.0x1.0	RCC Box
42.	16+855	1x1.0x1.0	RCC Box
43.	16+965	1x1.0x1.0	RCC Box
44.	18+607	1x1.0x1.0	RCC Box
45.	22+685	1x1.0x1.0	RCC Box
46.	28+056	1x1.0x1.0	RCC Box
47.	28+109	1x1.0x1.0	RCC Box
48.	28+233	1x1.0x1.0	RCC Box
49.	29+766	1x1.0x1.0	RCC Box

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

Sl. No.	Location at km	Type of repair required
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

(i) The existing bridges at the following locations shall be re-constructed as new Structures

Sl. No.	Bridge location (km)	Salient details of existing bridge	Adequacy or otherwise of the existing waterway, vertical clearance, etc.*	Remarks
Nil				

*Attach GAD

(ii) The following narrow bridges shall be widened:

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

@ Attach cross-section

(b) Additional New bridges

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

Major Bridge: -

Sr. No.	Design Chainage in km	Span arrangement (No.xLength)	Total length in m	Overall Width in m	Remarks
Nil					

Minor Bridge: -

Sr. No.	Design Chainage in km	Span arrangement (No.x Length)	Total length in m	Overall Width in m	Remarks
1	3+300	1X52	52	1 x 12.0	Type of structure to be adopted by the EPC contractor as per best engineering practice & IRC, Mort&H specifications by using innovative technologies approved the authority
2	10+700	2x6	12	1 x 12.0	

Viaduct: -

Sr. No.	Design Chainage in km	Span arrangement (No x Length)	Total length in m	Overall Width in m	Type of Superstructure
Nil					

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

Sl. No.	Location at km	Remarks
Nil		

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

Sl. No.	Location at km	Remarks
Nil		

(e) Drainage system for bridge decks

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

(f) Structures in marine environment

Refer to the provision of relevant Manual and specify the necessary measures/ treatments for protecting structures in marine environment, where applicable.

(iv) Rail-road bridges

(a) Design, construction and detailing of ROB/RUB shall be as specified in the provision of relevant Manual. [Refer to the provision of relevant Manual and specify modification, if any]

(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 bridge (m)
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)	Number and length of span (m)
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 (ix) 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

Sl.No.	Location of bridge (km)	Nature and extent of repairs /strengthening to be carried out
Nil		

(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 (km)	Nature and extent of repairs /strengthening to be carried out
Nil		

(vii) List of Bridges and Structures

The following is the list of the Bridges and Structures:

Sr. No.	Design Chainage in km	Type of Structure
Minor Bridge		
1	3+300	Minor Bridge
2	10+700	Minor Bridge

8. Traffic Control Devices and Road Safety Works

(i) Traffic control devices and road safety works shall be provided in accordance with the section 9 of the manual referred to in Schedule D.

(ii) Specifications of the reflective sheeting as per IRC :67-2012 has been provided.

8.1 Crash Barrier

(a) Thrie Metal beam crash barrier shall be provided along the project highway as per section 9 of the manual. It shall be provided at Culvert/ bridge approaches on both sides and at location of embankment with height greater than or equal to 3m.

(b) The concrete crash barrier/ railing of bridge and culvert shall be painted in black and white stripes in general.

8.2 Transverse Rumble strip

Transverse rumble strips in the form of thermoplastic bar marking shall be provided to warn the drivers to reduce the speed for safety. Stripes shall be in full width of pavement. The stripes shall be provided at sharp curves, village approaches, location approaching access road, intersections and any other hazardous locations on the project highway. Guidelines of IRC-35 shall be followed.

9. Roadside Furniture

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

(ii) Overhead traffic sign: Full Gantry with 1 nos.

(iii) Road Marking and Signage

The following road marking, signage and safety devise shall be used on the project which is minimum. Further if any shall be in accordance with the section 9 of the manual referred to in Schedule D.

The minimum quantity of Traffic signages and pavement marking as per IRC: 35-2015 are tabulated:

Sl. No.	Traffic Signages, Road Marking and other appurtenances	unit	Quantity
1	Road Marking: -Lines, dashes, arrows	Sq. m	11015
2	900 mm triangular	Nos.	33
3	600 mm circular	Nos.	17
4	Rectangular 900 X 300 mm	Nos.	2
5	Rectangular 600x500 mm	Nos.	2
6	Rectangular 800x600 mm	Nos.	2
7	5th Km Stone	Nos.	7
8	Ordinary Km Stone	Nos.	5
9	Hectometer Stone	Nos.	121
10	Raised Road Marker (Studs)	Nos.	5000
11	Boundary pillars	Nos.	1202

Sl. No.	Traffic Signages, Road Marking and other appurtenances	unit	Quantity
12	Delineators	Nos.	450
13.1	Utility Ducts	Lm	Every 500m

10. Compulsory Afforestation

Refer to the provision of relevant Manual and 7470 nos. of trees which are required to be planted by the Contractor as compensatory afforestation.

11. Hazardous Locations

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

Sl. No.	Location stretch from (km) to (km)	LHS/RHS
Nil		

12. Special Requirement for Hill Road

This shall be provided accordance with section 13 of the Manual.

The side slope shall be protected by using suitable slope protection measures all along the highway on Hill side and valley side. The retaining wall, gabion wall and Soil nailing or Rock Bolting shall be constructed as per requirement of site condition in accordance with manual requirement. However, minimum length of protection works shall be construction as per details given below and the typical section of protection work are given in below.

a) Retaining wall shall be constructed with minimum length is 30768m with minimum 4.0m ht. above to be retaining wall as per site condition of stone masonry in cement mortar 1:3 or any other better material acceptable to the Authority Engineer. Contractors need to access the same and bid accordingly.

Retaining on Hill and Valley Side

Design Chainage in Km		Length in m
From	To	
0	3303	6605
3358	3450	93
3780	6070	4580
6490	6910	420
9030	9500	470
9830	10020	190
11550	12200	650
12530	14160	1630
14330	17350	6040
17600	17660	60
20000	20310	310
22180	24390	4420
25280	26560	1280
26710	26930	220
27230	27480	500
27630	27750	120
27750	29130	2760
29830	30040	420
Total Length		**30768**

b) Breast wall shall be constructed with minimum length is 5431 m on Main Road with varying height of 4.0 m, as per site condition of stone masonry in cement mortar or any other better material acceptable to the Authority Engineer. Contractor need to access the same and bid accordingly.

BREAST WALL LIST Hill Side

Design Chainage in km		**Length in m**
From	**To**	
3369	3450	81
6490	6910	420
9030	9500	470
9830	10020	190
11550	12200	650
12530	14160	1630
17600	17660	60
20000	20310	310
25280	26560	1280
Total Length		5431

c) Gabion wall shall be in wire crates in accordance with applicable clause of section 2500 of MoRTH specification for road and bridge works (fifth revision) and accordance with IRC: SP: 48-1998 and IRC: 56-2011. Minimum length is 570 m on Main road (ht. from5.0m to9.0m). Contractor need to access the same and bid accordingly.

Gabion Wall on Hill Side

Design Chainage in km		**Length in m**
From	**To**	
0+000	3+300	570
Total Length		**570**

d) Special Slope Stabilization Works with wire mesh

Wire mesh with bio engineering and barbed wire must be provided as per site condition as per design and specification. Contractors need to access the same and bid accordingly.

Wire Mesh with bio-engineering

Design Chainage in km		**Stretch Length (m)**
From	**To**	
0+000	3+300	200m

13. **SAFETY AND TRAFFIC MANAGEMENT DURING CONSTRUCTION: -**

1)Rock fall protection during construction period (Providing and fixing 2.5 metres high fencing with vertical angle iron posts 150 mm x 150 mm x 10 mm placed & every 0.5 metres center to center founded in M15 grade cement concrete, 0.6 metre below ground level and three horizontal iron angle 50mm x 50mm x6mm for connecting vertical post.

2)Diversion road at bridge locations & main road

3)Portable Type Barricade in Construction Zone-600 Nos.

4) Traffic Signs & making for Diversion- Road Work ahead, Man at work, Hazard Marker, Traffic Diversion, Chevron, Speed Limit, Restriction Ends, Flag Man, Overtaking Prohibited, Work Traffic Exit, Drum Delineator

5) Temporary shed for Landslide – 2 Nos.

6) Maintenance of existing road in traffic worthy condition (filling potholes, patches, clearance of land slide/snow etc)

Note: Contractor must be use Standard Specification/ given Annexure B or better in accordance with IRC &MoRT&H Specification

14. Muck Disposal and management:

The muck to be generated shall be appropriately dumped in tips at various suitable locations so that it does not degrade the various elements of the natural environment. For final disposal of the material convenient locations have been identified viz-a-viz to environmental aspects. The most suitable locations for dumping of the muck that would be generated from the Kargil – Zanskar road Package 1.

Location specified in the Schedule is tentative and approximate assessment. The actual as required on the basis of detailed investigations shall be determined by the Contractor in accordance with the Specifications and Standards. Any variations in the specified in this Schedule B shall not constitute a Change of Scope.

Details of Environment Management and Muck Disposal Management are as under

Sl. No.	Location in km	Muck Dumping no.	Coordinates	Remarks
1	Km 13+350	P1	34°27'41.77"N 76°04'25.54"E	

15. Change of Scope

The length of Structures and bridges, muck disposal sites specified here in above 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 Article 13.

16. Chainages wise indicative widening scheme with applicable typical Cross section

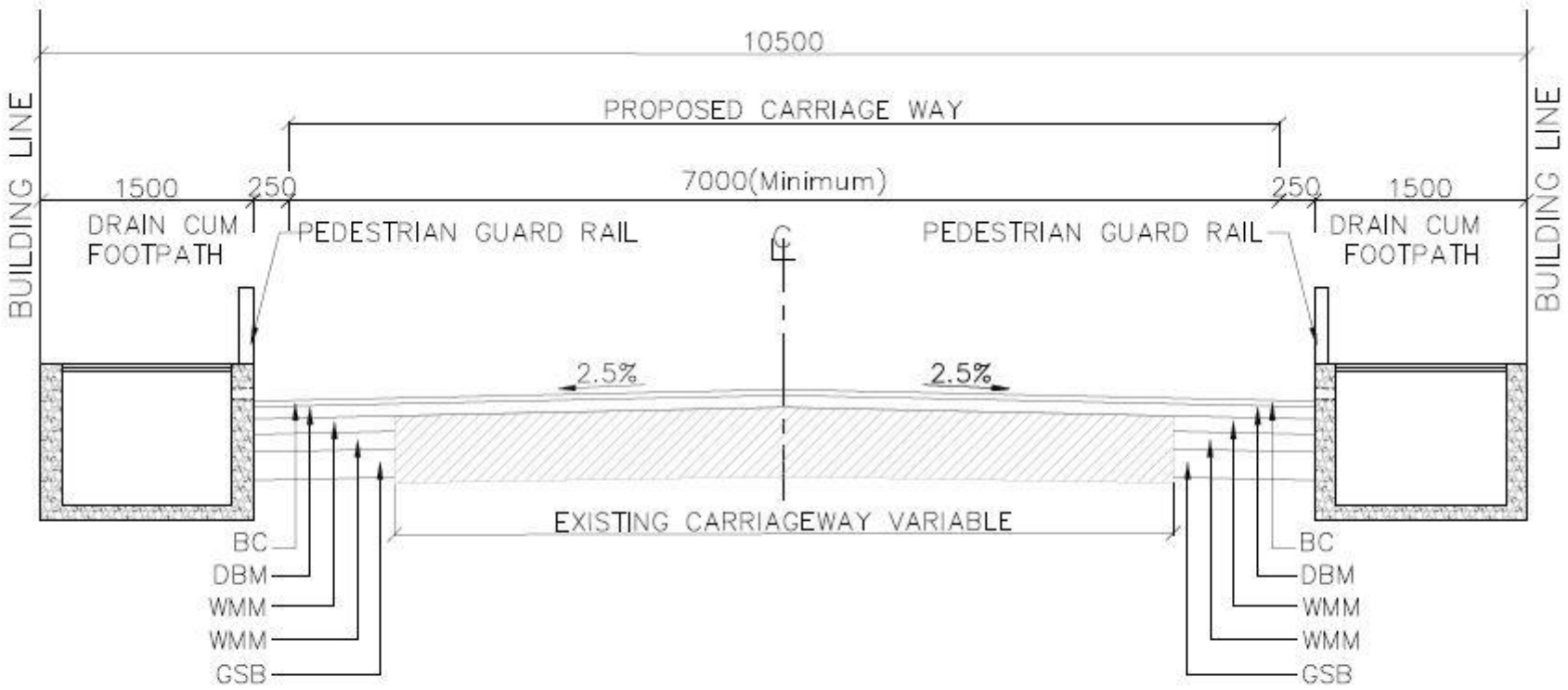
Design Chainage		Design Length	TCS No	Description of Widening
From	To			
0.000	3.303	3.303	3	TCS-3 : 2 Lane New construction in Realignment
3.303	3.358	0.055	4	TCS- 4 : Minor Bridge Location
3.358	3.450	0.093	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
3.450	3.780	0.330	2	TCS- 2: 2 Lane Concentric Widening with Overlay in Builtup Area with side drain
3.780	6.070	2.290	3A	TCS-3A : 2 Lane Reconstruction in Rural Area

Design Chainage		Design Length	TCS No	Description of Widening
From	To			
6.070	6.490	0.420	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
6.490	6.910	0.420	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
6.910	9.030	2.120	2	TCS- 2: 2 Lane Concentric Widening with Overlay in Builtup Area with side drain
9.030	9.500	0.470	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
9.500	9.830	0.330	2	TCS- 2: 2 Lane Concentric Widening with Overlay in Builtup Area with side drain
9.830	10.020	0.190	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
10.020	11.550	1.530	2	TCS- 2: 2 Lane Concentric Widening with Overlay in Builtup Area with side drain
11.550	12.200	0.650	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
12.200	12.530	0.330	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
12.530	14.160	1.630	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
14.160	14.330	0.170	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
14.330	17.350	3.020	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
17.350	17.600	0.250	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
17.600	17.660	0.060	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
17.660	20.000	2.340	2	TCS- 2: 2 Lane Concentric Widening with Overlay in Builtup Area with side drain
20.000	20.310	0.310	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
20.310	22.180	1.870	2	TCS- 2: 2 Lane Concentric Widening with Overlay in Builtup Area with side drain
22.180	24.390	2.210	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
24.390	25.280	0.890	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
25.280	26.560	1.280	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
26.560	26.710	0.150	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
26.710	26.930	0.220	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
26.930	27.230	0.300	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
27.230	27.480	0.250	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
27.480	27.630	0.150	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
27.630	27.750	0.120	3A	TCS-3A : 2 Lane Reconstruction in Rural Area

