SCHEDULES

Schedule-A

(See Clauses 2.1 and 8.1)

Site of the Project

1 The Site

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

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

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

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

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

Annex – I

(Schedule-A)

Site

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

1. Site

The Site of the Two-Lane Project Highway comprises the section of National Highway 06 commencing **from km 0+000 (Seling) to km 15+000 (Keifang) [Design Km 0.000 to Km 13.510] (approx. 13.510 km) section of Champai Seling NH-6 road in the State of Mizoram**. The land, carriageway and structures comprising the Site are described below.

S. N	Pkg No.	Existing Chainages	Design Chainages	Design Length
Economic Corridor				
1	**Package I**	From. Km 0+000 to Km 15+000	From De. Ch 0.000 to Ch. 13.510	13.510
			Total Length (km)	**13.510**

2. Land

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

S. N	Existing Chainage (km)		Right of Way (m)	Remarks
	From	To		
1	0+000	0+200	10.00	**Economic Corridor-Package I Starts At 0+000**
2	0+200	0+400	8.00	
3	0+400	0+600	7.00	
4	0+600	0+800	8.00	
5	0+800	1+000	7.00	
6	1+000	1+400	9.50	
7	1+400	1+600	8.00	
8	1+600	1+800	14.00	
9	1+800	2+000	6.30	
10	2+000	2+400	8.00	
11	2+400	2+600	12.00	
12	2+600	3+200	8.00	
13	3+200	3+400	8.40	
14	3+400	3+600	8.80	
15	3+600	4+000	8.00	
16	4+000	4+200	7.00	
17	4+200	4+400	7.50	
18	4+400	5+000	7.00	

S. N	Existing Chainage (km)		Right of Way (m)	Remarks
	From	To		
19	5+000	5+200	9.00	
20	5+200	5+800	8.00	
21	5+800	6+000	7.00	
22	6+000	9+000	8.00	
23	9+000	9+200	10.00	
24	9+200	9+400	9.00	
25	9+400	12+600	8.00	
26	12+600	12+800	7.00	
27	12+800	15+000	8.00	**Economic Corridor-Package I Ends At Km 15+000**

3. Carriageway

The present carriageway of the Project Highway is Single/Intermediate Lane. Type of the existing pavement is flexible.

4. Major Bridges

The Site includes the following Major Bridges:

S.N	Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-structure	Super-structure		
Package I						
-----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.N	Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)	ROB/ RUB
		Foundation	Superstructure			
Package I						
-----NIL-----						

6. Grade separators

The Site includes the following grade separators:

S.N	Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)
		Foundation	Superstructure		
Package I					
-----NIL-----					

7. Minor bridges

The Site includes the following minor bridges:

S.N	Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-structure	Super-structure		
Package I						
1	12+520	Open Foundation	RCC	PSC	1 x 35.70	12.00
2	13+860	Open Foundation	RCC	PSC	1 x36.00	11.10

8. Railway level crossings

The Site includes the following railway level crossings:

S. No.	Location (km)	Remarks
Package I		
-----NIL-----		

9. Underpasses (vehicular, non-vehicular)

The Site includes the following underpasses:

S. N	Chainage (km)	Type of Structure	No. of Spans with span length (m)	Width (m)
Package I				
-----NIL-----				

10. Culverts

The Site has the following culverts:

(a) Slab/Box Culverts: - 29 Nos.

S. N	Chainage (km)	Type of Culvert	Span /Opening with span length (m)	Width (m)
Package I				
1	1+004	Slab Culvert	1 x 1.50	6.80
2	1+712	Slab Culvert	1 x 1.00	9.00
3	1+916	Slab Culvert	1 x 1.60	5.40
4	2+422	Slab Culvert	1 x 1.00	5.20
5	3+465	Slab Culvert	1 x 1.00	8.00
6	3+645	Slab Culvert	1 x 1.20	6.50
7	4+065	Slab Culvert	1 x 3.00	11.00
8	4+355	Slab Culvert	1 x 1.10	5.40
9	4+935	Slab Culvert	1 x 5.80	5.60
10	5+277	Slab Culvert	1 x 1.10	5.00
11	6+650	Slab Culvert	1 x 1.00	5.80
12	7+423	Slab Culvert	1 x 1.50 m	6.00
13	7+837	Slab Culvert	1 x 0.9 m	6.00
14	7+837	Slab Culvert	1 x 0.9	6.10

S. N	Chainage (km)	Type of Culvert	Span /Opening with span length (m)	Width (m)
15	8+510	Slab Culvert	1 x 2.00 m	6.00
16	9+250	Slab Culvert	1 x 1.70	6.00
17	9+810	Slab Culvert	1 x 6.60	8.50
18	10+182	Slab Culvert	1 x 1.30	6.50
19	10+440	Slab Culvert	1 x 1.00	6.80
20	11+040	Slab Culvert	1 x 1.00	6.00
21	11+350	Slab Culvert	1 x 1.00	5.50
22	11+425	Slab Culvert	1 x 1.60	6.00
23	12+165	Slab Culvert	1 x 3.80	5.50
24	12+695	Slab Culvert	1 x 1.00	5.50
25	12+940	Slab Culvert	1 x 2.00	6.00
26	13+390	Slab Culvert	1 x 1.00	8.80
27	13+540	Slab Culvert	1 x 2.00	5.00
28	12+705	Slab Culvert	1 x 2.00	6.00
29	12+960	Slab Culvert	1 x 1.50	5.50

(b) HP Culverts: - 33 Nos.

S. N	Chainage (km)	Type of Culvert	Span /Opening with span length (m)	Width (m)
Package I				
1	0+380	HPC	1 x 1000	6.00
2	0+510	HPC	1 x 1000	10.20
3	0+666	HPC	1 x 900	6.00
4	0+834	HPC	1 x 900	6.30
5	1+072	HPC	1 x 900	6.10
6	1+455	HPC	1 x 600	6.10
7	1+261	HPC	1 x 900	6.50
8	1+510	HPC	1 x 600	5.50
9	2+040	HPC	1 x 600	6.00
10	3+110	HPC	1 x 900	6.80
11	5+541	HPC	Choke up	5.40
12	6+788	HPC	Choke up	6.10
13	7+200	HPC	1 x 900	6.50
14	7+525	HPC	1 x 600	6.10
15	8+035	HPC	1 x 900	6.00
16	8+905	HPC	1 x 900	6.20
17	9+495	HPC	1 x 1200	6.50
18	9+920	HPC	1 x 900	6.20
19	9+990	HPC	1 x 900	6.00
20	10+834	HPC	1 x 900	6.10
21	10+900	HPC	1 x 900	6.00
22	11+030	HPC	1 x 900	6.20
23	11+570	HPC	1 x 900	6.10
24	11+884	HPC	1 x 800	6.00
25	11+965	HPC	1 x 900	6.00
26	12+320	HPC	1 x 900	5.70
27	12+845	HPC	1 x 900	5.80
28	13+065	HPC	1 x 900	6.20
29	13+705	HPC	1 x 900	6.10
30	12+045	HPC	2 x 900	6.40
31	12+260	HPC	1 x 900	6.20

S. N	Chainage (km)	Type of Culvert	Span /Opening with span length (m)	Width (m)
32	12+460	HPC	1 x 900	6.10
33	12+495	HPC	1 x 900	6.20

11. Bus bays

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

S. N	Chainage (km)	Length (m)	Left Hand Side	Right Hand Side
Package I				
1	6+180	-	LHS	-
2	6+300	-	LHS	-
3	8+250	-	LHS	-
4	11+250	-	LHS	-
5	14+000	-	-	RHS

12. Truck Lay byes

The details of truck lay byes are as follows:

S. N	Chainage (km)	Length (m)	Left Hand Side	Right Hand Side
Package I				
-----NIL-----				

13. Road side drains

The details of the roadside drains are as follows:

S. N	Location		Type	
	From Km	to Km	Masonry/CC (Pucca)	Earthern (Kutcha)
Package – I				
1	0+000	0+600	RHS	-
2	7+800	8+000	-	RHS
3	8+200	9+000	-	RHS
4	9+400	9+600		RHS
5	14+000	14+400	LHS	-
6	14+600	15+000	LHS	-

14. Major junctions

The details of major junctions are as follows:

