Schedules

SCHEDULE - A

(See Clauses 2.1 and 8.1)

SITE OF THE PROJECT

1. The Site

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

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

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

1.4 The alignment plans of the Project Highway are specified in Annex-III. The proposed profile of the Project Highways shall be followed by the contractor with minimum FRL as indicated in the alignment plan. The Contractor, however improve/upgrade the Road Profile as indicated in Annexure-III based on site/design requirement.

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

Annex - I

(Schedule-A)

Site

1. The Site

The Site of the Project Highway comprises the section of National Highway -39 (New NH-2) from Kuraopokpi (Ex. Km288+815)to Sekmai(Ex.Km299+538) in the state of Manipur. The contract package of the project comprises the rehabilitation and upgradation of existing two lanes to 4 lane divided carriageway configuration. The land, carriageway and structures comprising the Site are described below:

2. Land

The Site of the Project Highway comprises the land (existing right of way (ROW)) as described below:

S. No	Existing Chainage (Km)		Existing ROW (m)	Remarks
	From	To		
1	288+815	290+000	12	
2	290+000	299+538	30	

3. Carriageway

The present carriageway of the Project Highway is generally Two Lane carriageway. The type of the existing pavement is flexible and road width details of package-5are as below:

S No	Existing Chainage		Length (m)	Terrain		Carriageway	
	From	To		LHS	RHS	Type	Width (m)
1	288+815	289+400	585	Rolling	Rolling	BT	6.5
2	289+400	290+600	1200	Valley	Hilly	BT	6.5
3	290+600	291+200	600	Valley	Hilly	BT	6.75
4	291+200	291+400	200	Valley	Hilly	BT	6.7
5	291+400	291+800	400	Valley	Hilly	BT	6.8
6	291+800	292+400	600	Valley	Hilly	BT	6.75
7	292+400	292+600	200	Valley	Hilly	BT	6.8
8	292+600	292+800	200	Hilly	Hilly	BT	6.8
9	292+800	293+200	400	Valley	Rolling	BT	6.8

S No	Existing Chainage		Length (m)	Terrain		Carriageway	
	From	To		LHS	RHS	Type	Width (m)
10	293+200	293+400	200	Valley	Valley	BT	7
11	293+400	293+600	200	Valley	Valley	BT	8
12	293+600	293+800	200	Hilly	Hilly	BT	8
13	293+800	294+000	200	Rolling	Rolling	BT	8
14	294+000	294+400	400	Rolling	Rolling	BT	7
15	294+400	295+000	600	Rolling	Rolling	BT	7.2
16	295+000	297+800	2800	Rolling	Rolling	BT	6.8
17	297+800	299+538	1738	Rolling	Rolling	BT	7

4. Major Bridges

The Site includes the following Major Bridges:

S No.	Ex. Chainage	Ex. Span arrangement (No. x Span)	Total Outer Width (m)	Type of Structure		
				Superstructure	Substructure	Foundation
NIL						

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

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

S. No.	Existing Chainage (KM)	Type of Structure		No. of Spans with span length(m)	Width (m)	ROB /RUB	Remarks
		Found-ation	Super-structure				
NIL							

6. Grade separators

The Site includes the following grade separators:

S.No.	Existing Chainage (KM)	Type of Structure		No. of Spans with span length (m)	Width (m)
		Foundation	Super structure		
NIL					

7. Minor bridges

The Site includes the following minor bridges:

S. No.	Ex. Chainage (Km)	Ex. Span arrangement (No. x Span)	Total Outer Width of Deck (m)	Type of Structure		
				Superstructure	Substructure	Foundation
1	289+968	1 x 6.7	10.6	Solid Slab	RCC wall type	Open
2	293+279	1 x 14	8.5	RCC T-Beam	RCC wall type	Open
3	297+007	1 x 26	11.0	PSC I Girder	RCC wall type	Open
4	297+1067	1 x 11.5	11.2	RCC T-Beam	RCC wall type	Open
5	299+015	1 x 6.7	10	Solid Slab	RCC wall type	Open

8. Railway level crossings

The Site includes the following railway level crossings:

S. No.	Location/ Existing Chainage (KM)	Remarks
NIL		

9. Underpasses (Vehicular, Non Vehicular)

The Site includes the following underpasses:

S. No.	Existing Chainage (Km)	Type of Structure	No. of Spans with span length (m)	Width (m)
NIL				

10. Culverts

10.1 Pipe Culverts:

The Site has the following existing pipe culverts:

S. No.	Ex. Chainages (Km)	Type of Culvert	No. of Pipes	Pipe Dia (m)	Carriageway Width (m)	Remarks
1	288+828	Pipe	2	1	7	Repairing Required (Broken)
2	288+950	Pipe	1	1	6.8	Repairing Required (Broken)
3	289+200	Pipe	1	1	6.8	Repairing Required (Broken)
4	289+337	Pipe	1	1	6.5	Repairing Required (Broken)
5	289+490	Pipe	1	1	6.9	Repairing Required (Broken)
6	289+601	Pipe	1	1		Cleaning Required (Block)

S. No.	Ex. Chainages (Km)	Type of Culvert	No. of Pipes	Pipe Dia (m)	Carriageway Width (m)	Remarks
7	289+660	Pipe	1	1	7	Blocked-L
8	289+748	Pipe	1	1	7	Blocked-L
9	289+799	Pipe	1	1	7	Blocked-L
10	289+867	Pipe	1	1	6.8	Repairing Required (Broken)
11	290+057	Pipe	1	1	6.5	
12	290+649	Pipe	-	-	-	Blocked
13	290+677	Pipe	1	1	7.1	
14	290+830	Pipe	2	1	6.8	
15	291+016	Pipe	1	1	6.3	
16	291+055	Pipe	1	1	6.7	Blocked-R
17	292+029	Pipe	1	1	6.2	
18	292+093	Pipe	1	1	6.4	Cleaning Required (Block)
19	292+368	Pipe	1	1	7	Cleaning Required (Block)
20	292+406	Pipe	1	1	6	
21	292+753	Pipe	1	1	6.7	
22	293+664	Pipe	1	1.2	6.1	Cleaning Required (Block)
23	294+097	Pipe	1	1	6.1	Blocked-R
24	294+293	Pipe	1	1	6.4	
25	294+392	Pipe	1	1	6.4	
26	294+797	Pipe	1	1	6.2	
27	295+342	Pipe	1	1	6.6	
28	295+498	Pipe	1	1	6.6	
29	296+250	Pipe	1	1	6.4	
30	296+505	Pipe	1	1	7.2	

10.2 Slab Culverts

The Site has the followingexisting slab culverts:

S. No.	Ex. Chainages (Km)	Type of Culvert	Thickness of Slab (m)	No. of Span	Clear Span (m)	Carriageway Width (m)	Remarks
1	289+105	Slab	0.2	1	3	6.5	
2	289+541	Slab	0.2	1	2	6.8	
3	290+171	Slab	0.2	1	2	6.5	Blocked-L
4	290+346	Slab	0.2	1	1.2	6.3	
5	290+405	Slab	0.2	1	2	7.2	
6	290+497	Slab	0.2	1	2	7.2	
7	290+572	Slab	0.2	1	2	7.2	

S. No.	Ex. Chainages (Km)	Type of Culvert	Thickness of Slab (m)	No. of Span	Clear Span (m)	Carriageway Width (m)	Remarks
8	291+104	Slab	0.3	1	1.5	Under Construction	
9	291+203	Slab	0.2	1	2	6.5	
10	291+341	Slab	0.2	1	1	6.7	
11	291+530	Slab	0.2	1	1	6.6	
12	291+716	Slab	0.25	1	1.5	6.6	
13	291+836	Slab	0.2	1	1	6.6	
14	291+855	Slab	0.2	1	1	7	
15	291+890	Slab	0.25	1	1	6.5	
16	292+441	Slab	0.2	1	1	6.3	Cleaning Required (Block)
17	292+503	Slab	0.5	1	6	7	
18	292+913	Slab	0.5	1	5	6.6	
19	293+534	Slab	0.2	1	1	6.7	
20	293+895	Slab	0.2	1	0.9	7	Blocked-L
21	293+923	Slab	0.2	1	0.9	7	Blocked-R
22	294+002	Slab	0.2	1	1	7	Blocked-R
23	294+194	Slab	0.2	1	1	6.6	Blocked-R
24	294+464	Slab	0.3	1	2	6.7	
25	294+594	Slab	0.2	1	1	6.6	
26	294+685	Slab	0.2	1	1	6.7	
27	294+885	Slab	0.2	1	1	6.5	
28	294+960	Slab	0.2	1	1	6	
29	295+091	Slab	0.2	1	0.9	7.25	
30	295+143	Slab	0.2	1	1	7.25	
31	295+593	Slab	0.2	1	1	6.6	
32	295+697	Slab	0.2	1	1	6.9	
33	295+827	Slab	0.22	1	1	6.9	
34	296+399	Slab	0.2	1	0.9	7.1	
35	296+693	Slab	0.2	1	0.6	6.6	
36	296+696	Slab	0.2	1	0.6	6.6	
37	297+238	Slab	0.2	1	3.2	7	
38	297+470	Slab	0.23	1	1	7	
39	298+166	slab		-	-	-	Blocked
40	299+313	Slab	0.2	1	1.4	7.25	

10.3Other Culverts

S. No.	Ex. Chainages (Km)	Type of Culvert	Thickness of Slab (m)	Span Arrangement	Clear Span (m)	Carriageway Width (m)	Remarks
1	296+123	Arch	-	1	4.5	6	

11. Bus bays& Bus Shelters

The details of bus stops on the site are as follows:

S.No	Ex. Chainages (Km)	Ex. Bus Stop	Side	Remarks
1	290+720	Ex.bus stop	LHS	Motbung
2	291+330	Ex.bus stop	LHS	Saparmeina
3	293+013	Ex.bus stop	LHS	N-SongLung
4	293+600	Ex.bus stop	LHS	N-SongLung
5	294+355	Ex.bus stop	RHS	N-SongLung
6	295+810	Ex.bus stop	RHS	N-SongLung
7	297+136	Ex.bus stop	LHS	Motbung
8	297+450	Ex.bus stop	LHS	Kanglatongbi
9	297+750	Ex.bus stop	RHS	Konglatongbi
10	298+215	Ex.bus stop	RHS	Konglatongbi

12. Truck Lay byes

The details of truck lay byes are as follows:

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

13. Road side drains

S. No.	Existing Chainage(Km)		Type	
	From	To	Masonry/cc (Pucca)	Earthen (Kutcha)

NIL

14. Major junctions

The details of Major junctions are as follows:

SN	Ex. Chainage	At Grade/ Grade	Details of Cross Road	Starts From

	(Km)	Separated	Direction (LHS/RHS)	Road Type (NH/SH/MDR)	
Nl					

15. Minor junctions

The details of the minor junctions are as follows:

S.No	Existing Chainage (Km)	Type of Junction	Width of Cross Road	Side	Village/Town Name
1	288+893	Y	4.2	RHS	Tokpakhul
2	290+386	Y	3.8	RHS	Tokpakhul
3	290+728	T	3.4	RHS	Pangmoul
4	290+775	T	2.9	RHS	Pangmoul
5	290+826	Y	3	RHS	Pangmoul
6	291+361	T	2.4	LHS	Pangmoul
7	291+507	T	2.3	LHS	Pangmoul
8	291+614	T	2.1	RHS	Motbung
9	291+730	T	2.5	RHS	Motbung
10	291+762	T	2.7	LHS	Motbung
11	291+860	T	3	RHS	Motbung
12	291+878	Y	3.9	LHS	Motbung
13	291+919	T	2.6	LHS	Motbung
14	291+920	T	3.6	RHS	Motbung
15	292+114	T	3	RHS	Motbung
16	292+202	T	2.3	LHS	Motbung
17	292+383	Y	2.5	LHS	Motbung
18	292+617	T	2.6	LHS	Motbung
19	292+835	T	3.3	RHS	Motbung
20	292+938	T	3.5	LHS	Motbung
21	293+274	T	2.6	LHS	Motbung
22	293+349	T	2.2	RHS	Motbung
23	293+567	Y	5.1	RHS	Kuraopokpi
24	294+394	T	5.2	RHS	Stantipur
25	294+553	T	3.3	LHS	Vijaynagar
26	294+900	T	3.3	RHS	Vijaynagar
27	294+932	T	4.3	LHS	Vijaynagar
28	294+960	T	1.7	RHS	Vijaynagar
29	295+062	T	3.7	LHS	Vijaynagar
30	295+350	T	4.2	LHS	Kanglatongbi
31	295+494	T	5.1	RHS	Kanglatongbi
32	295+547	T	4.8	RHS	Kanglatongbi
33	295+822	Y	4.3	RHS	Kanglatongbi
34	295+908	T	3.4	LHS	Kanglatongbi

S.No	Existing Chainage (Km)	Type of Junction	Width of Cross Road	Side	Village/Town Name
35	297+211	Y	6.7	RHS	Kanglatongbi
36	297+874	Y	2.8	RHS	Kanglatongbi
37	298+175	Y	3.6	LHS	Seknai
38	298+492	T	3	LHS	Seknai
39	298+502	Y	3.7	RHS	Seknai
40	298+634	T	2.4	RHS	Seknai
41	298+898	Y	3.5	LHS	Seknai
42	298+978	Y	3.2	RHS	Seknai
43	299+009	Y	2.7	LHS	Seknai
44	299+116	Y	3.9	RHS	Seknai
45	299+188	T	2.3	RHS	Seknai
46	299+400	T	3.5	LHS	Tendongyan

16. Bypasses

The details of the bypasses are as follows:

S. No.	Name of bypass (town)	Chainage (km)	Length	Carriageway	
		From ----to	(in Km)	Width (m)	Type
NIL					

17. Other structures

- Nil –

18. Referencing

The relationship between the "Existing Chainage" as per field survey and "Design Chainage" is given below:

S.No.	Existing Chainage	Design Chainage	Remarks
1	288+815	287+000	Start of Package-5a
2	289+000	287+175	
3	290+000	288+153	
4	291+000	289+132	
5	292+000	289+995	
6	293+000	290+998	
7	294+000	291+997	
8	295+000	292+970	
9	296+000	293+990	

S.No.	Existing Chainage	Design Chainage	Remarks
10	297+000	295+142	
11	298+000	296+251	
12	299+000	297+162	
13	299+538	299+700	End of Package-5a

Annex - II

(Schedule-A)

Dates for providing Right of Way of Construction Zone

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

S.No	Ex Chainage (m)		Design Chainage(m)		Length (m)	PROW width (m)	Date of Providing ROW*
	From	To	From	To			
1	288+817	288+866	287+000	287+050	50	45.0	90% land will be available at the time of appointed date and balance 10% land after 150(one hundred and fifty) days from Appointed date.
2	288+866	289+064	287+050	287+240	190	47.5	
3	289+064	289+313	287+240	287+390	150	52.5	
4	289+313	289+303	287+390	287+480	90	45.0	
5	289+303	289+435	287+480	287+600	120	47.5	
6	289+435	289+690	287+600	287+850	250	45.0	
7	289+690	289+740	287+850	287+900	50	47.5	
8	289+740	289+939	287+900	288+100	200	52.5	
9	289+939	290+298	288+100	288+450	350	46.5	
10	290+298	290+456	288+450	288+600	150	45.0	
11	290+456	290+508	288+600	288+650	50	47.5	
12	290+508	290+722	288+650	288+850	200	57.5	
13	290+722	290+774	288+850	288+900	50	47.5	
14	290+774	291+163	288+900	289+290	390	46.5	
15	291+163	291+422	289+290	289+550	260	45.0	
16	291+422	291+481	289+550	289+600	50	47.5	
17	291+481	291+586	289+600	289+680	80	54.0	
18	291+586	291+612	289+680	289+700	20	59.0	
19	291+612	291+676	289+700	289+750	50	52.5	
20	291+676	291+737	289+750	289+800	50	47.5	
21	291+737	292+409	289+800	290+400	600	45.0	
22	292+409	292+559	290+400	290+550	150	46.5	
23	292+559	292+859	290+550	290+850	300	45.0	
24	292+859	292+959	290+850	290+950	100	52.0	
25	292+959	293+002	290+950	291+000	50	48.5	
26	293+002	293+503	291+000	291+500	500	45.0	
27	293+503	293+943	291+500	291+940	440	37.5	
28	293+943	294+064	291+940	292+060	120	58.0	
29	294+064	296+060	292+060	294+050	1990	37.5	
30	296+060	296+400	294+050	294+390	340	45.0	
31	296+400	296+810	294+390	294+800	410	37.5	
32	296+810	296+910	294+800	294+900	100	38.8	
33	296+910	296+1110	294+900	295+100	200	37.5	
34	296+1110	297+058	295+100	295+200	100	42.5	

S.No	Ex Chainage (m)		Design Chainage(m)		Length (m)	PROW width (m)	Date of Providing ROW*
	From	To	From	To			
35	297+058	297+257	295+200	295+400	200	40.0	
36	297+257	297+457	295+400	295+600	200	45.0	
37	297+457	297+607	295+600	295+750	150	37.5	
38	297+607	297+678	295+750	295+820	70	41.2	
39	297+678	298+850	295+820	297+100	1280	45.0	
40	298+850	299+088	297+100	297+250	150	41.3	
41	299+088	299+488	297+250	297+650	400	37.5	
42	299+488	299+538	297+650	297+700	50	41.3	

- The dates specified herein, shall in no case be beyond 150 (one hundred and fifty) days after the Appointed Date.

Annex - III

(Schedule-A)

Alignment Plans

The existing alignment of the Package-5A i.e. Kuraopokpi to Sekmai section of Project Highway shall be modified as per the Alignment plan.

The proposed Alignment Plan and Profile of the Project Highway is available on e-Portal. Finished road level indicated in the alignment plan shall be followed by the contractor as minimum FRL.

Annex - IV

(Schedule-A)

Environment Clearances

As per GoI, MoEF notification No. 21-270/2008-IA, III dated 22nd August 2013, proposed project involves expansion of 10.700 Km existing National Highway (less than 100 Km). As a result Environmental clearances will not be required from MoEF.

However, forest clearance is required for Tree cutting.

SCHEDULE - B

(See Clause 2.1)

Development of the Project Highway

1. Development of the Project Highway

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

2. Rehabilitation and Augmentation as Four lane divided carriageway

Rehabilitation and Upgradation shall include Four lane divided carriageway of project highway as described in Annex-I of this Schedule-B and in Schedule-C.

3. Specifications and Standards

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

Annex - I
(Schedule-B)

Description of Four-Laning

1.1. Widening of the Existing Highway

The Project Highway shall follow the existing alignment unless otherwise specified by the Authority or shown in the alignment plan specified in Annex III of Schedule-A. Geometric deficiencies, if any, in the existing horizontal and vertical profiles shall be corrected as per the prescribed standards for plain/rolling terrain to the extent land is available.

1.2. Width of Carriageway

1.2.1 Four laning with paved shoulder from Kuraopokpi (Km287+000) to Sekmai (Km297+700) shall be undertaken. The width of paved carriageway shall be 2x9.0mwide in accordance with the Typical Cross Section (TCS) drawings presented in ***Appendix B1- Typical Cross Sections*** or Manual referred to in the Schedule-D (herein after called the "Manual") unless otherwise specified in this Schedule-B and Schedule-D.

The total roadway width of project highway shall be 18 m wide.

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

S. No.	Built-up stretch (Township)	Design Chainage (Km)		Length (m)	Paved Width (m)	(Typical cross section) (Ref. to Schedule B Appendix B-1)
		From	To			
1	Motbung	291+700	292+350	650	2x9.0m Main Carriageway +2x6.0m Service Road	TCS-11 & TCS-12

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

2. Geometric Design and General Features

2.1. General

Geometric design and general features of the Project Highway shall be in accordance with Section 2 of the Manual (IRC:SP: 84-2014).

2.2. Design speed

The design Speed for the project highway adopted for plain/rolling terrain is 100km/hr. However due to certain site constraints, the minimum design speed adopted for plain/rolling terrain is 80km/hr at locations mentioned in Schedule D.

2.3. Improvement of the existing road geometrics

The alignment of existing road has been improved at many locations along the route either by eliminating sharp curves and/or increasing the radii of horizontal curves. Also, at few locations the existing steep gradient have been improved through cutting/filling so as to conform the requirement of IRC:SP:84-2014 and achieving ruling gradient for plain/rolling terrain. So the reconstruction of road shall follow the improved alignment as enclosed in the bid document.

Sl. No.	Design Chainage (Km)		Type of deficiency	Remarks
	From Km	To Km		
As per Alignment Plan (Annex-III, Schedule A)				

2.3.1 Details of proposed Realignments:

S. No	Design Chainage(Km)		Side	Design Length (Km)	Remarks
	From	To			
As per Alignment Plan (Annex-III, Schedule A)					

2.3.2 Details of Proposed Bypasses:

S. No	Design Chainage(Km)		Side	Design Length (km)	Remarks
	From	To			
Nil					

2.4. Right of Way

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

2.5. Type of shoulders

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

S. No.	Design Chainage (Km)		Length (m)	(Typical cross section) (Ref. to Schedule B Appendix B-1)
	From	To		
1	291+700	292+350	650	TCS-11 &TCS-12

(b) In open country, paved shoulders of 1.5 m width shall be provided with same pavement layers of carriageway and balance 2.0m wide earthenshoulder shall be covered with 150mm thick compacted layer of granular/hard material. The granular sub-base(GSB) layer to be extended till side slope.