Design Chainage		Design Length	TCS No	Description of Widening
From	To			
27.750	29.130	1.380	3A	TCS-3A : 2 Lane Reconstruction in Rural Area
29.130	29.830	0.700	2B	TCS 2B : 2 Lane Reconstruction in Builtup Area with Side Drain Cum Footpath
29.830	30.040	0.210	3A	TCS-3A : 2 Lane Reconstruction in Rural Area

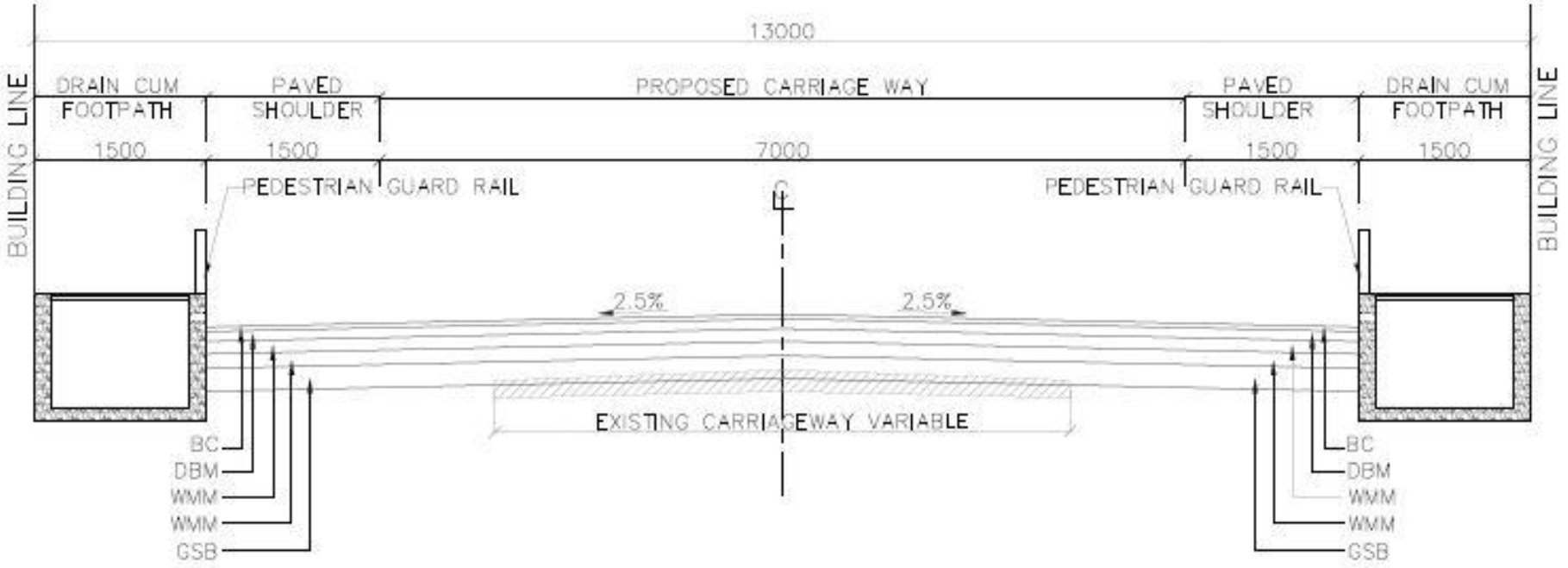
Note: Utility duct shall be laid with 300mm dia. HDPE pipe all along the project length @ 500m and cross sectional in accordance with IS: 4984/14333 or any other relevant code with inspection chambers at acceptable interval as approved by Authority Engineer/ Employer.

TCS given below



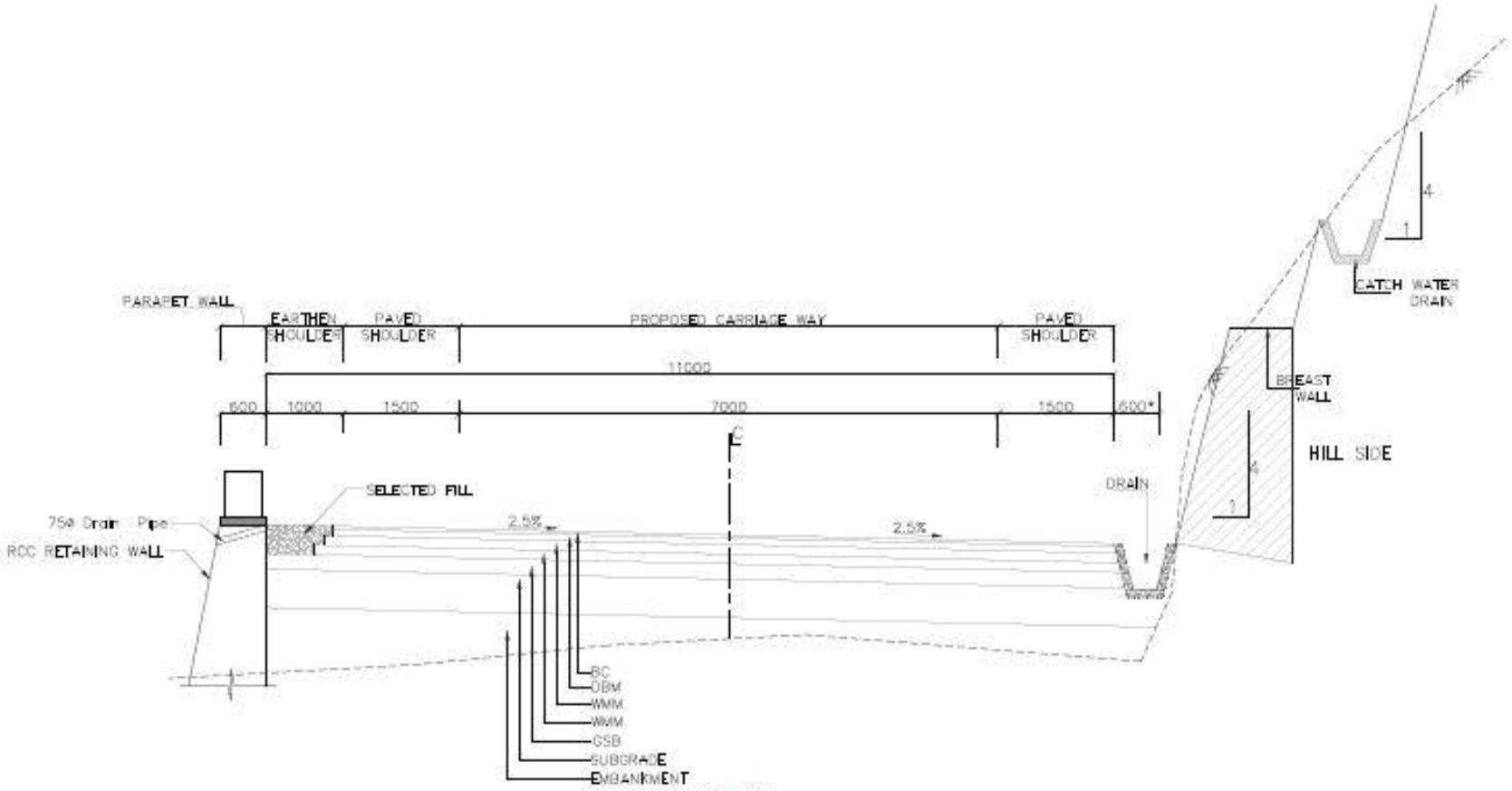
TCS - II

TWO LANE CONCENTRIC WIDENING WITH OVERLAY IN BUILTUP AREA WITH SIDE DRAIN



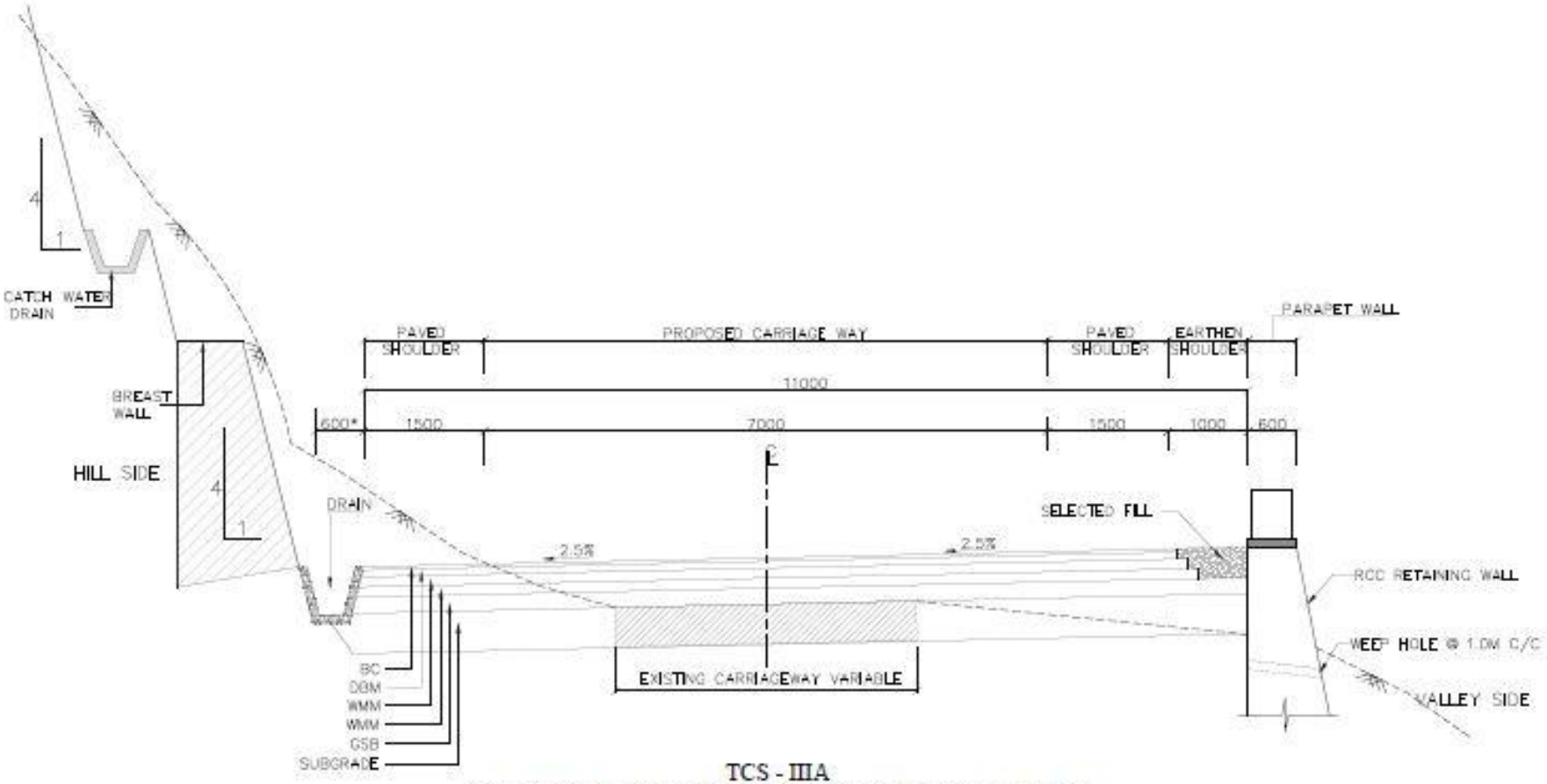
TCS - IIB

TWO LANE RECONSTRUCTION IN BUILTUP AREA



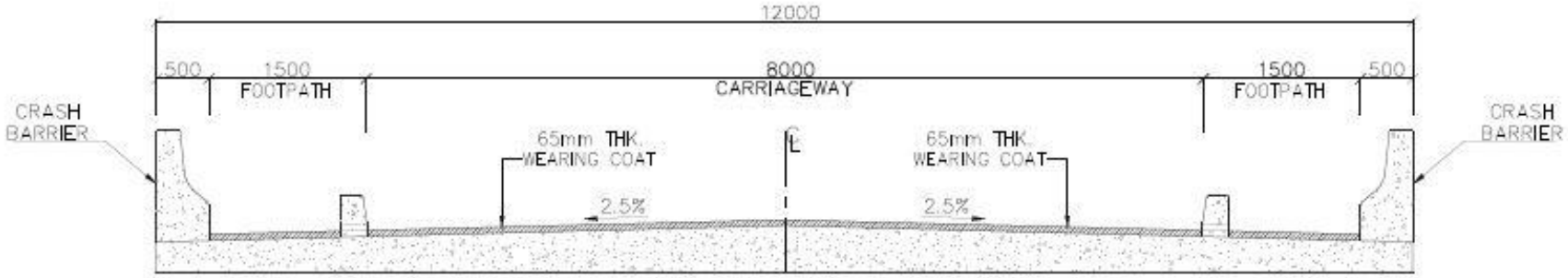
TCS - III

TWO LANE NEW CONSTRUCTION IN REALIGNMENT / RAISING / BRIDGE APPROACH / RURAL / BYPASS



TCS - IIIA

RECONSTRUCTION OF EXISTING CARRIAGEWAY WITH INTERMEDIATE SECTION IN RURAL SECTION



TCS -IV

MAJOR/MINOR BRIDGE LOCATION

Annex – III

(Schedule-A)

Tender Drawings

Schedule - C

(See Clause 2.1)

Project Facilities

1. Project Facilities

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

(a) tollplaza[s];

(b) roadside furniture;

(c) pedestrian facilities;

(d) tree plantation;

(e) truck lay-byes;

(f) bus-bays/ bus shelters/ bus stop;

(g) rest areas

(h) rainwater harvesting; and

(i) others to be specified

2. Description of Project Facilities

Each of the Project Facilities is described below:

(a) Toll Plaza: - Toll plaza to be designed as per latest available MoRT&H/NHAI guidelines. All the lanes of toll plaza shall be designed as Hybrid ETC System (HES) in all lane.

Location of Toll Plaza

Sr. No	Design Chainage	Length in m	No. of Lanes
Nil			

(b) Roadside furniture: - all roadside furniture like road marking, placing of signages to be design and proposed as per IRC:35-2015 and IRC:67-2012.

