National Highways & Infrastructure Development Corporation Limited

BUILDING INFRASTRUCTURE - BUILDING THE NATION

Ministry of Road Transport & Highways,
(Govt. of India)

"Construction of 4 - laning of Silchar (near Budha Nagar) at Existing km 233+00 (D. Ch. 24+560) to Jiribam at Existing km 212+060 (D. Ch. 37+650) of NH-37 (Length:13.09 km) in the State of Assam and Manipur on HAM (Pkg-2)."

TECHNICAL SCHEDULES (A to D)

January 2025

National Highways & Infrastructure Development Corporation Ltd
1st floor, Tower A, World Trade Centre, Nauroji Nagar

New Delhi – 110029

Schedule-A

Schedule - A

(See Clause 10.1)

Site of the Project

1. The Site

(i) Site of the Two-Lane (Proposed 4-lane Highway) Project Highway shall include the land, buildings, structures and road works as described in Annex-I of this **Schedule-A**

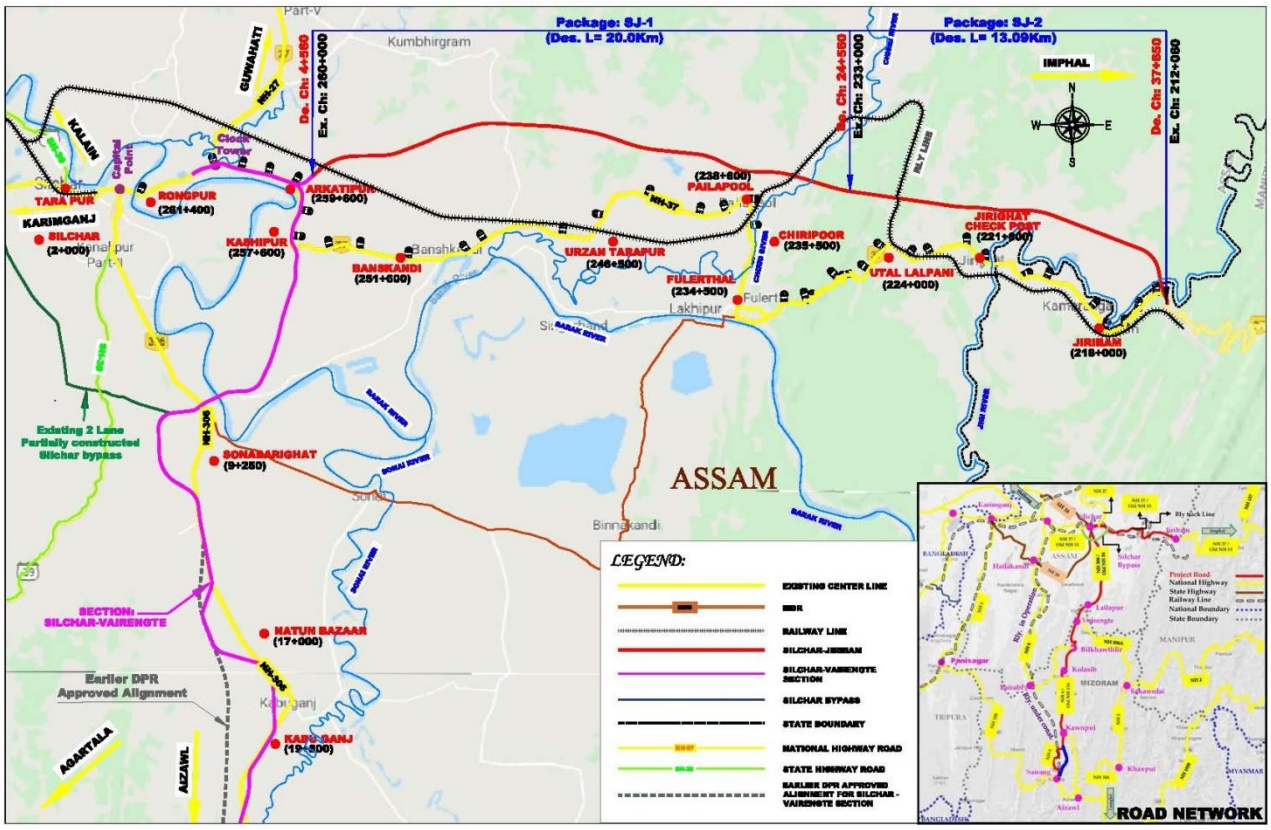
(ii) The dates of handing over the Right of Way to the Contractor are specified in Annex-II of this Schedule-A.

(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 10.3.1 of this Agreement.

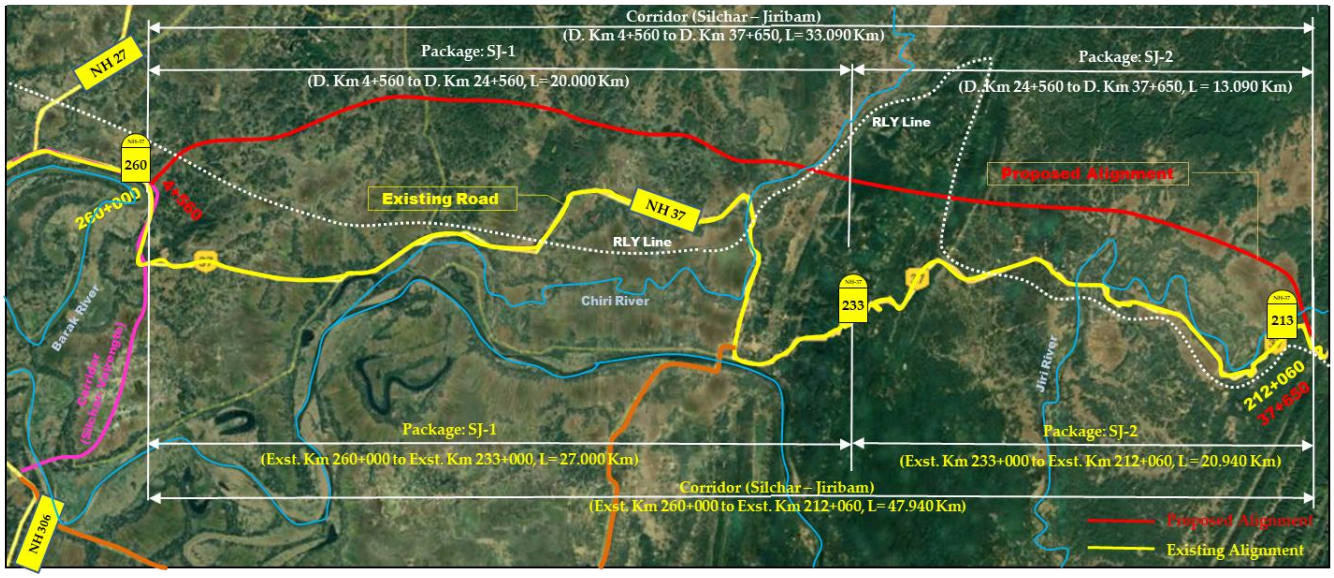
(iv) The alignment plans of the Project Highway are specified in Annex-III.

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

KEY PLAN



PROPOSED ALIGNMENT



Annex - I
(Schedule-A)
Site

1. Site

The Site of the two-lane (proposed 4-lane Highway) Project Highway starts near Budha Nagar, Cachar district in the state of Assam and ends at Jiribam district in the state of Manipur of NH-37 from Existing km 233+000 (Design Chainage km 24+560) to Existing km 212+060 (Design Ch. 37+650) under Pkg: P-2. The land, carriageway and structures comprising the Site are described below.

2. Land

The Site of the Project Highway comprises the land along existing NH described below:

SL No.	Design Chainage (km)		Length (m)	Right of Way (m)	Remarks
	From	To			
1	37+110	37+300	190	12	Leingangpokpi & Muktokhal in Manipur State
2	37+300	37+480	180	12	
3	37+480	37+530	50	12	
4	37+530	37+590	60	12	
5	37+590	37+650	60	12	
	Total		**540**		

SL No.	Design Chainage of Junctions (km)	Area (sqm)	Remarks
1	27+210	187.173	The Site of the Project Highway comprises the land (EROW) of cross-roads intersect with proposed project highway.
2	27+868	415.131	
3	29+700	68.809	
5	30+300	74.892	
6	30+510	435.588	
8	30+570	57.754	
9	31+409	117.957	
10	31+607	50.427	
11	32+671	126.194	
12	33+844	391.691	
13	34+140	127.346	
14	34+305	75.415	
15	34+850	113.146	
16	36+945	59.896	
17	37+125	48.240	
	Total	**2349.659**	

3. Carriageway

The present carriageway of the Project Highway (NH-37) is 7.0 m wide. The type of existing pavement is flexible. The details are given below.

SL No.	Existing Chainage (km)		Length (m)	Carriageway Width (m)	Remarks
	From	To			
1	233+000	212+700	20300	NA	Project road follows Green Field Alignment
2	212+600	212+060	540	7	Leingangpokpi & Muktokhal in Manipur State

4. Major Bridges

The Site includes the following Major Bridges:

Sl. No.	Chainage (km)	Type of super structures			No. of Spans with span length (m)	Width (m)
		Foundation	Sub- structure	Superstructure		
Project Road follows Green Field Alignment						

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

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

Sl. No.	Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)	ROB/RUB
		Foundation	Superstructure			
Project Road follows Green Field Alignment						

6. Grade separators

The Site includes the following grade separators:

Sl. No.	Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)
		Foundation	Superstructure		
Project Road follows Green Field Alignment					

7. Minor bridges

The Site includes the following minor bridges:

S. No.	Chainage (km)	Type of super structures			No. of Spans with span length (m)	Width (m)
		Foundation	Sub- structure	Superstructure		
Project Road follows Green Field Alignment						

8. Railway level crossings

The Site includes the following railway level crossings:

Sl. No.	Chainage (km)	Name of the crossing	Leads to		Remarks
			LHS	RHS	
Project Road follows Green Field Alignment					

9. Underpasses (vehicular, non-vehicular)

The Site includes the following underpasses:

S. No.	Chainage (km)	Type of Structure	No. of Spans with span length (m)	Width (m)
Project Road follows Green Field Alignment				

10. Culverts

The Site has the following culverts:

S. No.	Chainage (km)	Type of Culvert	Span /Opening with span length (m)	Width (m)
Project Road follows Green Field Alignment				

11. Bus bays

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

Sl. No.	Chainage (km)	Length (m)	Left Hand Side	Right Hand side
NIL (Project Road follows Green Field Alignment)				

12. Truck Lay byes

The details of truck lay byes are as follows:

Sl. No.	Chainage (km)	Length (m)	Left Hand Side	Right Hand side
NIL (Project Road follows Green Field Alignment)				

13. Roadside drains

The details of the roadside drains are as follows:

S. No.	Location		Type	
	From km	to km	Masonry/cc (Pucca)	Earthen (Kutcha)
Project Road follows Green Field Alignment				

14. Major Junctions

The details of major junctions are as follows.

Sl. No.	Chainage (km)	To-wards	At Grade	Side	Category of crossroad
Project Road follows Green Field Alignment					

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

15. Minor Junctions

The details of the minor junctions are as follows:

Sl. No.	Existing Chainage	Design Chainage	Type of Road (BT, CC, Gr.)	Type of Junctions (T, Y, +)	Side	Type of Road (SH/ MDR/ PMGSY/ VR)
(Project road follows Green Field Alignment)						

16. Roads Crossing the Greenfield Alignment:

S. No.	Existing Chainage (Km)	Design Chainage (Km)	Carriageway	
			Type	Cross road
1	(Project road follows Green Field Alignment)	27+210	1- Lane ER	Village Road
2		27+868	1-Lane BT	Village Road
3		29+700	1- Lane ER	Village Road
4		30+300	1- Lane ER	Village Road
5		30+570	1- Lane ER	Village Road
6		30+510	1- Lane ER	Village Road
7		31+409	1-Lane BT	Village Road

S. No.	Existing Chainage (Km)	Design Chainage (Km)	Carriageway	
			Type	Cross road
8		31+607	1- Lane ER	Village Road
9		32+671	1- Lane ER	Village Road
10		33+844	1-Lane BT	Village Road
11		34+140	1 Lane ER	Village Road
12		34+850	1- Lane ER	Village Road
13		36+940	1- Lane ER	Village Road
14		37+125	2-Lane BT	NH-37 (Existing)
15		37+260	1- Lane ER	Village Road
16		37+430	2-Lane BT	Village Road

17. Bypasses

The details of the bypasses are as follows:

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

18. Details of Existing Utilities Schedule

The existing utilities schedules as below,

18.1 Electrical Utilities

The Site includes the following Electrical Utilities: -

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

Extra High-Tension Lines (EHT LINES)							Remarks
Sl. No.	Chainage		Length of line(km)		Nos. of Crossings		
	From	To	400 KV	132 KV	400 KV	132 KV	
1	24+900	25+200		0.300		1	Maintained by AEGCL
2	25+500	26+700		1.2		1	Maintained by PGCIL
3	36+300	36+400		.200	1		Maintained by PGCIL

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

High Tension/ Low Tension Lines (HT/LT LINES)												
Sl. No	Chainage		Length of line(km)				Nos. of Crossings				Transformer	
	From	To	HT 44KV	LT 33KV	LT 11KV	LT 440V	HT 44 KV	LT 33K V	LT 11KV	LT 440V	No	Capacity
1	27+000	27+900			0..200 (2)*	0.280 (4)*			1	1		Falls under Assam P&E
2	28+200	28+600				0.500 (7)*				1		
3	29+400	30+000			0.300 (6)*	0.470 (13)*			1	3		

High Tension/ Low Tension Lines (HT/LT LINES)												
Sl. No	Chainage		Length of line(km)				Nos. of Crossings				Transformer	
	From	To	HT 44KV	LT 33KV	LT 11KV	LT 440V	HT 44 KV	LT 33K V	LT 11KV	LT 440V	No	Capacity
4	30+000	31+000			0.400 (10)*	0.25 0 (8)*			3	2		
5	31+000	32+000			0.100 (3)*	0.50 0 (19)*			1	3		
6	32+000	33+000			0.150 (3)*				1			
7	33+000	34+000			0.100 (3)*	0.15 0 (4)*			1	1		
8	34+000	35+000			0.250 (7)*	0.30 0 (11)*			1	2		
9	35+000	36+800			0.200 (7)*	0.10 0 (3)*			2	1		
10	36+800	37+600			0.600 (5)*	0.50 0 (5)*			1	1		Falls under Manipur P&E Supply

*Note: * Denotes number of poles*

18.2 Public Health Utilities (Water/Sewage Pipelines)

(a) The Site includes the following Public Health Utilities: -

Sl. No	Chainage		Length (in km)				Crossings				Remarks
	From	To	Water Supply Line		Sewage Line		Water Supply Line		Sewage Line		
			With Pumping	With Gravity Flow	With Pumping	With Gravity Flow	With Pumping	With Gravity Flow	With Pumping	With Gravity Flow	
1	27+000	28+000		0.150				1			Falls under Assam PHED
2	30+000	30+500		0.150				1			
3	31+000	31+500		0.100				1			
4	34+000	34+500		0.120				1			
5	36+500	36+800		0.100				1			
6	36+800	37+600		0.200				1			Falls under Manipur PHED

(b) Bore well/Hand Pump within RoW

Sl. No.	Bore Well**		Hand Pump	
	Chainage	Nos	Chainage	Nos
NIL				

(c) Water Tank within ROW

Sl. No.	Water Tank		
	Chainage	Nos	Capacity
NIL			

18.3 Any Other Lines - NIL

19. Other Structures: - NIL

Annex – II

(Schedule-A)

Dates for providing Right of Way of Construction Zone

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

(i) Full Right of Way (full width)

Description	Design Chainage (km)		Length (m)	Width (m)	Date of Providing ROW
	From	To			
(i) Full Right of Way (full width)	24+650	24+800	150	85	Within 30 Days of Appointed Date
(i) Full Right of Way (full width)	24+800	24+840	40	100	
(i) Full Right of Way (full width)	24+840	25+820	980	120	
(i) Full Right of Way (full width)	25+820	25+990	170	62.5	
(i) Full Right of Way (full width)	25+990	26+170	180	47.5	
(i) Full Right of Way (full width)	26+170	26+450	280	60	
(i) Full Right of Way (full width)	26+450	26+850	400	117.5	
(i) Full Right of Way (full width)	26+850	26+900	50	87.5	
(i) Full Right of Way (full width)	26+900	27+345	445	55	
(i) Full Right of Way (full width)	27+345	27+750	405	150	
(i) Full Right of Way (full width)	27+750	27+860	110	55	
(i) Full Right of Way (full width)	27+860	28+460	600	52.5	
(i) Full Right of Way (full width)	28+460	28+540	80	60	
(i) Full Right of Way (full width)	28+540	28+760	220	52.5	
(i) Full Right of Way (full width)	28+760	28+930	170	47.5	
(i) Full Right of Way (full width)	28+930	29+200	270	52.5	
(i) Full Right of Way (full width)	29+200	29+440	240	47.5	
(i) Full Right of Way (full width)	29+440	29+510	70	60	
(i) Full Right of Way (full width)	29+510	29+680	170	50	
(i) Full Right of Way (full width)	29+680	29+720	40	67.5	
(i) Full Right of Way (full width)	29+720	30+040	320	50	
(i) Full Right of Way (full width)	30+040	30+190	150	80	
(i) Full Right of Way (full width)	30+190	30+810	620	100	
(i) Full Right of Way (full width)	30+810	30+930	120	80	
(i) Full Right of Way (full width)	30+930	31+170	240	55	
(i) Full Right of Way (full width)	31+170	31+480	310	50	
(i) Full Right of Way (full width)	31+480	31+540	60	35	
(i) Full Right of Way (full width)	31+540	31+820	280	50	
(i) Full Right of Way (full width)	31+820	32+030	210	47.5	
(i) Full Right of Way (full width)	32+030	32+200	170	65	
(i) Full Right of Way (full width)	32+200	32+660	460	50	
(i) Full Right of Way (full width)	32+660	32+910	250	52.5	
(i) Full Right of Way (full width)	32+910	32+950	40	50	
(i) Full Right of Way (full width)	32+950	33+250	300	45	
(i) Full Right of Way (full width)	33+250	33+330	80	50	

Description	Design Chainage (km)		Length (m)	Width (m)	Date of Providing ROW
	From	To			
(i) Full Right of Way (full width)	33+330	33+420	90	55	Within 30 Days of Appointed Date
(i) Full Right of Way (full width)	33+420	33+935	515	80	
(i) Full Right of Way (full width)	33+935	33+960	25	140	
(i) Full Right of Way (full width)	33+960	34+250	290	80	
(i) Full Right of Way (full width)	34+250	34+390	140	52.5	
(i) Full Right of Way (full width)	34+390	34+600	210	45	
(i) Full Right of Way (full width)	34+600	34+650	50	47.5	
(i) Full Right of Way (full width)	34+650	34+830	180	55	
(i) Full Right of Way (full width)	34+830	34+910	80	65	
(i) Full Right of Way (full width)	34+910	34+950	40	72.5	
(i) Full Right of Way (full width)	34+950	35+080	130	60	
(i) Full Right of Way (full width)	35+080	35+920	840	47.5	
(i) Full Right of Way (full width)	35+920	36+290	370	65	
(i) Full Right of Way (full width)	36+290	36+470	180	45	
(i) Full Right of Way (full width)	36+470	36+720	250	50	
(i) Full Right of Way (full width)	36+720	36+820	100	35	
(i) Full Right of Way (full width)	36+820	36+890	70	55	
(i) Full Right of Way (full width)	36+890	37+110	220	60	
(i) Full Right of Way (full width)	24+650	24+800	150	85	
(i) Full Right of Way (full width)	24+800	24+840	40	100	
(i) Full Right of Way (full width)	24+840	25+820	980	120	
(i) Full Right of Way (full width)	25+820	25+990	170	62.5	
(i) Full Right of Way (full width)	25+990	26+170	180	47.5	
(i) Full Right of Way (full width)	26+170	26+450	280	60	
(i) Full Right of Way (full width)	26+450	26+850	400	117.5	
(i) Full Right of Way (full width)	26+850	26+900	50	87.5	
(i) Full Right of Way (full width)	26+900	27+345	445	55	
(i) Full Right of Way (full width)	27+345	27+750	405	150	
(i) Full Right of Way (full width)	27+750	27+860	110	55	
(i) Full Right of Way (full width)	27+860	28+460	600	52.5	
(i) Full Right of Way (full width)	28+460	28+540	80	60	
(i) Full Right of Way (full width)	28+540	28+760	220	52.5	
(i) Full Right of Way (full width)	28+760	28+930	170	47.5	
(i) Full Right of Way (full width)	28+930	29+200	270	52.5	
(i) Full Right of Way (full width)	29+200	29+440	240	47.5	
(i) Full Right of Way (full width)	29+440	29+510	70	60	
(i) Full Right of Way (full width)	29+510	29+680	170	50	
(i) Full Right of Way (full width)	29+680	29+720	40	67.5	
(i) Full Right of Way (full width)	29+720	30+040	320	50	
(i) Full Right of Way (full width)	30+040	30+190	150	80	
(i) Full Right of Way (full width)	30+190	30+810	620	100	
(i) Full Right of Way (full width)	30+810	30+930	120	80	
(i) Full Right of Way (full width)	30+930	31+170	240	55	Within 30 Days of

Description	Design Chainage (km)		Length (m)	Width (m)	Date of Providing ROW
	From	To			
(i) Full Right of Way (full width)	31+170	31+480	310	50	Appointed Date
(i) Full Right of Way (full width)	31+480	31+540	60	35	
(i) Full Right of Way (full width)	31+540	31+820	280	50	
(i) Full Right of Way (full width)	31+820	32+030	210	47.5	
(i) Full Right of Way (full width)	32+030	32+200	170	65	
(i) Full Right of Way (full width)	32+200	32+660	460	50	
(i) Full Right of Way (full width)	32+660	32+910	250	52.5	
(i) Full Right of Way (full width)	32+910	32+950	40	50	
(i) Full Right of Way (full width)	32+950	33+250	300	45	
(i) Full Right of Way (full width)	33+250	33+330	80	50	
(i) Full Right of Way (full width)	33+330	33+420	90	55	
(i) Full Right of Way (full width)	33+420	33+935	515	80	
(i) Full Right of Way (full width)	33+935	33+960	25	140	
(i) Full Right of Way (full width)	33+960	34+250	290	80	
(i) Full Right of Way (full width)	34+250	34+390	140	52.5	
(i) Full Right of Way (full width)	34+390	34+600	210	45	
(i) Full Right of Way (full width)	34+600	34+650	50	47.5	
(i) Full Right of Way (full width)	34+650	34+830	180	55	
(i) Full Right of Way (full width)	34+830	34+910	80	65	
(i) Full Right of Way (full width)	34+910	34+950	40	72.5	
(i) Full Right of Way (full width)	34+950	35+080	130	60	
(i) Full Right of Way (full width)	35+080	35+920	840	47.5	
(i) Full Right of Way (full width)	35+920	36+290	370	65	
(i) Full Right of Way (full width)	36+290	36+470	180	45	
(i) Full Right of Way (full width)	36+470	36+720	250	50	
(i) Full Right of Way (full width)	36+720	36+820	100	35	
(i) Full Right of Way (full width)	36+820	36+890	70	55	
(i) Full Right of Way (full width)	36+890	37+110	220	60	

(ii) Part Right of Way (part width)

Description	Design Chainage (km)		Length (m)	Width (m)	Date of Providing ROW
	From	To			
Part Right of Way (part width)	37+110	37+300	190	88	Within 30 Days of Appointed Date
Part Right of Way (part width)	37+300	37+480	180	134	
Part Right of Way (part width)	37+480	37+530	50	53	
Part Right of Way (part width)	37+530	37+590	60	45.5	
Part Right of Way (part width)	37+590	37+650	60	40.5	

Description	Chainage	Type of Junction	Area	Date of Providing ROW
Part Right of Way (part width)	27+210	Minor Junction	1087.393 sqm	
Part Right of Way (part width)	27+868	Major Junction	2308.516 sqm	
Part Right of Way (part width)	29+700	Minor Junction	2654.838 sqm	

Part Right of Way (part width)	30+300	Minor Junction	271.451 sqm	Within 30 Days of Appointed Date
Part Right of Way (part width)	30+510	Major Junction	4484.413 sqm	
Part Right of Way (part width)	30+570	Minor Junction	417.542 sqm	
Part Right of Way (part width)	31+409	Minor Junction	304.033 sqm	
Part Right of Way (part width)	31+607	Minor Junction	249.569 sqm	
Part Right of Way (part width)	32+671	Minor Junction	903.117 sqm	
Part Right of Way (part width)	33+844	Major Junction	2352.463 sqm	
Part Right of Way (part width)	34+140	Minor Junction	831.016 sqm	
Part Right of Way (part width)	34+305	Minor Junction	623.546 sqm	
Part Right of Way (part width)	34+850	Minor Junction	358.82 sqm	
Part Right of Way (part width)	36+945	Minor Junction	393.221 sqm	
Part Right of Way (part width)	37+125	Major Junction	3222.862 sqm	

(iii) Balance Right of Way (available width)

Description	Design Chainage (km)		Length (m)	Width (m)	Date of Providing ROW
	From	To			
NIL					

COORDINATE SYSTEM_UNIVERSAL TRANSVERSE MERCATOR (UTM)-WGS84 (ZONE 46N)

The co-ordinates of Centerline are given below: -

Sl. No.	Design Chainage (Km)	Easting (m)	Northing (m)
1	24560	506002.2153	2746242.0177
2	24600	506041.7215	2746235.7527
3	24650	506091.1616	2746228.2920
4	24700	506140.6522	2746221.1729
5	24750	506190.1479	2746214.0892
6	24800	506239.6435	2746207.0055
7	24850	506289.1392	2746199.9218
8	24900	506338.6349	2746192.8381
9	24950	506388.1305	2746185.7544
10	25000	506437.6262	2746178.6707
11	25050	506487.1219	2746171.5869
12	25100	506536.6175	2746164.5032
13	25150	506586.1132	2746157.4195
14	25200	506635.6089	2746150.3358
15	25250	506685.1045	2746143.2521
16	25300	506734.6002	2746136.1684
17	25350	506784.0959	2746129.0847
18	25400	506833.5915	2746122.0010
19	25450	506883.0872	2746114.9173
20	25500	506932.5829	2746107.8336
21	25550	506982.0785	2746100.7498
22	25600	507031.5742	2746093.6661
23	25650	507081.0699	2746086.5824
24	25700	507130.5655	2746079.4987
25	25750	507180.0612	2746072.4150

Sl. No.	Design Chainage (Km)	Easting (m)	Northing (m)
26	25800	507229.5569	2746065.3313
27	25850	507279.0525	2746058.2476
28	25900	507328.5482	2746051.1639
29	25950	507378.0439	2746044.0802
30	26000	507427.5395	2746036.9965
31	26050	507477.0352	2746029.9128
32	26100	507526.5309	2746022.8290
33	26150	507576.0265	2746015.7453
34	26200	507625.5222	2746008.6616
35	26250	507675.0179	2746001.5779
36	26300	507724.5135	2745994.4942
37	26350	507774.0092	2745987.4105
38	26400	507823.5049	2745980.3268
39	26450	507873.0005	2745973.2431
40	26500	507922.4962	2745966.1594
41	26550	507971.9919	2745959.0757
42	26600	508021.4875	2745951.9919
43	26650	508070.9832	2745944.9082
44	26700	508120.4789	2745937.8245
45	26750	508169.9745	2745930.7408
46	26800	508219.4702	2745923.6571
47	26850	508268.9659	2745916.5734
48	26900	508318.4615	2745909.4897
49	26950	508367.9572	2745902.4060
50	27000	508417.4529	2745895.3223
51	27050	508466.9485	2745888.2386
52	27100	508516.4442	2745881.1549
53	27150	508565.9399	2745874.0711
54	27200	508615.4355	2745866.9874
55	27250	508664.9312	2745859.9037
56	27300	508714.4269	2745852.8200
57	27350	508763.9225	2745845.7363
58	27400	508813.4182	2745838.6526
59	27450	508862.9139	2745831.5689
60	27500	508912.4095	2745824.4852
61	27550	508961.9052	2745817.4015
62	27600	509011.4009	2745810.3178
63	27650	509060.8965	2745803.2340
64	27700	509110.3922	2745796.1503
65	27750	509159.8879	2745789.0666
66	27800	509209.3835	2745781.9829
67	27850	509258.8792	2745774.8992
68	27900	509308.3749	2745767.8155
69	27950	509357.8705	2745760.7318
70	28000	509407.3662	2745753.6481

