



NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION
LTD.
(Ministry of Road Transport & Highways)
Government of India

DRAFT CONTRACT AGREEMENT & SCHEDULES

Widening and Up-gradation of existing carriageway into 2-lane with
paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km
15.300) along NH-717B in the State of Sikkim on EPC mode.

Engineering, Procurement & Construction
(EPC) Mode

BID DOCUMENT (Schedule)

June 2026

Technical Schedule

Schedule - A

Schedule-A
(See Clauses 2.1 and 8.1)
Site of the Project

1 The Site

- (i)** Site of the Rhenock-Rongli section of NH-717B having Two-Lane Project Highway shall include the land, Buildings, structures and road works as described in Annex-I of this Schedule-A.
- (ii)** The dates of handing over the Right of Way to the Contractor are specified in **Annex-II of this Schedule-A.**
- (iii)** An inventory of the Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority Representative and the Contractor, and such inventory shall form part of the memorandum referred to in **Clause 8.2 (i) of this Agreement.**
- (iv)** The alignment plans of the Project Highway are specified in Annex-III. In the case of sections where no modification in the existing alignment of the Project Highway is contemplated, the alignment plan has not been provided. Alignment plans have only been given for sections where the existing alignment is proposed to be upgraded. The proposed profile of the Project 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.
- (vi)** Contractor should geotagged & mapped along with its physical dimensions' length & width and photographic condition evidence along with date & time stamped for each and every structures / building (commercial/ non-commercial), private land, land use, access roads, revenue & forest land within 100 m each side of the edge of the proposed right of way (PRoW). Contractor shall identify secondary intersecting/ access roads/cross roads, design improvement thereof.

Annex - I
(Schedule-A)
Site

[Note: All the chainages/location referred to in Annex-I to Schedule-A are existing chainages.]

1.0 Site

The Site of the Two-Lane with paved shoulder Project Highway comprises the section of National Highway NH-717B commencing from km 0+000 (Rhenock) to km 15+300 (Rongli) in the State of Sikkim. The land, carriageway and structures comprising the Site are described below.

2.0 Land

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

Sr. No.	Chainage		ROW (m)	Remarks
	From	To		
1	0+000	15+300	Varies from 19 to 26 m	Refer Annex-II of this Schedule-A

3.0 Carriageway

The present width of carriageway of the Project Highway is a Two-Lane road. The type of the existing pavement is flexible.

Sr. No	Existing Chainage (Km)		Length (km)	Existing Carriageway Width (m)	Type of Pavement	Remarks
	From	To				
1.	0+000	15+300	15.3	7	Flexible	Except Sinking Zone, where carriageway varies from 3 m-4 m.

4.0 Major Bridges

The Site includes the following Major Bridge:

Sr.No.	Chainage (km)		Type of Structure			No of Spans with span length (m)	Width (m)
	Existing	Design	Foundation	Sub Structure	Super Structure		
1.	15+300	-	Open	-	RCC/PSC	1x55+1x20	10.1

5.0 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						

6.0 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					

7.0 Minor bridges

The Site includes the following minor bridges:

Sr.No.	Chainage (km)		Type of Structure			No of Spans with span length (m)	Width (m)
	Existing	Design	Foundation	Sub Structure	Super Structure		
1	14+300	-	Open	-	Balley Bridge	1x18	5.5

8.0 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 following underpasses:

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

10. Culverts

The Site has the following existing culverts:

S. No.	Existing Chainage (km)	Type of Culvert	Span/Opening with span length (m)	Width(m)
1	00+082	BOX	1x1.5	11
2	00+295	BOX	1x1.5	11
3	00+490	BOX	1x1.5	11
4	00+560	BOX	1x1.5	11
5	01+030	BOX	1x1.5	11
6	01+330	BOX	1x1.5	11
7	01+526	BOX	1x1.5	11
8	01+954	BOX	1x1.5	11

S. No.	Existing Chainage (km)	Type of Culvert	Span/Opening with span length (m)	Width(m)
9	02+217	BOX	1x1.5	11
10	02+325	BOX	1x1.5	11
11	02+528	BOX	1x1.5	11
12	02+817	BOX	1x1.5	11
13	03+185	BOX	1x1.5	11
14	03+405	BOX	1x1.5	11
15	03+542	BOX	1x1.5	11
16	03+620	BOX	1x1.5	11
17	03+823	BOX	1x1.5	11
18	04+045	BOX	1x1.5	11
19	04+444	BOX	1x1.5	11
20	04+535	BOX	1x1.5	11
21	04+690	BOX	1x1.5	11
22	04+875	BOX	1x1.5	11
23	05+640	BOX	1x1.5	11
24	05+920	BOX	1x1.5	11
25	06+305	BOX	1x1.5	11
26	06+515	BOX	1x1.5	11
27	06+780	BOX	1x1.5	11
28	07+580	BOX	1x1.5	11
29	08+325	BOX	1x1.5	11
30	09+030	BOX	1x1.5	11
31	09+120	BOX	1x1.5	11
32	09+570	BOX	1x1.5	11
33	09+840	BOX	1x1.5	11
34	09+910	BOX	1x1.5	11
35	10+015	BOX	1x1.5	11
36	10+125	BOX	1x1.5	11
37	10+625	BOX	1x1.5	11
38	10+922	BOX	1x1.5	11
39	11+315	BOX	1x1.5	11
40	11+555	BOX	1x1.5	11
41	11+725	BOX	1x1.5	11
42	12+210	BOX	1x1.5	11
43	12+282	BOX	1x1.5	11
44	12+480	BOX	1x1.5	11
45	12+635	BOX	1x1.5	11
46	12+800	BOX	1x1.5	11
47	12+920	BOX	1x6	11
48	13+085	BOX	1x1.5	11
49	13+170	BOX	1x1.5	11
50	13+275	BOX	1x3	11
51	13+325	BOX+PIPE, Hybrid	1x1	11
52	13+550	BOX	1x3	11
53	13+770	BOX	1x1	11

S. No.	Existing Chainage (km)	Type of Culvert	Span/Opening with span length (m)	Width(m)
54	14+037	BOX	1x3	11
55	14+515	BOX	1X3	11
56	14+790	BOX	1x2	11
57	14+910	BOX	1x3	11

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	Remarks
1	0+820	-	-	✓	-
2	1+450	-	-	✓	-
3	5+660	-	✓	-	-

12. Truck Lay byes

The details of truck lay byes are as follows:

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

13. Road side drains

The details of the roadside drains are as follows

Sr. No.	Location		Type	
	From km	To km	Masonry/CC (Pucca)	Earthen (Kutcha)
1	00+000	00+350	-	✓
2	00+350	00+700	✓	-
3	00+700	00+800	-	✓
4	00+800	00+950	-	-
5	00+950	01+350	✓	-
6	01+350	01+400	-	✓
7	01+400	01+700	✓	-
8	01+700	01+750	-	✓
9	01+750	2+000	✓	-
10	02+000	02+100	-	✓
11	02+100	02+200	✓	-
12	02+200	02+250	-	✓
13	02+250	02+650	✓	-
14	02+650	02+750	-	✓
15	02+750	03+950	✓	-

Sr. No.	Location		Type	
	From km	To km	Masonry/CC (Pucca)	Earthen (Kutchra)
16	03+950	04+000	✓	-
17	04+000	04+050	✓	-
18	04+050	04+150	-	✓
19	04+150	04+250	✓	-
20	04+250	04+900	-	✓
21	04+900	04+950	✓	-
22	04+950	05+000	-	✓
23	05+000	05+550	✓	-
24	05+550	05+600	✓	-
25	05+600	05+650	✓	-
26	05+650	05+700	✓	-
27	05+700	05+800	-	✓
28	05+800	06+000	✓	-
29	06+000	06+600	-	✓
30	06+600	06+650	✓	-
31	06+650	06+800	✓	-
32	06+800	06+850	✓	-
33	06+850	10+250	-	✓
34	10+250	11+000	-	✓
35	11+000	11+050	✓	-
36	11+050	12+950	-	✓
37	12+950	14+200	✓	-
38	14+200	14+450	-	✓
39	14+450	15+150	✓	-

14.0 Major junctions

The details of major junctions are as follows:

Sr. No.	Location at	At grade	Separated	Category of Cross Road			
				NH	SH	MDR	Others
1	14+024	✓	-	-	✓	-	✓

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

15.0 Minor junctions

The details of the minor junctions are as follows:

Sr. No.	Location at	Type	
		Y- junction	Cross road
1	1+330	✓	-
2	1+490	✓	-
3	1+870	✓	-
4	2+450	✓	-
5	3+630	✓	-
6	4+990	✓	-
7	5+050	✓	-
8	5+570	✓	-
9	5+840	✓	-
10	6+550	✓	-
11	6+660	✓	-
12	6+890	✓	-
13	10+260	✓	-
14	11+880	✓	-
15	13+200	✓	-
16	14+410	✓	-

16. Bypasses

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

Sr. No.	Name of bypass (town)	Chainage		Length (in Km)
		From km	To km	
NIL				

17. Other structure:

(i) Retaining wall

The details of the retaining wall are as follows:

Sr. No.	Existing Chainage (Km)		Length (m)
	From km	To km	
1	0+350	0+380	30 m
2	0+500	0+530	30 m
3	0+550	0+565	15 m
4	0+650	0+700	50 m
5	0+700	0+750	50 m
6	0+850	0+875	25 m
7	1+450	1+465	15 m
8	1+500	1+520	20 m
9	2+950	2+980	30 m
10	3+000	3+040	40 m

Sr. No.	Existing Chainage (Km)		Length (m)
	From km	To km	
11	4+450	4+495	45 m
12	4+700	4+720	20 m
13	4+950	4+980	30 m
14	5+000	5+050	50 m
15	5+050	5+090	40 m
16	5+100	5+140	40 m
17	5+150	5+200	50 m
18	5+650	5+675	25 m
19	5+750	5+790	40 m
20	5+800	5+820	20 m
21	6+250	6+270	20 m
22	6+750	6+800	50 m
23	7+500	7+520	20 m
24	7+550	7+600	50 m
25	7+600	7+650	50 m
26	7+650	7+700	50 m
27	7+700	7+750	50 m
28	7+750	7+800	50 m
29	7+800	7+850	50 m
30	7+850	7+895	45 m
31	8+600	8+615	15 m
32	9+700	9+730	30 m
33	10+550	10+600	50 m
34	10+600	10+630	30 m
35	10+700	10+710	10 m
36	10+850	10+860	10 m
37	11+450	11+495	45 m
38	11+500	11+515	15 m
39	11+950	12+000	50 m
40	12+000	12+040	40 m
41	12+350	12+400	50 m
42	12+400	12+440	40 m
43	12+550	12+585	35 m
44	12+950	13+000	50 m
45	13+000	13+060	60 m
46	13+050	13+075	25 m
47	13+100	13+140	40 m
48	13+150	13+190	40 m
49	13+200	13+210	10 m
50	13+300	13+320	20 m
51	13+350	13+375	25 m

Sr. No.	Existing Chainage (Km)		Length (m)
	From km	To km	
52	13+400	13+420	20 m
53	13+550	13+595	45 m
54	13+600	13+610	10 m
55	13+700	13+750	50 m
56	13+750	13+795	45 m
57	13+800	13+860	60 m
58	13+900	13+905	5 m
59	14+000	14+005	5 m
60	14+050	14+090	40 m
61	14+100	14+145	45 m
62	14+400	14+415	15 m
63	14+450	14+500	50 m
64	14+500	14+550	50 m
65	14+550	14+580	30 m
66	14+650	14+665	15 m
67	14+700	14+730	30 m
68	14+850	14+875	25 m
69	14+900	14+960	60 m
70	14+950	14+980	30 m
71	15+000	15+050	50 m
72	15+050	15+100	50 m
73	15+100	15+135	35 m

(ii) **Breast wall**

The details of the Breast wall are as follows:

Sr. No.	Existing Chainage (Km)		Length (m)
	From km	To km	
1	0+150	0+160	10 m
2	0+200	0+240	40 m
3	0+550	0+575	25 m
4	0+650	0+670	20 m
5	1+000	1+020	20 m
6	1+050	1+070	20 m
7	1+150	1+170	20 m
8	1+450	1+475	25 m
9	1+550	1+565	15 m
10	2+900	2+930	30 m
11	3+150	3+155	5 m
12	3+200	3+245	45 m
13	3+300	3+350	50 m
14	3+350	3+390	40 m
15	3+400	3+435	35 m

Sr. No.	Existing Chainage (Km)		Length (m)
	From km	To km	
16	3+500	3+540	40 m
17	3+550	3+590	40 m
18	5+600	5+625	25 m
19	5+700	5+735	35 m
20	5+750	5+800	50 m
21	5+800	5+850	50 m
22	5+850	5+900	50 m
23	5+900	5+950	50 m
24	6+100	6+125	25 m
25	6+150	6+190	40 m
26	6+450	6+475	25 m
27	6+500	6+520	20 m
28	6+600	6+635	35 m
29	6+650	6+680	30 m
30	6+700	6+720	20 m
31	6+750	6+800	50 m
32	6+800	6+810	10 m
33	6+850	6+900	50 m
34	6+900	6+940	40 m
35	7+000	7+010	10 m
36	7+050	7+090	40 m
37	7+100	7+110	10 m
38	7+150	7+175	25 m
39	7+200	7+235	35 m
40	7+250	7+275	25 m
41	7+300	7+310	10 m
42	7+500	7+515	15 m
43	7+550	7+600	50 m
44	7+700	7+730	30 m
45	7+750	7+790	40 m
46	7+850	7+860	10 m
47	7+900	7+950	50 m
48	7+950	8+000	50 m
49	8+550	8+560	10 m
50	8+600	8+640	40 m
51	8+650	8+700	50 m
52	8+700	8+720	20 m
53	8+950	8+975	25 m
54	9+050	9+070	20 m
55	9+100	9+140	40 m
56	9+250	9+280	30 m
57	9+350	9+380	30 m

Sr. No.	Existing Chainage (Km)		Length (m)
	From km	To km	
58	9+400	9+440	40 m
59	9+450	9+460	10 m
60	9+500	9+540	40 m
61	9+550	9+600	50 m
62	9+600	9+640	40 m
63	9+700	9+740	40 m
64	9+750	9+785	35 m
65	10+050	10+080	30 m
66	11+000	11+040	40 m
67	11+050	11+100	50 m
68	11+150	11+190	40 m
69	11+200	11+225	25 m
70	11+250	11+265	15 m
71	11+400	11+415	15 m
72	11+750	11+760	10 m
73	11+800	11+820	20 m
74	12+800	12+810	10 m
75	12+900	12+910	10 m
76	13+150	13+165	15 m
77	13+450	13+460	10 m
78	13+500	13+510	10 m
79	13+950	13+990	40 m
80	14+050	14+060	10 m
81	14+100	14+150	50 m
82	14+150	14+200	50 m
83	14+200	14+250	50 m
84	14+250	14+260	10 m
85	14+400	14+420	20 m
86	14+850	14+875	25 m
87	14+900	14+930	30 m

18. Details of Existing Utilities: The details of existing utilities are given in Sheet-I (Annex-I of Schedule-A)

(i) **ELECTRICAL UTILITIES**

The site includes the following electrical utilities: -

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

Sr. No	Chainage		Length along NH (in Km)				ROW Crossings (in km)			
	From km	To km	400KV	220KV	110KV	66KV	400KV	220KV	110KV	66KV
Nil										

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

Sr. No	Chainage		Length (in Km)				Crossings (no's)				Transformer	
	From	To	33 KV	22 KV	11 KV HT line/3-Phase LT line	No. of LT/ HT poles	33KV	22KV	11KV	LT/HT	No	Capacity
1	0+000	0+664	-	-	0.626	269 Nos. of HT poles including T-off having 9mt lattice structure, 26 nos of poles having 11mt lattice structure & 75 nos. of LT poles having 8.5mt lattice structure.						25 KVA (1 No.) / 63 KVA (1 No.) / 100/KVA (1 No.)
2	0+985	1+967	-	-	0.982							
3	2+260	2+498	-	-	0.238							
4	2+635	2+680	-	-	0.045							
5	2+925	3+387	-	-	0.462							
6	3+490	3+658	-	-	0.168							
7	3+866	3+897	-	-	0.031							
8	4+100	4+264	-	-	0.164							
9	4+370	4+695	-	-	0.325							
10	4+823	5+160	-	-	0.337							
11	5+312	5+450	-	-	0.138							
12	5+787	6+130	-	-	0.343							
13	6+280	6+470	-	-	0.190							

Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.

14	6+550	7+117	-	-	0.567						
15	7+316	7+670	-	-	0.354						
16	7+910	8+668	-	-	0.758						
17	8+771	9+300	-	-	0.529						
18	9+460	9+510	-	-	0.050						
19	9+675	10+302	-	-	0.627						
20	10+412	11+136	-	-	0.724						
21	11+516	13+455	-	-	1.939						
22	14+047	14+514	-	-	0.371						

(c) Public Health Department & Rural Development Department Utilities (PHED & RDD, Water Pipelines)

(a) The site includes the following public health department utilities: -

Sr No	Chainage(km)		Type	Length (in Km)				Crossings				Remarks
	From	To		Water Supply line		Sewage line		Water Supply line		Sewage line		
				With Pumping	With Gravity	With Pumping	With Gravity	With Pumping	With Gravity	With Pumping	With Gravity	
1	0+700	0+800	DN-65mm (GI)		0.100							
2	1+750	1+880	DN-65mm (GI)		0.150				1 NO. at Ch. 1+880			
3	1+880	2+030	DN-65mm (GI)		0.150							
4	3+050	5+050	DN-100mm (GI)		2.000							
5	4+650	7+150	DN-50mm (GI)		2.500							
6	7+150	7+450	DN-80mm (GI)		0.300				1 NO. at Ch.7+400			

Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.

Sr No	Chainage(km)		Type	Length (in Km)				Crossings				Remarks
	From	To		Water Supply line		Sewage line		Water Supply line		Sewage line		
				With Pumping	With Gravity	With Pumping	With Gravity	With Pumping	With Gravity	With Pumping	With Gravity	
7	Household connection/Consumer supply		DN 15mm (GI)		0.600							

(b) The site includes the following RDD utilities: -

Sr · No	Chainage (Km)		Type	Length (in Km)				Crossings				Remarks
	From	To		Water Supply line		Sewage line		Water Supply line		Sewage line		
				With Pumping	With Gravity	With Pumping	With Gravity	With Pumping	With Gravity	With Pumping	With Gravity	
1	0+000	0+860	DN 40 mm (GI)		0.210							Reservoir tank (5000 ltr): 02 nos
			DN 32 mm (GI)		0.650				1 no			
2	1.700	3.000	DN 40 mm (GI)		1.000				1 no.			
3	0.900	1.700	DN 25 mm (GI)		1.000							
4	3.000	3.950	DN 65 mm (GI)		0.200							
5	3.950	4.500	DN 65mm (GI)		8.500							
6	4.500	6.500	DN 40 mm (GI)		2.300							
7	6.500	8.550	DN 40 mm (GI)		0.700							
			DN 32 mm (GI)		0.800				1 no.			
			DN 25 mm (GI)		1.000							
8	8+550	11+900	DN 32 mm (GI)		0.570							
			DN 25 mm (GI)		0.560				1 no.			
			DN 20 mm (GI)		0.190							
			DN 15 mm (GI)		0.500							
9	11+900	14+514	DN 40 mm (GI)		0.210							
			DN 32 mm (GI)		0.990				1 no.			
			DN 25 mm (GI)		0.120							
			DN 20 mm (GI)		0.090				1 no.			
			DN 15 mm (GI)		2.250							

(i) Any Other Line: 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)					
(a)	Stretch-I	Km 0.00 to 0.010	0.01	25 m	On Appointed Date
		Km 0.010 to 0.250	0.24	24 m	
		Km 0.250 to 0.270	0.02	20 m	
		Km 0.270 to 0.380	0.11	24 m	
		Km 0.380 to 0.400	0.02	20 m	
		Km 0.400 to 0.720	0.32	24 m	
		Km 0.720 to 0.730	0.01	20 m	
		Km 0.730 to 1.200	0.47	24 m	
		Km 1.200 to 1.210	0.01	20 m	
		Km 1.210 to 1.430	0.22	24 m	
		Km 1.430 to 1.490	0.06	20 m	
		Km 1.490 to 1.800	0.31	24 m	
		Km 1.800 to 1.820	0.02	20 m	
		Km 1.820 to 2.010	0.19	24 m	
		Km 2.010 to 2.030	0.02	20 m	
		Km 2.030 to 3.380	1.35	24 m	
		Km 3.380 to 3.390	0.01	20 m	
		Km 3.390 to 3.630	0.24	24 m	
		Km 3.630 to 3.640	0.01	25 m	
		Km 3.640 to 3.660	0.02	26 m	
		Km 3.660 to 3.680	0.02	25 m	
		Km 3.680 to 3.770	0.09	24 m	
		Km 3.770 to 3.780	0.01	20 m	
		Km 3.780 to 3.910	0.13	24 m	
		Km 3.910 to 3.930	0.02	20 m	
		Km 3.930 to 4.530	0.6	24 m	
		Km 4.530 to 4.570	0.04	20 m	
		Km 4.570 to 5.040	0.47	24 m	
		Km 5.040 to 5.070	0.03	20 m	
		Km 5.070 to 5.620	0.55	24 m	
		Km 5.620 to 5.660	0.04	20 m	
		Km 5.660 to 5.860	0.2	24 m	
		Km 5.860 to 5.900	0.04	20 m	
		Km 5.900 to 6.970	1.07	24 m	
		Km 6.970 to 7.000	0.03	20 m	
		Km 7.000 to 7.540	0.54	24 m	
		Km 7.540 to 7.590	0.05	20 m	
		Km 7.590 to 8.830	1.24	24 m	
		Km 8.830 to 8.850	0.02	20 m	

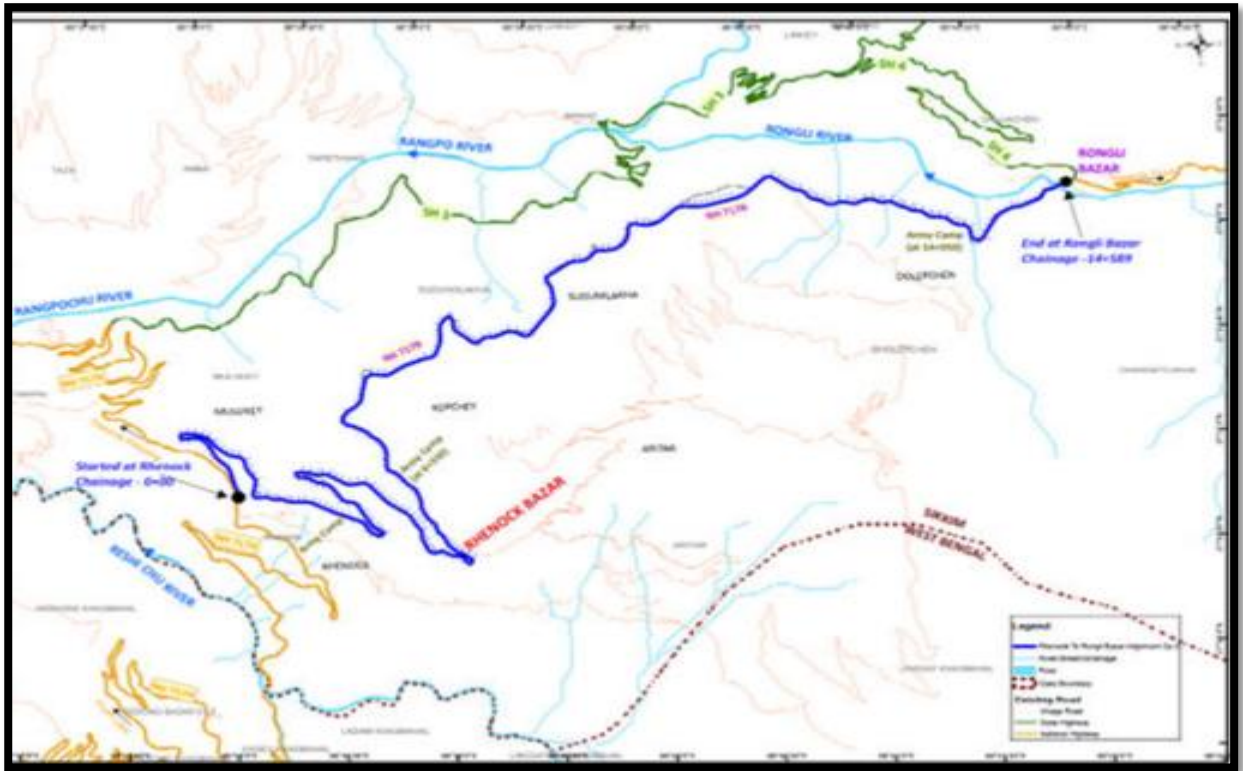
Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.

		Km 8.850 to 12.350	3.5	24 m	
		Km 12.350 to 12.420	0.07	20 m	
		Km 12.420 to 12.530	0.11	24 m	
		Km 12.530 to 12.580	0.05	20 m	
		Km 12.580 to 12.610	0.03	19 m	
		Km 12.610 to 12.790	0.18	24 m	
		Km 12.790 to 12.880	0.09	20 m	
		Km 12.880 to 13.190	0.31	24 m	
		Km 13.190 to 13.230	0.04	20 m	
		Km 13.230 to 14.589	1.359	24 m	
(ii) Part Right of Way (part width) : NIL					
(iii) Balance Right of Way (width) : 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:



An alignment plan is given in soft copy.

- (i) The alignment of the Project Highway is enclosed in alignment plan. Finished road level indicated in the alignment plan shall be followed by the contractor as minimum FRL. In any case, the finished road level of the project highway shall not be less than those indicated in the alignment plan. 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 are enclosed. The contractor 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, in addition to MoRTH Circular no. RT-25035/07/2023-RS (Part) (221534), dated 20.07.2023.

Annex - IV

(Schedule-A)

Environment Clearances

Sr.No.	Clearances	Present Status
1	Environment Clearance	Not Applicable
2	Wildlife Approval	Not Applicable
3	Forest Clearance	Required

Schedule - B

Schedule - B
(See Clause 2.1)

Development of 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 Widening & Up-gradation of Project Highway

Widening & up-gradation of Project Highway shall include Two-Laning with paved shoulder of the Project Highway as described in Annexe-I of this Schedule-B and Annexe-I of Schedule-C.

3 Specifications and Standards

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

Annex -I (Schedule-B)

1. Description of Two-Lane with Paved Shoulder

The Site of the Two-Lane Project Highway comprises the section of National Highway-717B commencing from Rhenock at Km 0.00 and ends at Rongli at Km 14.589 (Length 14.589 Km) in the State of Sikkim. The land, carriageway and structures comprising the site are described below.

1.1 Widening of the Existing Highway

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 steep terrain to the extent land is available.

1.2 Width of Carriageway

Two-laning with a paved shoulder shall be undertaken. The paved carriageway shall be 7.0m wide with 1.0m paved shoulder on both sides in accordance with the typical cross-section drawings and as per IRC:SP:73-2018.

On Horizontal Curves, roadways width should be increased to provide for extra widening at Curves as per Cl. 6.8.5 of IRC:SP: 48-2023.

Provided that in the built-up areas, the width of the carriageway shall be as specified in the following table:

Sr. No.	Built-up Stretch (Township)	Location		Width (m)	Typical cross-section
		From	To		
Nil					

1.2.1 Except as otherwise provided in this Agreement, the width of the paved carriageway and cross-sectional features shall conform to paragraph 1.1 above.

2. Geometric Design and General Features

2.1 General

Geometric design and general features of the Project Highway shall be in accordance with Section 2 of the Manual, referred to as the Manual in Sch-D or another relevant IRC codes.

2.2 Design Speed

The design speed shall be the minimum design speed of 40 km/h for steep terrain, except at hairpin bends & exceptional locations where geometrics could not be improved due to site constraints.