(c) Rainwater Harvesting: As per Ministry of Environment and Forest notification, dated 8 October 2019 and 23 April 2010, construction of rainwater harvesting structure has been adopted accordingly.60 nos. of recharge shaft of 0.5 m dia. for 10 to 15 m depth one on each side of the carriageway are proposed.

(d) Bus Stops: In order to promote the use of public transport and facilitate the travel for passengers 16 nos. of bus stops have been proposed at 16 locations along the project road.

Sl. No.	Design Chainage	Side (LHS/RHS)	Remarks
1	0+200	LHS	Bus Shelter
2	3+550	LHS/RHS (Both Sides)	Bus Shelter
3	7+000	LHS/RHS (Both Sides)	Bus Shelter
4	7+850	LHS	Bus Shelter
5	7+900	RHS	Bus Shelter

6	8+840	LHS	Bus Shelter
7	8+870	RHS	Bus Shelter
8	10+950	LHS	Bus Shelter
9	11+000	RHS	Bus Shelter
10	18+150	LHS	Bus Shelter
11	18+200	RHS	Bus Shelter
12	20+200	LHS	Bus Shelter
13	20+220	RHS	Bus Shelter
14	22+000	LHS/RHS (Both Sides)	Bus Shelter
15	25+150	LHS	Bus Shelter
16	25+220	RHS	Bus Shelter

(d) Rest Area: Rest area to be designed as per latest available MoRT&H/NHAI guidelines.

Rest Area - Nil

(e) High Mast Lighting & Electric Pole:
Provision of Electric Pole (Street Lighting) as per specification or as per the instruction of the Authority

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:

Annex – I

(Schedule-D)

Specifications and Standards for Construction

1. Specifications and Standards

All Materials works and construction operations shall conform to the Manual of Specifications and Standards for Two-Laning of Highways IRC: SP:73-2018, Hill Road Manual (IRC:SP: 48-1998)Guidelines referred to as the Manual, and MORTH Specifications for Road and Bridge Works. Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Authority's Engineer.

2. Deviations from the Specifications and Standards

(i) 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.

(ii) Notwithstanding anything to the contrary contained in Paragraph 1 above, the following Specifications and Standards shall apply to the Project Highway, and for purposes of this Agreement, the aforesaid Specifications and Standards shall be deemed to be amended to the extent set forth below:

Sr. No.	Item	Clause referred in Manual	Provision as per Manual	Modified Provision
1	Typical Cross section	2.16		These clauses are deemed to be amended as shown in the typical cross section (refer Schedule B).
2	Typical Cross Section	2.6.1, 2.7 and 2.16		
3	Radii of Horizontal Curves	2.9.4	Mountainous and steep terrain, desirable minimum radii and absolute minimum shall be 150 m and 75 m, respectively.	Mountainous and steep terrain, desirable minimum radii and absolute minimum shall be 75 m and 30 m, respectively except at the location given in alignment drawing (refer Annex-III, schedule A).
4	Width of New Bridge	7.3		To be amended as shown in the typical Cross section (refer Schedule B)
5	Utility Duct	2.15	Utility Duct with 600mm dia….	Utility duct shall be laid in accordance with IS: 4984/14333 or any other relevant code with inspection chambers at acceptable interval as approved by Authority Engineer/ Employer.

ATTACHMENT-DI
TECHNICAL SPECIFICATIONS FOR ROAD & BRIDGE

Table of Contents

CLAUSE 304 EXCAVATION FOR STRUCTURES

CLAUSE 305 EMBANKMENT CONSTRUCTION

Sub-Clause 305.2.2.2 Borrow Materials

Sub-Clause 305.2.2.4 Compaction Requirements

Sub-Clause 305.3 Construction Operations

Sub-Clause 305.8 Measurement for Payment

CLAUSE 306 SOIL EROSION AND SEDIMENTATION CONTROL

SECTION 400 Sub-Bases, Bases (Non-Bituminous) and Shoulders

CLAUSE 401 GRANULAR SUB -BASE

Sub-Clause 401.2.2 Physical Requirements

CLAUSE 406 WET MIX MACADAM SUB -BASE/BASE

Sub-Clause 406.4 Opening to Traffic

SECTION 500 Base and Surface Courses (Bituminous)

Sub-Clause 501.2 Materials

Sub clause 501.2.1 Binder

Binder of VG-10 grade shall be used or if available viscosity grade of bitumen shall be used in accordance with IS: 73

CLAUSE 505 DENSE BITUMINOUS MACADAM

CLAUSE 507 BITUMINOUS CONCRETE

Binder of CRMB-60 grade shall be used.

SECTION 800 Traffic Signs, Markings and Other Road Appurtenances

CLAUSE 803 ROAD MARKINGS

CLAUSE 806 ROAD DELINATORS

TECHNICAL SPECIFICATIONS

1 The Technical Specifications contained herein shall be read in conjunction with the other Bidding Documents as specified in Volume-IX.

1.1 Site Information General

1.1.1 The information given hereunder and provided elsewhere in these documents is given in good faith by the Employer, but the Contractor shall satisfy himself regarding all aspects of site conditions and no claim will be entertained on the plea that the information supplied by the Employer is erroneous or insufficient.

The area in which the works are located is in hilly/mountainous terrain,

1.1.2 Climatic Conditions

1.1.2.1 The temperature in this region is as under:

i) During summer months, the average maximum temperature recorded is 20°C

ii) During winter months, the minimum average temperature is -20°C.

1.1.3 Seismic Zone

The stretch lies in Seismic Zone-V as defined in Fig. 18 of IRC: 6-2017.

2 GENERAL REQUIREMENTS

The Technical Specifications in accordance with which the entire work described hereinafter shall be constructed and completed by the Contractor shall comprise of the following:

2.1 Part-I: General Technical Specifications

The General Technical Specifications shall be the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS" (Fifth Revision, April 2013), issued by the Ministry of Road Transport and Highways, Government of India and published by the Indian Roads Congress, henceforth called MORT&H Specifications and deemed to be bound into this document.

2.2 Part-II: Supplementary Technical Specifications

The Supplementary Technical Specifications shall comprise of various Amendments/Modifications/ Additions to the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS" referred to in Part-I above and Additional Specifications for item of works which are not covered in Part-I.

2.3 A clause or a part thereof in "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (Fifth Revision April 2013",), referred in Part-I above, where Amended/Modified/Added upon, and incorporated in Part-II, referred to above, such Amendment/Modification/ Addition supersedes the relevant Clause or part of the Clause.

2.3.1The Additional Specifications shall comprise of specifications for item of works which not covered in Part-I.

2.3.2 When an Amended/Modified/Added Clause supersedes a Clause or part thereof in the said Specifications, then any reference to the superseded Clause shall be deemed to refer to the Amended/Modified/Added Clause or partthereof.

2.3.3In so far as Amended/Modified/Added Clause may come in conflict or be inconsistent with any of the provisions of the said MORT&H Specifications under reference; the Amended/Modified/Added Clause shall alwaysprevail.

2.3.4The following Clauses in the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (Fifth Revision April 2013",) have been Amended/Modified/Added upon

Sr. No.	Section No.	Section Title	Clause No.
1.	100	General	102,106,108,109, 111,112,114,115 and 121
2.	200	Site Clearance	201 and 202
3.	300	Earthwork, Erosion Control and Drainage	301,304,305 and 306
4.	400	Sub-base, Bases (Non-Bituminous) and Shoulders	401and 406
4.	500	Bases and Surface Courses (Bituminous)	501,505 and 507
5.	800	Traffic signs, Markings and other Road Appurtenances	803,806 and 811
6.	2100	Open Foundations	2104

2.4 PART-III Specifications for Miscellaneous Works

Technical Specifications for Miscellaneous works shall be the latest "Specifications volume I to VI, 1996 for Civil Works and General Specifications for Electrical Works PART I – INTERNAL, PART – II, EXTERNAL for electric work 1994 as published by the Central Public Works Department (CPWD), Government of India" and deemed to be bound into this document.

2.5 The latest edition till 60 days before the final date of submission of the bid of all specifications / standard shall be applicable.

SCOPE OF WORKS

Road Works

Site clearance; setting-out and layout; widening of existing carriageway and strengthening including camber corrections; construction of new road/ parallel service road; bituminous pavements remodelling/construction of junctions, intersections, bus bays, lay byes; supplying and placing of drainage channels, flumes, guard posts, guard rails and other related items; construction/extension of cross drainage works, bridges, approaches and other related works; road markings, road signs and kilometer/ hectometre stones; protective works for roads/ bridges; all aspects of quality assurance of various components of works; rectification of the defects in the completed works during the Defect Liability Period; submission of "As built" drawings and any other related documents; and other items of work as may be required to be carried out for completing the works in accordance with the drawings and provisions of the Contract to insure safety.

Other Items

Execution of any other items of work for the construction and completion of the Works in accordance with the provisions of the Contract including all incidental items as well as preparation and submittal of reports, plans as may be required.

During the period of the Contract the right of way and all existing roads shall be kept open for traffic and maintained in a safe and usable condition. Residents along and adjacent to the works are always to be provided with safe and convenient access to their properties. Traffic control and traffic diversions shall be used as necessary to protect the works and maintenance will be carried out as directed by the Engineer and provided in the Contract.

Any other items as required to fulfil all contractual obligations as per the Bid Documents.

PART II

SUPPLEMENTARY TECHNICAL SPECIFICATION

AMENDMENTS/MODIFICATIONS/ADDITIONS TO EXISTING CLAUSES OF GENERAL TECHNICAL SPECIFICATIONS

SECTION100 General

CLAUSE 102 DEFINITIONS

The following abbreviations shall be added in this Clause: "MORT&H" : Ministry of Road Transport & Highways

(Previously known as 'MOST', Ministry of Surface Transport)

"NHAI" : National Highways Authority of India

CLAUSE 106 CONSTRUCTION EQUIPMENT

Add the following sub para (g) and (h) after sub para (f)

- Adequate standby equipment including spare parts shall be available.
- All measuring devices and gauges shall be in good working condition. Measuring devices that can affect product quality shall be calibrated prior to use and at prescribed intervals against certified equipment. Calibration procedures shall be established, maintained and documented and corrective actions taken when results are unsatisfactory. Accuracy and fitness of measuring devices shall be ensured by proper maintenance.

CLAUSE 108 SITE INFORMATION

Sub-Clause108.4 This clause shall be as follows:

"Identification of quarry sites and borrow areas shall be the responsibility of the Contractor. Materials procured from quarry sites and borrow areas identified by Contractor and to be used in Works must comply with the requirements of quality as stipulated in the Technical Specification for particular items of work."

CLAUSE 109 SETTING OUT

Sub-Clause109.8 Delete the 2nd and 3rd sentences in Clause 109.8 and substitute the following: "Setting out of the road alignment and measurement of angles shall be done by using Total Station."

CLAUSE 111 PRECAUTIONS FOR SAFEGUARDING THE ENVIRONMENT

Sub-Clause 111.1 General

Delete the text of Clause 111.1 in its entirety and substitute the following:

"The Contractor shall take all necessary measures and precautions and otherwise ensure that the execution of the Works and all associated operations on site or off-site are carried out in conformity with statutory and regulatory requirements including those prescribed elsewhere in this document.

The Contractor shall take all measures and precautions to avoid any nuisance or disturbance arising for the execution of the Works. This shall wherever possible be achieved by suppression of the nuisance at source rather than abatement of the nuisance once generated. All vehicles deployed for material haulage shall be spillage proof.

Haul roads shall be inspected at least once daily to clear any accidental spillage. In the event of any spoil, debris, wastes or any deleterious substance

from the Site being deposited on any adjacent land, the Contractor shall immediately remove all such material at no cost to the Contract and restore the affected area to its original state to the satisfaction of the Engineer."

Sub-Clause 111.2 Borrow Pits for Embankment Construction

Delete the text of Clause 111.2 and substitute the following:

"Prior approval shall be sought from the concerned State Authorities, and the Contractor shall comply with all local environmental regulations. For all borrow areas, the actual extent of area/zones to be excavated shall be demarcated with the signboards and the operational areas shall be access controlled.

In the case of borrow from tank beds, a regrade/improvement of the inlet channels (at least up to 100m stretch) shall be undertaken in consultation with the concerned state government departments (the Minor Irrigation department of the State PWD) and local bodies. The Contractor shall ensure that excavation of tank beds is uniform over the entire area and that the finished profile of the bed issmooth.

In the case of borrow from the dry highlands, all borrow areas shall be reinstated by the formation gentle side slopes, re-vegetated and connected to the nearest drainage channel to avoid the formation of pools during/after the rainy seasons.

Plant and machinery used in the borrow areas shall conform to State noise emission regulations. All operation areas shall be water sprinkled to contain dust levels to the National Ambient Air Quality Standards."

Sub-Clause 111.3 Quarry Operations

Delete the text of Clause 111.3 and substitute the following:

"Aggregates shall be sourced only from quarry sites that comply with the local/state environmental and other applicable regulations. Occupational safety procedures/practices for the work force in all quarries shall be in accordance with applicable laws. Quarry and crushing units shall have adequate dust suppression measures, such as sprinklers, in work areas and along all approach roads to the quarry sites. These shall preferable be located on the upwind side."

Sub-Clause 111.5 Pollution from Hot-Mix Plant and Batching Plants

Delete the 1st sentence of Clause 111.5 and substitute the following:

"Bituminous hot mix plant and concrete batching plants shall be located at least one(1)km away from the sensitive receptors (schools, hospitals, etc.) and atleast 500m from urban settlements, unless otherwise required by the statutory requirements."

Sub-Clause 111.8.1 Environmental Protection:

Add the following sentences in the first paragraph of Sub Clause 111.8.1:

Water tankers with suitable sprinkling system shall be deployed along the haulage roads and in the work sites. Water shall be sprinkled regularly all along the routes to suppress airborne dusts from truck/dumper movements particularly on unpaved roads. Actual frequency will be agreed with the Engineer to suit site conditions."

Sub-Clause 111.8.2 Air Quality

The Contractor shall device and implement methods of working to minimize dust, gaseous and other air-borne emissions and carry out the Works in such a

manner as to minimize adverse impacts on the air quality. Construction camps shall have facilities for LPG fuel. The use of firewood shall not be permitted.

The Contractor shall utilize effective water sprays during delivery, manufacture, processing and handling of materials when dust is likely to be created, and to dampen stored materials during dry and windy weather. Stockpiles of friable materials shall be covered with clean tarpaulins, with applications of sprayed water during dry and windy weather. Stockpiles of materials or debris shall be dampened prior to their movement, except where this is contrary to the Specification.