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

2.6. Lateral and vertical clearances at Underpasses

2.6.1 Lateral and vertical clearances at underpasses and provisions of guard rails/ crash barriers shall be as per the paragraph 2.10 of the Manual.

2.6.2 Lateral Clearance: The width of the openings at underpasses shall be as follows:

S. No.	Location (Chainage)	Span/opening (m)	Remarks
Nil			

2.7. Lateral and vertical clearances at overpasses

2.7.1 Lateral and vertical clearances at overpasses and provision of guard rails/crash barriers shall be as per the paragraph 2.11 of the Manual.

2.7.2 Lateral Clearance: The size of the openings at overpasses shall be as follows:

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

2.8. Service roads / Slip roads

Service roads/Slip roads shall be constructed at the locations and for the lengths

indicated below:

S. No.	Design Chainage (km)		Side	Length (m)
	from	to		
1	291+700	292+350	Both Side	650

2.9. Grade separated structures:

2.9.1 Grade separated structures shall be provided as per the paragraph 2.13 of the Manual. The requisite particulars are given below:

S. No.	Location of Structure	Deck Width (m)	Number and length of spans	Approach gradient
NIL				

2.10. Cattle and Pedestrian under pass / over pass

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

S.No.	Location	Type of crossing
NIL		

2.11. Typical Cross Section of the Project Highway

Typical Cross Sections (TCS) have been developed as TCS-1 to TCS-9 and TCS-11 to TCS-12 showing configuration along with a schedule of their applicability is presented in Appendix B-1 to this Schedule-B.

3. Intersections and Grade Separators

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

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

(a) At-grade intersections

Major Junctions: -

S. No	Existing Chainage (Km)	Design Chainage (Km)	Type of Junction	Side	Remarks
Nil					

Minor Junctions: -

S.No	Existing Chainage	Design Chainage	Type of Junction	Side	Proposed Width	Village/Town Name
1	287575	285465	T	RHS	3.5	Phoibih
2	288060	285955	T	RHS	2.7	Phoibih
3	288125	286010	T	LHS	2.4	Saparmeina
4	288150	286050	T	RHS	5.7	Saparmeina
5	288255	286145	T	LHS	3.8	Saparmeina
6	288265	286170	T	RHS	6	Saparmeina
7	288875	286765	T	LHS	5.3	Saparmeina
8	288640	286820	Y	RHS	4.2	Saparmeina
9	292389	290385	T	RHS	3.8	Tokpakhul
10	292738	290725	T	BOTH	2.2(LHS)/ 3.4(RHS)	Tokpakhul
11	292781	290775	T	RHS	2.9	Tokpakhul
12	292843	290840	T	RHS	2.7	Pangmoul
13	293510	291505	T	LHS	2.4	Pangmoul
14	293617	291620	T	BOTH	2.3(LHS)/ 2.1(RHS)	Pangmoul
15	293741	291755	T	RHS	2.4	Pangmoul
16	293765	291775	T	LHS	2.7	Pangmoul
17	293882	291880	T	LHS	3.8	Pangmoul
18	293922	291920	T	LHS	2.6	Pangmoul
19	294118	292110	T	RHS	3.2	Motbung
20	294205	292200	T	LHS	2.2	Motbung
21	294381	292385	T	LHS	2.2	Motbung
22	294483	292480	T	LHS	3.2	Motbung
23	294622	292605	T	LHS	2.4	Motbung
24	294837	292825	T	RHS	3.5	Motbung
25	294940	292940	T	LHS	3.5	Motbung

S.No	Existing Chainage	Design Chainage	Type of Junction	Side	Proposed Width	Village/Town Name
26	295300	293280	T	LHS	2.3	Motbung
27	295380	293350	T	RHS	2.2	Motbung
28	295600	293575	T	RHS	4	Kuraopokpi
29	296400	294400	T	RHS	4.2	Stantipur
30	296562	294555	T	LHS	2	Vijaynagar
31	296908	294900	T	RHS	2.7	Vijaynagar
32	296940	294925	T	LHS	3.6	Vijaynagar
33	296978	294960	T	RHS	1.5	Vijaynagar
34	297072	295065	T	LHS	3.1	Vijaynagar
35	297208	295355	T	LHS	4.1	Vijaynagar
36	297351	295500	T	RHS	5.1	Kanglatongbi
37	297400	295550	T	BOTH	2.8(LHS)/ 4.3(RHS)	Kanglatongbi
38	297682	295820	T	RHS	3.9	Kanglatongbi
39	297766	295905	T	LHS	2.5	Kanglatongbi
40	299075	297245	T	RHS	5.2	Kanglatongbi

For the drainage, additional Pipe Culvert (NP4 class) shall be provided on cross roads as per site condition.

(b) Grade separated intersection with/without ramps

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

4. Road Embankment and Cut Section

4.1 The reconstruction of the existing road and construction of new road embankment/ cuttings shall conform to the Specifications and Standards given in section 4 of the Manual and the specified cross sectional details. Deficiencies in the Plan and Profile of the existing road shall be corrected.

4.2 Raising of the Existing Road

The profile of the existing road at the following locations shall be raised:

S. No.	Chainage		Length	Extent of raising
	From	To		
As per Alignment Plan & Profile (Annex-III, Schedule A)				

5. Pavement Design

5.1. Pavement design

Pavement design shall be carried out in accordance with Section 5 of the Manual and IRC:37-2018.

5.2. Type of pavement

Flexible pavement should be provided on entire project length.

5.3. Design requirements

Pavement design shall be as per section 5 of the Manual and IRC: 37: 2018.

Design Period and Strategy

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

5.3.1 Design Traffic

Notwithstanding anything to the contrary contained in this Agreement or the Manual, the Contractor shall design the pavement forminimum design traffic of ***30*** Million Standard Axles (MSA).

5.4. Reconstruction stretches

The entire length of the Project road requires 'reconstruction' following the Alignment Plan (Annex III-Schedule A). The entire road shall be designed as new flexible pavement.

6. Roadside Drainage

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

7. Design of Structures

7.1. General

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

7.1.2 Width of the carriageway of new bridges and structures shall be as follows:

S. No.	Bridge (Km)	Carriageway width and Cross section Features
As per GAD		

7.1.3 The following structures shall be provided with footpaths:

S. No.	Bridge (Km)	Carriageway width and Cross section Features
As per GAD		

7.1.4 All bridges shall be high-level bridges.

7.1.5 The following structures shall be designed to carry utility services specified in table below:

Sl. No.	Bridge at km	Utility service to be carried	Remarks
To be finalized as per the site condition, during the execution, in consultation with the Authority Engineer.			

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 for Project Highway.

7.2. Culverts

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

7.2.2 Reconstruction of Existing Culverts:

(i) **Reconstruction of Pipe Culvert to Pipe Culvert**

The following pipe culverts are proposed for reconstruction to pipe culverts:

S.No.	Location		Proposed Span (m)	Type	Remarks
	Existing	Proposed			

S.No.	Location		Proposed Span (m)	Type	Remarks
	Existing	Proposed			
NIL					

(ii) **Reconstruction of Pipe/Slab Culvert to Box Culvert**

The following pipe/slab culverts are proposed for reconstruction to box culverts:

S No	Chainage (Km)		Type	Proposed Span (m)	Remark
	Existing	Design			
1	288+828	287+013	Box Culvert	1x3.0x3.0 m	
2	289+541	287+703	Box Culvert	1x2.0x2.0 m	
3	289+660	287+822	Box Culvert	1x2.0x2.0 m	
4	290+171	288+324	Box Culvert	1x2.0x2.0 m	
5	290+497	288+640	Box Culvert	1x2.0x2.0 m	
6	290+830	288+955	Box Culvert	1x2.0x2.0 m	
7	291+203	289+334	Box Culvert	1x2.0x2.0 m	
8	291+855	289+916	Box Culvert	1x2.0x2.0 m	
9	292+093	290+089	Box Culvert	1x2.0x2.0 m	
10	292+406	290+397	Box Culvert	1x2.0x2.0 m	
11	292+503	290+490	Box Culvert	1x6.0x3.0 m	Cushion 3.0m
12	292+913	290+905	Box Culvert	1X5.0X3.0 m	
13	293+664	291+661	Box Culvert	1x2.0x2.0 m	
14	294+097	292+093	Box Culvert	1x2.0x2.0 m	
15	294+194	292+191	Box Culvert	1x2.0x2.0 m	
16	294+293	292+290	Box Culvert	1x2.0x2.0 m	
17	294+392	292+389	Box Culvert	1x2.0x2.0 m	
18	294+464	292+461	Box Culvert	1x3.0x3.0 m	
19	294+594	292+590	Box Culvert	1x3.0x3.0 m	
20	294+685	292+681	Box Culvert	1x2.0x2.0 m	
21	294+797	292+794	Box Culvert	1x2.0x2.0 m	
22	294+885	292+882	Box Culvert	1x2.0x2.0 m	
23	294+960	292+957	Box Culvert	1x2.0x2.0 m	
24	295+143	293+113	Box Culvert	1x2.0x2.0 m	
25	295+342	293+312	Box Culvert	1x2.0x2.0 m	
26	295+827	293+797	Box Culvert	1x2.0x2.0 m	
27	296+123	294+113	Box Culvert	1X5.0X3.0 m	Cushion 3.0m
28	296+399	294+389	Box Culvert	1x2.0x2.0 m	
29	296+505	294+495	Box Culvert	1x2.0x2.0 m	
30	296+696	294+686	Box Culvert	1x2.0x2.0 m	
31	297+238	295+380	Box Culvert	1X4.0x5.0 m	
32	297+470	295+612	Box Culvert	1x2.0x2.0 m	

S No	Chainage (Km)		Type	Proposed Span (m)	Remark
	Existing	Design			
33	298+166	296+418	Box Culvert	1x2.0x2.0 m	

7.2.3 Widening of Existing Culverts:

All existing culverts which are not to be reconstructed shall be widened to the roadway width of the Project Highway as per the typical cross section given in Appendix B-1 to this Schedule-B. Repairs and strengthening of existing structures where required shall be carried out.

(a) Retaining / widening of Pipe Culverts.

S No	Chainage (Km)		Type	(Nos x dia in m)	Remark
	Existing	Design			
1	291+016	289+148	Pipe	1X1.0 m	Widened Both side
2	292+753	290+744	Pipe	1X1.0 m	Widened Both side
3	295+498	293+468	Pipe	1X1.0 m	Widened Both side
4	296+250	294+240	Pipe	1X1.0 m	Widened Both side

(b) Retaining / widening of Slab Culverts

S No	Chainage (Km)		Type	Span	Remark
	Existing	Design			
1	299+313	297+475	Slab	1X1.4 m	Widened Both side

7.2.4 Additional **New culverts** shall be constructed as per particulars given in the table below:

S No	Design Chainage (Km)	Type	Proposed Span (m)	Remark
1	287+283	Box Culvert	1x3.0x2.0 m	
2	291+920	Box Culvert	1x2.0x2.0 m	
3	294+840	Box Culvert	1x2.0x2.0 m	
4	295+850	Box Culvert	1x2.0x2.0 m	
5	296+760	Box Culvert	1x3.0x3.0 m	
6	297+030	Box Culvert	1x3.0x3.0 m	

One additional culvert shall also be provided at each 'T' or 'Y' shape junction and two additional pipe culvers at each cross roads as per site condition for drainage requirement.

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

Sl. No.	Location		Type	Size	Type of repair required
	Existing	Proposed			
Necessary repair and rehabilitation / strengthening works are to be carried out for all widening and retained culverts as per site condition and as directed by Authority's Engineer.					

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

7.3. Bridges

7.3.1 Existing bridges to be re-constructed

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

a) Major Bridges:

S.No.	Location		Type of Existing structure	Span Arrangement		Deck width
	Existing	Proposed		Existing	Proposed	
NIL						

b) Minor Bridges:

S. No.	Location		Type of Existing structure	Span Arrangement		Deck width
	Existing	Proposed		Existing	Proposed	
NIL						

(ii)The following bridges shall be retained / widened:

a) Major Bridges:

S. No	Chainage (km)		Span Arrangement (m)	Outer Width (m)	Super Struc. Type	Remarks
	Design	Existing				
NIL						

b) Minor Bridges:

S. No	Chainage (km)		Span Arrangement	Outer Width	Super Structure Type	Super Structure Type
	Design	Existing	(m)	(m)		
1	288+129	289+968	1 x 6.0 (Clear span) x 3	11.0+11.0	Box Cell	Existing bridge dismantled new 4L bridge is proposed.
2	291+277	293+279	1 x 14.8	11.0+11.0	RCC T-Beam	Existing bridge dismantled new 4L bridge is proposed.
3	295+148	297+007	1 x 26.0	11.0	PSC T Beam with RCC Deck	Existing bridge retained as same, new 2L bridge is proposed.
4	296+209	297+1067	1 x 11.8	11.0	RCC T-Beam	Existing bridge retained as same, new 2L bridge is proposed.
5	297+177	299+015	1 x 6.0 (Clear span) x 3	11.0	Box Cell	Existing bridge retained as same, new 2L bridge is proposed.

Note: Necessary repair and rehabilitation/ strengthening works are to be carried out for all widening and retained bridges as per site condition and as directed by the Authority's Engineer

7.3.2 Additional New bridges:

New bridges at the following locations on the Project Highway shall be constructed. The GADs of new bridges are attached inVolume II: Drawings folder.

S. No.	Design Chainage (km)	Proposed Span (m)	Outer Width (m)	Type of Structure	Remarks
Nil					

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

S. No.	Location at km	Remarks
NIL		

7.3.4 Repairs/replacements of railing/parapets of the existing bridges shall be undertaken as follows:

S.No.	Location		Type of Existing structure	Span Arrangement	Remarks
	Existing	Proposed			
As per Note given under clause 7.3.1					

7.3.5 Drainage system for bridge decks

An effective drainage system for bridge decks shall be provided as specified in paragraph 7.20 of the Manual.

7.3.6 Structures in marine environment

Sl. No.	Location at km	Remarks
NIL		

7.4. Rail-road bridges- NIL

7.4.1 Design, construction and detailing of ROB/RUB shall be as specified insection 7 of the Manual.

7.4.2 *Road over-bridges- NIL*

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

S. No.	Chainage	Proposed Span	Type of Superstructure	Deck Width	Remarks
NIL					

7.4.3 *Road under-bridges*

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

S.No.	Location of Level crossing	Proposed Span arrangement
NIL		

7.5. Grade separated structures

S. No.	Design	Type of	Proposed	Deck width

	Chainage	Structure	Span (m)	(M)
NIL				

7.6. Repairs and strengthening of bridges and structures

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

A. Bridges

Sl. No.	Location of bridge (km)	Nature and extent of repairs/strengthening to be carried out
Repair of wearing course and partially damaged railing most of existing bridge location. Vegetation growth need to be removed from existing structure.		

B. ROB / RUB

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

C. Overpasses/Underpasses and other structures

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

7.7. W- Beam Metal Crash Barrier

The W beam crash Barriers are proposed where the embankment height is more than 3m height. The locations are as below:

S. No.	Design Chainage (Km)		TCS Type	Length (m)
	From	To		
Left Hand Side (LHS)				
1	288+132	288+500	TCS - 4	368
2	288+500	288+560	TCS - 6	60
3	288+930	289+000	TCS - 8	70
4	289+000	289+030	TCS - 5	30
5	289+030	289+070	TCS - 6	40
6	289+070	289+120	TCS - 5	50
7	289+120	289+220	TCS - 6	100

S. No.	Design Chainage (Km)		TCS Type	Length (m)
	From	To		
8	289+220	289+240	TCS - 3	20
9	289+240	289+300	TCS - 4	60
10	290+020	290+050	TCS - 6	30
11	290+050	290+250	TCS - 5	200
12	290+250	290+260	TCS - 6	10
13	290+380	290+390	TCS - 1	10
14	290+390	290+560	TCS - 8	170
15	290+880	290+980	TCS - 4	100
16	290+980	291+070	TCS - 1	90
17	291+070	291+110	TCS - 8	40
18	291+110	291+220	TCS - 7	110
19	291+220	291+269	TCS - 8	49
20	291+284	291+330	TCS - 8	46
21	291+330	291+360	TCS - 1	30
22	291+500	291+550	TCS - 1	50
23	292+450	292+500	TCS - 9	50
24	294+090	294+100	TCS - 1	10
25	294+100	294+180	TCS - 7	80
26	294+180	294+220	TCS - 8	40
27	294+220	294+270	TCS - 1	50
28	295+161	295+190	TCS-9 to TCS-1	29
29	296+040	296+090	TCS - 1	50
30	296+120	296+204	TCS - 1	84
31	296+216	296+270	TCS - 1	54
32	296+750	296+850	TCS - 1	100
RIGHT HAND SIDE (RHS)				
1	290+490	290+540	TCS - 8	50
2	291+090	291+110	TCS - 8	20
3	291+110	291+220	TCS - 7	110
4	291+220	291+269	TCS - 8	49
5	291+284	291+330	TCS - 8	46
6	291+330	291+350	TCS - 1	20
7	294+090	294+100	TCS - 1	10
8	294+100	294+180	TCS - 7	80
9	294+180	294+220	TCS - 8	40
10	294+220	294+270	TCS - 1	50
11	295+161	295+200	TCS-9 to TCS-1	39
12	295+200	295+230	TCS - 1	30

7.8. Protection Work

The Stone Masonry Breast wall have been proposed on hill side section along the roadway edge where cutting is required or cutting is more than available ROW.

Retaining walls are proposed to restrict the earth along the filling section where normal side slope crosses the available ROW. The PCC toe walls are adopted upto the height of 2m and RCC retaining wall where the required height of wall at site is more than 2m.

The project section where the hill cut heights of side slope is more than 25m, Surficial protection and Erosion Control measures have been considered and details of Typical measures for soil and Rocky surface are presented in Appendix B-1 of this Schedule B.

Breast wall and Retaining wall shall be provided in accordance with section 13 of the Manual.