2.3 Improvement of the Existing Road Geometrics

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

Sl. No	Stretch (from km to km)	Type of deficiency	Remarks
As per Alignment plan			

Details of Bypasses are specified as under:

Sl. No.	Name of Bypass	Existing Chainage (km)		Design Chainage (km)		Design Length (km)
		From	To	From	To	
Nil						

(i) Details of Realignment(2.130Km):

Sl. No.	Chainage (Design)		Length	TCS	Description	Remarks
	From km	To km				
1	0+780	1+020	240	TCS-4B	Typical Cross Section -4B, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) New Construction and Valley Side Slope (RHS)	Realignment for Curve improvement
2	1+880	1+920	40	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)	Realignment for Curve improvement
3	2+790	2+950	160	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)	Realignment for Curve improvement
4	3+460	3+520	60	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep	Realignment for Curve improvement
5	3+580	3+660	80	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep	Realignment for Curve improvement
6	3+700	3+850	150	TCS-4B	Typical Cross Section -4B, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) New Construction and Valley Side Slope (RHS)	Realignment for Curve improvement
7	3+900	3+950	50	TCS-4B	Typical Cross Section -4B, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) New Construction and Valley Side Slope (RHS)	Realignment for Curve improvement

8	4+000	4+050	50	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)	Realignment for Curve improvement
9	5+170	5+260	90	TCS-2B	Typical Cross Section -2B, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS), Realignment	Realignment for Curve improvement
10	5+480	5+560	80	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)	Realignment for Curve improvement
11	7+140	7+200	60	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)	Realignment for Curve improvement
12	7+560	7+670	110	Viaduct	TCS is attached	Realignment for Avoiding the narrow Zone-1
13	8+520	8+560	40	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)	Realignment for Curve improvement
14	8+860	8+910	50	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)	Realignment for Curve improvement
15	9+190	9+270	80	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)	Realignment for Curve improvement
16	9+870	9+900	30	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)	Realignment for Curve improvement
17	9+990	10+050	60	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)	Realignment for Curve improvement
18	10+860	10+960	100	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain)	Realignment for Curve improvement

					Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)	
19	11+200	11+750	550	Tunnel	TCS attached	Realignment for Avoiding the narrow Zone-2
20	13+690	13+740	50	MNB	TCS is attached	Realignment for Avoiding the Sharp curve and traffic movement during MNB construction.

2.4 Right of Way

(a) Details of the Right of Way are given in Annexure-II of Schedule A.

(b) **Provision of Additional Right of way (RoW):** - The requirements of land and access to the lands beyond Row are inevitable during execution of protection works'. Additional land should be acquired at culverts/ structures locations to chanellise hill side stream for the construction of catch water drains (CWDs) for effective interception and disposal of hill runoff which can lead to erosion, slope instability, and pavement deterioration. This provision is essential to prevent uncontrolled surface runoff from entering the formation, to prevent surface runoff from directly reaching roadways, buildings, or other critical structures. Also, to implement safety measures effectively additional land if necessary should be acquired at the locations where slope stabilization anchors (e.g., soil nails, rock bolts) extend beyond RoW.

2.5 Type of Shoulders

a) In built-up sections, footpaths/fully paved shoulders shall be provided in the following stretches:

Sr. No.	Design Chainage Stretch (in km)		Length (m)	Fully paved shoulders	Footpaths	Reference to cross section
	Start	End				
As per TCS.						

b) In open country, paved shoulders of 1.0m width shall be provided on both hill and valley sides. The Earthen shoulder, as given below, at the valley side shall be covered with a 150mm thick compacted layer of granular material:

Description	Width of Earthen Shoulder (m)
Open Country normal section	2.50 m (0.50 m ES + 1.00 m for Thrie beam installation + 1.00 m for Utility Corridor)

c) Design and specifications of paved shoulders and granular material shall conform to the requirements specified in the relevant Manual.

2.6 Lateral and vertical clearances at underpasses

- a) Lateral and vertical clearances at underpasses and provision of guardrails/crash barriers shall be as per the provisions of the Manual.
- b) **Lateral clearance:** The width of the opening at the underpasses shall be as follows:

Sr. No.	Design Chainage (km)	Silent features	Minimum length of the Viaduct to be provided	Road to be carried over/under the structure	Type of Structure	Location	Remarks
Nil							

2.7 Lateral and vertical clearances at overpasses

- a) Lateral and vertical clearances at overpasses shall be as per the provisions of the relevant Manual.
- b) **Lateral clearance:** The width of the opening at the overpasses shall be as follows:

Sr. No.	Location (Chainage) (from km to km)	Span/ opening (m)	Remarks
Nil			

2.8 Service Roads

Service roads' width shall be constructed as per the relevant manual at the locations and for the lengths indicated below:

Sl. No	Design Chainage (Km)		Bridge Length (m)	Length (km)	Side
	From	To			
Nil					

2.9 Grade Separated Structures

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

Sr. No.	Locations	Length	Number of Span	Approach		Remarks, if any
				A1	A2	
Nil						

- (b) 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: [Refer to the 156 provision of the relevant Manual and specify the type of vehicular underpass/ overpass structure and whether the crossroad is to be carried at the existing level, raised or lowered]

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

2.10 Cattle and pedestrian underpass/overpass:

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

Sr. No.	Location	Type of crossing
Nil		

2.11 Typical cross-section of the Project Highway

TCS of Type	Description	Length (km)	Remarks
TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)	0.210	Refer to Chainage-wise details for the respective typical cross-section, as furnished in the table below.
TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)	0.264	
TCS-2	Typical Cross Section -2 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)	0.190	
TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)	1.500	
TCS-2B	Typical Cross Section -2B, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS), Realignment	0.100	
TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)	0.580	
TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)	2.420	

TCS of Type	Description	Length (km)	Remarks
TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)	2.240	
TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)	5.580	
TCS-4B	Typical Cross Section -4B, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) New Construction and Valley Side Slope (RHS)	0.490	
TCS-5	Typical Cross Section -5, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)	0.230	
Viaduct	New Construction (Realignment)	0.110	
Tunnel	New Construction (Realignment)	0.550	
MNB	Re-Construction (Realignment)	0.050	
MJB	Repair and Rehabilitation (R&R)	0.075	
	Total Proposed length of the project road	14.589	

(ii) Typical cross-section of the Project Highway with chainage:

S. No.	Chainage (Km)		Length (m)	Type of TCS
	From	To		
1	0+000	0+130	130	TCS-3A
2	0+130	0+340	210	TCS-4A
3	0+340	0+360	20	TCS-3A
4	0+360	0+400	40	TCS-4A
5	0+400	0+420	20	TCS-2A
6	0+420	0+560	140	TCS-4A
7	0+560	0+600	40	TCS-3A
8	0+600	0+640	40	TCS-4A
9	0+640	0+700	60	TCS-3A
10	0+700	0+720	20	TCS-4A
11	0+720	0+740	20	TCS-3A
12	0+740	0+780	40	TCS-1
13	0+780	1+020	240	TCS-4B
14	1+020	1+080	60	TCS-3
15	1+080	1+120	40	TCS-4
16	1+120	1+140	20	TCS-3
17	1+140	1+180	40	TCS-4

S. No.	Chainage (Km)		Length (m)	Type of TCS
	From	To		
18	1+180	1+200	20	TCS-3
19	1+200	1+520	320	TCS-4
20	1+520	1+580	60	TCS-3
21	1+580	1+600	20	TCS-4
22	1+600	1+680	80	TCS-3
23	1+680	1+740	60	TCS-4
24	1+740	1+780	40	TCS-3
25	1+780	1+920	140	TCS-4
26	1+920	1+940	20	TCS-3
27	1+940	2+140	200	TCS-4
28	2+140	2+210	70	TCS-2
29	2+210	2+270	60	TCS-4
30	2+270	2+340	70	TCS-2
31	2+340	2+360	20	TCS-1
32	2+360	2+380	20	TCS-2
33	2+380	2+480	100	TCS-1
34	2+480	2+520	40	TCS-3
35	2+520	2+560	40	TCS-4
36	2+560	2+660	100	TCS-3
37	2+660	2+760	100	TCS-4
38	2+760	2+780	20	TCS-1
39	2+780	3+180	400	TCS-4A
40	3+180	3+220	40	TCS-3A
41	3+220	3+260	40	TCS-4A
42	3+260	3+280	20	TCS-3A
43	3+280	3+460	180	TCS-4A
44	3+460	3+520	60	TCS-2A
45	3+520	3+580	60	TCS-1A
46	3+580	3+660	80	TCS-2A
47	3+660	3+700	40	TCS-1A
48	3+700	3+950	250	TCS-4B
49	3+950	4+520	570	TCS-4
50	4+520	4+560	40	TCS-3
51	4+560	4+880	320	TCS-4
52	4+880	4+920	40	TCS-3
53	4+920	5+020	100	TCS-4
54	5+020	5+040	20	TCS-3
55	5+040	5+100	60	TCS-4
56	5+100	5+140	40	TCS-3
57	5+140	5+170	30	TCS-1
58	5+170	5+270	100	TCS-2B
59	5+270	5+440	170	TCS-4
60	5+440	5+470	30	TCS-2
61	5+470	5+570	100	TCS-4A
62	5+570	5+620	50	TCS-3A
63	5+620	5+640	20	TCS-4A

S. No.	Chainage (Km)		Length (m)	Type of TCS
	From	To		
64	5+640	5+660	20	TCS-3A
65	5+660	6+200	540	TCS-4A
66	6+200	6+220	20	TCS-3A
67	6+220	6+440	220	TCS-4A
68	6+440	6+550	110	TCS-2A
69	6+550	6+750	200	TCS-4A
70	6+750	6+790	40	TCS-2A
71	6+790	6+820	30	TCS-1A
72	6+820	7+120	300	TCS-2A
73	7+120	7+140	20	TCS-3A
74	7+140	7+560	420	TCS-4A
75	7+560	7+670	110	VIADUCT
76	7+670	7+900	230	TCS-5
77	7+900	8+000	100	TCS-4A
78	8+000	8+070	70	TCS-3A
79	8+070	8+100	30	TCS-4A
80	8+100	8+200	100	TCS-3A
81	8+200	8+280	80	TCS-4A
82	8+280	8+300	20	TCS-3A
83	8+300	8+360	60	TCS-4A
84	8+360	8+480	120	TCS-3A
85	8+480	8+500	20	TCS-4A
86	8+500	8+520	20	TCS-3A
87	8+520	8+700	180	TCS-4A
88	8+700	8+790	90	TCS-3A
89	8+790	8+850	60	TCS-4A
90	8+850	8+930	80	TCS-2A
91	8+930	8+980	50	TCS-4A
92	8+980	9+080	100	TCS-3A
93	9+080	9+140	60	TCS-4A
94	9+140	9+170	30	TCS-3A
95	9+170	9+270	100	TCS-4A
96	9+270	9+310	40	TCS-2A
97	9+310	9+340	30	TCS-4A
98	9+340	9+560	220	TCS-3A
99	9+560	9+660	100	TCS-4A
100	9+660	9+700	40	TCS-3A
101	9+700	9+760	60	TCS-4A
102	9+760	9+800	40	TCS-3A
103	9+800	9+820	20	TCS-4A
104	9+820	9+870	50	TCS-3A
105	9+870	9+900	30	TCS-4A
106	9+900	9+980	80	TCS-3A
107	9+980	10+050	70	TCS-4A
108	10+050	10+080	30	TCS-3A
109	10+080	10+120	40	TCS-4A

S. No.	Chainage (Km)		Length (m)	Type of TCS
	From	To		
110	10+120	10+300	180	TCS-3A
111	10+300	10+370	70	TCS-4A
112	10+370	10+510	140	TCS-3A
113	10+510	10+640	130	TCS-4A
114	10+640	10+710	70	TCS-2A
115	10+710	10+760	50	TCS-4A
116	10+760	10+780	20	TCS-2A
117	10+780	10+980	200	TCS-4A
118	10+980	11+030	50	TCS-3A
119	11+030	11+100	70	TCS-4A
120	11+100	11+150	50	TCS-3A
121	11+150	11+200	50	TCS-1A
122	11+200	11+750	550	TUNNEL
123	11+750	11+920	170	TCS-4A
124	11+920	12+040	120	TCS-2A
125	12+040	12+070	30	TCS-1A
126	12+070	12+120	50	TCS-4A
127	12+120	12+170	50	TCS-3A
128	12+170	12+420	250	TCS-4A
129	12+420	12+480	60	TCS-3A
130	12+480	12+500	20	TCS-2A
131	12+500	12+560	60	TCS-4A
132	12+560	12+580	20	TCS-2A
133	12+580	12+640	60	TCS-4A
134	12+640	12+660	20	TCS-1A
135	12+660	12+720	60	TCS-4A
136	12+720	12+740	20	TCS-3A
137	12+740	12+780	40	TCS-2A
138	12+780	12+940	160	TCS-4A
139	12+940	13+000	60	TCS-3A
140	13+000	13+040	40	TCS-2A
141	13+040	13+100	60	TCS-4A
142	13+100	13+120	20	TCS-1A
143	13+120	13+240	120	TCS-4A
144	13+240	13+340	100	TCS-3A
145	13+340	13+400	60	TCS-2A
146	13+400	13+450	50	TCS-4A
147	13+450	13+480	30	TCS-3A
148	13+480	13+600	120	TCS-2A
149	13+600	13+670	70	TCS-3A
150	13+670	13+690	20	TCS-2A
151	13+690	13+740	50	MNB
152	13+740	13+750	10	TCS-2A
153	13+750	13+800	50	TCS-3A
154	13+800	13+940	140	TCS-2A
155	13+940	14+040	100	TCS-4A

S. No.	Chainage (Km)		Length (m)	Type of TCS
	From	To		
156	14+040	14+130	90	TCS-2A
157	14+130	14+200	70	TCS-3A
158	14+200	14+280	80	TCS-4A
159	14+280	14+320	40	TCS-3A
160	14+320	14+500	180	TCS-4A
161	14+500	14+514	14	TCS-1A
162	14+514	14+589	75	MJB
Total Length (m)			14589	

3. Intersections and Grade Separators:

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

Existing intersections that are deficient shall be improved to the prescribed standards.

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

(i) At-grade intersections

(a) Major Junctions

At grade major junctions shall be improved at intersecting roads with the Project highway, as given below:

Sl. No	Location of intersection (Design Chainage)	Type of intersection	Other features
1	Km 13+580	Cross Road Intersection	An intersecting road to be developed/constructed for at least 120 m in length.

(b) Minor Junctions

At grade minor junctions shall be improved at intersecting roads with the Project highway, as given below:

Sl. No	Location of intersection (Design Chainage)	Type of intersection	Other features
1	1+330	Y- Junction	An intersecting road to be developed/constructed for at least 60 m in length.
2	1+490	Y- Junction	
3	1+870	Y- Junction	

4	2+450	Y- Junction	
5	3+630	Y- Junction	
6	4+990	Y- Junction	
7	5+050	Y- Junction	
8	5+570	Y- Junction	
9	5+840	Y- Junction	
10	6+550	Y- Junction	
11	6+660	Y- Junction	
12	6+890	Y- Junction	
13	10+260	Y- Junction	
14	11+880	Y- Junction	
15	13+200	Y- Junction	
16	14+410	Y- Junction	

(ii) Grade-separated intersections with/ without ramps:

Sl. No.	Location	Salient features	Minimum Length of viaduct to be provided	Roads 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 as per the given Plan & Profile.

(iii) **Sufficient Provisions of Protection Measures including drainage for Cut Slope and Valley Slope:** The structured approach as detailed below should be followed: -

a) Protection measures including sub-surface & surface drainage provisions for cut slope and valley slope should be designed on the basis of detailed geotechnical investigation bore holes at identified critical locations such as deep cut/fill sections, bridge abutments, soft ground zones, landslide-prone areas, or zones with abrupt changes in soil conditions carried out at an interval of 500m or closer as specified in applicable design standard along the project alignment to determine subsurface soil stratification and engineering properties of slope forming materials. This will facilitate accurate characterization of soil types and support the design of appropriate protection measures. In case of deep cut sections having height more than 6.0m, the depth of bore hole should be minimum to the depth of cutting above finished road level or 5.0m below competent stratum whichever is achieved earlier. For remaining locations, the provision of applicable standard prevails.

b) Large Shear Box testing should be performed on representative bulk samples, particularly for coarse-grained soils such as gravels or bouldery strata, where conventional shear box test is not appropriate.

c) The **design** should be based on geological and geotechnical investigations. Geotechnical investigation shall be conducted just after recession of monsoon to represent the weakest sub-soil condition.

d) As digital evidence, **Contractor** should use software applications to authenticate with digital/photos/videos evidence that survey has been carried out. If required, **PMU/RO** will also check real time using cloud platform.

e) **Design Report** shall include comprehensive technical reports including geotechnical basis report (GBR) and designs for slope protection measures for the project length.

f) **Contractor** should **submit** detailed working drawings, its specifications and associated quantities of work items for slope protection requirements for each km of road section.

g) The design along with considered design parameters duly based on investigations and working drawings, its specifications and associated quantities of work items for slope stabilisation requirements shall be vetted and validated by renowned and reputed Government/academic institutions having expertise in the area.

h) Protection Measures: following shall be firmed up by the Design Consultant duly vetted by Third Party as specified in sub-para (g) above.

- Sub-soil Properties (Density, c-phi) & Stratification for each bore hole location
- (b) Water Level at each bore hole location-
- (c) Ru Pore Water Coefficient considered for analysis
- (d) Rock Properties (Core Recovery, Rock Quality Designation RQD, Geological Soil Index GSI and Rock Mass Rating RMR) for each bore hole location
- (e) Minimum Length of Rock Fall Barrier, if applicable

Any change in design parameters/upgradation of protection measures subsequently proposed by Contractor as change of scope (CoS) shall also be vetted by the third party like THDCL, GSI and NIRM or any other reputed agency in this field.

5. PAVEMENT DESIGN

- (i) Pavement design shall be carried out in accordance with the provision of relevant Manual.
- (ii) **Type of pavement:-** Flexible pavement shall be adopted. The contractor shall accordingly carry out pavement design (i.e. GSB/WMM/DBM/BC) after conducting requisite tests as per standard and specifications.
- (iii) **Design requirement:-** Design requirement for the flexible pavement shall be in accordance with section 5 of the latest IRC: SP-73 and IRC:37.

(a) Design Period and Strategy

Flexible pavement shall be designed for a minimum design period of 20 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 design traffic of 25 million standard axles.

(iv) Reconstruction of Stretches (12.384 Km)

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

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
1	0+000	0+130	130	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
2	0+130	0+340	210	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
3	0+340	0+360	20	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
4	0+360	0+400	40	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
5	0+400	0+420	20	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
6	0+420	0+560	140	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
7	0+560	0+600	40	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
8	0+600	0+640	40	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
9	0+640	0+700	60	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
10	0+700	0+720	20	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
11	0+720	0+740	20	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
12	0+740	0+780	40	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
13	1+020	1+080	60	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
14	1+080	1+120	40	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
15	1+120	1+140	20	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
16	1+140	1+180	40	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
17	1+180	1+200	20	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
18	1+200	1+520	320	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
19	1+520	1+580	60	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
20	1+580	1+600	20	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
21	1+600	1+680	80	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
22	1+680	1+740	60	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
23	1+740	1+780	40	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
24	1+780	1+880	100	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
25	1+920	1+940	20	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
26	1+940	2+140	200	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
27	2+140	2+210	70	TCS-2	Typical Cross Section -2 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
28	2+210	2+270	60	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
29	2+270	2+340	70	TCS-2	Typical Cross Section -2 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
30	2+340	2+360	20	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
31	2+360	2+380	20	TCS-2	Typical Cross Section -2 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
32	2+380	2+480	100	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
33	2+480	2+520	40	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
34	2+520	2+560	40	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
35	2+560	2+660	100	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
36	2+660	2+760	100	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
37	2+760	2+780	20	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
38	2+780	3+790	10	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
39	2+950	3+180	230	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
40	3+180	3+220	40	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
41	3+220	3+260	40	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
42	3+260	3+280	20	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
43	3+280	3+460	180	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
44	3+520	3+580	60	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
45	3+660	3+700	40	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
46	3+850	3+900	50	TCS-4B	Typical Cross Section -4B, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) New Construction and Valley Side Slope (RHS)
47	3+950	4+000	50	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
48	4+050	4+520	470	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
49	4+520	4+560	40	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
50	4+560	4+880	320	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
51	4+880	4+920	40	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
52	4+920	5+020	100	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
53	5+020	5+040	20	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
54	5+040	5+100	60	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
55	5+100	5+140	40	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
56	5+140	5+170	30	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
					Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
57	5+260	5+270	10	TCS-2B	Typical Cross Section -2B, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS), Realignment
58	5+270	5+440	170	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
59	5+440	5+470	30	TCS-2	Typical Cross Section -2 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
60	5+470	5+480	10	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
61	5+560	5+570	10	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
62	5+570	5+620	50	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
63	5+620	5+640	20	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
64	5+640	5+660	20	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
65	5+660	6+200	540	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
66	6+200	6+220	20	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
67	6+220	6+440	220	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
68	6+440	6+550	110	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
69	6+550	6+750	200	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
70	6+750	6+790	40	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
71	6+790	6+820	30	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
72	6+820	7+120	300	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
73	7+120	7+140	20	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
74	7+200	7+560	360	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
75	7+670	7+900	230	TCS-5	Typical Cross Section -5, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
76	7+900	8+000	100	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
77	8+000	8+070	70	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
					Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
78	8+070	8+100	30	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
79	8+100	8+200	100	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
80	8+200	8+280	80	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
81	8+280	8+300	20	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
82	8+300	8+360	60	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
83	8+360	8+480	120	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
84	8+480	8+500	20	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
85	8+500	8+520	20	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
86	8+560	8+700	140	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
87	8+700	8+790	90	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
					Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
88	8+790	8+850	60	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
89	8+850	8+860	10	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
90	8+910	8+930	20	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
91	8+930	8+980	50	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
92	8+980	9+080	100	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
93	9+080	9+140	60	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
94	9+140	9+170	30	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
95	9+170	9+190	20	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
96	9+270	9+310	40	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
97	9+310	9+340	30	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
					Slope (LHS) And Hill Side Breast Wall (RHS)
98	9+340	9+560	220	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
99	9+560	9+660	100	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
100	9+660	9+700	40	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
101	9+700	9+760	60	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
102	9+760	9+800	40	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
103	9+800	9+820	20	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
104	9+820	9+870	50	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
105	9+900	9+980	80	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
106	9+980	9+990	10	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
107	10+050	10+080	30	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
					Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
108	10+080	10+120	40	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
109	10+120	10+300	180	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
110	10+300	10+370	70	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
111	10+370	10+510	140	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
112	10+510	10+640	130	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
113	10+640	10+710	70	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
114	10+710	10+760	50	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
115	10+760	10+780	20	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
116	10+780	10+860	80	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
117	10+960	10+980	20	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
					Slope (LHS) And Hill Side Breast Wall (RHS)
118	10+980	11+030	50	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
119	11+030	11+100	70	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
120	11+100	11+150	50	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
121	11+150	11+200	50	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
122	11+750	11+920	170	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
123	11+920	12+040	120	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
124	12+040	12+070	30	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
125	12+070	12+120	50	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
126	12+120	12+170	50	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
127	12+170	12+420	250	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
128	12+420	12+480	60	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
129	12+480	12+500	20	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
130	12+500	12+560	60	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
131	12+560	12+580	20	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
132	12+580	12+640	60	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
133	12+640	12+660	20	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
134	12+660	12+720	60	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
135	12+720	12+740	20	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
136	12+740	12+780	40	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
137	12+780	12+940	160	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
138	12+940	13+000	60	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
					Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
139	13+000	13+040	40	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
140	13+040	13+100	60	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
141	13+100	13+120	20	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
142	13+120	13+240	120	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
143	13+240	13+340	100	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
144	13+340	13+400	60	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
145	13+400	13+450	50	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
146	13+450	13+480	30	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
147	13+480	13+600	120	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
148	13+600	13+670	70	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
149	13+670	13+690	20	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
150	13+740	13+750	10	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
151	13+750	13+800	50	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
152	13+800	13+940	140	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
153	13+940	14+040	100	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
154	14+040	14+130	90	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
155	14+130	14+200	70	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
156	14+200	14+280	80	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
157	14+280	14+320	40	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
158	14+320	14+500	180	TCS-4A	Typical Cross Section - 4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)

S. No	Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
159	14+500	14+514	14	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)

6. ROADSIDE DRAINAGE

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

Cement Concrete Lined Drain of trapezoidal shape as shown in the different typical cross sections in length to be constructed = 13804 m

7. DESIGN OF STRUCTURES

(i) General

a. All bridges, culverts and structures shall be designed and constructed in accordance with the provisions of the 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:

Sl. No.	MNB/MJB at km	Width of carriageway and cross-sectional features
1	7+615	Total Deck Width = 13.1 m (Typical Cross Section attached)
2	13+715	Total Deck Width = 13.1 m (Typical Cross Section attached)
3	14+550	Total Deck Width = 13.1 m (Typical Cross Section attached)

c. The following structures shall be provided with a footpath, as per the provisions of IRC:

Sl. No.	Location at km	Remarks
1	7+615	Viaduct
2	13+715	MNB
3	14+550	MJB

d. All bridges shall be high-level bridges.

e. The following structures shall be designed to carry utility services as per site requirement.

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

- f. Cross-section of the new culverts and Bridges at deck level for the Project Highway shall conform to the typical cross-sections given.

(ii) **Culverts**

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

b. **Reconstruction of existing culverts:**

The existing culverts at the following locations shall be reconstructed as new culverts:

Sl. No.	Culvert location	Span/Opening (m)	Remarks
1	00+085	1X2X2	RCC BOX
2	00+275	1X3X3	RCC BOX
3	00+470	1X3X3	RCC BOX
4	00+550	1X2X2	RCC BOX
5	01+051	1X3X3	RCC BOX
6	01+340	1X2X2	RCC BOX
7	01+552	1X3X3	RCC BOX
8	01+932	1X3X3	RCC BOX
9	02+173	1X2X2	RCC BOX
10	02+280	1X3X3	RCC BOX
11	02+535	1X3X3	RCC BOX
12	03+146	1X2X2	RCC BOX
13	03+410	1X2X2	RCC BOX
14	03+616	1X2X2	RCC BOX
15	03+870	1X2X2	RCC BOX
16	04+083	1X2X2	RCC BOX
17	04+410	1x2x2	RCC BOX
18	04+570	1x2x2	RCC BOX
19	04+725	1X2X2	RCC BOX
20	04+920	1X2X2	RCC BOX
21	05+625	1X2X2	RCC BOX
22	05+902	1X2X2	RCC BOX
23	06+285	1X2X2	RCC BOX
24	06+494	1X2X2	RCC BOX
25	06+755	1X2X2	RCC BOX
26	07+532	1X2X2	RCC BOX
27	08+178	1X2X2	RCC BOX
28	09+285	1X3X3	RCC BOX
29	09+534	1x3x3	RCC BOX
30	09+713	1x3x3	RCC BOX
31	09+822	1x3x3	RCC BOX
32	10+285	1X2X2	RCC BOX
33	10+527	1X2X2	RCC BOX
34	10+870	1X2X2	RCC BOX
35	11+100	1X2X2	RCC BOX
36	11+810	1X2X2	RCC BOX

Sl. No.	Culvert location	Span/Opening (m)	Remarks
37	12+005	1X2X2	RCC BOX
38	12+158	1X2X2	RCC BOX
39	12+318	1X2X2	RCC BOX
40	12+435	1X6X4	RCC BOX
41	12+600	1X2X2	RCC BOX
42	12+685	1X2X2	RCC BOX
43	12+788	1X2X2	RCC BOX
44	12+883	1X2X2	RCC BOX
45	13+030	1x3x3	RCC BOX
46	13+267	1X2X2	RCC BOX
47	13+518	1X3X3	RCC BOX
48	13+928	1X4X3	RCC BOX
49	14+180	1X2X2	RCC BOX
50	14+294	1X2X2	RCC BOX

- c. **Widening of Existing Culverts:** All existing culverts that are not to be reconstructed shall be widened to the roadway width of the Project Highway as per the details below. 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 (RCC Box type)** shall be constructed as per particulars given in the table below:

Sl. No	Culvert location	Span/Opening (m)
1	00+820	1X2X2
2	02+840	1X2X2
3	03+046	1X2X2
4	03+495	1X2X2
5	03+765	1X2X2
6	05+235	1X2X2
7	05+485	1X2X2
8	06+115	1X2X2
9	07+205	1X2X2
10	07+905	1X2X2
11	08+450	1X3X3
12	08+725	1x5x3
13	08+880	1x5x3
14	09+155	1x3x3
15	10+720	1X2X2

- e. **Repair/Replacement of railing/Parapets, flooring, and protection works of the existing culverts** shall be undertaken as follows:

Sr. No.	Location in 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:

S.No.	Bridge location (km)	Salient details of the existing bridge	Adequacy or otherwise of the existing waterway, vertical clearance, etc*	Remarks
1	13+715	1x18 Truss type= 50m		

- (ii) The following narrow bridges shall be widened:

Sr. No.	Location (Km)	Existing Width (m)	Extent of Widening (m)	Cross-section at deck level for widening
NIL				

(b) Additional New Bridges/Viaduct

New Bridges at the following locations on the Project Highway shall be constructed. GADs for the viaducts are attached in the drawings folder, and minimum span arrangements, as shown in the GAD's are to be followed.

Sr. No.	Location	Total length (m)	Remarks
1	7+615	110	Pile foundation to be adopted

Note: In case, the Span arrangement is modified by the EPC Contractor as per site requirement, the same shall be done with the approval of the Competent Authority and without any additional financial implication. Notwithstanding, the span length shall be treated as minimum.