Sl. No.	Design Chainage (Km)	Easting (m)	Northing (m)
71	28050	509456.8619	2745746.5644
72	28100	509506.3576	2745739.4807
73	28150	509555.8532	2745732.3970
74	28200	509605.3489	2745725.3132
75	28250	509654.8732	2745718.4339
76	28300	509704.4635	2745712.0481
77	28350	509754.1152	2745706.1584
78	28400	509803.8233	2745700.7656
79	28450	509853.5829	2745695.8701
80	28500	509903.3889	2745691.4725
81	28550	509953.2365	2745687.5731
82	28600	510003.1205	2745684.1724
83	28650	510053.0360	2745681.2707
84	28700	510102.9780	2745678.8683
85	28750	510152.9393	2745676.9027
86	28800	510202.9031	2745674.9995
87	28850	510252.8669	2745673.0963
88	28900	510302.8306	2745671.1930
89	28950	510352.7944	2745669.2898
90	29000	510402.7582	2745667.3865
91	29050	510452.7219	2745665.4833
92	29100	510502.6857	2745663.5800
93	29150	510552.6387	2745661.4201
94	29200	510602.5610	2745658.6387
95	29250	510652.4446	2745655.2335
96	29300	510702.2817	2745651.2051
97	29350	510752.0646	2745646.5540
98	29400	510801.7855	2745641.2810
99	29450	510851.4365	2745635.3869
100	29500	510901.0100	2745628.8727
101	29550	510950.5166	2745621.8657
102	29600	511000.0175	2745614.8185
103	29650	511049.5184	2745607.7713
104	29700	511099.0192	2745600.7241
105	29750	511148.5201	2745593.6770
106	29800	511198.0292	2745586.6883
107	29850	511247.6272	2745580.3651
108	29900	511297.3237	2745574.8694
109	29950	511347.1049	2745570.2027
110	30000	511396.9569	2745566.3663
111	30050	511446.8660	2745563.3613
112	30100	511496.8182	2745561.1885
113	30150	511546.7997	2745559.8484
114	30200	511596.7966	2745559.3416
115	30250	511646.7951	2745559.6548

Sl. No.	Design Chainage (Km)	Easting (m)	Northing (m)
116	30300	511696.7916	2745560.2496
117	30350	511746.7880	2745560.8444
118	30400	511796.7845	2745561.4391
119	30450	511846.7810	2745562.0339
120	30500	511896.7774	2745562.6287
121	30550	511946.7739	2745563.2235
122	30600	511996.7704	2745563.8182
123	30650	512046.7668	2745564.4130
124	30700	512096.7633	2745565.0078
125	30750	512146.7597	2745565.6026
126	30800	512196.7562	2745566.1965
127	30850	512246.7555	2745566.3382
128	30900	512296.7501	2745565.6465
129	30950	512346.7263	2745564.1217
130	31000	512396.6701	2745561.7642
131	31050	512446.5678	2745558.5747
132	31100	512496.4053	2745554.5541
133	31150	512546.1689	2745549.7034
134	31200	512595.8447	2745544.0240
135	31250	512645.4190	2745537.5176
136	31300	512694.8780	2745530.1858
137	31350	512744.2079	2745522.0308
138	31400	512793.3950	2745513.0548
139	31450	512842.4258	2745503.2602
140	31500	512891.2864	2745492.6499
141	31550	512939.9635	2745481.2268
142	31600	512988.4434	2745468.9940
143	31650	513036.7127	2745455.9550
144	31700	513084.7581	2745442.1133
145	31750	513132.5660	2745427.4728
146	31800	513180.1233	2745412.0375
147	31850	513227.4168	2745395.8119
148	31900	513274.4333	2745378.8003
149	31950	513321.1831	2745361.0680
150	32000	513367.8787	2745343.1931
151	32050	513414.5744	2745325.3181
152	32100	513461.2701	2745307.4431
153	32150	513507.9657	2745289.5682
154	32200	513554.6614	2745271.6932
155	32250	513601.3571	2745253.8182
156	32300	513648.0527	2745235.9433
157	32350	513694.7484	2745218.0683
158	32400	513741.4441	2745200.1933
159	32450	513788.1397	2745182.3184
160	32500	513834.8354	2745164.4434

Sl. No.	Design Chainage (Km)	Easting (m)	Northing (m)
161	32550	513881.5311	2745146.5684
162	32600	513928.2268	2745128.6935
163	32650	513974.9224	2745110.8185
164	32700	514021.6181	2745092.9435
165	32750	514068.3138	2745075.0686
166	32800	514115.0094	2745057.1936
167	32850	514161.7051	2745039.3186
168	32900	514208.4008	2745021.4437
169	32950	514255.0964	2745003.5687
170	33000	514301.7921	2744985.6937
171	33050	514348.4878	2744967.8187
172	33100	514395.1834	2744949.9438
173	33150	514441.8791	2744932.0688
174	33200	514488.5748	2744914.1938
175	33250	514535.2705	2744896.3189
176	33300	514581.9661	2744878.4439
177	33350	514628.6618	2744860.5689
178	33400	514675.3575	2744842.6940
179	33450	514722.0531	2744824.8190
180	33500	514768.7488	2744806.9440
181	33550	514815.4445	2744789.0691
182	33600	514862.1401	2744771.1941
183	33650	514908.8358	2744753.3191
184	33700	514955.5315	2744735.4442
185	33750	515002.2271	2744717.5692
186	33800	515048.9228	2744699.6942
187	33850	515095.6185	2744681.8193
188	33900	515142.3141	2744663.9443
189	33950	515189.0098	2744646.0693
190	34000	515235.7055	2744628.1944
191	34050	515282.4012	2744610.3194
192	34100	515329.0968	2744592.4444
193	34150	515375.7925	2744574.5695
194	34200	515422.4882	2744556.6945
195	34250	515469.1838	2744538.8195
196	34300	515515.8795	2744520.9445
197	34350	515562.5752	2744503.0696
198	34400	515609.2708	2744485.1946
199	34450	515655.9665	2744467.3196
200	34500	515702.6622	2744449.4447
201	34550	515749.3578	2744431.5697
202	34600	515796.0535	2744413.6947
203	34650	515842.7492	2744395.8198
204	34700	515889.4449	2744377.9448
205	34750	515936.1405	2744360.0698

Sl. No.	Design Chainage (Km)	Easting (m)	Northing (m)
206	34800	515982.8362	2744342.1949
207	34850	516029.5319	2744324.3199
208	34900	516076.2275	2744306.4449
209	34950	516122.9232	2744288.5700
210	35000	516169.6189	2744270.6950
211	35050	516216.3145	2744252.8200
212	35100	516263.0102	2744234.9451
213	35150	516309.7059	2744217.0701
214	35200	516356.4015	2744199.1951
215	35250	516403.0959	2744181.3168
216	35300	516449.5908	2744162.9297
217	35350	516495.2993	2744142.6755
218	35400	516539.9391	2744120.1634
219	35450	516583.3979	2744095.4484
220	35500	516625.5672	2744068.5923
221	35550	516666.3415	2744039.6621
222	35600	516705.6190	2744008.7303
223	35650	516743.3014	2743975.8740
224	35700	516779.2946	2743941.1754
225	35750	516813.5086	2743904.7213
226	35800	516845.8578	2743866.6027
227	35850	516876.2615	2743826.9150
228	35900	516904.6437	2743785.7573
229	35950	516930.9333	2743743.2326
230	36000	516955.0647	2743699.4470
231	36050	516976.9776	2743654.5101
232	36100	516996.6172	2743608.5342
233	36150	517013.9344	2743561.6341
234	36200	517028.8859	2743513.9272
235	36250	517041.4355	2743465.5329
236	36300	517052.0042	2743416.6641
237	36350	517062.0266	2743367.6789
238	36400	517072.0449	2743318.6928
239	36450	517082.0633	2743269.7068
240	36500	517092.0816	2743220.7207
241	36550	517102.1000	2743171.7347
242	36600	517112.1183	2743122.7486
243	36650	517122.1367	2743073.7626
244	36700	517132.1551	2743024.7766
245	36750	517142.1734	2742975.7905
246	36800	517152.1918	2742926.8045
247	36850	517162.2101	2742877.8184
248	36900	517172.2285	2742828.8324
249	36950	517182.5116	2742779.9018
250	37000	517194.3168	2742731.3190

Sl. No.	Design Chainage (Km)	Easting (m)	Northing (m)
251	37050	517208.1324	2742683.2692
252	37100	517223.9375	2742635.8366
253	37150	517241.7046	2742589.1035
254	37200	517261.4030	2742543.1511
255	37250	517282.9985	2742498.0590
256	37300	517306.1953	2742453.7670
257	37350	517329.5985	2742409.5835
258	37400	517349.6970	2742363.8371
259	37450	517362.4674	2742315.5529
260	37500	517367.0781	2742265.8203
261	37550	517365.3966	2742215.8607
262	37600	517362.1711	2742165.9648
263	37650	517358.9400	2742116.0810

The co-ordinates of RoW are given below: -

LHS				RHS		
Sl. no.	Design Chainage (Km)	Easting (m)	Northing (m)	Design Chainage (Km)	Easting (m)	Northing (m)
1	24+560	506007.0340	2746271.6282	24+560	505998.2175	2746217.3394
2	24+650	506095.5144	2746257.9746	24+650	506087.5343	2746203.5566
3	24+650	506098.4581	2746277.7569	24+650	506086.0916	2746193.6612
4	24+700	506147.7359	2746270.6686	24+700	506135.6936	2746186.5259
5	24+800	506246.7272	2746256.5012	24+800	506234.6849	2746172.3585
6	24+840	506286.3238	2746250.8342	24+800	506232.5598	2746157.5098
7	24+840	506287.7405	2746260.7333	24+840	506272.1563	2746151.8429
8	24+900	506347.1353	2746252.2329	24+840	506270.7396	2746141.9437
9	25+000	506446.1266	2746238.0655	24+900	506330.1344	2746133.4433
10	25+100	506545.1180	2746223.8980	25+000	506429.1257	2746119.2758
11	25+200	506644.1093	2746209.7306	25+100	506528.1171	2746105.1084
12	25+300	506743.1006	2746195.5632	25+200	506627.1084	2746090.9410
13	25+400	506842.0920	2746181.3958	25+300	506726.0997	2746076.7736
14	25+500	506941.0833	2746167.2284	25+400	506825.0911	2746062.6062
15	25+600	507040.0746	2746153.0609	25+500	506924.0824	2746048.4388
16	25+700	507139.0660	2746138.8935	25+600	507023.0737	2746034.2713
17	25+820	507257.8556	2746121.8926	25+700	507122.0651	2746020.1039
18	25+820	507253.6053	2746092.1952	25+820	507240.8547	2746003.1030
19	25+900	507332.7984	2746080.8613	25+820	507244.7507	2746030.3256
20	25+990	507421.8906	2746068.1106	25+900	507323.9438	2746018.9917
21	25+990	507420.8281	2746060.6863	25+990	507413.0360	2746006.2410
22	26+100	507529.7185	2746045.1021	25+990	507414.0985	2746013.6654
23	26+170	507599.0125	2746035.1849	26+100	507522.9890	2745998.0812
24	26+170	507600.0750	2746042.6093	26+170	507592.2829	2745988.1640
25	26+300	507728.7638	2746024.1916	26+170	507591.5746	2745983.2144

LHS				RHS		
Sl. no.	Design Chainage (Km)	Easting (m)	Northing (m)	Design Chainage (Km)	Easting (m)	Northing (m)
26	26+400	507827.7551	2746010.0242	26+200	507621.2720	2745978.9642
27	26+450	507877.2508	2746002.9405	26+300	507720.2633	2745964.7968
28	26+450	507881.5010	2746032.6379	26+400	507819.2546	2745950.6294
29	26+500	507930.9967	2746025.5542	26+450	507868.7503	2745943.5457
30	26+600	508029.9880	2746011.3867	26+450	507864.8543	2745916.3231
31	26+700	508128.9793	2745997.2193	26+500	507914.3499	2745909.2393
32	26+800	508227.9707	2745983.0519	26+600	508013.3413	2745895.0719
33	26+900	508326.9620	2745968.8845	26+700	508112.3326	2745880.9045
34	26+900	508322.3576	2745936.7123	26+800	508211.3239	2745866.7371
35	27+000	508421.3489	2745922.5449	26+850	508260.8196	2745859.6534
36	27+100	508520.3402	2745908.3775	26+850	508265.0698	2745889.3508
37	27+203	508622.2378	2745893.7941	26+900	508314.5655	2745882.2671
38	27+227	508651.0712	2745926.6025	27+000	508413.5568	2745868.0997
39	27+237	508659.3682	2745914.1061	27+100	508512.5482	2745853.9322
40	27+218	508637.2890	2745891.6400	27+202	508614.0143	2745839.4106
41	27+300	508718.3229	2745880.0426	27+219	508623.4180	2745789.8782
42	27+345	508762.8690	2745873.6673	27+225	508632.8618	2745801.5322
43	27+345	508769.5985	2745920.6882	27+218	508628.8630	2745837.2855
44	27+400	508824.0438	2745912.8961	27+300	508710.5308	2745825.5974
45	27+500	508923.0351	2745898.7287	27+345	508754.9545	2745819.2396
46	27+600	509022.0264	2745884.5613	27+345	508748.0693	2745772.2429
47	27+700	509121.0178	2745870.3938	27+400	508802.7933	2745764.4133
48	27+750	509170.7297	2745863.2792	27+500	508901.7852	2745750.2502
49	27+750	509163.8442	2745816.2806	27+600	509000.7771	2745736.0870
50	27+800	509213.2796	2745809.2055	27+700	509099.7691	2745721.9238
51	27+900	509312.2709	2745795.0381	27+750	509149.4934	2745714.8096
52	28+000	509411.2623	2745780.8707	27+750	509156.1372	2745761.7458
53	28+100	509510.2536	2745766.7033	27+800	509205.4875	2745754.7603
54	28+200	509609.2449	2745752.5359	27+860	509264.8823	2745746.2599
55	28+300	509707.8393	2745739.3401	27+900	509305.8743	2745742.9186
56	28+400	509806.6526	2745728.1197	28+000	509403.8244	2745728.9002
57	28+500	509905.6433	2745718.8800	28+100	509502.8157	2745714.7328
58	28+600	510004.8262	2745711.6194	28+200	509601.8070	2745700.5654
59	28+700	510104.1346	2745706.3439	28+300	509701.4194	2745687.2340
60	28+760	510163.9788	2745704.0022	28+400	509801.2761	2745675.8957
61	28+760	510163.7885	2745699.0058	28+460	509861.2670	2745670.0543
62	28+800	510203.7596	2745697.4832	28+460	509860.5774	2745662.5861
63	28+900	510303.6871	2745693.6767	28+540	509940.8264	2745655.9046
64	28+930	510333.6653	2745692.5348	28+540	509941.3889	2745663.3835

LHS				RHS		
Sl. no.	Design Chainage (Km)	Easting (m)	Northing (m)	Design Chainage (Km)	Easting (m)	Northing (m)
65	28+930	510333.8556	2745697.5311	28+600	510001.5448	2745659.2221
66	29+000	510403.8049	2745694.8666	28+700	510101.9016	2745653.8914
67	29+100	510503.7325	2745691.0601	28+800	510201.9515	2745650.0176
68	29+200	510604.2622	2745686.0861	28+900	510301.8790	2745646.2111
69	29+200	510603.9529	2745681.0956	29+000	510401.8065	2745642.4046
70	29+300	510704.2345	2745673.6202	29+100	510501.7341	2745638.5981
71	29+400	510804.2980	2745663.6403	29+200	510600.9831	2745633.6885
72	29+440	510844.2482	2745658.9484	29+300	510700.1116	2745626.2994
73	29+440	510845.1603	2745666.3928	29+400	510798.9626	2745616.4408
74	29+510	510915.0796	2745657.2050	29+440	510838.4720	2745611.8009
75	29+510	510914.3885	2745652.2530	29+440	510837.8577	2745606.8388
76	29+600	511003.5411	2745639.5690	29+510	510906.7495	2745597.7860
77	29+680	511082.7423	2745628.2935	29+510	510907.4728	2745602.7335
78	29+680	511085.2038	2745645.5837	29+600	510996.4939	2745590.0681
79	29+720	511124.8045	2745639.9459	29+693	511088.0703	2745577.0308
80	29+720	511122.3430	2745622.6557	29+800	511194.6608	2745561.9162
81	29+800	511201.3561	2745611.4661	29+900	511294.8245	2745549.9947
82	29+900	511299.8642	2745599.7400	30+000	511395.2462	2745541.4249
83	30+000	511398.6258	2745591.3107	30+040	511435.5106	2745538.9333
84	30+040	511438.2494	2745588.8583	30+040	511434.6756	2745523.9565
85	30+040	511439.1010	2745603.8341	30+100	511495.4126	2745521.2131
86	30+100	511498.1568	2745601.1663	30+190	511586.5907	2745519.3767
87	30+190	511587.0018	2745599.3758	30+190	511586.6242	2745509.3430
88	30+190	511587.0531	2745609.3757	30+300	511697.3864	2745510.2531
89	30+250	511646.2010	2745609.6513	30+400	511797.3793	2745511.4427
90	30+350	511746.1933	2745610.8408	30+495	511892.3721	2745512.5727
91	30+400	511796.1897	2745611.4356	30+495	511894.3230	2745348.5843
92	30+500	511896.1827	2745612.6251	30+525	511924.3209	2745348.9412
93	30+600	511996.1752	2745613.8147	30+525	511922.3700	2745512.9296
94	30+700	512096.1685	2745615.0043	30+600	511997.3651	2745513.8218
95	30+810	512206.3470	2745616.2899	30+700	512097.3581	2745515.0113
96	30+810	512206.4420	2745606.2904	30+810	512206.7967	2745516.2897
97	30+850	512247.0421	2745606.3371	30+810	512206.8017	2745526.3915
98	30+900	512297.6363	2745605.6367	30+930	512325.5484	2745525.7724
99	30+930	512328.0083	2745604.8115	30+930	512325.9015	2745537.3442
100	30+930	512327.6271	2745592.3173	31+000	512395.0989	2745534.3090
101	31+000	512398.2414	2745589.2193	31+050	512444.5843	2745531.1463
102	31+050	512448.5963	2745585.9998	31+100	512493.9650	2745527.1625
103	31+100	512498.8445	2745581.9457	31+170	512562.9718	2745520.2038

LHS				RHS		
Sl. no.	Design Chainage (Km)	Easting (m)	Northing (m)	Design Chainage (Km)	Easting (m)	Northing (m)
104	31+170	512569.1281	2745574.8583	31+170	512563.2947	2745522.6832
105	31+170	512568.8482	2745572.3740	31+200	512592.7568	2745519.2153
106	31+200	512598.9327	2745568.8326	31+250	512641.9180	2745512.7638
107	31+250	512648.9200	2745562.2712	31+350	512739.9243	2745497.4005
108	31+300	512698.7910	2745554.8777	31+450	512837.3236	2745478.7864
109	31+350	512748.5319	2745546.6540	31+480	512866.3663	2745472.5811
110	31+400	512798.1288	2745537.6025	31+480	512867.9579	2745479.9103
111	31+450	512847.5680	2745527.7257	31+540	512926.1594	2745466.5595
112	31+480	512877.1086	2745521.4137	31+540	512924.4135	2745459.2655
113	31+480	512875.5049	2745514.0872	31+650	513029.9915	2745431.8754
114	31+540	512934.3260	2745500.5935	31+700	513077.6364	2745418.1490
115	31+540	512936.0759	2745507.8865	31+750	513125.0070	2745403.6428
116	31+650	513043.4734	2745480.0235	31+800	513172.2069	2745388.3240
117	31+700	513091.9189	2745466.0658	31+850	513219.1062	2745372.2336
118	31+750	513140.1250	2745451.3026	31+900	513265.6927	2745355.3779
119	31+800	513188.0784	2745435.7381	32+000	513358.9412	2745319.8452
120	31+820	513207.1458	2745429.3027	32+030	513386.9578	2745309.1206
121	31+820	513206.3384	2745426.9366	32+030	513382.4890	2745297.4467
122	31+850	513234.8947	2745417.0329	32+100	513447.8638	2745272.4214
123	31+900	513282.2638	2745399.8938	32+200	513541.2543	2745236.6718
124	32+000	513375.9225	2745364.2061	32+200	513545.7230	2745248.3457
125	32+030	513403.9390	2745353.4815	32+300	513639.1153	2745212.5954
126	32+030	513405.7265	2745358.1510	32+400	513732.5066	2745176.8455
127	32+100	513471.1013	2745333.1258	32+500	513825.8979	2745141.0956
128	32+200	513564.4918	2745297.3762	32+600	513919.2893	2745105.3456
129	32+200	513563.5980	2745295.0414	32+700	514012.6806	2745069.5957
130	32+300	513656.9902	2745259.2911	32+800	514106.0719	2745033.8458
131	32+400	513750.3816	2745223.5412	32+910	514208.8015	2744994.5212
132	32+500	513843.7729	2745187.7912	32+910	514209.6953	2744996.8559
133	32+600	513937.1642	2745152.0413	33+000	514293.7484	2744964.6807
134	32+650	513983.8599	2745134.1663	33+100	514387.1397	2744928.9307
135	32+637	513988.7225	2745182.1380	33+200	514480.5310	2744893.1808
136	32+652	514002.9255	2745177.3135	33+250	514527.2258	2744875.3062
137	32+700	514031.4493	2745118.6261	33+250	514526.3321	2744872.9714
138	32+800	514124.8407	2745082.8762	33+330	514601.0452	2744844.3714
139	32+900	514218.2320	2745047.1263	33+330	514600.1514	2744842.0366
140	32+950	514264.9268	2745029.2516	33+420	514684.2036	2744809.8617
141	32+950	514263.1393	2745024.5821	33+420	514679.7349	2744798.1878
142	33+000	514309.8358	2745006.7068	33+500	514754.4488	2744769.5875

LHS				RHS		
Sl. no.	Design Chainage (Km)	Easting (m)	Northing (m)	Design Chainage (Km)	Easting (m)	Northing (m)
143	33+100	514403.2272	2744970.9568	33+600	514847.8402	2744733.8376
144	33+200	514496.6185	2744935.2069	33+700	514941.2315	2744698.0876
145	33+250	514543.3133	2744917.3323	33+813	515046.5888	2744657.7572
146	33+250	514544.2071	2744919.6670	33+793	515000.2707	2744591.9766
147	33+330	514618.9201	2744891.0671	33+800	515011.6005	2744582.1462
148	33+330	514619.8139	2744893.4019	33+846	515077.9901	2744645.7368
149	33+420	514703.8661	2744861.2269	33+900	515128.0142	2744626.5878
150	33+420	514708.3348	2744872.9009	33+935	515160.7003	2744614.0756
151	33+500	514783.0488	2744844.3006	33+935	515139.2503	2744558.0408
152	33+600	514876.4401	2744808.5506	33+960	515162.5981	2744549.1033
153	33+700	514969.8314	2744772.8007	33+960	515184.0481	2744605.1381
154	33+840	515101.9925	2744722.2098	34+000	515221.4055	2744590.8378
155	33+880	515167.3770	2744788.3362	34+100	515314.7969	2744555.0879
156	33+875	515179.2538	2744779.1741	34+200	515408.1882	2744519.3379
157	33+875	515133.4839	2744710.1550	34+254	515458.3257	2744500.1455
158	33+900	515156.6141	2744701.3008	34+240	515439.7290	2744491.8450
159	34+000	515250.0055	2744665.5509	34+250	515446.2504	2744477.2343
160	34+100	515343.3968	2744629.8010	34+290	515498.8289	2744500.7024
161	34+200	515436.7881	2744594.0510	34+300	515506.9420	2744497.5967
162	34+250	515483.4829	2744576.1764	34+390	515590.9934	2744465.4221
163	34+250	515479.0142	2744564.5025	34+390	515591.8871	2744467.7569
164	34+300	515525.7107	2744546.6272	34+500	515694.6184	2744428.4316
165	34+390	515609.7621	2744514.4526	34+600	515788.0098	2744392.6817
166	34+390	515607.9746	2744509.7830	34+650	515834.7046	2744374.8071
167	34+500	515710.7059	2744470.4577	34+650	515832.0233	2744367.8027
168	34+600	515804.0964	2744434.7081	34+700	515878.7199	2744349.9274
169	34+600	515804.9901	2744437.0429	34+830	516000.1277	2744303.4528
170	34+700	515898.3823	2744401.2926	34+830	515996.5527	2744294.1137
171	34+800	515991.7737	2744365.5427	34+900	516061.9276	2744269.0884
172	34+840	516029.0318	2744351.2804	34+950	516108.6224	2744251.2138
173	34+830	516025.4146	2744368.6933	34+950	516113.0911	2744262.8877
174	34+840	516038.8223	2744375.4188	35+000	516159.7876	2744245.0124
175	34+860	516045.4728	2744344.9868	35+080	516234.4998	2744216.4128
176	34+910	516094.5033	2744326.2181	35+080	516236.2873	2744221.0823
177	34+910	516097.1845	2744333.2225	35+200	516348.3578	2744178.1821
178	35+000	516181.2376	2744301.0472	35+300	516440.9840	2744142.1407
179	35+080	516255.9498	2744272.4476	35+350	516485.5712	2744122.3860
180	35+080	516253.2686	2744265.4432	35+400	516529.3073	2744100.3335
181	35+200	516365.3390	2744222.5430	35+450	516571.6929	2744076.2315

LHS				RHS		
Sl. no.	Design Chainage (Km)	Easting (m)	Northing (m)	Design Chainage (Km)	Easting (m)	Northing (m)
182	35+300	516459.1519	2744186.0293	35+500	516613.0085	2744049.9231
183	35+350	516506.1078	2744165.2183	35+550	516652.8653	2744021.6440
184	35+400	516551.8607	2744142.1378	35+600	516691.1736	2743991.4783
185	35+450	516596.4029	2744116.7996	35+650	516728.0933	2743959.2915
186	35+500	516639.6230	2744089.2668	35+700	516763.2766	2743925.3739
187	35+550	516681.3117	2744059.6849	35+750	516796.6473	2743889.8217
188	35+600	516721.6686	2744027.8982	35+800	516828.2730	2743852.5645
189	35+650	516760.2890	2743994.2158	35+850	516857.9970	2743813.7732
190	35+700	516797.0884	2743958.7366	35+900	516885.7452	2743773.5448
191	35+750	516832.1577	2743921.3714	35+950	516911.4481	2743731.9798
192	35+800	516865.3157	2743882.3001	36+000	516935.0919	2743689.0860
193	35+850	516896.5544	2743841.5163	36+050	516956.4663	2743645.2589
194	35+920	516936.6113	2743782.1612	36+100	516975.6692	2743600.3196
195	35+920	516951.4504	2743791.4379	36+150	516992.6020	2743554.4768
196	36+000	516992.8847	2743718.8352	36+200	517007.2224	2743507.8450
197	36+050	517015.7193	2743671.9839	36+250	517019.5019	2743460.5132
198	36+100	517036.1046	2743624.2517	36+300	517029.9623	2743412.1468
199	36+150	517054.2270	2743575.1529	36+400	517050.0012	2743314.1846
200	36+200	517069.7450	2743525.6244	36+500	517070.0379	2743216.2125
201	36+290	517091.5812	2743435.1503	36+600	517090.0746	2743118.2404
202	36+290	517072.0081	2743431.0399	36+720	517114.1177	2743000.6788
203	36+400	517094.0886	2743323.2011	36+720	517119.0163	2743001.6806
204	36+470	517108.1133	2743254.6255	36+820	517139.0530	2742903.7085
205	36+470	517113.0119	2743255.6273	36+820	517129.2558	2742901.7048
206	36+600	517139.0607	2743128.2587	36+890	517143.2815	2742833.1244
207	36+720	517163.1037	2743010.6971	36+890	517140.8322	2742832.6235
208	36+720	517153.3065	2743008.6934	36+933	517149.6202	2742790.0654
209	36+800	517169.3369	2742930.3109	36+925	517127.3990	2742794.7882
210	36+820	517173.3432	2742910.7214	36+939	517126.8316	2742779.7990
211	36+820	517183.1404	2742912.7250	36+950	517153.2124	2742773.4552
212	36+890	517197.1661	2742844.1446	37+000	517165.3507	2742723.5108
213	36+890	517199.6154	2742844.6455	37+050	517179.5167	2742674.2612
214	36+950	517211.7432	2742786.3924	37+110	517199.4643	2742615.3053
215	37+000	517223.3141	2742739.0114	37+070	517051.8020	2742612.9256
216	37+050	517236.7490	2742692.2774	37+092	517050.4920	2742582.9543
217	37+110	517255.4990	2742636.7657	37+140	517191.4316	2742580.1749
218	37+110	517274.3099	2742643.5606	37+200	517215.8649	2742522.5035
219	37+150	517288.0590	2742607.8467	37+250	517238.4516	2742475.3528
220	37+200	517306.8535	2742563.9939	37+300	517262.0563	2742430.1060

LHS				RHS		
Sl. no.	Design Chainage (Km)	Easting (m)	Northing (m)	Design Chainage (Km)	Easting (m)	Northing (m)
221	37+250	517327.5872	2742520.6832	37+350	517278.9033	2742384.4239
222	37+300	517350.0896	2742477.7142	37+400	517283.7663	2742341.6028
223	37+350	517377.9954	2742433.6023	37+410	517283.8109	2742331.2367
224	37+400	517413.2123	2742385.2568	37+430	517287.9307	2742317.0752
225	37+410	517421.7444	2742374.5311	37+450	517296.7012	2742305.0345
226	37+430	517427.4775	2742357.0232	37+460	517311.6760	2742295.6428
227	37+440	517424.1687	2742335.9469	37+475	517330.8075	2742288.5911
228	37+450	517416.5629	2742324.2047	37+500	517332.0662	2742265.7690
229	37+460	517400.6433	2742311.6255	37+530	517331.5420	2742237.4288
230	37+465	517394.4782	2742304.1302	37+530	517339.0337	2742237.0683
231	37+500	517397.0775	2742266.2722	37+600	517334.7286	2742167.7423
232	37+550	517395.3351	2742213.9415	37+650	517331.4975	2742117.8585
233	37+590	517392.7555	2742174.0167			
234	37+590	517387.7659	2742174.3399			
235	37+650	517383.8877	2742114.4651			

The co-ordinates of RoW at Junctions are given below: -

LHS				RHS		
Sl No.	Design Chainage (Km)	Easting (m)	Northing (m)	Design Chainage (Km)	Easting (m)	Northing (m)
1	27+211	508633.8413	2745913.8627	27+203	508610.8492	2745817.2952
2	27+225	508646.9867	2745905.6337	27+218	508625.6979	2745815.1701
3	27+218	508637.2890	2745891.6400	27+873	509277.3002	2745738.1064
4	27+843	509255.8929	2745803.1068	27+890	509285.9989	2745684.5278
5	27+820	509243.5045	2745871.9689	27+909	509305.8169	2745687.2201
6	27+850	509263.4145	2745873.8639	27+895	509298.6206	2745734.9948
7	27+865	509277.8444	2745799.9652	29+693	511085.3113	2745557.6512
8	30+290	511687.2270	2745610.1393	29+700	511090.7151	2745543.9342
9	30+290	511687.3202	2745633.3480	29+713	511104.6712	2745549.4321
10	30+305	511702.3201	2745633.2878	29+710	511102.8995	2745553.9294
11	30+305	511702.2278	2745610.3178	29+708	511101.5583	2745565.3475
12	30+570	511967.5522	2745613.4742	29+707	511102.9206	2745574.9167
13	30+580	511979.1885	2745642.4288	31+394	512783.0398	2745489.5715
14	30+595	511993.1066	2745636.8354	31+390	512777.7207	2745478.8632
15	30+590	511987.3181	2745622.4318	31+406	512791.1546	2745472.1902
16	31+408	512806.1315	2745536.0593	31+410	512798.4388	2745486.6215
17	31+412	512813.3101	2745550.5109	31+600	512981.6009	2745444.9416
18	31+427	512826.7440	2745543.8379	31+600	512979.0579	2745435.2722
19	31+424	512821.3896	2745533.0584	31+615	512993.5647	2745431.4570
20	31+600	512994.3181	2745493.2976	31+615	512996.1042	2745441.1135
21	31+600	512996.8619	2745502.9702	32+664	513978.5919	2745082.6448
22	31+615	513011.3686	2745499.1550	32+664	513973.2294	2745068.6360

LHS				RHS		
Sl No.	Design Chainage (Km)	Easting (m)	Northing (m)	Design Chainage (Km)	Easting (m)	Northing (m)
23	31+615	513008.8214	2745489.4695	32+680	513987.2381	2745063.2736
24	32+649	513988.5111	2745150.4496	32+680	513992.6006	2745077.2823
25	32+660	514002.2086	2745156.5634	33+817	515046.0760	2744644.7687
26	32+677	514010.1201	2745126.7909	33+832	515059.5794	2744637.3126
27	33+850	515120.4025	2744730.6332	34+150	515360.9300	2744537.4282
28	33+870	515135.0134	2744724.3835	34+166	515365.8814	2744504.1684
29	34+125	515368.2001	2744620.3063	34+175	515380.7452	2744506.3370
30	34+122	515372.8195	2744644.2314	34+166	515376.6009	2744531.4295
31	34+138	515387.4422	2744640.8884	37+097	517125.7364	2742603.9501
32	34+140	515382.4914	2744614.8357	37+125	517121.9333	2742574.1921
33	34+840	516030.5144	2744356.0667			
34	34+860	516049.2014	2744354.7273			

Annex - III

(Schedule-A)

Alignment Plans

The alignment plan of the Project Highway is available on E - Tendering portal of NHIDCL.