1. Breast wall

The Stone masonry Breast Wall shall be provided at the following locations:

S No	Design Chainage (Km)		TCS type	Breast Wall height above GL		Length (m)	
	From	To		LHS	RHS	LHS	RHS
1	287+770	287+780	6		1.5		10
2	287+780	287+790	6		1.5		10
3	287+790	287+800	6		1.5		10
4	287+800	287+810	6		1.5		10
5	287+810	287+820	6		1.5		10
6	287+820	287+830	6		3		10
7	287+830	287+840	6		3		10
8	287+840	287+850	6		3		10
9	287+850	287+860	6		3		10
10	287+860	287+870	6		3		10
11	287+870	287+880	6		3		10
12	287+880	287+890	6		3		10
13	287+890	287+900	6		3		10
14	287+900	287+910	6		3		10
15	287+910	287+920	6		3		10
16	287+920	287+930	6		3		10
17	287+930	287+940	6		3		10
18	287+940	287+950	6	1.5	3	10	10
19	287+950	287+960	6	1.5	3	10	10
20	287+960	287+970	6	1.5	3	10	10
21	287+970	287+980	6	1.5	3	10	10
22	287+980	287+990	6	1.5	3	10	10
23	287+990	288+000	6	1.5	3	10	10
24	288+000	288+010	6	1.5	3	10	10
25	288+010	288+020	6	1.5	3	10	10

S No	Design Chainage (Km)		TCS type	Breast Wall height above GL		Length (m)	
	From	To		LHS	RHS	LHS	RHS
26	288+020	288+030	6	1.5	3	10	10
27	288+030	288+040	6	1.5	3	10	10
28	288+040	288+050	6	1.5	3	10	10
29	288+050	288+060	6	1.5	3	10	10
30	288+060	288+070	6		3		10
31	288+070	288+080	6		3		10
32	288+080	288+090	6		3		10
33	288+090	288+100	6		3		10
34	288+100	288+110	6		1.5		10
35	288+110	288+120	6		1.5		10
36	288+150	288+160	4		1.5		10
37	288+160	288+170	4		1.5		10
38	288+170	288+180	4		1.5		10
39	288+180	288+190	4		1.5		10
40	288+190	288+200	4		1.5		10
41	288+200	288+210	4		3		10
42	288+210	288+220	4		3		10
43	288+220	288+230	4		1.5		10
44	288+230	288+240	4		1.5		10
45	288+240	288+250	4		1.5		10
46	288+250	288+260	4		1.5		10
47	288+260	288+270	4		1.5		10
48	288+270	288+280	4		1.5		10
49	288+280	288+290	4		1.5		10
50	288+290	288+300	4		1.5		10
51	288+300	288+310	4		1.5		10
52	288+310	288+320	4		1.5		10
53	288+320	288+330	4		1.5		10
54	288+330	288+340	4		1.5		10
55	288+340	288+350	4		1.5		10
56	288+350	288+360	4		1.5		10
57	288+360	288+370	4		1.5		10
58	288+370	288+380	4		1.5		10
59	288+380	288+390	4		1.5		10
60	288+390	288+400	4		1.5		10
61	288+400	288+410	4		1.5		10
62	288+410	288+420	4		1.5		10
63	288+420	288+430	4		3		10
64	288+430	288+440	4		3		10
65	288+440	288+450	4		3		10
66	288+450	288+460	4		3		10

S No	Design Chainage (Km)		TCS type	Breast Wall height above GL		Length (m)	
	From	To		LHS	RHS	LHS	RHS
67	288+460	288+470	4		3		10
68	288+470	288+480	4		3		10
69	288+480	288+490	4		3		10
70	288+490	288+500	4		3		10
71	288+500	288+510	6		3		10
72	288+510	288+520	6		3		10
73	288+520	288+530	6		3		10
74	288+530	288+540	6		3		10
75	288+540	288+550	6		3		10
76	288+550	288+560	6		3		10
77	288+560	288+570	6		3		10
78	288+570	288+580	6		3		10
79	288+580	288+590	6		3		10
80	288+590	288+600	6		3		10
81	288+600	288+610	6		3		10
82	288+610	288+620	6		3		10
83	288+620	288+630	6		3		10
84	288+630	288+640	6		3		10
85	288+640	288+650	6		3		10
86	288+650	288+660	6		3		10
87	288+660	288+670	6		3		10
88	288+670	288+680	6		3		10
89	288+680	288+690	6		3		10
90	288+690	288+700	6		3		10
91	288+700	288+710	6		3		10
92	288+710	288+720	6		3		10
93	288+720	288+730	6		3		10
94	288+730	288+740	6	1.5	3	10	10
95	288+740	288+750	6	1.5	3	10	10
96	288+750	288+760	6	1.5	3	10	10
97	288+760	288+770	6	1.5	3	10	10
98	288+770	288+780	6	1.5	3	10	10
99	288+780	288+790	6	1.5	3	10	10
100	288+790	288+800	6	3	3	10	10
101	288+800	288+810	6	1.5	3	10	10
102	288+810	288+820	6	1.5	3	10	10
103	288+820	288+830	6	1.5	3	10	10
104	288+830	288+840	6	1.5	3	10	10
105	288+840	288+850	6	1.5	3	10	10
106	288+850	288+860	6		3		10
107	288+860	288+870	6		3		10
108	288+870	288+880	6		3		10

S No	Design Chainage (Km)		TCS type	Breast Wall height above GL		Length (m)	
	From	To		LHS	RHS	LHS	RHS
109	289+120	289+130	6		3		10
110	289+130	289+140	6		3		10
111	289+140	289+150	6		3		10
112	289+150	289+160	6		3		10
113	289+160	289+170	6		3		10
114	289+170	289+180	6		1.5		10
115	289+180	289+190	6		1.5		10
116	289+190	289+200	6		1.5		10
117	289+200	289+210	6		1.5		10
118	289+210	289+220	6		1.5		10
119	289+370	289+380	6		1.5		10
120	289+380	289+390	6		1.5		10
121	289+390	289+400	6		1.5		10
122	289+400	289+410	6		1.5		10
123	289+410	289+420	6		1.5		10
124	289+420	289+430	6		1.5		10
125	289+430	289+440	6		1.5		10
126	289+440	289+450	6		1.5		10
127	289+450	289+460	6		1.5		10
128	289+460	289+470	6		1.5		10
129	289+470	289+480	6		1.5		10
130	289+480	289+490	6		1.5		10
131	289+490	289+500	6		3		10
132	289+500	289+510	6		3		10
133	289+510	289+520	6		3		10
134	289+520	289+530	6		3		10
135	289+530	289+540	6		3		10
136	289+540	289+550	6		3		10
137	289+550	289+560	6		3		10
138	289+560	289+570	6		3		10
139	289+570	289+580	6	1.5	3	10	10
140	289+580	289+590	2	1.5	3	10	10
141	289+590	289+600	2	1.5	3	10	10
142	289+600	289+610	2	1.5	3	10	10
143	289+610	289+620	2	3	3	10	10
144	289+620	289+630	2	3	3	10	10
145	289+630	289+640	2	3	3	10	10
146	289+640	289+650	2	3	3	10	10
147	289+650	289+660	2	3	3	10	10
148	289+660	289+670	2	3	3	10	10

S No	Design Chainage (Km)		TCS type	Breast Wall height above GL		Length (m)	
	From	To		LHS	RHS	LHS	RHS
149	289+670	289+680	2	3	3	10	10
150	289+680	289+690	2	3	3	10	10
151	289+690	289+700	2	3	3	10	10
152	289+700	289+710	2	3	3	10	10
153	289+710	289+720	2	3	3	10	10
154	289+720	289+730	2	3	3	10	10
155	289+730	289+740	2	3	3	10	10
156	289+740	289+750	2	3	3	10	10
157	289+750	289+760	2	1.5	3	10	10
158	289+760	289+770	2	1.5	3	10	10
159	289+770	289+780	6	1.5	3	10	10
160	289+780	289+790	6	1.5	3	10	10
161	289+790	289+800	6		3		10
162	289+800	289+810	6		3		10
163	289+810	289+820	6		3		10
164	289+820	289+830	6		3		10
165	289+830	289+840	6		1.5		10
166	289+840	289+850	6		1.5		10
167	289+850	289+860	6		1.5		10
168	289+860	289+870	6		1.5		10
169	290+000	290+010	6		1.5		10
170	290+010	290+020	6		1.5		10
171	290+020	290+030	6		3		10
172	290+030	290+040	6		3		10
173	290+040	290+050	6		3		10
174	290+050	290+060	5		3		10
175	290+060	290+070	5		3		10
176	290+070	290+080	5		3		10
177	290+080	290+090	5		3		10
178	290+090	290+100	5		3		10
179	290+100	290+110	5		3		10
180	290+110	290+120	5		3		10
181	290+120	290+130	5		3		10
182	290+130	290+140	5		3		10
183	290+140	290+150	5		3		10
184	290+150	290+160	5		3		10
185	290+160	290+170	5		3		10
186	290+170	290+180	5		3		10
187	290+180	290+190	5		3		10
188	290+190	290+200	5		3		10
189	290+200	290+210	5		3		10

S No	Design Chainage (Km)		TCS type	Breast Wall height above GL		Length (m)	
	From	To		LHS	RHS	LHS	RHS
190	290+210	290+220	5		3		10
191	290+220	290+230	5		3		10
192	290+230	290+240	5		3		10
193	290+240	290+250	5		3		10
194	290+250	290+260	6		3		10
195	290+260	290+270	6		3		10
196	290+270	290+280	6		3		10
197	290+280	290+290	6		3		10
198	290+290	290+300	6		3		10
199	290+300	290+310	6		3		10
200	290+310	290+320	6		3		10
201	290+320	290+330	6		1.5		10
202	290+560	290+570	6		1.5		10
203	290+570	290+580	6		3		10
204	290+580	290+590	6		3		10
205	290+590	290+600	6		1.5		10
206	290+600	290+610	6		1.5		10
207	290+610	290+620	6		1.5		10
208	290+620	290+630	6		1.5		10
209	290+630	290+640	6		1.5		10
210	290+640	290+650	6		1.5		10
211	290+650	290+660	6				
212	290+660	290+670	6		1.5		10
213	290+670	290+680	6		1.5		10
214	290+680	290+690	6		1.5		10
215	290+690	290+700	6		1.5		10

2. Toe/Retaining wall:

Retaining walls shall be designed considering appropriate height as per site condition. The PCC walls have been adopted upto the height of 2m only and RCC retaining walls for height more than 2m.The proposal shall be got approved from the Authority Engineer. The minimum length and height details of Toe Wall are as below:

Details of Toe Walls:

S No	Design Chainage (Km)		TCS Type	Toe wall height above GL (m)		Length (m)	
	From	To		LHS	RHS	LHS	RHS
1	287000	287010	8	0.832		10	
2	287010	287020	8	0.485		10	

S No	Design Chainage (Km)		TCS Type	Toe wall height above GL (m)		Length (m)	
	From	To		LHS	RHS	LHS	RHS
3	287020	287030	8	0.240		10	
4	288190	288200	4	1.606		10	
5	288200	288210	4	1.238		10	
6	288210	288220	4	0.986		10	
7	288220	288230	4	0.850		10	
8	288230	288240	4	0.686		10	
9	288240	288250	4	0.503		10	
10	288250	288260	4	0.545		10	
11	288260	288270	4	0.537		10	
12	288270	288280	4	0.490		10	
13	288280	288290	4	0.571		10	
14	288290	288300	4	0.657		10	
15	288300	288310	4	0.725		10	
16	288310	288320	4	0.955		10	
17	288320	288330	4	1.022		10	
18	288330	288340	4	0.779		10	
19	288340	288350	4	0.783		10	
20	288350	288360	4	0.845		10	
21	288360	288370	4	1.042		10	
22	288370	288380	4	1.224		10	
23	288380	288390	4	1.089		10	
24	288390	288400	4	0.721		10	
25	288400	288410	4	0.379		10	
26	288410	288420	4	0.038		10	
27	288420	288430	4	0.100		10	
28	288430	288440	4	0.100		10	
29	288440	288450	4	0.339		10	
30	288450	288460	4	1.480		10	
31	288460	288470	4	1.143		10	
32	288470	288480	4	0.763		10	
33	288480	288490	4	0.409		10	
34	288490	288500	4	0.369		10	
35	288930	288940	8	0.317		10	
36	288940	288950	8	1.237		10	
37	288950	288960	8	1.084		10	
38	288960	288970	8	0.955		10	
39	288970	288980	8	0.901		10	
40	288980	288990	8	0.922		10	
41	288990	289000	8	0.834		10	
42	289000	289010	5	0.485		10	

S No	Design Chainage (Km)		TCS Type	Toe wall height above GL (m)		Length (m)	
	From	To		LHS	RHS	LHS	RHS
43	289010	289020	5	0.277		10	
44	289020	289030	5	0.146		10	
45	289070	289080	5	0.231		10	
46	289080	289090	5	0.465		10	
47	289090	289100	5	0.708		10	
48	289100	289110	5	0.636		10	
49	289110	289120	5	0.250		10	
50	289240	289250	4	0.619		10	
51	289250	289260	4	0.915		10	
52	289260	289270	4	1.211		10	
53	289270	289280	4	1.265		10	
54	289280	289290	4	0.930		10	
55	289290	289300	4	0.673		10	
56	290050	290060	5	0.418		10	
57	290060	290070	5	0.243		10	
58	290070	290080	5	0.078		10	
59	290080	290090	5	0.178		10	
60	290090	290100	5	0.357		10	
61	290100	290110	5	0.457		10	
62	290110	290120	5	0.258		10	
63	290120	290130	5	0.298		10	
64	290130	290140	5	0.547		10	
65	290140	290150	5	0.613		10	
66	290150	290160	5	0.851		10	
67	290160	290170	5	1.061		10	
68	290170	290180	5	1.548		10	
69	290180	290190	5	1.743		10	
70	290190	290200	5	1.653		10	
71	290200	290210	5	1.625		10	
72	290210	290220	5	1.535		10	
73	290220	290230	5	1.428		10	
74	290230	290240	5	1.057		10	
75	290240	290250	5	0.588		10	
76	290390	290400	8	0.441		10	
77	290400	290410	8	1.352		10	
78	290550	290560	8	0.868		10	
79	290880	290890	4	1.458		10	

S No	Design Chainage (Km)		TCS Type	Toe wall height above GL (m)		Length (m)	
	From	To		LHS	RHS	LHS	RHS
80	290960	290970	4	1.518		10	
81	290970	290980	4	0.804		10	
82	291070	291080	8	0.187		10	
83	291080	291090	8	0.198		10	
84	291090	291100	8	1.353		10	
85	291110	291120	7		0.660		10
86	291120	291130	7		1.338		10
87	291130	291140	7	1.882	2.018	10	10
88	291140	291150	7	1.726	2.205	10	10
89	291150	291160	7	1.533	1.901	10	10
90	291160	291170	7	1.340	1.260	10	10
91	291170	291180	7	0.851	1.358	10	10
92	291180	291190	7	1.313	1.683	10	10
94	291190	291200	7	1.606	1.601	10	10
95	291200	291210	7	1.898	0.293	10	10
97	291210	291220	7	1.470	0.061	10	10
98	291220	291230	8	1.760		10	
99	291230	291240	8	1.854		10	
100	291260	291269	8	0.228		9	
101	291284	291290	8		1.973		6
102	291290	291300	8	0.235		10	
103	291300	291310	8	1.020	1.817	10	10
104	291310	291320	8	2.262	0.795	10	10
105	291320	291330	8	0.543		10	
106	294100	294110	7	0.714	0.726	10	10
107	294110	294120	7		1.950		10
108	294120	294130	7		1.473		10
109	294130	294140	7		1.011		10
110	294140	294150	7		0.578		10
111	294150	294160	7		0.508		10
112	294160	294170	7	1.929	0.390	10	10
113	294170	294180	7	1.584	0.200	10	10
114	294180	294190	8	1.342		10	
115	294190	294200	8	1.226		10	
116	294200	294210	8	0.949		10	
117	294210	294220	8	0.566		10	

S No	Design Chainage (Km)		TCS Type	Toe wall height above GL (m)		Length (m)	
	From	To		LHS	RHS	LHS	RHS
118	295161	295170	9 to 1	1.024		9	
119	295170	295180	9 to 1	0.387		10	

Details of Retaining Walls:

S No	Design Chainage (Km)		TCS type	Retaining Wall height above GL		Length (m)	
	From	To		LHS	RHS	LHS	RHS
1	288120	288130	4	4.012		10	
2	288130	288140	4	4.021		10	
3	288140	288150	4	4.082		10	
4	288150	288160	4	3.672		10	
5	288160	288170	4	3.075		10	
6	288170	288180	4	2.532		10	
7	288180	288190	4	2.041		10	
16	290410	290420	8	2.075		10	
17	290420	290430	8	3.170		10	
18	290430	290440	8	4.027		10	
19	290440	290450	8	4.388		10	
20	290450	290460	8	4.552		10	
21	290460	290470	8	4.157		10	
22	290470	290480	8	4.150		10	
23	290480	290490	8	4.304		10	
24	290490	290500	8	4.283		10	
25	290500	290510	8	4.059		10	
26	290510	290520	8	3.957		10	
27	290520	290530	8	2.837		10	
28	290530	290540	8	2.985		10	
29	290540	290550	8	3.546		10	
32	290890	290900	4	3.289		10	
33	290900	290910	4	4.690		10	
34	290910	290920	4	5.346		10	
35	290920	290930	4	4.987		10	
36	290930	290940	4	4.371		10	
37	290940	290950	4	2.817		10	
38	290950	290960	4	2.282		10	
41	291100	291110	8	2.089		10	
42	291110	291120	7	2.265		10	
43	291120	291130	7	2.014		10	

52	291240	291250	8	2.050		10	
53	291250	291260	8	2.118		10	
56	291290	291300	8		2.345		10
60	294110	294120	7	2.630		10	
61	294120	294130	7	3.314		10	
62	294130	294140	7	2.999		10	
63	294140	294150	7	2.264		10	
64	294150	294160	7	2.114		10	

4. Stone Pitching

The Stone pitching has been adopted to protect the erosion of embankment side slope where the river stream are very close and may damage the side slope. The minimum locations on the project highway are as below:

S. No.	Design Chainage (Km)		Length (m)	Avg. height (m)	Side
	From	To			
1	288+132	288+500	368	3.50	LHS
2	289+220	289+240	20	3.00	LHS
3	289+240	289+300	60	3.50	LHS
4	290+880	290+980	100	1.50	LHS

(b) Surficial Protection and Erosion Control Measures (Cut Height of Side Slope >25m)

The Hill side surficial protection and erosion control measures is proposed at locations where the cut height of side slope is more than 25m.

The minimum details of locations with length and average height are as below and may be finalized in consultation with the Authority Engineer.

S No	Design Chainage (m)		Length (m)	Average Height (m)
	From	To		
Nil				

Hill side Typical Surficial Protection and Erosion Control Measures for cut height of side slope more than 25m are presented in Appendix-1 of this Schedule B and described below:

(a) Hill side Toe Gabion wall for Isolated Soil Strata- Mechanically woven Zn+10%Al with PVC coated steel wire mesh gabion toe wall with minimum height of wall 3.0 m shall be constructed for the locations wherever soil strata is encountered after cutting at the toe of hill side slope. Gabion toe wall shall be constructedalong with non-woven geotextile behind the gabion for filtration & separation and road edge drain.

(b) Surficial Protection for Rocky Strata -Continuously threaded anchors shall be installed wherever rocky strata are encountered on the slope.Surficial protection with secured drapery system shall be done for full length and height of cut slope surface developed by cutting the rock with slope angle of 80 degree with horizontal after excavation, wherever rocky strata is encountered. Surface protection for rocky strata shall be done by high resistance double twisted hexagonal Zn+5%Al coated wire mesh with top, bottom and surface continuously threaded anchors. Top, bottom and surface anchors shall have minimum length and minimum diameter as 3.0 m and 25 mm respectively. Top and bottom anchors shall be provided at a maximum spacing of 1.5 m and 3.0 m c/c in longitudinal direction respectively. Surface anchors shall be provided with maximum spacing of 3 m c/c in longitudinal and vertical directions for total area. All rock anchors shall be fully grouted. Minimum yield strength of anchorages shall be 500 MPa.

(c) Erosion Control Measures for Soil Surface - Self drilling anchors shall be installed wherever collapsible strata is encountered on the slope. Erosion control measures shall be adopted for cut slope wherever soil strata is encountered at the surface and slope angle shall be limited to 45 degrees or flatter with horizontal after the excavationupto proposed right of way. Three dimensional reinforced synthetic geomat shall be used for erosion control measures along with hydraulically applied erosion control measures. Self Drilling Anchors shall be used for supporting geomat along with u-pins. Minimum length and outer diameter of self drilling anchors shall be 1 m and 32 mm respectively. Self drilling anchors shall be provided with maximum spacing of 3 m c/c in longitudinal and vertical directions.

(d) Drainage Measures for Cut Slopes - Drainage measures for internal seepage in the cut slope shall be adopted by installing PVC pipes inside the slope. PVC pipes for internal seepage shall be half perforated and lined with geotextile. PVC pipes shall be installed for minimum 4 m length at spacing of 4 m c/c in longitudinal direction in minimum 4 layers at the bottom of the cut slope. Top drain shall also be constructed at the toe wherever soil strata is encountered after rocky strata. In addition to the above mentioned drainage measures, suitable surface drainage measures shall be adopted as per the site condition.

8. Traffic Control Devices and Road Safety Works

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

8.1. Traffic signs, Pavement marking and Safety barriers

a) **Traffic Signs:**

Traffic signs include roadside signs, overhead signs and curb mounted signs along the entire Project Highway as per section 9 of Manual.

b) **Pavement marking:**

Pavement markings shall cover road marking for the entire Project Highway as per section 9 of Manual

c) **Safety Barrier:**

Provide W-beam crash barrier, and parapet walls along the project highway as suggested in the section 9 of Manual.

8.2. Specifications of the Reflective Sheeting

The prismatic Reflective sheeting shall be provided in accordance with the para 9.2.3 of the Manual.

9. Roadside Furniture

a. Roadside furniture shall be provided in accordance with the provisions of Section 9and 12 of the Manual and as given in Schedule-C.

b. Overhead traffic signs: location and size

Overhead traffic signs are provided as per site requirement according to paragraph 9.2.5 of the Manual and as given in Schedule-C.
Major Road Junctions

a) Delineators: Delineators for the entire Project Highway

10. Compulsory Afforestation

NIL

11. Hazardous Locations

The hazardous locations those require safety barriers are the locations such as Road Side obstacles, Sharp Curves, Bridge approaches and any other locations identified in consultation with Authority Engineer during the execution of project highway.