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

Sr. No.	Location (km)	Remarks
Nil		

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

Sr. No.	Location (km)	Remarks
Nil		

(e) **Drainage System for Bridge Decks:** An effective drainage system for bridge decks shall be provided as specified in the provisions of the relevant Manual.

(f) **Structures in Marine Environment:** Nil

(iv) **Rail-Road Bridges**

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

(b) **Road over bridges**

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

Sl. No.	Location of Level Crossing (Chainage km)	Length of 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:

Sr. 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 Annexe-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 of extent of repairs/strengthening to be carried out
1	14+550	Replacement of bearing, repairing of crash barrier, painting etc.

(b) ROB/RUB

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

(c) Overpasses/Underpasses and other structures

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

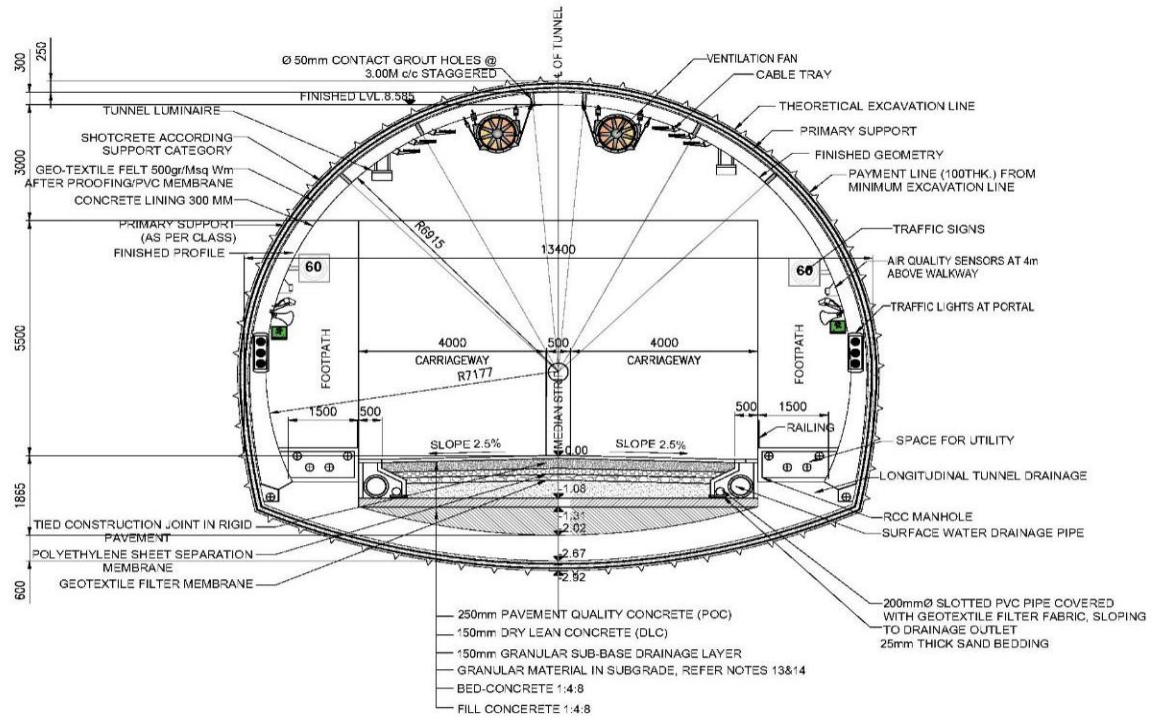
(vii) Tunnel

Sr. No.	Location	Total length (m)	Remarks
1	km 11+200 to 11+750	550	As per TCS & drawings attached. Rock classification: Class-III (275 m), Class-IV (220m) & Class-V (55m)

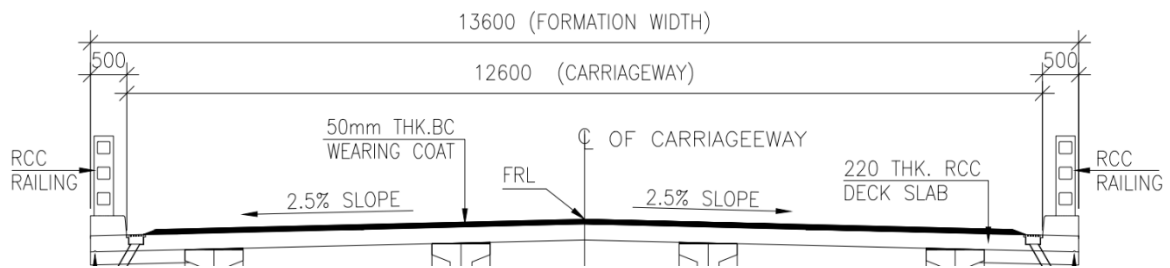
(viii) List of Bridges and Structures

The following is a list of Bridges and Structures

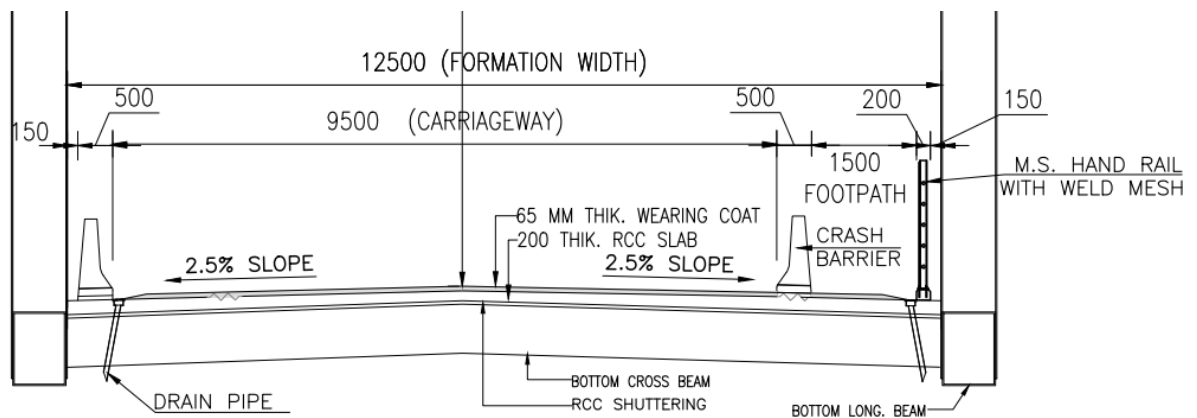
Sl. No.	Location	Type of Structures
1	7+615	Viaduct
2	11+475	Tunnel
3	13+715	Minor Bridge
4	14+550	Major Bridge



Tunnel Cross Section



Viaduct Cross Section



Minor Bridge Cross Section

8. Traffic Control Devices and Road Safety Works

- (i) Traffic control devices and road safety works shall be provided in accordance with the provisions of the relevant Manual.
- (ii) Specifications of the reflective sheeting shall be Class C sheeting described in IRC:67 and type VIII/IX/XI as per ASTM D 4956-09 fixed over Aluminium or Aluminium Composite Material.

The minimum nos. of traffic signboards are as hereunder-

Sl. No.	Item	Total Nos
(i)	90 cm equilateral triangle	366
(ii)	60 cm equilateral triangle	28
(iii)	90 cm high octagon	269
(iv)	60 cm circular	31
(v)	Hazard Marker Sign Boards	138
(vi)	Village Name Boards of size 900x600	34
(vii)	Place Identification Boards of size 1200x900	16
(viii)	Advance Direction Sign Boards of 1800x1200	17
(ix)	Chevron boards of size 600x450	1008

- (iii) **Road Marking:** The road markings with hot applied thermoplastic paint consisting of different lane markings, directional arrows, chevron marking, letterings, transverse bar marking (speed calming measure) etc. shall cover the entire Project Highway and at all junctions/intersections as per relevant code, manual and relevant MoRT&H circular.
- (iv) **Road studs:** The Reflective Pavement Markers (RRPM) i.e. road studs of prismatic retroreflective type conforming to ASTM D 4280, Table 9.1 of Manual to be provided following placement details as per IRC:35. The colour pattern of road studs for edge line and center line with respect traffic movement is to be adopted as per Manual and as per relevant MoRT&H Circular.

Minimum number of road studs of different colours: 5675 no.

- (v) **Road Delineators:** Minimum 36 no. of road delineators to be provided as per the Manual and the relevant IRC code.

9. Roadside Furniture

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

(ii) Overhead Traffic Signs: Location and Size

The location & size of overhead traffic signs shall be as hereunder:

Location	Size	Remarks
11+925	12.0 m x 2.0 m	Clear height of gantry = 6.0 m

10. Compulsory Afforestation: NIL

11. Hazardous Locations

The safety barriers (Thrie Beam Crash Barriers along with reflectors) shall be provided at the following hazardous locations:

Sl. No.	Location stretches from (km) to (km)	LHS/RHS	Remarks
1	km 00+000 to km 7+560	At Valley side	Except at culvert locations.
2	km 7+670 to km 11+200		
3	km 11+750 to km 13+690		
4	km 13+740 to km 14+514		

12. Special Requirement for Hill Roads

a) Retaining Wall:

The minimum requirement of a retaining wall is as follows, which may increase as per final drawings and design approved by the competent authority. The Contractor is required to conduct a detailed investigation to assess the work based on site survey, investigations and assessment before commencement of work. Any increase in length within 10% of the total scope mentioned herein shall not constitute a Change of Scope.

Retaining Walls Locations LHS:

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
1	0+000	0+130	130	RW 4m	Plum
2	0+340	0+360	20	RW 4m	Plum
3	0+400	0+420	20	RW 4m	Plum
4	0+560	0+600	40	RW 4m	Plum
5	0+640	0+700	60	RW 4m	Plum
6	0+720	0+740	20	RW 4m	Plum
7	3+180	3+220	40	RW 4m	Plum
8	3+260	3+280	20	RW 4m	Plum
9	3+460	3+520	60	RW 4m	Plum

Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
10	3+580	3+660	80	7m RCC RW	RCC
11	5+570	5+620	50	RW 4m	Plum
12	5+640	5+660	20	RW 4m	Plum
13	6+200	6+220	20	RW 4m	Plum
14	6+440	6+550	110	8m RCC RW	RCC
15	6+750	6+790	40	RW 4m	Plum
16	6+820	7+120	300	RW 4m	Plum
17	7+120	7+140	20	RW 4m	Plum
18	7+670	7+900	230	10m RCC RW	RCC Counterfort
19	8+000	8+070	70	RW 4m	Plum
20	8+100	8+200	100	RW 4m	Plum
21	8+280	8+300	20	RW 4m	Plum
22	8+360	8+480	120	RW 4m	Plum
23	8+500	8+520	20	5m RCC RW	RCC
24	8+700	8+790	90	RW 4m	Plum
25	8+850	8+930	80	RW 4m	Plum
26	8+980	9+080	100	RW 4m	Plum
27	9+140	9+170	30	6m RCC RW	RCC
28	9+270	9+310	40	RW 4m	Plum
29	9+340	9+560	220	RW 4m	Plum
30	9+660	9+700	40	5m RCC RW	RCC
31	9+760	9+800	40	6m RCC RW	RCC
32	9+820	9+870	50	5m RCC RW	RCC
33	9+900	9+980	80	8m RCC RW	RCC
34	10+050	10+080	30	5m RCC RW	RCC
35	10+120	10+300	180	5m RCC RW	RCC
36	10+370	10+510	140	9m RCC RW	RCC
37	10+640	10+710	70	5m RCC RW	RCC
38	10+760	10+780	20	7m RCC RW	RCC
39	10+980	11+030	50	RW 4m	Plum
40	11+100	11+150	50	5m RCC RW	RCC
41	11+920	12+040	120	RW 4m	Plum
42	12+120	12+170	50	RW 4m	Plum
43	12+420	12+480	60	7m RCC RW	RCC
44	12+480	12+500	20	5m RCC RW	RCC
45	12+560	12+580	20	RW 4m	Plum
46	12+720	12+740	20	RW 4m	Plum
47	12+740	12+780	40	RW 4m	Plum
48	12+940	13+000	60	RW 4m	Plum
49	13+000	13+040	40	5m RCC RW	RCC
50	13+240	13+340	100	RW 4m	Plum
51	13+340	13+400	60	7m RCC RW	RCC

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
52	13+450	13+480	30	RW 4m	Plum
53	13+480	13+600	120	RW 4m	Plum
54	13+600	13+670	70	RW 4m	Plum
55	13+670	13+690	20	6m RCC RW	RCC
56	13+740	13+750	10	5m RCC RW	RCC
57	13+750	13+800	50	8m RCC RW	RCC
58	13+800	13+940	140	10m RCC RW	RCC
59	14+040	14+130	90	5m RCC RW	RCC
60	14+130	14+200	70	6m RCC RW	RCC
61	14+280	14+320	40	RW 4m	Plum

Retaining Walls Locations RHS:

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
1	1+020	1+080	60	RW 4m	Plum
2	1+120	1+140	20	RW 4m	Plum
3	1+180	1+200	20	RW 4m	Plum
4	1+520	1+580	60	5m RCC RW	RCC
5	1+600	1+680	80	RW 4m	Plum
6	1+740	1+780	40	RW 4m	Plum
7	1+920	1+940	20	RW 4m	Plum
8	2+140	2+210	70	RW 4m	Plum
9	2+270	2+340	70	8m RCC RW	RCC
10	2+360	2+380	20	RW 4m	Plum
11	2+480	2+520	40	RW 4m	Plum
12	2+560	2+660	100	RW 4m	Plum
13	4+520	4+560	40	RW 4m	Plum
14	4+880	4+920	40	8m RCC RW	RCC
15	5+020	5+040	20	RW 4m	Plum
16	5+100	5+140	40	RW 4m	Plum
17	5+170	5+270	100	RW 4m	Plum
18	5+440	5+470	30	RW 4m	Plum

Total proposed minimum length of all type of Retaining wall: 5020m

b) BREAST WALL

The minimum requirement of the Breast wall is as follows, which may increase as per final drawings and design approved by the competent authority. The Contractor is required to conduct a detailed investigation to assess the work based on site survey, investigations and assessment before commencement of work. Any increase in length within 10% of the total scope mentioned herein shall not constitute a Change of Scope.

Breast Walls Locations LHS:

S.N	Chainage From	Chainage To	Length (m)	Minimum Height	Type
1	0+780	0+820	40	BW 4m	Plum
2	0+820	1+080	260	BW 3m	Plum
3	1+080	1+120	40	BW 4m	Plum
4	1+120	1+140	20	BW 3m	Plum
5	1+140	1+180	40	BW 3m	Plum
6	1+180	1+200	20	BW 3m	Plum
7	1+200	1+520	320	BW 4m	Plum
8	1+520	1+580	60	BW 4m	Plum
9	1+580	1+600	20	BW 4m	Plum
10	1+600	1+680	80	BW 4m	Plum
11	1+680	1+700	20	BW 4m	Plum
12	1+700	1+720	20	BW 3m	Plum
13	1+720	1+780	60	BW 4m	Plum
14	1+780	1+920	140	BW 4m	Plum
15	1+920	1+940	20	BW 4m	Plum
16	1+940	1+960	20	BW 3m	Plum
17	1+960	2+140	180	BW 4m	Plum
18	2+210	2+220	10	BW 4m	Plum
19	2+220	2+240	20	BW 3m	Plum
20	2+240	2+270	30	BW 4m	Plum
21	2+480	2+520	40	BW 4m	Plum
22	2+520	2+560	40	BW 4m	Plum
23	2+560	2+660	100	BW 4m	Plum
24	2+660	2+760	100	BW 4m	Plum
25	3+700	3+720	20	BW 4m	Plum
26	3+720	3+760	40	BW 3m	Plum
27	3+760	3+950	190	BW 4m	Plum
28	3+950	4+520	570	BW 4m	Plum
29	4+520	4+560	40	BW 4m	Plum
30	4+560	4+640	80	BW 4m	Plum
31	4+640	4+660	20	BW 3m	Plum
32	4+660	4+880	220	BW 4m	Plum
33	4+880	4+920	40	BW 4m	Plum
34	4+920	5+020	100	BW 4m	Plum
35	5+020	5+040	20	BW 3m	Plum
36	5+040	5+100	60	BW 4m	Plum
37	5+100	5+140	40	BW 4m	Plum
38	5+270	5+440	170	BW 4m	Plum
39	7+560	7+580	20	BW 3m	Plum
40	7+580	7+600	20	BW 3m	Plum
41	7+900	8+000	100	BW 4m	Plum
42	10+300	10+320	20	BW 3m	Plum
43	10+880	10+900	20	BW 3m	Plum
44	10+900	10+920	20	BW 3m	Plum

Breast Walls Locations RHS:

Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.

S.N	Chainage From	Chainage To	Length (m)	Minimum Height	Type
1	0+000	0+130	130	BW 3m	Plum
2	0+130	0+340	210	BW 3m	Plum
3	0+340	0+360	20	BW 3m	Plum
4	0+360	0+400	40	BW 4m	Plum
5	0+420	0+560	140	BW 3m	Plum
6	0+560	0+600	40	BW 4m	Plum
7	0+600	0+640	40	BW 4m	Plum
8	0+640	0+700	60	BW 4m	Plum
9	0+700	0+720	20	BW 4m	Plum
10	0+720	0+740	20	BW 4m	Plum
11	2+780	3+180	400	BW 4m	Plum
12	3+180	3+220	40	BW 3m	Plum
13	3+220	3+260	40	BW 3m	Plum
14	3+260	3+280	20	BW 3m	Plum
15	3+280	3+460	180	BW 3m	Plum
16	5+470	5+570	100	BW 3m	Plum
17	5+570	5+620	50	BW 3m	Plum
18	5+620	5+640	20	BW 4m	Plum
19	5+640	5+660	20	BW 4m	Plum
20	5+660	6+180	520	BW 4m	Plum
21	6+180	6+200	20	BW 3m	Plum
21	6+200	6+220	20	BW 4m	Plum
22	6+220	6+440	220	BW 4m	Plum
23	6+550	6+750	200	BW 3m	Plum
24	7+120	7+140	20	BW 3m	Plum
25	7+140	7+600	460	BW 3m	Plum
26	7+720	7+740	20	BW 3m	Plum
27	8+000	8+020	20	BW 4m	Plum
28	8+020	8+080	60	BW 3m	Plum
29	8+080	8+260	180	BW 4m	Plum
30	8+260	8+280	20	BW 3m	Plum
31	8+280	8+850	570	BW 4m	Plum
32	8+900	8+920	20	BW 3m	Plum
33	8+930	8+980	50	BW 4m	Plum
34	8+980	9+080	100	BW 4m	Plum
35	9+080	9+100	20	BW 4m	Plum
36	9+100	9+120	20	BW 3m	Plum
37	9+120	9+140	20	BW 4m	Plum
38	9+140	9+170	30	BW 3m	Plum
39	9+170	9+180	10	BW 4m	Plum
40	9+180	9+220	40	BW 3m	Plum
41	9+220	9+270	50	BW 4m	Plum
42	9+300	9+340	40	BW 3m	Plum
43	9+340	9+560	220	BW 4m	Plum
44	9+560	9+620	60	BW 4m	Plum
45	9+620	9+640	20	BW 3m	Plum
46	9+640	9+660	20	BW 4m	Plum
47	9+660	9+700	40	BW 3m	Plum
48	9+700	9+760	60	BW 3m	Plum
49	9+760	9+800	40	BW 4m	Plum
50	9+800	9+820	20	BW 3m	Plum
51	9+820	9+870	50	BW 3m	Plum
52	9+870	9+900	30	BW 3m	Plum
53	9+900	9+980	80	BW 3m	Plum
54	9+980	10+020	40	BW 3m	Plum

55	10+020	10+050	30	BW 4m	Plum
56	10+050	10+080	30	BW 3m	Plum
57	10+080	10+120	40	BW 4m	Plum
58	10+120	10+300	180	BW 4m	Plum
59	10+300	10+360	60	BW 3m	Plum
60	10+360	10+370	10	BW 4m	Plum
61	10+370	10+510	140	BW 4m	Plum
62	10+510	10+640	130	BW 3m	Plum
63	10+710	10+760	50	BW 3m	Plum
64	10+780	10+980	200	BW 3m	Plum
65	10+980	11+020	40	BW 4m	Plum
66	11+020	11+100	80	BW 3m	Plum
67	11+100	11+120	20	BW 4m	Plum
68	11+120	11+180	60	BW 3m	Plum
69	11+750	11+920	170	BW 4m	Plum
70	12+070	12+120	50	BW 4m	Plum
71	12+120	12+160	40	BW 4m	Plum
72	12+160	12+180	20	BW 3m	Plum
73	12+180	12+480	300	BW 4m	Plum
74	12+500	12+560	60	BW 3m	Plum
75	12+580	12+640	60	BW 4m	Plum
76	12+660	12+720	60	BW 4m	Plum
77	12+720	12+740	20	BW 4m	Plum
78	12+780	12+940	160	BW 4m	Plum
79	12+940	13+000	60	BW 4m	Plum
80	13+040	13+100	60	BW 4m	Plum
81	13+120	13+240	120	BW 4m	Plum
82	13+240	13+340	100	BW 4m	Plum
83	13+400	13+450	50	BW 4m	Plum
84	13+450	13+480	30	BW 3m	Plum
85	13+600	13+670	70	BW 4m	Plum
86	13+750	13+800	50	BW 4m	Plum
87	13+940	14+040	100	BW 4m	Plum
88	14+130	14+200	70	BW 3m	Plum
89	14+200	14+280	80	BW 4m	Plum
90	14+280	14+320	40	BW 4m	Plum
91	14+320	14+340	20	BW 4m	Plum
92	14+340	14+440	100	BW 3m	Plum
93	14+440	14+500	60	BW 4m	Plum

Total proposed minimum length of Breast wall: 11530 m.

c) Special Slope Protection

The minimum requirement for Special Slope Protection work is as follows. The Contractor is required to conduct detailed investigation to assess the work based on site survey, investigations and assessment before commencement of work. Any increase in area within 10% of total scope mentioned herein shall not constitute a Change of Scope.

The Special Slope protection works shall comprise of the following:

- (i) Excavation in rock in accordance with the requirements of lines, grades and cross sections

- (ii) Supply and Installation of Self Drilling hollow soil/rock anchor of different diameter (horizontal and vertical) in soil /overburden /rock suitable for, drilling placing and cement grouting. Installations with all accessories.
- (iii) Providing & installing Gabion box for retaining structure with Mechanically Woven Double Twisted Hexagonal Shaped Wire Mesh Gabion Boxes
- (iv) Supply and fixing of Double Twisted Mesh over the geo-jute layer.
- (v) Coir mat (450GSM) applied on slope surface for erosion control.
- (vi) Structural steel work, fixed with or without connecting plate, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete
- (vii) Details of specification and standard has been specified in Schedule-D

Slope protection in LHS side

Sr. No	Chainage From	Chainage To	Length(m)
1	00+820	00+840	20
2	00+840	00+860	20
3	00+860	00+880	20
4	00+880	00+900	20
5	00+900	00+920	20
6	00+920	00+940	20
7	00+940	00+960	20
8	00+960	00+980	20
9	00+980	01+000	20
10	01+000	01+020	20
11	01+700	01+720	20
12	01+940	01+960	20
13	02+220	02+240	20
14	03+720	03+740	20
15	03+740	03+760	20
16	04+640	04+660	20
17	07+560	07+580	20
18	07+580	07+600	20
19	10+300	10+320	20
20	10+880	10+900	20
21	10+900	10+920	20

Slope protection work RHS Side

Sr. No	Chainage From	Chainage To	Length(m)
1	05+500	05+520	20
2	06+180	06+200	20
3	07+120	07+140	20
4	07+140	07+160	20

Sr. No	Chainage From	Chainage To	Length(m)
5	07+160	07+180	20
6	07+180	07+200	20
7	07+200	07+220	20
8	07+220	07+240	20
9	07+240	07+260	20
10	07+260	07+280	20
11	07+320	07+340	20
12	07+520	07+540	20
13	07+540	07+560	20
14	07+560	07+580	20
15	07+580	07+600	20
16	07+720	07+740	20
17	08+020	08+040	20
18	08+040	08+060	20
19	08+060	08+080	20
20	08+260	08+280	20
21	08+900	08+920	20
22	09+100	09+120	20
23	09+180	09+200	20
24	09+200	09+220	20
25	09+300	09+320	20
26	09+320	09+340	20
27	09+620	09+640	20
28	09+980	10+000	20
29	10+000	10+020	20
30	10+060	10+080	20
31	10+300	10+320	20
32	10+320	10+360	40
33	10+780	10+800	20
34	10+800	10+820	20
35	10+820	10+840	20
36	10+840	10+860	20
37	10+860	10+880	20
38	10+880	10+900	20
39	10+900	10+920	20
40	10+920	10+940	20
41	10+940	10+960	20
42	10+960	10+980	20
43	11+020	11+040	20
44	11+040	11+060	20
45	11+060	11+080	20
46	11+120	11+140	20
47	11+140	11+160	20
48	11+160	11+180	20
49	12+160	12+180	20
50	14+340	14+360	20

Sr. No	Chainage From	Chainage To	Length(m)
51	14+360	14+380	20
52	14+380	14+400	20
53	14+400	14+420	20
54	14+420	14+440	20

Note: The minimum area of special slope protection work is **12,160 sqm having 1520m length**. The height of special protection work should be assessed and approved by the Authority's Engineer, as per site requirement.

Total minimum length of slope protection work: 1520m

(d) The tension cracks in the crown area within the influence area/zone in a 300m wide strip should also be identified, if any, and marked on the map. The repair of identified tension crack is within the scope of Works.

(e) **Dumping Sites:** The contractor shall arrange dumping sites, if any, for stacking/ disposal of excavated material/debris. Un-controlled or inappropriate muck disposal can give rise to a variety of problems.

(f) **Design for slope stabilisation measures:** In case the Contractor or Concessionaire proposes to deviate from the specified slope stabilisation measures, he shall indicate the alternative proposed along with detailed design and supporting data and investigations. The Authority shall have the design with supporting data and investigations vetted from a specified Government agency having expertise in slope stabilisation measures. However, where the DPR has not provided for slope stabilisation measures, the Contractor or Concessionaire shall suggest slope stabilisation measures along with detailed design and supporting data and investigations. In such cases too, the Authority shall have the design with supporting data and investigations vetted from a specified Government agency having expertise in slope stabilisation measures.

(g) **Construction in Stages:** Construction should be done in stages. The initial period of about one year should be given for the cutting of hill slopes for the road and completion of protection works for stabilization of the slopes. The subsequent works shall be taken up for those sections only where the formation cutting and protection measures remain stable after one monsoon season. **However, works related to structures, protection, tunnel etc may be taken up at any time after the Appointed Date.**

(h) **Cutting of Slope:** To ensure slope stability and minimize environmental impact, hill cutting should be carried out in stepped or benched sections rather than through complete or vertical cuts. Cutting should start from top to bottom. This method reduces the risk of landslides, improves drainage management, and facilitates safer construction practices. Additionally, protective works shall also be planned & implemented alongside with the excavation process.

13. CHANGE OF SCOPE

(i) The design principles and specifications should be adequately captured based on necessary geological/ geotechnical investigations; any variations in

quantities/design principles & specifications during implementation substantiated by comprehensive investigations by contractors/ concessionaires shall qualify for change of scopes. Also, site conditions are substantially changed between time period of site survey and actual execution on site. In most cases, extent of landslide is increased leading to contractual complications. In few cases, it is also observed that slopes are naturally stabilized, not requiring any treatment. Negative change of scope shall be considered for such cases.

(ii) Contractor should submit Geotechnical Report after detailed investigation along with design to AE/IE & Authority. The report should clearly mention the appreciable deviation from the GBR, parameters specified in 4 (iii) of Annex-I of Sch-B and variation in site conditions with photographic evidences which necessitate variation in extent and upgradation of protection measures. Any change in design subsequently proposed by Contractor as Change of Scope (CoS) should also be vetted by the same institution as detailed in para 4 (iii) of Annex-I of Sch-B which originally vetted the DPR drawings in respect of above parameters.

(iii) The length, and height of protection works, drainage system, shotcrete, concrete cladding/Retaining structures, breast wall and other items specified in schedule 'B' or 'C' shall be treated as minimum requirements. The actual quantities as required on the basis of detailed investigations shall be determined by the Contractor in consultation with Authority and its Engineer and in accordance with the Specifications and Standards. Any increase in length up to 10% for the items measured in linear meter or area up to 10% for the items measured in square meter of landslide location mentioned in the Schedule -B/C shall not constitute a Change of Scope, save and except any variations in the quantities arising out of a Change of Scope expressly undertaken in accordance with the provisions of Article 13 of the EPC Contract Agreement.