Any vehicle with an open load-carrying area used for transporting potentially dust- producing material shall have properly fitting side and tail boards. Materials having the potential to produce dust shall not be loaded to a level higher than the side and tail boards and shall be covered with clean tarpaulins in good condition. The tarpaulin shall be properly secured and extend at least 300mm over the edges of the side of the side and tailboards.

The Contractor shall monitor air-quality once weekly in all operational areas under the project and take the necessary steps to comply with the specified requirements. Air quality parameters will include SPM, RPM, SO_2, NO_X, HC and CO. operational areas include work sites, haulage roads, hot mix plants, quarries, crushing plants, stockpiles, borrow sites and spoil disposal sites.

Sub-Clause 111.8.3 Water Sources and Water Quality

The Contractor shall provide independent sources of water supply, such as bore wells, for use in the Works and for associated storage, workshop and work force compounds. Prior approval shall be obtained from the relevant State Authorities and all installations shall follow local regulations. Bore wells installed and used for the project shall be left in good operating condition for the use of NHAI and local communities. The Contractor shall prevent any interference with the supply to or abstraction from and prevent any pollution of water resources(includingundergroundpercolatingwater)asaresultoftheexecutionof the Works.

Areas where water is regularly or repetitively used for dust suppression purposes shall be laid to fall to specially constructed settlement tanks to permit sedimentation of particulate matter. After settlement, the water may be re-used for dust suppression and rinsing. The Contractor shall protect all watercourses, waterways, ditches, canals, drains, lakes and the likes from pollution as a result of the execution of the Works.

All water and other liquid waste products arising on the Site shall be collected and disposed of at a location on or off the Site and in a manner that shall not cause either nuisance or pollution.

The Contractor shall at all times ensure that all existing stream courses and drains within, and adjacent to, the Site are kept safe and free from any debris and any materials arising from the Works. The Contractor shall not discharge or deposit any matter arising from the execution of the Works into any water except with the permission of the Engineer and the regulatory authority concerned.

Work force camps shall have septic tank and soak away pits. Operational areas like POL storage areas/hot mix plant areas shall comply with local/state environmental regulations and safety procedures. Storage and handling areas shall be impervious and surrounded by an impervious lined drain to catch any accidental spills. Storm water shall be stored in lined holding tanks with oil, grease-tapping facility prior to disposal in to nearby watercourses. The

trappings and sludge of holding tanks shall be disposed off in accordance with the procedures approved by the local regulatory authority.

Sub-Clause 111.20 Control and Disposal of Wastes

The Contractor shall control the disposal of all forms of waste generated by the construction operations and in all associated activities. No uncontrolled deposition or dumping shall be permitted. Wastes to be so controlled shall include, but shall not be limited to, all forms of fuels and engine oils, all types of bitumen, cement, and surplus aggregates, gravels, bituminous mixtures etc. The Contractor shall make specific provision for the proper disposal of these and any other waste products, conforming to local regulations and acceptable to the Engineer.

Spilling of oil and bituminous products during construction and transport shall be avoided to reduce the chances of contamination of surface as well as ground water.

Degraded materials shall be disposed of in a manner as approved by the Engineer and wastewater shall be disposed into septic tanks and soak pits etc. The Contractor shall make arrangements to clean-up spoil as soon as the work finishes in a stretch. If such sites are located outside the ROW, restoration of the site to a level acceptable to the land owner(s) will be carried out within a time period agreed between landowner(s) and the Contractor. Separators shall be used to separate POL materials from wastewater prior to discharging to the watercourses or as approved by the Engineer in conformance with directives and guidelines.

Disposal of solid waste materials shall be outlined in a plan for which environmental clearances shall be obtained from State environmental regulatory authorities. Potential locations for solid waste disposal are the natural depressions and borrow areas. The areas used for dumping of uncontaminated debris shall be covered with 300mm soil and shall be planted. Contaminated debris shall be dumped in depressions whose bed must be impervious e.g., stone quarry sites or depressions made impervious with 450mm thick impervious floor apron as per MORT&HTechnicalSpecifications.Eachsuccessive1.0mlayersshallbecovered with 500mm thick soil layer, and the area will be covered with 300mm thick layer and planted.

After Clause 111.12 add the following new Clauses 111.13 to 111.17

Sub-Clause 111.13 Haulage Roads

Existing roads used for hauling shall be strengthened and/ or widened by the Contractor in accordance with the requirements for normal and construction traffic.

Where such roads are not existing, the Contactor shall construct project specific single lane paved roads in settlement areas and gravel roads in open areas conforming to the Ministry of Road Transport and Highways (MORT&H) specifications.

The alignment of the haulage roads shall be fixed to avoid agricultural land to the extent possible. In unavoidable circumstances, suitable compensation shall be paid to the people whose land will be temporarily acquired for the duration of the operations. The compensation shall cover for loss of income for the duration of temporary acquisition and land restoration. Prior to the

construction of the haul roads, topsoil shall be stripped and stockpiled for re-use.

Material dumping sites shall be access controlled to prevent the unauthorized entry of the people, grazing cattle and stray animals.

Haulage roads shall be reinstated upon completion of hauling for the use of local communities."

Sub-Clause 111.14 Equipment and Vehicles used for the Works

Equipments and vehicles deployed for the construction activities shall not be older than 5 years. Equipments used for road and bridge works shall be based on new technology and shall generate noise and pollutants not exceeding the limits specified by the relevant State Authorities. Vehicles and machineries used for road and bridge works are to be regularly maintained to conform to the National Air Quality Standards. Blasting, if any, will be carried out using small charges.

Sub-Clause 111.15 Noise Control

The Contractor shall consider noise as an environmental constrain in the planning and execution of the Works.

The Contractor shall take all necessary measures so that the operation of all mechanical equipment and construction processes on and off the site shall not cause any unnecessary or excessive noise, taking in to account applicable environmental requirements. The Contractor shall use all necessary measures and shall maintains all plant and silencing equipment in good conditions so as to minimize the noise emission during construction works.

Any member of the work force likely to be exposed to beyond their threshold noise levels shall be provided with protective equipment, such as earplugs, and shall be rotated every four hours.

Construction operations shall be limited to daytime hours only, particularly in the settlement areas.

Sub-Clause 111.16 Vibration Control

The Contractor shall take measures during construction activities to control the movement of the work force and construction machinery/equipment, and to avoid/ minimize activities, which produce vibrations.

Sub-Clause 111.17 Measurement

Monitoring of Air/Water/Noise and Soil quality shall be paid as per numbers of samples tested. For Compliance of all other provisions made in this Clause 111, it shall be deemedtobeincidentaltotheworkandnoseparatemeasurementshallbemade. The Contractor shall be deemed to have made allowance for such compliance with these provisions in the preparations of his prices for items of work included in the Bills of Quantities and full compensation for such compliance shall be deemed to be covered by them."

CLAUSE 112 ARRANGEMENT FOR TRAFFIC DURING CONSTRUCTION

Sub-Clause 112.4 Traffic Safety and Control

Last line of Para 5 shall be read as under:

"The signs shall be of approved design and of reflector type." **Add the following paragraph at the end of the clause:**

"Before commencement of any construction, the Contractor shall prepare and

submit details of the arrangements for passing traffic during construction, design of barricades, signs, markings, lights, flags etc. conforming and satisfying the requirements of the "Guidelines on Safety in Road Construction Zones" of IRC: SP 55-2001 and get the same approved by the Engineer.

Sub-Clause 112.6 Measurement for Payment and Rates

a) The provision of treated shoulder including construction of temporary cross drainage structures, if required, as described in Clause 112.2 including their maintenance, dismantling and clearing debris, where necessary, shall be considered as incidental to the works and shall be Contractor's responsibility.

b) The Construction of temporary diversion including temporary cross drainage structures asdescribedinsubclause112.3,shallbemeasuredinlinearmeterand the unit contract rate shall be inclusive of full compensation for construction (including supply of material, labor, tools, etc.), maintenance as per sub clause 112.5, final dismantling, and disposal.

c) All Traffic safety and control devices during construction as per sub clause 112.4including providing, erecting and maintaining barrier, signs, markings, flags, lights and providing flag men etc. is included in item rate.

CLAUSE 114 SCOPE OF RATES FOR DIFFERENT ITEMS OF WORK

Sub-Clause114.2 Item (ii) of Clause 114.2 shall read as follows:

A detailed resource-based construction programme including resources planning using computerized critical path network method/PERT in a form, which facilitates control of the progress of the works and consequences of any changes in terms of time. The programme shall also include detailed network, activities for the submission and approval of materials, procurement of critical materials and equipment, fabrication of special products/ equipment and their installation and testing and for all activities of the Contractor that are likely to affect the progress of work etc. including updating all such activities on the basis of decisions taken at the periodic site review meetings or as directed by the Engineer. The Contractor shall submit data via electronic media to the Engineer in a form readily compatible with Engineer's planning system.

The first issue of the detailed construction programme including the detailed description of the system and the procedures shall be submitted to the Engineer for acceptance not later than 28 days after the date of receipt of the letter of acceptance.

The contractor shall submit to the Engineer for approval & consent, the updated & revised programme at every three months interval or as such as directed by the Engineer. The updated & revised programme shall be submitted showing the actual progress achieved (physical & financial) and the effects of the progress achieved on the timing of the remaining work including any change to the sequence of the activities

CLAUSE 115 METHODOLOGY AND SEQUENCE OF WORK

The Clause shall be substituted as follows:

Sub-Clause115.1 Submission of Method Statement

The Contractor shall submit methods statement within 28 days after the date of letter of acceptance. The methods statement shall be submitted in two parts.

The General part of the methods statement shall describe the Contractor's proposals regarding preliminary works, common facilities, and items that

require consideration at the early stage of the Contract. The General part shall be furnished along with the first issue of the construction programme (refer clause 114.2) and shall include information on:

a) Sources of materials like coarse aggregate and fine aggregate, quantity and quality of materials available in different sources;

b) Sources of manufactured materials like cement, steel, bitumen reinforcement, prestressing strands and bearings. Wherever possible the Contractor shall identify at least two sources for each of the items; he shall also submit test certificates of recently manufactured materials for the consideration of the Engineer.

c) Locations of site facilities like batching plant, hot mix plant, aggregate processing plant, crushing plant etc.

d) Details of facilities/approaches for transportation of men, equipment and materials for construction of pavements, foundations and substructure in riverbed, and plan for free traffic flow and safe drainage.

e) Information on procedures to be adopted by the Contractor for prevention and mitigation of negative environmental impact due to construction activities.

f) Any other information required by the Engineer subsequent to the scrutiny of method statement

The General part of the Q.A. Programme shall accompany the method statement under sub-clause105.3.

The Special part of the methods statement shall be submitted to the Engineer by the Contractor for each important item of work like construction of embankments and subgrade, pavements, pile/well foundations, concreting, prestressing, repair and rehabilitation of existing structures, concrete superstructure, dismantling of structures and pavement and for any other item as directed by the Engineer.

These statements shall give information on

i) Details of personnel both for execution and quality control of the work.

ii) Equipment deployment with details of number of units, capacity, standby arrangements

iii) Sequence of construction, details of temporary or enabling works like, diversions, cofferdams, formwork including specialized formwork for superstructure, details of borrow areas, method of construction of embankment and subgrade, pavements, piles, wells, concreting procedures, details of proprietary process and products (e.g. details of prestressing systems, proprietary piling systems, bearings, expansion joints etc.) and details of equipment to be deployed. Wherever necessary, technical literature, design calculations and drawings shall be included in the method statement.

iv) Testing and acceptance procedures including documentation.

v) Special part of the Q.A. Programme referred in clause 105.3 for the particular item of work shall be submitted along with the methods statement for the concerned activity.

vi) Engineer shall examine and approve the methods statement or direct the Contractor to resubmit the statement with required modifications. The modified statement shall be submitted within 14 days of receipt of Engineer's comments.

The sole responsibility for the safety and adequacy of the methods adopted by the Contractor shall rest on the Contractor irrespective of any approval given by the Engineer.

Sub-Clause115.2 Approval of Proprietary Product/Process/System

Only proprietary products proven by International usage in comparable projects shall be permitted to be used. Fully authenticated details of licensing and collaboration arrangement shall be submitted by the manufacturer, where relevant.

Within 90 days of award of work the Contractor shall submit the following information for all proprietary products for approval by the Engineer.

i) Name of manufacturer and name of product/ process/system.

Complete details of the manufacturer of the product/ process/ system shall be furnished. Details of projects where similar product/process/system has been successfully used shall be furnished. Authenticated copies of license/collaboration agreement shall be furnished.

ii) General features of the product/product process/system.

Detailed write up with methods statements shall be furnished for each product/ process/ system. This shall include complete working drawings & installation drawings, technical specifications covering fabrication, materials, system of corrosion protection etc.

i) Details of product development and development testing.

ii) Acceptance test and criteria.

Manufacturer shall submit a quality assurance system document. Details of acceptance test and criteria of acceptance shall be furnished in this document.

i) Installation procedure.

ii) Maintenance procedure and schedule.

iii) Warranty proposal.

The Engineer may instruct any additional tests for the purpose of accepting the product. The charges of these additional tests shall be borne by the Employer only in case the product satisfies the specifications.

CLAUSE 120 FIELD LABORATORY

Sub-Clause 120.2 Description

Replace the words “indicated in the drawings” in the first sentence of second paragraph of this Clause with the words “per provisions indicated in this Clause and at a location approved by the Engineer.”

Replace “electric supply etc.” to the second sentence of first paragraph by “including uninterrupted power supply etc.”

Delete the first sentence of second paragraph “The floor space in the drawing”and substitute the following:

“The floor space required for the field laboratory shall be not less than 200 sq.m.

“The fourth sentenceofsecond paragraphs “Thefurnishing In Table100-2”shall read as under.

“A good semi furnished office accommodation shall be provided to the Material Engineers of the Supervision Team as per the direction of the Engineer.”

Add the following at the end of this Clause:

"There shall also be provided a concrete paved area, for storing samples adjacent to the laboratory, of about 100 sq.mand another 75 sq.mshall be suitably roofed with open sides giving protection against sun and rain.

Within 14 (fourteen) days of the commencement date, the Contractor shall prepare and submit a layout plan and details of the laboratory building and make/supplier of the equipment to the Engineer for his approval.