S. No.	Location		At grade	Separated	Category of Cross Road			
	Chainage	Location			NH	SH	MDR	Others
Package – I								
1	0+000	Seling	T	-	NH	-	-	-

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

15. Minor junctions

The details of the minor junctions are as follows:

S. N	Location		Type	
	Chainage	Location	T -junction	Cross road
Package – I				
-----NIL-----				

16. Bypasses

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

S. N	Name of bypass (town)	Chainage (km) From km to km	Length (in Km)
-----NIL-----			

17. Other structures- NIL

Annex – II

(As per Clause 8.3 (i))

(Schedule-A)

Dates for providing Right of Way of Construction Zone

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

S.N	Design Chainage		Design Length	PROW	Remark
	From	To			
1	0.000	0.310	0.310	12	Minimum 90% on Appointed Date. Remaining within 150 days of Appointed Date.
2	0.310	0.680	0.370	24	
3	0.680	0.840	0.160	12	
4	0.840	4.500	3.660	24	
5	4.500	4.530	0.030	54	
6	4.530	6.210	1.680	24	
7	6.210	6.270	0.060	50	
8	6.270	8.750	2.480	24	
9	8.750	8.770	0.020	33	
10	8.770	10.810	2.040	24	
11	10.810	10.820	0.010	32	
12	10.820	13.220	2.400	24	
13	13.220	13.250	0.030	42	
14	13.250	13.450	0.200	24	
15	13.450	13.460	0.010	30	
16	13.460	13.510	0.050	24	

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

Annex - III

(Schedule-A)

Alignment Plans

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

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

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

Annex – IV

(Schedule-A)

Environment Clearances

Environmental Clearance is not required as per new Notification of MoEF dated 22/08/2013.

Schedule - B

(See Clause 2.1)

Development of the Project Highway

1. Development of the Project Highway

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

2. Rehabilitation and augmentation

Rehabilitation, upgradation and augmentation shall include Two-Laning with Paved Shoulder and widening/reconstruction/new construction and Strengthening of the 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 Two-Laning with Paved Shoulder

1. Widening of the Existing Highway

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

(ii) Width of Carriageway

(a) Two-Laning with paved shoulders shall be undertaken. The paved carriageway shall be 10m wide in accordance with the typical cross sections drawings in the Manual (IRC: SP 73-2018).

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

S.N	Built-up stretch (Township)	Location (km to km)		Width (m)		Typical cross section (Ref. to Manual)
		From	To			
Package I						
1	Seling	0.000	0.200	10.00	Both Side	Fig No.06
2	Seling	0.200	0.350	10.00	LHS	Fig No.06
3	Seling	0.450	0.600	10.00	RHS	Fig No.06
4	Thingsul	0.600	0.800	10.00	LHS	Fig No.06
5	Keifang	12.220	12.350	10.00	LHS	Fig No.06

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

2. Geometric Design and General Features

(i) General

Geometric design and general features of the Project Highway shall be in accordance with Section 2 of the Manual IRC: SP 73-2018.

(ii) Design speed

The design speed shall be the minimum design speed of 30/40 km per

hour for mountainous and steep terrain.

(iii) Improvement of the existing road geometrics

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

S.N.	Stretch/Design Chainages (HIP Chainage)	Type of deficiency		Remarks
		Radius of curve	Design Speed	
NIL				

(iv) Right of Way

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

(v) Type of shoulders

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

S.N	Stretch (from km to km)		Fully paved shoulders/ footpaths	Reference to cross section
Package I				
1	0.000	0.200	1.5m Footpath	Fig No.06
2	0.200	0.350	1.5m Footpath	Fig No.06
3	0.450	0.600	1.5m Footpath	Fig No.06
4	0.600	0.800	1.5m Footpath	Fig No.06
5	12.220	12.350	1.5m Footpath	Fig No.06

(b) In open country, paved shoulders of 1.5 m width shall be provided and balance 1.0m width shall be covered with 150 mm thick compacted layer of granular material.

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

(vi) Lateral and vertical clearances at underpasses

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

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

S.N	Location (Chainage)	Span/ opening	Remarks

	(from km to km)	**(m)**	
NIL			

(vii) Lateral and vertical clearances at overpasses

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

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

S.N	**Location (Chainage) (from km to km)**	**Span/ opening (m)**	**Remarks**
NIL			

(viii) Service roads

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

S.N	**Location of service road (from km to km)**	**Right hand side (RHS)/Left hand side (LHS)/ or Both sides**	**Length (km) of service road**
NIL			

(ix) Grade separated structures

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

S.N	**Location of structure**	**Length (m)**	**Number and length of spans (m)**	**Approach gradient**	**Remarks, if any**
NIL					

(b) In the case of grade separated structures, the type of structure and the level of the Project Highway and the cross roads shall be as follows:

S.N	**Location**	**Type of structure Length (m)**	**Cross road at**			**Remarks, if any**
			Existing Level	**Raised Level**	**Lowered Level**	
NIL						

(x) Cattle and pedestrian underpass /overpass

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

S. N	Location	Type of crossing
NIL		

(xi) Typical cross-sections of the Project Highway

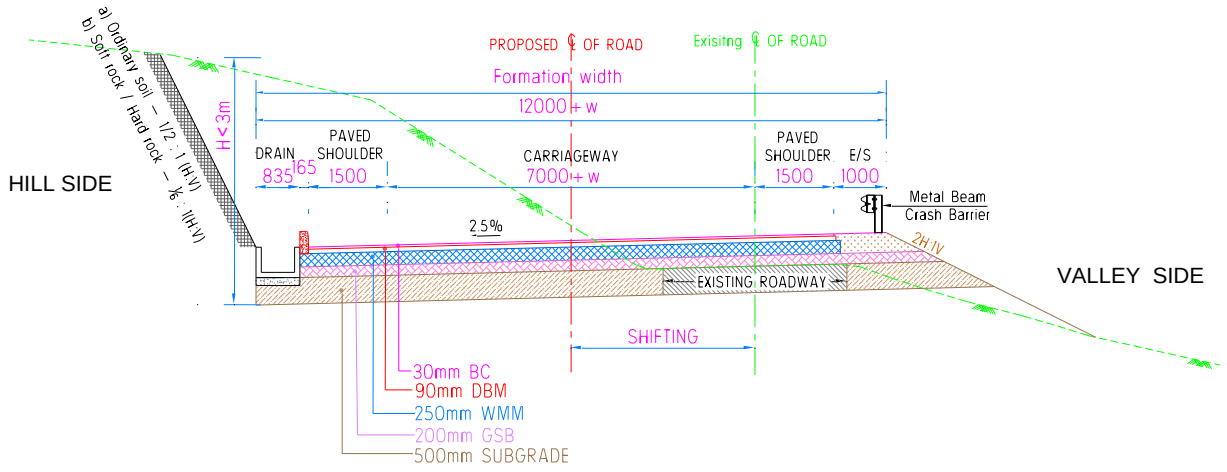

FIG. – 1A
2 – LANE CARRIAGEWAY WITHOUT BREAST WALL – HILLSIDE WIDENING
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

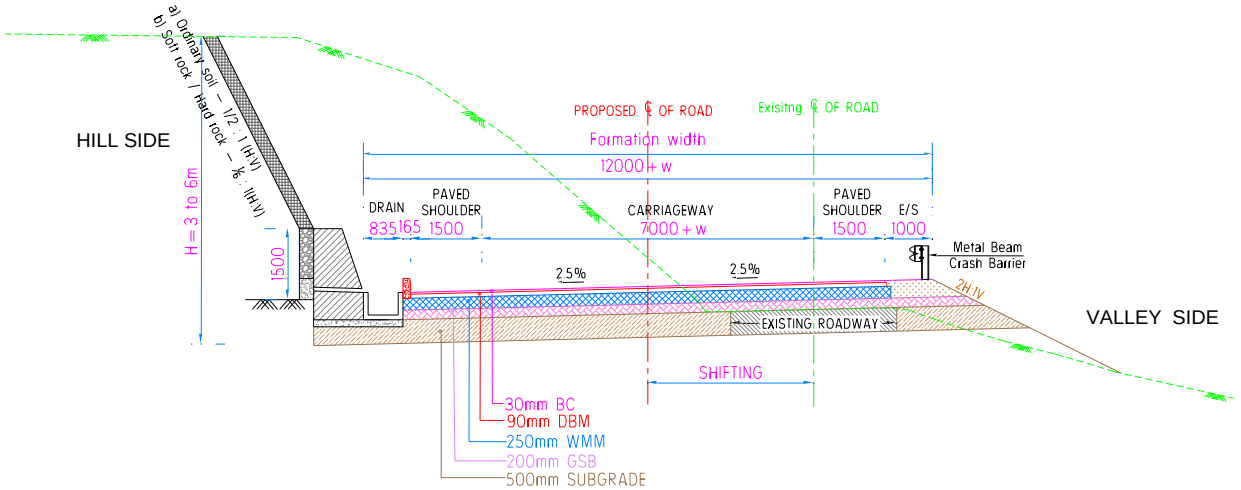

FIG. – 1B
2 – LANE CARRIAGEWAY WITH BREAST WALL OF 1.5M HEIGHT – HILLSIDE WIDENING
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