(a) The safety barriers shall be provided on both side of curves with radius upto 450m as per clause 9.7.1 of Manual at the following hazardous locations on:

S No	CHAINAGE		Length	Remark (Curve Radius)
	Start	End		
Inner edge on Median				
1	287+021	287+377	357	-360
2	287+384	287+760	376	360
3	287+991	288+293	302	-360
4	288+333	288+782	450	360
5	288+827	289+092	265	-360
6	289+521	289+879	357	360
7	289+945	290+220	275	-360

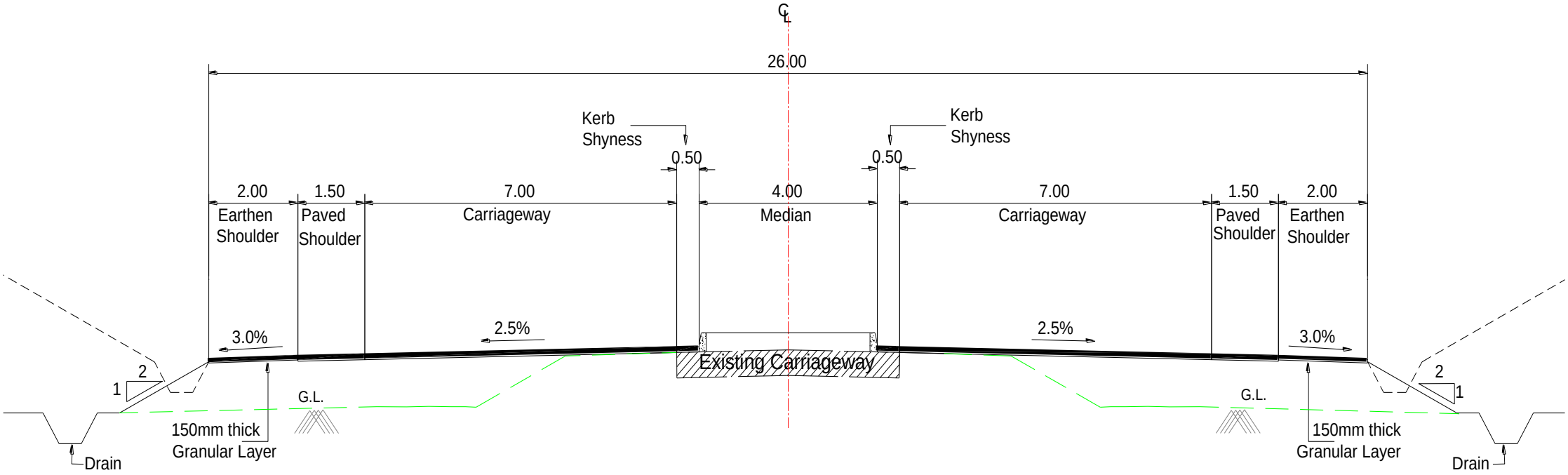
Outer Edge left Side				Outer Edge right Side			
S No	CHAINAGE		Length	S No	CHAINAGE		Length
	Start	End			Start	End	
1	287+384	287+760	376	1	287+021	287+377	357
2	288+560	288+782	222	2	287+991	288+293	302
3	289+521	289+879	357	3	288+827	289+092	265
				4	289+945	290+220	275

12. Special Requirement for Hill Roads

In accordance with the Section 13 of the Manual and recommended practices for treatment of Embankment and road side slope erosion control.

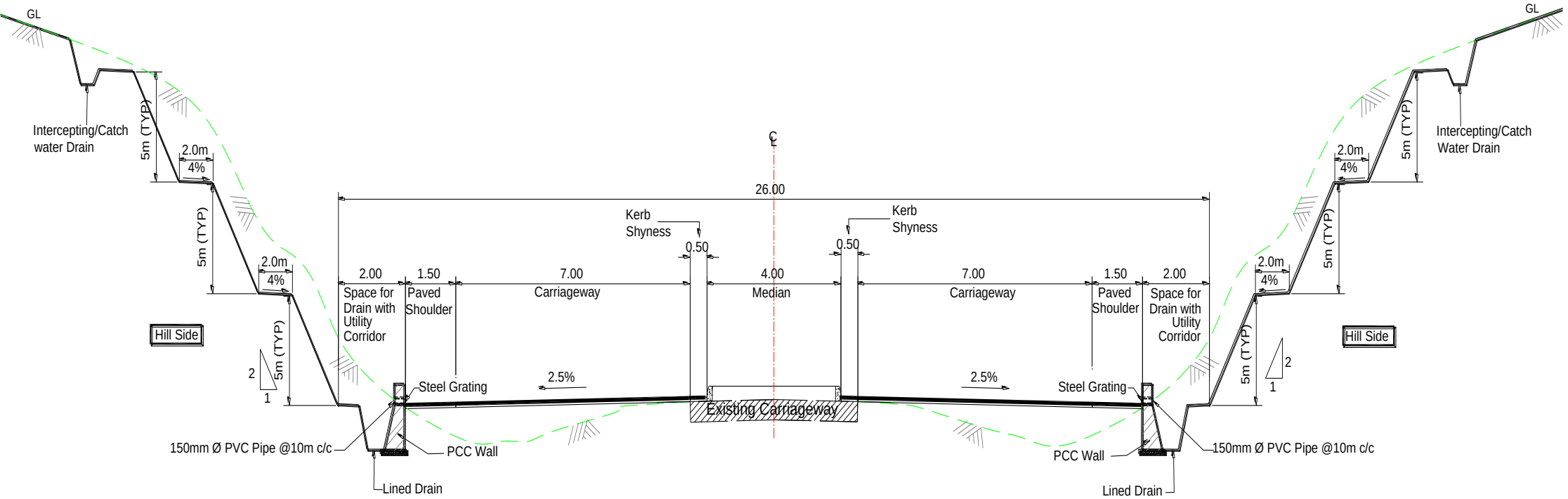
13. Change of Scope: The length of Structures and bridges specified hereinabove shall be treated as an approximate assessment. The actual lengths as required on the basis of detailed investigations shall be determined by the Contractor in accordance with the Specifications and Standards. Any variations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

Appendix B1 - Typical Cross Sections

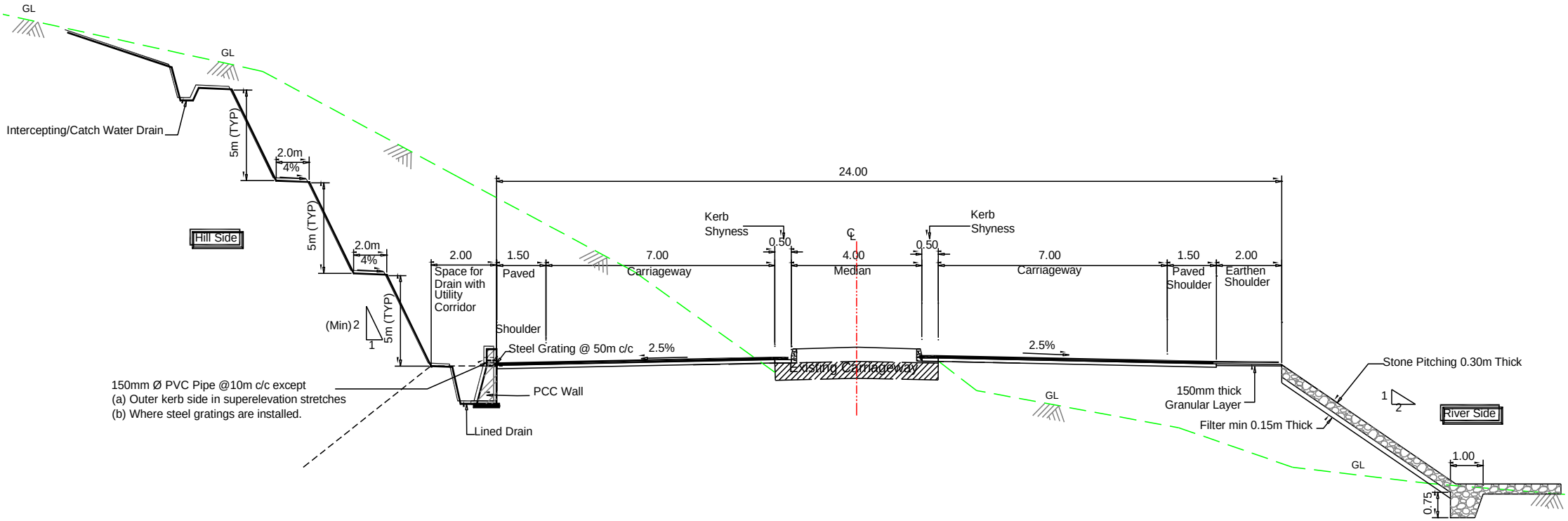


TCS-1 : 4-Lane Divided Carriageway With Raised Media

(Normal Fill/Cut Section– Rural Section)

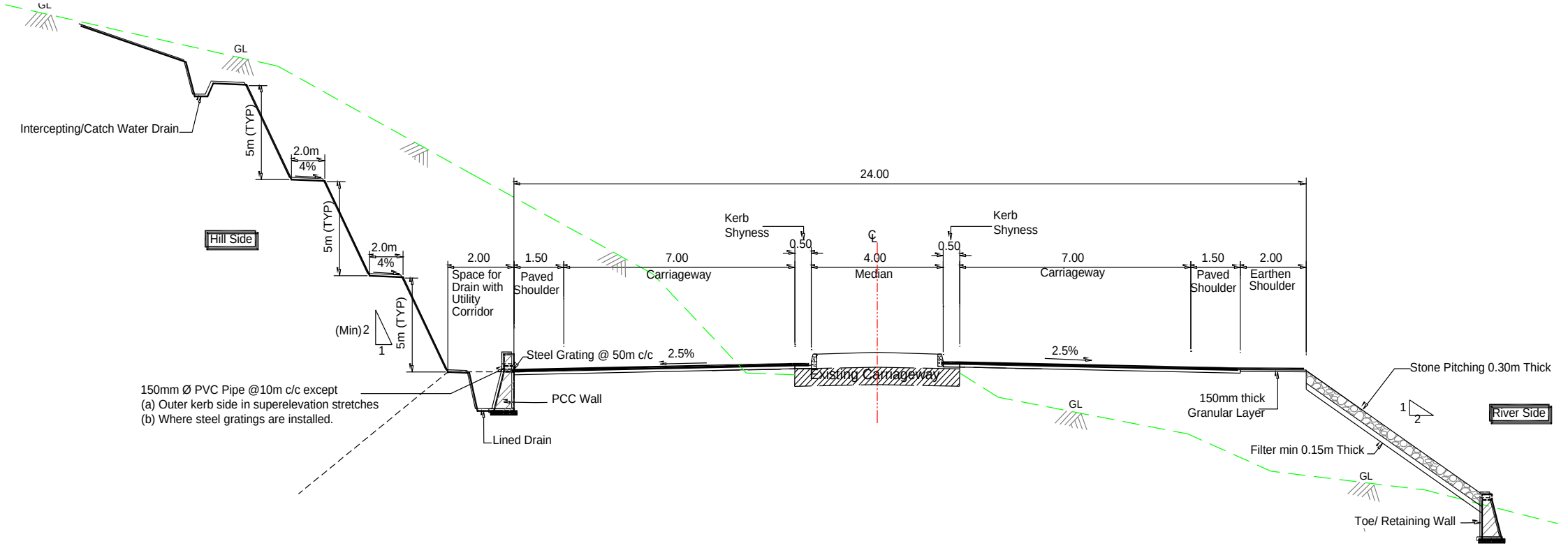


TCS-2 : 4-Lane Divided Carriageway with Both-sideHill Cutting



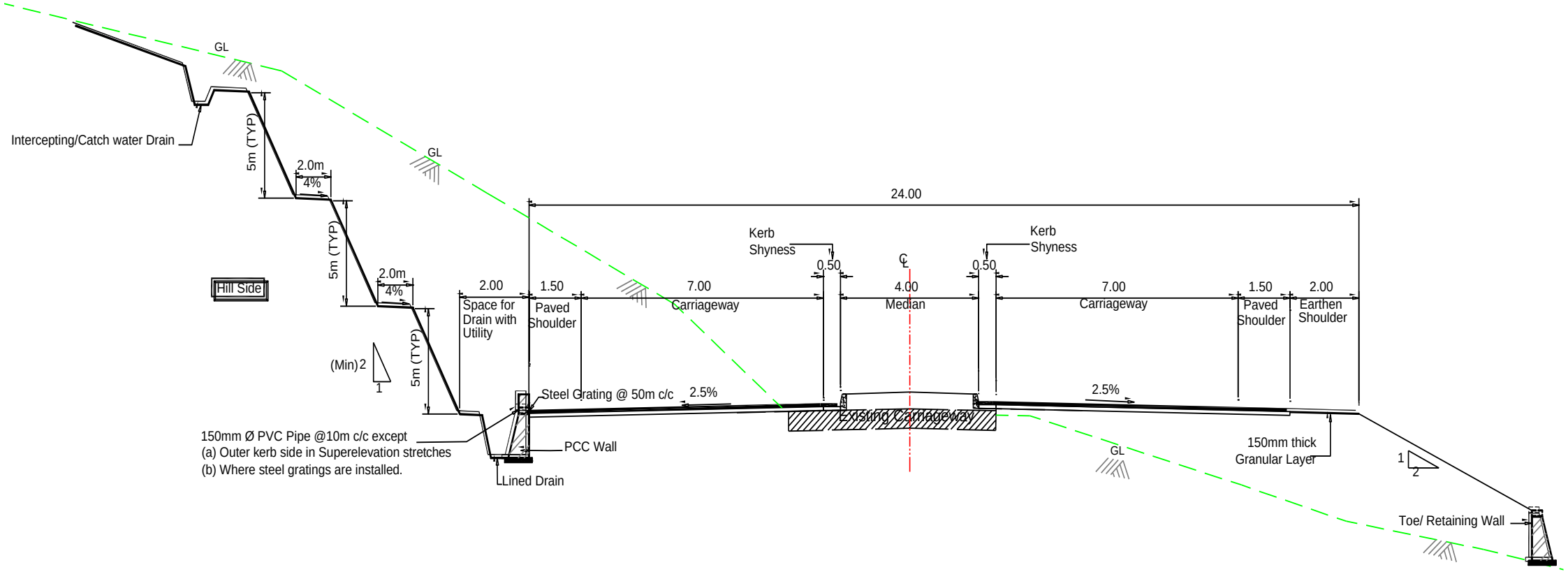
TCS-3 :4-Lane Divided Carriageway

(Hill Side Cutting / Fill and River Side Stone Pitching)



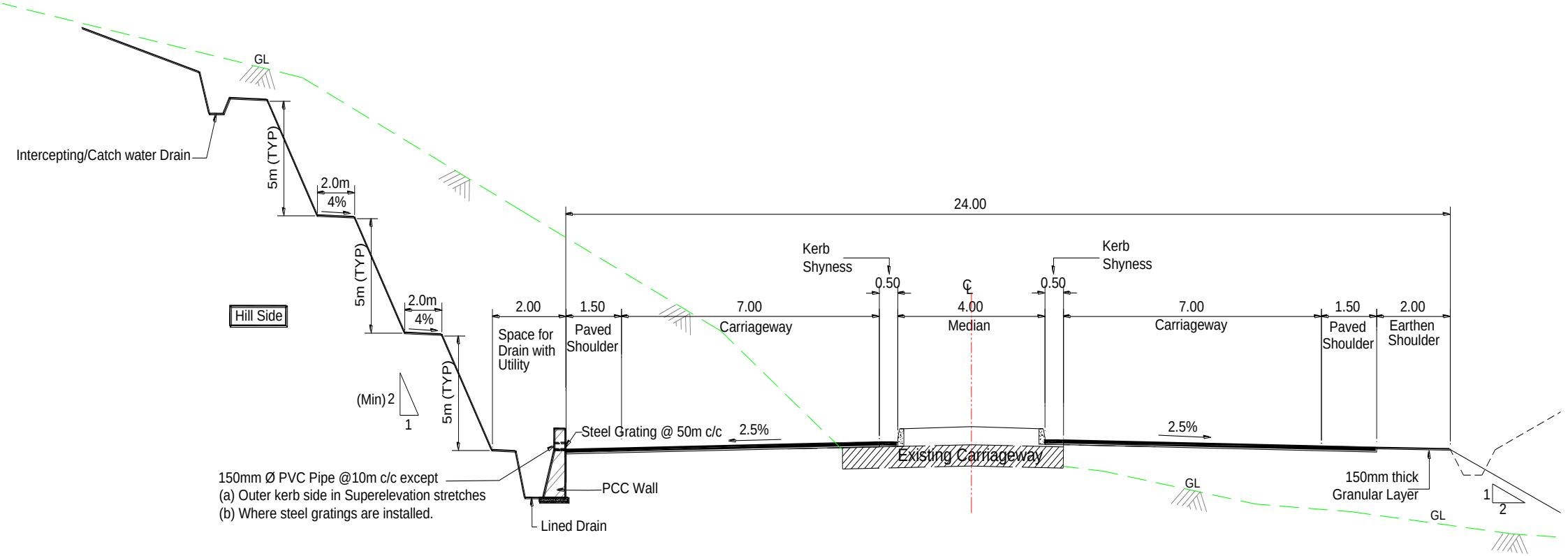
TCS-4 : 4-Lane Divided Carriageway

(Hill Side Cutting / Fill and River Side Stone Pitching with Toe/Retaining Wall)

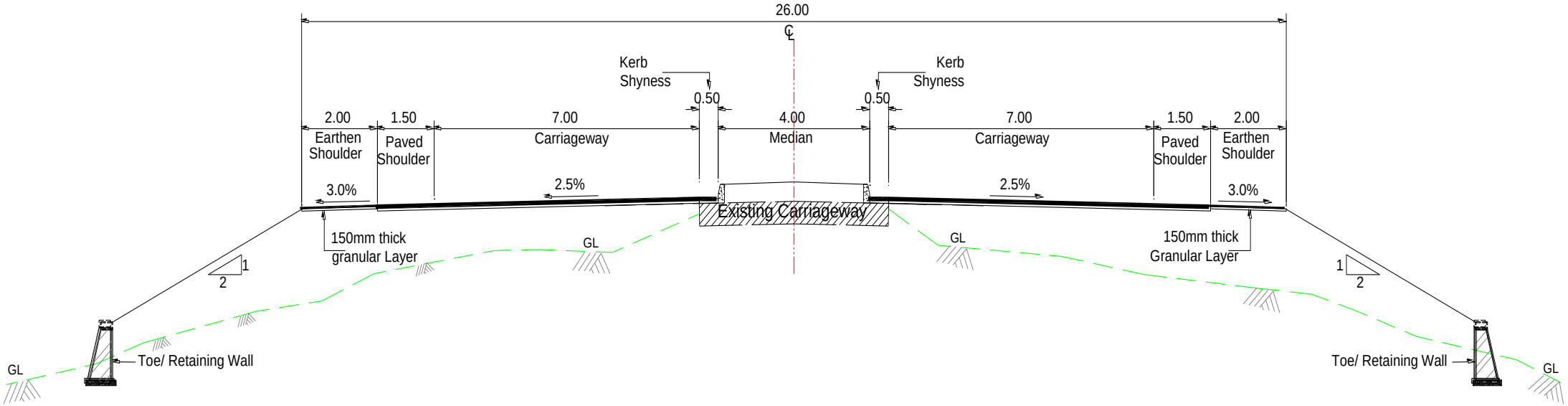


TCS-5 : 4-Lane Divided Carriageway

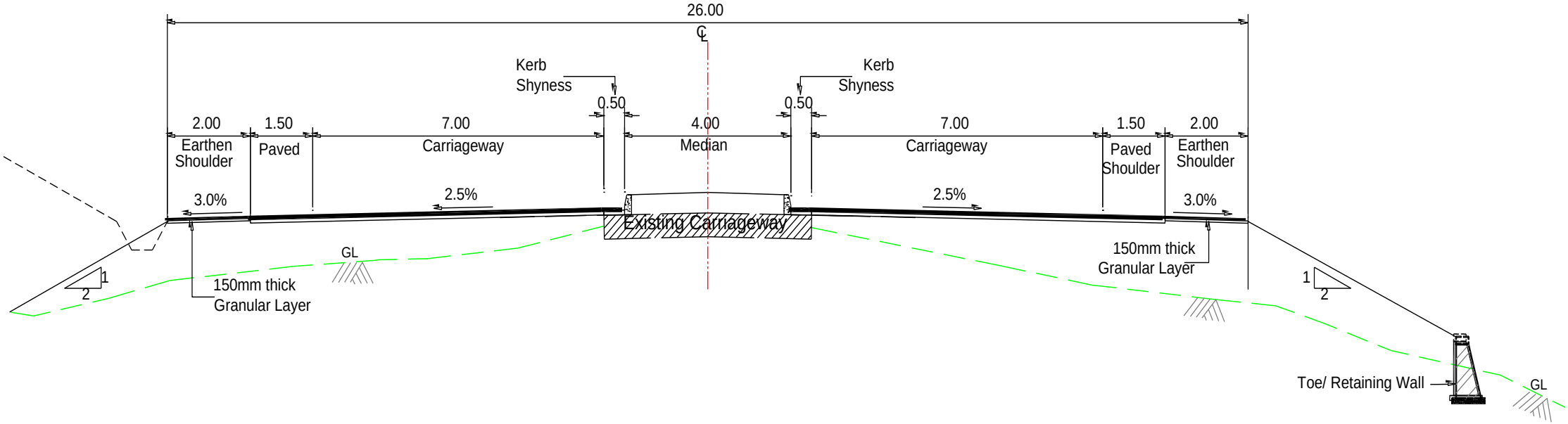
(One Side Hill Cutting and Other Side Toe/Retaining Wall)