14. UTILITY SHIFTING:

Details are given in Sheet-II (Annex-I to Schedule-B)

Sheet-II (Annexe-I to Schedule-B)

Utility Shifting

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

Notes:

- a) The type/spacing/size/specifications of poles/towers/lines/cables to be used in shifting work shall be as per the guidelines of Utility Owning Department and it is to be agreed solely between the Contractor and the Utility Owning Department. No change of scope shall be admissible, and no cost shall be paid for using different type/spacing/size/specifications in shifted work in comparison to those in the existing work or for making any overhead crossings to underground as per requirement of Utility Owning Department and/or/construction of project highway. The Contractor shall carry out joint inspection with Utility Owning Department and get the estimates from Utility Owning Department. The assistance of the Authority is limited to giving forwarding letter on the proposal of Contractor to Utility Owning Department whenever asked by the Contractor. The decision/approval of Utility Owning Department shall be binding on the Contractor.
- b) The supervision charges at the rates/charges applicable of the Utility Owning Department shall be paid directly by the Authority to the Utility Owning Department as and when Contractor* furnishes demand of Utility Owning Department along with a copy of estimated cost given by the latter.
- c) The dismantled materials/scrap of existing Utility to be shifted/dismantled shall belong to the Contractor who would be free to dispose-off the dismantled material as deemed fit by them unless the Contractor* is required to deposit the dismantled material to Utility Owning Department as per the norms and practice and, in that case the amount

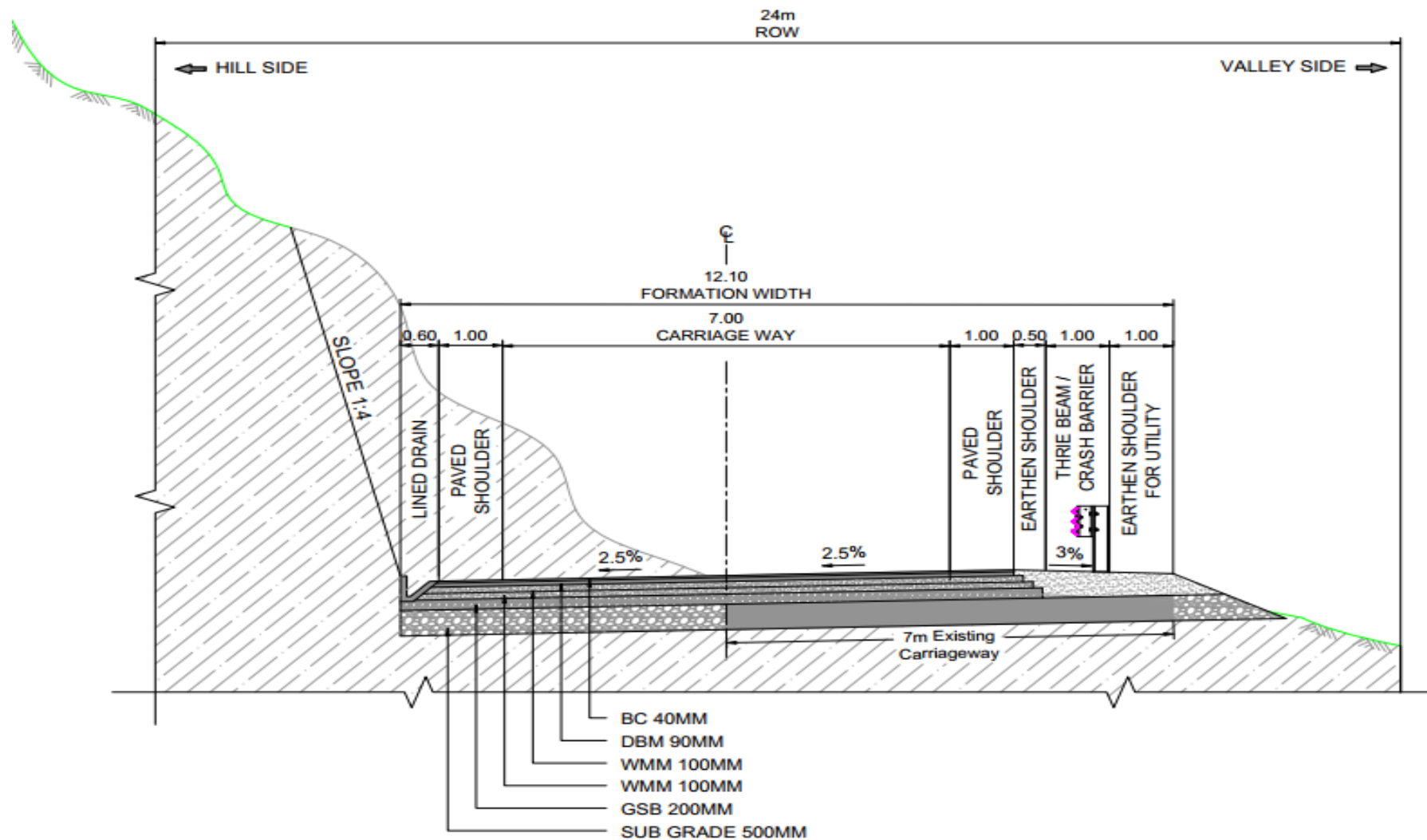
of credit for dismantled material may be availed by the Contractor as per the estimate agreed between them.

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

Note -II Copy of the utility shifting plans is enclosed as Annexure-II to Schedule B1.

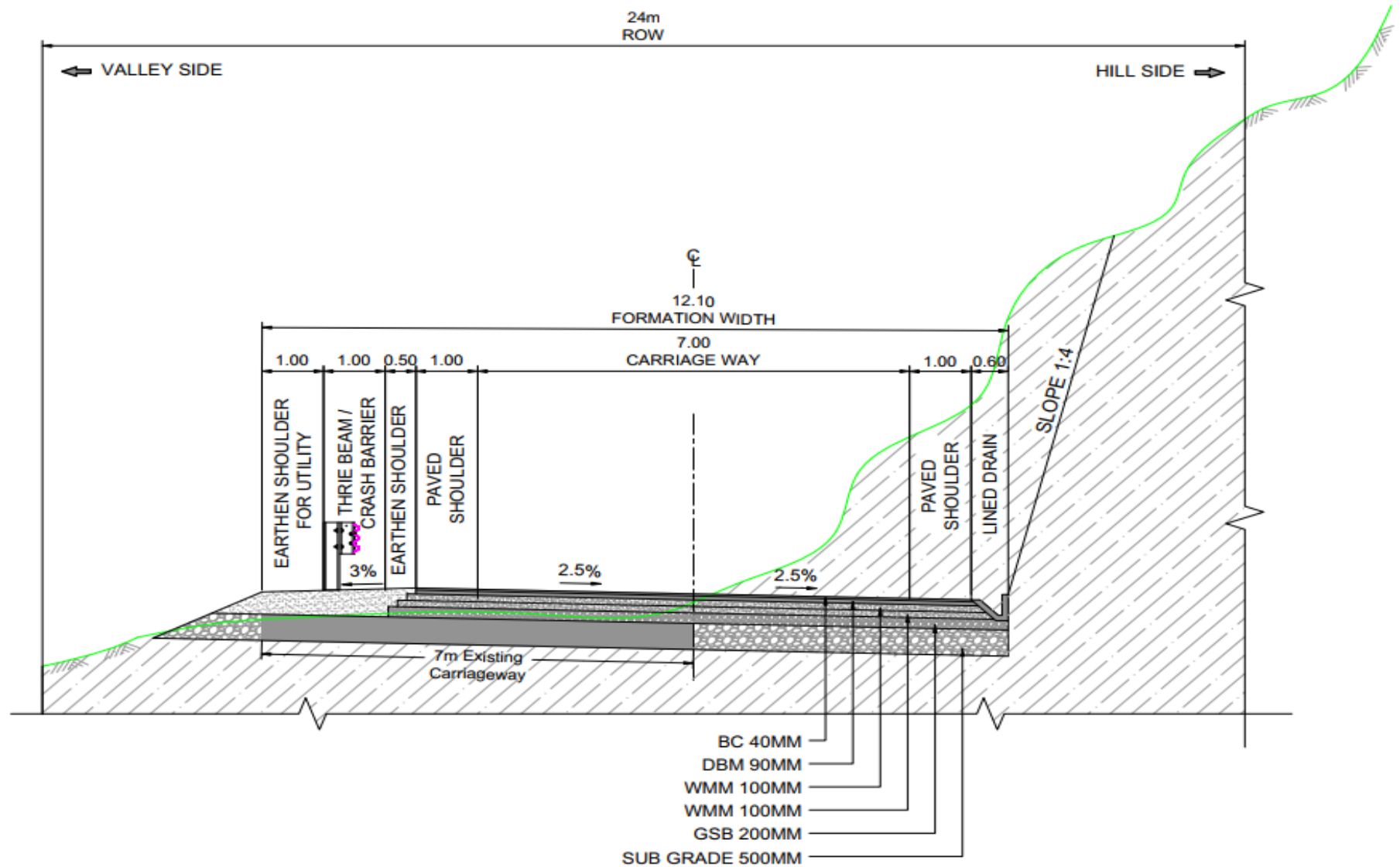
Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.

Typical Cross Section



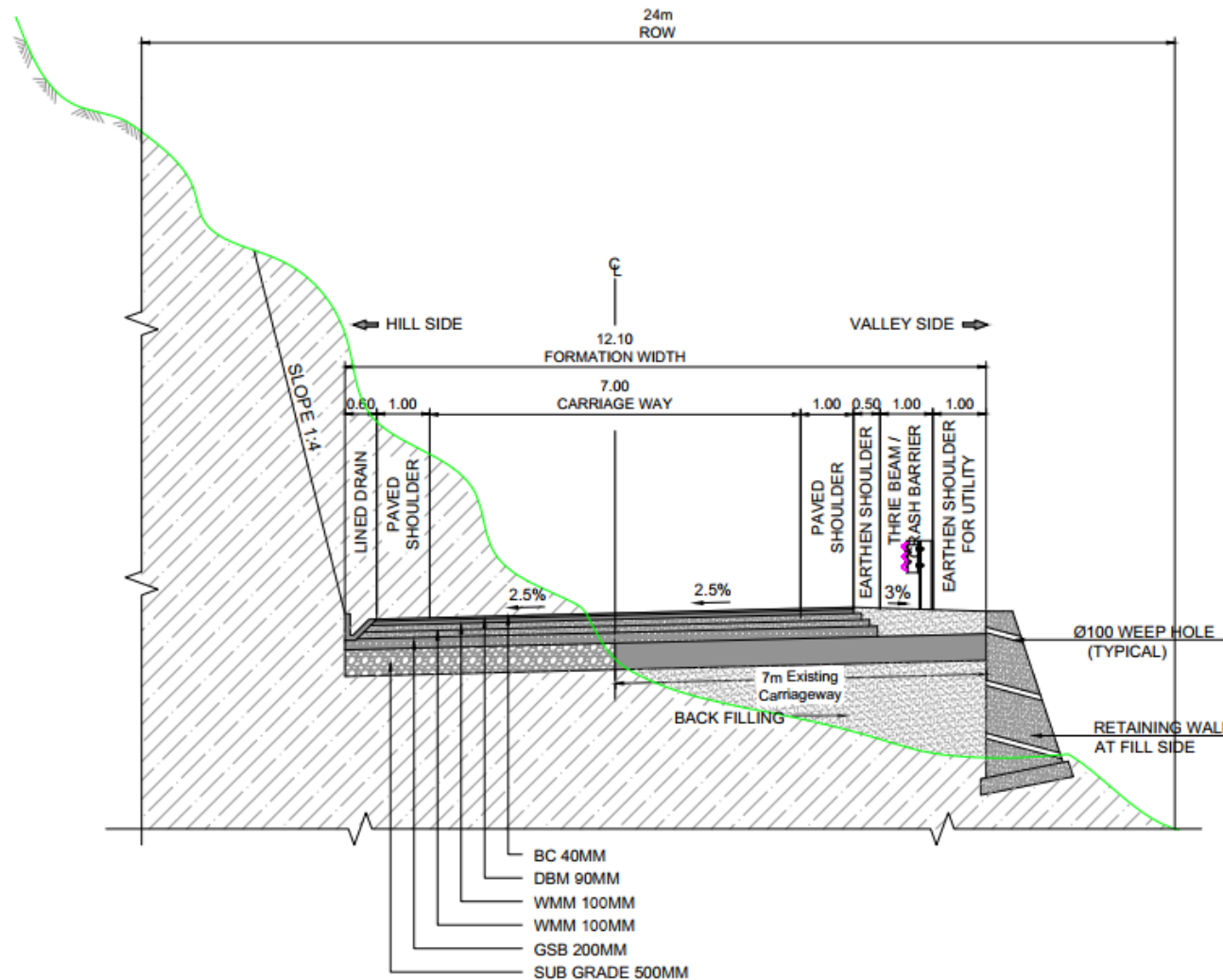
TYPICAL CROSS SECTION-1
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/
STEEP TERRAIN) HILL SIDE SLOPE(LHS)
AND VALLEY SIDE SLOPE(RHS)

Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.



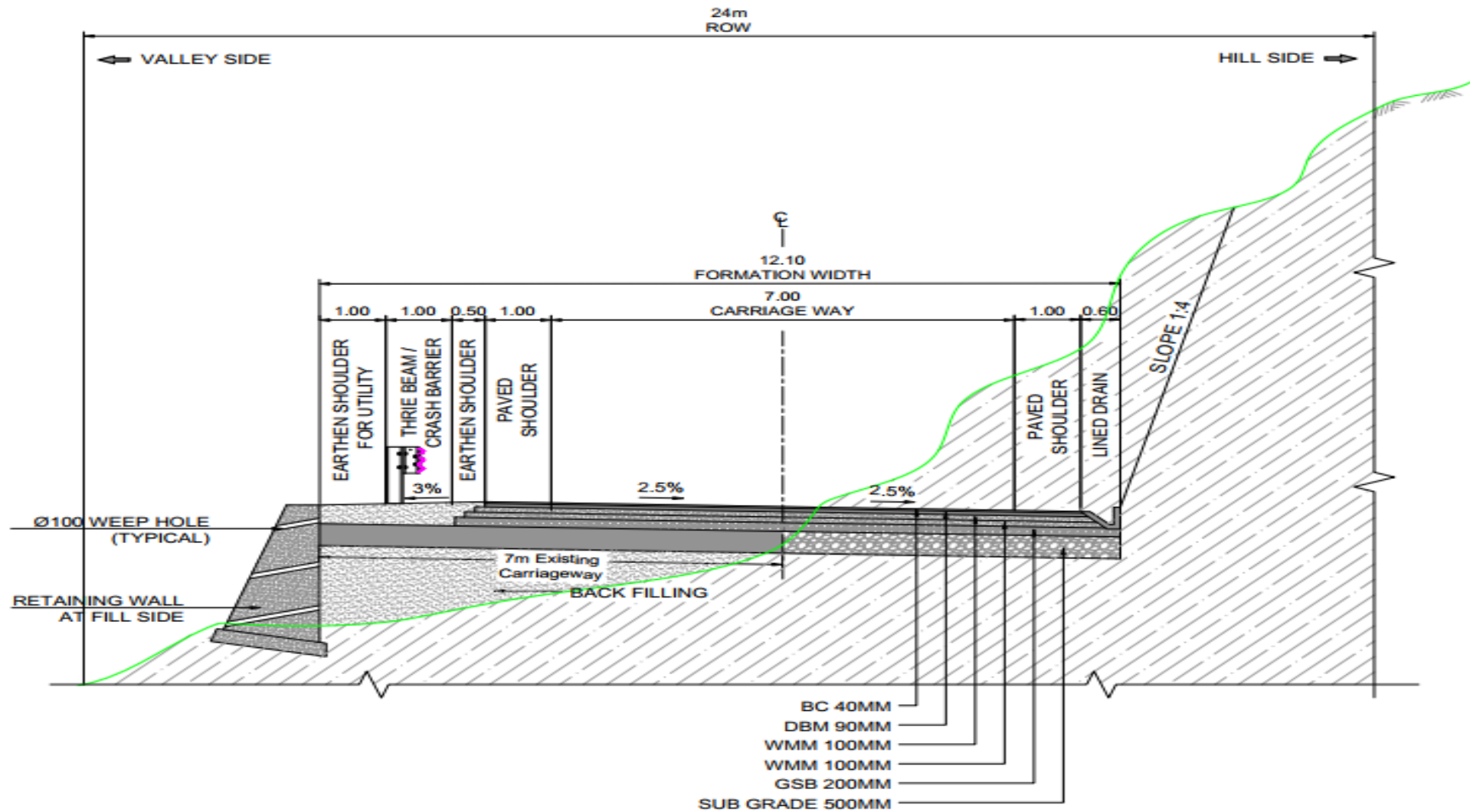
TYPICAL CROSS SECTION-1A
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/
STEEP TERRAIN) VALLEY SIDE SLOPE(LHS)
AND HILL SIDE SLOPE(RHS)

Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.



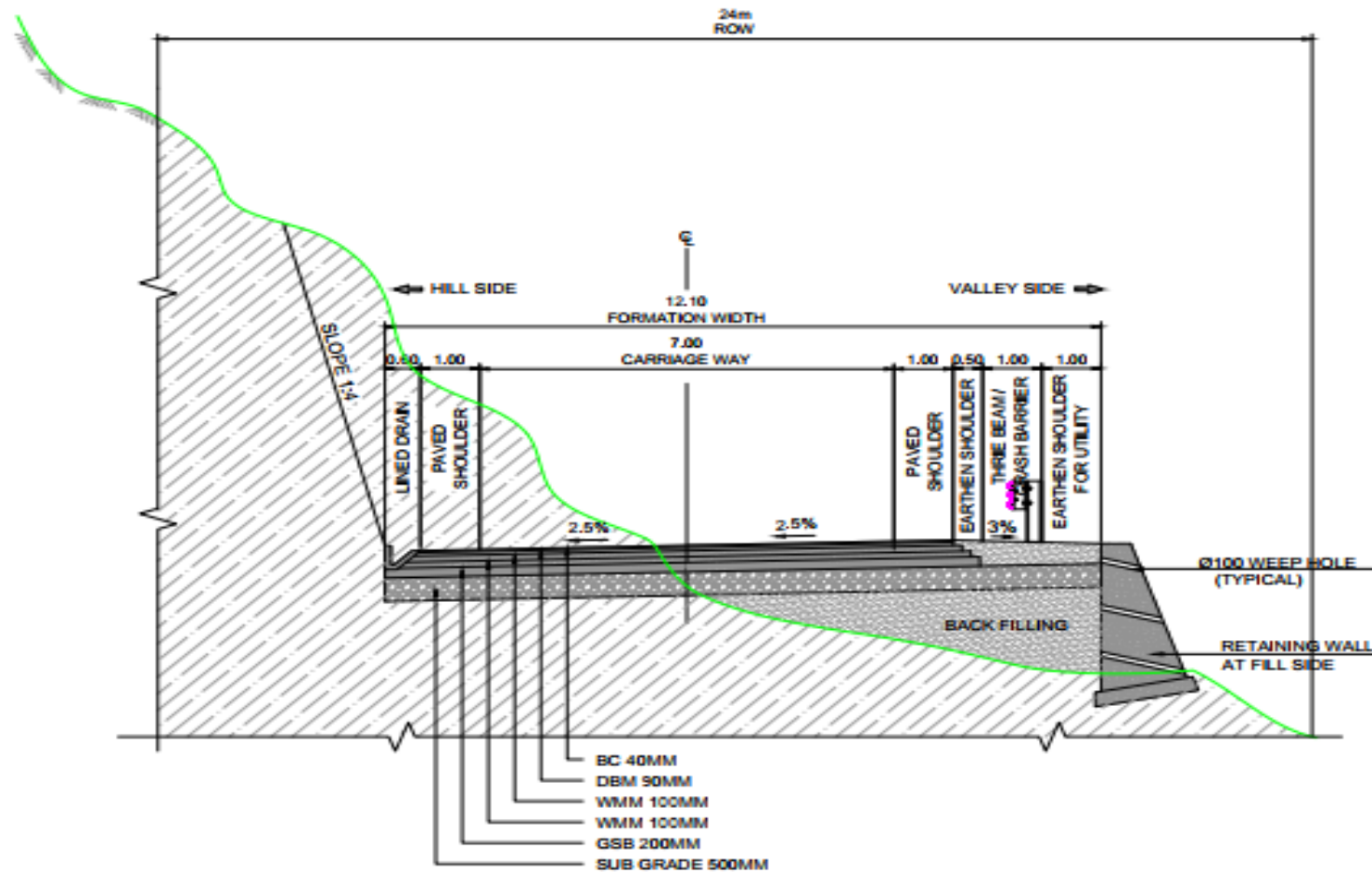
TYPICAL CROSS SECTION-2
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/
STEEP TERRAIN) HILL SIDE SLOPE(LHS)
AND VALLEY SIDE RETAINING WALL(RHS)

Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.



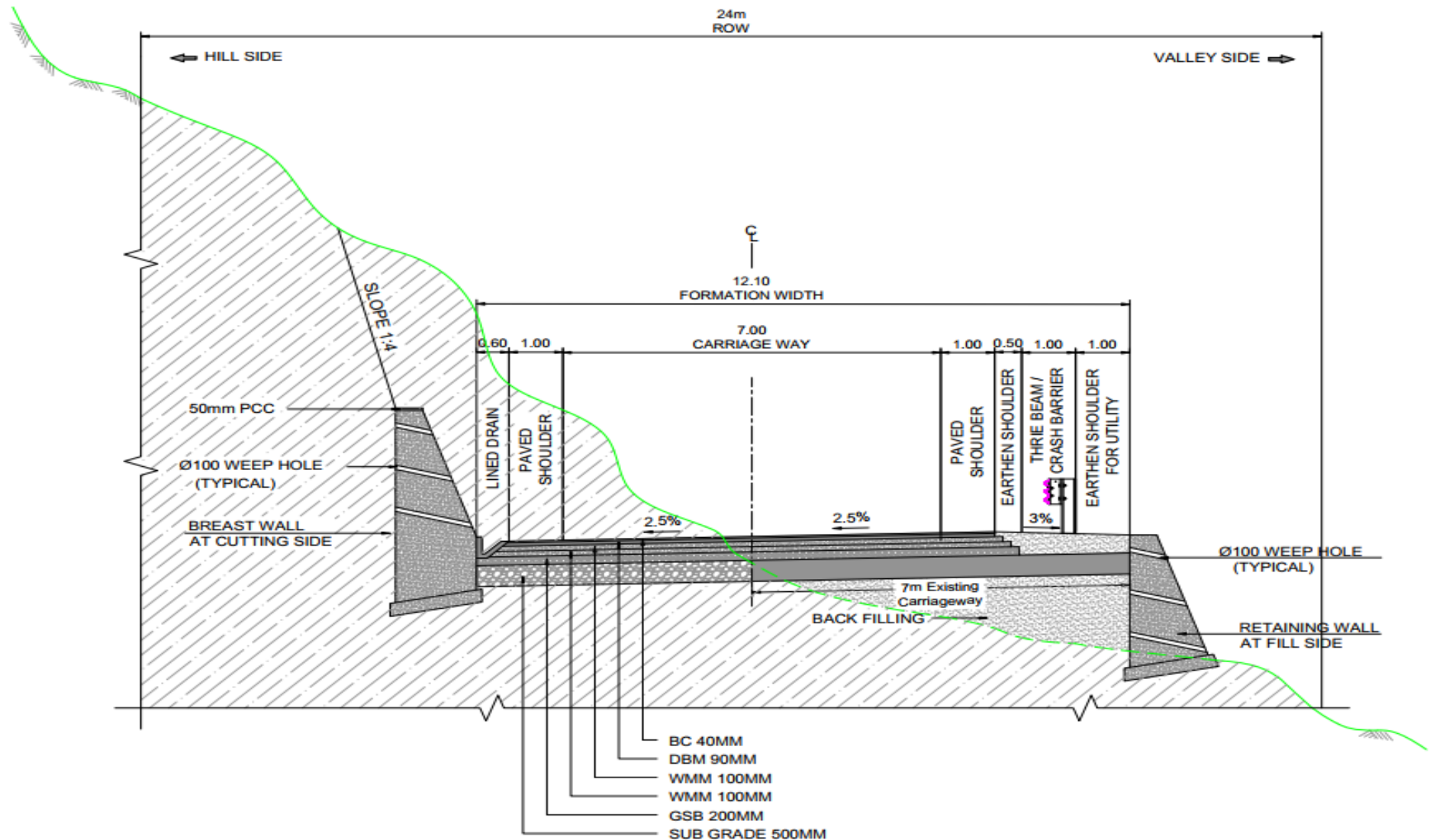
TYPICAL CROSS SECTION-2A
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/
STEEP TERRAIN) VALLEY SIDE RETAINING WALL(LHS)
AND HILL SIDE SLOPE(RHS)

Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.



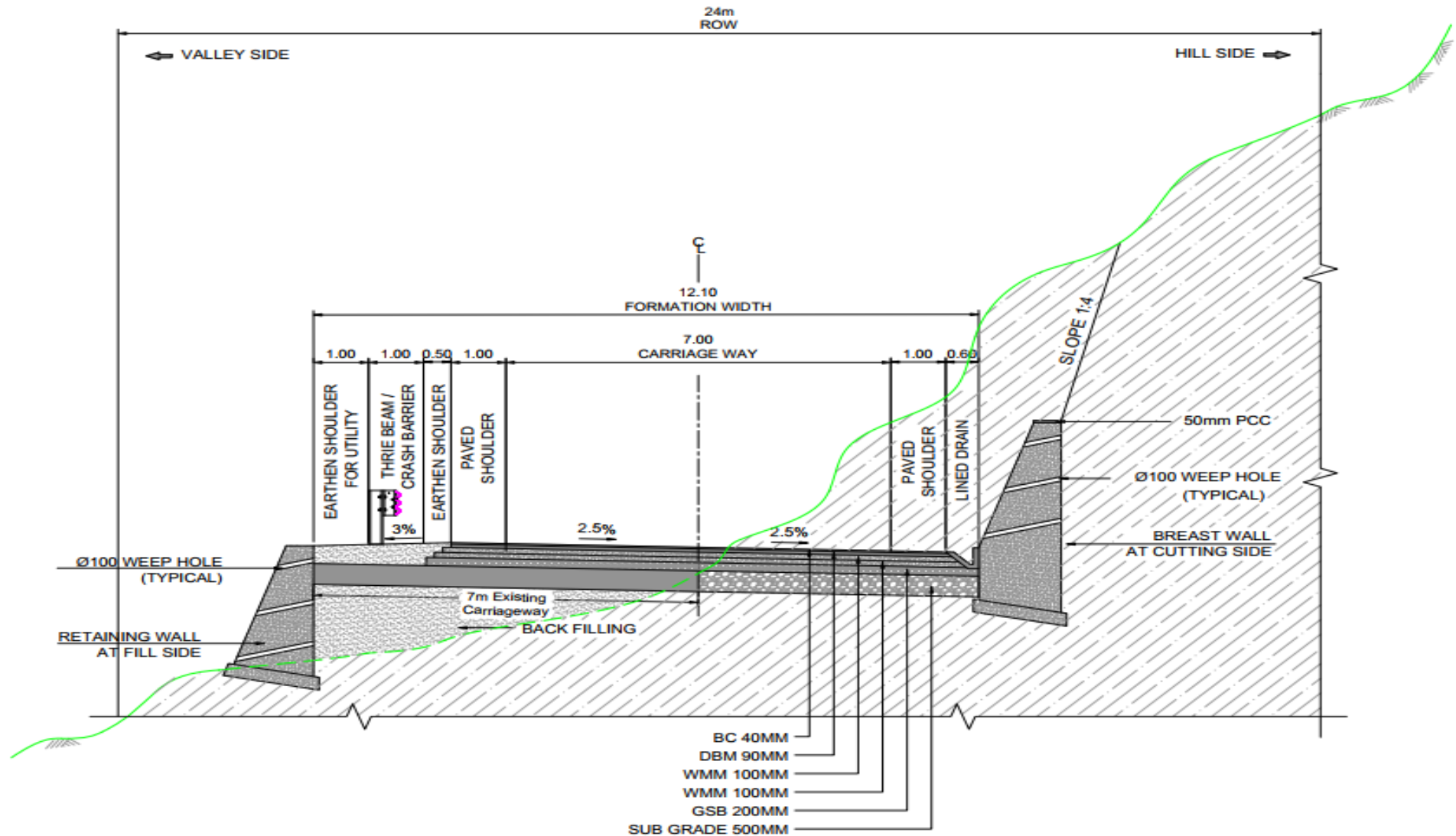
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2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/
STEEP TERRAIN) HILL SIDE SLOPE(LHS)
AND VALLEY SIDE RETAINING WALL(RHS)

Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.