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

(i) The alignment of the Project Highway is enclosed in the alignment plan. The finished road level indicated in the alignment plan shall be treated as minimum with reference to OGL. The contractor shall design the road profile of the project highway in accordance with Schedule-D.

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

Annex - IV

(Schedule-A)

Environment and Forest Clearances

As per MOEF notification F. No. 21-270/2008-1A.III (dated 22 August 2013), Environmental Clearance is not required, however, Forest Clearance is required for 30.081 ha.

Schedule-B
(Highway)

Schedule - B

(See Clause 2.1)

Development of the Project Highway

1 Development of the Project Highway

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

2 Four-Laning with Paved Shoulder

Four Laning shall include construction of the 4-Lane Road and Twin tube Tunnel as described in Annex-I of Schedule-B, Schedule-B1 and in Schedule C.

3 Specifications and Standards

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

Annex - I

(Schedule-B)

Construction of Four-lane Project Highway comprises the section of National Highway No. 37 from Silchar (near Budha Nagar) at Existing km 233+00 (D. Ch. 24+560) to Jiribam at Existing km 212+060 (D. Ch. 37+650) of NH-37 (Length:13.09 km) under Pkg-2 in the State of Assam and Manipur on Hybrid Annuity Mode (HAM).

The coordinates of start and end point of project road are given below.

Co-ordinates of Start and End of Project Stretch

Location		UTM Co-Ordinate	
Description	**Design Chainage**	**Easting (m)**	**Northing (m)**
Start of Project Road	24+560	506002.2153	2746242.0177
End of Project Road	37+650	517358.9400	2742116.0810

Note: The project alignment shall be merged with Preceding & Succeeding packages as per alignment plans.

Description of the Project

1. Development of the Project Highway

The Project Highway shall generally follow the horizontal alignment shown in the plan specified in Annex - Ill of Schedule-A, unless otherwise specified by the Authority. Notwithstanding anything to the contrary contained in this Agreement or IRC: SP: 84 the proposed plan & profile, locations of different structures/drains/service & slip road/RE walls, chainages of different structures/drains/service & slip road/RE walls, length of different structures/drains/service & slip road/RE walls etc. of the project highway as indicated in the Schedule A, Schedule B, Schedule C and their Annexes shall be treated as minimum requirement. Based on site/design requirement, the Concessionaire shall finalize their Detailed Designs (Development Stage) including plan & profile of the project highway and submit the same to Authority & its Engineer for its Consent/Approval and Safety Audit by Safety Auditor, before the start of the execution of project. The designs so approved shall not be in contradiction with the scope of project. For avoidance of doubt, the provisions mentioned in schedule B & C cannot be changed, only the design of the components is to be submitted for consent/ approval.

1.1 Width of Carriageway

1.1.1 Four Laning with paved shoulders shall be undertaken. The paved carriageway shall be 18.0 m for four laning (including paved shoulder and kerb shyness/edge strip). The earthen shoulder shall be 2m on either side. (Circular: NHAI/ Bharatmala/ EC/ DPR/ 2016/ 143430) and Edge strip shall be minimum 0.6m as clause No. 2.5.3 IRC: SP:84-2019 in case of depressed median.

1.1.2 In built-up sections/areas the width of paved carriageway shall be 20.2m for four laning (including paved shoulder and kerb shyness/edge strip).

Sl. No.	Built-up stretch (Township)	Location (km)	Width (m)	Typical cross section (Ref. to Manual)
NIL				

1.1.3 Except as otherwise provided in this Agreement, the width shall be adjusted to fit into appropriate plans and cross sections developed in accordance with TCS enclosed.

1.1.4 The entire cross-sectional elements shall be accommodated in the available/proposed ROW. Consultant has to mention specifically such areas in Schedule-B). If required, suitable retaining structures shall be provided to accommodate the highway cross section within the available/ proposed ROW. The details of such sections are mentioned in Schedule-B. In case of any other section not included in Schedule-B, where retaining structures are to be provided, shall constitute a Change of Scope.

1.1.5 In addition to the width of paved carriageway mentioned in above clauses, additional lanes shall be provided as acceleration/deceleration lane and taper to the required length at entry/exit locations as per manual.

1.2 Width of Median

1.2.1 The width of median including kerb shyness shall be 5m for raised median and depressed median varying at approach to Tunnel from 5.0 m to 31.0 m as per TCS enclosed in this schedule.

1.2.2 In case of depressed median, a minimum of 0.6m width adjacent to carriageway in either direction shall be paved. In case of depressed, the metal beam (thrie beam) crash barrier shall be provided on either side of the median. In case width of median is more than 9m, no crash barrier is required to be provided in the median side. (Clause No. 2.5 IRC: SP: 84-2019 & Circular RW/NH-29023/02/2019-S&R (P&B).

1.2.3 Median shall be turfed as per clause 6.3.2 of IRC: SP: 84-2019 however, suitable paving (paver blocks, etc.) shall be proposed in case where turfed is not possible at flush median to prevent spreading of soil on carriageway (clause No. 6.3.2 IRC: SP: 84-2019). Ornamental type shrubs shall be provided in the median as per clause No. 2.5.6 of IRC: SP: 84-2019 and IRC: SP: 21:2009.

1.2.4 A suitable anti-glare measures shall be proposed at per site requirement in consultation with IE. (Clause No. 2.5.6 & 2. 5. 7 IRC: SP: 84-2019)

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. Intermediate Sight distance (Desirable Minimum Sight Distance) shall be followed for design of all vertical curves including structures as well as highways. (Clause No. 2.9.5 IRC: SP: 84-2019).

2.2 Design Speed

The project road shall be designed for 100 Kmph for plain and rolling terrain and 60 Kmph for mountainous and steep terrain. (Clause No. 2.2 IRC: SP: 84-2019). However, the contractor shall adopt minimum design speed for designing the project highway as specified in plan and profile drawings of Annex-III of Schedule A and in Annex-I of Schedule D.

2.3 Improvements of the existing road geometrics

2.3.1 The existing road geometrics shall be improved as per the codal provisions. In the sections, where improvement of the existing road geometrics to the prescribed standards is not possible, the existing road geometrics shall be improved to the extent possible within the

given right of way and appropriate road signs, pavement markings and safety measures shall be provided.

Sl. no.	Stretch (Design Chainage) Km.		Type of Deficiency	Remarks
	From	To		
NIL				

2.3.2 The entire cross-sectional elements shall be accommodated in the available/proposed ROW. If required, suitable full height retaining structures shall be provided to accommodate the highway cross section within the available/ proposed ROW. The details of such sections are mentioned in Schedule-B. In case of any other section not included in Schedule-B, where retaining structures are to be provided, shall constitute a Change of Scope.

2.3.3 Realignments: The existing road shall be improved to the standards as specified in the manual at the following locations:

Sl. No.	Existing Chainage (Km.)		Design Chainage (Km.)		Length (km.)
	From	To	From	To	
As per Annex-III of Schedule A (Plan & Profile Drawings)					

2.3.4 Bypasses / Greenfield: The existing road shall be bypassed to the standards as specified in the manual at the following locations:

Sl. No	Location	Existing Chainage (Km)		Existing Length (m)	Design Chainage (Km)		Design Length (m)
		From	To		From	To	
1	Green Field Alignment	233+000	212+060	20940	24+560	37+650	13090

2.4 Right of Way

Details of the Right of Way along Project Highways and Side Roads are given in Annex-II of Schedule-A.

2.5 Type of shoulders

2.5.1 The Design Specification of paved shoulders shall conform to the requirements specified in paragraph 5.10 of the manual.

2.5.2 Paved shoulders and strip on median side shall be of same specification and pavement composition as of main carriageway (clause No. 5. 10 IRC: SP: 84-2019).

2.5.3 The overlay on the main carriageway pavement and on the paved shoulders shall be uniform in thickness and composition. (Clause No. 5.10IRC: SP: 84-2019 - Not Applicable.

2.5.4 In Built-up sections, footpaths/fully paved shoulder shall be provided with width 1.5m / 2.5m respectively. (Clause No. 2. 15 & clause No. 2.6 IRC: SP: 84-2019) – **Not Applicable**.

2.5.5 The width of paved shoulders and earthen shoulders shall be as indicated in Annex-II of Schedule B.

2.5.6 The Design Specification of paved shoulder shall conform to the requirements specified in paragraph 5.11 of the manual.

2.5.7 The earthen shoulder shall be well graded with granular material / gravel crust stones or combination thereof, confirming to Clause 401 of MoRTH specification. (Clause No. 5. 11 IRC: SP: 84-2019).

2.5.8 The earthen shoulder of 1.0m width on median side shall be provided with top 150 mm on earthen shoulder with well graded naturals and morrum gravel crust stones thereof, confirming to Clause 401 of MoRTH specification to fix MBCB and confirm placement requirement of MBCB. (Clause No. 9.7.2(C) IRC: SP: 84-2019)

2.6 Lateral and Vertical Clearances at Underpasses

2.6.1 In case of VUP/ LVUP/ SVUP, the proposed structure, the finish road level in VUP/ LVUP/ SVUP shall be kept 150 mm above the ground level/service road/ crossroad (whichever is higher) to ensure that these VUP/ LVUP/ SVUP don't become water accumulation points. (Clause No. 2.10 IRC: SP: 84-2019)

2.6.2 The vertical and horizontal clearance at the underpasses shall be as per Clause 2.10.2 of the manual.

S. No.	Location Chainage (Km.)	Span / opening (m)	Minimum Vertical Clearance (m)	Remarks
1	27+210	1 x 7m	4	SVUP
2	29+700	1 x 7m	4	SVUP
3	30+510	1 x 24m	5.5	VUP
4	31+409	1 x 12m	4	LVUP
5	31+607	1 x 7m	4	SVUP
6	32+671	1 x 7m	4	SVUP
7	33+844	1 x 12m	4	LVUP
8	34+850	1 x 7m	4	SVUP
9	36+940	1 x 7m	4	SVUP
10	37+125	1 x 24m	5.5	VUP

**Note- Any requirement of Ground Improvement at the locations of proposed Retaining Wall / Toe Wall / High Embankment shall not be treated as COS and will be incidental to work.*

2.7 Lateral and Vertical Clearances at overpasses

2.7.1 Lateral and vertical clearances for overpasses shall be as per paragraph 2.11 of the Manual.

2.7.2 Lateral clearance: The width of the opening at the Overpasses shall be as follows:

Sl. No.	Location Chainage (Km.)	Span / opening (m)	Vertical Clearance	Remarks
NIL				

2.8 Service roads /Slip Road /Connecting Roads

2.8.1 Service Road: The height of embankment of service road shall confirm to clause 4.2.1 of IRC: SP 84-2019.

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

Sl. No.	Design Chainage (Km.)		Right Hand side (RHS)/Left Hand side (LHS)/Both side (BHS)		Paved carriageway width including shyness (m.)	Total length (m)
	From	To	LHS	RHS		
1	34+850	34+940	0.00	90	3.75	90

2.8.3 The Parking bays shall be provided along the service road (clause No. 2. 12.2.1 IRC: SP: 84-2019)

Sl. No.	Design Chainage (Km.) of Parking Bay		Remarks
	LHS Service Road	RHS Service Road	
NIL			

2.8.4 Slip Road: The height of embankment of slip road shall confirm to clause 4.2.1. (Clause No. 4.2.1 IRC: SP: 84-2019)

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

Sl. No.	Design Chainage (Km.)		Right Hand side (RHS)/Left Hand side (LHS)/Both side (BHS)		Paved carriageway width including shyness (m.)	Total length (m)
	From	To	LHS	RHS		
1	30+090	30+940	850	850	7.50	1700
2	33+440	34+200	760	760	7.50	1520
3	37+125	37+470	345	345	7.50	690

2.8.5 Separator between Main Carriageway and Service/Slip Road (clause No. 2.15.1 IRC: SP.:84-2019)

A separator between main carriageway and service/slip road shall be provided to prevent the pedestrians, local vehicles and animals entering the highway.

Note:

i. Above length of the service/slip roads is minimum specified. The actual length of the service/slip/connecting roads shall be determined by the Concessionaire / Contractor in accordance with the approved plan & profile and design approved from the Independent / Authority Engineer. Any increase/decrease up to 5 percent length from the length specified in this Clause of Schedule-B shall not constitute a Change of Scope. Any additional length shall be dealt in Change of Scope.

ii. The Acceleration, deceleration lane, right turning storage lane, entry/exit lanes shall be constructed in addition to length given in above table and shall be deemed to be part of the scope and no Change of Scope shall be considered for the same. (Clause No. 2. 12.2 IRC: SP:84-2019)

2.9 Grade Separated Structures (Clause No. 3.4 IRC: SP: 84-2019):

Grade separated structures shall be constructed as per paragraph 2.13 of the Manual. Proposed levels at structure locations as shown in plan & profile specified in Annex-III of schedule A are minimum requirement and only for guidance and any increase in levels shall not constitute any change of scope. Entry/Exit arrangement from main carriageway shall be 50m before/after the start/end of approach road to grade separator i.e. Start/end of valley curve (clause No.2.12.2.2 IRC: SP: 84-2019). RCC barrier shall start from start of valley curve and end after grade separator at end of valley curve.

The sub-structure shall be continued in the median portion with RCC barrier wherever superstructure has not been proposed in median portion. (Clause 7 .1 (vii) I RC: SP: 84-2019/ IRC: SP: 87-2019).

50m long MBCB Safety barriers on structure approaches shall be provided on all four faces of each structure. MBCB provided towards median side of each structure shall be joined on ends in semi-circular shape. (Clause No. 4.3.5 and 4.9, IRC 119)

2.5m/1.5m/0.75m wide footpaths shall be provided at grade intersection below structures for each direction of pedestrian movement (refer fig 3.1 to 3.6 IRC: SP: 84-2019).

The requisite particulars are given below:

2.9.1 Vehicle Overpass (VOP)

Sr. no.	Design Chainage (Km.)	LHS Roadway width (m)	RHS Roadway width (m)	Superstructure provision in median	Span arrangement (m)	Minimum vertical clearance	Skew angle	Remarks
NIL								

2.9.2 Vehicle Underpasses (VUP)

Sr. no.	Design Chainage (Km.)	LHS Roadway width (m)	RHS Roadway width (m)	Superstructure provision in median	Overall Span arrangement (m)	Minimum vertical clearance	Skew angle	Remarks
1	30+510	11.5	11.5	-	1 x 24	5.5	0	
2	37+125	11.5	11.5	-	1 x 24	5.5	0	

2.9.3 Light Vehicle Underpasses (LVUP)

Sr. no.	Design Chainage (Km.)	LHS Roadway width (m)	RHS Roadway width (m)	Super structure provision in median	Clear Span arrangement (m)	Minimum vertical clearance (m)	Skew angle	Remarks
1	31+409	11.5	11.5	-	1 x 12	4.0	15	
2	33+844	11.5	11.5	-	1 x 12	4.0	20	

2.9.4 Small Vehicle Underpasses (SVUP)

Sr. no.	Design Chainage (Km.)	LHS Roadway width (m)	RHS Roadway width (m)	Super structure provision in median	Clear Span arrangement (m)	Minimum vertical clearance (m)	Skew angle	Remarks
1	27+210	11.5	11.5	-	1 x 7	4.0	0	
2	29+700	11.5	11.5	-	1 x 7	4.0	0	
3	31+607	11.5	11.5	-	1 x 7	4.0	0	
4	32+671	11.5	11.5	-	1 x 7	4.0	0	
5	34+850	11.5	11.5	-	1 x 7	4.0	0	
6	36+940	11.5	11.5	-	1 x 7	4.0	0	

2.9.5 Cattle and Pedestrian underpasses

Sr. no.	Design Chainage (Km.)	LHS Roadway width (m)	RHS Roadway width (m)	Super structure provision in median	Span arrangement (m)	Minimum vertical clearance	Skew angle	Remarks
NIL								

Cattle and pedestrian underpass shall be constructed as follows: (No Clause exists IRC: SP:84-2019/ IRC: SP:87-2019)

2.9.6 Interchanges (IC) (clause No. 3.4 IRC: SP:84-2019)

Sr. no.	Design Chainage (Km.)	Name of Structure	Span arrangement (m)	Total width (m)	Typical cross section	Remarks
NIL						

2.9.7 Details of Ramps, Crossroads and Connecting Roads at Interchanges (IC)

Sr. no.	Carriageway width including Kerb shyness (m.)	Length (m)	Description of Ramps, Crossroads and connecting roads	Remarks
NIL				

2.10 Typical Cross Section (TCS) of the Project Highway (clause No. 2. 17 IRC: SP: 84-2019)

The Project Highway shall be constructed to Four lane configuration. Typical cross sections required to be developed in different sections of the Project Highway are given below.

SL No.	Design Chainage (Km.)		Length (m.)	TCS	Remarks
	From	From			
1	24+560	24+600	40	TCS 4	4 Lane Highway without Service Road in Cutting on both sides
2	24+600	24+630	30	TCS 9A	4 Lane Highway at Approach to Tunnel
3	24+630	24+830	200	TCS 9B	4 Lane Highway at Approach to Tunnel
4	24+830	25+710	880	Tunnel Section	Cross-sections shown below under Sch. B-1 (10A,10B,10C & 10D).
5	25+710	25+970	260	TCS 9A	4 Lane Highway at Approach to Tunnel
6	25+970	26+000	30	TCS 9B	4 Lane Highway at Approach to Tunnel
7	26+000	26+160	160	TCS 4	4 Lane Highway without Service Road in Cutting on both sides
8	26+160	26+390	230	TCS 1	4 Lane Highway without Service Road (Embankment Height ≤ 3m with Turfing treatment)
9	26+390	26+450	60	TCS 4	4 Lane Highway without Service Road in Cutting on both sides
10	26+450	26+860	410	TCS 5	4 Lane Highway without Service Road in Cutting with both side Breast Wall
11	26+860	27+010	150	TCS 4	4 Lane Highway without Service Road in Cutting on both sides
12	27+010	27+090	80	TCS 1	4 Lane Highway without Service Road (Embankment Height ≤ 3m with Turfing treatment)
13	27+090	27+140	50	TCS 4	4 Lane Highway without Service Road in Cutting on both sides

SL No.	Design Chainage (Km.)		Length (m.)	TCS	Remarks
	From	From			
14	27+140	27+180	40	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
15	27+180	27+260	80	TCS 1	4 Lane Highway without Service Road (Embankment Height ≤ 3m with Turfing treatment)
16	27+260	27+300	40	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
17	27+300	27+770	470	TCS-TP	Toll Plaza (As shown in Plan & Profile)
18	27+770	28+010	240	TCS 4	4 Lane Highway without Service Road in Cutting on both sides
19	28+010	28+170	160	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
20	28+170	28+250	80	TCS 1	4 Lane Highway without Service Road (Embankment Height ≤ 3m with Turfing treatment)
21	28+250	28+360	110	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
22	28+360	28+410	50	TCS 4	4 Lane Highway without Service Road in Cutting on both sides
23	28+410	28+510	100	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
24	28+510	28+580	70	TCS 4	4 Lane Highway without Service Road in Cutting on both sides
25	28+580	28+640	60	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
26	28+640	28+690	50	TCS 1	4 Lane Highway without Service Road (Embankment Height ≤ 3m with Turfing treatment)
27	28+690	28+820	130	TCS 4	4 Lane Highway without Service Road in Cutting on both sides
28	28+820	28+910	90	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
29	28+910	29+110	200	TCS 4	4 Lane Highway without Service Road in Cutting on both sides
30	29+110	29+250	140	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
31	29+250	29+430	180	TCS 1	4 Lane Highway without Service Road (Embankment Height ≤ 3m with Turfing treatment)
32	29+430	29+540	110	TCS 4	4 Lane Highway without Service Road in Cutting on both sides
33	29+540	29+890	350	TCS 2	4 Lane Highway without Service Road (Embankment Height > 3m and ≤ 6m with Geo-green on

SL No.	Design Chainage (Km.)		Length (m.)	TCS	Remarks
	From	From			
					Embankment slope)
34	29+890	29+950	60	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
35	29+950	30+020	70	TCS 2	4 Lane Highway without Service Road (Embankment Height > 3m and ≤ 6m with Geo-green on Embankment slope)
36	30+020	30+090	70	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
37	30+090	30+940	850	TCS 7	4 Lane Highway with Slip Road on both sides (at underpass approaches)
38	30+940	31+200	260	TCS 1	4 Lane Highway without Service Road (Embankment Height ≤ 3m with Turfing treatment)
39	31+200	31+750	550	TCS 2	4 Lane Highway without Service Road (Embankment Height > 3m and ≤ 6m with Geo-green on Embankment slope)
40	31+750	31+840	90	TCS 2	4 Lane Highway without Service Road (Embankment Height > 3m and ≤ 6m with Geo-green on Embankment slope)
41	31+840	31+930	90	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
42	31+930	32+010	80	TCS 1	4 Lane Highway without Service Road (Embankment Height ≤ 3m with Turfing treatment)
43	32+010	32+210	200	TCS 4	4 Lane Highway without Service Road in Cutting on both sides
44	32+210	32+270	60	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
45	32+270	32+340	70	TCS 1	4 Lane Highway without Service Road (Embankment Height ≤ 3m with Turfing treatment)
46	32+340	32+380	40	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
47	32+380	32+490	110	TCS 4	4 Lane Highway without Service Road in Cutting on both sides
48	32+490	32+550	60	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
49	32+550	32+800	250	TCS 2	4 Lane Highway without Service Road (Embankment Height > 3m and ≤ 6m with Geo-green on Embankment slope)

SL No.	Design Chainage (Km.)		Length (m.)	TCS	Remarks
	From	From			
50	32+800	33+440	640	TCS 1	4 Lane Highway without Service Road (Embankment Height ≤ 3m with Turfing treatment)
51	33+440	34+200	760	TCS 7	4 Lane Highway with Slip Road on both sides (at underpass approaches)
52	34+200	34+850	650	TCS 1	4 Lane Highway without Service Road (Embankment Height ≤ 3m with Turfing treatment)
53	34+850	34+940	90	TCS 8	4 Lane Highway with Slip Road on one side
54	34+940	35+090	150	TCS 4	4 Lane Highway without Service Road in Cutting on both sides
55	35+090	35+140	50	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
56	35+140	36+450	1310	TCS 1	4 Lane Highway without Service Road (Embankment Height ≤ 3m with Turfing treatment)
57	36+450	36+710	260	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
58	36+710	37+120	410	TCS 3	4 Lane Highway without Service Road (Embankment Height > 6m with Stone pitching on Embankment slope)
59	37+120	37+470	350	TCS 7	4 Lane Highway with Slip Road on both sides (at underpass approaches)
60	37+470	37+600	130	TCS 6	4 Lane Highway without Service Road with normal Cut and Fill
61	37+600	37+650	50	TCS 4	4 Lane Highway without Service Road in Cutting on both sides
62	Other TCS			TCS 11	4 Lane of Bridge without Service Road at deck with Footpath
63				TCS 12	4 Lane of Bridge with Service at deck with Footpath
64				TCS 13	4 Lane of SVUP/LVUP/VUP at deck
65				TCS 14	Box Culvert
66				TCS 15	Box Culvert at Depressed Median
67				TCS 16	Box Culvert with Service Road
68				TCS 17	Pipe Culvert

Note:

1. Any variations in the lengths specified in the above table shall not constitute a Change of Scope.
2. Lengths mentioned in the above list for cross section types concerned to structures

are inclusive of structure length.

3. Retaining wall/ RE wall shall be provided for full height on all structures. (Clause No. 7 .1 (iv) IRC: SP:84-2019)
4. Toe wall (0.6m ht) to be provided where ROW is restricted and water bodies along the proposed highway on the sections specified in Schedule-B.
5. Chainages may be adjusted according to location of structures as per drawings.
6. For example (The design Consultant has to mention clearly the changes from the cross section shown in the manual).
7. Carriageway width tapering shall be provided 1 in 50 as per manual Clause no 2.5.4.

   Intermediate Sight Distance (Desirable Minimum Sight Distance) shall be followed for design of all vertical curves (Summit and Valley Curves) including structures as well as highways. (Clause No.2.9.5 IRC: SP: 84-2019)
8. Provide detailing of placement and specification of Railing, Fencing and electric poles, etc. (Clause No. 2.17 IRC: SP:84-2019)

3. Intersections and Grade Separated Intersections (Section 3, IRC: SP:84-2019)

All at-grade intersections and grade separated intersections shall be as per Section 3 of the manual. Existing at-grade intersections shall be improved to the prescribed standards.

The service road pavement composition shall be continued on crossroads of the intersections for the length specified for at-grade and grade separated intersections.