The field laboratory to be provided under the Contract shall be handed over to the Engineer in finished and fully equipped condition not later than 2 months after the receipt of Notice to Commence Work, and the field laboratory with all equipment/ instrument shall be to the entire satisfaction of the Engineer. During the 2-monthperiod starting from the Notice to Commence work, the laboratory tests shall be performed in another laboratory proposed by the Contractor and approved by the Engineer.

Laboratory Equipment

General

The items of laboratory equipment shall be provided in the field laboratory depending upon the items to be executed as per Table mentioned below instead of Table 100-2 shown in MORTH:

The following items of laboratory equipment shall be provided in the field laboratory:

The equipment and instruments shall be new and shall be quality certified by Bureau of Indian Standards (BIS).

Sr. No.	Sub No.	Item, Specifications	Nos. required
A: General			
(i)	**Balance**		
	(a)	7 kg to 10 kg capacity semi -self indicating Electronic Type –Accuracy 1 gm	2
	(b)	500 gm capacity semi-self-indicating Electronic Type – Accuracy 0.01 gm	2
	(c)	Chemical balance 100gm capacity - Accuracy 0.0001gm	1
	(d)	Pan balance 5 kg capacity - Accuracy 0.5 gm	2
	(e)	Platform Scale – 300 kg capacity	1
	(f)	Triple Beam balance-25kg capacity Accuracy 1gm	2
(ii)	**Ovens – Electrically operated, thermostatically controlled**		
	(a)	From 100°C to 220°C – Sensitivity	2
(iii)	**Sieves, as per IS 460-1962**		
	(a)	IS Sieves 450 mm internal dia. of sieve sets as per BIS of required sieve sizes complete with lid and pan	2 set
	(b)	IS sieve 200 mm internal dia. (brass frame and steel or brass wire cloth mesh) consisting of sieve sets of required sieve sizes complete with lid and pan	2 set
(iv)	Sieve shaker capable of taking 200 mm and 450 mm dia. Sieves electrically operated with time switch assembly (As per BIS)		1
(v)	200 tones compression testing machine		1
(vi)	Stop watches 1/5 sec. Accuracy		2
(vii)	Glassware comprising of Beakers, Pipettes, dishes, measuring cylinders (100 to 1000		1 Dozen

	cc capacity) glass rods and funnels, glass thermometers range 0°C to 100°C and metallic thermometers range 300°C		each
(viii)	Hot plates 200 mm dia (1500 watt)		6
(ix)	**Enamel trays**		
	(a)	600 mm x 450 mm x 50 mm	10
	(b)	450 mm x 300 mm x 40 mm	10
	(c)	300 mm x 250 mm x 40 mm	6
	(d)	Circular plates of 250 mm dia.	6
(x)	Water Testing Kit		1
(xi)	First Aid Box		1
(xii)	Spatula Set of 100 and 200 long		3
(xiii)	Digging Tools (pixels, shovel, fork etc.)		As reqd.
(xiv)	Miscellaneous tools (sledge hammer, lump hammer, wooden pegs etc.)		As reqd.
(xv)	Maximum and Minimum Thermometer		2 Set
(xvi)	Rain Gauge		1 Set
(xvii)	Timer 0-60 minutes with alarm & 1/5 sec accuracy.		3 Sets

B: For Soils and Aggregates			
(i)	Water still, 3 litre/hr with fittings and accessories		1
(ii)	Liquid limit device with Casagrande and ASTM grooving tools as per IS: 2720		1
(iii)	Sampling pipettes fitted with pressure and suction inlets, 10 mlCapacity		2 set
(iv)	Compaction apparatus (Proctor) as per IS: 2720 (Part 8) complete with collar, base plate and hammer		1 set
(v)	Modified AASHTO compaction apparatus as per IS. 2720 (Part 7) 1980 or Heavy Compaction Apparatus as per IS complete with collar, base plate and hammer		1 set
(vi)	Sand pouring cylinder with conical funnel and tap and complete as per IS 2720 (Part 28) 1980 including modified equipment		4
(vii)	Sampling tins with lids 100 mm dia x 75 mm ht½ kg capacity and miscellaneous items like moisture,tins with lid (50 grams) etc.		12
(viii)	Lab CBR testing equipment for conducting CBR testing, load frame with 5 Ton capacity, electrically operated with speed control as per IS: 2720 (Part 16), and consisting of following:		**1 set**
	(a)	CBR moulds 150-mm dia– 175-mm htcomplete with collar, base plateetc.	**24**
	(b)	Tripod stands for holding dial gauge holder	**24**
	(c)	CBR plunger with settlement dial gauge holder	**1**
	(d)	Surcharge weight 147-mm dia2.5 kg weight with centralhole	48
	(e)	Spacer disc 148-mm dia, 47.7-mm ht. With handle	3
	(f)	Perforated plate (Brass)	24
	(g)	Soaking tank for accommodating 24 CBR moulds	
	(h)	Provingringsof1000kg,2500kgand5000kgcapacity	1 each
	(i)	Dial gauges, 25 mm travel- 0.01 mm/division	10
	(j)	**Aluminium Tis**	
	50x30m		36 nos
	55x35m		36 nos
	70x45m		36 nos
	70x50m		36 nos
	80x50m		36 nos
(ix)	Standard Penetration test equipment		1
(x)	Nuclear Moisture Density Meter or equivalent		2
(xi)	Speedy moisture meter complete with chemicals		2

(xii)	Unconfined compression test apparatus	1 set
(xiii)	Aggregate Impact Test Apparatus	1
(xiv)	Aggregate Impact Test Apparatus as per IS 2386 (Part 4)1963	1
(xv)	Los Angeles abrasion Test Apparatus as per IS 2386 (Part 4)1963	1
(xvi)	Riffle Box of Slot size of 50mm as per ASTM C-136	1

	C: For Bitumen and Bituminous Mixes	
(i)	Constant temperature bath for accommodating bitumen	2
	Test specimen electrically operated and thermostatically controlled, 50-liter capacity temp. range ambient 80o C	
(ii)	Penetrometer automatic type, adjustable weight arrangement and needles as per IS. 1203 – 1978	2
(iii)	Solvent extraction or centrifuge type apparatus complete (AASHTO, T-164) with extraction thimbles with stocks of solvent and filter paper	1
(iv)	Laboratory mixer including required accessories about .02 cum capacity electrically operated fitted with heating jacket	1
(v)	Marshall compaction apparatus automatically operated as per ASTM 1559-62 T and complete with electrically operated loading unit, compaction pedestal heating head assembly, dial micrometre and bracket for flow measurement, load transfer bar, specimen mould 100 mm dia. (4 in) with base plate, collars, specimen extractor, compaction hammer 4.53 kg (10 lb.) x457 mm (18 in) fall	1 set
(vi)	Distant Reading Digital Thermometer for Measuring Temperatures in Asphaltic Mixes	As required
(vii)	Riffle Box	1
(viii)	Automatic Asphalt Content Gauge [Nuclear are equivalent]	1
(ix)	Thin film Oven test apparatus to the requirement of AASHTO T 179, including accessories	1
(x)	Ring Ball Apparatus as per IS 1205- 1978	1
(xi)	Asphalt Institute Vacuum Viscometer as per IS 1206(part II) – 1978	1
(xii)	BS U- Tube Modified Reverse Floro Viscometer IS 1206(Part III) – 1978	1
(xiii)	Apparatus for Determination of Ductility Test as per IS 1208 – 1978	1
(xiv)	Pen Sky – Martars closed Tester for testing flashandfire point as per IS 1209 – 1978.	1
(xv)	Apparatus for Float Test – IS – 1210 – 1978	1
(xvi)	Apparatus for Determination of water content (Deanand Shark Method) IS – 1211 – 1978	1
(xvii)	Apparatus for Determination of Loss on Heading IS– 1212-1978.	1
(xviii)	Apparatus of Determination of specified Gravity IS- 1202-1978	1
(xix)	Core cutting machine with 100mm dia. Diamond cutting Edge	1
(xx)	Apparatus for Elastic Recovery test for Modified Bitumen	1
(xxi)	Apparatus for Storage Stability test for Modified Bitumen	1
(xxii)	Apparatus for Separation test for modified bitumen	1

D: For Cement, Cement Concrete and Materials			
(i)	Water still		1
(ii)	Vicat needle apparatus for setting time with plungers, as per IS. 269-1967		1
(iii)	Moulds		
	(a)	150 mm x 300 mm ht cylinder with capping component	As required
	(b)	150mmx150 mm x150mm cubical for compressive strength	As required
	(c)	150mmx100 mm x600mm beam for flexural strength	As required
(iv)	Concrete permeability apparatus		1
(v)	High frequency mortar cube vibrator for cement testing		1
(vi)	Concrete mixer power driven, 1 cu ft. capacity		1
(vii)	Variable frequency and amplitude vibrating table size 1 metre x 1 metre, as per the relevant British Standard		1
(viii)	Flakiness & Elongation test apparatus		2each
(ix)	Aggregate impact test apparatus as per IS 2386 (Part 4) 1963		2
(x)	Los Angeles abrasion apparatus as per IS. 2386 (Part 4) 1963		1
(xi)	Flow table as per IS 712-1973		1
(xii)	(a)	Equipment for slump test	2
	(b)	Compaction factor test equipment	1
(xiii)	Equipment for determination of specific gravity for fine and coarse aggregate as per IS 2386 (Part 3) 1963		2
(xiv)	Flexural attachment to compression testing machine		1
(xv)	Core cutting machine with 150 mm dia. Diamond cutting edge		1
(xvi)	Needle vibrator		1
(xvii)	Vibrating hammer as per BS specification		1
(xviii)	Air entrainment meter ASTM C - 231		1
(xix)	0.5 Cft, 1 Cft cylinder for checking bulk density of aggregate with tamping rod		1
(xx)	Soundness testing apparatus for cement		1
(xxi)	Flexural Beam testing machine with accessories		1
(xxii)	Chemicals solutions and consumable		As reqd.
(xxiii)	Chloride Testing kit for chemical analysis of chloride content.		1
(xxiv)	ION Exchange kit for rapid determination of sulphate content.		1

E: For Control of Profile and Surface Evenness			
(i)	Digital Level complete with all accessories		2 sets
(ii)	Distomat or equivalent		2 Nos.
(iii)	Theodolite – Electronically operated with computerized output attachment		2 sets
(iv)	Total Station with all accessories		2 sets
(v)	Towed Fifth Wheel Bump Indicator		1 set
(vi)	3meter straight edge and measuring wedge		2 sets
	Camber templates 2 lane		
(vii)	String line Arrangement with paver and sensor powers		1
	(a)	Crown type cross-section	2 sets
	(b)	Straight run cross-section	2 sets

(viii)	Steel tape		
	(a)	5 m long	as reqd
	(b)	10 m long	as reqd
	(c)	20 m long	as reqd
	(d)	30 m long	as reqd
	(e)	50 m long	As reqd
	(e)	50 m long	As reqd
(ix)	Precision Staff		3 Sets

Note: The laboratory set-up must be complete including a set of reference standards, adequately staffed and operational to the satisfaction of the Engineer not later than 2 months from the date of receipt of Notice to commence theworks.

Sub-Clause 120.3 Ownership

This Clause shall read as under:

"Land for the laboratory shall be provided by the Contractor."

Sub-Clause 120.4 Maintenance

This Clause shall read as under:

"The Contractor shall arrange to maintain the field laboratory including sample store yards in a satisfactory manner until the issue of Taking over Certificate for the whole work. Maintenance includes all activities described in Clause 120.4 and maintenance of equipment and running of the same including chemicals and consumables."

Sub-Clause 120.5 Rate

The construction, supply, installation, maintenance, and operation including all consumables like chemicals &reagents etc., and all other expenses involved in connection thereto for the field laboratory shall be incidental to the work, and shall not be paid for separately.

SECTION 200 Site Clearance

CLAUSE 201 CLEARING AND GRUBBING

Sub-Clause 201.1 Scope

Replace with following Para:

This work shall consist of cutting, excavating, removing, and disposing of all materials such as trees of girth up to 300 mm, bushes, shrubs, stumps, roots, grass weeds, rubbish etc. and top soil up to 150 mm, which in the opinion of Engineer isunsuitable for incorporation in the work including draining out stagnant water if any from the area of road land, drain, cross drainage structure and other area as specified in the drawing or instructed by Engineer. It shall include necessary excavation by harrow discs or any other suitable equipment, backfilling of the pits by suitable soil, resulting from uprooting of trees & stumps and making the surface in proper grade by suitable equipment and compacted by power roller to required compaction as per Clause 305.3.4. The work also includes handling, salvaging and disposal of cleared material. Clearing and grubbing shall be performed less than one month in advance of earthwork operation and in accordance with requirement of thesespecifications.

CLAUSE 202 DISMANTLING CULVERTS, BRIDGES AND OTHER STRUCTURES/ PAVEMENTS

Sub-Clause 202.5 Disposal of Materials

The first paragraph of the sub clause shall read as below:

All materials obtained of dismantling/milling shall be the property of the Contractor for which he shall quote a rate for rebate in BOQ Bill No. 1, and the Contractor shall be free to use this material in work, or he may sell/dispose the material to as desired / deemed fit by him.

The existing pavement crust shall be reused as indicated below:

Contractor shall be free to use dismantled / milled material, as is where basis is, or by suitably modifying the material, or by crushing the material, or by breaking the material, and screening the same, provided it meets the specifications and is approved by the Engineer.

SECTION 300 Earthwork, Erosion Control and Drainage

CLAUSE 301 EXCAVATION FOR ROADWAY AND DRAINS

Sub-Clause 301.1 Scope

Add the following as second paragraph under this clause:

"The work shall also include excavation for channel training at culverts/bridges, excavation of existing shoulders and medians for purposes of widening the pavement and excavation of existing embankment for reconstruction to specification."

CLAUSE 304 EXCAVATION FOR STRUCTURES

Sub-Clause 304.3.2 Excavation

At the end of 1st paragraph of Clause 304.3.2 inserts the following additional sentences:

"TheContractor shall ensure the stability and structural integrity of adjacent existing foundations and structures and if necessaryshall, at his own expense,install temporary or permanent sheet piles, coffer dams, shoring or similar as support or protection to the satisfaction of theEngineer."

CLAUSE 305 EMBANKMENT CONSTRUCTION

Sub-Clause 305.2 Material and General Requirements

Sub-Clause 305.2.1 Physical Requirements:

Sub-Clause 305.2.1.2 Add the following after second paragraph:

"Soils having medium and high swelling potential shall be defined based onLiquid Limit, Plastic Limit, Shrinkage Limit, Gradation, Free swelling Index, Field dry Density and Field Moisture Content and types of Clay minerals present in the soil and as directed by the Engineer. The location and the extent of these soils with medium to high swelling potential should be defined as directed by the Engineer."