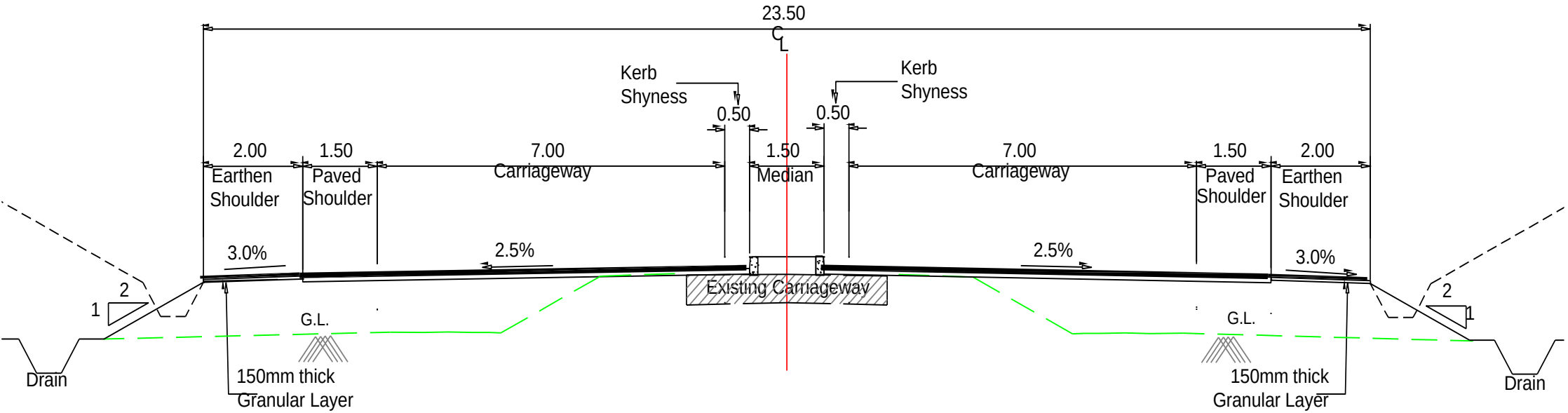
TCS-6 : 4-Lane Divided Carriageway
(One Side Hill Cutting and Other Side normal Cut/Fill Section)



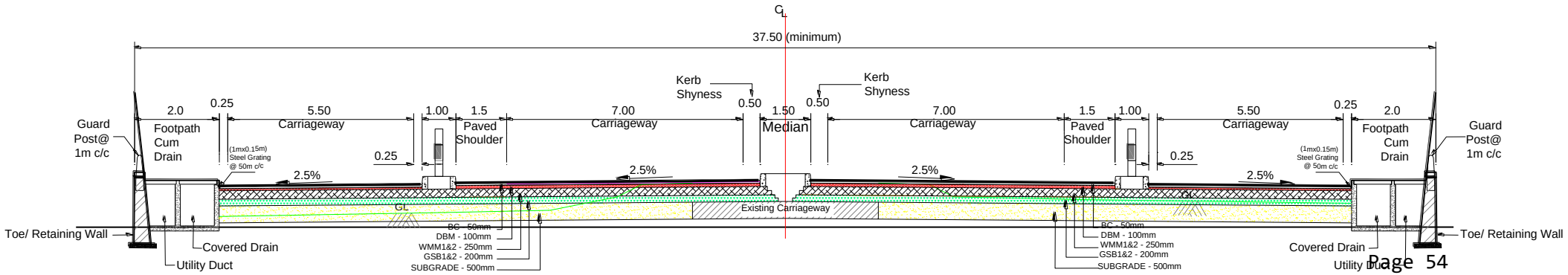
TCS-7 : 4-Lane Divided Carriageway with Bothside Toe/Retaining Walls



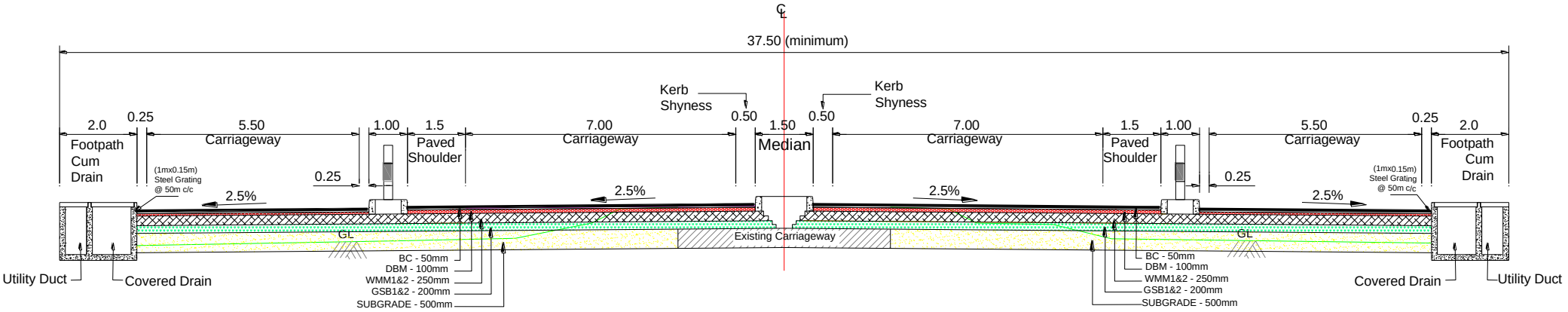
TCS-8 : 4-Lane Divided Carriageway
(One Side Retaining Wall and Other Side normal Cut/Fill Section)



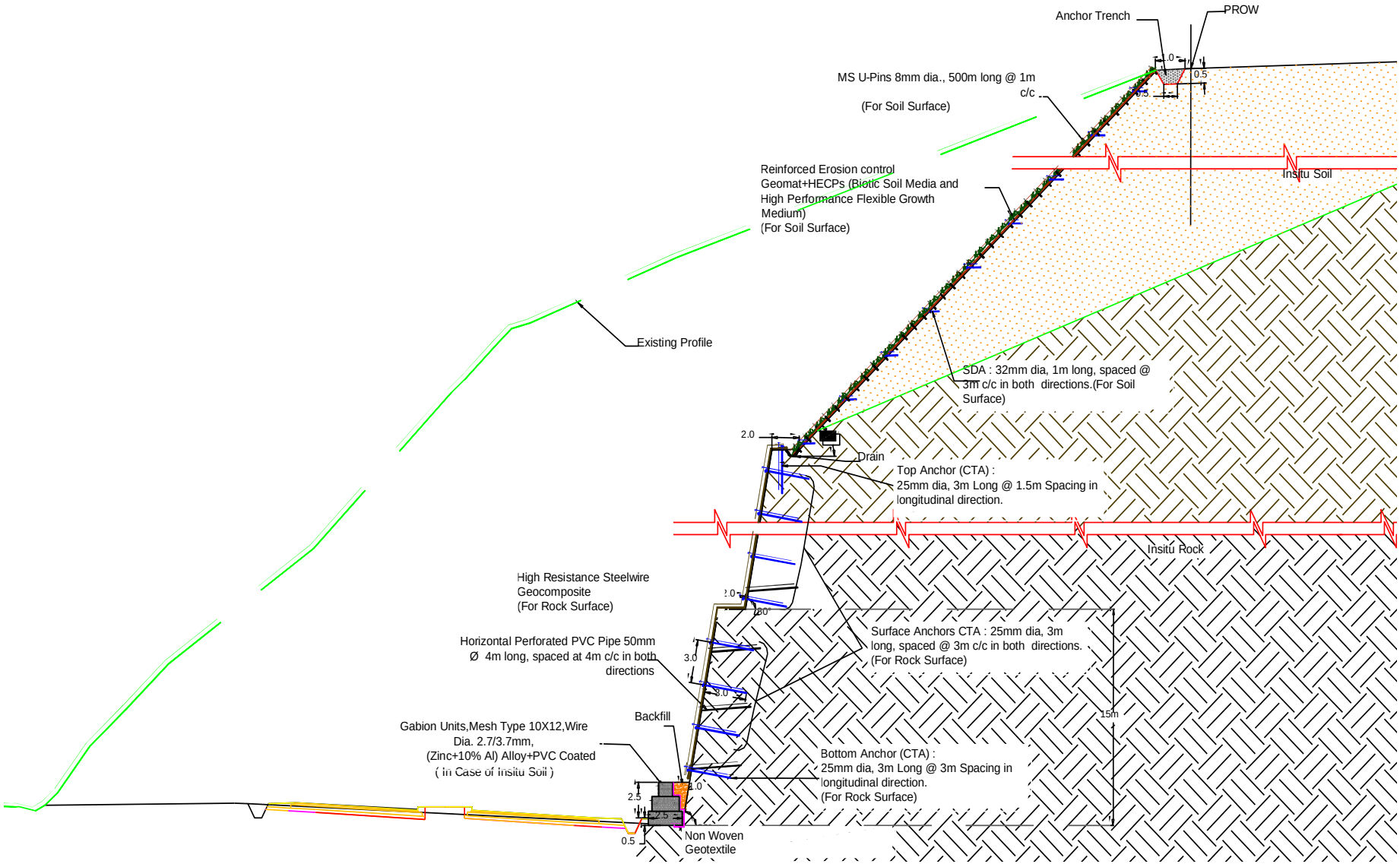
TCS-9 : 4-Lane Divided Carriageway WithCut/Fill (Semi Built up Area)



TCS - 11 : 4-Lane Divided Carriageway with Service Road (Built up Area)
(with Teo / Retaining wall or Breast wall as per Site Condition)



TCS - 12 : 4-Lane Divided Carriageway with Service Road (Market Area)



Typical Surficial Protection and Erosion Control Measures(Cut Height of Side Slope > 25m)

Applicable Stretches of Typical Cross-section

S No	Design Chainage (Km)		Length (m)	TCS Type
	From	To		
1	287+000	287+030	30	8
2	287+030	287+640	610	6
3	287+640	287+770	130	1
4	287+770	288+126	356	6
5	288+126	288+132	6	BRG
6	288+132	288+500	368	4
7	288+500	288+880	380	6
8	288+880	288+930	50	1
9	288+930	289+000	70	8
10	289+000	289+030	30	5
11	289+030	289+070	40	6
12	289+070	289+120	50	5
13	289+120	289+220	100	6
14	289+220	289+240	20	3
15	289+240	289+300	60	4
16	289+300	289+580	280	6
17	289+580	289+770	190	2
18	289+770	289+870	100	6
19	289+870	290+000	130	1
20	290+000	290+050	50	6
21	290+050	290+250	200	5
22	290+250	290+330	80	6
23	290+330	290+390	60	1
24	290+390	290+560	170	8
25	290+560	290+700	140	6
26	290+700	290+880	180	1
27	290+880	290+980	100	4
28	290+980	291+070	90	1
29	291+070	291+110	40	8
30	291+110	291+220	110	7
31	291+220	291+269	49	8
32	291+269	291+284	15	BRG
33	291+284	291+330	46	8
34	291+330	291+600	270	1
35	291+600	291+700	100	1 to 12
36	291+700	292+190	490	12
37	292+190	292+210	20	11
38	292+210	292+350	140	12
39	292+350	292+450	100	12 to 9
40	292+450	293+400	950	9
41	293+400	293+500	100	9 to 1
42	293+500	294+100	600	1

S No	Design Chainage (Km)		Length (m)	TCS Type
	From	To		
43	294+100	294+180	80	7
44	294+180	294+220	40	8
45	294+220	294+300	80	1
46	294+300	294+400	100	1 to 9
47	294+400	295+100	700	9
48	295+100	295+135	35	9 to 1
49	295+135	295+161	26	BRG
50	295+161	295+200	39	9 to 1
51	295+200	296+204	1004	1
52	296+204	296+216	12	BRG
53	296+216	297+175	959	1
54	297+175	297+181	6	BRG
55	297+181	297+700	519	1

Total Length (m) of each TCS:		
TCS-1	4072	4 Lane Divided Carriageway with 4m Raised Median- Normal Cut/Fill section in Rural Section
TCS-2	190	4 Lane Divided Carriageway with 4m Raised Median- Both side Hill Cutting with PCC Toe wall cum lined drain
TCS-3	20	4 Lane Divided Carriageway with 4m Raised Median- Hill side Cutting/Normal Filling and River side Stone Pitching on
TCS-4	528	4 Lane Divided Carriageway with 4m Raised Median- Hill side Cutting/Normal Filling and River side Stone Pitching on Embankment with Toe/Retaining wall
TCS-5	280	4 Lane Divided Carriageway with 4m Raised Median- One side Hill Cutting with PCC Toe wall cum lined drain and other side Toe/ Retaining wall
TCS-6	2136	4 Lane Divided Carriageway with 4m Raised Median- One side Hill Cutting with PCC Toe wall cum lined drain and other side Normal Cut/Fill
TCS-7	190	4 Lane Divided Carriageway with 4m Raised Median- Both side Toe/Retaining walls
TCS-8	445	4 Lane Divided Carriageway with 4m Raised Median- One side Normal Cut/Fill and other side Toe/Retaining wall
TCS-9	1650	4 Lane Divided Carriageway with 1.5m Raised Median- Normal Cut/Fill section in Semi Built up Area
TCS-11	20	4-Lane Divided Carriageway with 1.5m Raised Median & both side Service Road with Footpath cum Drain (with Teo / Retaining wall or Breast wall as per Site Condition)(at Built up Area)
TCS-12	630	4-Lane Divided Carriageway with 1.5m Raised Median & both side Service Road with Footpath cum Drain at Market Area.
Varies	474	
Bridges	65	Bridge Section as per GAD

(Schedule B-1)

The shifting of utilities and felling of trees shall be carried out by the Contractor. The cost of the same shall be borne by the Authority.

Annex – I

SCHEDULE - C

PROJECT FACILITIES

1. Project Facilities

The Contractor shall construct the Project Facilities described in this Annex-I to form part of the Two Lane with Paved Shoulders Project Highway. Such Project Facilities shall include:

(a) Toll Plaza

(b) Roadside furniture;

(c) Pedestrian facilities;

(d) Tree plantation;

(e) Truck lay-byes;

(f) Bus-bays and bus shelters;

(g) Median Opening

(h) Utility duct

(i) Others to be specified

1. Operational and maintenance base camp
2. Utilities

2. Description of Project Facilities

Each of the Project Facilities is described below:

a) Roadside furniture

The roadside furniture shall include the provision of the;

i.Traffic Signs

Traffic signs include roadside signs, overhead signs and curb mounted signs along the entire Project Highway as per manual recommended in Schedule D. locations of the sign boards shall be finalized with the consultation of Authority Engineer.

ii.Pavement Markings

Pavement markings shall cover road marking for the entire Project Highway as per the manual recommended in Schedule D. locations of the sign boards shall be finalized with the consultation of Authority Engineer.

iii.LED Traffic Blinkers

For all **Pedestrian** cross walks along the alignment, at all Major Junction locations and at Curve locations where curve radius not confirming to minimum radius as per design standards and any other locations specified in relevant manual recommended in Schedule D.

iv.Crash barrier

Provide W-beam Steel crash barrier along the Project Highway at the locations as suggested in the manual recommended in Schedule D.

No W-Beam Steel crash barrier is required where already masonry/ concrete parapet wall is provisioned.

v.Delineators

Delineators for the entire project highway at the locations as recommend in relevant IRC Manual (mentioned in Schedule D) or as directed by Authority's Engineer shall be provided.

vi.Boundary stones

For the entire project highway as recommend in relevant IRC Manual (mentioned in Schedule D) shall be provided.

vii. Hectometer/Kilometer stones

For the entire project highway as recommend in relevant IRC Manual (mentioned in Schedule D) shall be provided

b) Pedestrian Facilities

i. Pedestrian Guard Rail: Provide pedestrian guard rail at each bus stop location, shall be provided.

ii. Additional Pedestrian facilities shall be provided at vulnerable locations as per specifications and standards specified in Schedule D.

c) Landscaping and Tree Plantation

Landscaping: At major intersections, interchange etc.

Landscaping within ROW of the project highway shall be done as per specifications and standards specified in Schedule D.

d) Truck Lay-Byes: NIL

e) Bus Bays/Bus Shelters

Bus Bays (15m length and 3.5m width) with ghost island (width=1.5m) and taper of 100m length on bothside as per Figure 12.2 of IRC:SP:84-2014 are proposed at following locations. The design of bus shelters should be aesthetically pleased with surrounding. However, locations shall be decided with Authority & Authority's Engineer at site. The minimum number of bus bays/ shelters is given below.

S No	Design Chainage (Km)	Side	Location
1	288+710	Both	Takpakhul
2	290+910	Both	Pangmoul
3	292+000	Both	Motbung (Urban)
4	294+850	Both	Kanglatongbi
5	295+520	Both	Kanglatongbi

f) Median Opening

The median opening of 20m length are proposed at following locations with both side storage lanes of 3.5m for 55mlength (minimum) where the proposed median width is 4m:

S No	Design Chainage (m)	Median Width (m)	Name of Place
1	288+400	4	
2	290+650	4	Pangmoul
3	291+650	4 to 1.5	Motbong
4	292+100	1.5	Motbong
5	293+200	1.5	Motbong
6	294+600	1.5	Vijaynagar
7	295+600	4	Kanglatongbi

g) Utility Duct

A 600mm diameter NP-4 Pipe with inspection box/chamber as per clause 2.16 of IRC:SP:84-2014 are proposed.

Design Chainage (Km)		Length	No. Utility Duct	Built-up Area
From	To			
291+700	292+350	650	2	Motbong

h) Others: NIL

1. Operational and maintenance base camp- NIL

2. Utilities- NIL

3. Rainwater Harvesting- NIL

SCHEDULE – D

(Refer Clause 2.1)

SPECIFICATIONS AND STANDARDS

1. Construction

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

2. Design Standards

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

Manual of Specifications and Standards for Four Laning of Highways through Public Private Partnership (IRC: SP: 84-2014), referred to herein as the Manual.

Annex - I

(Schedule-D)

Specifications and Standards for Construction of Project Highway

1. Specifications and Standards

All Materials, works and construction operations shall conform to the Manual of Specifications and Standards for Four Laning of Highways through Public Private Partnership (IRC: SP: 84-2014), referred to as the Manual and MoR&TH Specifications for Road and Bridge Work (Fifth Revision 2013). Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Authority's Engineer.

2. Deviations from the Specifications and Standards

2.1 The terms "Concessionaire", "Independent Engineer" and "Concession Agreement" used in the Manual shall be deemed to be substituted by the terms "Contractor", "Authority Engineer" and "Agreement" respectively.

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

S. No	Clause No	Description	Deviation to Clause
1	**2.5.1**	Median width in Open country with isolated built up area	The median width of 2.5 including Kerb Shyness of 0.5m on either side has been adopted in TCS-9 and TCS-10

Schedule -E

(See Clauses 2.1 and 14.2)

Maintenance Requirements

1. Maintenance Requirements

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

(ii) The Contractor shall repair or rectify any Defect or deficiency set forth in Paragraph2 of this Schedule-E within the time limit specified therein and any failure in this behalf shall constitute non-fulfilment of the Maintenance obligations by the Contractor. Upon occurrence of any breach hereunder, the Authority shall be entitled to effect reduction in monthly lump sum payment as set forth in Clause 14.6 of this Agreement, without prejudice to the rights of the Authority under this Agreement, including Termination thereof.