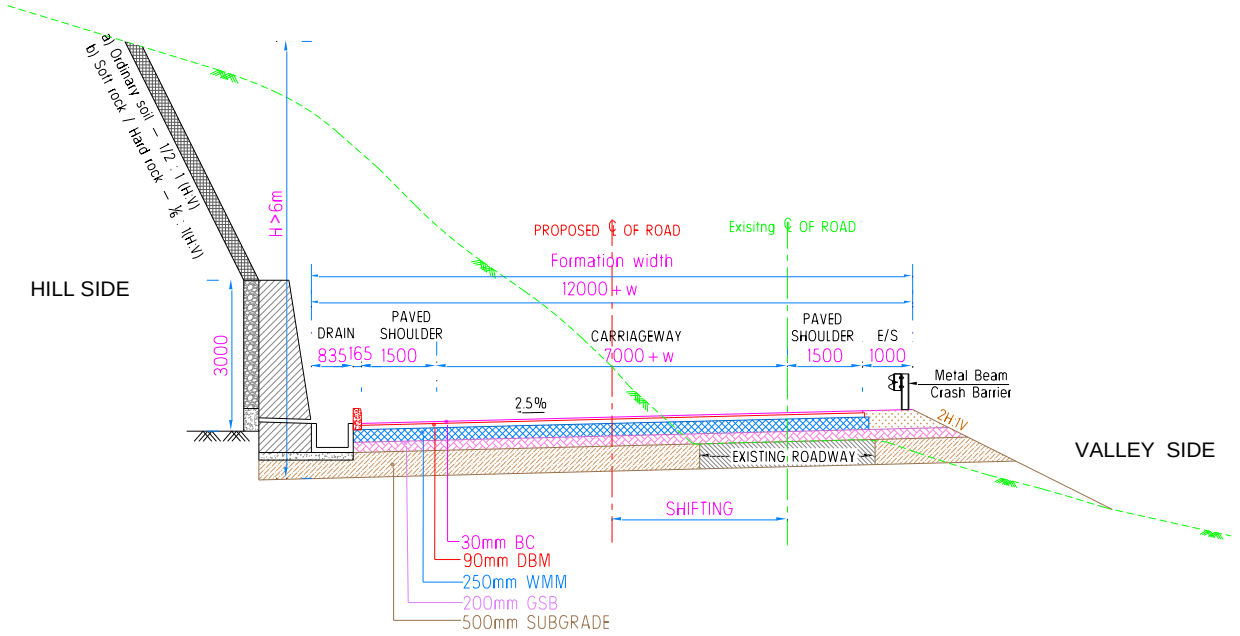

FIG. – 1C

2 – LANE CARRIAGEWAY WITH BREAST WALL OF 3M HEIGHT – HILLSIDE WIDENING
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

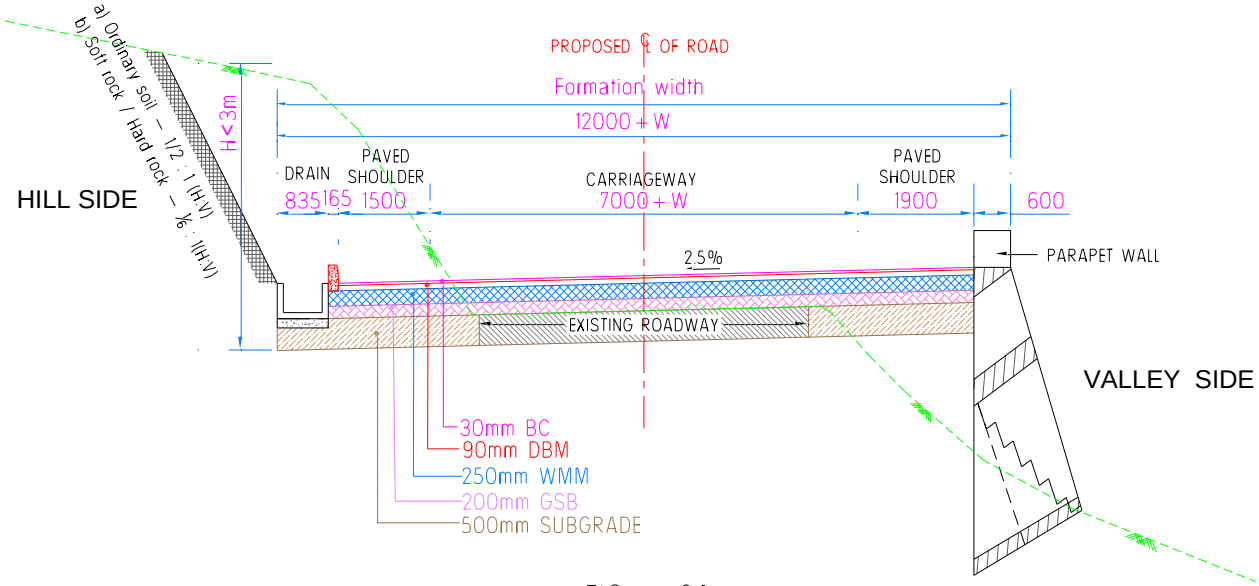

FIG. – 2A

2 – LANE CARRIAGEWAY WITHOUT BREAST WALL
AND WITH RETAINING WALL ON VALLY SIDE – CONCENTRIC WIDENING
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

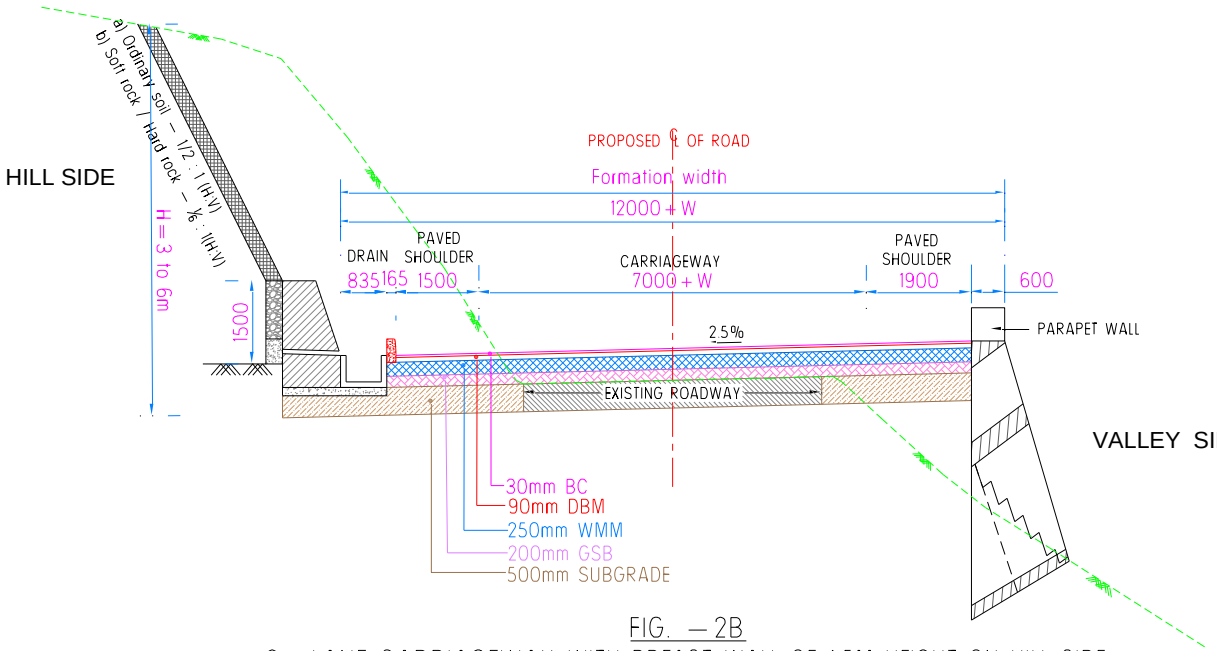

FIG. – 2B

2 – LANE CARRIAGEWAY WITH BREAST WALL OF 1.5M HEIGHT ON HILL SIDE AND RETAINING WALL ON VALLY SIDE – CONCENTRIC WIDENING (OPEN COUNTRY – MOUNTAINOUS TERRAIN)