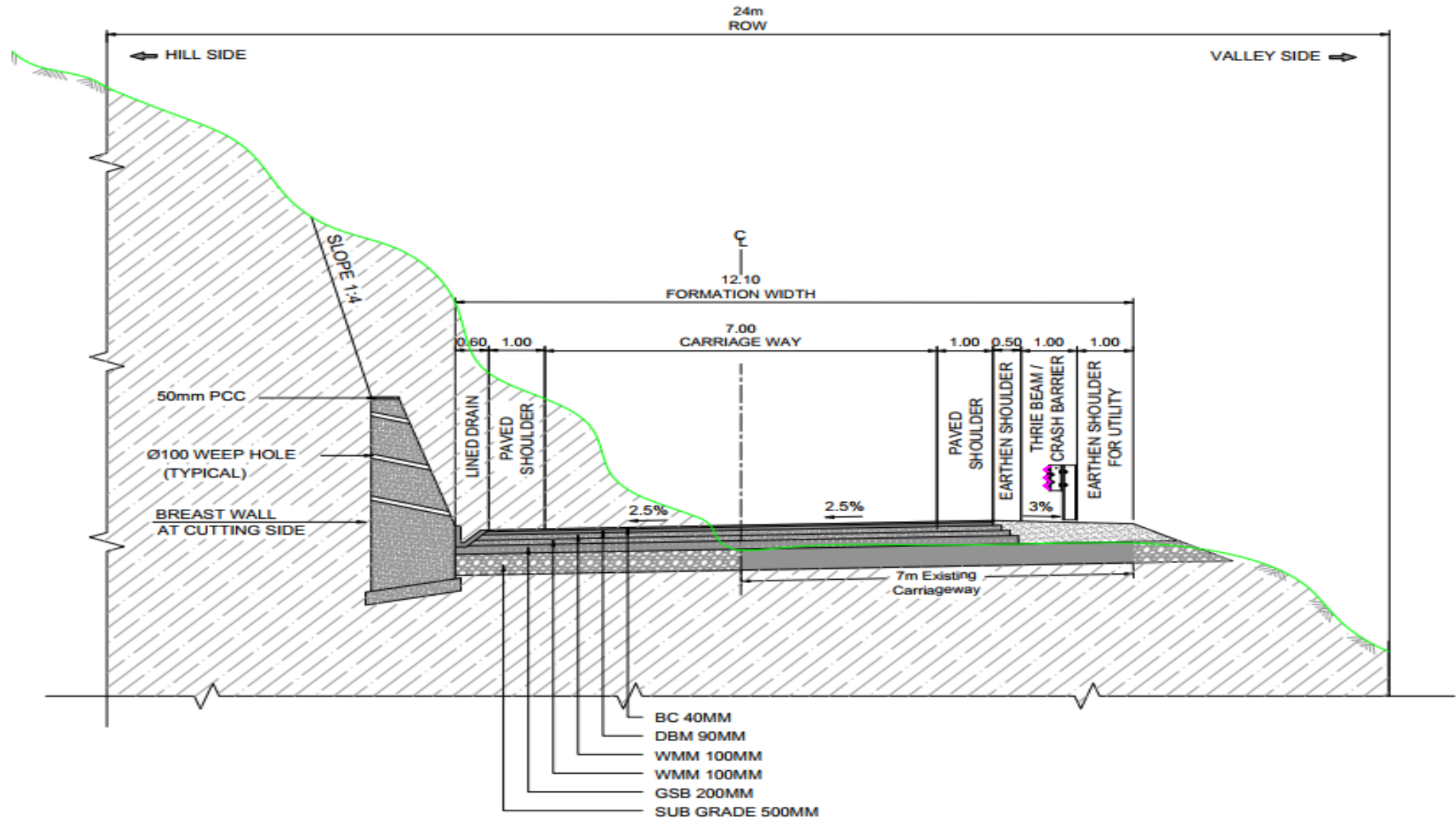
TYPICAL CROSS SECTION-3
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/
STEEP TERRAIN) HILL SIDE BREAST WALL(LHS)
AND VALLEY SIDE RETAINING WALL(RHS)

Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.



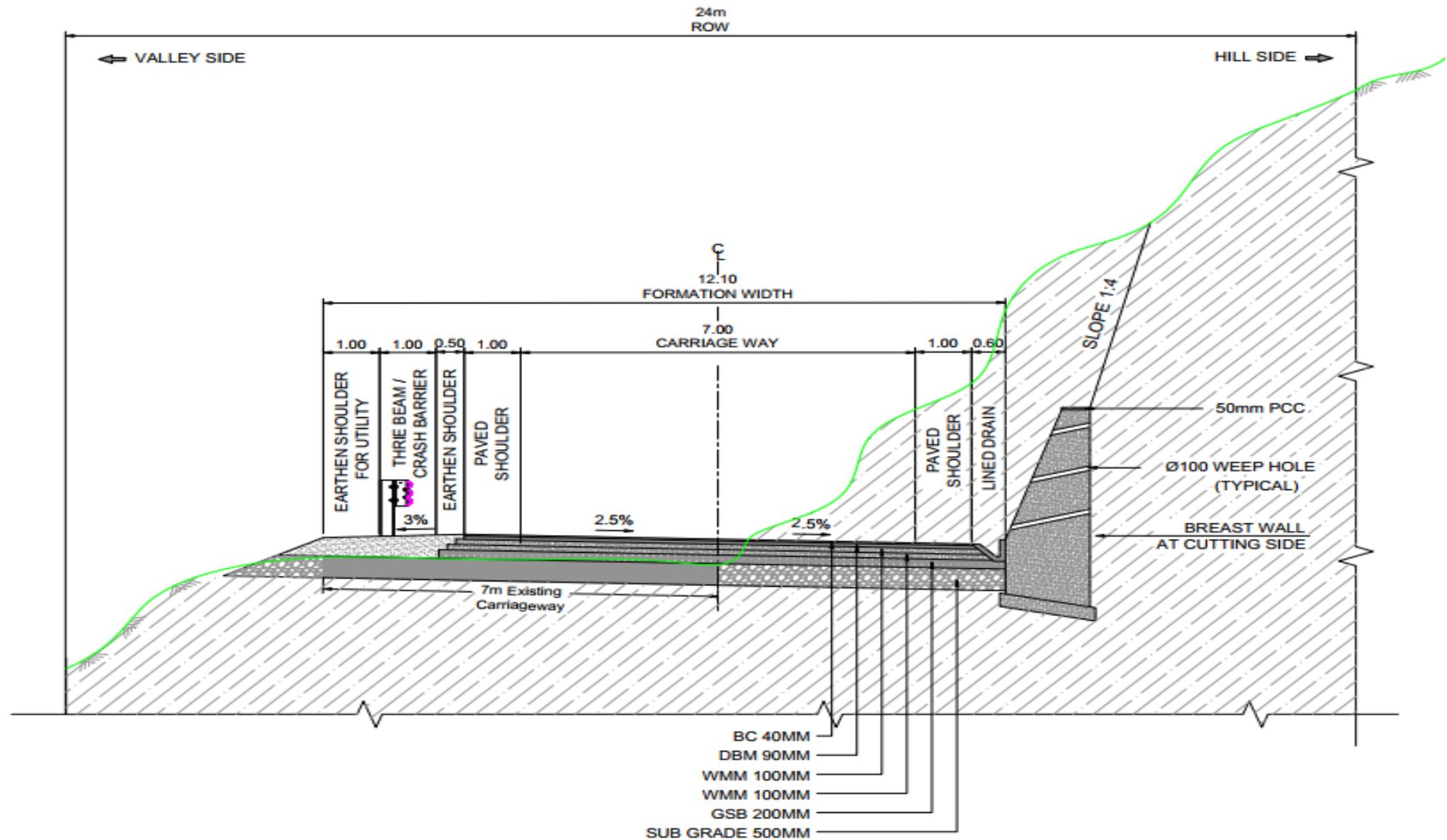
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2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/
STEEP TERRAIN) VALLEY SIDE RETAINING WALL(LHS)
AND HILL SIDE BREAST WALL(RHS)

Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.



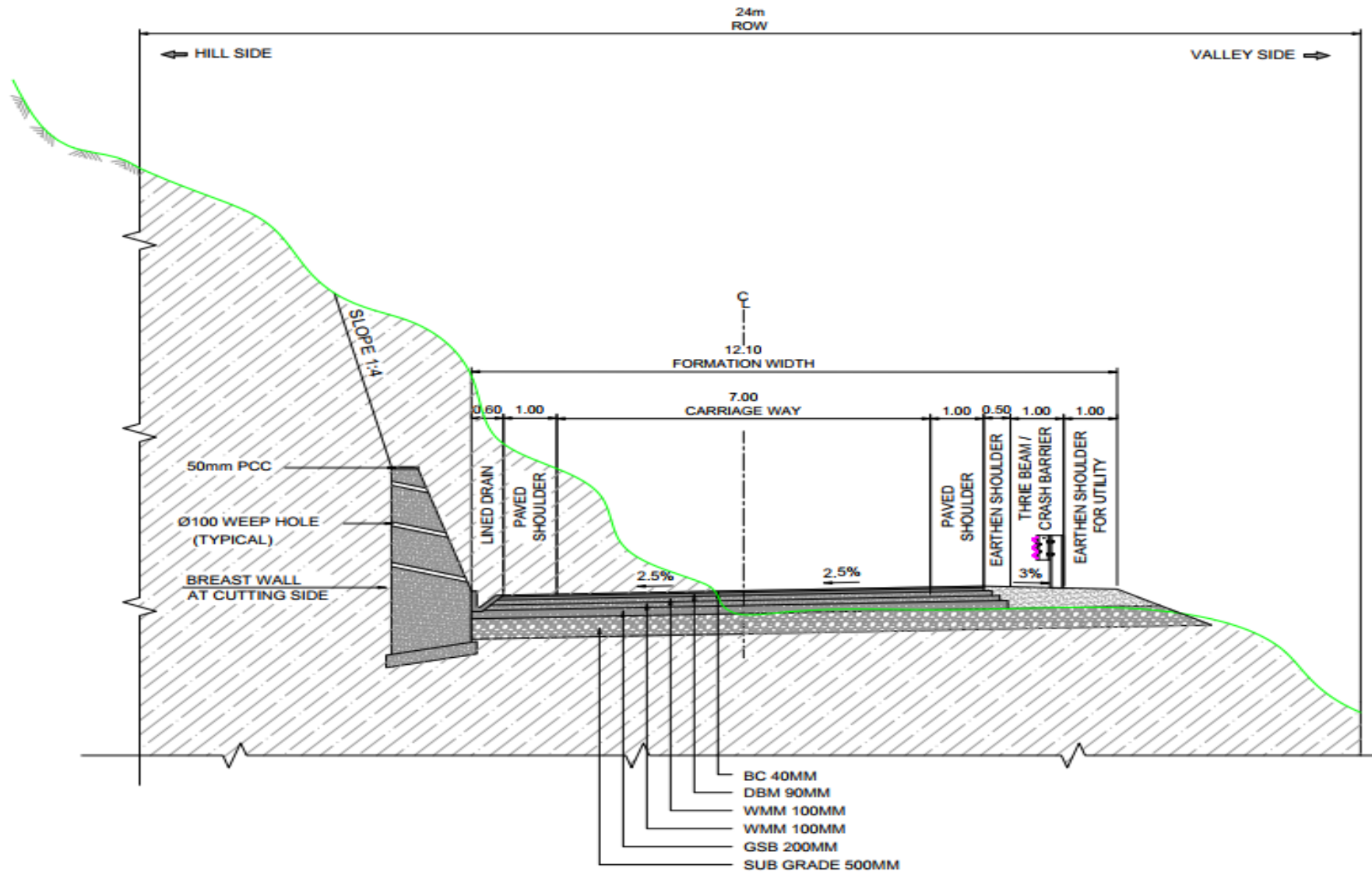
TYPICAL CROSS SECTION-4
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/
STEEP TERRAIN) HILL SIDE BREAST WALL(LHS)
AND VALLEY SIDE SLOPE(RHS)

Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.



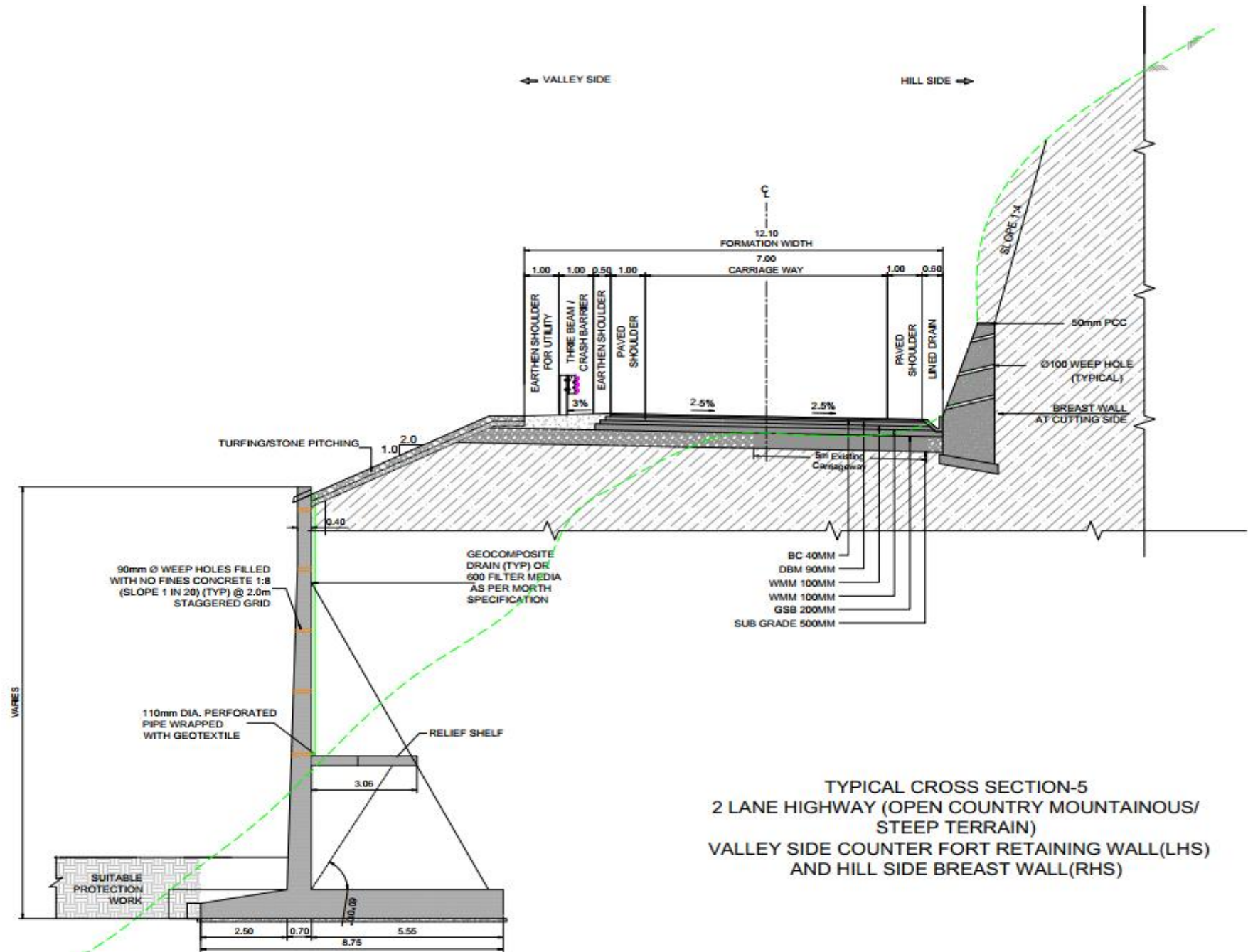
TYPICAL CROSS SECTION-4A
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/
STEEP TERRAIN) VALLEY SIDE SLOPE(LHS)
AND HILL SIDE BREAST WALL(RHS)

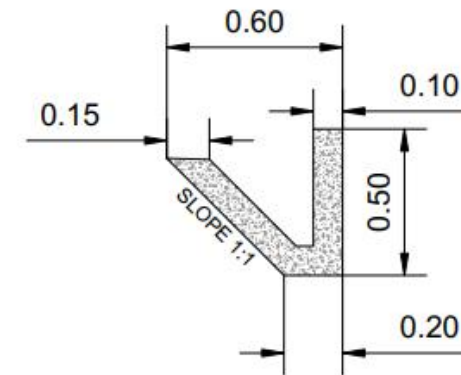
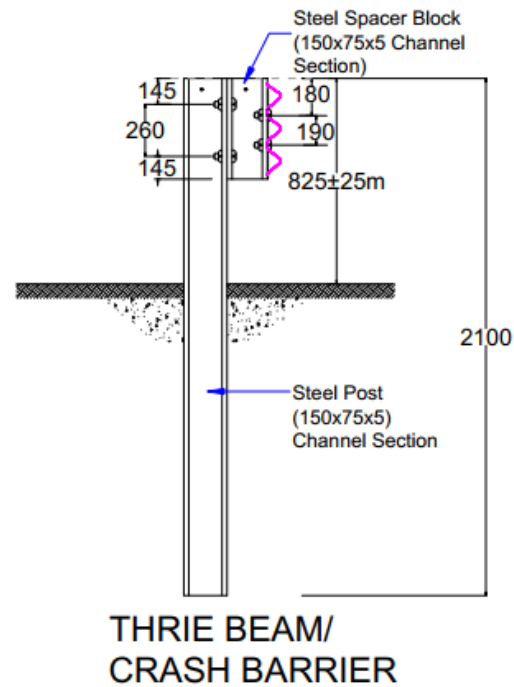
Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.



TYPICAL CROSS SECTION-4B
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/
STEEP TERRAIN) HILL SIDE BREAST WALL(LHS)
AND VALLEY SIDE SLOPE(RHS)
NEW CONSTRUCTION

NHIDCL, MoRT&H





LINED DRAIN

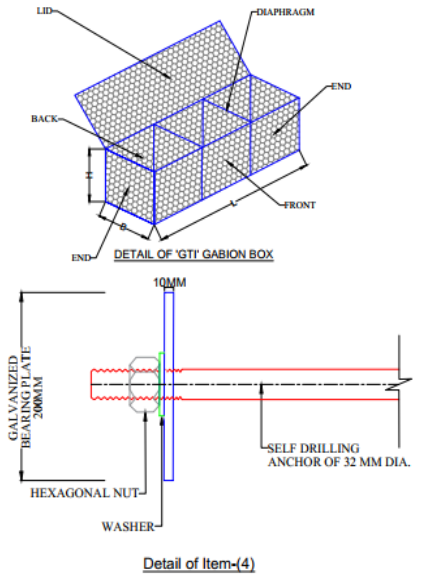
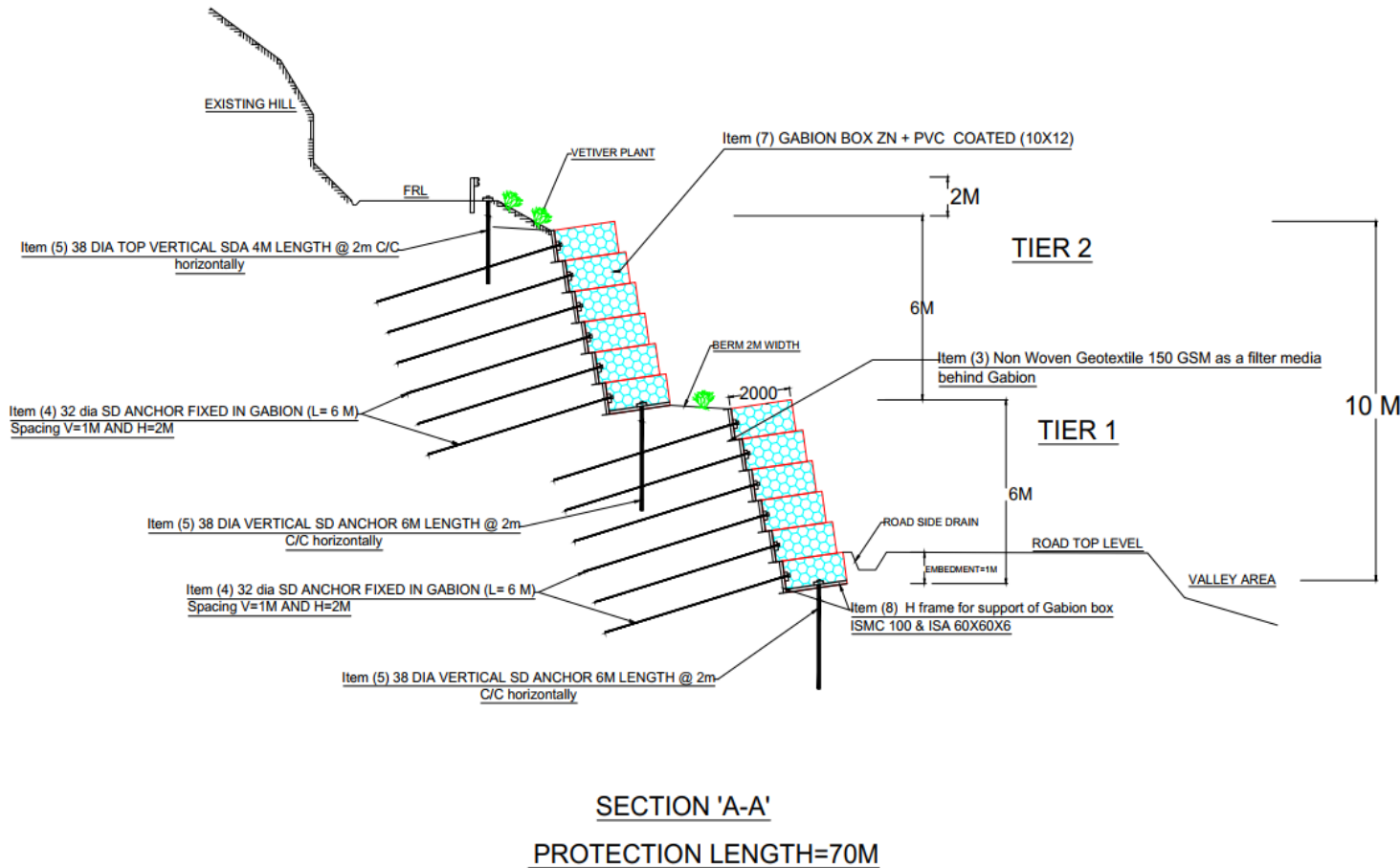
Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.

SPECIFICATIONS:

- 1). Needle Punched and mechanically bonded non-woven Geotextile indigenously manufactured from high quality fibers on the prepared subgrade for Separation 150 gsm
- 2). Self Drilling hollow soil/rock anchor of outer dia of 32 mm and inner dia of 18.5mm, yield load carrying capacity of minimum 230 kN in soil /overburden /rock suitable for, drilling placing and cement grouting
- 3). Gabion box for retaining structure with Mechanically Woven Double Twisted Hexagonal Shaped Wire mesh Gabion Boxes as per IS 16014:2012, MORTH Clause 2500, of required size, Mesh Type 10x12 (D=100 mm with tolerance of $\pm 2\%$) Zinc + PVC coated, DT Mesh wire diameter 2.7/3.7 mm, mechanically edged/selvedged with partitions at every 1m interval and shall have minimum 10 numbers of openings per meter of mesh perpendicular to twist, tying with lacing wire of diameter 2.2mm, supplied @ 3% by weight of Gabion boxes, filled with boulders with least dimension of 200 mm
- 4). Self drilling Hollow soil / rock anchor of outer dia of 38 mm and Inner dia of 19 mm, Yield Load Carrying Capacity of Minimum 400 kN in soil / overburden /rock suitable for drilling placing and cement grouting. Installation with all accessories such as 76 mm dia drill bit, couplers, 8mm thick base plate and nut and bolt complete in all. respect.
- 5). Structural steel work in single section, fixed with or without connecting plate, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.

***Note :**

- 1). As per site observations; the most critical section is 20m from OGL & Average Inclination of slope = 700
- 2). The given proposal is on site observations basis as suggested by an expert.



Schedule - C

Schedule - C
(See Clause 2.1)

PROJECT FACILITIES

1. Project Facilities

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

- (a) ~~_____ toll plaza;~~
- (b) road side furniture;
- (c) ~~_____ pedestrian facilities;~~
- (d) tree plantation;
- (e) truck lay-byes;
- (f) bus bays and bus shelters;
- (g) ~~_____ rest areas;~~
- (h) Others to be specified: street lighting

2. Description of Project Facilities

Each of the project facilities is described below:

2.1 Toll Plaza

Toll plaza shall be designed as per the guidelines of manual and it is provided at following locations:

Sl. No.	Toll Plaza Location (Design Chainage in Km)
NIL	

2.2 Road side furniture

As described in Annex-I of Schedule-B, including the below mentioned facility:

2.2.1 Identification & boundary stones:

Sl. No.	Project facility	Location	Design requirements	Other essential details
1	5 th Kilometer stones	Km 0+000 to 14+589	As per Manual and relevant IRC code.	-
2	Kilometer stones			
3	Hectometer stones			
4	Boundary stones			

2.3 Pedestrian facilities : Nil

2.4 Tree plantation : As per Manual.

2.5 Truck lay-byes :

Sl. No.	Location	Design requirements	Other essential details
1	km 7+270 (LHS)	As per Manual and relevant IRC code.	-

2.6 Bus bays and bus shelters:

S.N	Design Chainage	Side	Remarks
1	0+160	RHS	Habitation area.
2	1+500	RHS	
3	1+770	RHS	
4	2+400	LHS	
5	3+600	RHS	
6	4+600	RHS	
7	5+220	LHS	
8	5+550	LHS	
9	5+950	RHS	
10	6+210	LHS	
11	9+090	LHS	
12	12+050	RHS	
13	12+070	LHS	
14	12+510	LHS	

2.7 Rest areas : NIL

2.8 Others:

2.8.1 Street lightening:

S. No.	Location	Design requirements	Other essential details
1	At Junctions/Intersections, MJB, MNB and it's approaches, Bus Bay and Bus shelters, Truck Lay byes etc.	As per Manual and relevant IRC code.	Minimum 106 nos.

Schedule- D

Schedule - D
(See Clause 2.1)
Specifications and Standards

1. **Construction:** The Contractor shall comply with the Specifications and Standards set forth in Annex-I of this Schedule-D for construction of the Project Highway.

2. **Design Standards:**

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

Manual of Specifications and Standards for Two Laning of Highways (IRC: SP: 73 2018), referred to herein as the Manual.;

IRC-37: 2018 Guidelines for the design of flexible pavements;

Code for Practice of Road Signs IRC- 67: 2022;

IRC SP:91-2019 Guidelines for Road Tunnel

The Hill Road Manual IRC SP:48: 2023 should be referred.

The NGT Order dated 01.11.2018 should be followed for disposal of muck.

3. As regards, the work of utility shifting, the relevant specification, relevant rules, regulations and acts of Utility Owning Department/Agencies shall be applicable.

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-Lanning of Highways (IRC: SP:73), referred to as the Manual and MORTH Specifications for Road and Bridge Works. In addition, provisions of relevant Codes, Standards, Specifications, Guidelines etc. of IRC, MoRTH, AASHTO, ASTM, Euro Codes and British Codes shall also be referred. Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Authority's Engineer.

1.1 Design Standards for special slope protection works

- (i) Hill Road Manual IRC SP: 48:2023
- (ii) MoRT&H OM no. RW/NH-33044/55/2021-S&R (P&B) pt./Hill Slope Monitoring (Computer No. 219394), dated 28.11.2024
- (iii) IRC- HRB- Special Report-23 -State of the Art: Design and Construction of Rock fall Mitigation systems.
- (iv) IRC: SP: 42 - 2014, Guidelines of Road Drainage.
- (v) IRC SP: 116-2018 - Guidelines for Design and Installation of Gabion Structures.
- (vi) BS 8006-1:2010+A1:2016-Code of Practice for Strengthened /Reinforced Soil& other fills.
- (vii) BS 8081:2015+A2:2018 - Code of Practice for Grouted Anchors.
- (viii) FHWA-NHI-14-007 - Soil Nail Walls Reference Manual (FHWA GEC 007), 2015.
- (ix) FHWA-IF-99-015 - Ground Anchors and Anchored System (GEC No. 4), 1999.
- (x) IS 16014:2018, Mechanically Woven, Double-Twisted, Hexagonal Wire Mesh Gabions, Rivet Mattresses, Rock Fall Netting and Other Products for Civil Engineering Purposes (Galvanized Steel Wire or Galvanized Steel Wire with Polymer Coating) – Specification.