Sub-Clause 305.2.2.2 Borrow Materials

Para 1 of this Clause shall read as under:

" No borrow area shall be made available by the Employer for this work. The arrangement for the source of supply of the material for embankment and sub-grade as well as compliance to the different environmental requirements in respect of excavation and borrow areas as stipulated, from time to time, by the Ministry of Environmental and Forest, Government of India and the local bodies, as applicable, shall be the sole responsibility of the Contractor."

Sub-Clause 305.2.2.4 Compaction Requirements

In Clause 305.2.2.4 delete Table 300-2 and substitute the following:

Table 300-2

Compaction Requirements of Embankment and Subgrade

Sr. No.	Type of Work/Material	Relative Compaction as %age of maximum laboratory dry density as per IS 2720 (Part 8)
1	Subgrade and earthen shoulders	Not less than 97%
2	Embankment	Not less than 95%
3	Expansive clays	Not allowed
4	Design CBR of Subgrade & Shoulder has been taken 5. The borrow earth used for subgrade material must satisfied the requirement of the design CBR of 5 %	

Para 2 of this Clause given below Table 300-2 shall read as under:

The contractor shall at least 21 working days before commencement of construction of embankment and the subgrade; submit the following to the Engineer for approval:

(i) The values of maximum dry density and optimum moisture content obtained in accordance with IS: 2720 (Part 8) for each fill material proposed to be used in the construction of embankment andsubgrade.

(ii) The graphs of Density plotted against moisture content from which each of the values in (i) above of maximum dry density and optimum moisture content were determined.

(iii) The dry density-moisture content-CBR relationships, heavy comp activeefforts conformingtotheIS2770(part 8)foreachofthefillmaterialproposedtobeused in thesubgrade.

The above information shall form the basis for compaction only upon its approval by the Engineer."

Sub-Clause 305.3 Construction Operations

Sub-Clause 305.3.4 Compacting Ground Supporting Embankment/Subgrade

Para 1 of this clause shall be read as

"Where necessary the original ground shall be levelled, scarified, mixed with water and then compacted by rolling to facilitate placement of first layer of embankment so astoachieveminimum drydensityasgiveninTable300-2.

Sub-Clause 305.8 Measurement for Payment

Substitute Clause 305.8.1 shall be read as

"Earth embankment/sub-grade construction shall be measured separately by taking cross sections at intervals after clearing and grubbing and if necessary compaction of original ground before the embankment work starts and after its completion and computing the volumes of earthwork in cubic metres by the method of average and areas."

CLAUSE 306 SOIL EROSION AND SEDIMENTATION CONTROL

Sub-Clause 306.4 Measurements for Payment

Substitute Clause 306.4 as follows:

"All temporary sedimentation and pollution control works shall be deemed as incidental to the earthwork and other items of work and as such no separate payment shall be made for thesame."

SECTION 400 Sub-Bases, Bases (Non-Bituminous) and Shoulders

CLAUSE 401	GRANULAR SUB BASE
Sub-Clause 401.1	Scope
	Add the following at the end of this Clause:
	"A site trial shall be performed in accordance with Clause 901.16."
Sub-Clause 401.2.2	Physical Requirements
	Add at the end of this clause as under:
	The Contractor shall, at least 21 working days before the commencement of the construction of the sub-base course, submit to the Engineer, the results for approval of the laboratory testing on the physical properties defined above. The construction of the sub-base course shall be taken up only upon the Engineer's approval of the material.
	Grading-I of table 400-1 shall be adopted at site.
CLAUSE 406	WET MIX MACADAM SUB BASE/BASE
Sub-Clause 406.4	Opening to Traffic
	The Clause shall be read as follows:
	No vehicular traffic of any kind shall be allowed on the finished wet mix macadam surface.
SECTION 500	Base and Surface Courses (Bituminous)
Sub-Clause 501.2	Materials
Sub clause 501.2.1	Binder
	Binder of VG-10 grade shall be used or if available viscosity grade of bitumen shall be used in accordance with IS: 73
Sub-Clause 501.2.2	Delete "Crushed gravel or other hard material" from first Line of Para 1."
	Para 3 isdeleted.
CLAUSE 505	DENSE BITUMINOUS MACADAM
Sub-Clause 505.2.1	Bitumen
	Binder of VG-10 grade shall be used or if available viscosity grade of bitumen shall be used in accordance with IS: 73.
CLAUSE 507	BITUMINOUS CONCRETE
Sub-Clause 507.2.1	Bitumen
	Binder of CRMB-60 grade shall be used.
SECTION 800	Traffic Signs, Markings and Other Road Appurtenances
CLAUSE 803	ROAD MARKINGS
Sub-Clause 803.2	Materials
	This clause shall read as under:
	"Road markings shall be hot applied thermoplastic compound and the materials shall meet the requirements as specified in Clause 803.4.
	The road markings shall be laid in one layer with appropriate road marking machine approved by the Engineer. Before the road-marking machine is used on the permanent works, the satisfactory working of the machine shall be demonstrated on a suitable site, which is not part of the permanent works. The rate of application shall be checked and adjusted as necessary before application on a

large scale is commenced, and thereafterdaily."

CLAUSE 806 ROAD DELINATORS

Sub-Clause806.2 This clause shall read as follows:

a) Triangular Object Marker shall be 300mm side with four red reflectors, made out of 2mm thick aluminium sheet, face to be fully covered by high intensity grade white retro reflective sheeting of encapsulated lens type as per clause 801. The background/border/symbolsshall bemadebyscreen-printingof desiredcolouras per sign details. The sign plate shall be fixed with 6mm dia. aluminium rivets on MS angle iron frame. The angle iron frame shall be made with angle of size 40mmx40mmx5mm. The sign shall be fixed with nut-bolts & welding on MS pipe 50mm dia (NB-MW) and 500mmhigh.

b) Rectangular hazard marker 600mm x 300mm made out of2mm thick aluminium sheet, face to be fully covered by high intensity grade white retro reflective sheeting of encapsulated lens type. The background/ border/ symbols shall be made by screen-printing of desired colour as per sign details. The sign plate shall be fixed with 6mm dia aluminium rivets on MS angle iron frame. The angle iron frame shall be made with angle of size 40mmx40mmx5mm. The sign shall be fixed to 80mm dia (NB-MW) MSpipe.

c) Roadway Indicators shall be 1000mm high made with 100 mm dia. NB medium weight MS pipe. One reflector of high intensity grade retro reflective sheeting with encapsulated lens shall be provided on top of the reflector. The white & red reflector shall be provided alternatively of 40mm width, so that total width of reflector shall be 120mm. A wire mesh cover of 150mm height shall be provided ontop.

d) All components of signs & supports shall be thoroughly descaled, cleaned, primed and painted with two coats of epoxy paint. The sign backside shall be with grey colour and post shall be white colour/ alternate white & black bands. The post below ground shall be painted with three coats of redlead.

Clause 2100 Open Foundation

Sub-Clause 2104.1 Preparation of Foundation

Please add the following as a last para-

Considering the soil SBC as per Geotechnical report, 1 m of depth below the founding level of bridges shall be removed and replaced with granular sand. The cost of the excavation and sand shall be made from respective items.

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

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

Annex -I

(Schedule-E)

Repair/rectification of Defects and deficiencies

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

Table -1: Maintenance Criteria for Pavements:

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
Flexible Pavement (Pavement of MCW, Service Road, Approaches of Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	Potholes	Nil	< 0.1 %of area and subject to limit of 10 mm in depth	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC 82: 2015 and Distress Identification Manual for Long Term Pavement Performance Program, FHWA2003(http://www.tfhrc.com/pavement/lttp/reports/03031/)	24-48 hours	MORT&H Specification 3004.2
	Cracking	Nil	< 5 %subject to limitof0.5 sq.m for any 50 m length	Daily			7-15 days	MORT&H Specification 3004.3
	Rutting	Nil	< 5 mm	Daily	Straight Edge		15 -30 days	MORT&H Specification 3004.2
	Corrugations and Shoving	Nil	< 0.1% ofarea	Daily	Length Measurement Unit like		2-7 days	IRC:82- 2015
	Bleeding	Nil	< 1 % of area	Daily	Scale, Tape, odometer etc.		3-7 days	MORT&H Specification 3004.4
	Ravelling/Stripping	Nil	< 1 % of area	Daily			7-15 days	IRC:82-2015 read with IRC SP 81
	Edge Deformation/ Breaking	Nil	< 1 m for any 100 m section and width <0.1 matanylocation, restricted to 30 cm from the edge	Daily			7- 15 days	IRC:82-2015
	Roughness BI	2000mm/km	2400mm/km	Bi- Annually	Class I Profilometer SCRIM(Sideway- force CoefficientRoutine 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	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					
						Condition Survey Equipment		
	Other Pavement Distresses			Bi- Annually			2-7 days	IRC:82- 2015
	Deflection/ Remaining Life			Annually	Falling Weight Deflectometer	IRC 115: 2014	180 days	IRC:115- 2014
Rigid Pavement (Pavement of MCW, Service Road, Grade structure, approaches of connecting road, slip roads, lay byes etc. as applicable)	Roughness BI	2200m m/km	2400mm /km	Bi- Annually	Class I Profilometer	ASTM E950 (98) :2004 and ASTM E1656 - 94: 2000	180 days	IRC:SP:83- 2018
	Skid	Skid Resistance no. at different speed of vehicles		Bi- Annually	SCRIM (Sideway- force	IRC:SP:83-2018	180 days	IRC:SP:83- 2018
		Minimum SN 36 33 32 31 31		**traffic Speed (Km/h)** 50 65 80 95 110	Coefficient Routine Investigation Machine or equivalent)			
Embankment/ Slope	Edge drop at shoulders	Nil	40m m	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 inprescribedslope of camber/cross fall	Daily			7-15 days	MORT&H Specification 408.4
	Embankment Slopes	Nil	<15 %variation inprescribe side slope	Daily			7-15 days	MORT&H Specification 408.4
	Embankment Protection	Nil	Nil	Daily	NA		7-15 days	MORT&H Specification
	Rain Cuts/ Gullies in slope	Nil	Nil	DailySpecially 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:

Sr.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	**SingleDiscreteCracksNotintersecting with any joint**	w = width of crack L = length of crack d = depth of crack D = depth ofslab	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-movingcar	Seal without delay	Seal, and stitch if L >lm. Within 7days
			3	w = 0.5 - 1.5 mm, discernible from fast-movingcar		
			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 morejoints**	w = width of crack L = length of crack d = depth of crack D = depth ofslab	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 > 1m. Within 7 days	
			4	w = 3.0 - 6.0 mm	Dowel Bar Retrofit. Within 15 days	Full Depth Repair Dismantle and reconstructaffected. Portion with norms and specifications - See Para 5.5 & 9.2Within 15days
			5	w > 6 mm, usually associated with spalling, and/or slab rocking under traffic	Not Applicable, as it may befull 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 ofslab	0	Nil, not discernible	No Action	
			1	w < 0.5 mm, discernable from slow movingvehicle	Seal with epoxy, if L > 1 m. Within 7 days	Staple or dowel bar retrofit. Within 15days
			2	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route seal and stitch, ifL> l m. Within 15 days	-
			3	w = 3.0 - 6.0 mm	Staple, if L > 1 m. Within 15 days	Partial Depth Repair withstapling.Within 15 days
			4	w = 6.0 - 12.0 mm, usually associated withspalling	Not Applicable, as it may befull depth	
			5	w > 12 mm, usually associated with spalling, and/or slab rocking under traffic		Full Depth Repair Dismantle and reconstruct affected portion as pernorms And specifications - See Para 5.6.4 Within 15 days

Sr.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	**MultipleCracks intersecting with one or morejoints**	**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, Reinstatesubbase, Reconstruct whole slab as per specifications within 30 days
			4	w = 3.0 - 6.0 mm panel broken into 2 or 3pieces		
			5	w > 6 mm and/or panelbroken 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 withepoxy Within 7days
			2	w < 1.5 mm; L < 0.6 m, only one cornerbroken		
			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 Reinstate sub-base, and reconstructthe slab as per norms and specifications within 30days
			4	w > 1.5 mm; L > 0.6 m or three corners broken		
			5	three or four corners broken		
6	**Punch out (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	Applicable, as it may be fulldepth	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. Within30days
			5	w > 3 mm, L > 3 m/m^2 and deformation		
7	RavellingorHoneycombtype surface	r = area damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	Short Term	Long Term
					No action.	Not Applicable
			1	r < 2 %	Local repair of areas damaged and liable to be damaged. Within 15 days	
			2	r = 2 - 10 %		
			3	r = 10-25%	Bonded Inlay, 2 or 3 slabs if affecting. Within 30 days	
			4	r = 25 - 50 %		
			5	r > 50% and h > 25 mm	Reconstruct slabs, 4 or more slabs ifaffecting.	

Sr.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	
8	**Scaling**	r = 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 ofareas damagedandliable to be damaged. Within 7days	
			2	r = 2 - 10 %		
			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 patchtest	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		
			5	t < 0.1 mm	DiamondGrindingif affecting50% or more slabs ina continuousstretch of minimum 5 km. Within 30 days	
10	**Pop out (Small Hole), Pothole Refer Para 8.4**	n = number/m^2 d = diameter h = maximumdepth	0	d < 50 mm; h < 25 mm; n < 1 per 5 m^2	No action.	Not Applicable
			1	d=50-100mm;h<50mm;n<1 per 5 m^2	Partial depth repair 65 mm deep. Within 15 days	
			2	d=50-100mm;h>50mm;n<1 per 5 m^2		
			3	d = 100 - 300 mm; h < 100 mm n < 1 per 5m^2		
			4	d = 100 - 300 mm; h > 100 mm; n < 1 per 5m^2		
			5	d > 300 mm; h > 100 mm: n > 1 per 5 m^2		
Joint Defects						
11	**Joint Seal Defects**	loss or damage L = Length as % total jointlength	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.	