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

[Specify all the relevant documents]

2. Repair/rectification of Defects and deficiencies

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

3. Other Defects and deficiencies

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

4. Extension of time limit

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

5. Emergency repairs/restoration

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

6. Daily inspection by the Contractor

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

7. Pre-monsoon inspection / Post-monsoon inspection

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

8. Repairs on account of natural calamities

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

Annex –I

(Schedule-E)

Repair/rectification of Defects anddeficiencies

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

Table -1: Maintenance Criteria forPavements:

AssetType	Performance Parameter	Level ofService (LOS)		Frequency of Inspection	Tools/Equipment	Standards and Referencesfor Inspection and DataAnalysis	Time limitfor Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
Flexible Pavement (Pavement of MCW, Service Road, approache	Potholes	Nil	< 0.1% of area and subjectto limit of 10 mmin depth	Daily	Length Measurement Unitlike Scale,Tape, odometer etc.	IRC 82: 2015 and DistressIdentification Manual for Long TermPavement Performance Program, FHWA 2003(http://www.tfhrc.com/pavement/lttp/reports/03031/)	24-48hours	MORT&H Specification 3004.2

AssetTypes ofGrade structure, approachesof connecting roads,slip roads,lay byes etc. as applicable)	**Performance Parameter**	**Level ofService (LOS)**		**Frequency of Inspection**	**Tools/Equipment**	**Standards and Referencesfor Inspection and DataAnalysis**	**Time limitfor Rectification/ Repair**	**Maintenance Specifications**
		Desirable	**Acceptable**					
	Cracking	Nil	< 5% subjectto limitof 0.5sqm forany 50 m length	Daily			7-15 days	MORT&H Specification3004.3
	Rutting	Nil	< 5mm	Daily	Straight Edge		15 -30days	MORT&H Specification3004.2
	Corrugations and Shoving	Nil	< 0.1% ofarea	Daily	Length Measurement Unitlike		2-7days	IRC:82-2015

AssetType	Performance Parameter	Level ofService (LOS)		Frequency of Inspection	Tools/Equipment	Standards and Referencesfor Inspection and DataAnalysis	Time limitfor Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
	Bleeding	Nil	< 1 %of area	Daily	Scale,Tape, odometer etc.		3-7days	MORT&H Specification3004.4
	Ravelling / Stripping	Nil	< 1 %of area	Daily			7-15 days	IRC:82-2015read with IRCSP 81
	Edge Deformation/ Breaking	Nil	< 1 mfor any100 msection and width < 0.1 mat any location,restricte	Daily			7- 15days	IRC:82-2015

AssetType	Performance Parameter	Level ofService (LOS)		Frequency of Inspection	Tools/Equipment	Standards and Referencesfor Inspection and DataAnalysis	Time limitfor Rectification/ Repair	Maintenance Specifications
		Desirable	**Acceptable**					
			d to30 cmfrom theedge					
	Roughness BI	2000 mm/km	2400 mm/km	Bi-Annually	Class I Profilometer SCRIM (Sideway-force Coefficient Routine Investigation Machineor equivalent)	Class I Profilometer : ASTM E950 (98) :2004 –Standard Test Method for measuring Longitudinal Profile of Travelled Surfaces with Accelerometer Established Inertial Profiling Reference ASTM E1656 -94: 2000- Standard Guide for Classification of Automatic Pavement Condition Survey Equipment	180days	IRC:82-2015
	Skid Number	60SN	50SN	Bi-Annually			180days	BS:7941-1: 2006
	Pavement Condition Index	3	2.1	Bi-Annually			180days	IRC:82-2015

AssetType	Performance Parameter	Level ofService (LOS)		Frequency of Inspection	Tools/Equipment	Standards and Referencesfor Inspection and DataAnalysis	Time limitfor Rectification/ Repair	Maintenance Specifications
		Desirable	**Acceptable**					
	Other PavementDistresses			Bi-Annually			2-7days	IRC:82-2015
	Deflection/RemainingLife			Annually	Falling Weight Deflectometer	IRC 115: 2014	180days	IRC:115-2014
Rigid Pavement (PavementofMCW, ServiceRoad,Grade structure,	Roughness BI	2200mm/km	2400mm/km	Bi-Annually	Class I Profilometer	ASTM E950 (98) :2004 and ASTM E1656-94:2000	180days	IRC:SP:83-2008
	Skid	Skid Resistance no. at different speed of vehicles		Bi-Annually	SCRIM (Sideway-force	IRC:SP:83-2008	180days	IRC:SP:83-2008

AssetType	Performance Parameter	Level ofService (LOS)		Frequency of Inspection	Tools/Equipment	Standards and Referencesfor Inspection and DataAnalysis	Time limitfor Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
approaches of connecting roads, slip roads,lay byes etc. as applicable)		Minimum SN	Traffic Speed(Km/h)		Coefficient Routine Investigation Machineor equivalent)			
		36	50					
		33	65					
		32	80					
		31	95					
		31	110					

AssetType	Performance Parameter	Level ofService (LOS)		Frequency of Inspection	Tools/Equipment	Standards and Referencesfor Inspection and DataAnalysis	Time limitfor Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
Embankment/ Slope	Edgedrop at shoulders	Nil	40mm	Daily	Length Measurement Unitlike Scale,Tape, odometer	IRC	7-15 days	MORT&H Specification408.4
	Slopeof camber/crossfall	Nil	<2% variation in prescribedslope of camber/cross fall	Daily			7-15 days	MORT&H Specification408.4
	EmbankmentSlopes	Nil	<15% variation in prescribe	Daily			7-15 days	MORT&H Specification408.4

AssetType	Performance Parameter	Level ofService (LOS)		Frequency of Inspection	Tools/Equipment	Standards and Referencesfor Inspection and DataAnalysis	Time limitfor Rectification/ Repair	Maintenance Specifications
		Desirable	**Acceptable**					
			side slope					
	Embankment Protection	Nil	Nil	Daily	NA		7-15 days	MORT&H Specification
	RainCuts/ Gulliesin slope	Nil	Nil	Daily Specially During Rainy Season	NA		7-15 days	MORT&H Specification

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

Table -2: **Maintenance Criteria for RigidPavements:**

S.No.	Type ofDistress	Measured Parameter	Degreeof Severity	AssessmentRating	RepairAction	
					For the case d < D/2	For the case d > D/2
CRACKING						
1	**Single Discrete Cracks Not intersecting withany joint**	w = width ofcrack L = length ofcrack d = depth of crack D = depth ofslab	0	Nil, notdiscernible	NoAction	Not applicable
			1	w < 0.2 mm. hair cracks		
			2	w = 0.2 - 0.5 mm, discerniblefrom slow-movingcar	Seal withoutdelay	Seal, and stitch if L> lm.
			3	w = 0.5 - 1.5 mm, discerniblefrom fast-movingcar		Within7days

S.No.	Type ofDistress	Measured Parameter	Degreeof Severity	AssessmentRating	RepairAction	
					For the case d < D/2	For the case d > D/2
			4	w = 1.5 - 3.0mm	Seal, and stitch if L > l m. Within 7days	Staple or DowelBar Retrofit, FDRfor affectedportion. Within 15days
			5	w > 3mm.		
2	**Single Transverse (or Diagonal)Crack intersecting withone or morejoints**	w = width ofcrack L = length ofcrack d = depth of crack D = depth ofslab	0	Nil, notdiscernible	NoAction	
			1	w < 0.2 mm, hair cracks	Route and seal with epoxy. Within 7days	Staple or DowelBar Retrofit. Within 15days
			2	w = 0.2 - 0.5 mm, discerniblefrom slowvehicle		
			3	w = 0.5 - 3.0 mm, discerniblefrom fastvehicle	Route, seal and stitch,if L > 1m. Within 7days	

S.No.	Type ofDistress	Measured Parameter	Degreeof Severity	AssessmentRating	RepairAction	
					For the case d < D/2	For the case d > D/2
			4	w = 3.0 - 6.0mm	Dowel BarRetrofit. Within 15days	Full DepthRepair Dismantle and reconstructaffected. Portion withnorms and specifications-See Para 5.5 &9.2 Within 15days
			5	w > 6 mm, usually associatedwith spalling, and/or slab rockingunder traffic	Not Applicable, as it may befull depth	
3	**SingleLongitudinal Crackintersecting with one ormore joints**	w = width ofcrack L = length ofcrack d = depth ofcrack D = depth ofslab	0	Nil, notdiscernible	NoAction	
			1	w < 0.5 mm, discernable fromslow movingvehicle	Seal with epoxy, if L >1 m. Within 7days	Staple or dowelbar retrofit. Within 15days

S.No.	Type ofDistress	Measured Parameter	Degreeof Severity	AssessmentRating	RepairAction	
					For the case d < D/2	For the case d > D/2
			2	w = 0.5 - 3.0 mm, discerniblefrom fastvehicle	Route seal and stitch, ifL > lm. Within 15days	-
			3	w = 3.0 - 6.0mm	Staple, if L > 1m. Within 15days	Partial DepthRepair withstapling. Within 15days
			4	w = 6.0 - 12.0 mm, usually associated with spalling	Not Applicable, as it may befull depth	
			5	w > 12 mm, usually associatedwith spalling, and/or slab rockingunder traffic		Full DepthRepair Dismantle and reconstructaffected portion as pernorms and specifications -

S.No.	Type ofDistress	Measured Parameter	Degreeof Severity	AssessmentRating	RepairAction	
					For the case d < D/2	**For the case d > D/2**
						See Para5.6.4 Within 15days
4	**Multiple Cracks intersecting withone or morejoints**	**w = width ofcrack**	0	Nil, notdiscernible	NoAction	-
			1	w < 0.2 mm, hair cracks	Seal, and stitch if L > l m. Within 15days	
			2	w = 0.2 - 0.5 mm. discerniblefrom slowvehicle		
			3	w = 0.5 - 3.0 mm, discerniblefrom fastvehicle	Full depth repairwithin 15days	Dismantle,Reinstate subbase, Reconstructwhole slab as per specificationswithin 30days
			4	w = 3.0 - 6.0 mm panel brokeninto 2 or 3 pieces		
			5	w > 6 mm and/or panel broken		

S.No.	Type ofDistress	Measured Parameter	Degreeof Severity	AssessmentRating	RepairAction	
					For the case d < D/2	For the case d > D/2
				into more than 4 pieces		
5	**CornerBreak**	w = width of crack L = length ofcrack	0	Nil, notdiscernible	NoAction	-
			1	w < 0.5 mm; only 1 cornerbroken	Seal with lowviscosity epoxyto secure broken parts Within 7days	Seal with epoxyseal withepoxy Within 7days
			2	w < 1.5 mm; L < 0.6 m, onlyone cornerbroken		
			3	w < 1.5 mm; L < 0.6 m, twocorners broken	Partial Depth (ReferFigure 8.3of IRC:SP:83-2008) Within 15days	Full depth repair
			4	w > 1.5 mm; L > 0.6 m orthree cornersbroken		
			5	ree or four cornersbroken		Reinstate sub-base, and reconstruct the

S.No.	Type ofDistress	Measured Parameter	Degreeof Severity	AssessmentRating	RepairAction	
					For the case d < D/2	**For the case d > D/2**
						slab as pernorms andspecifications within30days
6	**Punchout (Applicable to ContinuousReinforced Concrete Pavement (CRCP) only)**	w = width ofcrack L = length(m/m2)	0	Nil, notdiscernible		NoAction
			1	w < 0.5 mm; L < 3m/m^2	Not Applicable, as itmay be fulldepth	Seal withlow viscosity epoxyto secure broken parts. Within 15days
			2	either w > 0.5 mm or L < 3m/m^2		
			3	w > 1.5 mm and L < 3 m/m^2		
			4	w > 3 mm, L < 3 m/m^{2}and deformation		Full depth repair-Cut out andreplace damaged areataking care not todamage reinforcement. Within 30days
			5	w>3mm,L>3m/m^{2}and deformation		

<table>
<tr><th rowspan="2">S.No.</th><th rowspan="2">Type ofDistress</th><th rowspan="2">Measured Parameter</th><th rowspan="2">Degreeof Severity</th><th rowspan="2">AssessmentRating</th><th colspan="2">RepairAction</th></tr>
<tr><th>For the case d < D/2</th><th>For the case d > D/2</th></tr>
<tr><td colspan="7">Surface Defects</td></tr>
<tr><td rowspan="5">7</td><td rowspan="5">Ravelling or Honeycomb type surface</td><td rowspan="5">r = areadamaged surface/totalsurface of slab (%) h = maximumdepth ofdamage</td><td>0</td><td>Nil, notdiscernible</td><td>ShortTerm
Noaction.</td><td>LongTerm<br rowspan="5">NotApplicable</td></tr>
<tr><td>1</td><td>r < 2%</td><td rowspan="2">Local repair of areas damaged and liable to be damaged.
Within 15days</td></tr>
<tr><td>2</td><td>r = 2 - 10%</td></tr>
<tr><td>3</td><td>r =10-25%</td><td rowspan="2">Bonded Inlay, 2 or 3 slabs if affecting.</td></tr>
<tr><td>4</td><td>r = 25 - 50%</td></tr>
</table>

S.No.	Type ofDistress	Measured Parameter	Degreeof Severity	AssessmentRating	RepairAction	
					For the case d < D/2	**For the case d > D/2**
					Within 30days	
			5	r > 50% and h > 25mm	Reconstruct slabs, 4or more slabs if affecting. Within 30days	
8	**Scaling**	r = damagedsurface/totalsurface of slab (%) h = maximumdepth ofdamage	0	Nil, notdiscernible	**ShortTerm**	**LongTerm**
					Noaction.	NotApplicable
			1	r <**2 %**	Local repair of areas damaged and liable to be damaged. Within 7days	
			2	r = 2 - 10%		

S.No.	Type ofDistress	Measured Parameter	Degreeof Severity	AssessmentRating	RepairAction	
					For the case d < D/2	For the case d > D/2
			3	r = 10 - 20%	Bonded Inlay within15 days	
			4	r = 20 - 30%		
			5	r > 30 % and h > 25mm	Reconstruct slabwithin 30days	
9	**Polished Surface/Glazing**	t = texturedepth, sand patchtest	0		Noaction.	NotApplicable
			1	t > 1mm		
			2'	t = 1 - 0.6mm	Monitor rate of deterioration	
			3	t = 0.6 - 0.3mm		
			4	t = 0.3 - 0.1mm		

S.No.	Type ofDistress	Measured Parameter	Degreeof Severity	AssessmentRating	RepairAction	
					For the case d < D/2	For the case d > D/2
			5	t < 0.1 mm	Diamond Grinding if affecting 50% or more slabs in a continuous stretch of minimum 5km. Within 30days	
10	**Popout (SmallHole), Pothole ReferPara 8.4**	n = number/m^2d = diameter h = maximumdepth	0	d < 50 mm; h < 25 mm; n < 1 per5 m^2	Noaction.	NotApplicable
			1	d = 50 - 100 mm; h < 50 mm; n <1 per 5 m^2	Partial depth repair65 mmdeep. Within 15days	
			2	d = 50 - 100 mm; h > 50 mm; n <1 per 5 m^2		

S.No.	Type ofDistress	Measured Parameter	Degreeof Severity	AssessmentRating	RepairAction	
					For the case d < D/2	For the case d > D/2
			3	d = 100 - 300 mm; h < 100 mm n < 1 per 5m^2	Partial depth repair110mm i.e.10 mm more than the depth of the hole. Within 30days	
			4	d = 100 - 300 mm; h > 100 mm; n< 1 per 5m^2		
			5	d > 300 mm; h > 100 mm: n > 1per 5 m^2	Full depthrepair. Within 30days	

JointDefects						
11	**Joint SealDefects**	loss or damage L = Length as %total joint length	0	Difficult todiscern.	**ShortTerm** Noaction.	**LongTerm** NotApplicable
			1	Discernible, L< 25% but of littleimmediate consequence withregard to ingress of wateror trappingincompressible material.	Clean joint, inspectlater.	
			3	Notable.L>25% insufficientprotection against ingress ofwater and trapping incompressiblematerial.	Clean and reapply sealantin selected locations. Within 7days	
			5	Severe; w > 3mm negligible protection against ingress ofwater	Clean, widen and reseal thejoint. Within 7days	

				and trapping incompressiblematerial.		
12	**Spalling ofJoints**	w = width oneither side of the joint L= lengthofspalled portion (as %joint length)	0	Nil, notdiscernible	Noaction.	NotApplicable
			1	w < 10mm	Apply low viscosity epoxyresin/ mortar in crackedportion.	
			2	w = 10 - 20 mm, L <25%	Within 7days	
			3	w = 20 - 40 mm, L >25%	Partial Depth Repair. Within 15days	
			4	w = 40 - 80 mm, L >25%	30 - 50 mm deep, h = w + 20%of w, within 30days	
			5	w > 80 mm, and L > 25%	50 - 100 mm deeprepair. H = w + 20% ofw. Within 30days	
13	**Faulting (or Stepping)**	f = difference oflevel	0	not discernible, < 1 mm	Noaction.	Noaction.

	in Cracks or Joints		1	f < 3mm		
			2	f = 3 - 6mm	Determine cause and observe,take action for diamondgrinding	Replace the slabas appropriate. Within 30days
			3	f = 6 - 12mm	DiamondGrinding	
			4	f= 12 - 18 mm	Raise sunkenslab.	Replace the slabas appropriate. Within 30days
			5	f> 18mm	Strengthen subgrade andsub-base by groutingand raising sunkenslab	
14	**Blowup or Buckling**	h = vertical displacementfrom normalprofile	0	Nil, notdiscernible	**ShortTerm**	**LongTerm**
			1	h < 6mm	NoAction	
			2	h = 6 - 12mm	Install Signs to WarnTraffic	

			3	h = 12 - 25 mm	within 7days	
			4	h > 25mm	Full DepthRepair. Within 30days	
			5	shattered slabs, ie 4or more pieces	Replace broken slabs. Within 30days	
15	**Depression**	h = negativevertical displacementfrom normal profile L =length	0	Not discernible, h < 5mm	Noaction.	NotApplicable
			1	h = 5 - 15mm		
			2	h = 15-30 mm, Nos<20% joints	Install Signs to WarnTraffic within 7days	
			3	h = 30 - 50 mm		
			4	h > 50 mm or >20% joints	Strengthensubgrade. Reinstate pavement at normallevel	

			5	h > 100mm	if L < 20m. Within 30days	
16	**Heave**	h = positivevertical displacementfrom normalprofile. L = length	0	Not discernible. h <5 mm	**ShortTerm**	**LongTerm**
					Noaction.	scrabble
			1	h = 5 - 15mm	Followup.	
			2	h = 15 - 30 mm, Nos <20%joints	Install Signs toWarn Traffic within 7days	
			3	h = 30 - 50 mm		
			4	h > 50 mm or >20% joints	Stabilise subgrade. Reinstate pavement at normal level if length < 20 m. Within 30days	
			5	h > 100mm		
17	**Bump**	h = vertical	0	h < 4mm	Noaction	

		displacement from normalprofile	1	h = 4 - 7mm	Grind, in case of new construction within 7days	ConstructionLimit for New Construction.
			3	h = 7 - 15mm	Grind, in case of ongoingMaintenance within 15days	Replace in caseof newconstruction. Within 30days
			5	h > 15mm	Full DepthRepair. Within 30days	Full DepthRepair. Within 30days
18	**Lane to Shoulder Drop-off**	f = differenceof level	0	Nil, not discernible <3mm	**ShortTerm** Noaction.	**LongTerm**
			1	f = 3 - 10mm	Spot repair ofshoulder within 7 days	
			2	f = 10 - 25 mm		
			3	f = 25 - 50 mm	Fill upshoulder	

			4	f = 50 - 75 mm	within 7days	For any 100m stretchReconstruct shoulder, if affecting 25%or more ofstretch. Within 30days
			5	f > 75mm		
Drainage						
19	**Pumping**	quantity offines and waterexpelled through open joints andcracks Nos	0	not discernible	NoAction	
			1 to2	slight/ occasional Nos< 10%	Repair cracks and jointsWithout delay.	Inspect andrepair sub-drainageat distressedsections andupstream.
			3 to4	appreciable/ Frequent 10 -25%	Lift or jack slab within 30 days.	
		Nos/100 m stretch	5	abundant, crack development > 25%	Repair distressedpavement sections. Strengthensubgrade and subbase. Replaceslab. Within 30days	

20	**Ponding**	Ponding onslabs due to blockage of drains	0-2	No discernible problem	Noaction.	
			3 to4	Blockages observedin drains,butwater flowing	Clean drains etc. within 7days, Followup	Action requiredto stop waterdamaging foundation within30 days.
			5	Ponding,accumulation of waterobserved	-do-	

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

<table>
<tr><th>Asset Type</th><th>Performance Parameter</th><th colspan="3">Level of Service(LOS)</th><th>Frequencyof Measurement</th><th>TestingMethod</th><th>Recommended Remedial measures</th><th>Time limitfor Rectification</th><th>Specifications and Standards</th></tr>
<tr><td rowspan="2">Highway</td><td rowspan="2">Availability of SafeSight Distance</td><td colspan="3">As per IRC SP :84-2014, aminimum of safe stopping sight distanceshall be availablethroughout.

<table><tr><th>DesignSpeed, kmph</th><th>Desirable MinimumSight Distance(m)</th><th>Safe Stopping Sight Distance (m)</th></tr><tr><td>100</td><td>360</td><td>180</td></tr><tr><td>80</td><td>260</td><td>130</td></tr></table></td><td>Monthly</td><td>ManualMeasurements with Odometeralong with video/image backup</td><td colspan="2">Removal of obstruction within24 hours, in case of sight lineaffected by temporary objects such astrees, temporaryencroachments.