- (xi) IS 14268: 2017 - Uncoated Stress Relieved Low Relaxation Seven-Wire (Ply) Strand for Prestressed Concrete— Specification.
- (xii) IS: 1893-1 (2016), —Criteria for Earthquake Resistant Design of Structure, Bureau of Indian Standards, and New Delhi.
- (xiii) Ministry of Road Transport and Highways (MORTH), —Specifications for Road and Bridges Works - Fifth Revision.
- (xiv) Geological, geotechnical& Geophysical investigations as per IRC: 78, Specifications for drilling, coring testing etc. issued by ISI. BIS, MoRT&H and other relevant codes are applicable.
- (xv) Other Indian / International Standards applicable as per Good Industry Practice.

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 for the below:

Clause Referred in Manual	Item	Provision as per Manual	Modified Provision	Remarks
2.2.1	Minimum design speed in hilly terrain.	40 kmph	At some locations listed below, where the horizontal curve radius is not meeting the criteria as per manual	Speed is restricted for Curve having radius less 50m.
2.6.1	Width of shoulders in mountainous and steep terrain (Hilly Area)	Paved shoulder (open country) = 1.50 m (each side) Earthen shoulder (open country) = 1.00 m (valley side)	As defined in clause 2 (vii) (b) of Annex-I of Sch-B	

The following Policy circulars of MoRTH shall be also complied:

Sl. No.	Policy circular No.	Dated	Subject
1	Efile No. RW/NH-33044/55/2021-S&R(P&B)Pt./ Hill slope monitoring (Computer No. 219394)	28 th November 2024	Expert Committee Report on Cost Effective Long Term Remedial Measures for landslide prone areas in hilly regions.
2	Efile No. RW/NH-34066/09/2017/S&R(B) (Computer no. 185417)	12 th February 2021	Reinforcing Steel Bars (Clause 1000.9.3.1 of Ministry's specification for Roads and Bridge Works).
3	E-file No. RW/NH-33044/22/2020-S&R (P&B) (Computer No. 186381)	4 th June 2024	Width of shoulder (Paved earthen) for National Highways
4	Efile no. RW/NH-35072/05/2018-S&R(P&B) (Computer No. 165688)	19 th April 2024	Recommended Bitumen type & grade for different climate & traffic loading for National Highway and Expressway works in India
5	Efile No. RW/NH-35072/05/2018-S&R(P&B) (E165688)	23 rd August 2023	Use of Bitumen: Demand Supply, Type & grade, specifications, source of procurement and quality in construction of National Highway Projects
6	Efile No. RW/NH-36098/25/2022-S&R (P&)/Pt.	16 th March 2023	Safety in road construction zone in National Highway Projects - effective and adequate measures to be taken
7	Efile No. RW/NH-36098/17/2022/S&R(B)	2 nd January 2023	Provisions of crash barriers in existing bridge.
8	NH-12037/170/2025/TUNNEL	05 th December 2025	Guidelines for Preparation and Mitigation of Road Tunnel Collapses
9	NH-12037/166/2025/Tunnel	27 th January 2026	Standard Operating Procedure for passage of vehicles carrying hazardous material through tunnels on National Highways

CURVE DETAILS:

Curve details where speed limit is restricted to 20-30km/hr. are given in the table below:

Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration Rhenock (Km 0.00) to Rongli Bazaar (Km 15.300) along NH-717B in the State of Sikkim on EPC mode.

Sl. N	HIP Chainage	Radius	Transition Length	SPEED (V) in KMPH	Super elevation e (%)	Remark
1	760.972	28	15	20	6.35	Hair Pin Bends
2	802.856	28	0	20	6.35	
3	1033.326	60	15	30	6.67	
4	1716.733	30	25	20	5.93	
5	1870.25	60	15	30	6.67	
6	1934.038	60	15	30	6.67	
7	1992.877	80	15	30	5.00	
8	2593.83	60	15	30	6.67	
9	2790.88	30	15	20	5.93	Hair Pin Bends
10	2832.349	30	0	20	5.93	
11	3538.369	80	15	30	5.00	
12	3707.562	27	15	20	6.58	Hair Pin Bends
13	3747.891	27	0	20	6.58	
14	3900.926	60	15	30	6.67	
15	3977.35	60	15	30	6.67	
16	4911.686	50	15	25	5.56	
17	4962.601	40	15	20	4.44	
18	5350.288	60	15	30	6.67	
19	5444.072	25	15	20	7.11	Hair Pin Bends
20	5483.813	25	0	20	7.11	
21	5793.768	60	15	30	6.67	
22	5858.715	50	15	25	5.56	
23	5920.305	50	15	25	5.56	
24	6000.284	80	15	30	5.00	
25	6103.05	80	15	30	5.00	
26	6273.074	60	15	30	6.67	
27	6475.214	80	15	30	5.00	
28	6555.469	50	15	25	5.56	
29	6822.131	80	15	30	5.00	
30	7146.597	45	15	25	6.17	
31	7240.065	60	15	30	6.67	
32	8158.685	60	15	30	6.67	
33	8532.633	30	15	20	5.93	Hair Pin Bends
34	8561.984	30	0	20	5.93	
35	8671.744	60	15	30	6.67	
36	8863.943	50	15	25	5.56	
37	8952.77	60	15	30	6.67	
38	9022.349	60	15	30	6.67	
39	9290.917	50	15	25	5.56	
40	9879.602	35	15	20	5.08	
41	10340.687	60	15	30	6.67	
42	10745.09	40	15	20	4.44	
43	11923.632	60	15	30	6.67	
44	12465.955	60	15	30	6.67	

Sl. N	HIP Chainage	Radius	Transition Length	SPEED (V) in KMPH	Super elevation e (%)	Remark
45	12552.148	60	15	30	6.67	
46	12661.077	60	15	30	6.67	
47	12732.205	80	15	30	5.00	
48	12804.507	60	15	30	6.67	
49	12864.134	50	15	25	5.56	
50	12941.994	60	15	30	6.67	
51	13071.898	60	15	30	6.67	
52	13119.029	50	15	25	5.56	
53	13192.064	60	15	30	6.67	
54	13275.194	50	15	25	5.56	
55	13478.417	80	15	30	5.00	
56	13683.892	30	15	20	5.93	
57	13756.809	30	15	20	5.93	
58	14130.748	80	15	30	5.00	
59	14446.766	40	15	20	4.44	
60	14501.849	60	15	30	6.67	

3. Technical Specification:

➤ Counter-fort Retaining wall

- Design Standards

- Codes and Standards:** Design should comply with relevant codes like ACI 318 (for concrete), BS 8110, Eurocode 2, or IS 456 for design and construction.
- Load Considerations:** Consider lateral earth pressure, surcharge loads, seismic forces, and other environmental factors.
- Safety Factors:** Apply appropriate safety factors as per the design code.

- Materials

- Concrete Grade:** Minimum M25 or C30 for reinforced concrete.
- Reinforcement Steel:** High-yield strength deformed bars conforming to ASTM A615, IS 1786, or equivalent.
- Cement:** OPC 43/53 grade or equivalent.
- Aggregate:** Clean, well-graded aggregate conforming to IS 383 or equivalent.

- Structural Details

- Reinforcement:**

Vertical bars: Main reinforcement to resist bending moments.

Horizontal and inclined bars: Ties and distribution steel to control shrinkage and temperature effects.

Adequate anchorage and lap lengths as per design standards.

- II. **Concrete Cover:** Minimum 40 mm for reinforcement to protect against corrosion.
- III. **Footing Design:** Base slab must be designed to distribute loads from the counterforts uniformly to the foundation soil.

Construction Considerations

- I. **Formwork:** Ensure smooth, properly aligned formwork to achieve desired dimensions and prevent honeycombing.
- II. **Curing:** Proper curing for a minimum of 7-14 days to achieve adequate strength.
- III. **Construction Joints:** Located at points of minimum shear, with shear keys or dowels for continuity.
- IV. **Quality Control:** Test concrete and steel samples for strength and quality compliance.

- **Drainage and Waterproofing**

- I. Provide weep holes or drainage pipes at regular intervals to prevent hydrostatic pressure buildup behind the wall.
- II. Use waterproofing membranes or coatings to protect the wall from seepage.

- **Maintenance**

- I. Regular inspections for cracks, spalling, and water seepage.
- II. Apply protective coatings periodically to reduce corrosion risks.

➤ **Slope protection (Self Drilling Anchoring Work):**

ISO certified SDA shall be arranged as specified in the drawings in order to stabilize in-situ strata. The grout shall be made of OPC grade 53 with suitable admixtures. The SDA, nuts, bearing plates and couplers shall be epoxy coated. In-house testing facility of the manufacturer shall have NABL, GAI-LAP certifications.

Drilling shall be carried out by suitable equipment. Diameter of SDA shall be 32 (inner dia-18.5mm) & 38 mm (inner dia-19.0mm) as specified. The SDA shall be made of tensile strength of min. 400 kN. The SDA rod shall be

continuously threaded. For convenience of installation, appropriate arrangement (coupler) shall be made to connect two smaller lengths of SDA to achieve the required length.

Installation guideline

- a. **Scaling works:** All the loose debris & unwanted materials are to be properly removed from the surface of slope and in the location of SDA applications.
- b. The SDA is driven in the required position with help of sacrificial drill bit at the bottom of the anchor bar which facilitates in drilling the hole. The minimum diameter, minimum length and minimum spacing of SDA shall be as specified or site requirement. Additional length and/or spacing of anchoring/nailing shall be carried out as per site condition and as directed by Authority/Authority's Engineer.
- c. The grout is pumped through the hollow bar during the drilling process. Grouting shall be done by using OPC grade 53 along with addition of suitable admixture. Mixing shall be done along with potable water so as to form the cementitious paste.
- d. The base plates of size 200mm x 200mm x 10 mm shall be placed at interface for tightening the nuts.
- e. The fascia (if applicable) shall be installed in front and connected to the steel rods with base plate and nuts.

Following equipment deployed on site

- 1) Grout agitator
- 2) Compressor - 450 to 600CFM
- 3) Drilling equipment percussion/rotary type
- 4) Any other required equipment.

Expansive plasticizing agent for cement grouts shall be used, typical brand name DR. FIXIT PIDICRETE AM is a shrinkage compensating grout admixture for pressure grouting or similar brand with same properties.

Technical Specification of Mechanically Woven Double Twisted Hexagonal Shaped Wire Mesh netting roll, Mesh Type 10x12, Zn + PVC coated Mesh Wire dia. 2.7/3.7mm (ID/OD), end of roll mechanically edged / selvaged, with galvanization as per IS 16014:2012 and MoRTH (Fifth Revision) 2013, Clause 2500.

Scope:

This specification covers the use of mechanically woven hexagonal shaped double twisted (DT) wire mesh rock fall netting for surface rock fall protection including the scope of furnishing and installation as per the special provisions mentioned in the specifications, instructions from the manufacturer/supplier of the rock fall protection system and as directed by the Engineer- In-Charge.

General Requirements:

The DT wire mesh rock fall netting shall meet the minimum requirements of mechanically woven DT hexagonal shaped zinc and PVC coated wire mesh mainly mesh wire diameter, mesh type, zinc coating, PVC coating, wire tensile strength and mesh panel tensile strength as specified in this document.

System Technology:

The DT wire mesh rock fall netting shall be made up of mechanically woven hexagonal DT wire mesh. The steel wire shall be heavily zinc coated soft temper steel. PVC coating shall be applied for added protection, to use in corrosive environment. Nominal PVC thickness of 0.50mm shall be applied. The hexagonal shape of the mesh provides a better distribution of the working tensions along the wires that form the mesh.

Zn + PVC Coated
Hexagonal wire mesh



Figure 1 Typical Wire Mesh Rock fall Netting

Material Specifications:

Mechanically Woven Double Twisted Hexagonal shaped Zn + PVC coated wire mesh: All steel wires used in the manufacturing of wire mesh rock fall netting shall conform to IS 16014:2012. The wire used for the manufacture of mesh shall have a tensile strength between 350-550N/mm² and elongation shall not be less than 10%. Test shall be carried out on a sample of at least 20 cm length. All tests on the mesh wire, selvaging wire & lacing wire shall be performed prior to manufacturing the mesh. The DT wire mesh shall have peak tensile strength of 40 kN/m tested as per procedure outlined in clause 6 of this specification.

Selvedge wire: The diameter of the selvaging shall be bigger than the wires in the mesh. The diameter of selvedge wire shall be 3.4mm and shall have same characteristics as the mesh wire.

Lacing wire: The diameter of the lacing wire shall be 2.2 mm and shall have same characteristics as the mesh wire and shall

l have same characteristics as the mesh wire.

Zinc coating

Zinc coating: Minimum quantities of Zinc shown at Table 1 shall meet the requirements of IS 4826:1979.

Adhesion of zinc coating: The adhesion of the zinc coating to the wire shall be such that, when the wire is wrapped ten turns around a mandrel having four times the diameter of the wire, it does not flake or crack when rubbing it with the bare fingers in accordance with IS 4826:1979.

PVC (Polyvinyl Chloride) coating

- PVC coating thickness: Nominal - 0.5 mm, Minimum - 0.4 mm;
- Specific weight: 1.3 kg/dm³ - 1.35 kg/dm³ in accordance with IS 13360, Part3, section 1.
- Hardness: between 50 and 60 Shore D, according to IS 13360, Part5, section 11
- Tensile strength: Higher than 20.6 MPa, according to IS 13360, Part5, section 1
- Elongation at break: not less than 200% in accordance with IS 13360, Part5, section 1.5.
- Colour: Grey - RAL 7037.

Wire diameter, tolerances, zinc coating shall conform to values indicated in Table 1:
Table 1 Characteristics of Mesh wire, Selvedge wire and Lacing wire

Characteristics of 10x12 mesh	Mesh wire	Selvedge wire	Lacing wire
Mesh Wire Dia mm	2.7	3.4	2.2
Tolerance (+/-) mm	0.07	0.09	0.06
Zn Coating Min (gm/sq.m)	260	270	240

The wire mesh shall have nominal opening of 100mm as shown in Figure 2. The mesh opening tolerances are indicated in Table 2.

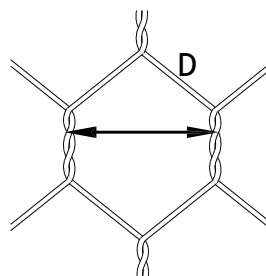


Figure 2 Mesh Details

Tolerances in Mesh Opening size: - 2% to +2%

DT mesh shall have minimum 10 numbers of mesh openings per meter of mesh perpendicular to twist of mesh.

Procedure for verification of mesh opening.

Rockfall netting shall be unfolded on the plain ground.

Any shrink in the unfolded netting shall be removed, by stretching the Mesh panel. Marking on the ground shall be made from the Centre of the twist of one mesh and the second.

Marking shall be done at 1 m distance.

The number of mesh Openings in the 1 m shall be counted & verified.

Table 2 Standard Mesh

Mesh type	“D” (mm)	Tolerance	Mesh Panel Strength (parallel to twist)	Zinc +PVC coated		
				Diameter of wire (Inner / Outer wire)		
				Mesh wire(mm)	Selvedge (mm)	Lacing wire(mm)
10X12	100mm	- 2% to +2%	40kN /m	2.7/3.7	3.4/4.4	2.2/3.2

Dimensions of DT wire mesh

DT wire mesh shall be manufactured in a standard width of 4m and length of 25 or 50m with tolerance of $\pm 5\%$. Table 3 indicates standard sizes of DT wire mesh rock fall netting other roll sizes may be required as per site conditions subject to the Engineer's approval. For non-standard roll lengths there may be some variation outside the tolerance limit from the nominal size shown in the contract drawings.

Table 3 Standard sizes of DT wire mesh rock fall netting

Type	Length (m)	Width (m)
DT wire mesh (Mesh 10x12)	25	4
	50	4
	100	4

Installation:

Vegetation, debris and loose soils and other deleterious matter shall be cleared to the satisfaction of Authority Engineer. Reference benchmarks, line and levels shall be marked at site. The materials, tools and tackles shall be shifted to site without damaging system.

The rolls of DT wire mesh rock fall netting should be rolled down the surface from top anchoring system as per the contract drawings. New roll shall be placed in the same manner directly overlapping the adjacent roll such that longitudinal ropes of both the rolls can be laced together by hand. Lacing shall commence by twisting end of the lacing wire tightly to the wire mesh. It shall then pass round the two edges being joined using alternate single and double loops at approximately 100mm intervals. The lacing wire shall be securely tied off at the bottom of the roll. The bottom anchoring shall be done as per the drawings.

Manufacturer's installation guideline shall be referred for details.

Testing and Acceptance criteria:

Testing shall be done on raw material as per codes specified in Table 4. Approval for the material shall be obtained in the writing from the Engineer before actual start of

supply. The manufacturer of the DT wire mesh rock fall netting shall provide manufacturers test certificate for the material with every lot/shipment. The manufacturers test certificate for DT wire mesh rock fall netting shall be provided for certifying that rock fall protection system conforms to all the technical and special requirements.

The punch strength test results shall be 19kN in accordance with MoRTH section 2500 and test specified therein.

DT wire mesh tensile strength test procedure

A tensile test on DT wire mesh sample shall be carried out in order to estimate tensile strength parallel to twist. The test shall be carried out as per procedure outlined below. The DT wire mesh tensile strength shall be minimum 40 kN/m.

- Take a DT wire mesh of approximately 1.0 m width. The sample shall have edge wire on both the sides.
- The height of the sample shall be such that after selvedging on both the sides, effective height of the sample shall be more than 300 mm. Sample shall be loaded on the UTM in a direction parallel to twist, with the samples being gripped as shown in the figure 3.
- The effective height of sample (gauge length) shall be the distance measured between the two rows of inner gripping pins on two grips.
- Distance between the two end gripping points (pins) along the width of the sample shall be recorded as the unit width under test. The width shall be at least 700 mm.
- The load shall be applied gradually to the sample and the test be continued till the break point.
- The peak load and the % elongation shall be recorded.
- The strength of the DT wire mesh shall be (peak load/unit width under test) expressed in kN/m.

NB. If the sample slips at any of the gripping point during the test, such a test shall be discarded and a new sample shall be taken.

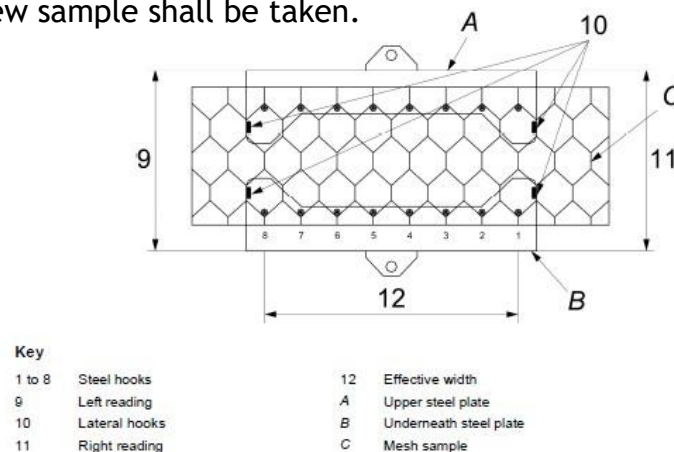


Figure 4 Tensile strength of mesh panel

PVC coating thickness test procedure:

The thickness of the PVC coating shall be determined on a randomly chosen individual piece of wire removed from the coil at 3 places 1 metre apart.

Measure with a micrometre the diameter of the galvanized steel wire with PVC coating. Determine the thickness of the PVC coating by stripping the PVC coating from the wire and measure the reduced diameter with a micrometre. The thickness of the coating is the difference between the diameter of the galvanized steel wire with PVC coating and the measured diameter of the galvanized steel wire divided by two. The thickness

values should be as per clause 3.e. While removing the PVC coating by stripping, take care not to remove any of the metallic surfaces.

Table 4 Testing Plan

Sr. No	Test	Reference	Frequency of Testing	Sample size	Remarks
	MESH WIRE				
1	Tensile strength & Elongation%	IS 16014:2012	Once	Three	
2	Mass of Zinc & adhesion	IS 4826:1979	Once	Three	
3	DT wire mesh panel strength	Clause 1.6	Once	Three	
4	Physical dimension of Wire mesh rock fall netting	TDS, Visual checking			
5	PVC coating thickness	Clause 1.3.5	Once	Three	
Note:	Testing of wire shall be done on samples from raw material				

Schedule - E
(See Clauses 2.1 and 14.2)

Maintenance Requirements

1. Maintenance Requirements

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

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.

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

2. Repair/rectification of Defects and deficiencies

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

3. Other Defects and deficiencies

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

4. Extension of time limit

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

5. Emergency repairs/restoration

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

6. Daily inspection by the Contractor

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

7. Pre-monsoon inspection / post-monsoon inspection

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

8. Repairs on account of natural calamities

All damages occurring to the Project Highway on account of a Force Majeure Event or 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, FHWA 2003 (http://www.tfhrc.com/pavement/ltp/reports/03031/)	24-48 hours	MORT&H Specification 3004.2	
	Cracking	Nil	< 5 % subject to limit of 0.5 sqm for any 50 m length	Daily			7-15 days	MORT&H Specification 3004.3	
	Rutting	Nil	< 5 mm	Daily	Straight Edge		15 -30 days	MORT&H Specification 3004.2	
	Corrugations and Shoving	Nil	< 0.1 % of area	Daily	Length Measurement Unit like Scale, Tape, odometer etc.		2-7 days	IRC:82-2015	
	Bleeding	Nil	< 1 % of area	Daily			3-7 days	MORT&H Specification 3004.4	
	Ravelling/ Stripping	Nil	< 1 % of area	Daily			7-15 days	IRC:82-2015 read with IRC SP 81	
	Edge Deformation / Breaking	Nil	< 1 m for any 100 m section and width < 0.1 m at any location, restricted to 30 cm from the edge	Daily			7- 15 days	IRC:82-2015	
	Roughness BI	2000 mm/km	2400 mm/km	Bi-Annually	Class I Profilometer SCRM		Class I Profilometer : ASTM E950 (98) :2004 -Standard Test Method for measuring Longitudinal Profile of Travelled	180 days	IRC:82-2015
	Skid Number	60SN	50SN	Bi-Annually				180 days	BS: 7941-1: 2006

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					
	Pavement Condition Index	3	2.1	Bi-Annually	(Sideway-force Coefficient Routine Investigation Machine or equivalent)	Surfaces with Accelerometer Established Inertial Profiling Reference ASTM E1656 -94: 2000- Standard Guide for Classification of Automatic Pavement Condition Survey Equipment	180 days	IRC:82-2015
	Other Pavement Distresses			Bi-Annually			2-7 days	IRC:82-2015
	Deflection/Remaining Life			Annually	Falling Weight Deflecto meter	IRC 115: 2014	180 days	IRC:115-2014
Rigid Pavement (Pavement of MCW, Service Road, Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	Roughness BI	2200mm/km	2400mm/km	Bi-Annually	Class I Profilometer	ASTM E950 (98) :2004 and ASTM E1656 -94: 2000	180 days	IRC:SP:83-2008
	Skid	Skid Resistance no. at different speed of vehicles		Bi-Annually	SCRIM (Sideway-force Coefficient Routine Investigation Machine or equivalent)	IRC:SP:83-2008	180 days	IRC:SP:83-2008
		Minimum SN	Traffic Speed (Km/h)					
		36	50					
		33	65					
		32	80					
		31	95					
		31	110					
Embankment/ Slope	Edge drop at shoulders	Nil	40mm	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC SP:73-2018, IRC 36-2010 & IRC 56-2011	7-15 days	MORT&H Specification 408.4
	Slope of camber/cross fall	Nil	<2% variation in prescribed slope of camber /cross fall	Daily			7-15 days	MORT&H Specification 408.4
	Embankment Slopes	Nil	<15 % variation in prescribe side slope	Daily			7-15 days	MORT&H Specification 408.4

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

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

Table -2: Maintenance Criteria for Rigid Pavements:

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
CRACKING						
1	Single Discrete Cracks Not intersecting with any joint	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	Not applicable
			1	w < 0.2 mm. hair cracks		
			2	w = 0.2 - 0.5 mm, discernible from slow-moving car	Seal without delay	Seal, and stitch if L > 1m. Within 7days
			3	w = 0.5 - 1.5 mm, discernible from fast-moving car		
			4	w = 1.5 - 3.0 mm	Seal, and stitch if L > 1 m. Within 7 days	Staple or Dowel Bar Retrofit, FDR for affected portion. Within 15days
			5	w > 3 mm.		
2	Single Transverse (or Diagonal) Crack intersecting with one or more joints	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.2 mm, hair cracks	Route and seal with epoxy. Within 7 days	Staple or Dowel Bar Retrofit. Within 15days
			2	w = 0.2 - 0.5 mm, discernible from slow vehicle		
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route, seal and stitch, if L > 1 m. Within 7 days	
			4	w = 3.0 - 6.0 mm	Dowel Bar Retrofit. Within 15 days	Full Depth Repair Dismantle and reconstruct affected.

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
			5	w > 6 mm, usually associated with spalling, and/or slab rocking under traffic	Not Applicable, as it may be full depth	Portion with norms and specifications - See Para 5.5 & 9.2 Within 15days
3	Single Longitudinal Crack intersecting with one or more joints	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.5 mm, discernible from slow moving vehicle	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, if L > l m. Within 15 days	-
			3	w = 3.0 - 6.0 mm	Staple, if L > 1 m. Within 15 days	Partial Depth Repair with stapling. Within 15 days
			4	w = 6.0 - 12.0 mm, usually associated with spalling	Not Applicable, as it may be full depth	
			5	w > 12 mm, usually associated with spalling, and/or slab rocking under traffic		Full Depth Repair Dismantle and reconstruct affected portion as per norms and specifications - See Para 5.6.4 Within 15 days
4	Multiple Cracks intersecting with one or more joints	w = width of crack	0	Nil, not discernible	No Action	-
			1	w < 0.2 mm, hair cracks	Seal, and stitch if L > l m. Within 15 days	
			2	w = 0.2 - 0.5 mm. discernible from slow vehicle		
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Full depth repair within 15 days	Dismantle, Reinstall subbase, Reconstruct whole slab as per specifications within 30 days
			4	w = 3.0 - 6.0 mm panel broken into 2 or 3 pieces		
			5	w > 6 mm and/or panel broken into more than 4 pieces		
5	Corner Break		0	Nil, not discernible	No Action	-

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
		w = width of crack L = length of crack	1	w < 0.5 mm; only 1 corner broken	Seal with low viscosity epoxy to secure broken parts Within 7 days	Seal with epoxy seal with epoxy Within 7days
			2	w < 1.5 mm; L < 0.6 m, only one corner broken		
			3	w < 1.5 mm; L < 0.6 m, two corners broken	Partial Depth (Refer Figure 8.3 of IRC:SP: 83-2008) Within 15 days	Full depth repair
			4	w > 1.5 mm; L > 0.6 m or three corners broken		
			5	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	Not Applicable, as it may be full depth	No Action
			1	w < 0.5 mm; L < 3 m/m ²		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		Full depth repair - Cut out and replace damaged area taking care not to damage reinforcement. Within 30days
			4	w > 3 mm, L < 3 m/m ² and deformation		
			5	w > 3 mm, L > 3 m/m ² and deformation		
Surface Defects						
7	Ravelling or Honeycomb type surface	r = area damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	Short Term	Long Term
				No action.		
			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 if affecting.				