Sr.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	Notable. L > 25% insufficient protection against ingress of water andtrappingincompressible material.	Clean and reapply sealant in selected locations. Within 7 days	
			5	Severe; w > 3 mm negligibleprotection against ingress ofwater and trapping incompressible material.	Clean, widen and reseal the joint. Within 7 days	
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.	
			1	w < 10 mm	Apply low viscosity epoxy resin/ mortar in crackedportion. Within 7 days	
			2	w = 10 - 20 mm, L < 25%		
			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	Not Applicable
13	**Faulting (orStepping) 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 diamondgrinding	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 groutingand raising sunken slab	
14	**Blow-up or Buckling**	H =vertical displacement from normalprofile	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, i.e. 4 or morepieces	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	

Sr.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	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.	
			1	h = 5 - 15 mm	Follow up.	
			2	h = 15 - 30 mm, Nos <20% joints	Install Signs to Warn Trafficwithin 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		scrabble
17	**Bump**	H =vertical displacement from normalprofile	0	h < 4 mm	No action	
			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 Drop-off**	f = difference of level	0	Nil, not discernible < 3mm	**Short Term**	**Long Term**
					No action.	
			1	f = 3 - 10 mm	Spot repair of shoulder within 7 days	
			2	f = 10 - 25 mm		
			3	f = 25 - 50 mm	Fill up shoulder within 7 days	For any 100 m stretch Reconstruct shoulder, if affecting 25% or more ofstretch. Within 30days
			4	f = 50 - 75 mm		
			5	f > 75 mm		
Drainage						
19	**Pumping**	quantity of fines and water expelled through open joints and cracks Nos Nos/100 m stretch	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.	
			5	abundant,crack development >25%	Repair distressed pavement	

Sr.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
					sections. Strengthen subgrade and subbase. Replace slab. Within 30 days	
20	**Ponding**	Ponding on slabs due to blockage of drains	0-2	Nodiscernible problem	No action.	
			3 to 4	Blockages observed in drains, but water flowing	Clean drains etc. within 7 days, Follow up	Action required to stop water damaging foundation within 30 days.
			5	Ponding, accumulation of water observed	-do-	

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

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Highway	Availability of Safe Sight Distance	As per IRC SP: 84-2019, a minimum of safe stopping sight distance shall be available throughout.	Monthly	Manual Measurements with Odometer along with video/image backup	Removal of obstruction within 24 hours, in case of sight line affected by temporary objects such as trees, temporary encroachments. In case of permanent structure or design deficiency: Removalofobstruction/improvementofdeficiency at theearliestSpeed Restriction boards and suitable traffic calming measures such as transverse bar marking, blinkers, etc. shall be applied during the period of rectification.		IRC: SP 84-2019
		Design Speed, kmph / **Desirable Minimum Sight Distance (m)** / **Safe Stopping Sight Distance (m)**: 100 / 360 / 180; 80 / 260 / 130					
Pavement Marking	Wear	<70% of marking remaining	Bi- Annually	Visual Assessment as per Annexure-F of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect within 2months-	IRC:35-2015
	Day time Visibility	During expected life Service Time Cement Road - 130mcd/m^2/lux BituminousRoad- 100mcd/m^2/lux	Monthly	AsperAnnexure-D of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect – within 2 months	IRC:35- 2015

<table>
<tr><th>Asset Type</th><th>Performance Parameter</th><th>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></td><td>Night Time Visibility</td><td>
<table>
<tr><td colspan="3">Initial and Minimum Performancefor Dry Retro reflectivity during nighttime:</td></tr>
<tr><td>Design Speed</td><td colspan="2">(RL)RetroReflectivity (mcd/m^2/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">Initial and Minimum Performance for Night Visibility under wet condition(Retro reflectivity):</td></tr>
</table>
</td><td>Bi-Annually</td><td>As per Annexure-E 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></td><td></td><td>Initial 7 days Retro reflectivity: 100 mcd/m^2/lux
Minimum Threshold Level: 50 mcd/m^2/lux</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Skid Resistance</td><td>Initial and Minimum performance for SkidResistance:</td><td>Bi-Annually</td><td>As per Annexure-G of IRC:35-2015</td><td></td><td>Within 24 hours</td><td>IRC:35-2015</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 (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 markingsetc.					
Road Signs	Shape Position and	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 shapeisDamaged. Relocation asper requirement change of signboard	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	Testingof each Signboard usingRetroReflectivityMeasuring Device.In accordance with ASTM D 4956-09.		48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual postsigns) 1 Month in case of Gantry/Cantilever Sign boards	RC:67-2012
Kerb	Kerb Height	As per IRC 86:2018 depending upon type of Kerb	Bi-Annually	Use of distance measuring tape	Raising Kerb Height	Within 1 Month	IRC 86:2018
	Kerb Painting	Functionality: Functioning of Kerb painting as intended	Daily	Visual with video/image backup	Kerb Repainting	Within 7-days	IRC 35:2015
Other Road Furniture	Reflective Pavement	Numbers and Functionality as per specifications in	Daily	Counting	New Installation	Within 2 months	IRC:SP:84-2019,IRC:35-

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Markers (Road Studs)	IRC:SP:84-2019 and IRC: 35-2015, unless specified in Schedule-B.					2015
	Pedestrian Guardrail	Functionality: Functioning of guardrail asintended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:SP:84-2019
	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 ofEnd Treatment as intended	Daily	Visual with video/image	Rectification	Within 7 days	IRC:SP:84-2019,
	Traffic Safety Barriers			backup			IRC:119-2015
	Attenuators	Functionality: Functioning of Attenuators asintended	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:79-2019
	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:84-2019
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:84-2019
		No major failure in the lighting system	Daily	-	Rectification of failure	24 hours	IRC:SP:84-2019

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		No minor failure in the lighting system	Monthly	-	Rectification of failure	8 hours	IRC:SP:84-2019
	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:84-2019
		No major/minor failure in the lighting system	Daily	-	Rectification of failure	8 hours	IRC:SP:84-2019
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:84-2019
	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:84-2019
	Vegetation affecting sight line and road structures	Sight line shall be	Daily	Visual with video/image backup	Removal of Trees	Immediate	IRC:SP:84-2019
Rest Areas	Cleaning of toilets	-	Daily	-	-	Every 4 hours	
	Defects in electrical, water and sanitary installations	-	Daily	-	Rectification	24 hours	
Other				-	Rectification	15 days	IRC:SP:84-2019

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
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				
Pipe/box/slab culverts	Free waterway/ unobstructed flowsection	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 barrelbefore rainy season.	15 days before onset of monsoon and within 30 days after end ofrainy season.	IRC:5-2015, IRC:SP:40-2019 and IRC:SP:13-2004
	Leak-proof expansion joints if any	No leakage through expansionjoints	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:40-2019 and IRC SP:69-2011
	Structurally sound	Spalling of concrete not more than 0.25 sqm Delamination of concrete not more than 0.25 sq.m. Cracks wider than 0.3 mm not more than 1m aggregatelength	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 perIRC:SP:40-2019.	15 days	IRC:SP:40-2019 and MORTH Specifications clause 2800
	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 andpitching	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier.	IRC: SP 40-2019and IRC:SP:13-2004.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
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 expansionjoint	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 & 2811.
	User safety (condition of crash barrier andguardrail)	No damaged or missing stretch of crash barrier or pedestrian hand railing	Daily	Visual inspection anddetailed condition survey as per IRC SP: 35- 1990.	Repairs and replacement of safety barriers as the case may be	3days	IRC: 5-2015, IRC SP: 84-2019and IRC SP: 40-2019.
	Rusted reinforcement Spalling of concrete Delamination	Not more than 0.25 sq.m Not more than 0.50 sq.m Not more than 0.50 sq.m	Bi- Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge InspectionUnit	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 portionwith epoxy mortar / concrete.	15 days	IRC SP: 40-2019 and MORTH Specification 1600.
	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 InspectionUnit	Grouting with epoxy mortar, investigatingcauses for cracks development and carry out necessary rehabilitation.	48 Hours	IRC SP: 40-2019 and MORTH Specification 2800.
	Rainwater seepage	Leakage - nil	Quarterly	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge InspectionUnit	Grouting of deck slab at leakageareas,waterproofing, repairs to drainage	1 months	MoRTH specifications

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	through deck slab				spouts		2600 & 2700.
	Deflection due to permanent loads and live loads	Within design limits.	Once in Every 10 Years for spans more than 40 m	Load test method	Carry outmajor rehabilitation works on bridge to retain original design loadscapacity	6 months	IRC SP: 51-2015.
	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 structure of super	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 stripjoint.	Bi-Annually	Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge InspectionUnit	Replace of expansionjoint seal in	15 days	MORTH specifications 2600 and IRC SP: 40-2019.
	Debris and dust in strip seal expansion joint	No dust debris expansion or in joint gap.	Monthly	Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge InspectionUnit	Cleaning of expansion joint gapsthoroughly	3 days	MORTH specification s 2600 and IRC SP: 40-2019.
	Drainage spouts	No down take pipe missing/broken below soffit of the deck slab. No silt, debris, clogging of drainage	Monthly	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge InspectionUnit	Cleaning of drainage spouts thoroughly. Replacement of missing/broken down take		MORTH

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		spout collection chamber.			pipes with a minimum pipe extension of 500mm below soffit of slab. Providing sealant around the drainagespout if any leakages observed.	3 days	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 InspectionUnit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out repairs tosubstructureby grouting/guniting and micro concretingexpending on type of defect noticed	30 days	IRC SP: 40-2019 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 ofreinforcement or rubber	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge InspectionUnit	In case of failure of even one bearing on any pier/abutment, all the bearings on that pier/abutment shall be replaced, in order toget uniform load transfer on tobearings.	3 months	MORTH specification 2810andIRC SP: 40-2019.
Bridge Foundations	Scouring around foundations	Scouring shall not be lower than maximum scour level for the bridge	Bi-Annually	Condition survey and visualinspection as per IRC SP:35-1990 UsingMobile Bridge Inspection Unit. In case of doubt, use Underwater camera for inspection of deep wells inmajor	Suitable protection works around pier/abutment	1 month	IRC SP: 40-2019,IRC 83-2014, MORTH specification 2500

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
				Rivers.			
	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 todamaged aprons andpitching.	30 days after defect observation or2	IRC: SP 40-2019 and IRC: SP: 13-2004.
		sq.m, damage to solidapron (concrete apron) not morethan1 sq.m				weeks before onset of rainy season whicheveris 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 thecontractor.							

Table 4: Maintenance Criteria for Hill Roads

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

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

Note: For all tables 1 to 5 above, latest BIS & IRC standards (even those not indicated herewith) along with MoRT&H 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)	**Roadside 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**	
(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**	
(i)	Scouring and/or cavitation	15 (fifteen) days
(c)	**Piers, abutments, return walls and wingwalls**	
(i)	Cracks and damages including settlement and tilting, spalling, scaling	30 (thirty) days
(d)	**Bearings (metallic) ofbridges**	
(i)	Deformation, damages, tilting or shifting ofbearings	15 (fifteen) days Greasing of metallic bearings once in a year
(e)	**Joints**	
(i)	Malfunctioning of joints	15 (fifteen) days
(f)	**Otheritems**	
(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 guidebunds	30 (thirty) days
(vii)	Growth of vegetation affecting the structure or obstructing the waterway	15 (fifteen) days
(g)	**HillRoads**	
(i)	Damage to retaining wall/breast wall	7 (seven) days
(ii)	Landslides requiring clearance	12 (twelve) hours
(iii)	Snow requiring clearance	24 (twenty-four) hours

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

Schedule - F

(See Clause 4.1 (vii) (a))

Applicable Permits

1. Applicable Permits

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

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

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

(c) Licence for use of explosives;

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

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

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

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

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

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

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

Schedule – G

(See Clauses 7.1 and 19.2)

Annex-I

(See Clause 7.1)

Form of Bank Guarantee

[Performance Security/Additional Performance Security]

[MD,National Highways & Infrastructure Development Corporation Limited, New Delhi] WHEREAS:

(A) ____[name and address of contractor] (Hereinafter called the "**Contractor**") and [name and address of the authority], (hereinafter called the **"Authority"**) have entered into an agreement (hereinafter called the "**Agreement**") for the Widening & Upgradation to 2 lane with paved shoulder of NH-301 Kargil Zanskar Road from Design km 0.000 (Ex. km 0.000) to km 30.040 (Ex. km 30.000) of 30.040 Km length in the Union Territory of Ladakh on EPC mode (Pkg–I), subject to and in accordance with the provisions of the Agreement

(B) The Agreement requires the Contractor to furnish a Performance Security for due and faithful performance of its obligations, under and in accordance with the Agreement, during the {Construction Period/ Defects Liability Period and MaintenancePeriod}(asdefinedintheAgreement)inasumofRs…..cr.(Rupees…….. crore) (the "**Guarantee Amount**").

(C) We, through ourbranchat (the "**Bank**") have agreed to furnish this bank guarantee (hereinafter called the **"Guarantee**") by way of Performance Security.

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

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor's obligations during the {Construction Period/ Defects Liability Period and Maintenance Period} under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.

2. AletterfromtheAuthority,underthehandofanofficernotbelowtherankof[General Manager in the National Highways Authority of India], that the Contractor has committed default in the due and faithful performance of all orany of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

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

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

5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend

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

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Agreement or for the fulfilment, compliance and/or performance of all or any of the obligations of the Contractor under the Agreement.

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

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

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

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

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

12. 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.	90621010002610
3	Beneficiary Bank Branch	IFSC SYNB0009062
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.

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

Annex – II

(Schedule - G)

(See Clause 19.2)

Form for Guarantee for Advance Payment

[MD,National Highways & Infrastructure Development Corporation Limited, New Delhi] 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 Widening & Upgradation to 2 lane with paved shoulder of NH-301 Kargil Zanskar Road from Design km 0.000 (Ex. km 0.000) to km 30.040 (Ex. km 30.000) of 30.040 Km length in the Union Territory of Ladakh on EPC mode (Pkg–I),, subject to and in accordance with the provisions of theAgreement

(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"**AdvancePayment**")equalto10%(tenpercent)oftheContractPrice;and that the Advance Payment shall be made in two instalments 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 instalment to remain effective till the complete and full repayment of the instalment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of {first/second} instalment of the Advance Payment is Rs. ------ cr. (Rupees crore) andtheamount of this Guarantee is Rs. ------- cr. (Rupees ------ crore) (the **"Guarantee Amount")** [$]**.**

(C) We, …….. through ourbranchat..... (the "**Bank"**) have agreedtofurnish this bank guarantee (hereinafter called the **"Guarantee"**) for the Guarantee Amount.

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

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 tothe 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 specifiedtherein.

1. 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 orany 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, not withstanding 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.