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

3.1 At-grade intersections (clause No. 3.2 IRC: SP: 84-2019):

(a) Major Junctions:

Sl. No.	Design Chainage (Km)	Type of Junctions (T, Y, +)	Leads to	Median Opening	Category of crossroad	Carriage way width of crossroad	Length of crossroad to be developed	
							LHS	RHS
1	27+868	T	LHS - Makhan Nagar & RHS - Umed Nagar	No	Village Road	3.75 m	70m	55m
2	37+430	Entry/Exit Arrangement	LHS - Jiribam RHS - Silchar	No	NH-37 (Existing)	2 x 7.5m	-	135 m

(b) Minor Junctions:

Sl. No.	Design Chainage (Km)	Type of Junctions (T, Y, +)	Leads to	Median Opening	Category of crossroad	Carriageway width of crossroad	Length of crossroad to be developed	
							LHS	RHS
1	30+300 With Service Road LHS	T	LHS-Kharjan Punji	No	Village Road	3.75	35m	-
2	30+570 With Service Road LHS	Y	LHS-Kharjan Punji	No	Village Road	3.75	35m	-
3	34+140 With Service Road BHS	Y	LHS-Lakhichera RHS-Lakhinagar	No	Village Road	3.75	40m	45m
4	37+260 With SR (LHS)	T	LHS-Narandhor Basa	No	Village Road	3.75	8m	-

Note:

1. Type of Junction to be improved as per manual. (clause No. 3.2.5 IRC: SP:84-2019)
2. The contractor shall take up 'Detailed Engineering study' to ascertain further details of all intersections and treatment of the intersections shall be designed in accordance with the latest guidelines mentioned out in section-3 of the manual. Auxiliary lanes including storage, acceleration and deceleration lane along with physical islands to be provided.

   The crossroad at the junctions which are having a level difference from the main carriageway, are to be improved at the level of main carriageway for the length of 30m and then to be merged with the crossroad at the gradient not more than 1: 50. (Clause No. 3.2.2 IRC: SP: 84-2019).
3. For minor / major layout for left-in / left out arrangement with physical islands with hazard marking. Where there is space constraint to provide physical islands, the effect of junction kept wide opened can be avoided by Ghost Island with marking. (Fig 3.7, IRC: SP:84-2019)
4. For U-turn, Self-Regulated U-Turn facility shall be created. (Fig 3.6 IRC: SP: 84-2019) as per fig 3.6 of manual (IRC SP 84).

3.2 At-Grade Intersections below Grade Separators/ Interchanges: These shall be provided as given at para below of this Annex-I of the Schedule B. (Clause No. 3.4.7 of IRC: SP: 84-2019)

Sl. No.	Design Chainage (Km)	Type of Junctions (T, Y, +)	Leads to	U-Turn provision in Viaduct spans	Category of crossroad	Carriageway width of crossroad	Length of crossroad to be developed	
							LHS	RHS
1	27+210 (Under SVUP)	+	LHS - Makhan Nagar RHS - Uttar Lalpani Pt V	No	Village Road	3.75	55m	60
2	29+700 (Under	+	LHS - Makhan	No	Village Road	3.75	20m	40m

Sl. No.	Design Chainage (Km)	Type of Junctions (T, Y, +)	Leads to	U-Turn provision in Viaduct spans	Category of crossroad	Carriageway width of crossroad	Length of crossroad to be developed	
							LHS	RHS
	SVUP)		Nagar RHS - Lakhichera Road					
3	30+510 (Under VUP)	T	LHS - Kharjan Punji RHS - Digligaon	Yes	Village Road	2 x 8.0 m	-	135m
4	31+409 (Under LVUP)	+	LHS - Santipur RHS - Digligaon	No	Village Road	3.75	27m	27m
5	31+607 (Under SVUP)	+	LHS - Banadurpur RHS - Lakhichera Road	No	Village Road	3.75	22m	22m
6	32+671 (Under SVUP)	+	LHS - Banadurpur Cha Bagicha RHS - Lakhichera Road	No	Village Road	3.75	67m	27m
7	33+844 (Under LVUP)	+	LHS - Santipur RHS - Lakhinagar Ext. FV	Yes	Village Road	7	80m	80m
8	34+850 (Under SVUP)	+	LHS - Lakhichera FV Pt I RHS - Alubaja	No	Village Road	3.75	37m	100m
9	36+940 (Under SVUP)	+	LHS - Narandhor Basa RHS - Narandhor Basa	No	Village Road	3.75	21m	45m
10	37+125 (Under VUP)	T	RHS - Silchar	Yes	NH-37 (Existing)	2 x 7.5m	-	135m

Note:

1. The Concessionaire /Contractor shall take up 'Detailed Engineering study' to ascertain further details of all intersections and treatment of the intersections shall be designed in accordance with the latest guidelines mentioned out in section-3 of manual.
2. Junction improvement under grade separators shall be carried out as per manual with proper entry/exit to crossroads and slip/service roads, etc. Auxiliary lanes including storage, acceleration and deceleration lane along with physical islands to be provided.
3. The location of grade-separated structures is indicative. Exact location should be decided in consultation with Independent Engineer

4. Intersection Layout, Entry/Exit, Right Turning Lane, U-Turns, Geometric Design and Typical Cross Sections of Interchange shall be included by DPR consultant in Annexes to schedule-B.

5. Only Entry or Exit shall be designed at any location (provision of entry/exit by Ghost Island not permitted). (Clause No. 2.13.1 IRC: SP:84-2019**)**

4. Road Embankment and Cut Section

Construction of road embankment/cuttings shall conform to the Specifications and Standards given in section 4 of the manual. Notwithstanding anything to the contrary contained in this Agreement or Manual, the proposed profile of the project highway as indicated in the Annex-Ill of Schedule A shall be treated as minimum requirement.

Based on site/design requirement, the Concessionaire / Contractor shall design the alignment plans and profiles of the project highway based on site/design requirement mentioned in Schedule B with approval from the Independent Engineer/Authority Engineer within the available Right of Way. However, it is clarified that bottom of subgrade level shall be at-least 1500 mm above HFL/Existing ground level for a Greenfield/ bypass stretch.

The side slopes shall not be steeper than 2H: 1V. In case, there is a ROW constraint than, suitable soil retaining structures shall be provided. (Clause No. 4.2 IRC: SP:84-2019)

For stability of slope up to 3m height the turfing can be adapted. For the slope from 3-6m suitable, geocell, geo-grid, geo-green etc. with 1.5H: 1V slope can be provided with suitable drainage chutes as per IRC 56. For the slope more than 6m height, a complete slope stability analysis as per IRC:75 shall be done and the slopes shall be (1.5H:1V) compulsory protected with stone pitching within stone masonry grid structure of 4mx4m and suitable drains/chutes etc. shall be provided for effective drainage of the water.

Where pond ash is used for embankment construction, the embankment shall be designed and constructed in accordance with IRC: SP: 58 (Clause No. 4.2.4 & 4.4.4.i (d) IRC: SP: 84-2019)

5. Pavement Design

5.1 Pavement design shall be carried out in accordance with Section 5 of the Manual.

5.2 Type of Pavement and Design requirement (Clause No. 5.4 IRC: SP: 84-2019)

The pavement shall be flexible type for entire length of project highway except for toll plaza location and Tunnel location where rigid pavement shall be provided. Design Period and Strategy Pavement shall be constructed for the entire length of Project Highway including paved shoulders. Flexible Pavement shall be designed for a minimum design period of 20 years and minimum sub grade CBR of 6%. Whereas rigid pavement shall be designed for a minimum design period of 30 years. Stage construction shall not be permitted.

5.2.1 Recommended Pavement Design: Notwithstanding anything to the contrary contained in this Agreement or the manual, the Concessionaire / contractor shall design the pavement of main carriageway for design traffic of 40 MSA.

5.2.2 The pavement for service road/slip roads shall be designed for projected traffic 20 MSA subject to minimum as follows: (Clause No. 5.5.4 IRC: SP: 84-2019).

i. Service Roads in Built-up areas for minimum 20 MSA: Not Applicable.

ii. Slip Roads for minimum 20 MSA

iii. Service Roads in Rural Area for minimum 10 MSA

5.3 In order to meet the intended functional requirement of respective pavement layers on main carriageway, the minimum thickness of respective pavement layers for main carriageway and connecting crossroads/ service roads/ slip roads/ entry/exit locations, acceleration/ deceleration lane, right turning lanes shall, however, in no case be less than as given below:

5.3.1 Main carriageway, paved shoulder, median side paved strip, entry/exit locations, acceleration/ deceleration lane, right turning lanes (Flexible) with GSB/WMM

Pavement composition	Minimum crust thickness in mm
Subgrade	500
GSB	200
Geogrid	Biaxial
WMM	250
DBM (VG-40)	75
BC(PMB/CRMB)	40

Note: Geogrid (biaxial) as an additional layer shall be provided at original ground level after C&G in view of ground improvement due to waterlogged / low line area accorded at site.

5.3.2 Main carriageway, paved shoulder, median side paved strip, entry/exit locations, acceleration/ deceleration lane, right turning lanes (Flexible) with CTB/CTSB & Subgrade CBR 8%

Pavement composition	Minimum crust thickness in mm
Subgrade	500
CTB	165
CTSB	200
CRACK LAYER (WMM)	100
DBM	80
BC	40

5.3.3 Main carriageway, paved shoulder, median side paved strip, entry/exit locations, acceleration/ deceleration lane, right turning lanes (Rigid) -For Toll Plaza location and Tunnel.

Pavement composition	Minimum crust thickness in mm
Subgrade	500
GSB	150
DLC	150
PQC	280

5.3.4 Crossroads / service roads/ slip roads

Pavement composition	Minimum crust thickness in mm
Subgrade	500
GSB	200
WMM	250
DBM	70 for SR/CR & 95 for Slip Road
BC	40

5.4 Reconstruction of Stretches with New pavement (Clause No. 5.9.4 IRC: SP: 84-2019)

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

Sl. no	Design chainage		Pavement composition	Remarks
	From	To		
1	212+700	212+060	Flexible	
Note: Proposed locations as shown above shall be in line with plan & profile specified in Annex-III of schedule A are minimum requirement and only for guidance and any increase in length shall not constitute any change of scope.				

5.5 Bituminous Mix for Overlay (Clause No. 5.9.8 IRC: SP: 84-2019)

The following stretches of the existing road shall be provided bituminous overlay as follows.

Sl. no	Design chainage		Overlay Pavement composition	Remarks
	From	To		
NIL				

6. Roadside Drainage

6.1 Drainage system including surface and subsurface drains for the Project Highway including crossroads shall be provided as per section 6 of the manual. RCC Drain cum footpaths / PCC open Drain shall conform to the cross- sectional features and other details as given in Annexes to Schedule-B and shall be provided as under:

i) RCC Cover Drain at Tunnel:

RCC Cover Drain shall be provided at Tunnel including Portal portion as following locations.

Sl. No.	Design Chainage (Km)		Length (m)		Width Drain (m)	Total Length (m)
	From	To	LHS	RHS		
1	24+775	25+715	770	770	1.5	1540
Total			**1540**			

Note: The above locations are minimum. Additional locations, if any required as per site condition shall be provided as per manual. It shall not be treated as a change in scope of work.

ii) PCC Open Drain at Grade Separator:

PCC Open Drain shall be provided on Grade Separator at following locations.

Sl. No.	Design Chainage (Km)		Length (m)		Width Drain (m)	Total Length (m)
	From	To	LHS	RHS		
1	30+140	30+890	750	-	1.5	750
	30+160	30+890	-	730	1.5	730
2	33+490	34+150	660	660	1.5	1320
3	37+140	37+430	290	-	1.5	290
	Sub Total on each side		**1700**	**1390**		**3090**
	Total		**3090**			

Note: The above locations are minimum. Additional locations, if any required as per site condition shall be provided as per manual. It shall not be treated as a change in scope of work.

iii) PCC Open Drain at Locations from cutting to filling side:

PCC Open drain shall be provided at the following locations.

Sl. No.	Design Chainage (Km)		Length (m)		Width Drain (m)	Total Length (m)
	From	To	LHS	RHS		
1	27+020	27+080	0	60	1.3	60
2	27+090	27+105	15	0	1.3	15
3	27+330	27+480	150	0	1.3	150
4	27+340	27+430	0	90	1.3	90
5	27+570	27+765	0	195	1.3	195
6	27+795	27+850	55	0	1.3	55
7	27+935	27+965	30	0	1.3	30
8	27+995	28+015	20	0	1.3	20
9	28+860	28+905	0	45	1.3	45
10	29+110	29+150	40	0	1.3	40
11	29+420	29+435	0	15	1.3	15
12	32+190	32+205	15	0	1.3	15
13	32+200	32+230	0	30	1.3	30
14	32+475	32+505	30	0	1.3	30
15	36+400	36+460	60	0	1.3	60
16	37+140	37+430	0	290	1.3	290
	Sub Total on each side		**415**	**725**		**1140**
	Total		**1140**			

Note: The above locations are minimum. Additional locations, if any required as per site condition shall be provided as per manual. It shall not be treated as a change in scope of work. Outlet of rainwater shall be connected nearest cross drainage structures / chutes as per design and site condition.

iv) PCC Open Drain at Hill Side

PCC Open drain at Hill side section shall be provided at following locations.

Sl. No.	Design Chainage (Km)		Length (m)		Width Drain (m)	Total Length (m)
	From	To	LHS	RHS		
1	24+860	24+910	50	0	1	50
2	24+780	24+910	0	130	1	130
3	25+680	25+715	35	0	1	35
4	25+820	26+180	0	360	1	360
5	25+835	26+145	310	0	1	310
6	26+390	27+020	630	630	1	1260
7	27+080	27+140	0	60	1	60
8	27+105	27+175	70	0	1	70
9	27+260	27+340	0	80	1	80
10	27+750	27+795	45	0	1	45
11	27+765	28+010	0	245	1	245
12	27+860	27+935	75	0	1	75
13	27+965	27+995	30	0	1	30
14	28+015	28+080	65	0	1	65
15	28+110	28+175	65	0	1	65
16	28+245	28+650	0	405	1	405
17	28+360	28+405	45	0	1	45
18	28+510	28+580	70	0	1	70
19	28+685	28+825	140	0	1	140

Sl. No.	Design Chainage (Km)		Length (m)		Width Drain (m)	Total Length (m)
	From	To	LHS	RHS		
20	28+700	28+860	0	160	1	160
21	28+855	29+110	255	0	1	255
22	28+905	29+115	0	210	1	210
23	29+150	29+250	100	0	1	100
24	29+430	29+535	105	0	1	105
25	29+435	29+540	0	105	1	105
26	30+030	30+160	0	130	1	130
27	31+840	31+935	0	95	1	95
28	32+010	32+190	180	0	1	180
29	32+015	32+200	0	185	1	185
30	32+205	32+270	65	0	1	65
31	32+335	32+475	140	0	1	140
32	32+380	32+490	0	110	1	110
33	32+505	32+550	45	0	1	45
34	34+885	35+140	255	0	1	255
35	34+930	35+090	0	160	1	160
36	36+460	36+710	250	0	1	250
37	37+430	37+650	0	220	1	220
38	37+600	37+650	50	0	1	50
	Sub Total on each side		**3075**	**3285**		**6360**
	Total		**6360**			

Note: The above locations are minimum. Additional locations, if any required as per site condition shall be provided as per manual. It shall not be treated as a change in scope of work.

6.2 **Unlined Drains** other than above mentioned locations shall be provided in the entire project length which gets terminated at all crossroad locations. In case, the definite outfall is not available, a rainwater harvesting system shall be provided at the deepest location for dispersal of water.

6.3 Median Drain (Clause No. 6.3 IRC: SP: 84-2019)

Lined drain shall be provided in the center of the median at super elevation locations and depressed median. Draining of storm water from one carriageway to another carriageway is not permitted. the Concessionaire / Contractor shall design the median drain based on site / design requirement mentioned in Schedule D with approval from the Independent Engineer and shall be connected with the nearest culvert/outfall.

6.4 Drainage arrangement between Main Carriageway and Service/Slip Roads (Clause No. 2.15 IRC: SP: 84-2019)

A suitable drainage arrangement for draining storm water of main carriageway shall be provided. Storm water of main carriageway to service road is not permitted.

6.5 Drainage where Embankment Height is more than 3m (Clause No. 6.4 IRC: SP: 84-2019)

Drainage chutes shall be provided at suitable interval on embankment slopes. The drainage arrangement shall include kerb, cement concrete drainage channel at the edge roadway, Cement Concrete Chutes, CC bedding, energy dissipation basin, etc. Mountable Kerb shall

be provided beyond the post of MBCB to channelize storm water into chute. (Clause No. 6.8.2.4 of IRC: SP: 84-2019)

6.6 Drainage for Structures (Clause No. 6.8 IRC: SP: 84-2019)

A suitable drainage arrangement for draining storm water from deck slab shall be provided. Water shall not fall on any surface of the structures or remain standing or flowing over the road below structure.

6.7 Drainage for Underpass and Subways Structures (Clause No. 6.8.3 IRC: SP: 84-2019)

A suitable drainage arrangement for draining storm water from Underpass and Subways shall be provided.

6.8 Drainage arrangement of Retaining Structures (No Clause in IRC: SP: 84-2019)

Vertical Drop-down drainage pipes with suitable cleaning provision shall be provided at suitable interval. Drainage fixtures and dropdown pipes shall be of rigid, corrosion resistant material not less than 100mm dia. The Storm water of main carriageway draining on service road is not permitted.

7. Design of Structures

7.1 General

Project Highway is proposed to be constructed to Four-lane configuration. As such, superstructure of all bridges, culverts and structures is to be designed for edge movement of the vehicle considering stitching of new superstructure in future due to widening for additional lane. Special vehicle loading is to be considered in design of all bridges, culverts and structures.

All structures except wherever expansion joints have been provided, the pavement layers WMM, DBM & BC shall be continued over the structures for smooth riding quality of the project highway. These structures shall be designed considering the dead load of pavement (WMM, DBM, BC, etc.) layers.

All major structures will be designed preferably as continuous slab to reduce the number of expansion joints on the MJB/ ROBs/ flyover/ Interchange etc.

7.1.1 AII bridges, culverts and structures shall be designed for IRC class Special Vehicle (SV) loading as per IRC: 6 and constructed in accordance with section-7 of the manual and shall conform to the cross-sectional features and other details specified therein.

7.1.2 The overall width of the structures shall be as given in Para 7.3 of Annex-I of Schedule- B. (ref. Clause No. 7.3 IRC: SP: 84-2019 other than overall deck width)

7.1.3 The Safety Barrier and Footpath on Bridges and RoB shall continue on approaches. The footpath shall be provided with paved surface & railing till the embankment height is more than 3m. (Clause No. 7.17 IRC: SP: 84-2019)

Details of Structures with footpaths (Clause No. 7.2 ii IRC: SP: 84-2019)

Sl. no.	Location at Km.	Skew Angle	Footpath width (m)		Remarks
			LHS	RHS	
1	ROB @ 26+279	13º	1.5	1.5	
2	MNB @ 30+280	20º	1.5	1.5	
3	MNB @ 30+710	37º	1.5	1.5	

Sl. no.	Location at Km.	Skew Angle	Footpath width (m)		Remarks
			LHS	RHS	
4	MJB @ 31+511	20°	1.5	1.5	
5	MNB @ 33+947	0°	1.5	1.5	
6	MNB @ 34+305	45°	1.5	1.5	
7	MJB @ 36+770	17°	1.5	1.5	

7.1.4 AII bridges shall be high level bridges.

7.1.5 AII structures shall be designed to carry utility services on outer side of RCC barrier/Railing as per site requirement.

7.1.6 Cross section of the new culverts and bridges at deck level for the Project Highway shall conform to the typical cross sections 11, 12, 14, 15, 16 & 17 of Schedule-B.

7.2 Culverts (Clause No. 7.3 i IRC: SP: 84-2019)

7.2.1 Overall width of all culverts shall be equal to the roadway width of the approaches. The overall width of culverts shall be including width of main carriageway and slip/service roads/Entry ramps/Exit Ramps/ Acceleration/Deceleration lanes, etc. All culverts shall also be continued in median and in gap between main carriageway and service road.

7.2.2 New/Reconstruction of existing RCC pipe culverts: The existing culverts at the following locations shall be re-constructed as new culverts

Sl. no.	Design Chainage (km)	Culvert type	Skew angle	Span/ Opening (m)	New / Reconstruction	Culvert crossing type (Balancing /Stream etc.)	Remarks
NIL							

7.2.3 Widening of existing RCC pipe culverts (Clause No. 7.3 iii IRC: SP: 84-2019)

All existing culverts which are to be retained shall be widened to the proposed roadway width of the Project Highway as per the typical cross section given in section 7 of the Manual. Repairs and strengthening of existing structures where required shall be carried out.

Sl. no.	Design Chainage (km)	Culvert type	Skew angle	Span/ Opening (m)	Repairs Rehabilitation proposals	Culvert crossing type (Balancing/ Stream etc.)	Remarks
NIL							

7.2.4 Construction of Box Culverts:

7.2.5 New culverts (given in table below) shall be constructed for width equal to the proposed roadway width of the Project Highway & as per typical cross-section given in schedule B. The details are given as under:

Box Culverts (Clause No. 7.3 i IRC: SP: 84-2019)

Sl. no.	Design Chainage (km)	Span arrangement (m)	Skew angle	Culvert crossing type	Remarks
1	24+720	1 x 3 x 3		Balancing	
2	25+780	1 x 3 x 3		Stream	
3	26+875	1 x 2 x 2		Stream	
4	27+250	1 x 3 x 3		Balancing	
5	27+470	1 x 3 x 3		Balancing	

Sl. no.	Design Chainage (km)	Span arrangement (m)	Skew angle	Culvert crossing type	Remarks
6	27+740	1 x 3 x 3		Balancing	
7	28+095	1 x 3 x 3		Balancing	
8	28+240	1 x 4 x 4		Balancing	
9	28+670	1 x 3 x 3		Balancing	
10	29+270	1 x 3 x 3		Balancing	
11	29+360	1 x 2 x 2		Balancing	
12	29+737	1 x 4 x 4		Stream	
13	29+850	1 x 3 x 3		Balancing	
14	30+010	1 x 3 x 3		Balancing	
15	31+040	1 x 5 x 3		Balancing	
16	31+735	1 x 3 x 3		Stream	
17	31+960	1 x 3 x 3		Stream	
18	32+310	1 x 2 x 2		Balancing	
19	32+710	1 x 3 x 3		Balancing	
20	33+280	1 x 3 x 3		Balancing	
21	33+690	1 x 2 x 2		Balancing	
22	34+660	1 x 5 x 3		Stream	
23	35+220	1 x 5 x 3		Stream	
24	35+540	1 x 3 x 3		Balancing	
25	35+830	1 x 5 x 3		Balancing	
26	36+370	1 x 2 x 2		Balancing	
27	36+920	1 x 3 x 4		Stream	
28	37+590	1 x 2 x 2		Balancing	

7.2.6 Widening of existing box culverts

All existing culverts which are to be retained shall be widened to the proposed roadway width of the Project Highway as per the typical cross section given in Schedule-B. Repairs and strengthening of existing structures where required shall be carried out.

(Clause No. 7.3 iii IRC: SP: 84-2019)

Sl. no.	Design Chainage (km)	Culvert type	Skew angle	Span/ Opening (m)	Repairs Rehabilitation proposals	Culvert crossing type (Balancing/ Stream etc.)	Remarks
NIL							

7.2.7 Pipe Culverts on Crossroads:

Sl. no.	Design Chainage (km)	Span Arrangement	Type	Length of culvert (m)	Remarks
1	27+200	1x1.2	Pipe Culvert	2 x 12=24	NP-4 RCC
2	27+900	1x1.2	Pipe Culvert	2 x 12=24	
3	29+700	1x1.2	Pipe Culvert	2 x 12=24	
4	30+300	1x1.2	Pipe Culvert	1 x 12=12	
5	30+500	1x1.2	Pipe Culvert	1 x 24=24	
6	31+400	1x1.2	Pipe Culvert	2 x 12=24	
7	31+600	1x1.2	Pipe Culvert	2 x 12=24	
8	32+670	1x1.2	Pipe Culvert	2 x 12=24	
9	33+840	1x1.2	Pipe Culvert	2 x 18=36	

Sl. no.	Design Chainage (km)	Span Arrangement	Type	Length of culvert (m)	Remarks
10	34+850	1x1.2	Pipe Culvert	2 x 12=24	
11	36+940	1x1.2	Pipe Culvert	2 x 12=24	
12	37+120	1x1.2	Pipe Culvert	2 x 24=48	

7.2.8 Utility ducts in bypasses (Greenfield as well as Brownfield which is being upgraded) in form of NP-4 RCC Pipe dia 600 mm shall be provided across the Project Highway @ 0.50 km c/c and along with inspection chamber where directed for crossing of utilities anywhere as per manual (Clause 2. 16) requirements. **(Clause No. 2.16 IRC: SP:84-2019)**

Location of Utility duct

Sl. no.	Design Chainage (Km)		Remarks
	From	To	
01	24+560	37+650	The exact location of utility duct crosses the project highway shall be identified as per site condition in consultation with IE.
Total 24 numbers.			

7.3 Bridges

7.3.1 Existing bridges to be re-constructed/widened:

1. Existing bridges proposed for reconstructed as new structures: (Clause No. 7.3 iv(a) IRC: SP:84-2019)
   -NIL
2. Existing narrow bridges proposed to be retained and widened: (Clause No. 7.3 iv IRC: SP:84-2019)
   -NIL

7.3.2 **Additional New Bridges**: New bridges at the following locations on the Project Highway shall be constructed. GADs for the new bridges are attached in the drawings folder. (Ref. Clause: No. 7.3 ii IRC: SP: 84-2019 except overall deck width)

Sl. no.	Design Chainage (km)	Total proposed length (m)	Type of crossing	Total proposed width (m)		TCS	Skew angle
				MCW	SR		
Major Bridge							
1	31+511	2 x 36 (Girder)	Stream (Digli River)	2 x12.5	-	TCS-11	20º
2	36+770	3 x 36 (Girder)	Stream (Jiri river)	2 x12.5	-	TCS-11	17º
Minor Bridge							
5	30+280	1 x 40 (PSC "I" Girder)	Stream	2x11.5	2x11.0	TCS-12	20º
6	30+710	1 x 12 (Box)	Stream	2x11.5	2x11.0	TCS-12	37º
7	33+947	1 x 40 (PSC "I" Girder)	Stream	2x11.5	2x11.0	TCS-12	0º
8	34+305	1 x 10 (Box)	Stream	2x17.0	-		45º

7.3.3 The railings of existing bridges shall be replaced by crash barriers at the following locations: (Clause No. 7.17 iv IRC: SP: 84-2019)

Sl. no.	Design Chainage (Km)		Length (m)	Remarks
	From	To		
NIL				

7.3.4 The existing bridges/ RoB / Grade Separators/ RUB retained on the project highway shall be upgraded and rehabilitation measures/proposals shall be specified as follows: (Clause No.7.3 iv(b) IRC: SP:84-2019)

Sl. no.	Location (km)	Rehabilitation proposals	Remarks
		NIL	

7.3.5 Structures in marine environment: - the specific locations are to be mentioned by DPR Consultant.

-NIL

7.4 Railroad Bridges (ROB/RUB) (Clause No. 7.18 IRC: SP: 84-2019)

7.4.1 Design, construction and detailing of ROB/RUB shall be as specified in Section 7 of the manual.

7.4.2 Road over bridges (road over rail) shall be provided at the following locations, as per GAD drawings attached in the drawing folder.

Sl. no.	Design Chainage (km)	Proposed Span arrangement (m)	Type of super structure (i.e. Bow string, simply supported, composite structure etc.)	Name of crossing	Total width (m)	Skew angle	Remarks
1	26+279	4 x 36 + 1 x 20	composite structure	Kamranga - Jirighat	2 x 13.5	13^{o}	Approved GAD may be referred from RORACS portal.

Note:

If the length/width of the span/ type of super-structure is changed due to any reason the COS shall be considered.

1. ROB shall be designed, constructed and maintained as per the requirements of Railway authorities. The construction plan shall be prepared in consultation with the concerned railway authority.
2. The ROB shall be constructed and maintained by the concessionaire /Contractor under supervision of the Railway Authorities.
3. All charges payable to the Railways like D&G, Capitalized maintenance, signaling, cabling, OHE modification, earthling etc. except P&E charges shall be borne by the Concessionaire / Contractor.

7.4.3 Road under bridges (road under railway line) shall be provided at the following level crossings, as per GAD drawings attached

Sl. no.	Design Chainage (km)	Proposed Span arrangement (m)	Name of crossing	Total width (m)	Skew angle	Remarks
NIL						

7.5 Grade Separated Structures (Clause No. 7.19 IRC: SP: 84-2019)

The grade separated structures shall be provided at the locations and of the type and length specified in paragraphs 2.9, 2.10 and 3 of Annex-I of Schedule-B.

7.6 FOB / Skywalks (Clause No. 10 IRC: 103 and Clause No. 9.8.5 IRC: SP: 84-2019)

FOB / Skywalks shall be provided in buildup areas/ near schools.

-NIL

7.7 A summary of Culverts, Bridges and Structures shall be presented as follows:

Sl. no.	Name of Structures	Total numbers	Remarks
1	Major Bridge	2	
2	Minor Bridge	4	
3	ROB	1	
4	VUP	2	
5	LVUP	2	
6	SVUP	6	
7	Box Culverts	28	
8	Pipe Culverts	12	

8. Traffic Control Devices and Road Safety Works

8.1 Traffic control devices and road safety works shall be provided in accordance with Section 9 of the IRC: SP: 84

8.2 Traffic Signs:

Traffic signs shall be provided as per IRC 67 as mentioned in Schedule-C.