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
8	Scaling	r = damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	Within 30 days	Long Term
			1	r < 2 %	Short Term No action.	
			2	r = 2 - 10 %	Local repair of areas damaged and liable to be damaged. Within 7days	Not Applicable
			3	r = 10 - 20%		
			4	r = 20 - 30 %	Bonded Inlay within 15 days	
			5	r > 30 % and h > 25 mm	Reconstruct slab within 30 days	
9	Polished Surface/Glazing	t = texture depth, sand patch test	0		No action.	Not Applicable
			1	t > 1 mm		
			2 '	t = 1 - 0.6 mm	Monitor rate of deterioration	
			3	t = 0.6 - 0.3 mm		
			4	t = 0.3 - 0.1 mm		
			5	t < 0.1 mm	Diamond Grinding if affecting 50% or more slabs in a continuous stretch of minimum 5 km. Within 30 days	
10	Pop out (Small Hole), Pothole Refer Para 8.4	n = number/m ² d = diameter h = maximum depth	0	d < 50 mm; h < 25 mm; n < 1 per 5 m ²	No action.	Not Applicable
			1	d = 50 - 100 mm; h < 50 mm; n < 1 per 5 m ²	Partial depth repair 65 mm deep. Within 15 days	
			2	d = 50 - 100 mm; h > 50 mm; n < 1 per 5 m ²		
			3	d = 100 - 300 mm; h < 100 mm n < 1 per 5 m ²	Partial depth repair 110mm i.e.10 mm more than the depth of the hole. Within 30 days	
			4	d = 100 - 300 mm; h > 100 mm; n < 1 per 5 m ²		
			5	d > 300 mm; h > 100 mm: n > 1 per 5 m ²	Full depth repair. Within 30 days	

Joint Defects						
11	Joint Seal Defects	loss or damage L = Length as % total joint length	0	Difficult to discern.	Short Term No action.	Long Term Not Applicable
			1	Discernible, L < 25% but of little immediate consequence with regard to ingress of water or trapping incompressible material.	Clean joint, inspect later.	
			3	Notable. L > 25% insufficient protection against ingress of water and trapping incompressible material.	Clean and reapply sealant in Selected locations. Within 7 days	
			5	Severe; w > 3 mm negligible protection against ingress of water 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.	Not Applicable
			1	w < 10 mm	Apply low viscosity epoxy resin/ mortar in cracked portion.	
			2	w = 10 - 20 mm, L < 25%	Within 7 days	
			3	w = 20 - 40 mm, L > 25%	Partial Depth Repair. Within 15 days	
			4	w = 40 - 80 mm, L > 25%	30 - 50 mm deep, h = w + 20% of w, within 30 days	

Joint Defects						
			5	w > 80 mm, and L > 25%	50 - 100 mm deep repair. H = w + 20% of w. Within 30 days	
13	Faulting (or Stepping) in Cracks or Joints	f = difference of level	0	not discernible, < 1 mm	No action.	No action.
			1	f < 3 mm		
			2	f = 3 - 6 mm	Determine cause and observe, take action for diamond grinding	Replace the slab as appropriate.
			3	f = 6 - 12 mm	Diamond Grinding	Within 30days
			4	f= 12 - 18 mm	Raise sunken slab.	Replace the slab as appropriate. Within 30days
			5	f> 18 mm	Strengthen subgrade and sub-base by grouting and raising sunken slab	
14	Blow-up or Buckling	h = vertical displacement from normal profile	0	Nil, not discernible	Short Term	Long Term
					No Action	
			1	h < 6 mm	Install Signs to Warn Traffic within 7 days	
			2	h = 6 - 12 mm		
			3	h = 12 - 25 mm		
			4	h > 25 mm	Full Depth Repair. Within 30 days	
			5	shattered slabs, ie 4 or more pieces	Replace broken slabs. Within 30 days	

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

Joint Defects						
			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 dayss	For any 100 m stretch Reconstruct shoulder, if affecting 25% or more of stretch. 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	0	not discernible	No Action	Inspect and repair sub-drainage at distressed sections and upstream.
			1 to 2	slight/ occasional Nos < 10%	Repair cracks and joints Without delay.	
			3 to 4	appreciable/ Frequent 10 - 25%	Lift or jack slab within 30 days.	

Joint Defects						
		Nos/100 m stretch	5	abundant, crack development > 25%	Repair distressed pavement sections. Strengthen subgrade and subbase. Replace slab. Within 30 days	
20	Ponding	Ponding on slabs due to blockage of drains	0-2	No discernible problem	No action.	Action required to stop water damaging foundation within 30 days.
			3 to 4	Blockages observed in drains, but water flowing	Clean drains etc within 7 days, Follow up	
			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: 52-2019, 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: Removal of obstruction/improvement of deficiency at the earliest Speed Restriction boards and suitable traffic calming measures such as transverse bar marking, blinkers, etc. shall be applied during the period of rectification.		IRC : 52-2019
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 2 months	IRC:35-2015
	Day time Visibility	During expected life Service Time Cement Road - 130mcd/m ² /lux Bituminous Road - 100mcd/m ² /lux			Monthly	As per Annexure-D of IRC:35-2015	Re - painting	Cat-1 Defect - within 24 hours Cat-2 Defect - within 2 months	IRC:35-2015
	Night Time Visibility	<u>Initial and Minimum Performance for Dry Retro reflectivity during night time:</u>			Bi-Annually	As per Annexure-E of IRC:35-2015	Re - painting	Cat-1 Defect - within 24 hours Cat-2 Defect - within 2 months	IRC:35-2015

Asset Type	Performance Parameter	Level of Service (LOS)			Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		Design Speed	(RL) Retro Reflectivity (mcd/m ² /lux)						
			Initial (7 days)	Minimum Threshold level (TL) & warranty period required up to 2 years					
		Up to 65	200	80					
		65 - 100	250	120					
		Above 100	350	150					
		<u>Initial and Minimum Performance for Night Visibility under wet condition (Retro reflectivity):</u> Initial 7 days Retro reflectivity: 100 mcd/m ² /lux Minimum Threshold Level: 50 mcd/m ² /lux							
	Skid Resistance	Initial and Minimum performance for Skid Resistance: Initial (7days): 55BPN Min. Threshold: 44BPN *Note: shall be considered under urban/city traffic condition encompassing the locations like pedestrian crossings, bus bay, bus stop, cycle track intersection delineation, transverse bar markings etc			Bi-Annually	As per Annexure-G of IRC:35-2015		Within 24 hours	IRC:35-2015
Road Signs	Shape and Position	Shape and Position as per IRC:67-2022. Signboard should be clearly visible for the design speed of the section.			Daily	Visual with video/image backup	Improvement of shape, in case if shape is damaged.	48 hours in case of Mandatory Signs, Cautionary and Informatory Signs	IRC:67-2022

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
					Relocation as per requirement	(Single and Dual post signs) 15 Days in case of Gantry/Cantilever Sign boards	
	Retro reflectivity	As per specifications in IRC:67-2022	Bi-Annually	Testing of each signboard using Retro Reflectivity Measuring Device. In accordance with ASTM D 4956-09.	Change of signboard	48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs) 1 Month in case of Gantry/Cantilever Sign boards	IRC:67-2022
Kerb	Kerb Height	As per IRC 86:1983 depending upon type of Kerb	Bi-Annually	Use of distance measuring tape	Raising Kerb Height	Within 1 Month	RC 86:1983
	Kerb Painting	Functionality: Functioning of Kerb painting as intended	Daily	Visual with video/image backup	Kerb Repainting	Within 7-days	RC 35:2015
Other Road Furniture	Reflective Pavement Markers (Road Studs)	Numbers and Functionality as per specifications in IRC:SP 73-2018 and IRC:35-2015, unless specified in Schedule-B.	Daily	Counting	New Installation	Within 2 months	IRC:SP:73-2018, IRC:35-2022
	Pedestrian Guardrail	Functionality: Functioning of guardrail as intended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:SP:73-2018,
	Traffic Safety Barriers	Functionality: Functioning of Safety Barriers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:73-2018, IRC:119-2015

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	End Treatment of Traffic Safety Barriers	<u>Functionality:</u> Functioning of End Treatment as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:73-2018, IRC:119-2015
	Attenuators	<u>Functionality:</u> Functioning of Attenuators as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP-2014, IRC:119-2015
	Guard Posts and Delineators	<u>Functionality:</u> 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:67-2022
	Traffic Blinkers	<u>Functionality:</u> Functioning of Traffic Blinkers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:73-2018,
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:73-2018
		No major failure in the lighting system	Daily	-	Rectification of failure	24 hours	IRC:SP:73-2018,
		No minor failure in the lighting system	Monthly	-	Rectification of failure	8 hours	IRC:SP:73-2018,
	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:73-2018,
		No major/minor failure in the lighting system	Daily	-	Rectification of failure	8 hours	IRC:SP:73-2018,

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Trees and Plantation including median plantation	Obstruction in a minimum head-room of 5.5 m above carriageway or obstruction in visibility of road signs	No obstruction due to trees	Monthly	Visual with video/image backup	Removal of trees	Immediate	IRC: SP:73-2018,
	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:73-2018,
	Vegetation affecting sight line and road structures	Sight line shall be free from obstruction by vegetation	Daily	Visual with video/image backup	Removal of Trees	Immediate	IRC:SP:73-2018,
Rest Areas	Cleaning of toilets	-	Daily	-	-	Every 4 hours	
	Defects in electrical, water and sanitary installations	-	Daily	-	Rectification	24 hours	
Other Project Facilities and Approach roads	Damage or deterioration in Approach Roads, pedestrian facilities, truck lay-bys, bus-bays, bus- shelters, cattle crossings, Traffic Aid Posts, Medical Aid Posts and other works		Daily	-	Rectification	15 days	IRC:SP:73-2018,

Table 4: Maintenance Criteria for Structures and Culverts:

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Pipe/box/slab culverts	Free waterway/unobstructed flow section	85% of culvert normal flow area to available.	2 times in a year (before and after rainy season)	Inspection by Bridge Engineer as per IRC SP: 35-1990 and recording of depth of silting and area of vegetation.	Cleaning silt up soils and debris in culvert barrel after rainy season, removal of bushes and vegetation, U/s of barrel, under barrel and D/s of barrel before rainy season.	15 days before onset of monsoon and within 30 days after end of rainy season.	IRC 5-2015, IRC SP:40-2019 and IRC SP:13-2004
	Leak-proof expansion joints if any	No leakage through expansion joints	Bi-Annually	Physical inspection of expansion joints as per IRC SP: 35-1990 if any, for leakage strains on walls at joints.	Fixing with sealant suitably	30 days or before onset of rains whichever comes earlier	IRC SP:40-2019 and IRC SP:69-2011
	Structurally sound	Spalling of concrete not more than 0.25 sqm	Bi-Annually	Detailed inspection of all components of culvert as per IRC SP:35-1990 and recording the defects	Repairs to spalling, cracking, delamination, rusting shall be followed as per IRC: SP:40-2019.	15 days	IRC SP 40-2019 and MORTH Specifications clause 2800
		Delamination of concrete not more than 0.25 Sqm.					
		Cracks wider than 0.3 mm not more than 1m aggregate length					
	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sqm, damage to solid apron	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier.	IRC: SP 40-2019 and 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
		(concrete apron) not more than 1 sqm					
Bridges including ROB's Flyover etc. as applicable	Riding quality or user comfort	No pothole in wearing coat on bridge deck	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC or wearing coat	15 days	MORT&H Specification 2811
Bridge -Super Structure	Bumps	No bump at expansion joint	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC on either side of expansion joints, profile correction course on approach slab in case of settlement to approach embankment	15 days	MORT&H Specification 3004.2 & 2811.
	User safety (condition of crash barrier and guard rail)	No damaged or missing stretch of crash barrier or pedestrian hand railing	Daily	Visual inspection and detailed condition survey as per IRC SP: 35-1990.	Repairs and replacement of safety barriers as the case may be	3days	IRC: 5-2015, IRC SP: 73-2018 and IRC SP: 40-2019.
	Rusted reinforcement	Not more than 0.25 sq.m	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out the repairs to affected concrete portion with epoxy mortar / concrete.	15 days	IRC SP: 40-2019 and MORTH Specification 1600.
	Spalling of concrete	Not more than 0.50 sq.m					
	Delamination	Not more than 0.50 sq.m					

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Cracks wider than 0.30 mm	Not more than 1m total length	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Grouting with epoxy mortar, investigating causes for cracks development and carry out necessary rehabilitation.	48 Hours	IRC SP: 40-2019 and MORTH Specification 2800.
	Rainwater seepage through deck slab	Leakage - nil	Quarterly	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Grouting of deck slab at leakage areas, waterproofing, repairs to drainage spouts	1 months	MORTH specifications 2600 & 2700.
	Deflection due to permanent loads and live loads	Within design limits.	Once in every 10 years for spans more than 40 m	Load test method	Carry out major rehabilitation works on bridge to retain original design loads capacity	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 of super structure	4 months	AASHTO LRFD specifications
	Leakage in Expansion joints	No damage to elastomeric sealant compound in strip seal expansion joint, no leakage of rain water through	Bi-Annually	Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge Inspection Unit	Replace of seal in expansion joint	15 days	MORTH specifications 2600 and IRC SP: 40-2019.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		expansion joint in case of buried and asphalt plug and copper strip joint.					
	Debris and dust in strip seal expansion joint	No dust or debris in expansion joint gap.	Monthly	Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge Inspection Unit	Cleaning of expansion joint gaps thoroughly	3 days	MORTH specifications 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 spout collection chamber.	Monthly	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Cleaning of drainage spouts thoroughly. Replacement of missing/broken down take pipes with a minimum pipe extension of 500mm below soffit of slab. Providing sealant around the drainage spout if any leakages observed.	3 days	MORTH specification 2700.
Bridge-substructure	Cracks/spalling of concrete/ rusted steel	No cracks, spalling of concrete and rusted steel	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out repairs to substructure by grouting/guniting and micro concreting depending on type of defect noticed	30 days	IRC SP: 40-2019 and MORTH specification 2800.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Bearings	Delamination of bearing reinforcement not more than 5%, cracking or tearing of rubber not more than 2 locations per side, no rupture of reinforcement or rubber	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	In case of failure of even one bearing on any pier/abutment, all the bearings on that pier/abutment shall be replaced, in order to get uniform load transfer on to bearings.	3 months	MORTH specification 2810, IRC 83 and IRC SP: 40-2019.
Bridge Foundation	Scouring around foundations	Scouring shall not be lower than maximum scour level for the bridge	Bi-Annually	Condition survey and visual inspection as per IRC SP:35-1990 using Mobile Bridge Inspection Unit. In case of doubt, use Underwater camera for inspection of deep wells in major Rivers.	Suitable protection works around pier/abutment	1 month	IRC SP: 40-2019, MORTH specification 2500
	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sq.m, damage to solid apron (concrete apron) not more than 1 sq.m	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching.	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier.	IRC: SP 40-2019 and IRC: SP:13-2022.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Slope Protection (Landslide & Sinking)	Movement & deformation in landslide & sinking zones	Movement & deformation beyond permissible limit should be made good to the design standard	14 Days	Once in month/ as when noticed	Standard method as approved by the Authority QA/QC plan of the contractor	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier	Refer the Schedule B and Schedule D
	Any material or defect development in workmanship used in protection work	The material and workmanship specification should be in accordance with Schedule B and Schedule D	14 Days	Once in month/ as when noticed	Standard method as approved by the Authority QA/QC plan of the contractor	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier.	Refer the Schedule B and Schedule D
Tunnel - Lining and side walls	Peeling off (honeycomb, scaling, spalling, cracking)	Peeling off of concrete not more than 0.25sqm	Annually / Daily	Detailed inspection	Repairs to peeling off (honey comb, scaling, spalling, cracking)	24 hours	
	Water leakage	No water dripping down to road surface	Daily	Daily inspection	Installation of leak prevention trough	15 days	
	Steel corrosion	Not more than 0.25 sqm	Annually	Detailed inspection of all components as per IRC/International guidelines	All the corroded reinforcement shall be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out the repairs to affected concrete portion with epoxy mortar/concrete	15 days	

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Insufficient effective lining thickness	Effective thickness needs to be secured	In case possibility of in-sufficient effective lining thickness is estimated by detailed inspection	Detailed investigation by electromagnetic wave and core boring of lining concrete	Detailed design shall be conducted in close coordination with the Authority to determine countermeasure works, such as inner reinforcement lining by concrete/continuous fiber sheet	1 year	
	Corrosion of Steel Fibers in Steel Fiber Concrete	Not more than 0.25 sqm	Annually	Detailed inspection of all components as per IRC/International guidelines	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out the repairs to affected concrete portion with epoxy mortar/concrete	15 days	
Tunnel - Entrance	Peeling off (honey comb, scaling, cracking)	not more than 0.25sqm	Daily/Annually	Daily inspection/Detailed inspection	Repairs to peeling off (honey-comb, scaling, cracking)	24 hours	
	Inclination, movement, settlement, joints, etc. caused by external forces.	Deterioration does not affect structural soundness	Annually	Detailed inspection	Detailed de-sign shall be conducted in close coordination with the Authority to determine counter-measure works	1 year	
	Scour	Scour shall not be affect safety of tunnel/road-way structure	Bi-Annually	Basic inspection and Detailed inspection	Suitable protection works around tunnel entrance	1 month	

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Tunnel - Leak prevention trough/Flaking prevention facility	Corrosion of trough/flaking prevention net	No corrosion	Annually	Detailed inspection	Replacement of corroded parts with new trough/flaking prevention net, or all the corroded parts shall be thoroughly cleaned from rusting and applied with anti-corrosive coating	7 days	
	Cracking, deformation, defect, and water leakage of trough/flaking prevention net	No water dripping down to road surface	Daily	Visual inspection on Board and distant visual inspection	Replacement of deteriorated trough/flaking prevention net with new parts	24 hours	
	Corrosion of bolts and nuts (Mounting Bracket)	No corrosion	Annually	Detailed inspection	Replacement of corroded parts with new trough/flaking prevention net, or all the corroded parts shall be thoroughly cleaned from rusting and applied with anti-corrosive coating	24hours	
	Falling out or loosening of bolts and nuts (Mounting Bracket)	All bolts and nuts installed properly	Annually	Detailed inspection	Installation of new bolts and nuts	24hours	
	Floating, cracked, or flaked filling prevention sheet	Free from floating, crack, and flaking	Annually	Detailed inspection	Replacement of floating, cracked, or flaked filling prevention sheet with new sheet	3 months	

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Cracks, corrosion, deformation, defects, or back-lash of hand-rail	Free from cracks, corrosion, deformation, defects, or backlash	Annually/Daily	Detailed inspection	Replacement of deteriorated handrail with new handrail	1 month	
	Deformation, failure, or defect of audit corridor observer corridor	Free from deformation, failure, or defect	Annually	Detailed inspection	Replacement of deteriorated parts of audit corridor observer with new parts	1 month	
	Cracks, deformation, defects of ceiling board	Deterioration does not affect structural soundness	Annually	Detailed inspection	Replacement of deteriorated parts with new parts or monitoring	3 months	
	Water leakage of ceiling board	No water dripping down to road surface	Daily	Daily inspection	Installation of leak prevention trough	15 days	
	Cracks, corrosion, deformation, and defects of wire	Deterioration does not affect traffic safety	Annually/Daily	Detailed inspection/ Daily inspection	Replacement of deteriorated wire with new wire	1 month	
	Cracks, corrosion, deformation, defects, back-lash of main body attachment	Deterioration does not affect traffic safety	Annually/Daily	Detailed inspection/ Daily inspection	Replacement of deteriorated main body attachment with new attachment	1 month	

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Fracture, crack, corrosion deformation, defect, backlash of mounting bracket	Deterioration does not affect	Annually/Daily	Detailed inspection/ Daily inspection	Replacement of deteriorated mounting bracket with new bracket	1 month	
	Fracture/looseness, fall-off/crack/corrosion of bolts and nuts, Anchors	All bolts and nuts installed properly	Annually	Detailed inspection	Installation of new bolts and nuts	24hours	
Tunnel – Drainage facilities	Deformation and fracture of catchment and circular channel	Drainage function is secured	Daily/Annually	Daily inspection/ detailed inspection	Replacement of deteriorated catchment/circular channel with new catchment/circular channel	1 month	
	Damage, corrosion, or deformation of the lid of catchment and circular channel	Drainage function is secured	Daily/Annually	Daily inspection/ detailed inspection	Replacement of deteriorated catchment/circular channel with new catchment/circular channel	1 month	

Note: Any Structure during the entire contract period which is found that does not complies with all requirements of this Table will be prepared, rehabilitated or even reconstructed under the scope of the contractor.

Table 5: Maintenance Criteria for Hill Roads

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

Hill Roads		
(i)	Damage to Retaining wall/ Breast wall	7 (Seven) days
(ii)	Landslides requiring clearance	12 (Twelve) hours
(iii)	Snow requiring clearance	24 (Twenty Four) hours
Tunnel		
(i)	Damage to Riding Surface inside the tunnel will be governed by stipulations for Road	As stated in preceding sections
(ii)	Damage of Air monitoring sensors / Ventilation system	Temporary measures within 24 hrs and permanent measures within 15 days

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

A. Flexible Pavement

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

Nature of Defect or deficiency		Time limit for repair/rectification
(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], Rain water harvesting/Artificial Recharge Unit 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 wing walls		
(i)	Cracks and damages including settlement and tilting, spalling, scaling	30 (thirty) days
(d) Bearings (metallic) of bridges		
(i)	Deformation, damages, tilting or shifting of bearings	15 (fifteen) days Greasing of metallic bearings once in a year
(e) Joints		
(i)	Malfunctioning of joints	15 (fifteen) days
(f) Other items		

Nature of Defect or deficiency		Time limit for repair/rectification
(i)	Deforming of pads in elastomeric bearings	7 (seven) days
(ii)	Gathering of dirt in bearings and joints; or clogging of spouts, weep holes and vent-holes	3 (three) days
(iii)	Damage or deterioration in kerbs, parapets, handrails and crash barriers	3 (three) days (immediately within 24 hours if posing danger to safety)
(iv)	Rain-cuts or erosion of banks of the side slopes of approaches	7 (seven) days
(v)	Damage to wearing coat	15 (fifteen) days
(vi)	Damage or deterioration in approach slabs, pitching, apron, toes, floor or guide bunds	30 (thirty) days
(vii)	Growth of vegetation affecting the structure or obstructing the waterway	15 (fifteen) days
(g)	Slope Protection (Landslide & Sinking)	
	Any damage, Temporary measures Permanent measures	within 48 (forty eight) hours within 15 (fifteen) days or as specified by the Authority's Engineer
(g) Hill Roads		
(i)	Damage to retaining wall/breast wall	7 (seven) days
(ii)	Landslides requiring clearance	12 (twelve) hours
(iii)	Snow requiring clearance	24 (twenty four) hours
(h) Tunnel		
(i)	Damage to Riding Surface inside the tunnel will be governed by stipulations for Road	As stated in preceding sections
(ii)	Damage of Air monitoring sensors / Ventilation system	Temporary measures within 24 hrs and permanent measures within 15 days

[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

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.

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)
Form of e-Bank Guarantee
Annex-I
(See Clause 7.1)

[Performance Security/Additional Performance Security]

To,

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

WHEREAS:

- (A) _____ [name and address of contractor] (hereinafter called the “**Contractor**”) and National Highways & Infrastructure Development Corporation, 1st & 2nd Floor, Tower A, World Trade Centre, Nauroji Nagar, New Delhi - 110029, (hereinafter called the “**Authority**”) have entered into an agreement (hereinafter called the “**Agreement**”) for **Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration from Rhenock (Km 0.00) to Rongli Bazaar (Km 14.589) along NH-717B in the State of Sikkim** on Engineering, Procurement and Construction (the “**EPC**”) basis, subject to and in accordance with the provisions of the Agreement.
- (B) The Agreement requires the Contractor to furnish a Performance Security for due and faithful performance of its obligations, under and in accordance with the Agreement, during the {Construction Period/ Defects Liability Period and Maintenance Period} (as defined in the Agreement) in a sum of Rs.... cr. (Rupees crore) (the “**Guarantee Amount**”).
- (C) We, through our branch at (the “**Bank**”) have agreed to furnish this bank guarantee (*hereinafter called the “**Guarantee**”*) by way of Performance Security.

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

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor’s obligations during the {Construction Period/ Defects Liability Period and Maintenance Period} under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of General Manager in the NHIDCL that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of

the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfillment and/ or performance of all or any of the obligations of the Contractor contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Agreement or for the fulfillment, compliance and/or performance of all or any of the obligations of the Contractor under the Agreement.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect on ****\$. Unless a demand or claim under this Guarantee is made in writing before expiry of the Guarantee, the Bank shall be discharged from its liabilities hereunder. Additionally, the claim period shall be 01 (one) year beyond the validity of Guarantee.
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

^{\$} Insert date being 2 (two) years from the date of issuance of this Guarantee (in accordance with Clause 7.2 of the Agreement).

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

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.
12. This guarantee shall also be operatable at our..... Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.
13. 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, detail of which is as under:

S. No.	Particulars	Details
1.	Name of Beneficiary	National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)
2.	Name of Bank	Canara Bank
3.	Account No.	8598201005819
4.	IFSC Code	CNRB0008598

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing

branch.

Annex - II

(Schedule - G)

(See Clause 19.2)

Annexure-II: Form for Insurance Surety Bond for Advance Payment

To,

The Managing Director,

National Highways and Infrastructure Development Corporation of India Limited, 1st & 2nd Floor,
Tower A, World Trade Centre, Nauroji Nagar, New Delhi-110029

WHEREAS:

- (D) [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.
- (D) In accordance with Clause 19.2 of the Agreement, the Authority shall make to the Contractor an interest bearing @Bank Rate + 3% advance payment (hereinafter called "Advance Payment") equal to 10% (ten per cent) of the Contract Price; and that the Advance Payment shall be made in two installments subject to the Contractor furnishing an irrevocable and unconditional Insurance Surety Bond by Insurance Company for an amount equivalent to 110% (one hundred and ten percent) of such installment to remain effective till the complete and full repayment of the installment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of (first/second) installment of the Advance Payment is Rs. cr. (Rupees crore) and the amount of this
- (D) Insurance Surety Bond is Rs. cr. (Rupees - crore) (the "Guarantee Amount") \$.
- (D) We, through our branch at (the "Insurance Company" have agreed to furnish this Insurance Surety Bond (hereinafter called the "Guarantee") for the Guarantee Amount.

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

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

letter from the Authority, under the hand of an officer not below the rank of General Manager in the National Highways and Infrastructure Development Corporation Limited that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the instalment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Insurance Company.

\$ The guarantee amount should be equivalent to 110% of the value of the applicable installment.

The Insurance Company 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 Insurance Company, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

2. In order to give effect to this Insurance Surety Bond, the Authority shall be entitled to act as if the Insurance Company were the principal debtor and any change in the constitution of the Contractor and/or the Insurance Company, 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 Insurance Company under this Guarantee.
3. It shall not be necessary, and the Insurance Company hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Insurance Company its demand under this Guarantee.
4. The Authority shall have the liberty, without affecting in any manner the liability of the Insurance Company 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 Insurance Company 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 Insurance Surety Bond from its liability and obligation under this Guarantee and the Insurance Company hereby waives all of its right under any such law.
5. This Insurance Surety Bond is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Advance Payment.
6. Notwithstanding anything contained herein before, the liability of Insurance Company 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 Insurance Company under this Guarantee all rights of the Authority under this Insurance Surety Bond shall be forfeited and the Insurance Company shall be relieved from its liabilities hereunder.

7. The Insurance Surety Bond 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 Insurance Company shall be discharged from its liabilities hereunder. **Additionally, the claim period shall be 01 (one) year beyond the validity of ISB.**
8. The Insurance Company 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 Insurance Company.
9. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Insurance Company 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.
10. This Insurance Surety Bond 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.

Signed and sealed this day of 20 at

SIGNED, SEALED AND DELIVERED

For and on behalf of the Insurance Company by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

- NOTES:
- (i) The Insurance Surety Bond should contain the name, designation and code number of the officer(s) signing the Insurance Surety Bond.
 - (ii) The address, telephone number and other detail of the head of the Insurance Company as well as issuing branch should be

mentioned on the covering letter of issuing branch.

\$ 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)

Annex – III
(Schedule - G)
(See Clause 19.2)
Form for Guarantee for Advance Payment

To,

The Managing Director,

National Highways and Infrastructure Development Corporation of India Limited, 1st & 2nd Floor,
Tower A, World Trade Centre, Nauroji Nagar, New Delhi-110029

WHEREAS:

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

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

(C) We, through our branch at (the "Bank") have agreed to furnish this bank guarantee (*hereinafter called the "Guarantee"*) for the Guarantee Amount. NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful repayment on time of the aforesaid instalment of the Advance Payment under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein. A letter from the Authority, under the hand of an officer not below the rank of [General Manager in the NHIDCL], that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the instalment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and

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

binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

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

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

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

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

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

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

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

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

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

course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

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

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.

§ 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).