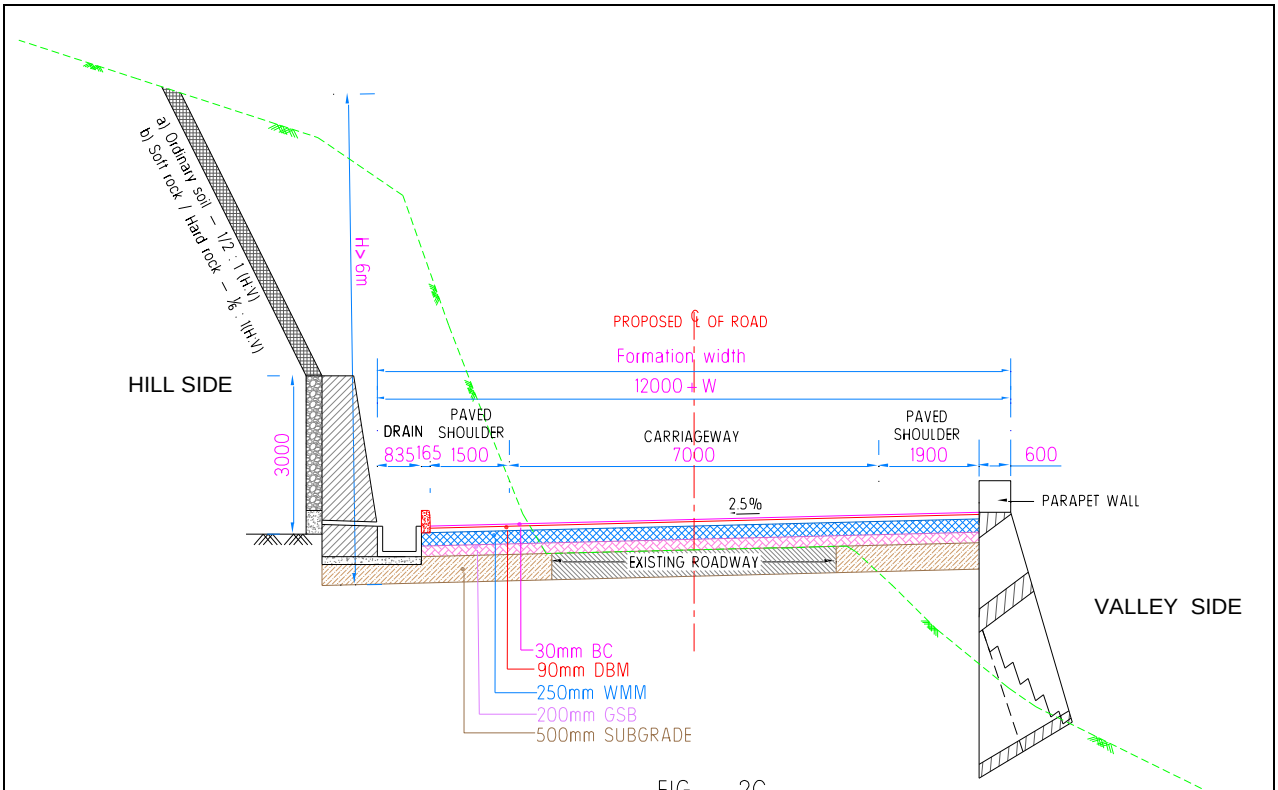

FIG. – 2C

2 – LANE CARRIAGEWAY WITH BREAST WALL OF 3M HEIGHT ON HILL SIDE AND RETAINING WALL ON VALLY SIDE – CONCENTRIC WIDENING (OPEN COUNTRY – MOUNTAINOUS TERRAIN)