8.3 Pavement Marking:

Pavement markings shall be completed as per IRC 35 as mentioned in Schedule-C.

8.4 Safety Barrier:

The safety barriers shall be provided in accordance with Section-9 of the Clause 9. 7 of the manuals.

The Safety Barrier length proposed are excluding the safety barrier already proposed on Culverts, Grade Separated Structures, Interchange, Bridges, RoB and RUB as applicable cross sections respectively.

End Treatment of Steel barriers/Rope Barrier shall be specified i.e. MELT or P-4 confirming to EN 1317-4, TT, MBCB barrier to Concrete Barrier (Clause No. 9.7.2 (b) IRC: SP: 84-2019) End Treatment to Concrete barrier shall be done as specified in Clause No. 9.7.3 (b) IRC: SP: 842019.

The details of the location are as below:

Sl. no.	Item	Left		RHS		Total length (m)	Remarks
		From	To	From	To		
1	W-beam Single faced MCB barrier						
2	Thrie-beam Single faced MCB	24+600	24+860	25+680	25+810	390	
		25+720	25+830	26+190	26+400	320	
		26+160	26+400	27+140	27+260	360	
		27+030	27+100	29+530	30+040	580	
		27+170	27+330	30+160	30+860	860	
		28+180	28+360	30+970	31+850	1060	
		28+410	28+510	31+930	32+010	180	
		28+580	28+690	32+290	32+380	200	
		29+530	29+890	32+480	33+000	880	
		29+940	31+850	33+620	34+320	2610	
		32+550	33+090	34+410	34+930	1060	
		34+030	34+330	35+120	36+640	1820	
		34+540	34+890	36+690	37+470	1130	
		35+140	36+400			1260	
		36+710	37+300			590	
		37+510	37+600			90	
3	wire rope safety barrier						
4	W-beam double faced MCB						
5	Thrie-beam double faced metal crash barrier						
6	Concrete Single faced barrier						
7	Concrete double-faced barrier						
8	Pedestrian guard rail						
9	End treatment for steel barrier						

9. ROADSIDE FURNITURE

9.1 It shall be provided as per the details mentioned in Schedule-C**.**

10. Hazardous Locations

The safety barriers shall be provided at the following hazardous location such as ponds, well, electric sub-station, Electric tower, spilt carriageway, etc.

Sl. no.	Location stretch (km.)		Type of safety barrier	LHS/RHS
	From	To		
NIL				

11. Special Requirement:

As the project involves cutting existing hill slopes, it is imperative that slopes are to be stabilized for insuring longevity of the slopes and the roads. Slope stability, erosion control and landslide correction shall be accomplished in accordance with IRC: SP 48:1998, IRC: 56-2011 and manual. The contractor shall be responsible for accurate assessment of the actual requirement & prepare design for slope protection & stabilization as per manual. Cut slopes should be designed in such a manner as to keep the cutting within available RoW and protection measures like rock bolting/ soil nailing/ reinforcing, as appropriate, shall be applied

to ensure both stability and protection from erosion/ withering as per Engineering Guidelines on Landslide Mitigation Measures for Indian Roads IRC: SP-106-2015.The Contractor/ Concessionaire shall undertake detailed investigations and design of all cut/ fill slopes beyond 3m depth / height for stability. Investigations shall inter-alia include fill soil, sub-soil/ rock strata for engineering properties, faults & fractures, geological studies. Contractor shall obtain approval/ no objection from the Independent Engineer and Authority before undertaking construction.

Any increase in length will not be considered as a change of scope. Therefore, the contractor should carry out thorough investigation at site and assess the requirement of slope protection and slide prone zone and other safety features at his own before submission of bid.

Disposal of Debris: - As per Manual under clause “13.13” of section 13 (Special Requirement for Hill Road)

Retaining Structure and protection works shall be provided at locations as indicated below and as provided in TCS schedule in cl. 2.10 of schedule-B.

Sl. no.	Design chainage (km.)		Length (m)	Side	Height (m)	Retaining structure/ toe wall	Type of safety barrier	Remarks
	From	To						
1	26+450	26+860	410	BHS	6	Retaining structure	Gabion type Breast Wall	
	Total		820					

11.1 Embankment and Cut slope Protection works

a) Embankment slope protection shall be provided as per requirement of the site as per Manual, however, minimum 30666 sqm turfing on filling side,

b) 64232 sqm erosion control on filling side (using geo-green) however, keeping in view sustainability, the geo-green blanket with vegetation should have minimum 7.5 kn/m MD and should be certified by at least Central Government Organization and product has minimum 5-7 years product performance certificate by MORT&H.

c) 17674 Sqm stone pitching for slope protection above 6m high embankment

d) Cut Slope treatment of 116466 sqm by non-woven coir erosion control blanket/DT Mesh for Face 2.7/3.7mm dia. wire, ZN+PVC with vegetation.

Note:

Before placement of support system at site, the slopes shall be stripped to remove the excess debris / hanging boulders, stones, muck, shrubs etc. and site specific best possible smooth surface shall be prepared. The support system shall be laced on this smooth surface

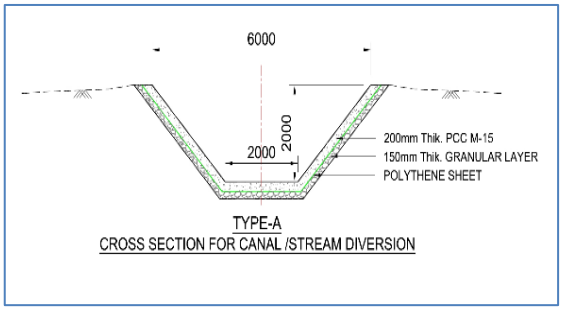
The locations and quantity of various protection works specified in this clause is tentative and minimum specified. The contractor shall be responsible for accurate assessment of slope protection & stabilization measures as per schedule D. Any change in location, increase in quantity, change in specifications or change in type of protection work shall not constitute a Change of Scope.

11.2 Diversion of nallah

Diversion of Nallah shall be constructed at the following locations.

Sl. No.	Chainage		Stream	Length (m)	Remarks	Side
	From	To				
1	33+947		NALA	60	Type A	RHS
2	34+300		NALA	60	Type A	Across
3	34+680	34+790	NALA	110	Type A	RHS
		Subtotal		**230**		

Note:



The actual cross-section of canal/ stream to be shifted and extent of such shifting (length) shall be determined by the Contractor as per the site/ design requirement with approval of concerned irrigation authority / Authority's Engineer. Any variation in the cross-section and length specified in this Clause of Schedule-B shall not constitute a Change of Scope, save and except any variations in the length arising out of a Change of Scope expressly undertaken in accordance with the provisions of Article 16.

12. Open Well within RoW

The Open well shall be identified, and appropriate treatment shall be provided.

Sl. no.	Design Chainage (km)	Well dimension (m)	Well depth (m)	Filling material for well	Slab on top of well Yes/ No	Remarks
NIL						

13. Emergency Crossover

Emergency crossovers shall be provided in accordance with Manual.

14. Shifting of Utilities

The Concessionaire / contractor shall undertake the work of shifting of any utility (including electric lines, water pipes, gas pipelines and telephone cables) to an appropriate location or alignment, in accordance with the provisions of Concession Agreement. Shifting of obstructing existing utilities indicated in Schedule A to an appropriate location in accordance with the standards and specifications of concerned Utility Owning Department is part of the scope of work of the Concessionaire / Contractor. The bidders may visit the site and assess the quantum of shifting of utilities for the projects before submission of their bid. The specifications of concerned Utility Owning Department shall be applicable and followed.

Note-I:

(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 the utility owning department. The assistance of the Authority is limited to forwarding letter on the proposal of

Contractor to utility owning department whenever asked by the Contractor. The decision/ approval of the 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 later.

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

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

Note II: - Copy of Utility shifting plan enclosed.

14.1 Details of proposed Utilities Schedules

Utilities details are given below under specific items.

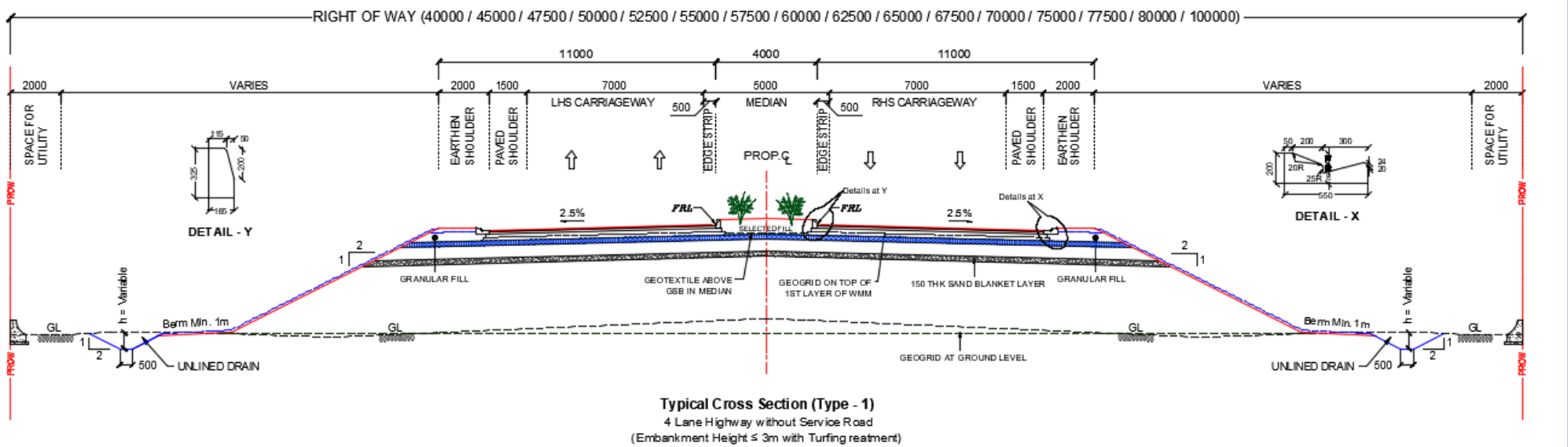
Sr. No.	Type of Utility	Unit	Quantity	Location/stretch (LHS/RHS)
A	**Electrical Utilities**			
A1	Electrical Poles (with Appraisal)	Nos.	195	BHS
A2	LT / 11KV / 440V Length	Km	10	BHS
A3	Transformer 25 KVA / 63 KVA / 100 KVA	Nos.	04	BHS
A4	HT location	Nos.	12 nos.	BHS
B	**Water/Sewage pipeline**	Km	1.5	BHS
B1	Water supply (Different dia. and Specification)	Km	1.5	
C	**Felling of Tress**	Nos.	10000	BHS

Note: Above quantities are excluding EHT (400 KV & 132 KV) towers of PGCIL & AEGCL.

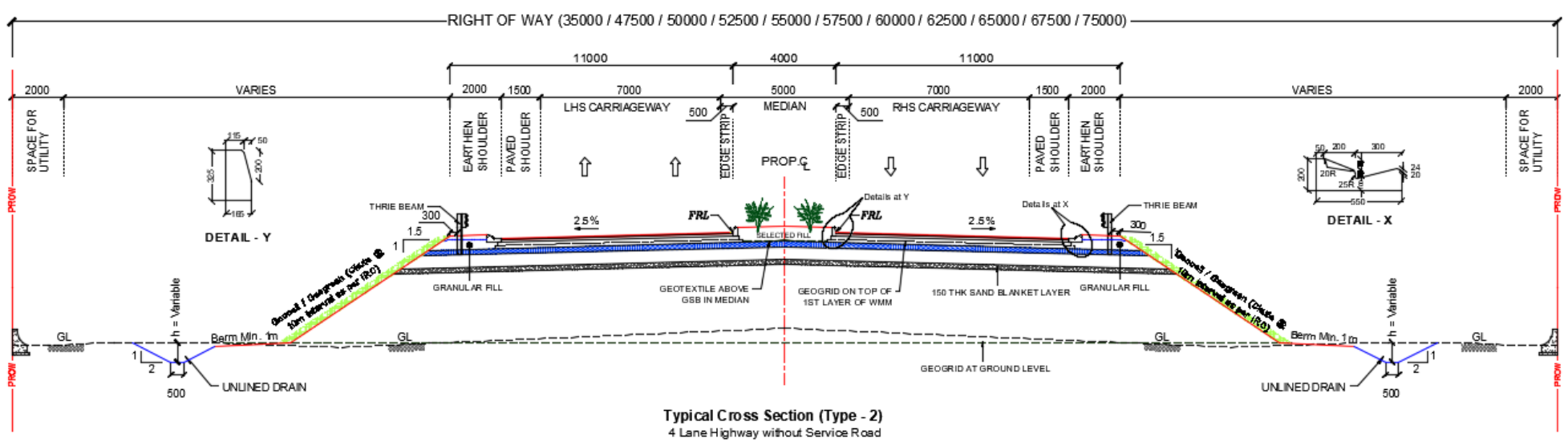
15. Work Zone Traffic Management Plans (Clause No. 7.19 IRC: SP:84-2019) Annex-II Schedule B- Typical Cross Sections

The traffic diversion plans shall be prepared as per IRC SP 55 for smooth flow of traffic and safety. A diversion plan shall be proposed for construction of Culvert, Grade Separated Structures, Bridges, RoB/RUB, etc. and traffic management plan for widening/ reconstruction of carriageway.

16. TYPICAL CROSS-SECTIONS: As enclosed below,



4-Lane Highway without Service Road (Embankment Height ≤ 3m with Turfing treatment) (TCS-1)

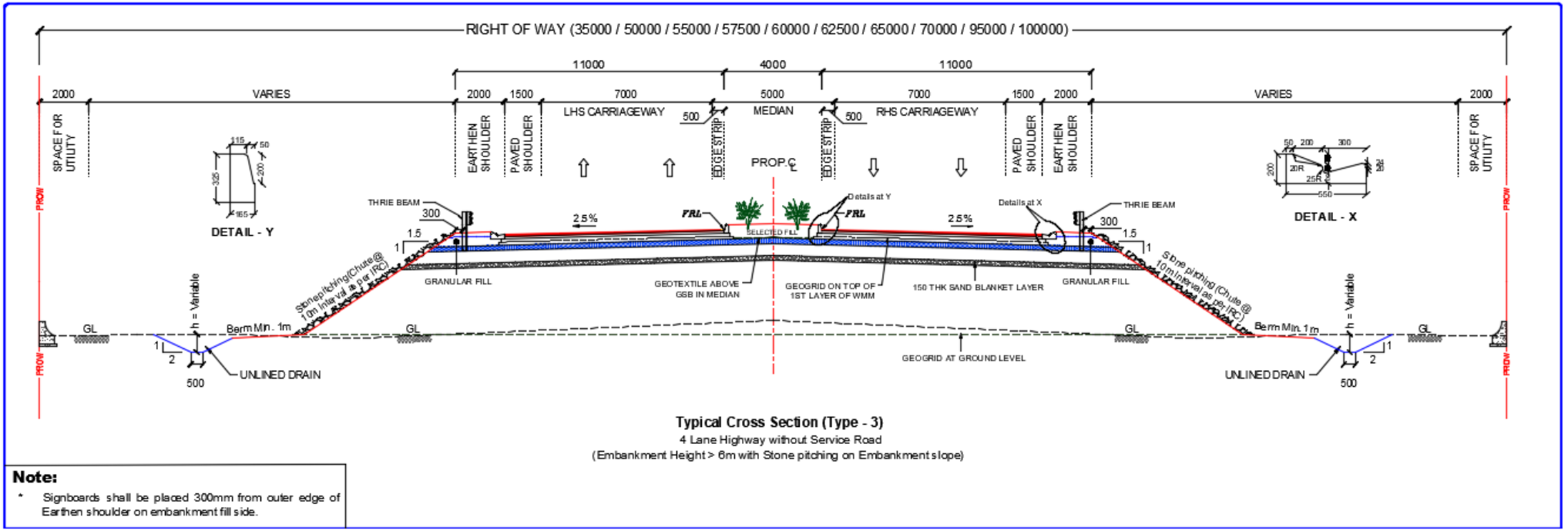


Typical Cross Section (Type - 2)
4 Lane Highway without Service Road
(Embankment Height > 3m and ≤ 6m with Geo-green on Embankment slope)

Note:

* Signboards shall be placed 300mm from outer edge of Earthen shoulder on embankment fill side.

4-Lane Highway without Service Road (Embankment Height > 3m and ≤ 6m with Geocell/ Geo-green on Embankment slope) (TCS-2)



Typical Cross Section (Type - 3)

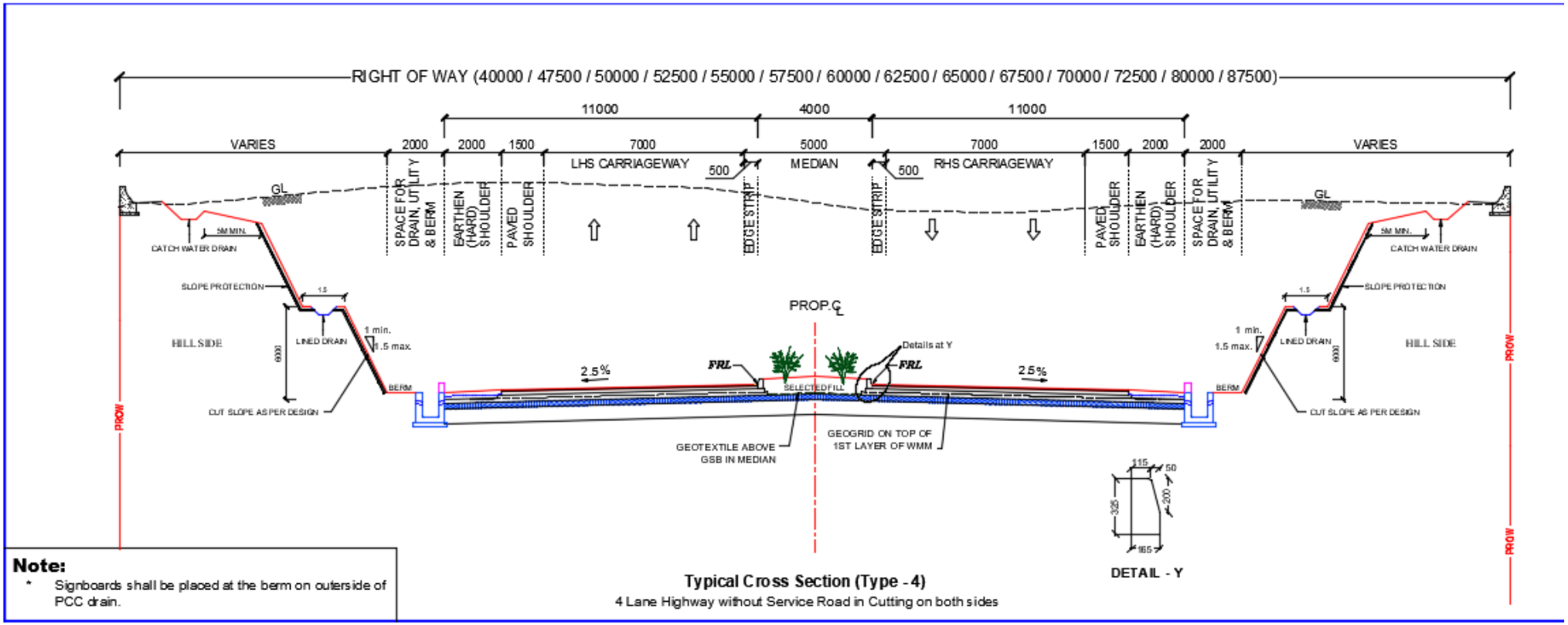
4 Lane Highway without Service Road

(Embankment Height > 6m with Stone pitching on Embankment slope)

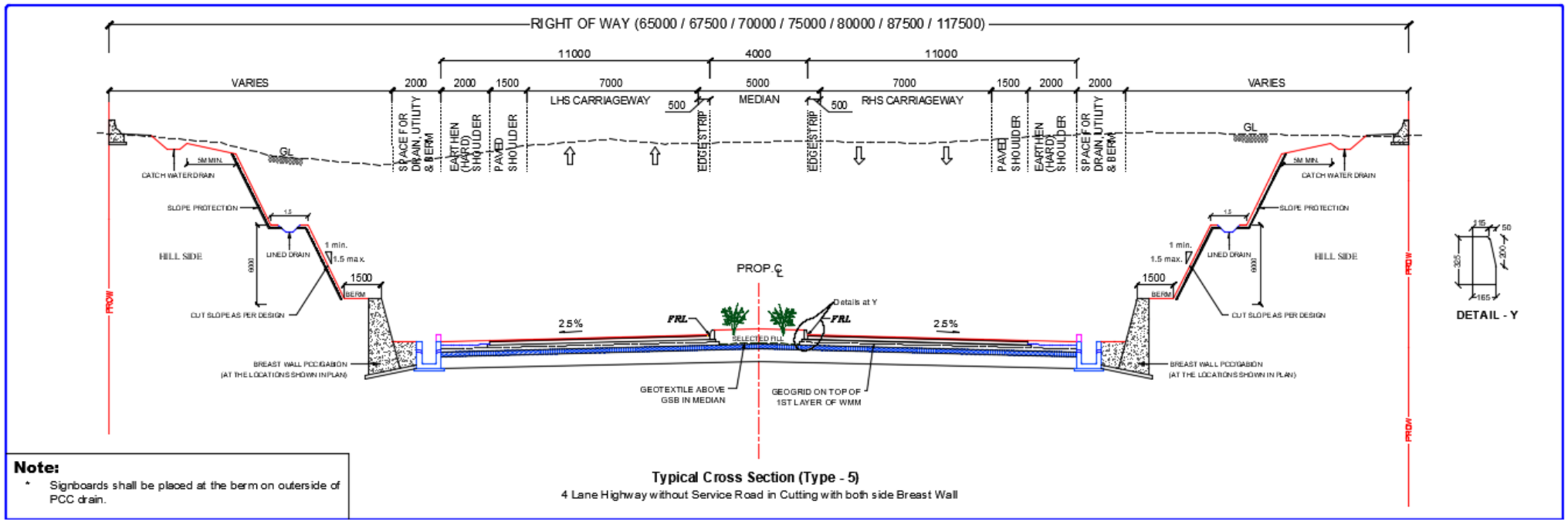
Note:

* Signboards shall be placed 300mm from outer edge of Earthen shoulder on embankment fill side.

4-Lane Highway without Service Road (Embankment Height > 6m with Stone pitching on Embankment slope) (TCS-3)



4-Lane Highway without Service Road in Cutting on both sides (TCS-4)



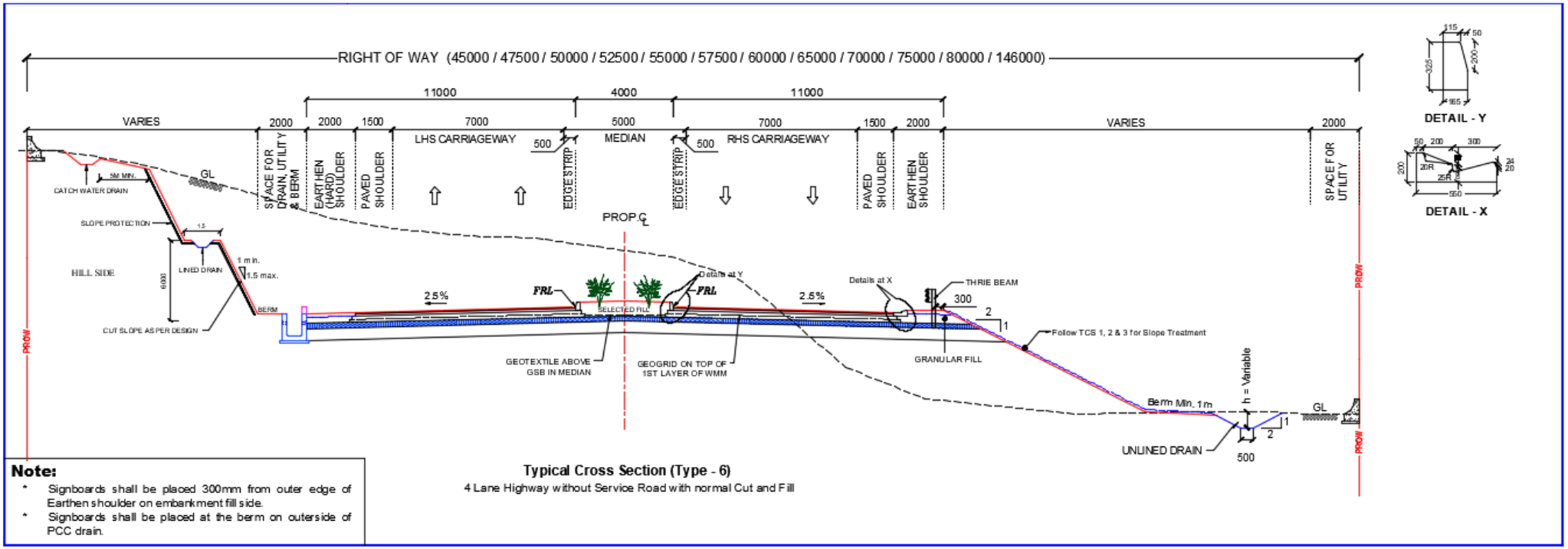
Note:

* Signboards shall be placed at the berm on outerside of PCC drain.

Typical Cross Section (Type - 5)

4 Lane Highway without Service Road in Cutting with both side Breast Wall

4-Lane Highway without Service Road in Cutting with both side Breast Wall (TCS-5)



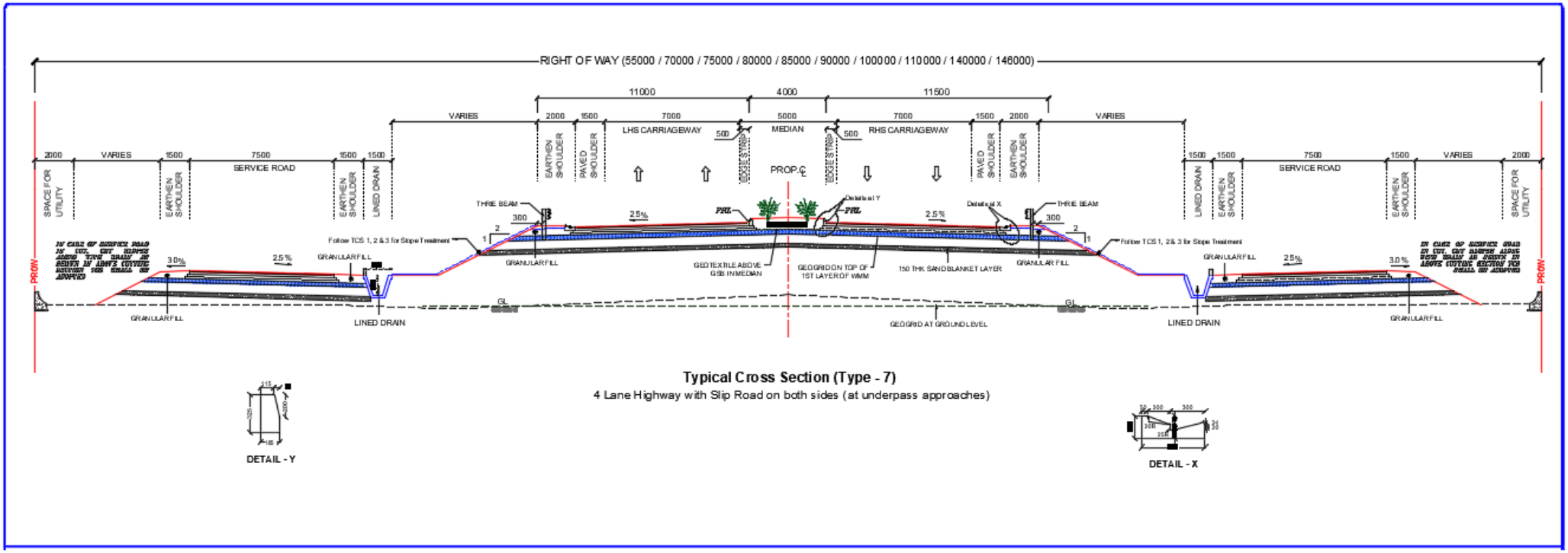
Note:

* Signboards shall be placed 300mm from outer edge of Earthen shoulder on embankment fill side.
* Signboards shall be placed at the berm on outerside of PCC drain.