Schedule - H

(See Clauses 10.1 (iv) and 19.3)

Contract Price Weightages

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

1.2 In initial period, Contractor shall do only the formation cutting and protection measures thereof in part length. The subsequent works shall start for those sections only where the formation cutting and protection measures remain stable-

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
I. Road works including culverts, widening and repair of culverts.	19.75%	B.1- Reconstruction/ New realignment/ bypass (Flexible pavement)	
		(1) Earthwork up to top of the embankment	16.32%
		(2) Sub-Grade	10.72%
		(3) Sub Base Course	15.49%
		(4) Non-Bituminous Base Course*	11.76%
		(5) Bituminous Base Course	21.96%
		(6) Wearing Coat	10.42%
		D- Re-Construction and New culverts on existing road, realignments, bypasses :	
		Culverts (length < 6 m)	13.33%
		A.1- Widening and repairs of Major Bridges	
III. Major Bridge (length > 60 m.) works and ROB/RUB/ elevated sections/flyovers including viaducts, if any	4.09%	(1) Foundation	0.00%
		i) Pile Foundation	0.00%
		ii) Open Foundation	0.00%
		(2) Sub-structure	0.00%
		(3) Super-structure (including bearings)	0.80%
		(4) Wearing Coat including expansion joints	0.00%
		(5) Miscellaneous Items like hand rails, crash barriers, road markings etc.)	0.44%
		(6) Wing walls/return walls	
		(7) Guide Bunds, River Training works etc.	0.00%
		(8) Approaches (including Retaining walls, stone pitching and protection works for floor, embankment slope etc.)	0.00%

II. Minor Bridges/ Underpasses / Overpasses	1.35%	C.2-New Elevated Section/Flyovers/ Grade Separators	
		(1) Foundation	
		(i) Well Foundation	0.00%
		(ii) Pile Foundation	54.83%
		(iii) Open Foundation	0.00%
		(2) Sub-structure	15.01%
		(3) Super-structure (including bearings)	23.26%
		(4) Wearing Coat including expansion joints	4.33%
		(5) Miscellaneous Items like hand rails, crash barriers, road markings etc.)	0.81%
		(6) Wing walls/return walls	0.00%
		(7) Approaches (including Retaining walls/Reinforced Earth wall, stone pitching and protection works)	0.52%
		A.2- New Minor bridges (length >6 and <60 m.)	
		(1) Foundation: On completion of the foundation work of abutments and piers	4.57%
		(2) Sub-structure: On completion of abutments and piers with abutment/ pier cap.	27.27%
		(3) Super-structure: On completion of the super-structure upto deck slab including bearings.	61.15%
		(4) Miscellaneous Works : On completion of wearing coat, expansion joint, crash barrier, railings, protection works and any remaining work associated to bridge including tests on bridge.	5.43%
		(5) Approaches: On completion of approaches including wing walls/ return walls, Retaining walls, stone pitching, protection works for floor, embankment slope etc. complete in all respect and fit for use.	1.58%
		(6) Guide Bunds and River Training Works: On completion of Guide Bunds and river Training Works complete in all respects	0.00%
		(i) Toll Plaza	0.00%
		(ii) Road side drains	
		(a) Drain	1.83%
		(b) Cover Slab	0.00%
		(iii) Road signs, markings, km stones, safety devices etc.	2.74%
IV. Other works	46.77%	(iv) Overhead gantry mounted signs	0.03%
		(v) Project facilities (a) Bus Bays (b) Truck lay-byes (c) Rest areas (d) others	2.23%
		(vi) Road side plantation	0.00%

V. Electrical utilities and public Health Utilities (Water pipe lines and sewagelines)	2.17%	(vii) Protection works# other than approaches to the bridges, elevated sections/ flyovers/grade separators and ROB/RUBs.	
		(a) Crash Barrier	6.67%
		(b) Retaining Wall	30.17%
		(c) Breast Wall	31.48%
		(d) Slope Protection	15.64%
		(viii) Safety and traffic management during construction	1.07%
		(ix) Junction	8.14%
		(i) EHT line	52.02%
		(ii) EHT crossings	
		(iii) HT/LT line	
		(iv) HT/LT crossings	
		(v) Water pipeline	
		(vi) Water pipeline crossings	47.98%
		(vii) Sewage lines	0.00%
		(viii) Sewage line crossings	0.00%
VI. Tunnel works	4.49%	A Inlet and Outlet Portal	
		1 Temporary Dewatering Arrangement	3.51%
		2 Open Excavation and Earthwork	3.58%
		3 Underground Excavation and over break in underground excavation for portal in Support Category dominating the Face Area	22.60%
		4 Primary support measures (Bolts & Anchors, including Drilling and Grouting)	43.71%
		5 Permanent Dewatering Arrangement	0.95%
		6 Concrete Back filling & bed lining work	10.39%
		7 RCC Concrete Works including reinforcement	13.68%
		8 Pavement work & side drain	1.58%
	19.18%	B Main Tunnel	
		1 Temporary Dewatering Arrangement	3.69%
		2 Underground Excavation and over break in underground excavation for portal in Support Category dominating the Face Area	23.79%
		3 Permanent Dewatering Arrangement	1.01%
		4 Primary support measures (Bolts & Anchors, including Drilling and Grouting)	22.94%
		5 Concrete Back filling & bed lining work	10.94%
		6 Fabricating and fixing in position permanent structural steel	21.57%
		7 RCC Concrete Works including reinforcement	14.40%
		8 Pavement work & side drain	1.66%

	C Monitoring of excavations/ construction & Electromechanical work	
2.20%	Monitoring of excavations/ construction	2.90%
	Electromechanical work	97.10%

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
B.1- Reconstruction/New realignment/bypass (Flexible pavement)		
(1) Earthwork up to top of the embankment	16.32%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length or 500 m length, whichever is less.
(2) Sub-Grade	10.72%	
(3) Sub Base Course	15.49%	
(4) Non-Bituminous Base Course*	11.76%	
(5) Bituminous Base Course	21.96%	
(6) Wearing Coat	10.42%	
D- Re-Construction and New culverts on existing road, realignments, bypasses: (1) Culverts (length < 6m)	13.33%	Cost of each culvert shall be determined on pro rata basis with respect to the total number of culverts. Payment shall be made on the completion of atleast one culvert. 75% of the cost will be payable on completion of box/abutments and slab/pipe and head wall. Remaining 25% will become payable on completion of protection works including return/wing walls and any other work associated with 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 including the length not handed over to the Contractor under clause 8.3 of this Contract Agreement 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 Bridges 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.2- New minor bridges (i) Foundation: On Completion of the foundation work of abutments and piers.	4.57%	Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length (m) of the minor bridges. (i) Foundation: Payment against foundation shall be made on pro-rata basis on completion of a stage completion of atleast two foundations of each bridge. In case where load testing is specified for foundation, the trigger of first payment shall include load testing also.
(ii) Sub – structure: On completion of abutments and piers with abutment/ pier cap.	27.27%	(ii) Sub - structure – Payment shall be made on pro-rata basis on completion of stage i.e. completion of atleast one sub-structure upto abutment/ pier cap level of each bridge.
(iii) Super-structure: On Completion of the super-structure upto deck slab including bearings.	61.15%	(iii) 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 upto deck slab including bearing as specified in the column of "Stage of Payment" in this sub- clause. If pre-cast girders/ segments are used, interim payments shall be made at 75% of the cost of that element, as derived from MoRTH Data Book, applicable SOR of State PWD on Base Date with tender discount/premium applied thereon.
(iv) Miscellaneous Works:	5.43%	(iv) Miscellaneous Works: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of wearing coat, expansion joint, crash barrier, railing, protection works, drainage and any other remaining work associated to bridge including tests on bridge for each bridge

v) Approaches: On completion of approaches including Retaining walls, stone pitching, protection works for floor, embankment slope etc. complete in all respect and fit for use.	1.58%	(v) Approaches: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of approaches including wing walls/ return walls, retaining walls, stone pitching in all respect as specified in the column of "Stage of Payment" in this sub- clause for each bridge.
(vi) Guide Bunds and River Training Works: On completion of Guide Bunds and river Training Works complete in all respects	0.00%	(vi) 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 for each bridge.

1.3.3 Major Bridge works, ROB/RUB and Structures.

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

Table 1.3.3

Stage of Payment	Weightage	Payment Procedure
1	2	3
A.1- Widening and repairs of Major Bridges		Cost of each Major Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridges.
(1) Foundation	0.00%	(1) Foundation: Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one foundation of each of the major Bridge as specified here in under.
(i) Pile Foundation	0.00%	(i) Pile Foundation
(a) Piling – On completion of pile upto bottom of pile cap		(a) Piling : Payment of 70% shall be made on completion of piling upto bottom of pile cap for each pile on prorata basis.
(b) Pile Cap : On completion of pile cap		(b) Pile Cap : Payment of 30% on pro- rata basis shall be made on completion of pile cap. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(ii) Open Foundation	0.00%	(ii) Open Foundation: Payment shall be made on completion of a stage i.e. on completion of atleast one foundation.
(2) Sub-structure	0.00%	(2) Sub-Structure: Payment against Sub-structure shall be made on pro- rata basis on completion of a stage i.e. completion of atleast one sub- structure of abutments/piers upto abutment/pier cap level of each of the major bridge.

(3) Super-structure (including bearings)	0.80%	(3) Super-structure: Payment shall be made on prrata basis on completion of a stage i.e. completion of superstructure up to deck slab including bearings of at least one span as specified here in under : If pre-cast RCC/PSC/Steel girders/ segments are used, interim payments shall be made at 75% of the cost of that element, as derived from MoRTH Data Book, applicable SOR of State PWD on Base Date with tender discount/premium applied thereon.
(4) Wearing Coat including expansion joints	0.00%	(4) Wearing Coat: Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified for each major bridge.
(5) Miscellaneous Items like hand rails, crash barriers, road markings etc.	0.44%	(5) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified for each major bridge.
(8) Approaches (including Retaining walls, stone pitching and protection works)	0.00%	(8) Approaches: Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified for each major bridge.
C.2 -New Elevated Section/Flyovers/ Grade Separators		Cost of each structure shall be determined on pro rata basis with respect to the total linear length (m) of the structures.
(1) Foundation		(1) Foundation: Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one foundation of each of the structure as specified here in under :
(i) Well Foundation (a) On completion of Cutting Edge + Well Curb (b) Well steining : On completion of well steining upto bottom of well cap. (c) On completion of bottom plug + top plug (if provisioned as per design) + well cap	0.00%	(i) Well Foundation (a) Cutting Edge + Well Curb: Payment of 10% shall be made on completion of a stage i.e. completion of cutting edge + well curb. (b) Well steining : Payment of 65% shall be made on completion of well steining upto bottom of well cap. The payment stage shall be further sub-divided on pro-rata basis i.e. (i) on completion upto 10 m and (ii) on completion of each subsequent 5 m or part thereof. (c) Bottom plug + top plug (if provisioned as per design) + well cap: Payment of 25% shall be made on completion of a stage i.e. completion of bottom plug, back fill, top plug and well cap.
(ii) Pile Foundation		(ii) Pile Foundation
(a) Piling – On completion of pile upto bottom of pile cap (b) Pile Cap : On completion of pile cap	54.83%	(a) Piling : Payment of 70% shall be made on completion of piling upto bottom of pile cap for each pile on pro-rata basis. (b) Pile Cap : Payment of 30% shall be made on completion of pile cap. In case where load testing is required for foundation, the

		trigger of first payment shall include load testing also where specified.
(iii) Open Foundation	0.00%	(iii) Open Foundation: Payment shall be made on completion of a stage i.e. on completion of atleast one foundation.
(2) Sub-structure	15.01%	(2) Sub-Structure: Payment against Sub- structure shall be made on pro- rata basis on completion of a stage i.e. completion of atleast one sub- structure of abutments/piers upto abutment/pier cap level of each of the structure.
(3) Super-structure (including bearings)	23.26%	(3) Super-structure: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super- structure upto deck slab including bearings of atleast one span as specified here in under: If pre-cast girders/ segments are used, interim payments shall be made at 75% of the cost of that element, as derived from MoRTH Data Book, applicable SOR of State PWD on Base Date with tender discount/premium applied thereon.
(4) Wearing Coat including expansion joints	4.33%	(4) Wearing Coat: Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified for each of the structure.
(5) Miscellaneous Items like hand rails, crash barriers, road markings etc.	0.81%	(5) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified for each of the structure.
(6) Wing walls/return walls	0.00%	(6) Wing walls/return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified for each of the structure.
(7) Approaches (including Retaining walls/Reinforced Earth wall, stone pitching and protection works)	0.52%	(7) Approaches: Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified here in under : If reinforced soil wall is used with facia panel/blocks, interim payment shall be made @75% of the Cost of that element as derived from MoRTH data Book. Applicable SOR of State PWD on Base Date with tender discount/premium applied thereon.

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
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1	2	3
(i) Toll plaza	0.00%	Unit of measurement is each completed toll plaza. Payment for each toll plaza shall be made on pro rata basis with respect to the total of all toll plazas as specified here in under :
(ii) Road side drains		
(a) Drains	1.83%	a) Drains: Unit of measurement is linear length in metre . Payment shall be made on pro rata basis on completion of a stage in a length of not less than 100 m on one side.
(b) Cover Slabs	0.00%	(b) Cover slabs: Unit of measurement is linear length in metre. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 100 m on one side.
(iii) Road signs, markings, km stones, safety devices, ...	2.74%	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 one Km on both sides.
(iv) Overhead gantry mounted signs	0.03%	Unit of measurement is each number. Payment shall be made on pro-rata basis on completion of each overhead gantry mounted sign
(v) Project Facilities (a) Bus bays (b) Truck lay-byes (c) Rest areas (d) others	2.23%	Unit of measurement is each number. Payment shall be made on pro rata basis for completed facilities.
(vi) Roadside plantation	0.00%	Unit of measurement is linear length in Km. Payment shall be made on pro rata basis on completion of one Km.
(vii) Protection works other than approaches to the bridges, elevated sections/ flyovers/grade separators and ROB/ RUBs	0.00%	
(a) Crash Barrier	6.67%	Unit of measurement is linear length.
(b) Retaining wall	30.17%	Payment against items (a), (b) & (c) shall be made on pro rata basis on completion of a stage in a length of not less than 10% (ten percent) of the total length and 100 m whichever is less.
(c) Breast wall	31.48%	
(d) Special Slope Protection Work	15.64%	Unit of measurement is area in sqm. Payment shall be made on pro rata basis on completion of each stage in an area of not less than 10% of the total area.
(viii) Safety and traffic management during construction	1.07%	Payment shall be made on prorata basis of physical progress every six months.
(ix) Junction	8.14%	

1.3.5 Electrical utilities and public Health Utilities (Water pipe lines and sewage lines)

Procedure for estimating the value of Electrical utilities and public Health Utilities (Water pipe lines and sewage lines) done shall be as stated in table 1.3.5.

Table 1.3.5

Stage of Payment	Weightage	Payment Procedure
1	2	3
(i) EHT line	0.00%	Unit of measurement is as per completed activities. Cost per activity shall be determined on pro-rate basis as per its weightage with reference to total cost of EHT line. Payment shall be made for completed activity. (The average weightage of major activities (only for payment purpose) in shifting work is (i) Erection of Poles-20%, (ii) Conductor stringing including laying of cable 30%, (iii) OTR erection (if involved)-15% and (iv) Charging of line including dismantling and site clearance-35% (with DTR) and 50% without DTR)
(ii) EHT crossings		Cost of each crossing shall be determined on pro-rata basis with reference to total no. of crossings. Payment shall be made for not less than 25% of the (iii) HT/LT line [**] (including transformers if any) (iv) HT/LT crossings [**] (v) Water pipeline [**] (vi) water pipeline [**] crossings crossings subject to a minimum of 4 crossings
(iii) HT/LT line	52.02%	Unit of measurement is as per completed activities. Cost per activity shall be determined on pro-rata basis as per its weightage with reference to total cost of LT/HT line. Payment shall be made for completed activity. (The average weightage of major activities (only for payment purpose) in shifting work is (i) Erection of Poles-20% (ii) Conductor stringing including laying of cable 30%, (iii) OTR erection (if involved)-10% and (iv) Charging of line including dismantling and site clearance-40% (with OTR) and 50% without OTR
(iv) HT/LT crossings		
(v) Water pipeline	47.98%	Unit of measurement is as per completed activities. Cost per activity shall be determined on pro-rata basis as per its weightage with reference to total cost of pipe line. Payment shall be made for completed activity. (The average weightage of major activities (only for payment purpose) in shifting work is laying of pipe-50%, Charging of line including all miscellaneous works and dismantling and site clearance-50%)
(vi) Water pipeline crossings		

(vii) Sewage lines	0.00%	Unit of measurement is as per completed activities. Cost per activity shall be determined on pro-rata basis as per its weightage with reference to total cost of pipe line. Payment shall be made for completed activity. (The average weightage of major activities (only for payment purpose) in shifting work is laying of pipe-50%, Charging of line including all miscellaneous works and dismantling and site clearance-50%)
(viii) Sewage line crossings	0.00%	Cost of each crossing shall be determined on pro-rata basis with reference to total no. of crossings. Payment shall be made for completed activity. (The average weightage of major activities in shifting work is laying pipe-50%, Charging of line including all miscellaneous works and dismantling and site clearance- 50%)

1.3.6 Tunnel Works

Procedure for estimating the value of Tunnel works shall be as stated in table 1.3.5.

Table 1.3.6

Stage of Payment	Weightage	Payment Procedure
1	2	3
A Inlet and Outlet Portal		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length or 500-m length, whichever is less.
1 Temporary Dewatering Arrangement	3.51%	
2 Open Excavation and Earthwork	3.58%	
3 Underground Excavation and over break in underground excavation for portal in Support Category dominating the Face Area	22.60%	
4 Primary support measures (Bolts & Anchors, including Drilling and Grouting)	43.71%	
5 Permanent Dewatering Arrangement	0.95%	
6 Concrete Back filling & bed lining work	10.39%	
7 RCC Concrete Works including reinforcement	13.68%	
8 Pavement work & side drain	1.58%	
B Main Tunnel		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length or 500-m length, whichever is less.
1 Temporary Dewatering Arrangement	3.69%	
2 Underground Excavation and over break in underground excavation for portal in Support Category dominating the Face Area	23.79%	
3 Permanent Dewatering Arrangement	1.01%	
4 Primary support measures (Bolts & Anchors, including Drilling and Grouting)	22.94%	
5 Concrete Back filling & bed lining work	10.94%	

6 Fabricating and fixing in position permanent structural steel	21.57%	
7 RCC Concrete Works including reinforcement	14.40%	
8 Pavement work & side drain	1.66%	
C Monitoring of excavations/ construction & Electromechanical work		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length or 500 m length , whichever is less.
Monitoring of excavations/ construction	2.90%	
Electromechanical work	97.10%	On delivery, installation and commissioning of E&M equipment in the ratio of 40:30:30.

2. Procedure for payment for Maintenance

- (i) The cost for maintenance shall be as stated in Clause 14.1 (i)
- (ii) Payment for Maintenance shall be made 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

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

- a) Detailed Drawings of Plan & Profile with Horizontal intersection Point, Vertical Intersection Points, elements of curves, and sight distances etc.
- b) Detailed Drawings of Cross-section at 50.0m interval along the alignment.
- c) Typical Cross-section with details of pavement thickness.
- d) Detailed Drawings of all Junctions/intersections.
- e) Detailed drawing for culverts.
- f) Detailed Drawings of road drainage measures and drainage Plan.
- g) Detailed Drawings of slope protection measures like Secured Drapery in Hill Side and RCC and Plum concrete retaining wall in Valley Side.
- h) Drawings of road furniture items including traffic signage, markings, safety barriers (Thrie beam) etc.
- i) Detailed Utility Shifting Drawings (Electrical, HT/EHT Line and Water Supply line etc.)
- j) Detailed Drawings of Major & Minor Bridges, Tunnel etc.
- k) Any other drawing relevant to the Project Highway as desired by Authority/Client.

Schedule - J
(See Clause 10.3 (ii))
Project Completion Schedule

1. Project Completion Schedule

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

2. Project Milestone-I

(ii) Project Milestone-I shall occur on the date falling on the **382th (Three Hundred and Eighty Two)** day from the Appointed Date (the “**Project Milestone- I**”).

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

3. Project Milestone-II

(i) Project Milestone-II shall occur on the date falling on the **657th (Six Hundred and Fifty Seven)** 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 structures

4. Project Milestone-III

(i) Project Milestone-III shall occur on the date falling on the **930th (Nine Hundred and Thrity)** 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 **1095th (One Thousand and Ninety Five)** day from the Appointed Date.
 - (ii) On or before the Scheduled Completion Date, the Contractor shall have completed construction in accordance with this Agreement.

6. Extension of time

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

Schedule - K

(See Clause 12.1 (ii)) Tests on Completion

1. Schedule for Tests

Tests

- I. **Visual and physical test:** The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests required are to be decided by the Authority/Authority's Engineer at the time of physical tests as per standard.
- 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 equipment's and the maximum permissible roughness for purposes of this Test shall be 2,000 (two thousand) mm for each kilometre.
- III. **Tests for bridges/viaducts:** All major and minor bridges/viaducts shall be subjected to the rebound hammer and ultrasonic pulse velocity tests, to be conducted in accordance with the procedure described in Special Report No. 17: 1996 of the IRC Highway Research Board on Non-destructive Testing Techniques, at two spots in every span, to be chosen at random by the Authority's Engineer. Bridges/viaducts with a span of 15 (fifteen) metres or more shall also be subjected to load testing.
- IV. **Test for Tunnels:** Authority engineer shall collect all the tunnel monitoring data and check to confirm all displacements have ceased within tolerance limit. Permanent lining shall be checked for any visible defect such as crack, spalling or seepage further rebound hammer and UPV tests to be conducted at doubtful parts of lining. Functioning of drainage system to be checked. Testing and commissioning of E&M and ventilation system Systems.
- V. **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.

- VI. **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.
- VII. **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.

2. **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.

3. **Completion Certificate**

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

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

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

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

Schedule - L
(See Clause 12.2)

- 1 I, (Name of the Authority's Engineer), acting as the Authority's Engineer, under and in accordance with the Agreement dated (the "Agreement"), for **Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration from Rhenock (Design Km 0.00) to Rongli Bazaar (Design Km 14.589) along NH-717B in the State of Sikkim** on Engineering, Procurement and Construction (the "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 of20.... .

SIGNED, SEALED AND DELIVERED

For and on behalf of the Authority's Engineer by:

(Signature)

(Name)

(Designation) (Address)

Schedule - M
(See Clauses 14.6, 15.2 and 19.7)
Payment Reduction for Non-Compliance

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

- (i) Monthly lump sum payments for maintenance shall be reduced in the case of non-compliance with the Maintenance Requirements set forth in Schedule-E.
- (ii) Any deduction made on account of non-compliance with the Maintenance Requirements shall not be paid even after compliance subsequently. The deductions shall continue to be made every month until compliance is done.
- (iii) The Authority's Engineer shall calculate the amount of payment reduction on the basis of weightage in percentage assigned to non-conforming items as given in Paragraph 2.

2. Percentage reductions in lump sum payments on monthly basis

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

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

S. No.	Item/Defect/Deficiency	Percentage
(iii)	Painting, repairs/replacement kerbs, railings, parapets, guideposts/crash barriers	5%
(iv)	Any Defects in Special slope protection works	10%
(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/5 th km stones	5%
(f)	Miscellaneous Items	
(i)	Removal of dead animals, broken down/accidented vehicles, fallen trees, road blockades or malfunctioning of mobile crane	10%
(ii)	Any other Defects in accordance with paragraph 1.	5%
(d)	Tunnels	
(i)	Any defect in the permanent lining	10%
(ii)	Drainage issue inside tunnel, water ponding, potholes or damage to lanes or walkway	10%
(iii)	Problem with firefighting system, PA system, signage , air monitoring inside the tunnel or any other defect in E&M or ventilation facility	15%
(iv)	Cleaning and repair of drains	5%

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

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

Where,

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

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

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

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

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

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

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

Schedule - N
(See Clause 18.1 (i))
Selection of Authority's Engineer

1. Selection of Authority's Engineer

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.

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

2. Terms of Reference

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

3. Appointment of Government entity as Authority's Engineer

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

Annex - I
(Schedule - N)

Terms of Reference for Authority's Engineer

1. Scope

(i) These Terms of Reference (the “TOR”) for the Authority’s Engineer are being specified pursuant to the EPC Agreement dated (the “**Agreement**”), which has been entered into National Highways & Infrastructure Development Corporation Ltd., 1st & 2nd Floor, Tower A, World Trade Centre, Nauroji Nagar, New Delhi - 110029 (the “**Authority**”) and (the “**Contractor**”) **Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration from Rhenock (Design Km 0.00) to Rongli Bazaar (Design Km 14.589) along NH-717B in the State of Sikkim** on Engineering, Procurement and Construction (the “EPC”) basis, 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 this TOR.

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

3. General

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

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

a). any Time Extension;

- b). any additional cost to be paid by the Authority to the Contractor;
- c). the Termination Payment; or
- d). issuance of Completion Certificate or
- e). Any other matter which is not specified in (a), (b), (c) or (d) above and which creates a financial liability on either Party.

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

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

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

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

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.

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- (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 management. For purpose of this paragraph 4 (ix), the tests specified in the MoRTH Specifications for Road and Bridge Works and respective Indian Roads Congress Standards/Guidelines/Manuals, together with any Indian/International other Standards mentioned therein including any modifications/substitutions thereof shall be deemed to be tests confirming to Good Industry Practice for quality management.

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- (x)** The Authority's Engineer shall witness all the quality control tests carried out by the Contractor at its site laboratory/main laboratory/field/plants. These include tests for all materials, mixes, products, etc. Authority's Engineer shall also witness all tests of finished products like bearing in the manufacturers' laboratory as mandated in respective standards. Authority's Engineer will also conduct review of quality control documents in respect manufactured of materials/finished factory products etc. as per IRC:SP:112.
 - (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 MORTH specifications for Road & Bridge works and respective Indian Roads Congress Standards/Guidelines/Manuals together with any other Indian/International Standards referred thereto. 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

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

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

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

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

The Authority's Engineer shall examine the request of the Contractor for closure of any lane(s) of the Project Highway for undertaking maintenance/repair thereof, and shall grant permission with such

modifications, as it may deem necessary, within 5 (five) days of receiving a request from the Contractor. Upon expiry of the permitted period of closure, the Authority's Engineer shall monitor the reopening of such lane(s), and in case of delay, determine the Damages payable by the Contractor to the Authority under Clause 14.5.

Determination of costs and time

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

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

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

Payments

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).

Authority's Engineer shall -

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

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

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.

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

Other duties and functions

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

Miscellaneous

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

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.

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

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

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

Notwithstanding 100% test checks by the AE, nothing shall relieve the Contractor of its obligations and liabilities under this Agreement in any manner nor shall the Authority's Engineer or the Authority be liable for the same in any manner; and if errors, omissions, ambiguities, inconsistencies, inadequacies or other Defects are found in the Quality, they and the construction works shall be corrected at the Contractor's cost.

Schedule - O

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

Forms of Payment Statements

1. Stage Payment Statement for Works

(a) The Stage Payment Statement for Works shall state:

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

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

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

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

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

(f) Deductions:

- i. Any amount to be deducted in accordance with the provisions of the Agreement except taxes;
- ii. Any amount towards deduction of taxes; and
- iii. Total of (i) and (ii) above.

(g) Net claim: (e) - (f) (iii);

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

- iv. For the Works executed (excluding Change of Scope orders);
- v. For Change of Scope Orders, and
- vi. Taxes deducted

2. Monthly Maintenance Payment Statement

(i) The monthly Statement for Maintenance Payment shall state:

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

(b) The deductions for maintenance work not done;

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

(ii) Amounts reflecting adjustments in price under Clause 19.12; and

(iii) Amount towards deduction of taxes

3. Contractor's claim for Damages

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

Schedule - P

(See Clause 20.1)

Insurance

1. Insurance during Construction Period

- i. The Contractor shall effect and maintain at its own cost, from the Appointed Date till the date of issue of the Completion Certificate, the following insurances for any loss or damage occurring on account of Non Political Event of Force Majeure, malicious act, accidental damage, explosion, fire and terrorism:
 - b). insurance of Works, Plant and Materials and an additional sum of 15 (fifteen) percent 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
 - c). Insurance for the Contractor's equipment and Documents brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.
- ii. The insurance under sub para (a) and (b) of paragraph 1(i) above shall cover the Authority and the Contractor against all loss or damage from any cause arising under paragraph 1.1 other than risks which are not insurable at commercial terms.

2. Insurance for Contractor's Defects Liability

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

3. Insurance against injury to persons and damage to property

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

The insurance cover shall be not less than: Rs. 2,00,00,000/- (Rupees Two Crore only), and it shall be contractor's responsibility for any liability beyond the amount specified in the agreement.

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

- a). the Authority's right to have the construction works executed on, over, under, in or through any land, and to occupy this land for the Works; and
- b). Damage which is an unavoidable result of the Contractor's obligations to execute the Works.

4. Insurance to be in joint names

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

Schedule-Q

(See Clause 14.10)

Tests on Completion of Maintenance Period

1. Riding Quality test:

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

2. Visual and physical test:

The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include measurement of cracking, rutting, stripping and potholes and shall be as per the requirement of maintenance mentioned in Schedule-E. Inspection of permanent lining inside the tunnels to be done visually in case of doubt the rebound hammer and UPV tests to be carried out. Site inspection test for functionality of all E&M and ventilation system for tunnels to be done.

Schedule-R

(See Clause 14.10)

Taking Over Certificate

I, (Name and designation of the Authority's Representative) under and in accordance with the Agreement dated (the "Agreement"), for **Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration from Rhenock (Design Km 0.00) to Rongli Bazaar (Design Km 14.589) along NH-717B in the State of Sikkim** on Engineering, Procurement and Construction (the "EPC") basis through (Name of Contractor), hereby certify that the Tests on completion of Maintenance Period in accordance with Article 14 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement and I hereby certify that the Authority has taken over the Project highway from the Contractor on this day.....

SIGNED, SEALED AND DELIVERED

(Signature)

(Name and designation of Authority's Representative)

(Address)

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