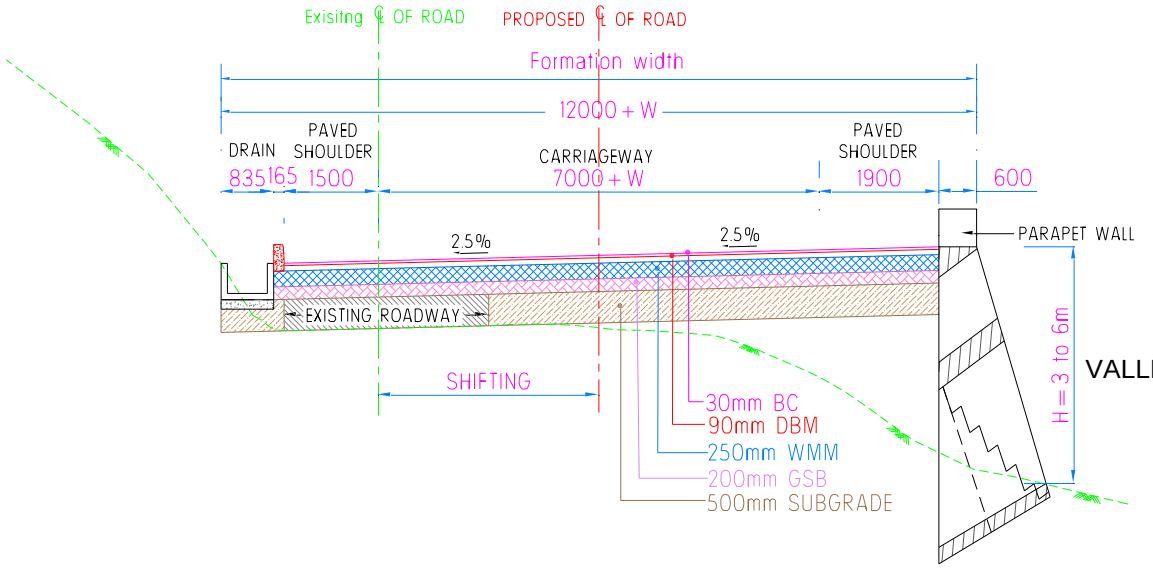

FIG. – 3A

2 – LANE CARRIAGEWAY WITH RETAINING WALL – VALLY SIDE WIDENING

(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

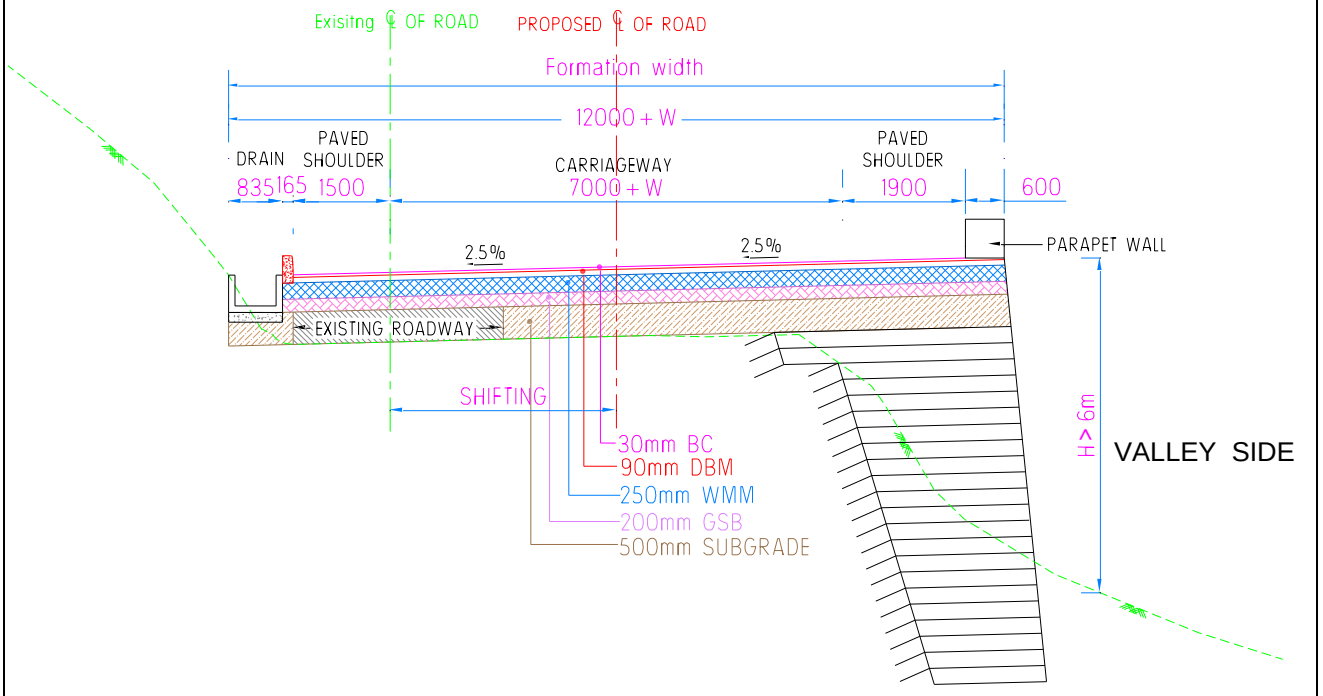

FIG. – 3B

2 – LANE CARRIAGEWAY WITH REINFORCED EARTH RETAINING WALL – VALLY SIDE WIDENING

(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

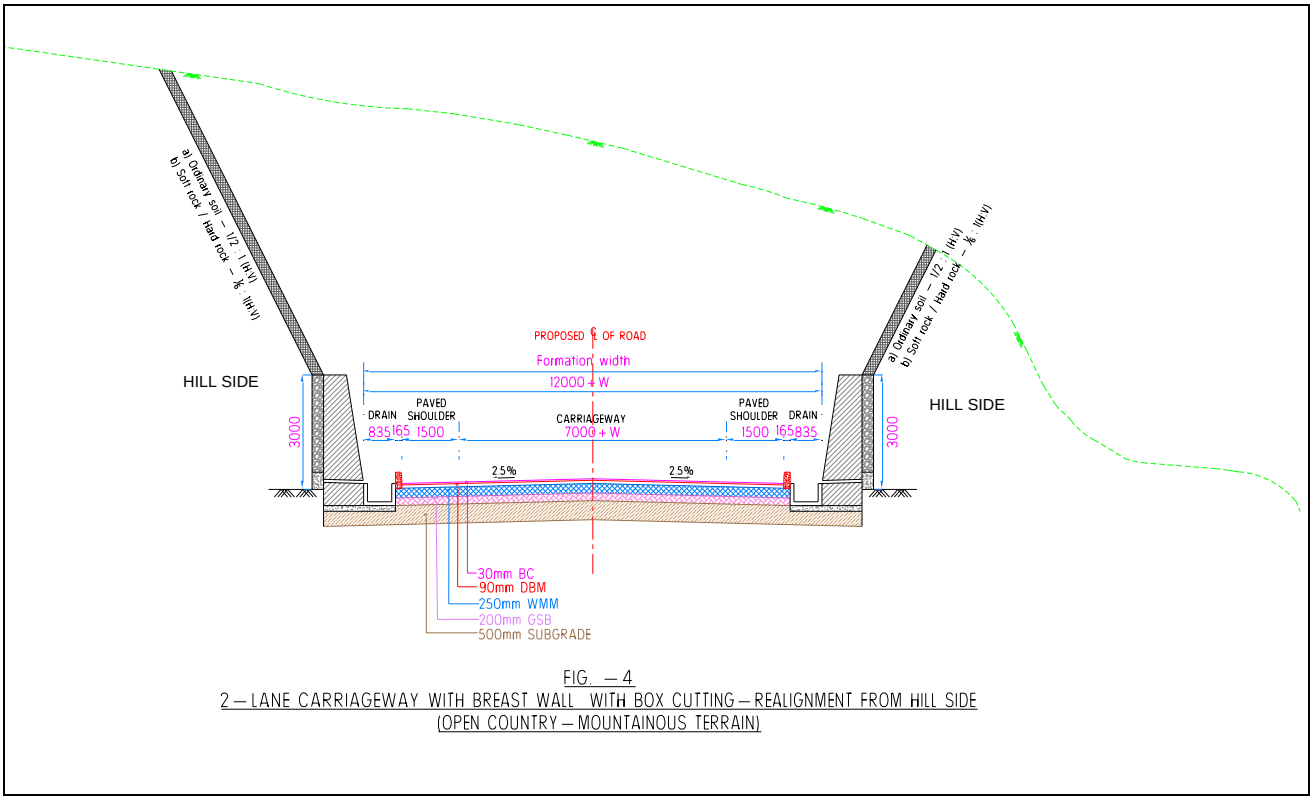

FIG. – 4
2 – LANE CARRIAGEWAY WITH BREAST WALL WITH BOX CUTTING – REALIGNMENT FROM HILL SIDE
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

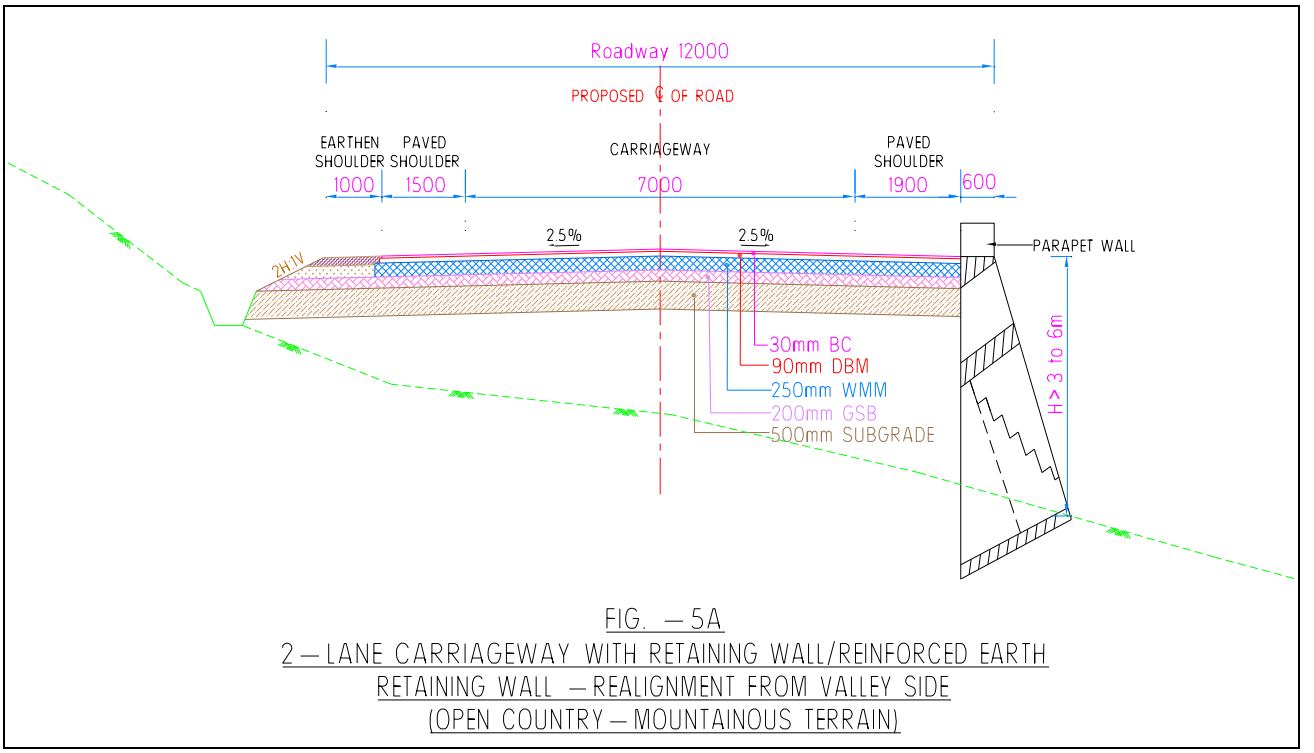

FIG. – 5A
2 – LANE CARRIAGEWAY WITH RETAINING WALL/REINFORCED EARTH RETAINING WALL – REALIGNMENT FROM VALLEY SIDE
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