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

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

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

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

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

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

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

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

11. 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.	90621010002610
3	Beneficiary Bank Branch	IFSC SYNB0009062
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) Thebankguaranteeshouldcontainthename,designationandcodenumberofthe officer(s) signing theguarantee.

$ Insert a date being 90 (ninety) days after the end of one year from the date of payment of the Advance payment to the Contractor (in accordance with Clause 19.2 of the Agreement).

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

Annex – III

(Schedule - G)
(See Clause 7.5.v)

Form for Guarantee for Withdrawal of Retention Money

The Managing Director,
National Highways & Infrastructure Development Corporation Limited
New Delhi

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 7.5.3 of the Agreement, the Contractor may withdraw the retention money (hereinafter called the "**Retention Money**") after furnishing to the Authority a bank guarantee for an amount equal to the proposed withdrawal.

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

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

1. The Bank hereby unconditionally and irrevocably undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.

2. A letter from the Authority, under the hand of an officer not below the rank of General Manager in the National Highways & Infrastructure Development Corporation Limited (NHIDCL) , that the Contractor has committed default in the due and faithful performance of all or any of its obligations for under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final, and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court,

tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

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

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

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

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

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

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

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

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

duly 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 up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

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

13. 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.	90621010002610
3	Beneficiary Bank Branch	IFSC SYNB0009062
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 Clauses10.1 (iv) and 19.3

Contract Price Weightages

1.1 The Contract Price for this Agreement is ……**Crores**

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	**45.29%**	**A- Widening and strengthening of existing road**	
		(1) Earthwork up to top of the sub-grade	1.15%
		(2) Sub-base Course	0.38%
		(3) Non Bituminous Base course	0.64%
		(4) Bituminous Base course	0.91%
		(5) Wearing Coat	1.55%
		(6) Widening and repair of culverts	0.00%
		B.1- Reconstruction/New Intermediate-Lane Realignment / Bypass (Flexible Pavement)	
		(1) Earthwork up to top of the sub-grade	21.87%
		(2) Sub-base Course	8.99%
		(3) Non bituminous Base course	16.34%
		(4) Bituminous Base course	27.35%
		(5) Wearing Coat	10.73%
		B.2- Reconstruction/New Intermediate-Lane Realignment / Bypass (Rigid Pavement)	0.00%
		C.1- Reconstruction/ New Service Road/ Slip Road (Flexible Pavement)	0.00%
		C.2- Reconstruction/New Service road (Rigid Pavement)	0.00%
		D- Reconstruction & New Culverts on on existing road, realignments, bypasses	
		Culverts (length <6m)	10.09%

Minor bridge/Underpasses/ Overpasses	**4.98%**	**A.1- Widening and repairs of Minor Bridges (length>6m & <60m)**	
		Minor Bridges	0.00%
		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.	28.11%
		(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.	46.59%
		(3) Approaches: On completion of approaches including Retaining walls, stone pitching, protection works complete in all respect and fit for use.	19.88%
		(4) Guide Bunds, Gabion Protection and River Training Works: On completion of Guide Bunds and river Training Works complete in all respects	5.42%
		B.1- Widening and repairs of underpasses/Overpasses	
		Underpasses/ Overpasses	0.00%
		B.2- New Underpasses /Overpasses	0.00%
Major bridge(length>60m) works and ROB/RUB/elevated sections/flyovers	**0.00%**	**A.1- Widening and repairs of Major Bridges**	0.00%
		A.2- New Major Bridges	0.00%
		B.1- Widening and repairs of	0.00%

including viaducts, if any		**(a) ROB**	
		(b) RUB	
		B.2- New ROB/RUB	0.00%
		C.1- Widening and repair of Elevated Section/Flyovers/Grade Separators	0.00%
		C.2- New Elevated Section/Flyovers/Grade Separators	0.00%
Other Works	**49.73%**	(i) Toll Plaza	0.00%
		(ii) Road side drains	24.99%
		(iii) Road signs, markings, km stones, safety devices,	9.44%
		(iv) Project facilities	0.00%
		a) Bus Bays/Shelter	0.16%
		b) Truck Lay-Byes	0.00%
		c) Rest Area	0.00%
		d) Others (Passing Lane)	0.00%
		(v) Road side Plantation	0.00%
		(vi) Protection works other than approaches to the bridges, elevated sections/ flyovers/grade separators and ROBs/RUBs.	
		(a) Retaining Wall	39.43%
		(b) Gabion Wall	5.29%
		(c) Breast Wall	18.76%
		(vii) Safety and traffic management during construction	
		a) Rock Netting in Avalanche Zone	0.00%
		b) Temporary diversion	1.21%
		(viii) Other miscellaneous works including Connecting road & Junction under Grade separator	0.72%

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
1	**2**	**3**
A- Widening & Strengthening of road		
(1) Earthwork up to top of the sub-grade	1.15%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 5 (five) km length, whichever is less.
(2) Sub-base Course	0.38%	
(3) Non bituminous Base course	0.64%	
(4) Bituminous Base course	0.91%	
(5) Wearing Coat	1.55%	
(7) Widening and Repair of culverts	0.00%	
B.1- Reconstruction/New Intermediate-Lane Realignment / Bypass (Flexible Pavement)		
(1) Earthwork up to top of the sub-grade	21.87%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 5(five) km length whichever is less.
(2) Sub-base Course	8.99%	
(3) Non bituminous Base course – WMM	16.34%	
(4) Bituminous Base course	27.35%	
(5) Wearing Coat	10.73%	
D- Reconstruction & New Culverts on existing road, realignments, bypasses		
Culverts (length <6m)	10.09%	Cost of each culverts 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

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 repair of minor bridges (length > 6m and < 60m)	0.000%	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 up to the abutment/pier cap.	28.11%	**(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+ substructure of each bridge subject to completion of at least two foundations along with sub-structure up to 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 superstructure in all respects including wearing coat, bearings, expansion joints, handrails, crash barriers, road signs & markings, tests on completion etc. complete in all respect.	46.59%	**(ii) Super-structure:** Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super-structure of at least 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.	19.88%	**(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.
(4) Guide Bunds, gabion Protection and River Training Works: On completion of Guide Bunds and river training works complete in all respects	5.42%	**Guide Bunds and River Training Works**: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of Guide Bunds and River training Works in all respects 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 Deleted

1.3.4 Other works.

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

Table 1.3.4

Stage of Payment	Weightage	Payment Procedure
1	**2**	**3**
(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	24.99%	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 5% (five per cent) of the total length.
(iii) Road signs, markings, km stones, safety devices,	9.44%	
(iv) Project Facilities	0.00%	
a) Bus Bays	0.16%	
b) Truck Lay-Byes	0.00%	
c) Rest Areas	0.00%	
d) Others (To be specified)	0.00%	
(v) Road side Plantation	0.00%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5% (five per cent) of the total length.
(vi) Protection Works other than approaches to the bridges, elevated sections/ flyover/ grade separators and ROBs/ RUBs	0.00%	
(a) Retaining Wall	39.43%	
(b) Gabion Wall	5.29%	
(c) Breast Wall	18.76%	
(vii) Safety and traffic management during construction	0.00%	Payment shall be made on prorate basis every six months.
a) Rock Netting in Avalanche Zone	0.00%	
b) Temporary diversion	1.21%	
(viii) Other miscellaneous works including Connecting road Junction under Grade separator	0.72%	Payment should be made on pro rata basis on completion of each stage

2. Procedure for payment for Maintenance

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

1. The Project drawings, as defined in Clause 1.1, Definitions, Article 1, Definitions and Interpretation, Part-I: Preliminary, of the Contract Agreement shall consist:

   (a) Working Drawings of all the components/elements of the Project as determined by Authority Engineer/Authority, and

   (b) As-built drawings for the Project components/elements as determined by AE/Authority. As-built drawings shall be duly certified by Authority Engineer.

2. A minimum list of the drawings of the various components/elements of the Project and project facilities required to be submitted by the Contractor is given below:

A. BRIDGE

General Arrangement Drawing
Detailed Drawings of Structures/Bridges

B. ROAD (PLAN & PROFILE)

Plan & Profile
Cross Sections
Drawings of horizontal alignment, vertical profile and cross sections
Drawings of cross drainage works
Drawings of traffic diversion plans and traffic control measures
Drawings of road drainage measures
Drawings of typical details slope protection measures
Drawings of landscaping and horticulture
Drawings of street lighting

C. STANDARD DRAWINGS

Detail of Mandatory Regulatory Signs
Detail of Mandatory Regulatory Signs & Compulsory Direction Control and Other Signs
Detail of Informatroy Signs
Detail of Cautionary Signs-TS
Detail of cautionary warning signs
Detail of cautionary warning signs
Details of route marking (chevron marking)
Details of road marking
Details of directional signs
Details Toe drain
Details of pitching, filtermaterial, chute drain and energy dissipation basin-std
Details of double head metal beam crash barrier
Details for 200meter 1 km & km post
Detail for boundary stone & guard post
Drain retaining wall & kerb
Gabion wall

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 ofeach 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 190th(One Hundred and Ninety) day from the Appointed Date (the "**Project Milestone-I**").

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

3. Project Milestone-II

(i) Project Milestone-II shall occur on the date falling on the 330 th (Three Hundred and Thirty)day from the Appointed Date (the "Project Milestone- II").

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

4. Project Milestone-III

(i) Project Milestone-III shall occur on the date falling on the 470th (Four Hundred & Seventy)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 **550th** (Five Hundred and Fifty) 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 forTests

(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

A. Road and Bridge

(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.

B. Other Tests

(i) 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.

(ii) 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 of defects pavement	Network Survey Vehicle (NSV)	At least twice a year (As per survey months defined for the state basis rainy season)
2	Roughnessof pavement	Network Survey Vehicle (NSV)	At least twice a year (As per survey months defined for the state basis rainy season)
3	Strength of pavement	Falling Weight Deflectometer(FWD)	At least once a year
4	Bridges	Mobile Bridge Inspection Unit(MBU)	At least twice a year (As per survey months defined for the state basis rainy season)
5	Road signs	Retro-reflectometer	At least twice a year (As per survey months defined for the state basis rainy season)

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

Schedule - L

(See Clause 12.2)

Completion Certificate

1 I, …….. (Name of the Authority's Engineer), acting as the Authority's Engineer, under and in accordance with the Agreement dated..... (the"**Agreement**"), the Widening & Upgradation to 2 lane with paved shoulder of NH-301 Kargil Zanskar Road from Design km 0.000 (Ex. km 0.000) to km 30.040 (Ex. km 30.000) of 30.040 Km length in the Union Territory of Ladakh on EPC mode (Pkg–I), (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 ANDDELIVERED

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 Paragraph2.

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, rain cuts, disturbed pitching, vegetation growth, pruning of trees	5%
(c)	**Bridges and Culverts**	
(i)	Desilting, cleaning. vegetation growth, damaged pitching, flooring, parapets, wearing course, footpaths, any damage to foundations	20%
(ii)	Any Defects in superstructures, bearings and sub-structures	10%
(iii)	Painting, repairs/replacement kerb, 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 kmstones	5%
(f)	**Miscellaneous Items**	
(i)	Removal of dead animals, broken down/accidental 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 asunder:

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

Where,

P= Percentage of particular item/Defect/deficiency fordeduction

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) TheseTermsofReference(the"**TOR**")fortheAuthority'sEngineerarebeingspecified pursuant to the EPC Agreement dated ..... (the "**Agreement**), which has been enteredintobetweenthe[nameandaddressoftheAuthority](the"**Authority**")and..... (the "**Contractor**")# Widening & Upgradation to 2 lane with paved shoulder of NH-301 Kargil Zanskar Road from Design km 0.000 (Ex. km 0.000) to km 30.040 (Ex. km 30.000) of 30.040 Km length in the Union Territory of Ladakh on EPC mode (Pkg–I), and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.

- In case the bid of Authority's Engineer is invited simultaneously with the bid of EPC project, then the status of bidding of EPC project only to be indicated

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

2. Definitions and interpretation

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

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

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

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 IndustryPractice.

(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 GoodIndustry 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 theContractor.

(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 theContractor.

(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 thisbehalf.

(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 permissiblelimit.

(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 Clause14.5.

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 theAgreement.

(ii) TheAuthority'sEngineershalldeterminetheperiodofTimeExtensionthatisrequired to be determined by it under theAgreement.

(iii) The Authority's Engineer shall consult each Party in every case of determination in accordance with the provisions of Clause18.5.

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 totheContractor, 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 Clause19.16.

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 Authorityforthwith.

(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-builtsurveyillustratingthelayoutoftheProjectHighwayandsetbacklines,ifany,ofthe buildingsandstructures forming partof ProjectFacilities;and shall hand themoverto the Authority against receiptthereof.

(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 theParties.

(v) TheAuthority'sEngineershallinformtheAuthorityandtheContractorofanyeventof Contractor's Default within one week of itsoccurrence.

Schedule - O

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

Forms of Payment Statements

1. Stage Payment Statement forWorks

The Stage Payment Statement for Works shall state:

(a) theestimatedamountfortheWorksexecutedinaccordancewithClause19.3

(i) subsequent to the lastclaim;

(b) amounts reflecting adjustments in price for the aforesaidclaim;

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

(d) amountsreflectingadjustmentinprice,ifany,for(c)aboveinaccordancewith 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 excepttaxes;

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 lastclaim:

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

ii. For Change of Scope Orders,and

iii. Taxesdeducted

2. Monthly Maintenance PaymentStatement

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 notdone;

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

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

(e) amount towards deduction oftaxes

3. Contractor's claim forDamages

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

Schedule - P

(See Clause 20.1)

Insurance

1. Insurance during ConstructionPeriod

(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 andterrorism:

(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 theSite.

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

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 ofoccurrences.

The insurance cover shall be not less than: Rs. 2,00,00,000/- (Two Crore only)

(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 theWorks.

4. Insurance to be in jointnames

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 Qualitytest

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 kilometer.

2. Visual and physicaltest

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**"), Widening & Upgradation to 2 lane with paved shoulder of NH-301 Kargil Zanskar Road from Design km 0.000 (Ex. km 0.000) to km 30.040 (Ex. km 30.000) of 30.040 Km length in the Union Territory of Ladakh on EPC mode (Pkg-I) (the "**Project Highway**") on Engineering, Procurement and Construction (EPC) basis through (NameofContractor),herebycertifythattheTestsoncompletionofMaintenance 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 ANDDELIVERED

(Signature)

(Name and designation of Authority'sRepresentative)

(Address)

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