Typical Cross Section (Type - 6)

4 Lane Highway without Service Road with normal Cut and Fill

4-Lane Highway without Service Road with normal Cut and Fill (TCS-6)

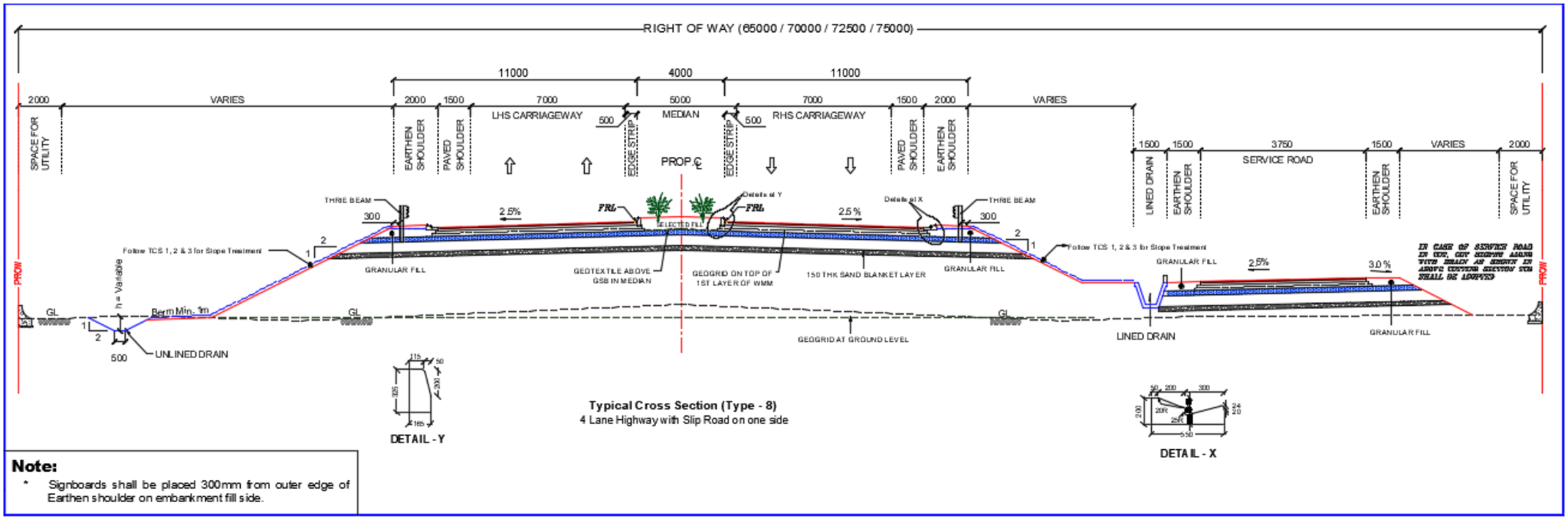


Typical Cross Section (Type - 7)

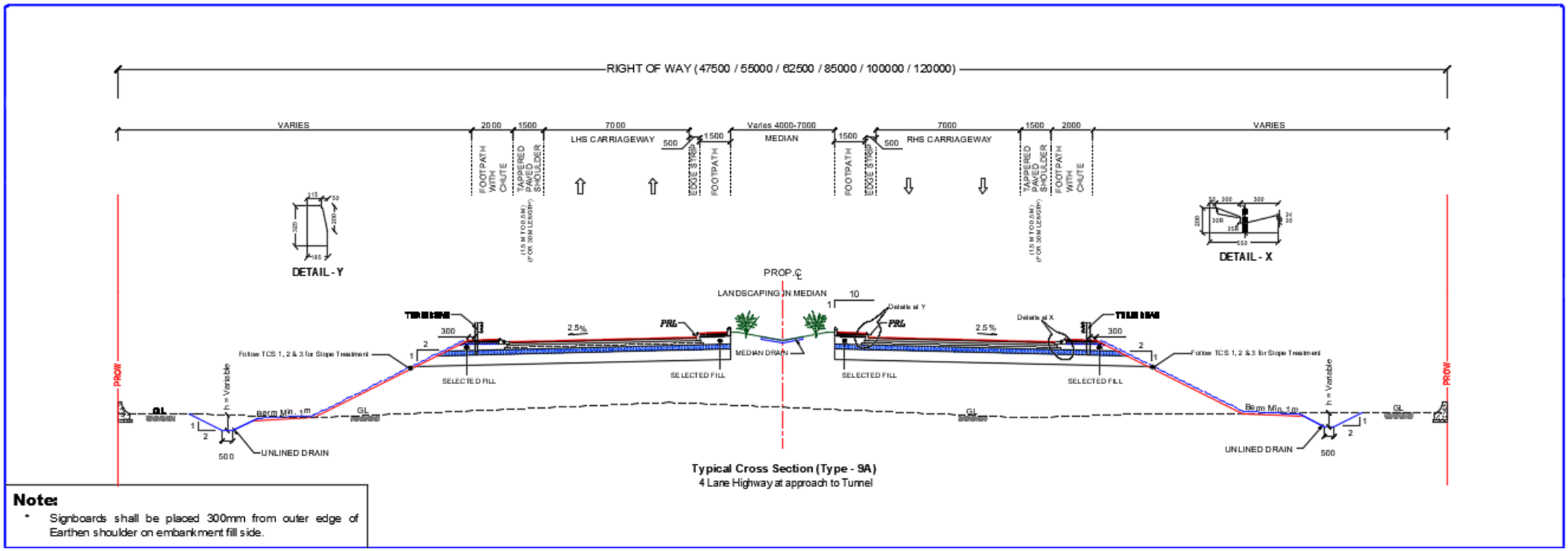
4 Lane Highway with Slip Road on both sides (at underpass approaches)

4-Lane Highway with Slip Road on both sides (TCS-7)

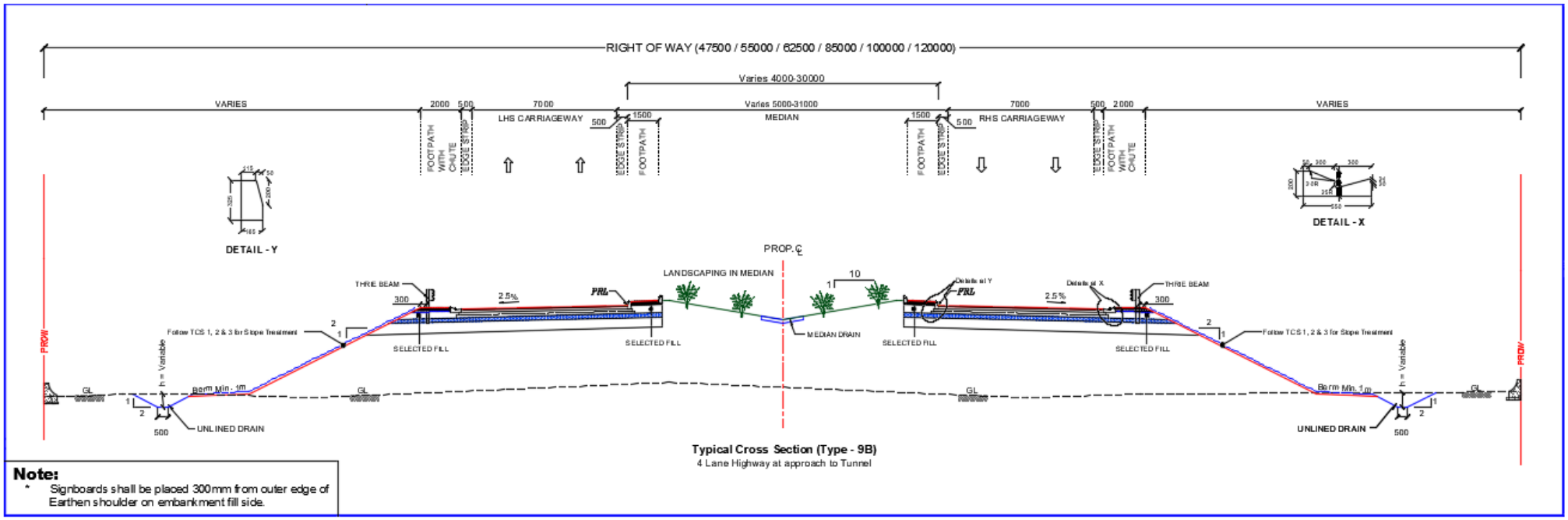
(at Underpass Approaches)



4-Lane Highway with Slip Road on one side (TCS-8)



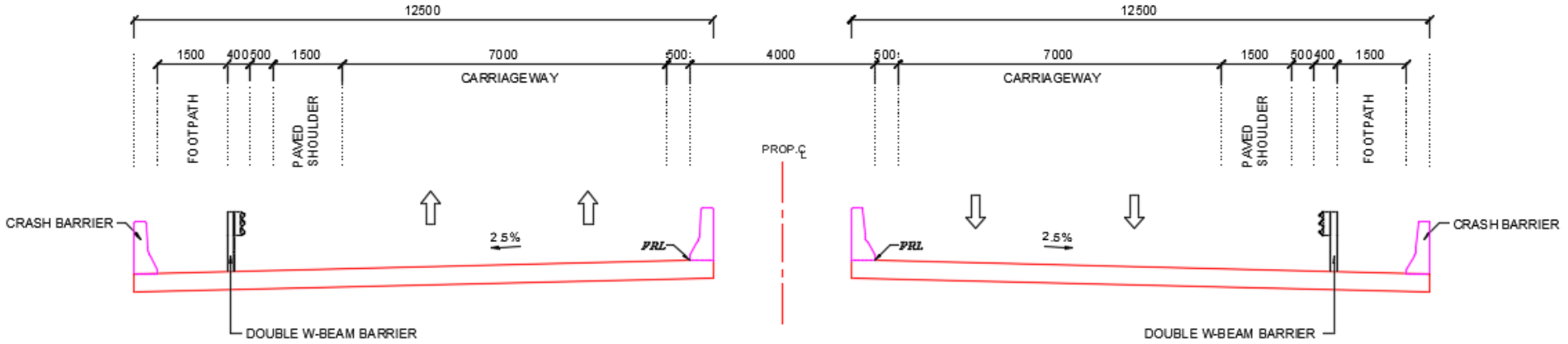
4-Lane Highway at Approach to Tunnel (TCS-9A)



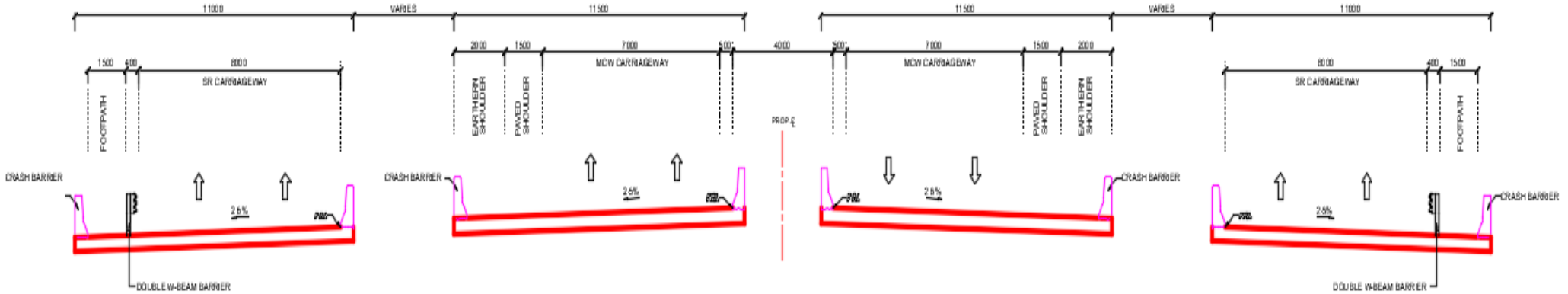
Typical Cross Section (Type - 9B)
4 Lane Highway at approach to Tunnel

Note:
* Signboards shall be placed 300mm from outer edge of Earthen shoulder on embankment fill side.

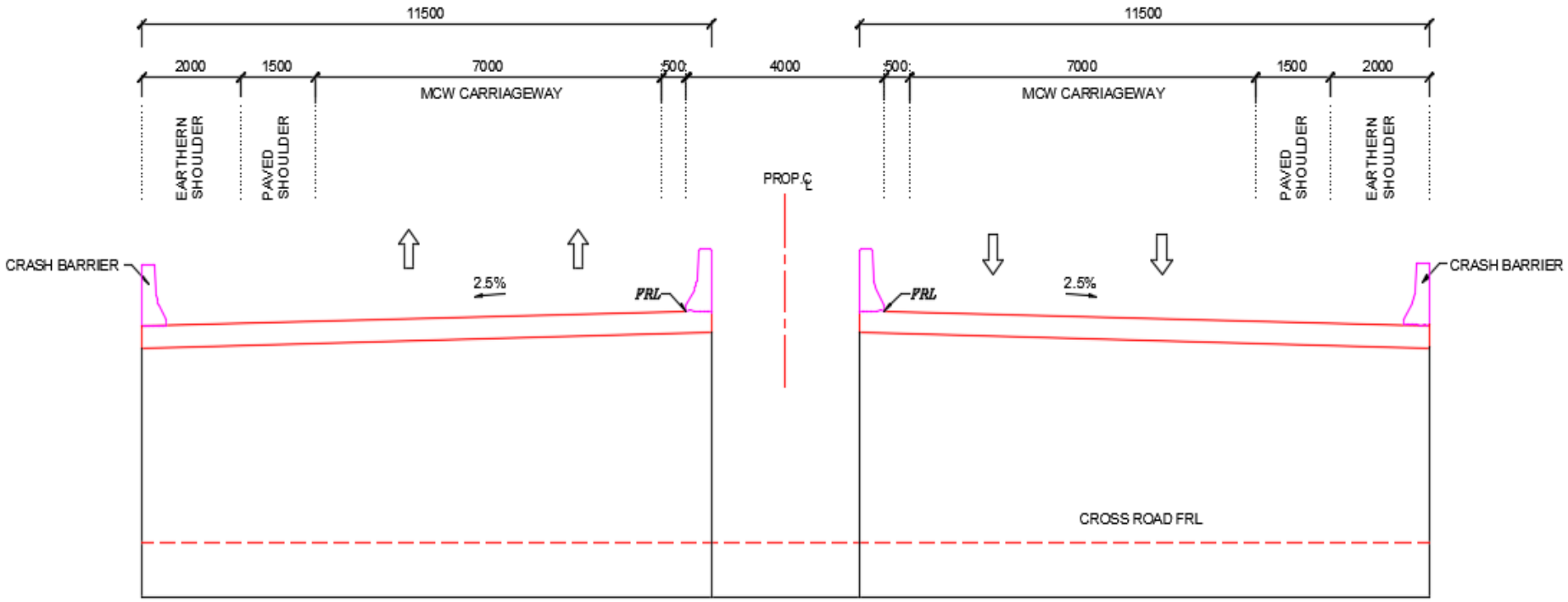
4-Lane Highway at Approach to Tunnel (TCS-9B)



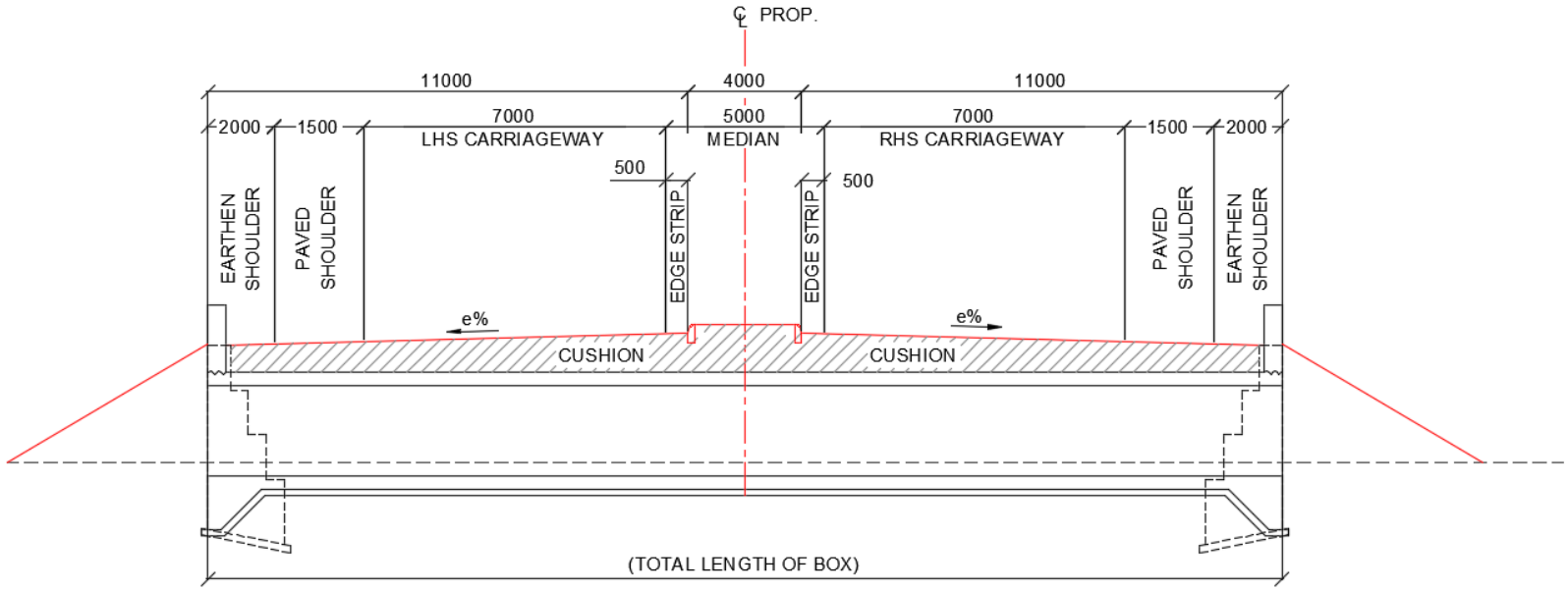
4-Lane of Bridge without Service Road at deck with Footpath (TCS-11)



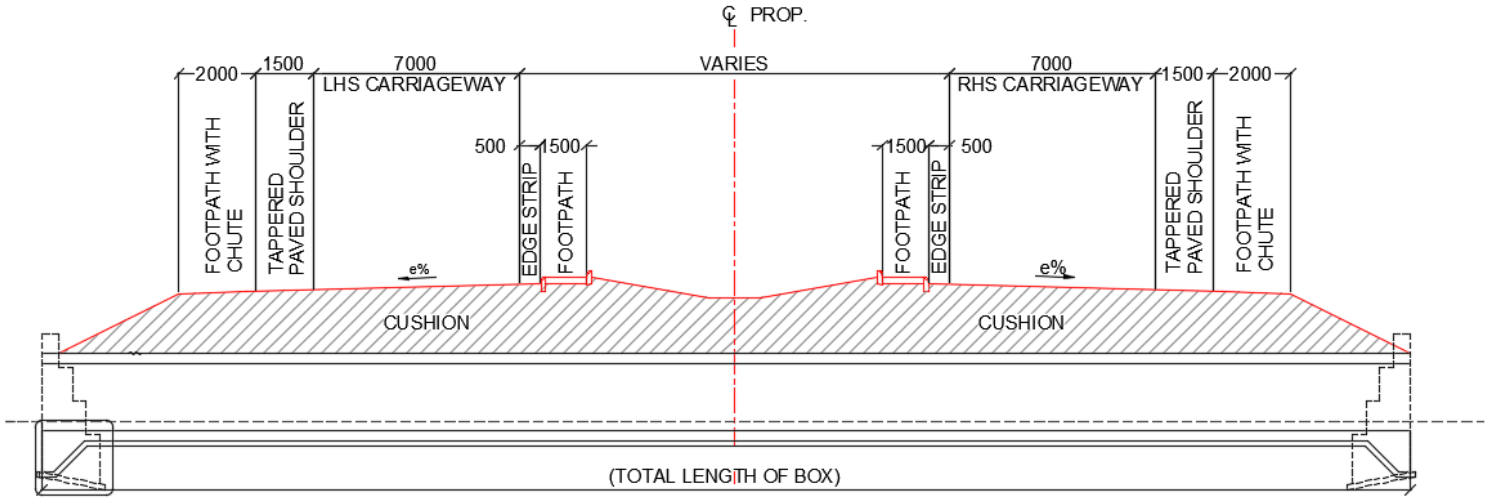
4-Lane of Bridge with Slip Road at deck with Footpath (TCS-12)



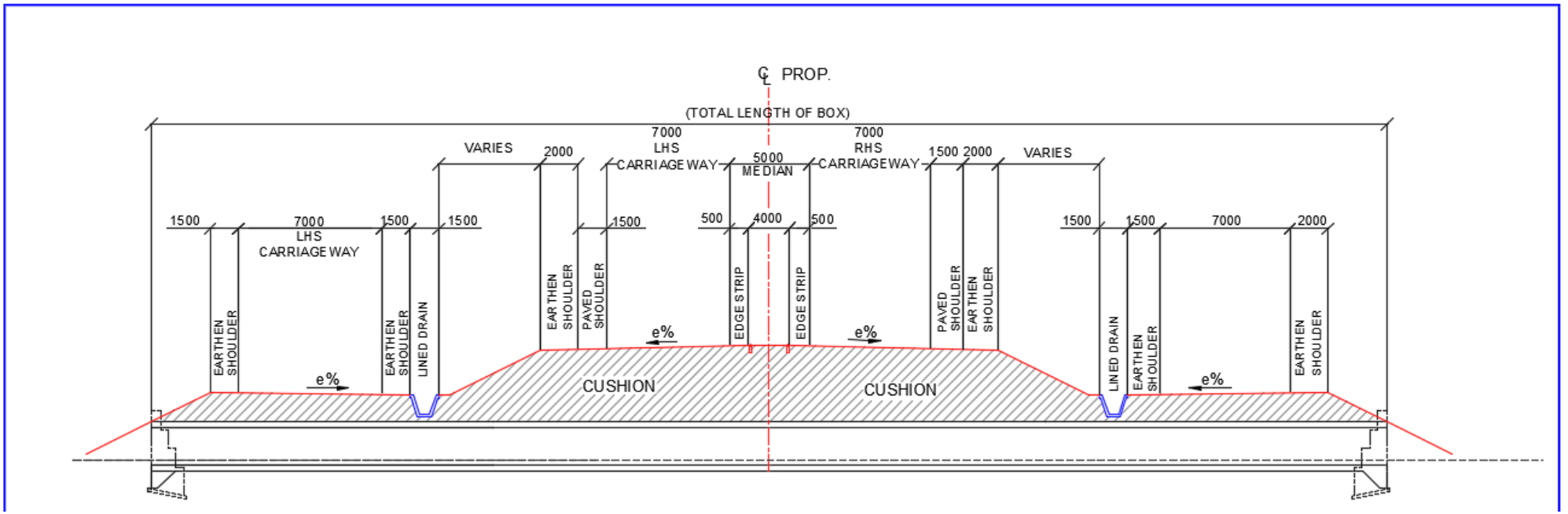
4-Lane of SVUP/LVUP/VUP at deck (TCS-13)



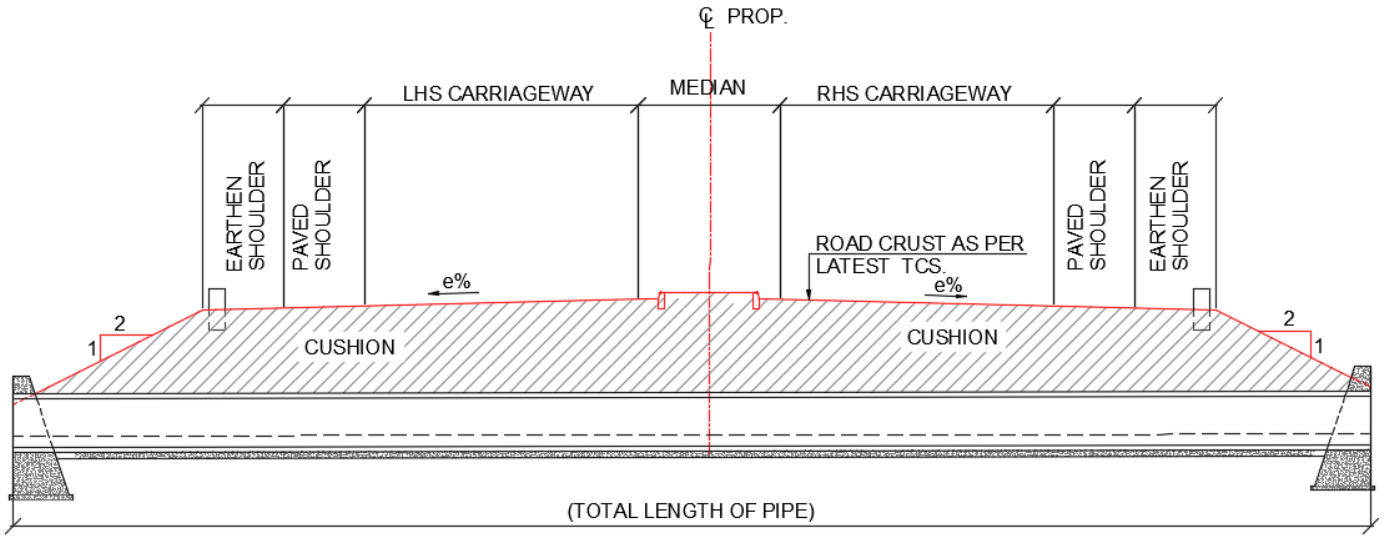
Box Culvert (TCS-14)



Box Culvert at depressed Median (TCS-15)

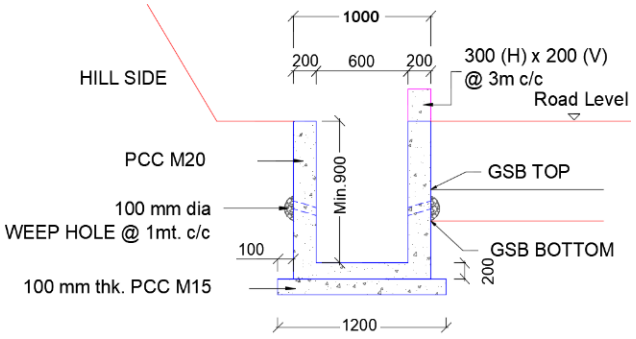


Box Culvert with Service Road (TCS-16)

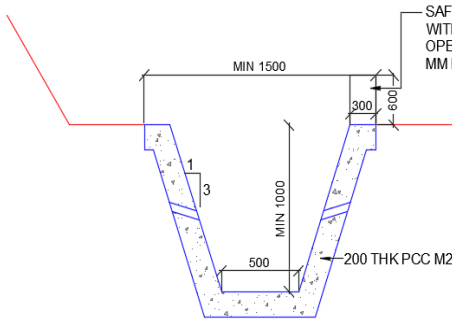


Pipe **Culvert**

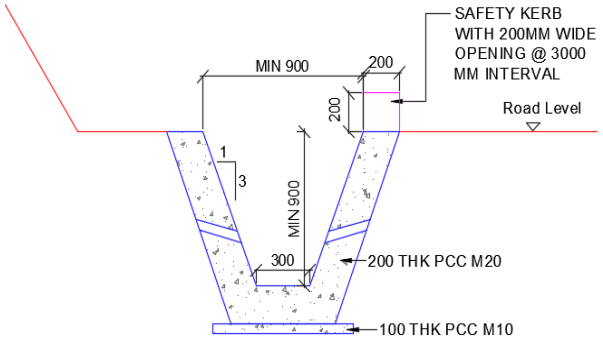
(TCS-17)



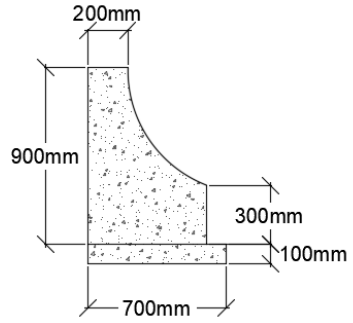
a. PCC Open Drain Hill Side



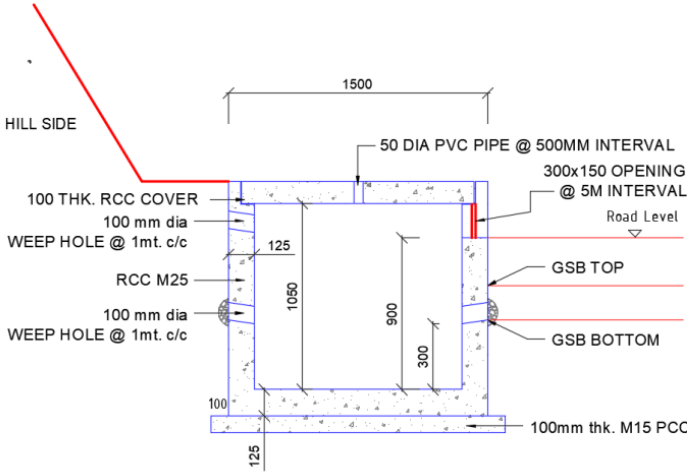
b. PCC Open Drain at Grade separator Sic



c. PCC Open Drain at Other



Road Boundary Wall



RCC Cover Drain

Schedule-B1
(Tunnel)

TECHNICAL SCHEDULE – B1 (TUNNEL)

(*Technical Schedule shall read in Conjunction with Technical Specification report, Vol-V: part of Tunnel DPR Report*)

1. Tunnel

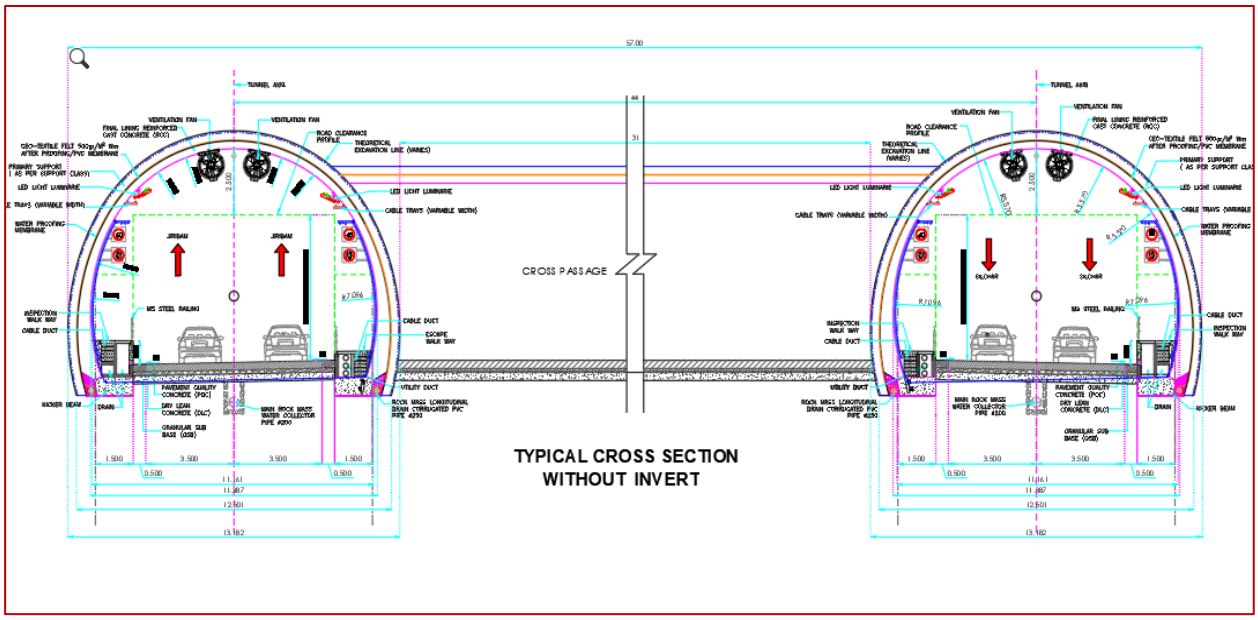
The Tunnel has been proposed to be of twin tube (2-lane unidirectional configuration, as per GAD enclosed. The tunnels shall be connected by one cross passage at 30° at spacing of 375m center to center to facilitate traffic diversion in the event of emergency, in accordance with IRC SP: 91:2019. Other tunnel ancillary works including drainage, waterproofing, ventilation, tunnel illumination including electrical sub-station on west side" portals, furnishing, signages, emergency facilities, etc. shall be provided as specified in IRC: SP:87-2019, IRCSP:91:2019 and specifications as per Schedule–D. Tunnel section GADs are depicted below. The Contractor shall undertake detailed investigations and carryout design of tunnels in accordance with the specifications stipulated under Schedule D. Pertinent details of tunnels are specified below.