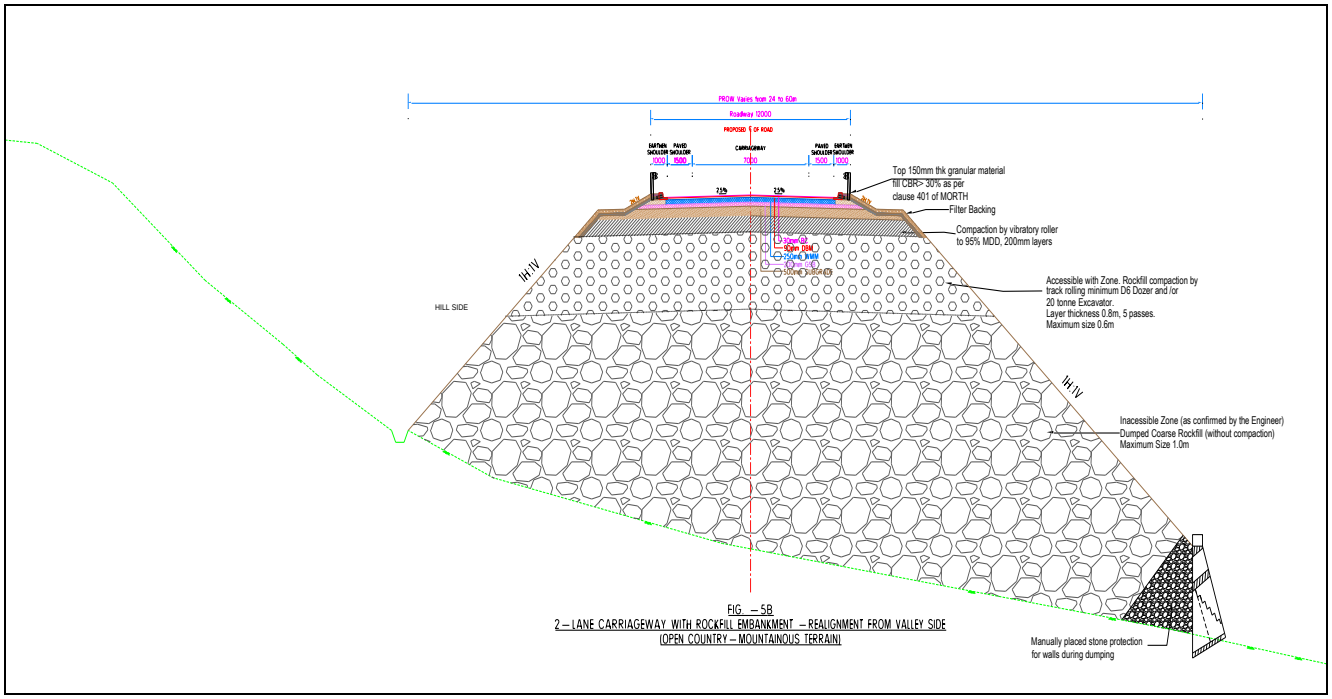

FIG. – 5B
2–LANE CARRIAGEWAY WITH ROCKFILL EMBANKMENT – REALIGNMENT FROM VALLEY SIDE
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

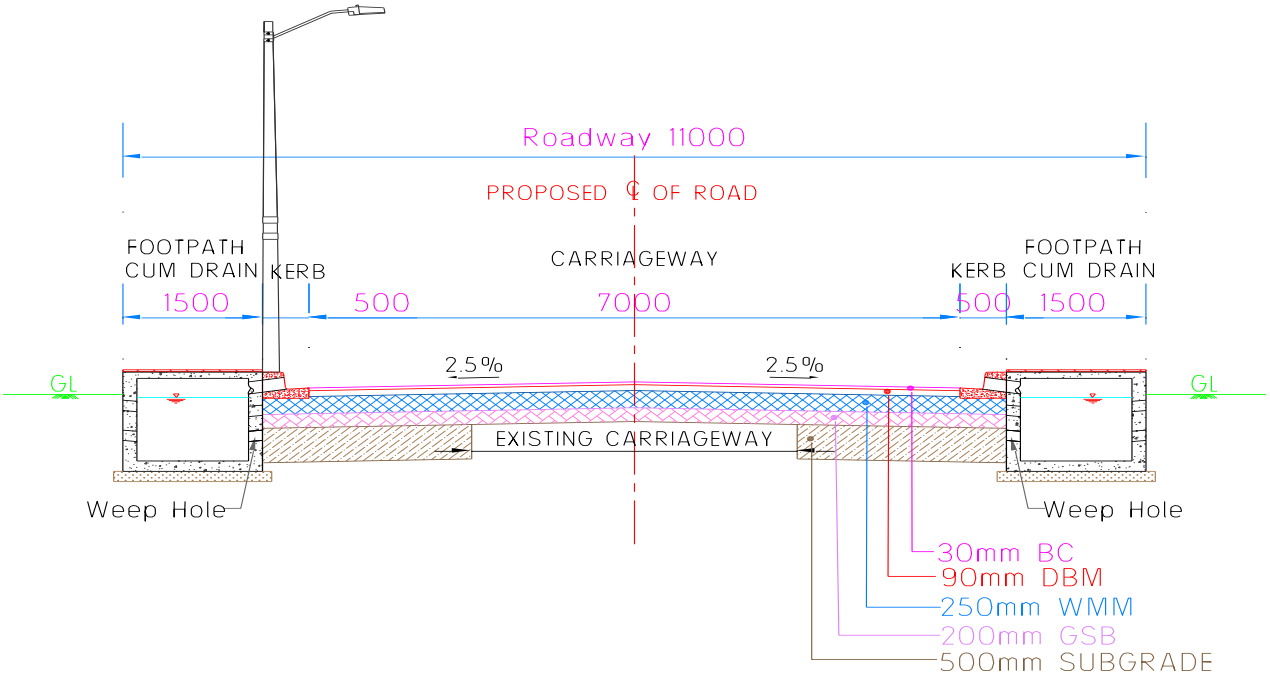

FIG. – 6
2 – LANE CARRIAGEWAY WITHOUT BREAST AND RETAINING WALL
(BUILT UP AREA – MOUNTAINOUS TERRAIN)

3. Intersections and Grade Separators

All intersections and grade separators shall be as per the provision of Section 3 of the Manual (IRC: SP 73-2018). 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:

(i) At-grade intersections

(a) Major Junction – 01 Nos.

S. No.	Location of intersection	Type of intersection	Other features
Package I			
1	0.000	T	LHS-Aizawl RHS-Lunglai

(b) Minor Junction – Nil

Sl. No.	Location of intersection	Type of intersection	Other features
Package I			
Nil			

(ii) **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

(i) Widening and improvement of the existing road embankment/cuttings and construction of new road embankment/ cuttings shall conform to the Specifications and Standards given in Section 4 of the Manual and the specified cross sectional details. Deficiencies in the plan and profile of the existing road shall be corrected.

(ii) **Raising of the existing road**

The existing road shall be raised in the following sections:

S.No	Section (from km to km)	Length	Extent of raising [Top of finished road level]
NIL			

5. Pavement Design

(i) Pavement design shall be carried out in accordance with the provision of Section 5 of the Manual (IRC: SP 73-2018), IRC relevant codes and International Standards.

(ii) Type of pavement

Flexible Pavement – Flexible Pavement shall be constructed in entire length of the project highway.

Flexible Pavement shall be constructed in full length of Main Carriageway of project highway.

(iii) Design requirements

(a) Design Period and strategy

Flexible pavement for new pavement or for widening and reconstruction of the existing pavement shall be designed for a minimum design period of 15 (Fifteen) years and minimum CBR of subgrade should be 8%. Stage construction shall not be permitted.