In case of permanent structureor designdeficiency:
Removal of obstruction/improvement of deficiency at the earliest
Speed Restrictionboards and suitable trafficcalming measures such as transversebar marking, blinkers, etc. shallbe applied during the periodof rectification.</td><td>IRC:SP84-2014</td></tr>
<tr><td>Pavement Marking</td><td>Wear</td><td colspan="3"><70% of markingremaining</td><td>Bi-Annually</td><td>VisualAssessmentas per Annexure-F ofIRC:35-2015</td><td>Re - painting</td><td>Cat-1Defect– within 24 hours
Cat-2 Defect - within 2months</td><td>IRC:35-2015</td></tr>
</table>

<table>
<tr><th>Asset Type</th><th>Performance Parameter</th><th>Level of Service(LOS)</th><th>Frequencyof Measurement</th><th>TestingMethod</th><th>Recommended Remedial measures</th><th>Time limitfor Rectification</th><th>Specifications and Standards</th></tr>
<tr><td></td><td>Day time Visibility</td><td>During expected life ServiceTime
Cement Road-130mcd/m²/lux
Bituminous Road -100mcd/m²/lux</td><td>Monthly</td><td>As per Annexure-Dof IRC:35-2015</td><td>Re - painting</td><td>Cat-1 Defect–within 24 hours
Cat-2 Defect–within 2months</td><td>IRC:35-2015</td></tr>
<tr><td></td><td>Night Time Visibility</td><td>Initial and MinimumPerformancefor Dry Retro reflectivityduringnight time:
<table><tr><td>Design Speed</td><td colspan="2">(RL) Retro Reflectivity(mcd/m²/lux)</td></tr><tr><td></td><td>Initial (7days)</td><td>Minimum Thresholdlevel (TL) &warranty periodrequired up to 2years</td></tr><tr><td>Up to65</td><td>200</td><td>80</td></tr><tr><td>65 -100</td><td>250</td><td>120</td></tr><tr><td>Above 100</td><td>350</td><td>150</td></tr></table>Initial and Minimum PerformanceforNight Visibility under wetcondition(Retroreflectivity):</td><td>Bi-Annually</td><td>As per Annexure-E of IRC:35-2015</td><td>Re - painting</td><td>Cat-1 Defect–within 24 hours
Cat-2 Defect–within 2months</td><td>IRC:35-2015</td></tr>
</table>

Asset Type	Performance Parameter	Level of Service(LOS)	Frequencyof Measurement	TestingMethod	Recommended Remedial measures	Time limitfor Rectification	Specifications and Standards
		Initial 7 days Retro reflectivity:100 mcd/m^2/lux Minimum Threshold Level:50 mcd/m^2/lux					
	Skid Resistance	Initial and Minimumperformance for SkidResistance: Initial (7days):55BPN Min. Threshold: 44BPN *Note: shall be considered under urban/city trafficcondition encompassing the locationslike pedestrian crossings, bus bay,bus stop, cycle trackintersection delineation, transverse barmarkings etc	Bi-Annually	As per Annexure-Gof IRC:35-2015		Within 24hours	IRC:35-2015
Road Signs	Shape and Position	Shape and Position as perIRC:67-2012. Signboard should be clearly visiblefor the design speed of thesection.	Daily	Visual with video/image backup	Improvement of shape, in caseif shape is damaged. Relocation as perrequirement	48 hours incase of Mandatory Signs,Cautionary and Informatory Signs (Singleand Dual post signs) 15 Days in case of Gantry/Cantilever Signboards	IRC:67-2012
	Retro reflectivity	As per specifications inIRC:67-2012	Bi-Annually	Testing of each	hange of ignboard	48 hours incase of Mandatory	RC:67-2012

Asset Type	Performance Parameter	Level of Service(LOS)	Frequencyof Measurement	TestingMethod	Recommended Remedial measures	Time limitfor Rectification	Specifications and Standards
				signboardusing Retro ReflectivityMeasuringDevice. In accordance with ASTMD 4956-09.		Signs, Cautionary and InformatorySigns (Singleand Dual post signs) 1 Month incase of Gantry/Cantilever Signboards	
Kerb	KerbHeight	As per IRC 86:1983 dependingupon type ofKerb	Bi-Annually	Use ofdistance measuringtape	Raising Kerb Height	Within 1 Month	RC 86:1983
	KerbPainting	Functionality: Functioning ofKerb painting asintended	Daily	Visualwith video/image backup	KerbRepainting	Within7-days	RC 35:2015
OtherRoad Furniture	ReflectivePavementMarkers(Road Studs)	Numbers and Functionality asper specifications in IRC:SP:84-2014and IRC:35-2015, unless specifiedin Schedule-B.	Daily	Counting	NewInstallation	Within 2months	IRC:SP:84-2014,IRC:35-2015
	Pedestrian Guardrail	Functionality: Functioning of guardrail asintended	Daily	Visual with video/image backup	Rectification	Within 15days	IRC:SP:84-2014
	Traffic Safety Barriers	Functionality: Functioning ofSafety Barriers asintended	Daily	Visual with video/image backup	Rectification	Within 7days	IRC:SP:84-2014, IRC:119-2015
	End Treatment of	Functionality: Functioning of End Treatment asintended	Daily	Visual with video/image	Rectification	Within 7days	IRC:SP:84-2014,

Asset Type	Performance Parameter	Level of Service(LOS)	Frequencyof Measurement	TestingMethod	Recommended Remedial measures	Time limitfor Rectification	Specifications and Standards
	Traffic Safety Barriers			backup			IRC:119-2015
	Attenuators	Functionality: Functioning of Attenuators asintended	Daily	Visual with video/imageb ackup	Rectification	Within 7days	IRC:SP-2014,IRC:119- 2015
	Guard Posts and Delineators	Functionality: Functioning ofGuard Posts and Delineators as intended	Daily	Visual with video/image backup	Rectificatio n	Within 15days	IRC: 79 - 1981
	OverheadSign Structure	Overhead signstructure shall be structurallyadequate	Daily	Visual with video/image backup	Rectification	Within 15days	IRC:67-2012
	TrafficB linkers	Functionality: Functioning ofTraffic Blinkers asintended	Daily	Visual with video/image backup	Rectification	Within 7days	IRC:SP:84-2014
Highway Lighting System	Highway Lights	Illumination: Minimum 40 Lux illumination onthe road surface	Daily	Theillumination level shallbe measuredwith luxmeter	Improvement in Lighting System	24hours	IRC:SP:84-2014
		Nomajor failure in the lighting system	Daily	-	Rectification of failure	24hours	IRC:SP:84-2014
		Nominor failure in the lighting system	Monthly	-	Rectification of failure	8hours	IRC:SP:84-2014
	Toll Plaza Canopy Lights	Minimum 40 Lux illumination onthe road surface	Daily	The illuminationlevel shallbe measuredwith luxmeter	Improvementin LightingSystem	24hours	IRC:SP:84-2014
		No major/minor failure in thelighting system	Daily	-	Rectification of failure	8hours	IRC:SP:84-2014

Asset Type	Performance Parameter	Level of Service(LOS)	Frequencyof Measurement	TestingMethod	Recommended Remedial measures	Time limitfor Rectification	Specifications and Standards
Treesand Plantation including medianplantation	Obstruction in aminimum head-room of 5.5 mabove carriagewayor obstruction in visibilityof road signs	No obstruction due totrees	Monthly	Visual with video/image backup	Removal oftrees	Immediate	IRC:SP:84-2014
	Deterioration in healthof treesand bushes	Health of plantation shall be asper requirement of specifications& instructions issued by Authorityfrom time to time	Daily	Visual with video/image backup	Timelywatering andtreatment. OrReplacement of Treesand Bushes.	Within 90days	IRC:SP:84-2014
	Vegetationaffectingsight line androad structures	Sight line shall be free from obstruction byvegetation	Daily	Visual with video/image backup	Removal ofTrees	Immediate	IRC:SP 84 - 2014
Rest Areas	Cleaning of toilets	-	Daily	-	-	Every 4hours	
	Defects in electrical,water and sanitaryinstallations	-	Daily	-	Rectification	24hours	

Asset Type	Performance Parameter	Level of Service(LOS)	Frequencyof Measurement	TestingMethod	Recommended Remedial measures	Time limitfor Rectification	Specifications and Standards
OtherProject Facilities and Approachroads	Damage or deterioration in ApproachRoads, pedestrian facilities, truck lay-bys, bus-bays,bus-shelters, cattle crossings, Traffic Aid Posts,Medical Aid Posts and otherworks		Daily	-	Rectification	15days	IRC:SP 84 - 2014

AssetType	PerformanceParameter	Level ofService (LOS)	FrequencyofMeasurement	TestingMethod	RecommendedRemedial measures	Timelimit for Rectification	SpecificationsandStandards
Pipe/box/slab culverts	Free waterway/ unobstructed flow section	85% ofculvert normal flowarea to available.	2 times ina year(before andafter rainyseason)	Inspection byBridge Engineer as perIRC SP: 35-1990 and recording of depthof silting and areaof vegetation.	Cleaning silt up soilsand debris in culvert barrel after rainy season,removal of bushes andvegetation, U/s of barrel, underbarrel and D/s of barrelbefore rainyseason.	15 days beforeonset ofmonsoon andwithin 30 daysafter end ofrainy season.	IRC5-2015, IRC SP:40-1993 and IRC SP:13-2004
	Leak-proof expansionjoints if any	No leakage throughexpansionjoints	Bi-Annually	Physicalinspection of expansionjoints as per IRC SP:35-1990 if any,for leakage strainson walls at joints.	Fixing with sealant suitably	30 days or beforeonset of rains whicheverc omesearlier	IRCSP:40-1993 andIRC SP:69-2011
	Structurallysound	Spalling of concrete not more than0.25 sqm	Bi-Annually	Detailedinspection of all componentsof culvert as perIRC SP:35-1990 and recording the defects	Repairs tospalling, cracking,delamination, rusting shall befollowed as perIRC:SP:40-1993.	15days	IRC SP 40-1993 and MORTH Specifications clause 2800
		Delaminationof concrete notmore than 0.25 sq.m.					
		Crackswider than 0.3 mmnot more than1m aggregatelength					

	Protection works in good condition	Damaged ofrough stone apronor bankrevetment not more than 3 sqm, damageto solid apron (concreteapron) not more than 1	2 times ina year(before andafter rainy season)	Condition surveyas per IRCSP:35-1990	Repairs to damaged aprons andpitching	30 days afterdefect observation or 2weeks beforeonset of rainy seasonwhic hever isearlier.	IRC: SP 40-1993 and IRC:SP:13-2004.
Bridgesincludin gROBs Flyover etc.as applicable	Ridingquali ty or user comfort	No potholein wearing coaton bridgedeck	Daily	Visual inspectionas per IRCSP:35-1990	Repairs to BC orwearing coat	15days	MORT&H Specification 2811
Bridge -Super Structure	Bumps	No bump at expansionjoint	Daily	Visual inspection as per IRCSP:35-1990	Repairs to BC oneither side of expansionjoints, profile correctioncourse on approach slab incase of settlement toapproach embankment	15days	MORT&H Specification 3004.2 & 2811.
	User safety(con ditionof crash barrier and guard rail)	No damagedor missingstretch of crashbarrier orpedestrian handrailing	Daily	Visualinspection and detailed condition surveyas per IRC SP:35- 1990.	Repairs andreplacement of safety barriers asthe case maybe	3days	IRC: 5-1998, IRC SP: 84-2014 and IRC SP: 40-1993.

	Rustedreinforcem ent	Not more than 0.25sq.m	Bi-Annually	Detailedcondition survey as per IRC SP: 35-1990using Mobile Bridge InspectionUnit	All the corroded reinforcement shallneed to be thoroughlycleaned from rusting andapplied with anti-corrosive coating before carrying out the repairs toaffected concrete portionwith epoxy mortar /concrete.	15days	IRC SP:40-1993 and MORTH Specification1600.
	Spallingof concrete	Not more than 0.50sq.m					
	Delaminatio n	Not more than0.50 sq.m					
	Crackswid er than 0.30mm	Not morethan 1m totallength	Bi-Annually	Detailedcondition survey as per IRC SP: 35-1990using Mobile Bridge InspectionUnit	Groutingwithepoxy mortar, investigating causes for cracks development and carry out necessary rehabilitation.	48 Hours	IRC SP: 40-1993 and MORTH Specification 2800.
	Rainwater seepageth roughdec kslab	Leakage - nil	Quarterly	Detailedcondition survey as per IRC SP: 35-1990using Mobile Bridge InspectionUnit	Grouting of deck slabat leakage areas, waterproofing, repairsto drainagespouts	1months	MORTH specifications 2600 & 2700.
	Deflectiond ue to permanent loads and	Within design limits.	Once in every 10 years for spans more	Load testmethod	Carry out majorrehabilitation workson bridge to retainoriginal design loads capacity	6months	IRC SP: 51-1999.

	liveloads		than 40m				
	Vibrations in bridge deck dueto movingtrucks	Frequency of vibrationsshall not be morethan 5Hz	Once in every 5years for spans more than 30m and every 10 years for spans between 15 to 30m	Laserdisplacement sensors orlaser vibro-meters	Strengthening of super structure	4months	AASHTO LRFD specifications
	Leakagein Expansionjoints	No damage to elastomeric sealant compound in strip seal expansionjoint, no leakage ofrain waterthrough expansion jointin case of buriedand asphalt plugand copper stripjoint.	Bi-Annually	Detailedcondition survey as perIRC SP:35-1990using Mobile Bridge InspectionUnit	Replace of seal in expansionjoint	15days	MORTH specifications 2600 and IRC SP:40-1993.
	Debrisand dust in strip seal	No dust or debrisexpa in nsion joint	Monthly	Detailedcondition survey as perIRC SP:35-1990 using	Cleaning of expansion joint gapsthoroughly	3days	MORTH specifications 2600 and

	expansion joint	gap.		Mobile Bridge InspectionUnit			IRC SP: 40-1993.
	Drainage spouts	No down take pipe missing/broken below soffitof the deck slab.No silt, debris,clogging of drainage spout collectionchamb	Monthly	Detailedcondition survey as perIRC SP: 35-1990 using Mobile Bridge InspectionUnit	Cleaningofdrainage spouts thoroughly. Replacement of missing/brokendown takepipeswitha minimum pipeextension of 500mm below soffitof slab. Providingsealant around the drainagespout if any leakagesobserved.	3days	MORTH specification 2700.
Bridge-substructure	Cracks/spalling of concrete/ rustedsteel	No cracks, spalling of concrete and rusted steel	Bi-Annually	Detailedcondition survey as perIRC SP: 35-1990using Mobile Bridge InspectionUnit	All the corrodedreinforcement shallneed to be thoroughlycleaned from rusting andapplied with anti-corrosive coating beforecarrying out repairs to substructure by grouting/gunitingand micro concreting depending on typeof	30days	IRC SP: 40-1993 and MORTH specification 2800.

	Bearings	Delamination of bearingreinforcement not more than 5%, crackingor tearing ofrubber not more than2 locations per side, norupture ofreinforcement orrubber	Bi-Annually	Detailedcondition survey as perIRC SP: 35-1990using Mobile Bridge InspectionUnit	In case of failure ofeven one bearing onany pier/abutment, allthe bearings on that pier/abutment shallbe replaced, in order togetuniform load transferon tobearings.	3months	MORTH specification 2810 and IRC SP: 40-199.
BridgeFoundations	Scouring aroundfoundations	Scouringshall not belower thanmaximum scour levelfor thebridge	Bi-Annually	Conditionsurvey and visual inspection asper IRC SP:35-1990 using Mobile BridgeInspection Unit. In case ofdoubt, useUnderwater camera for inspection ofdeep wells inmajor	Suitable protection works aroundpier/abutment	1month	IRC SP: 40-1993, IRC 83-2014,MORTH specification2500
	Protection works in good condition	Damagedof roughstone apron or bank revetmentnot more than 3	2 times in a year (beforeand afterrainy season)	Condition survey as per IRCSP:35-1990	Repairs to damaged aprons andpitching.	30 days after defectobservatio n or 2	IRC: SP 40-1993 and IRC:SP:13-2004.

		sq.m, damageto solid apron(concreteapron) not more than 1 sq.m				weeksbefore reonset of rainy seasonwhicheverisearlier.	
Note: AnyStructureduringtheentirecontractperiodwhichisfoundthatdoesnotcomplieswithallrequirementsofthisTablewillbeprepared, rehabilitated or even reconstructed under the scope of thecontractor.							

Table 4: Maintenance Criteria for Structures andCulverts:

Table 5: Maintenance Criteria for HillRoads

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

HillRoads		
(i)	Damage to Retaining wall/ Breastwall	7 (Seven)days
(ii)	Landslides requiringclearance	12 (Twelve)hours
(iii)	Snow requiringclearance	24 (Twenty Four) hours

<u>Note:</u>Foralltables1to5above,latestBIS&IRCstandards(eventhosenotindicated herewith) along with MoRTH specifications shall be binding for allmaintenance activities.

A. FlexiblePavement

Nature of Defect or deficiency		Time limit forrepair/ rectification
(b)	**Granular earth shoulders, side slopes, drains andculverts**	
(i)	Variation by more than 1 % in the prescribedslope of camber/cross fall (shall not be less thanthe camber on the maincarriageway)	7 (seven)days
(ii)	Edge drop at shoulders exceeding 40mm	7 (seven)days
(iii)	Variation by more than 15% in the prescribedside (embankment)slopes	30 (thirty) days
(iv)	Rain cuts/gullies inslope	7 (seven)days
(v)	Damage to or silting of culverts and sidedrains	7 (seven)days
(vi)	Desilting of drains in urban/semi- urbanareas	24 (twenty four)hours
(vii)	Railing, parapets, crashbarriers	7 (seven) days(Restore immediately if causingsafety hazard)
(c)	**Road side furniture including road sign and pavementmarking**	
(i)	Damage to shape or position, poor visibility orloss of retro-reflectivity	48 (forty eight)hours
(ii)	Painting of km stone, railing, parapets,crash barriers	As and when required/Once everyyear
(iii)	Damaged/missing signs road requiring replacement	7 (seven)days
(iv)	Damage to road markups	7 (seven)days
(d)	**Roadlighting**	
(i)	Any major failure of thesystem	24 (twenty four)hours
(ii)	Faults and minorfailures	8 (eight) hours
(e)	**Trees andplantation**	

Nature of Defect or deficiency		Time limit forrepair/ rectification
(i)	Obstruction in a minimum head- room of 5m above carriageway or obstruction in visibilityof road signs	24 (twenty four)hours
(ii)	Removal of fallen trees fromcarriageway	4 (four)hours
(iii)	Deterioration in health of trees andbushes	Timely watering andtreatment
(iv)	Trees and bushes requiringreplacement	30 (thirty) days
(v)	Removal of vegetation affecting sight line androad structures	15 (fifteen)days
(f) Restarea		
(i)	Cleaning oftoilets	Every 4 (four)hours
(ii)	Defects in electrical, water and sanitaryinstallations	24 (twenty four)hours
(g) [Toll Plaza]		
(h)	**Other Project Facilities and Approachroads**	
(i)	Damage in approach roads, pedestrianfacilities, truck lay- byes, bus-bays, bus-shelters,cattle crossings, [Traffic Aid Posts, Medical Aid Posts]and serviceroads	15 (fifteen)days
(ii)	Damaged vehicles or debris on the road	4 (four)hours
(iii)	Malfunctioning of the mobilecrane	4 (four)hours
Bridges		
(a) Superstructure		
(i)	Any damage, cracks, spalling/scaling Temporarymeasures Permanentmeasures	within 48 (forty eight)hours within 15 (fifteen) days oras specified by theAuthority's Engineer
(b) Foundations		

Nature of Defect or deficiency		Time limit forrepair/ rectification
(i)	Scouring and/or cavitation	15 (fifteen)days
(c)	**Piers, abutments, return walls and wing walls**	
(i)	Cracks and damages including settlementand tilting, spalling,scaling	30 (thirty) days
(d)	**Bearings (metallic) of bridges**	
(i)	Deformation, damages, tilting or shifting of bearings	15 (fifteen) daysGreasing of metallic bearings oncein ayear
(e)	**Joints**	
(i)	Malfunctioning ofjoints	15 (fifteen)days
(f)	**Otheritems**	
(i)	Deforming of pads in elastomericbearings	7 (seven)days
(ii)	Gathering of dirt in bearings and joints; orclogging of spouts, weep holes andvent-holes	3 (three)days
(iii)	Damage or deterioration in kerbs,parapets, handrails and crashbarriers	3 (three) days(immediately within 24 hours ifposing danger tosafety)
(iv)	Rain-cuts or erosion of banks of the side slopesof approaches	7 (seven)days
(v)	Damage to wearingcoat	15 (fifteen)days
(vi)	Damage or deterioration in approach slabs, pitching, apron, toes, floor or guidebunds	30 (thirty) days
(vii)	Growth of vegetation affecting the structureor obstructing thewaterway	15 (fifteen)days
(g)	**Hill Roads**	
(i)	Damage to retaining wall/breastwall	7 (seven)days
(ii)	Landslides requiringclearance	12 (twelve)hours

Nature of Defect or deficiency		Time limit forrepair/ rectification
(iii)	Snow requiringclearance	24 (twenty four)hours

Schedule -F

(See Clause 4.1(vii)(a))

Applicable Permits

1. Applicable Permits

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

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

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

(c) Licence for use of explosives;

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

(e) LicencefrominspectoroffactoriesorothercompetentAuthorityforsetting up batching plant;

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

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

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

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

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

Schedule – G

(See Clauses 7.1 and 19.2)

Annex-I

(See Clause 7.1)

Annex-I : Form of Bank Guarantee
[Performance Security/Additional Performance Security]

To,
Managing Director, NHIDCL,
National Highways & Infrastructure Development Corporation Ltd.

(A) _____[name and address of contractor] (hereinafter called the "**Contractor**") and [name and address of the authority], (hereinafter called the **"Authority"**) have entered into an agreement (hereinafter called the "**Agreement**") for the **"Name of Work"** (the "**EPC**") basis, subject to and in accordance with the provisions of the Agreement

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

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

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

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

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

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

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

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

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

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

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

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

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

[$] Insert date being 2 (two) years from the date of issuance of this Guarantee (in accordance with Clause 7.2 of the Agreement).