Sl. No	Chainage	Length	Carriageway	Remarks
1	Unidirectional Twin Tube Tunnel Tube 1(LHS) Ch. 24+910 to Ch.25+666	756m	Carriageway-7.0m+ Edge strip 0.5m + Footpath (Inspection walkway) cum drain 1.5m+ 1.5 footpath cum utility duct (Escape pathway) (Rigid Pavement)	Inlet Portal Excavation 80m and Outlet portal Excavation 51.00m Rigid Pavement composition within the Tunnel portion Tube 1 PQC – 280 mm DLC=150mm GSB=150mm
2	Unidirectional Twin Tube 2 (RHS) Ch. 24+880 to Ch.25+656	776	Carriageway-7.0m+ Edge strip 0.5m + Footpath (Inspection walkway) cum drain 1.5m+ 1.5 footpath cum utility duct (Escape pathway) (Rigid Pavement)	Inlet Portal excavation 41.50m and Outlet portal 45.0m Rigid Pavement composition within the Tunnel portion Tube 1 PQC – 280 mm DLC=150mm GSB=150mm
3	Cross Passage Connecting both tubes at 30-degree angle	63.0m	(1.0 Footpath +5.0m carriage way (Rigid Pavement)	Rigid Pavement composition within the Tunnel portion Tube 1 PQC – 280 mm DLC=150mm GSB=150mm

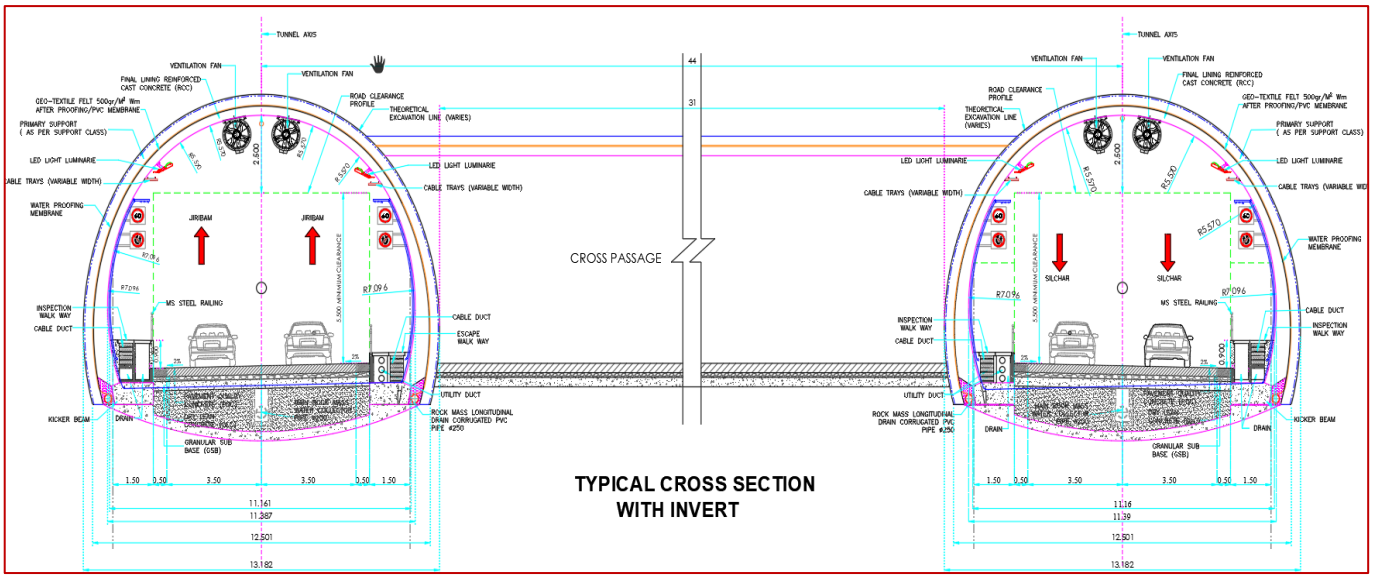
Note: The length of tunnels specified hereinabove shall be treated as an approximate assessment. The actual lengths as required on the basis of detailed investigations shall be determined by the Contractor in accordance with the Specifications and Standards. Any variations in the lengths specified in this Schedule- B shall not constitute a Change of Scope

The initial support recommendation as per the above-mentioned properties is given below,

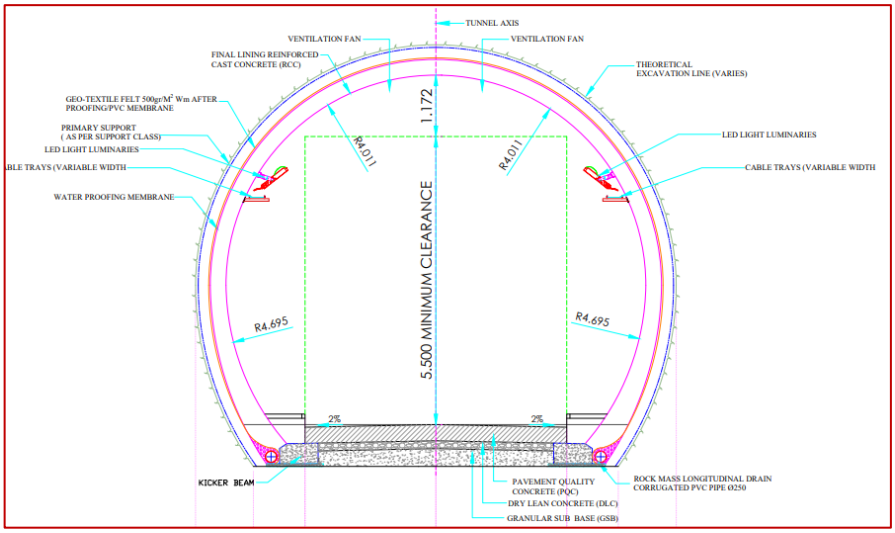
SUPPORT RECOMMENDATIONS											
S.no	Support Class	Shotcrete (mm)	Wire-mesh		Rock Bolt			Steel Rib		Pre support	
			Layer	No	Dia (mm)	L (m)	Spacing (m)	Type	Spacing	Type (mm)	Spacing (m)
1	***SC 03***	150	100x100 x6	1	25(SN)	4	2.5	-	-	-	-
2	***SC 04***	150	100x100 x6	1	25(SN)	6	2	LG#50-16-20	1.0 m	-	-
3	***SC 05***	250	100x100 x6	2	32(SDA)	6	1.5	ISMB 200	1.0 m	76	0.3
4	***SC 05A***	300	100x100 x6	2	32(SDA)	6	1.5	ISMB 250	1.0 m	114	0.3



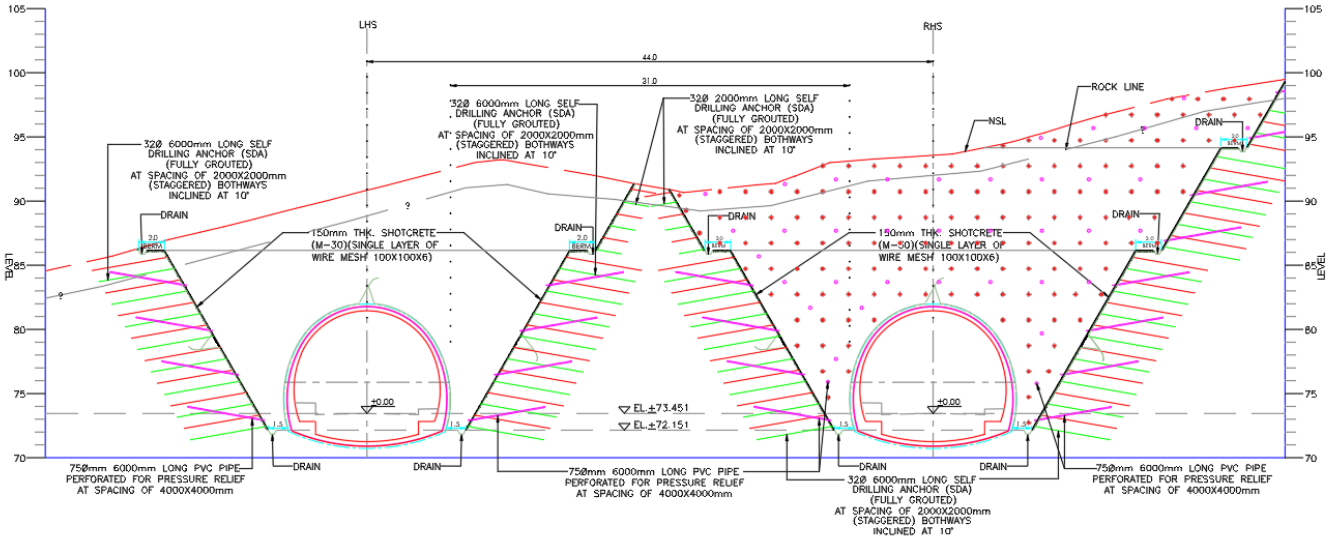
Typical Cross Section of Twin Tube Tunnel with Invert (TCS-10A)



Typical Cross Section of Twin Tube Tunnel without Invert (TCS-10B)



Typical Cross Section of Twin Tube Tunnel Cross Passage GAD (TCS-10C)



Typical Cross Section of Twin Tube Tunnel Portal (TCS-10D)

a) Functional/Safety Requirements Based on Length of Tunnels

Classification of Tunnel	Double Tube Uni-Directional				
	CP	Vent	Light	Comm	Fire Safety
Medium tunnel 500-1500 m	Yes	Yes	Yes	Yes	Yes

- Fire safety -Fire hydrant at spacing of 50 m
- Communication -Telephone spacing at 100 m
- Lighting -Tunnels Lighting as IRC: SP-91-2019
- Cross Passage -One Cross passage provided at 375m

b) Tunnel Ventilation System:

The ventilation system chosen is longitudinal ventilation with Jet Fans. 16 Nos (14 Working and 2 Standby) Jet in each tube. (780 N Thrust). Fresh air demand can be provided to the tunnel without exceeding the maximum airspeed in tunnel (10 m/s according to RVS 09.02.31).

- Fire thermal power of 50 MW.
- The defining parameter here is the fire power, that depends on inflammable goods, fuels, vehicle fire etc. that will be transported through the tunnels.
- 70% light vehicles (35% petrol, 35% diesel), and 30 % heavy vehicles (trucks, busses,)
- Twin tube unidirectional tunnels having 2 lanes for each direction.

The longitudinal (Jet) fans need to comply with fire rating (250°C - 2 hrs./400 °C - 2 hrs) in accordance with design of the tunnel

c) Fire Fighting Systems

Fire Suppression Systems with the goal to reduce the fire HRR by sufficient application of water, e.g., Deluge system with adequate water storage inside/ outside tunnel.

i) **The standpipe system for firefighting** shall be a Class – I" automatic Wet" typesystem. It contains water at all times that is attached to a water supply capable ofsupplying the system demand at all times and that requires no action other thanopening a loose valve to provide water at loose connections. The 150 mm main waterline shall be laid on one side of the walkway of tunnel wherein standpipe system shallbe installed at an interval of 50 m. The required flow rate for the standpipe system shall be 1892 l/minute. It shall be connected to a reliable water supply storage tank which is capable of supplying the system demand for a minimum of 1 hour.

ii) **Water Mist System** Fire Suppression Water mist fixed firefighting systems are meant for fire suppression. Mist Systems are able to control/suppress even large HGV fires, but they are not meant to extinguish the fire as this is done by the fire services. However, the systems are capable of encapsulate fires and limit temperatures so that working conditions for fire services are safer. The Mist System will have its own piping and pump arrangement inside the tunnel. The system shall be designed in compliance with NFPA 502 (Standard for Road Tunnels, Bridges, and Other Limited Access Highways).

d) Tunnel lighting system

The lighting system shall be calculated from the Guide for Lighting Road Tunnels and Underpasses CIE 88/2004. Also, the Guidelines for Road Tunnels IRC: SP:91-2019 will be taken into account.

Access Zone: The part of the open road immediately outside (in front of) the tunnel portal, covering the distance over which an approaching driver must be able to see intothe tunnel. The access zone begins at the stopping distance point ahead of the portal.

Threshold Zone: The first part of the tunnel, directly after entering the portal. The totallength of the threshold zone must be at least equal to the stopping distance. Over the firsthalf of the distance, the luminance level must be equal to Lth_1- 190 cd/m². It is recommended that from half the stopping distance onwards the lighting level may gradually and linearly decrease to a value, at the end of the threshold zone, equal to 0.4 In Threshold-2 length, luminance will be reducing continuously from 190 to 76cd/m² in Tubes -1&2 over a length of approx.50 m.

Transition Zone: A zone of diminished light level downstream of the threshold zone toenable gradual adaptation to the interior tunnel lighting level. The length of this zone isbased on the minimum time needed for a motorist's eye to adapt to the darker tunnel interior. The average luminance levels should decrease smoothly from 130cd/m² to 4cd/m² through the transition zone.

Interior Zone: The interior zone is the portion of the tunnel where the driver's vision has adapted to a low luminance. The interior of the tunnel should be illuminated to a level of4cd/m².

Exit Zone: The exit zone should be illuminated in the same way as the access zone of the tunnel. The 150m length of road (access/exit zone) at both sides of the tunnel shall be illuminated with LED-type street lighting fixtures on poles.

e) Tunnel Drainage and Water Proofing

The tunnel shall be designed as a dry and drained tunnel as per the contractor's detailed design. A waterproofing membrane shall be provided as per the drawing of the cross section of the tunnel. The water is drained along the bottom of the side walls with perforated drainage pipes.

f) Emergency Communication:

Emergency telephones should be provided in the tunnels and connected to the emergency power supply. When such a telephone is used, the location of the caller should be identified both at the control Centre and personnel by a warning light visible to rescuing personnel. Telephones should be provided at suitable places such as near the portals and at emergency exists. A communication system should give the traveling public the possibility of summoning help and receiving instructions and should ensure co-ordinate rescue. Systems should raise the alarm quickly and reliably when using unusual operating conditions

2. Power Supply for Tunnel and Tunnel Portals

For power supply to the tunnel and tunnel portals it is required to power supply line of 33KV and create Sub-stations 33/11 KV as per the requirement. The Sub-stations shall be created at west portal at suitable locations to cater the load of 1.5 MW. The Silchar side, west portal of the tunnel is located approximately 5.0 km from 132/33KV Pailapool GSS, AEGCL / APDCL, R2WF+PP7, Mahalthal, Assam 788102.

The length of supply line of 33 KV will depend on the locations of Sub-Station and may vary on ground at the time of execution. The land for all the Sub-Stations for the purpose of supplying power to the tunnel and tunnel portals shall be provided by the NHIDCL / competent authority.

Schedule-C

Schedule - C

(See Clause 2.1)

Project Facilities

1 The Concessionaire shall construct the project facilities in accordance with the provisions of this agreement. Such Project facilities shall include:

a) Toll Plaza

b) Roadside furniture

i. Kilometer and Hectometer Stones
ii. Traffic Signs
iii. Overhead Signs
iv. Road Marking
v. Road Delineators
vi. Reflective Pavement Markers & Solar Studs
vii. Traffic Impact Attenuators
viii. Boundary wall and Fencing

c) Operation and Maintenance centers

d) Way side Amenities / Service Areas

e) Truck lay-byes

f) Bus Bay and Bus shelter

g) Pedestrian Facilities

h) Highway Lighting

i) Rainwater Harvesting

j) Environmental Management Plan

k) Land Scaping and Tree Plantation

l) Advanced Traffic Management System (ATMS)

m) Highway Patrol Units

n) Emergency medical services

o) Crane Service

1.1 Project Facilities to be completed on or before project completion date have been described in Annex-I of this Schedule-C

Annex - I

(Schedule-C)

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) Roadside furniture

i. Kilometer and Hectometer Stones
ii. Traffic Signs
iii Overhead Signs
iv Road Marking
v Road Delineators
vi. Reflective Pavement Markers & Solar Studs
vii. Traffic Impact Attenuators
viii. Boundary wall and Fencing

c) Operation and Maintenance centers

d) Way side Amenities / Service Areas

e) Truck lay-byes

f) Bus Bay and Bus shelter

g) Pedestrian Facilities

h) Highway Lighting

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j) Environmental Management Plan

k) Land Scaping and Tree Plantation

l) Advanced Traffic Management System (ATMS)

m) Highway Patrol Units

n) Emergency medical services

o) Crane Service

2. Description of Project Facilities

Each of the Project Facilities is briefly described below:

2.1 Toll Plaza

Tolling system shall be provided in entire length of the project and the same is integrated with

the adjoining packages. The Toll Plazas shall be provided as per NHAI circular No. 17.5. 82 dated 24/5/2021 and Schedule D. Minimum Lane requirement in the opening year are as follows.

Toll Plaza shall be provided confirming **to (Clause No. 10.2 IRC: SP:84-2019** at the following locations:

S. no.	Location of toll plaza (km.)		Direction (Entry: to Highway, Exit: from Highway	Minimum number of toll lanes	
	Existing chainage	Design chainage		Entry	Exit
1	-	27+535		4	4

The sub-Items of toll plaza are as follows:

S. no.	Item	Number	Remarks
1	No of toll lanes	2 x 4	
2	Toll booth complex	2	1 each on either side
3	Weigh bridges	2	1 each on either side of toll plaza
4	Electrical system		Sufficient for all equipment placed on Toll Plaza and for future expansion
5	Highway nest with toilet facility	2	1 in each direction after crossing the toll booth
6	Internet facility	2	Internet facility with 2 different telecom operators

Note:

1. The Toll Plaza shall be constructed as per Manual (Schedule D) considering the modification as per NHAI Circular NHAI/Policy Guidelines/Management of Toll Plaza/2021 Policy Circular No. 17. 5.82 dated 24th May 2021.
2. Based on the toll lanes as given above, toll Booth complex, weigh bridges, electrical systems, and all other facilities required/ mentioned in manual shall be provided as per specification mentioned in Schedule D
3. No. of toll lane specified above are to be provided. The Concessionaire / Contractor shall design and provide toll lane as per Manual (Schedule D) & NHAI Circular NHAI/Policy Guidelines/Management of Toll Plaza/2021 Policy Circular No. 17.5. 82 dated 24th May 2021 subject to as specified above.
4. AII Toll Lanes to be equipped with Hybrid ETC equipment's as per NHAI/Policy Guidelines/Management of Toll Plaza/2021 Policy Circular No. 17.5. 82 dated 24th May 2021.
5. A separate Highway Nest with toilet facility for road users shall be provided near toll plaza location along with parking facility. One toilet block on each direction shall be provided. These toilet facilities shall follow CPWD specifications for sanitary ware items and fittings such as WC, wash basin, Wash basin-Under counter, Urinal flat back, PVC Cistern, IWC Orissa Pan, Flush Value -CP, Wash Basin pillar cock-GP, Bib Cock-GP, Health Faucet, W/c Bib cock, Wash Basin angle cock. One WC shall be provided for specially challenged persons.
6. Point of Sale (POS) with card swapping machines shall be provided.

7. Provide Lane markings and Traffic Signs as per IRC: SP: 84-2019, IRC 35 and IRC 67 **(Clause No. 10.8 & 10.9 of IRC: SP: 84-2019)**

8. Solar panels shall be erected over the either on FOB or over Toll Plaza / Admin building to generate the green energy. Same shall be utilized for toll plaza lighting and other energy requirement within toll plaza area along with conventional lighting.

9. Medium speed Weigh in Motion (MSWIM) devices shall be provided in all toll lanes at Toll Plaza Location. In addition to MSWIM, Static weigh Bridge (SWBs) shall be provided on each direction as per manual. **(Clause No. 10.6, IRC: SP: 84-2019).**

10. Provide impact Attenuators on Toil Plaza islands in the direction of traffic. Impact attenuators shall be self-restoring confirm to section 10.6 of IRC SP 99 i.e. Manual of Specifications and Standards for Expressways. **(Clause No9.6, IRC: SP: 84-2019)**

11. Provide Staircase on either side of the FOB at Median Island location by widening the island appropriately

2.2 Roadside furniture

2.2.1 Kilometer and Hectometer stones (clause no. 12.3 IRC: SP:84-2019)

S. no.	Item	Number	Remarks
1	5th Kilometer marker/stone & Kilometer marker/stone	4 & 28	The KM/ Hectometer stones/ marker can be concrete/ stones and shall be placed on both outer side of the earthen shoulder.
2	Hectometer marker/ stone	(8x no. of km) =109	In case KM/ Hectometer marker are to be fixed on separator between Main Carriageway & Service Road then these should be fixed as reflective signs. In case of Access Control Highway/ Expressway, KM/ Hectometer marker should be fixed as reflective sign Km/ Hectometer stones are required to provide on main carriageway and Service Road, both if continuous service road is provided throughout project, length if service road length is more than 1 km.

2.2.2 Traffic Signs (Clause No. 9.2 IRC: SP:84-2019)

Traffic Signs include roadside signs, overhead signs and kerb mounted signs etc. shall be provided along the entire Project Highway and on all Side, Roads joining the main carriageway/service road. A QR code shall be marked on back of each sign as per IRC 67.

All sign shall be of Micro Prismatic Grade Sheeting Corresponding to Class C sheeting as per ASTM D 4956 Type VIII, IX and XI. (Clause No. 9.2.3 IRC: SP: 84-2019)

All shoulder mounted signs shall be supported on GI Pipes. Overhead Signs shall be placed on a structurally sound gantry or cantilever structure made of GI pipes. (Clause No. 9.2.4 IRC: SP: 84-2019)

On multi-lane roads (6 lanes or above), signs shall be mounted overhead. (Clause No. 4.6 of IRC: 67 2022)

The siting of signs shall confirm to Table 4. 1 and Fig 4.1 of IRC 67. (Clause No. 4.7 IRC:

SP: 84-2019). The two successive signs shall be placed at a minimum distance of 0.6 x V metre (V is design speed in Kmph). (Clause No. 4.8 IRC 67 2022).

The overhead gantry signs shall be placed as given below:(Clause No. 16.3.2 of IRC 67 2022)

S. No.	Item	Carriageway (Left, Right, Both)
1	Overhead Gantry signs	
a	Start of Project	Both
b	End of project	Both
c	Toll plaza location	Both
d	Advance Direction Signs on main carriageway ahead of Grade separated Junction	Either left or right
e	Reassurance Signs on main carriageway	Either left or right
2	Overhead Cantilever Gantry signs	
a	Direction Signs on main carriageway and crossroad ahead of Grade separated Junction	Either left or right
b	At all major locations of crossroads i.e. NH, SH, MDR (start of grade Separated structure/at grade interchange)	Either left or right
c	At major trauma center, roads leading to religious places or any other important location	Both sides
3.	Double/Butterfly Cantilever	On Gore Area of Exit Locations of Access Controlled Highway/ Expressway.