(b) Design Traffic

Notwithstanding anything to the contrary contained in this Agreement or the Manual, the Contractor shall design the pavement for design traffic of 20 million standard axles. Minimum pavement composition should be adopted for new pavement/reconstruction of road as below:-

i. Main Carriageway:-

S. No.	Description	Minimum Crust Composition of Flexible Pavement (For 20 MSA)
1	BC	30 mm
2	DBM	90 mm
3	WMM	250 mm
4	GSB	200 mm
	Total	**570 mm**

ii. The Crust Composition for Truck Lay Byes shall be as per Main Carriageway Clause 5.3.2 (a) above.

iii. The Crust composition for Minor roads, Bus bay shall be as per section 5 of IRC: SP:73-2018.

(iv) Reconstruction of stretches

The following stretches of the existing road shall be reconstructed from GSB full layer and above. These shall be designed as new pavement.

Design Chainages		Design Length (Km)	Remarks
From	To		

Design Chainages		Design Length (Km)	Remarks
From	To		
0.000	0.070	0.070	Concentric Widening
0.110	0.350	0.240	RHS Widening
0.660	0.800	0.140	LHS Widening
0.800	0.860	0.060	Concentric Widening
1.200	1.260	0.060	Concentric Widening
1.400	1.460	0.060	Concentric Widening
1.580	1.660	0.080	Concentric Widening
1.660	1.700	0.040	LHS Widening
2.220	2.300	0.080	RHS Widening
2.500	2.760	0.260	Concentric Widening
2.760	2.800	0.040	LHS Widening
2.800	2.860	0.060	Concentric Widening
2.940	3.020	0.080	Concentric Widening
3.020	3.160	0.140	RHS Widening
3.240	3.280	0.040	Concentric Widening
3.580	3.660	0.080	RHS Widening
3.800	3.880	0.080	RHS Widening
4.040	4.160	0.120	Concentric Widening
4.200	4.240	0.040	RHS Widening
4.240	4.280	0.040	Concentric Widening
4.340	4.480	0.140	Concentric Widening
4.560	4.680	0.120	Concentric Widening
4.680	4.780	0.100	LHS Widening
5.140	5.240	0.100	RHS Widening
5.240	5.320	0.080	LHS Widening
5.380	5.420	0.040	Concentric Widening
5.420	5.500	0.080	LHS Widening
5.620	5.680	0.060	Concentric Widening
5.860	5.960	0.100	LHS Widening
6.340	6.400	0.060	LHS Widening
6.520	6.620	0.100	LHS Widening
6.700	6.740	0.040	Concentric Widening
6.740	6.780	0.040	LHS Widening
6.780	6.840	0.060	RHS Widening
7.140	7.200	0.060	Concentric Widening
7.280	7.400	0.120	LHS Widening
7.400	7.460	0.060	RHS Widening
7.460	7.560	0.100	LHS Widening
7.620	7.680	0.060	RHS Widening

Design Chainages		Design Length (Km)	Remarks
From	To		
7.780	7.920	0.140	LHS Widening
7.920	7.960	0.040	Concentric Widening
8.040	8.120	0.080	Concentric Widening
8.400	8.580	0.180	LHS Widening
8.640	8.720	0.080	Concentric Widening
8.780	8.820	0.040	Concentric Widening
8.820	8.880	0.060	RHS Widening
8.960	9.000	0.040	RHS Widening
9.000	9.040	0.040	LHS Widening
9.040	9.120	0.080	Concentric Widening
9.120	9.200	0.080	RHS Widening
9.200	9.280	0.080	LHS Widening
9.340	9.420	0.080	LHS Widening
9.420	9.500	0.080	Concentric Widening
9.500	9.600	0.100	LHS Widening
9.680	9.720	0.040	LHS Widening
9.720	9.770	0.050	Concentric Widening
9.840	9.980	0.140	LHS Widening
10.120	10.200	0.080	LHS Widening
10.320	10.480	0.160	LHS Widening
10.540	10.580	0.040	LHS Widening
10.580	10.630	0.050	RHS Widening
10.860	10.920	0.060	RHS Widening
10.920	10.940	0.020	Concentric Widening
11.060	11.140	0.080	Concentric Widening
11.240	11.300	0.060	Concentric Widening
11.300	11.360	0.060	LHS Widening
11.360	11.420	0.060	Concentric Widening
11.420	11.460	0.040	LHS Widening
11.640	11.680	0.040	LHS Widening
11.800	11.840	0.040	Concentric Widening
11.980	12.060	0.080	LHS Widening
12.140	12.260	0.120	RHS Widening
12.320	12.460	0.140	Concentric Widening
12.640	12.700	0.060	Concentric Widening
12.920	12.960	0.040	Concentric Widening
12.960	13.020	0.060	RHS Widening
13.060	13.160	0.100	Concentric Widening
13.300	13.440	0.140	RHS Widening

Design Chainages		Design Length (Km)	Remarks
From	To		
13.500	13.510	0.010	RHS Widening
Total Length (Km)		**6.300**	

6. Roadside Drainage

Drainage system including surface and subsurface drains for the Project Highway shall be provided as per the provision of Section 6 of the Manual (IRC:SP 73-2018).

S. No.	Package Detail	Design Length (Km)
1	Package I	13.993
	Total (Km)	**13.993**

On hill side open CC Drain with kerb shall be provided for typical cross sections mentioned in Clause 2.11 of Schedule B and as per cross section type given at Schedule D. In all built up areas RCC covered drains with Footpath shall be provided. Suitable crossing shall be provided at approaches to properties etc. invert levels of drains shall be decided on the basis of ground slopes of adjoining properties and open grounds.

In cutting portions CC open drain of suitable size shall be constructed for a minimum length of 7.053 Km as per typical cross sections mentioned in Clause 2.11 of Schedule B in consultation with Authority Engineer.

7. Design of Structures

(i) General

(a) All bridges, culverts and structures shall be designed and constructed in accordance with the provision of section 7 of the Manual (IRC: SP 73-2018) and shall conform to the cross- sectional features and other details specified therein.

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

S. No.	Bridge at km	Width of carriageway and cross-sectional features*
Package I		
NIL		

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

S. No.	Location at km	Remarks
NIL		

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

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

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

(f) Cross-section of the new culverts and bridges at deck level for the Project Highway shall conform to the typical cross-sections given in the provision of section 7 of the Manual (IRC:SP: 73-2018) and deviations given at Schedule D.

(ii) Culverts

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

(b) Reconstruction of existing culverts:

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

Refer to the provision of 7.3 (ii) of the Manual (IRC: SP 73-2018)

Slab Culverts: 09 Nos

S.No.	Culvert location		Proposed Span/ Opening (m.)	Proposed Width (m)	Remark
	Existing Chainage (Km)	Design Chainage (Km)			
Package I					
1	1/916	1.700	1 x 2.00 x 2.00	12.00	
2	3/645	3.295	1 x 4.00 x 4.00	12.00	
3	4/065	3.730	1 x 3.00 x 3.00	12.00	
4	8/905	7.975	1 x 4.00 x 4.00	12.00	
5	9/250	8.260	1 x 4.00 x 4.00	12.00	
6	9/810	8.760	1 x 6.00	12.00	
7	11/425	10.154	1 x 2.00 x 2.00	12.00	
8	12/940	11.530	1 x 3.00 x 3.00	12.00	
9	12/705	13.222	1 x 4.00 x 4.00	12.00	

Pipe Culverts: 24 Nos

S.No.	Existing Chainage (Km)	Design Chainage (Km)	Proposed Span/ Opening (No. x Dia.) (m)	Proposed Width (m)	Remark
Package I					
1	0/380	0.375	1 x 1200	12.00	
2	0/834	0.680	1 x 1200	12.00	

S.No.	Existing Chainage (Km)	Design Chainage (Km)	Proposed Span/ Opening (No. x Dia.) (m)	Proposed Width (m)	Remark
3	1/510	1.200	1 x 1200	12.00	
4	2/040	1.800	1 x 1200	12.00	
5	2/422	2.160	1 x 1200	12.00	
6	3/110	2.765	1 x 1200	12.00	
7	3/465	3.200	1 x 1200	12.00	
8	4/355	3.920	1 x 1200	12.00	
9	7/837	6.950	1 x 1200	12.00	
10	9/495	8.505	1 x 1200	12.00	
11	9/920	8.808	1 x 1200	12.00	
12	9/990	8.905	1 x 1200	12.00	
13	10/182	9.092	1 x 1200	12.00	
14	10/440	9.330	1 x 1200	12.00	
15	10/834	9.700	1 x 1200	12.00	
16	10/900	9.767	1 x 1200	12.00	
17	11/040	9.843	1 x 1200	12.00	
18	11/884	10.566	1 x 1200	12.00	
19	12/320	10.943	1 x 1200	12.00	
20	12/695	11.310	1 x 1200	12.00	
21	12/845	11.460	1 x 1200	12.00	
22	13/705	12.250	1 x 1200	12.00	
23	12/460	12.970	1 x 1200	12.00	
24	12/960	13.460	1 x 1200	12.00	