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

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

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

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

Sl. No	Particulars	Details
1	Name of the Beneficiary	lational Highways and Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	yndicate Bank, Transport Bhawan, 1st Parliament street, New Delhi-110001

Signed and sealed this ……. day of ……., 20…… at …….
SIGNED, SEALED AND DELIVERED
For and on behalf of the Bank by:
(Signature)
(Name)
(Designation)
(Code Number)
(Address)

NOTES:

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

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

Annex – II

(Schedule - G)

(See Clause 19.2)

Annex-II : Form for Guarantee for Advance Payment

To,
Managing Director, NHIDCL,
National Highways & Infrastructure Development Corporation Ltd.
WHEREAS:

(A) [name and address of contractor] (hereinafter called the "**Contractor**") has executed an agreement (hereinafter called the "**Agreement**") with the [name and address of the authority], (hereinafter called the "**Authority**") for the "**Name of Work"** (the "**EPC**") basis, subject to and in accordance with the provisions of the Agreement

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

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

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

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

A letter from the Authority, under the hand of an officer not below the rank of General Manager in the National Highways & Infrastructure Development Corporation Ltd., that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the instalment of the Advance Payment under and in

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

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

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

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

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

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

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

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

8. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has

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

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

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

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

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

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

Sl. No	Particulars	Details
1	Name of the Beneficiary	National Highways and Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Syndicate Bank, Transport Bhawan, 1st Parliament street, New Delhi-110001

Signed and sealed this ……. day of ……., 20…….. at ……..
SIGNED, SEALED AND DELIVERED
For and on behalf of the Bank by:
(Signature)
(Name)
(Designation)
(Code Number)
(Address)
NOTES:

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

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

SCHEDULE - H

(See Clauses 10.1(iv) and 19.3)

Contract Price Weightages

1.1 The Contract Price for this Agreement is **Rs. …….Crore.**

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

Item	Weightage in Percentage to the Contract Price	Stage of for Payment	Percentage Weightage
1	**2**	**3**	**4**
Roadworks including New Culverts, Widening and Repair of Culverts	63.36%	**A-Widening and Strengthening of Existing Road**	
		(1) Earthwork up to top of the sub-grade	
		(2) Sub Base Course	
		(3) Non Bituminous Base Course	
		(4) Bituminous Base Course	
		(5) Bituminous Concrete	
		(6) Widening and repair of culverts	0.91%
		B.1- Reconstruction/ New 4 Lane/Realignment/ Bypass (Flexible Pavement)	
		(1) Earthwork up to top of the sub-grade	12.95%
		(2) Sub Base Course (Granular work sub-base, shoulders)	15.15%
		(3) Non Bituminous Base Course (WMM)	16.92%
		(4) Bituminous Base Course (DBM)	19.32%
		(5) Wearing Coat (Bituminous Concrete)	9.05%
		C.1- Reconstruction/ New Service road (Flexible pavement)	
		(1) Earthwork up to top of the sub-grade	0.20%
		(2) Sub Base Course (Granular work sub-base, shoulders)	1.15%

Item	Weightage in Percentage to the Contract Price	Stage of for Payment	Percentage Weightage
1	2	3	4
		(3) Non Bituminous Base Course (WMM)	1. 70%
		(4) Bituminous Base Course (DBM)	0.52%
		(5) Wearing Coat (Bituminous Concrete)	0.39%
		D-Reconstruction and New Culverts on existing road, realignment and Bypasses,	
		(1) Culverts(length <6m)	21.74%
Minor Bridges/ Underpasses/ Overpasses	2.09%	**A.1- Widening and Repair of Minor bridges (length>6m and <60m)**	
		Minor Bridges	
		A.2-New Minor bridges (length>6m and <60m)	
		1. Foundation+Sub-Structure: On completion of foundation work including foundations for wing and return walls, abutments, piers up to the abutment/pier cap	64.03%
		2. Super-structure: On completion of super structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs and markings, tests on completion etc., complete in all respects	32.53%
		3. Approaches: On completion of approaches including Retaining walls, stone pitching, protection works, filter media. etc., complete in all respects & fit for use.	3.44%
		4. Guide Bunds and river Training Works: On completion of Guide Bund and River Training Works complete in all respects	
		B.2-New Underpass	

Item	Weightage in Percentage to the Contract Price	Stage of for Payment	Percentage Weightage
1	2	3	4
		1. Foundation+Sub-Structure: On completion of foundation work including foundations for wing and return walls, abutments, piers up to the abutment/pier cap	
		1. **Super-structure:** On completion of super structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs and markings, tests on completion etc., complete in all respects Wearing Coat (a) in case of Overpass- wearing coat including expansion joints complete in all respects as specified and (b) in case of underpass-rigid pavement including drainage facility complete in all respects as specified	
		2. **Approaches:** On completion of approaches including Retaining walls/Reinforced Earth walls,, stone pitching, protection works, etc., complete in all respects & fit for use.	
Major Bridge (length>60m) works and ROB/UB/Elevated sections/ Flyovers including viaducts, if any	20.56%	**A.1- Widening and Repair of Major Bridges**	
		1. Foundation	
		2. Sub-structure	
		3. Super-structure (including bearings)	
		4. Wearing Coat including expansion joints	
		5. Miscellaneous Items like hand rails, crash barriers, road marking etc.)	
		6. Wing walls/Return walls	

Item	Weightage in Percentage to the Contract Price	Stage of for Payment	Percentage Weightage
1	2	3	4
		7. Guide Bunds, River Training works etc.	
		8. Approaches (Including Retaining walls, stone pitching and protection works)	
		A.2- New Major Bridges	
		1. Foundation	38.63%
		2. Sub-structure	18.05%
		3. Super-structure (including bearings)	40.69%
		4. Wearing Coat including expansion joints	0.92%
		5. Miscellaneous Items like hand rails, crash barriers, road marking etc.)	0.33%
		6. Wing walls/Return walls	1.13%
		7. Guide Bunds, River Training works etc.	
		8. Approaches (Including Retaining walls, stone pitching and protection works)	0.25%
Other Works	13.99%	(ii) . Road Side Drain	24.07%
		(iii).Road signs, markings, km stones, safety devices… a) W beam crash barrier b) Utility Duct c) Misc	11.25% 13.14%
		(iv).Project Facilities a) Bus Shelter b) Truck lay byes	14.27%
		(v) Road side Plantation	

Item	Weightage in Percentage to the Contract Price	Stage of for Payment	Percentage Weightage
1	2	3	4
		(vi) Protection works other than approaches to the bridges, elevated section/flyover/grade separator and ROBs/ RUBs	0.69%
		(vii) Protection works a) Retaining wall b) Breast wall c) Toe Wall d) Surfacial protection and Erosion Control Measures (Cut Height of Side slope >25m)	 7.11% 21.24% 2.20% 6.03%
		(viii) Safety and Traffic Management during Construction	-

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1.3 Procedure of estimating the value of work done

1.3.1 Road works

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

Table 1.3.1

Stage of Payment	Percentage Weightage	Payment Procedure
A-Widening and Strengthening of Existing Road		
(6) Widening and repair of culverts	0.91%	Cost of each culverts shall be determined on pro rata basis with respect to the total number of culverts. Payment shall be made on the completion of at least 1(one) Culverts.
B.1- Reconstruction/ New 4 Lane/Realignment/ Bypass (Flexible Pavement)		
(1) Earthwork up to top of the sub-grade	12.95%	Unit of meaurement is linear length. Payment of each stage shall be made on pro rata basis

(2) Sub Base Course (Granular work sub-base, shoulders)	15.15%	on completion of a stage in full length or 5 (five) km length, whichever is less.
(3) Non Bituminous Base Course (WMM)	16.92%	
(4) Bituminous Base Course (DBM)	19.32%	
(5) Wearing Coat (Bituminous Concrete)	9.05%	
C.1- Reconstruction/ New Service road (Flexible pavement)		
(1) Earthwork up to top of the sub-grade	0.20%	Unit of meaurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 5 (five) km length, whichever is less.
(2) Sub Base Course (Granular work sub-base, shoulders)	1.15%	
(3) Non Bituminous Base Course (WMM)	1. 70%	
(4) Bituminous Base Course (DBM)	0.52%	
(5) Wearing Coat (Bituminous Concrete)	0.39%	
D-Reconstruction and New Culverts on existing road, realignment and Bypasses,		
(1) Culverts(length <6m)	21.74%	Cost of each culverts shall be determined on pro rata basis with respect to the total number of culverts. Payment shall be made on the completion of at least 1(one) Culverts.

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

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

Where P= Contract Price

L = Total length in km

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

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

1.3.2 **Minor Bridge and Underpasses/Overpasses**

Procedure for estimating the value of Minor Bridge and Underpass/overpassesshall be as stated in Table 1.3.2:

Table 1.3.2

Stage of Payment	Percentage Weightage	Payment Procedure
A.1- Widening and repairs of Minor Bridges (length >6m and <60m)	-	Cost of each Minor Bridge shall be determined on pro rata basis with respect to the total linear length of the Minor Bridge. Payment shall be made on the completion of widening and repair work of Minor Bridge.
A.2- New Minor Bridges		
1. Foundation +Sub-Structure: On completion of foundation work including foundations for wing and return walls, abutments, piers up to the abutment/pier cap	64.03%	**1. Foundation +Sub-Structure:**Cost of each Minor Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Minor Bridges. Payment against foundation+ substructure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation + substructure of each bridge subject to completion of at least two foundations along with sub structure upto abutment/pier cap level of each bridge.
2. Super-structure: On completion of super structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs and markings, tests on completion etc., complete in all respects	32.53%	**2. Super-structure:**Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super structure of at least one span in all respect as specified in the column of "Stage of Payment" in this sub-clause.

Stage of Payment	Percentage Weightage	Payment Procedure
3. Approaches: On completion of approaches including Retaining walls, stone pitching, protection works, filter media. etc., complete in all respects & fit for use.	3.44%	**3. Approaches** : Payment shall be made on pro-rata basis on completion of a stage i.e. completion of approaches in all respect as specified in the column of "Stage of Payment" in this sub-clause.
4. Guide Bunds and River Training Works: On completion of Guide Bunds and River Training Works complete in all respects		**4. Guide Bunds and River Training Works:**Payment shall be made on pro-rata basis on completion of a stage i.e. completion of Guide Bunds and River training works in all respects as specified.
B.2- New Underpass/Overpasses		
1. Foundation +Sub-Structure: On completion of foundation work including foundations for wing and return walls, abutments, piers up to the abutment/pier cap		**1. Foundation +Sub-Structure:**Cost of each Underpass shall be determined on pro rata basis with respect to the total linear length (m) of the Underpass. Payment against foundation+ substructure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation + substructure of each Underpass subject to completion of at least two foundations along with sub-structure upto abutment/pier cap level of each Underpass.
3. **Super-structure:** On completion of super structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs and markings, tests on completion etc., complete in all respects		**2. Super-structure:**Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super structure of at least one span in all respect as specified in the column of "Stage of Payment" in this sub-clause.

Stage of Payment	Percentage Weightage	Payment Procedure
Wearing Coat (a) in case of Overpass- wearing coat including expansion joints complete in all respects as specified and (b) in case of underpass-rigid pavement including drainage facility complete in all respects as specified.		
3. Approaches: On completion of approaches including Retaining walls/Reinforced Earth walls, stone pitching, protection works,. etc., complete in all respects & fit for use.		**3. Approaches** : Payment shall be made on pro-rata basis on completion of a stage i.e. completion of approaches in all respect as specified.

1.3.3 **Major Bridge works, ROB/RUB and Structures**

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

Table 1.3.3

Stage of Payment	Percentage Weightage	Payment Procedure
A.2- New Major Bridges and Cut & Cover Tunnel		
1. Foundation:	38.63%	**1. Foundation:**Cost of each Major Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridges. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of Major bridge subject to completion of atleast two foundations of the Major Bridge. Incase where load testing is

Stage of Payment	Percentage Weightage	Payment Procedure
		required for foundation, the trigger of first payment shall include load testing also where specified.
2. Sub-Structure	18.05%	**2. Sub-Structure:** Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of sub-structure of the major bridge subject to completion of atleast two sub-structures of abutments/piers upto abutment/pier cap level of the major bridge.
3.Super-structure (including bearings)	40.69%	**3. Super-structure:**Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super structure including bearing of at least one span in all respect as specified.
4.Wearing coat including expansion joints	0.92%	**4. Wearing Coat:**Payment shall be made on completion of wearing coat including expansion joints complete in all respect as specified.
5.Miscellaneous Items like hand rails, crash barriers, road marking etc.	0.33%	**5. Miscellaneous:**Payment shall be made on completion of all miscellaneous works like hand rails, crash barrier, road marking etc. complete in all respect as specified.

Stage of Payment	Percentage Weightage	Payment Procedure
6.Wing walls/ Return walls	1.13%	**6. Wing walls/ Return walls:** Payment shall be made on completion of all wing walls/return walls complete in all respect as specified.
7.Guide bunds, River Training works etc.		**7. Guide bunds, River Training works:** Payment shall be made on completion of all Guide bunds/ River Training works etc. complete in all respect as specified
8.Approaches (including Retaining walls, stone pitching and protection works)	0.25%	**8. Approaches:** Payment shall be made on completion of both approaches including stone pitching, protection works etc. complete in all respect as specified

1.3.4 Other works.

Procedure for estimating the value of other works done shall be as stated in Table 1.3.4:

Table 1.3.4

Stage of Payment	Percentage Weightage	Payment Procedure
(ii) Road side drains	24.07%	Unit of measurement is linear length in km. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5 (five) percent of the total length.
(iii)Road signs, markings, km stones, safety devices…		
d) W beam crash barrier	11.25%	
e) Utility Duct		
f) Misc.	13.14%	

Stage of Payment	Percentage Weightage	Payment Procedure
(iv) Project facilities		
a) Bus Shelter	14.27%	Payment shall be made on pro rata basis for completed facilities.
b) Truck lay-byes		
(v) Roadside plantation		Unit of measurement is linear length.
(vii) Protection works other than approaches to the bridges, elevated section/flyover/grade separator and ROBs/ RUBs	0.69%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5 (five) percent of the total length.
(viii) Protection works a) Retaining b) Breast wall c) Toe Wall d) Surfacial protection and Erosion Control Measures (Cut Height of Side slope >25m)	 7.11% 21.24% 2.20% 6.03%	
(ix) Safety and traffic management during construction		Payment shall be made on pro rata basis every six months.

2. Procedure for payment for Maintenance

2.1 The cost for maintenance shall be as stated in Clause 14.1.1.

2.2 Payment for Maintenance shall be made in quarterly installments in accordance with the provisions of Clause 19.7.

Schedule -I

(See Clause 10.2(iv))

Drawings

1. Drawings

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

2. Additional Drawings

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

Annex - I

(Schedule - I)

List of Drawings

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

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

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

a) Horizontal and Vertical Alignment (Plan & Profile) with:

- Details of Reference Pillars,
- Horizontal Intersection Point
- Vertical Intersection Point
- Elements of Curves, Details of Structures, etc.

b) Detailed Designed Cross Sections with Pavement layers at 20 m interval

c) Detailed Drawings of individual Cross Drainage Structures

d) Detailed drawing of Individual Minor & Major Bridges

e) Detailed Drawing of Breast wall, PPC wall, Retaining walls and Slope Protection work

f) Detailed Drawing of Drainage including lined drain and other drains.

g) Drawings of Major and Minor junctions,

h) Detailed Drawing of Light Vehicular Underpass

i) Drawings of a Truck lay bye and Bus bay with furniture and drainage system

j) Drawings of road furniture items including traffic signage, markings, safety barriers, etc.

k) Drawings of traffic diversion plans and traffic control measures

l) Drawings of landscaping and horticulture

m) Drawings of pedestrian crossings

n) General arrangement of Base camp and Administrative Block

Schedule - J

(See Clause 10.3 (ii))

Project Completion Schedule

1. *Project Completion Schedule*

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

2. *Project Milestone-I*

(i) Project Milestone-I shall occur on the date falling on the **[35% of the Scheduled Construction Period]** day from the Appointed Date (the "**Project Milestone- I**").

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

3. *Project Milestone-II*

(i) Project Milestone-II shall occur on the date falling on the **[60% of the Scheduled Construction Period]** day from the Appointed Date (the "**Project Milestone- II**").

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

4. *Project Milestone-III*

(i) Project Milestone-III shall occur on the date falling on the **[85% of the Scheduled Construction Period]** day from the Appointed Date (the "**Project Milestone- III**").

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

5. *Scheduled Completion Date*

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

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

6. ***Extension of time***

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

Schedule - K

(See Clause 12.1 (ii))

Tests on Completion

1. ***Schedule for Tests***

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

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

2. ***Tests***

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

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

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

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

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

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

3. ***Agency for conducting Tests***

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

4. ***Completion Certificate***

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

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

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

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

Schedule -L

(See Clause12.2)

Completion Certificate

1 I, …….. (Name of the Authority's Engineer), acting as the Authority's Engineer, under and in accordance with the Agreement dated ……(the "**Agreement**"), for **"…….Name of Work……"**on Engineering, Procurement and Construction(EPC) basis through …….. (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement, and I am satisfied that the Project Highway can be safely and reliably placed in service of the Users there of.

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

SIGNED, SEALED AND DELIVERED

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

(Signature)

(Name)

(Designation)(Address)

Schedule - M

(See Clauses 14.6, 15.2 and 19.7)

Payment Reduction for Non-Compliance

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

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

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

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

2. ***Percentage reductions in lump sum payments on monthly basis***

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

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

S. No.	Item/Defect/Deficiency	Percentage
(e)	**Road Furniture**	
(i)	Cleaning, painting, replacement of road signs, delineators, road markings, 200 m/km/5th km stones	5%
(f)	**Miscellaneous Items**	
(i)	Removal of dead animals, broken down/accidented vehicles, fallen trees, road blockades or malfunctioning of mobile crane	10%
(ii)	Any other Defects in accordance with paragraph 1.	5%
(g)	**Defects in Other Project Facilities**	5%

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

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

Where,

P= Percentage of particular item/Defect/deficiency for deduction
M1= Monthly lump-sum payment in accordance para 1.2 above of this Schedule
M2= Monthly lump-sum payment in accordance para 1.2 above of this Schedule
L1= Non-complying length L = Total length of the road,
R= Reduction (the amount to be deducted for non-compliance for a particular item/Defect/deficiency

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

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

Schedule -N

(See Clause 18.1(i))

Selection of Authority's Engineer

1. Selection of Authority's Engineer

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

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

2. Terms of Reference

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

3. Appointment of Government entity as Authority's Engineer

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

Annex – I
(Schedule - N)

Annex-I : Terms of Reference for Authority's Engineer

1. Scope

(i) These Terms of Reference (the "**TOR**") for the Authority's Engineer are being specified pursuant to the EPC Agreement dated ..... (the "**Agreement**), which has been entered into between the [name and address of the Authority] (the "**Authority**") and ..... (the "**Contractor**")# for [Two-Laning] of the **** section (km ** to km **) of National Highway No. ** in the State of *** on Engineering, Procurement, Construction (EPC) basis, and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.

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

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

2. Definitions and interpretation

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

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

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

3. General

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

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

(a) any Time Extension;

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

(c) the Termination Payment; or

(d) issuance of Completion Certificate or

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

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

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

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

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

4. Construction Period

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

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

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

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

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

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

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

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

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

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

(xi) The timing of tests referred to in Paragraph 4 (ix), and the criteria for acceptance/ rejection of their results shall be determined by the Authority's Engineer in accordance with the Quality Control Manuals. The tests shall be undertaken on a random sample basis and shall be in addition to, and independent of, the tests that may be carried out by the Contractor for its own quality assurance in accordance with Good Industry Practice.

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

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

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

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

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

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

(xviii) The Authority's Engineer shall carry out, or cause to be carried out, all the Tests specified in Schedule-K and issue a Completion Certificate, as the case may be. For carrying out its functions under this Paragraph 4 (xviii) and all matters incidental thereto, the Authority's Engineer shall act under and in accordance with the provisions of Article 12 and Schedule-K.

5. Maintenance Period

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

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

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

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

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

6. Determination of costs and time

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

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

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

7. Payments

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

(ii) Authority's Engineer shall -

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

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

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

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

8. Other duties and functions

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

9. Miscellaneous

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

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

(iii) Within 90 (ninety) days of the Project Completion Date, the Authority's Engineer shall obtain a complete set of as-built Drawings, in 2 (two) hard copies and in micro film form or in such other medium as may be acceptable to the Authority, reflecting the Project Highway as

actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Project Highway and setback lines, if any, of the buildings and structures forming part of Project Facilities; and shall hand them over to the Authority against receipt thereof.

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

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

Schedule - O

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

Forms of Payment Statements

1. ***Stage Payment Statement for Works***

The Stage Payment Statement for Works shall state:

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

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

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

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

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

(f) Deductions:

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

ii. Any amount towards deduction of taxes; and

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

(g) Net claim: (e) – (f) (iii);

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

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

ii. For Change of Scope Orders, and

iii. Taxes deducted

2. ***Monthly Maintenance Payment Statement***

The monthly Statement for Maintenance Payment shall state:

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

b) the deductions for maintenance work not done;

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

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

e) amount towards deduction of taxes

3. ***Contractor's claim for Damages***

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

Schedule - P

(See Clause 20.1)

Insurance

1. ***Insurance during Construction Period***

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

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

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

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

2. ***Insurance for Contractor's Defects Liability***

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

3. ***Insurance against injury to persons and damage to property***

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

The insurance cover shall be not less than: Rs. [*****]

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

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

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

4. ***Insurance to be in joint names***

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

Schedule-Q

(See Clause 14.10)

Tests on Completion of Maintenance Period

1. ***Riding Quality test:***

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

2. ***Visual and physical test:***

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

Schedule-R

(See Clause 14.10)

Taking Over Certificate

I, ……. (Name and designation of the Authority's Representative) under and in accordance with the Agreement dated …… (the "**Agreement**"), for [construction of the ****section (km ** to km **) of
****] (the "**Project Highway**") on Engineering, Procurement and Construction (EPC) basis through ……. (Name of Contractor), hereby certify that the Tests on completion of Maintenance Period in accordance with Article 14 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement and I hereby certify that the Authority has taken over the Project highway from the Contractor on this day.....

SIGNED, SEALED AND DELIVERED

(Signature)

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