The minimum number of signages to be provided are as mentioned below:

S. No.	Road Signs	Number	Remarks
I	**Mandatory/Regulatory**	-	
1	Stop signs	13	
2	Give Way Signs	04	
3	Prohibitory signs	04	
4	No Parking signs	08	
5	No Stopping signs	12	
6	Speed Limit signs (Circular)	14	
7	Speed Limit signs (Vehicle Type)	-	
8	Vehicle Control signs	-	
9	Restriction Ends sign	-	
10	Compulsory Direction Control and other signs	-	
II	**Cautionary/Warning**	-	
1	Left/Right Curve	-	
2	Left/ Right Curve with side road	06	
3	Right/Left Hairpin Bend	-	
4	Right/Left Reverse Bend	-	

S. No.	Road Signs	Number	Remarks
5	Series of Bends	-	
6	270 Degree Loop	-	
7	Side Road	-	
8	Y-intersection	07	
9	Cross Road	09	
10	Roundabout	-	
11	Traffic Signals	-	
12	T- Intersection	01	
13	Major Road Ahead	08	
14	Staggered Inter-section	-	
15	Merging Traffic Ahead	04	
16	Narrow Road Ahead	-	
17	Road Widens	-	
18	Narrow Bridge Ahead	-	
20	Steep Ascent/Descent	-	
21	Reduced Carriageway	02	
23	Start /End of Dual Carriageway	-	
24	Gap in Median	-	
25	Pedestrian Crossing	04	
26	Pedestrian crossing with backing board	-	
27	School Ahead	-	
28	Built Up Area	-	
29	Two Way Operation (on main carriage way /service road)	-	
30	Two Way Traffic on Cross Road Ahead	-	
31	Danger Warning Sign	-	
32	Deaf or Blind Persons Likely on Road Ahead	-	
33	Cycle Crossing	-	
34	Cycle Route Ahead (Warning for Cycles on road ahead)	-	
35	Dangerous Dip	-	
36	Speed Breaker	-	
37	Rumble Strip	10	
38	Rough Road	-	
39	Dangerous Ditch	-	
40	Slippery Road	-	
41	Slippery Road because of Ice	-	
42	Opening or Swing Bridge	-	
43	Overhead Cable	05	
44	Playground Ahead	-	
45	Quay Side or Riverbank	-	

S. No.	Road Signs	Number	Remarks
46	Sudden Side Winds	-	
47	Tunnel Ahead Warning	02	
48	Falling Rocks	-	
49	Cattle Crossing	-	
50	Wild Animals likely to be on Road Ahead	-	
51	Queues Likely Ahead	-	
52	Low flying Aircraft	-	
53	Unguarded Railway Crossing	-	
54	Guarded Railway Crossing	-	
55	Crash prone area ahead	-	
56	U- Turn	06	
III	**Chevron Signs**	-	
1	Single Chevron	460	
2	Double Chevron	-	
3	Triple Chevron	-	
IV	**Object Hazard Marker Sign**	-	
1	Left /Right side Object Hazard Marker	96	
2	Two-way Object Hazard Marker	-	
V	**Informatory/ Guide**	-	
1	Direction and Place Identification signs	37	
2	Stack Type dvance Direction Sign (Shoulder Mounted)	-	
3	Stack Type Advance Direction Sign with cautionary / regulatory signs (Shoulder Mounted)	-	
4	Map Type Advance Direction Sign (Shoulder Mounted)	-	
5	Map Type Advance Direction Sign for roundabout (Shoulder Mounted)	-	
6	Flag Type Direction Sign	07	
7	Reassurance Sign	-	
8	Place Identification Sign	07	
9	Truck Lay -By	01	
10	Toll Booth Ahead	02	
11	Weigh Bridge Ahead	-	
12	Shoulder Mounted Sign in Advance of a Grade Separated Junction/ Interchange	-	
13	Expressway Sign	-	
14	Gantry Mounted advance Direction Sign Ahead of a Flyover in Urban/City Roads	03	
15	Gantry Mounted advance Direction Sign Ahead Instead of of a Grade Separated Junction	-	
16	Gantry Mounted Advance Direction Sign	-	

S. No.	Road Signs	Number	Remarks
	for interchange.		
17	Lane Dedicated Gantry Sign	-	
18	Definition/Supplementary Plates	-	
19	Tourism Related Sign	-	
20	Tourist Destination Direction Information Signs Without Photograph	-	
21	Tourist Destination Direction Information Signs with Photograph	-	
22	Finger Destination direction Information Sign for Pedestrians	-	
23	Tourist Map Information Sign	-	
24	Boundary sign at Entrance to a City/Place	-	
25	Boundary sign at Entrance to a Tourist Destination	-	
VI	**Facility Information Signs**	-	
1	Eating Place	-	
2	Light Refreshment	-	
3	Resting Place	-	
4	Resting Place	-	
5	First Aid Post	02	
6	Toilet	02	
7	Filling Station (Fuel Pump)	-	
8	Hospital	-	
9	U-Turn Ahead	04	
10	Pedestrian Subway	-	
11	Police Station	-	
12	Picnic Site	-	
13	Repair Facility	-	
14	Railway Station/Metro Station/Monorail station	-	
15	Industrial Area	-	
16	Cycle Rickshaw Stand	-	
17	Taxi Stand	-	
18	Auto Rickshaw Stand	-	
20	Home Zone	-	
21	Camp Site	-	
23	Airport	-	
24	Golf Course	-	
25	National Heritage	-	
26	No Through Road	-	
27	No Through Side Road	-	
28	Toll Road Ahead	04	

S. No.	Road Signs	Number	Remarks
29	Guide Sign on Toll Lane Portal	02	
30	Country Border	-	
31	Entry Ramp for Expressway	-	
32	Exit Ramp for Expressway	-	
33	Bus Stop	04	
34	Bus Lane	-	
35	Contra Flow Bus Lane	-	
36	Cycle Lane	-	
37	Contra Flow Cycle Lane	-	
38	Holiday Chalets	-	
39	Emergency Exit	-	
VII	**Other Useful Information Signs**	-	
1	Signs For Persons with Disabilities	-	
2	International symbol of Accessibility	-	
3	Parking Information	-	
4	Parking Areas	-	
5	Ramped Entrance to Subway/Over Bridge	-	
6	Telephone Facilities	-	
7	Toilet Facilities	-	
8	Way Finding	-	
9	Parking Signs	-	
10	Auto Rickshaw Parking	-	
11	Cycle Parking	-	
12	Cycle Rickshaw Parking	-	
13	Scooter and Motorcycle Parking	-	
14	Taxi Parking	-	
15	Park and Ride	-	
16	Parking Restrictions Signs for Traffic Management	-	
17	Flood Gauge Sign	-	
VIII	**Route Maker Signs**	-	
1	State Highway Route Marker Sign	-	
2	National Highway Route Marker Sign	06	
3	Asian Highway Route Marker Sign	-	
4	Expressway Route Marker Sign	-	

Note: The locations of the placement of signages shall be finalized in consultation with Authority Engineer / Independent Engineer/ NHIDCL, as per requirement. Above details of sign boards are indicative and minimum specified. The exact type and number of sign boards shall be decided as per manual in consultation with Authority / Independent Engineer. Any variation in type/number/location specified above shall not constitute Change of Scope.

2.3 Road Marking (Clause No. 9.2 IRC: SP:84-2019)

Road Markings shall be Hot applied thermoplastic materials with reflectorized beads to achieve visibility confirming to clause 2.7.2 of IRC 35. (Clause No. 2.2 IRC: 35)

The cold applied plastics pavement markings shall be used for School Zone Markings, Audible Raised Profile Edge Lines and Block Markings (BM 01/02/03). (Clause No. 2.4 of IRC: 35)

S. No.	Item	Number & Length (m)
1	Longitudinal Marking	66.950Km
2	Transverse Marking	0.250Km
3	Hazard Marking	1.070Km
4	Block Marking	70 nos
5	Arrow Marking	178 nos
6	Directional Marking	09
7	Facility Marking	Nil
8	Center Line	20.63Km
9	Traffic Lane Lines	As per Manual
10	No Overtaking Lines	Nil
11	Warning Lines	Nil
12	Border or Edge Lines	51.300Km
13	Longitudinal Markings for Undivided Roads	2.450Km
14	Longitudinal Markings for divided Roads	13.440Km
15	Longitudinal Markings for Ramps/Slip Roads/One Way Streets	3.600Km
16	Stop Line	0.150Km
17	Give Way Lines	Nil
18	Diagonal Markings	0.670Km
19	Chevron Markings	0.610Km
20	Continuity Line	0.770Km
21	Word Messages	Nil
22	Lane Change	0.750Km
23	Merging/Diverging Marking	0.560Km
24	Hatch Markings	Nil
25	Raised Profile Lines	Nil
26	Lane Reduction / Narrowing Situations and Transitions (lane Balancing)	Nil
27	Directional Arrows	As per Manual
28	Mandatory Turn Arrows	43 nos
29	Guidance Arrows	Nil
30	Deflection Arrows	Nil
31	Bifurcation Arrows	04 nos
32	Arrows on Side Road Approaches	24 nos
33	Arrows on Main Road Approaches	50 nos
33a	Word Messages	Nil

S. No.	Item	Number & Length (m)
34	Yellow Box Markings	Nil
35	Ghost Island	Nil
36	Marking for Speed Breakers	Nil
37	Pedestrian Crossing	Nil
38	Markings when highway passes through settlement fig 9.4 of IRC SP 84/87	Nil
39	Transverse Bar Markings	As per Manual
40	Bus bay Marking	02 nos
41	Truck Lay-by Markings	01 nos
42	Toll Plaza Marking	01 nos
43	School Zone Markings	Nil
44	Object Markings within Carriageway	Nil
45	Objects Markings Adjacent to Carriageway	Nil
46	i. Subway Piers, Abutments, Culverts Head Walls, Concrete Barrier	Nil
47	ii Electrical poles	Nil
48	iii Guard rails	Nil
49	iv Kerb	Nil
50	Directional Markings as per Annexure: A 6	Nil
51	Facility Markings as per Annexure A.7 of IRC 35	Nil

Note: The locations of the marking shall be finalized in consultation with Authority Engineer / Independent Engineer / NHIDCL as per site requirement. Raised profile edge lines as per Clause 7.7 of IRC 35 shall be provided on both sides i.e., shoulder and median side.

2.4 Road Delineators (Clause No. 9.4 IRC: SP: 84-2019)

S. no.	Item	Number/Length (m)
1	Roadway indicator	430 Nos.
2	Median Marker on Median/RCC Barrier (Clause 4 of IRC 79 2019)	5500 Nos.
3	Object marker	
4	Flexible Object Markers (Clause 6 of IRC 79 2019)	
i	On Metal Beam Barrier	6695 m.
ii	On Toll Booth/Toll Island	06 Nos.
iii	On Entry/Exit of Tunnel	04 Nos.
iv	On Exit from Main carriageway	12 Nos.
5	Solar Blinkers on Median Opening, on exit from main carriageway and on approach ramp/crossroad at junctions below grade separated intersections.	08 nos.

Note: The locations of the marking shall be finalized in consultation with Independent Engineer/NHAI, as per site requirement in accordance with manual.

2.5 Reflective Pavement Markers & Solar Studs (Clause No. 9.5 IRC: SP:84-2019)

The Prismatic Retro-Reflective type confirming to ASTM D-4280 Pavement Markers & Solar

Power Studs on Highway shall be provided in accordance with Schedule - D.

Sl. No	Item	Number	Location	Remarks
1	White Colour one coloured face Road Studs	1762	Traffic lane line & centre of carriageway	Uni-directional carriageway
2	Red Colour one coloured face Road Studs	5316	Left hand edge of the carriageway, entry to truck lay bye / bus bay, start of service road, chevron/diagonal markings on gorge	
3	Yellow / Amber Colour one coloured face Road Studs	4408	Median side edge line, zebra crossing	
4	Green Colour one coloured face Road Studs	1604	Lay byes, left hand side of the carriageway in case of multi-lane divided carriageways, crossable continuous line like in acceleration/ deceleration lanes involving lane changing	

2.6 Traffic Impact Attenuators (Clause No. 9.6 IRC: SP:84-2019)

2.6.1 Provide Impact Attenuators in Gore Areas, it shall be self-restoring confirming to section 10.6 of IRC SP 99 i.e. Manual of Specifications and Standards for Expressways at following locations

S. No.	Item	Chainage / Number	Remarks
1	On flyover/grade separated structure at exit from main carriageway	04	
2	On Island of Toll Plaza	02	
3	Any other location which Safety Hazard	-	

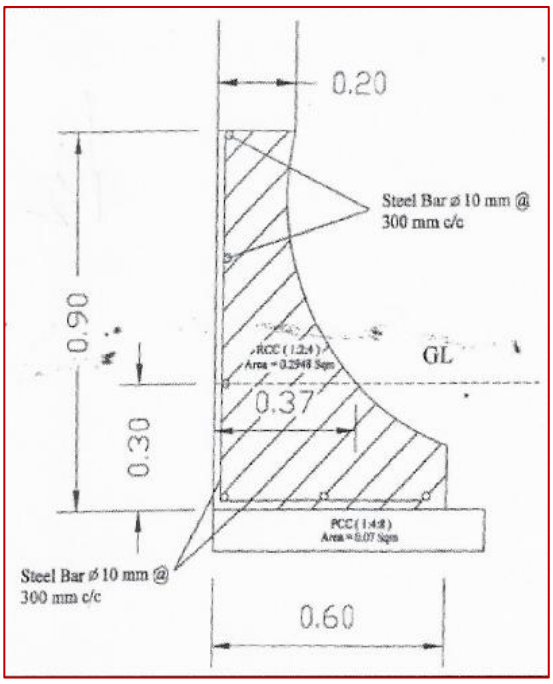
2.6.2 Providing End Terminals

Provide End Terminals P-4 type confirming to EN 1317-4 to Parapet Walls of Culverts, Structures ends for the safety of approaching traffic etc.

S. No.	Item	Number	Remarks
1	Culvert Ends	-	
2	Structures Ends	32	At bridge / viaduct RCC crash barrier end on approaching side
3	Any other location which Safety Hazard	-	

2.7 Boundary wall and Fencing (Clause No. 12.2 IRC: SP:84-2019)

Boundary wall shall be provided along the entire length on either side (including transverse requirements at structure locations) as per the detail given below in accordance with IRC: SP:84. Road boundary walls shall be provided at the boundary on both sides of the right of way available under the control of the Authority, except at ingress and egress points. The boundary walls shall be of reinforced cement concrete as per figure enclosed.



At all CD structure locations, the boundary wall shall be discontinued by turning and joining it with the wing/return wall to allow crossing through these structures during dry seasons.

3. Operation and Maintenance centers (Clause No.12.15 IRC: SP: 84-2019)

There shall be operation and maintenance center(s) as per Clause 12.15 of Schedule-D, either near the toll plaza location or at any other location along the Project Highway, as identified by the Concessionaire. The minimum land for O & M center shall be 2000 sqm and shall be acquired by the Concessionaire at his own cost and risk. Dedicated operation and maintenance center shall be provided in accordance to Schedule D.

4. Way side Amenities/ Service Areas/Rest Area (Clause No. 12.6 IRC: SP:84-2019/

S. No	Item	Existing Chainage (Km)	Side	Remarks
1	Way side Amenities-1	-	-	Tentative area=2 ha

The Site needs to levelled/ graded for the whole of Way side Amenities area and boundary wall of the height of 1.5m shall be constructed along the periphery of the area.

5. Truck lay-byes: (Clause No. 12.6 IRC: SP:84-2019/ IRC: SP:87-2019

5.1 The truck lay-bye shall be provided at below given location and as per the design mentioned in Schedule-D.

S. No	Design Chainage	Side	Remarks
1	36+100	LHS	

5.2 Toilet block along with Janitor room on each Truck Lay bye shall be provided. The toilet block shall consist of at least 1 block for bathing, at least 2 fixtures each for urinals, WC and wash basin. There shall be 24-hour lighting facility in toilet block. These toilets facilities must be functional round the clock including proper maintenance. For arrangement of water, 1 no. of boring along with water pump shall be provided to keep the toilet clean. For upkeep and maintenance of Toilet, 3 Safai wale (1 in each 8-hour shift) shall be engaged and is in the

scope throughout contract period.

5.3 Truck Lay Bye Pavement: Provide pavement composition (Flexible/Rigid/ Paver Blocks) as follows:

Pavement Composition is same as MCW (Flexible)

6. Bus Bay and Bus shelter: (Clause No. 12.7 IRC: SP:84-2019)

Provision of Busbay and bus shelter on highways as per IRC 80: 2022 including paving of layby, signs, markings, speed calming measures, drainage, lighting etc., in built-up areas, intersections of NH/SH/MDR and roads leading to large settlements is as follows:

6.1 Bus Bays with tapers shall be provided along with passenger's shelters shall be constructed at the following locations:

Sr. No.	Design (Existing) Chainage (Km)		Entry Taper Length	Bus Bay Length	Exit Taper Length	Remark
	Left	Right				
1	30+410		100	30	100	
2		30+420	100	30	100	

6.2 Kerb Side Bus Stop with Pedestrian shelter shall be provided at the following locations.

Sr. No.	Design (Existing) Chainage (Km)		Entry Taper Length	Bus Bay Length	Exit Taper Length	Remark
	Left	Right				
NIL						

6.3 Bus Bay Pavement: Provide pavement composition (Flexible/Rigid/ Paver Blocks) as follows:

Pavement Composition (Flexible/Rigid/ Paver Blocks)
Flexible same as MCW

7. Pedestrian Facilities (Clause No. 9.8 IRC: SP:84-2019)

Pedestrian Facilities shall be provided in accordance with the Manual of Specifications and Standards as referred in Clause 9.8 of Schedule D and IRC 103 2022. This shall consist of footpath (sidewalks), pedestrian guard rails and pedestrian crossing.

The details are as mentioned below:

Sl. No	Pedestrian facilities	Location
1	Pedestrian guardrails shall be 150 mm from Carriageway / Paved Shoulder i. Hazardous Locations on Straight Stretches ii. At Junctions / Intersections iii. Schools iv. Bus Stop/Railway Stations v. Overpass, Subway vi. Central Reserve	As per manual

2	Footpath paving including fixing of Tactile pavers	As per manual
3	Pedestrian Crossing i. With Zebra Marking ii. With Tabletop Crossing iii. At Intersections iv. At Schools	As per manual

8. Highway Lighting (Clause No. 12.5 IRC: SP:84-2019)

The street light poles shall be 1 piece, continuous-tapered, octagonal poles and shall be manufactured from one length of steel sheet, formed in continuous tapered tube, with one continuous arc-welded vertical seam. The minimum wall thickness for lighting poles shall not be less than 4 mm. The Bottom Diameter shall be minimum 175 mm. The Top Diameter shall be minimum 75 mm. The door on window of pole shall be antitheft. All electrical cable should be concealed. All electrical lighting fixers shall be LED. The fixtures shall be concealed except on poles. Lighting poles shall be fixed on outer side of steel/concrete barrier.

The lighting shall be Providing at the following locations:

S. No.	Lighting facilities	Chainage		Side	Lighting Source:
		From	To		
1	Toll Plaza area: The lighting in and around toll plaza, toll booths, office building, on the approach road, O&M center etc. shall be as per Section 12 of the Manual. In addition to at least two high mast light shall be provided on either side of toll plaza	27+300	27+770	BHS	Electricity Board / Generator / Solar
2	Rest Areas: The entire Rest areas shall be provided with lighting with average illumination to 40 Lux				Not Applicable
3	Truck lay-bye: The entire area of truck lay-byes and 50m length of the project highway on its either side shall be illuminated at night to provide an average illumination of 40Lux. Suitable designed electric poles having aesthetic appeal and energy saving bulbs (LED) may be used to provide required illumination. Alternatively, photo voltaic lamps may be used	35+900	36+300	LHS	Electricity Board / Solar
4	Bus Bay & bus shelter locations: The entire bus bay & bus shelter area shall be provided with Lighting (Average illumination of 40Lux.).	30+410 & 30+420		LHS RHS	Electricity Board / Solar

S. No.	Lighting facilities	Chainage From	Chainage To	Side	Lighting Source:
	Grade separated structures, interchanges, flyovers, underpasses (vehicular/ pedestrian) and Vehicle overpasses: Lighting requirement shall be as per section 12 of the manual. The top and underside of the grade separated structures including service road/ slip road, interchange area at the ground level up to 50m beyond the point from were flaring of the main carriageway takes place shall be provided with lighting. Also, on all legs of at grade interchange/ crossings the lighting shall be provided 50m beyond the point of Centre on all legs. The minimum illumination shall be 40 Lux., at the extreme edge of the Highway	Electricity Board / Solar			
6	Built-up sections on the project highway both in the median of main carriageway and on the service roads on both sides	Not Applicable			
7	On Median Openings provide 1 no. high mast lighting of 25m height	Not Applicable			
8	On Major Bridges and its approaches higher than 3m	Solar			

9. Rainwater Harvesting

The provision of rainwater harvesting shall be provided at every 1000m staggered in the entire project length and shall be executed as per requirement of IRC SP: 42-2014 and IRC SP: 50-2013. Additionally, wherever urban drains are provided, which do not have a definite outfall for discharge of water, at such location one pit for rainwater harvesting shall be provided along the side drains at the lowest point/ where the water stagnates. The type and location of rainwater harvesting is as follows:

Sl. No.	Rainwater Harvesting Type	Number	Depth of Recharge Structure
1	Type 1 confirming to clause 10.7.2 of IRC SP 42	-	-
2	Type 2 confirming to clause 10.7.3 of IRC SP 42	-	-
3	Type 3 confirming to clause 10.7.4 of IRC SP 42	-	-
4	Type 4 confirming to clause 10.7.5 of IRC SP 42	-	-

10. Environmental Management Plan (Attach MOEF Mitigation Report in Schedule D)

The Concessionaire / Contractor shall implement the Environmental Management plan & action Plan for undertaking possible mitigation measures in accordance with environmental clearance accorded by Ministry of Environment and Forests and climate change. The conditions & directions stipulated by the MOEF shall be complied by the contractor / concessionaire.

11. Land Scaping and Tree Plantation (Section 11 of IRC SP 84 2019)

The Concessionaire shall plant trees and shrubs of required numbers and types at the appropriate locations within Right of Way and in the land earmarked by the Authority for afforestation as per Schedule D at the following areas.

Sl. No.	Types of Plantations	Location (Km)	Number of trees to be planted	Remarks
1	Shrubs	In median except Structures+ Frist row from side of drain	1 row of 333 plants for the median of 2-3 metre at every km. and 2 rows of 333 plants (staggered) for the median of 3 metre and more	Ornamental type plantation shall be provided
2	Landscaping	O & M Centres, Vacant land parcels, Toll Plaza building and surroundings Vacant space below the flyovers	Landscaping plans shall be submitted by the Concessionaire/Contractor which shall include ornamental trees, decorative statues and landscaping	The number of Ornamental type plantation and other things shall be decided on the basis availability of land.
3	Plantations	Available open land within ROW	Minimum 1400 nos. of trees of desired type in one row as per availability of RoW @ 10 m c/c near edge of ROW on both sides (As per Schedule D)	Preferably local varieties like mango, Neem, Sheesham, Babul, Peepal etc. shall be planted

Drip irrigation system for median plantation by gravity/pressure sources with all necessary components / systems and emitting devices at plants shall be provided.

The Concessionaire shall maintain the trees and shrubs in good condition during concession period as per the concession agreement.

12. Advanced Traffic Management System (ATMS) (NHAI Policy Circular No 11.53/2023 dated 10th October 2023)

The Concessionaire is required to design, install, operate and maintain Advanced Traffic Management System (ATMS) as part of the project facilities. Advanced Traffic Management System shall be provided as per standards and specifications specified in the manual and as per NHAI circular 11.53/2023 dated 10th October 2023 and shall be maintained throughout the contract period.

- **Deleted (Not in Scope of Contractor).**

13. Highway Patrol Units (Clause No. 12.10 IRC: SP:84-2019)

Highway Patrol units shall be established and operate at toll plaza location as per Schedule-D Clause 12.10, which shall continuously patrol the highway in a stretch not exceeding 50 km (if the stretch is more than 50 km additional 1 number of patrol vehicle per 50 km or less shall be provided). The vehicle shall be brand new with fuel, driver, and insurance all-inclusive for the entire contract period. Highway Patrol units shall be fitted with GPS and GSM based vehicle tracker system. Highway Patrol Vehicles shall be stationed on layby

constructed on Project Highway @ every 20 km of each Toll Plaza.

14. Emergency medical services (Clause No. 12.11 IRC: SP:84-2019)

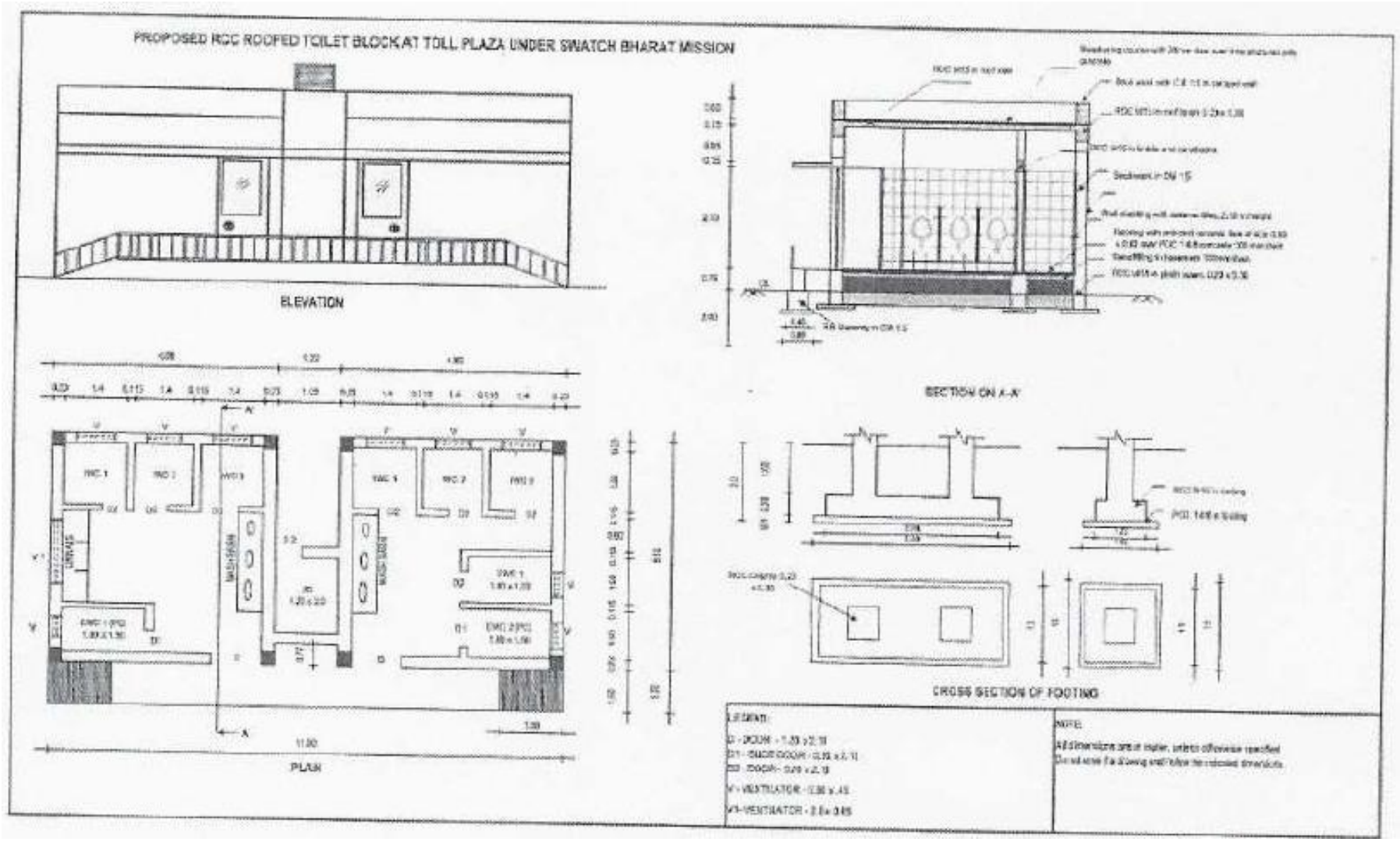
The Contractor shall, at its own cost, construct a medical aid post at each toll plaza with a minimum size of 5 x 5 sq.m with a toilet (to be used for the patients of minimum size of 3 x3 sq.m) and hand it over to the Authority, no later than 30 (thirty) days prior to PCOD/COD. The Medical Aid Post(s) shall be deemed to be part of the project and shall vest in the Authority. Medical Aid Post shall be set up at Administrative Block with round-the-clock services for victims of accidents on the Project Highway.

One number Ambulance shall be provided in a stretch not exceeding 50 km (if the stretch is more than 50 km additional 1 number of ambulances per 50 km or less shall be provided). The Ambulance shall be brand new with fuel, driver, medical staff and insurance all-inclusive for the entire contract period. Ambulance fitted with GPS and GSM based vehicle tracker system shall be provided to be integrated with the Video Incident Detection System with ATMS, as per Schedule - D, Clause 12. 11 (strictly as per details mentioned in Annex-I of Schedule D), along with all necessary manpower (including paramedical staff), medicines, equipment's etc. and shall be maintained in an effective manner throughout the contract period starting from the appointed date. Ambulance shall be stationed on lay bye constructed on Project Highway@ every 20 km of each Toll Plaza.

15. Crane Service: (Clause No. 12.12 IRC: SP:84-2019)

Crane Service shall be provided on project highway, as specified in the manual Clause 12. 12. One number crane shall be provided in a stretch not exceeding 50 km (if the stretch is more than 50 km additional 1 number of cranes per 50 km or less shall be provided). Crane having capacity of minimum 20T shall be made available. The crane shall be brand new with fuel, driver, and insurance all-inclusive for the entire contract period. Cranes shall be stationed on layby constructed on Project Highway@ every 20 km of each Toll Plaza.

Annexure-I (Schedule C) – Standard Drawing for Toilet



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:

Annex - I

(Schedule-D)

Specifications and Standards for Construction

1 Manual of Specifications and Standards to apply

All Materials, works and construction operations shall conform to the Manual of Specifications and Standards for Four-Laning of Highways (IRC: SP: 84-2019) with all amendments till date published by IRC (referred to as "Manual" in this Schedule) and MORT&H Specifications for Road and Bridge Works (5th revision). Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Authority Engineer for construction of the project highway.

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

ii. Technical Specifications of Tunnel work shall be referred separately from Volume-V (Tunnel Technical Specifications Report) submitted with DPR drawings and report.

2 Deviations from the Specifications and Standards

(i) The terms "Contractor", "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 the aforesaid Manual, the Specifications and Standards shall apply to the Project Highway, and for purposes of this Agreement, the aforesaid Manual shall be deemed to be amended to the extent set forth below:

Sl. No.	Manual Clause No	Details of Item	Description of Deviation
1	2.6.1	Width of paved and earthen Shoulder	Width of Shoulder shall be as given in typical cross-sections in Schedule B
2	2.17	Typical Cross Section	The typical cross sections shall be as given in Schedule B.
3	7.3	Overall width of structures	The Overall Deck Configuration of all structures shall be as given in Schedule B
4	6.2	Surface Drains	Lined/Unlined Side Drains shall be provided throughout the Project as per typical cross sections (TCS) except at cross drainage structures (River, nala, canal etc.)
5	9.7.5	Median Barriers	-
7	9.7.1	Roadside safety barriers	Thrie beam metal crash barriers shall be provided in entire length on outer side earthen shoulder of each main carriageway where the height is more than 3 m and approaches to bridges & underpasses but excluding

Sl. No.	Manual Clause No	Details of Item	Description of Deviation
			stretches covered by bridges & underpasses, where concrete barriers shall be provided.
8	Section 11	Landscaping and Tree Plantation	Landscaping and tree plantation shall be done as per **Schedule-C** in accordance with IRC: SP: 21:2009 and NHAI policy circular no. 7.4.11/2023 dated 03rd July 2023.
9	Section 12	Project Facilities	The project facilities and building structures shall be constructed in accordance to **Annex I** of **Schedule-C**.
10	12.5	Street lighting	Swaged steel tabular pole with swan neck shall be used for roadside lighting conforming to IS 2713-1980 controlled by suitable digital time switch and other specifications shall be as per Clause no 12.5 of IRC: SP:84-2019. The minimum level of Illumination shall be 40 Lux.

3 Advanced Traffic Management Systems (ATMS)

- Not in Scope.