(c) Widening of existing culverts:

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

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

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

Box Culvert: 09 Nos

S.No	Design Chainage (Km)	Proposed Span/ Opening (m)	Proposed Width (m)	Type	Remark
Package – I					
1	0.450	1 x 4.00 x 4.00	12.00	Box Culvert	New Construction
2	4.520	1 x 6.00	12.00	Box Culvert	New Construction
3	4.800	1 x 3.00 x 3.00	12.00	Box Culvert	New Construction

S.No	Design Chainage (Km)	Proposed Span/ Opening (m)	Proposed Width (m)	Type	Remark
4	6.240	1 x 2.00 x 2.00	12.00	Box Culvert	New Construction
5	6.485	1 x 4.00 x 4.00	12.00	Box Culvert	New Construction
6	7.590	1 x 2.00 x 2.00	12.00	Box Culvert	New Construction
7	10.820	1 x 4.00 x 4.00	12.00	Box Culvert	New Construction
8	12.085	1 x 2.00 x 2.00	12.00	Box Culvert	New Construction
9	12.600	1 x 2.00 x 2.00	12.00	Box Culvert	New Construction

Pipe Culvert: 24 Nos

S. No.	Design Chainage (Km)	No. x Dia.(mm)	Proposed Width (m)	Type	Remark
Package – I					
1	0.240	1 x 1200	12.00	HPC	New Construction
2	0.530	1 x 1200	12.00	HPC	New Construction
3	0.900	1 x 1200	12.00	HPC	New Construction
4	1.100	1 x 1200	12.00	HPC	New Construction
5	1.320	1 x 1200	12.00	HPC	New Construction
6	1.500	1 x 1200	12.00	HPC	New Construction
7	2.900	1 x 1200	12.00	HPC	New Construction
8	5.040	1 x 1200	12.00	HPC	New Construction
9	5.120	1 x 1200	12.00	HPC	New Construction
10	5.380	1 x 1200	12.00	HPC	New Construction
11	5.730	1 x 1200	12.00	HPC	New Construction
12	6.000	1 x 1200	12.00	HPC	New Construction
13	6.650	1 x 1200	12.00	HPC	New Construction
14	6.750	1 x 1200	12.00	HPC	New Construction
15	7.050	1 x 1200	12.00	HPC	New Construction
16	7.135	1 x 1200	12.00	HPC	New Construction
17	9.580	1 x 1200	12.00	HPC	New Construction
18	10.085	1 x 1200	12.00	HPC	New Construction
19	10.300	1 x 1200	12.00	HPC	New Construction
20	11.770	1 x 1200	12.00	HPC	New Construction
21	11.945	1 x 1200	12.00	HPC	New Construction
22	12.790	1 x 1200	12.00	HPC	New Construction
23	13.030	1 x 1200	12.00	HPC	New Construction
24	13.130	1 x 1200	12.00	HPC	New Construction

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

S. No.	Location at km	Type of repair required
NIL		

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

(iii) Bridges

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

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

Refer to the provision of 7.3.2 of the Manual (IRC: SP 73-2018)

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

(ii) The following narrow bridges shall be widened:

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

(b) Additional new bridges

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

Major Bridges: NIL

S. No.	Location (km)	Total length (m)	Remarks, if any
NIL			

Minor Bridges: NIL

S. No.	Location km (Design Ch.)	Total Length of bridge (m)	Total Width (m)
Package I			
NIL			

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

S. No.	Location at km	Remarks
NIL		

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

S. No.	Location at km	Remarks

NIL

(e) Drainage system for bridge decks

An effective drainage system for bridge decks shall be provided as specified in the provision of paragraph 7.21 of the Manual IRC SP 73 2018.

(f) Structures in marine environment: NIL

(iv) Rail-road bridges: NIL

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

(b) Road over-bridges

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

S.No.	Location of Level crossing (Chainage km)	Length of bridge (m)
NIL		

(c) Road under-bridges

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

S. No.	Location of Level crossing (Chainage km)	Number and length of span (m)
NIL		

(v) Grade separated structures: NIL

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

(vi) Repairs and strengthening of bridges and structures

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

(a) Bridges

Major Bridges:

S.No.	Location of bridge (km)	Nature and extent of repairs /strengthening to be carried out
Package I		
NIL		

Minor Bridges:

S. No.	Location of bridge (km)	Nature and extent of repairs /strengthening to be carried out
Package I		
1	11.118	Replacement of expansion joints & wearing coat, providing crash barrier and approach slab on bridge, painting & bed protection work.
2	12.412	Replacement of expansion joints & wearing coat, providing crash barrier and approach slab on bridge, painting & bed protection work.

(b) ROB / RUB

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

(c) Overpasses/Underpasses and other structures

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

(vii) List of Major Bridges and Structures

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

S. No.	Location
Package I	
NIL	

8. Traffic Control Devices and Road Safety Works

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

(ii) Specifications of the reflective sheeting shall be provided in accordance with Section 9 of the Manual.

9. Roadside Furniture

(i) Roadside furniture shall be provided in accordance with the provision of Section 9 of the Manual.

(ii) Overhead traffic signs: location and size

S. No	Location (Design Chainage)	Type	Remark
NIL			

10. Compulsory Afforestation

Deleted.

11. Hazardous Locations

The safety barriers shall be provided at the hazardous locations as per Clause 7.18 of the Manual (IRC:SP 73-2018). W-Beam metal crash barriers shall however be provided for a minimum length of (1.750+0.3) =2.050 Km at all hazardous locations. All hazardous locations shall be finalized in consultation with the Authority Engineer.

Above length of the W-Beam metal crash barriers is indicative and minimum specified. The actual length of the W-Beam metal crash barriers shall be determined by the Contractor in accordance with the Manual requirements with approval from the Authority's Engineer. Any increase in the length specified in this Clause of Schedule B shall not constitute a Change of Scope.

a) Stone Masonry Retaining Wall: Retaining Wall shall be constructed as per typical cross sections as per Schedule D and at other locations mentioned below:

RHS			LHS		
From	**To**	**Length**	**From**	**To**	**Length**
Package – I : From De. Ch 0.000 to Ch. 13.510 (Seling to Keifang)					
0+440	0+450	10.000	0+440	0+450	10.000
0+530	0+540	10.000	0+510	0+520	10.000
1+310	1+320	10.000	0+670	0+680	10.000
2+890	2+900	10.000	0+880	0+930	50.000
6+260	6+270	10.000	0+990	1+000	10.000
6+640	6+660	20.000	1+090	1+110	20.000
8+740	8+780	40.000	1+300	1+330	30.000
10+800	10+820	20.000	1+440	1+450	10.000
12+080	12+090	10.000	1+790	1+800	10.000
12+590	12+610	20.000	1+880	1+910	30.000
13+160	13+170	10.000	2+030	2+040	10.000
13+210	13+220	10.000	2+360	2+400	40.000
13+250	13+280	30.000	2+760	2+790	30.000
			2+880	2+900	20.000
			2+910	2+920	10.000
			4+490	4+500	10.000
			4+680	4+690	10.000
			4+790	4+800	10.000
			4+880	4+890	10.000
			5+020	5+030	10.000
			5+040	5+050	10.000
			5+100	5+110	10.000
			5+120	5+130	10.000
			5+270	5+280	10.000

RHS			LHS		
From	To	Length	From	To	Length
			5+700	5+760	60.000
			5+820	5+850	30.000
			5+880	5+920	40.000
			5+950	6+000	50.000
			6+160	6+200	40.000
			6+280	6+290	10.000
			6+350	6+370	20.000
			6+480	6+510	30.000
			6+620	6+630	10.000
			6+670	6+690	20.000
			6+750	6+760	10.000
			6+930	6+960	30.000
			7+030	7+040	10.000
			7+100	7+140	40.000
			7+200	7+210	10.000
			7+470	7+500	30.000
			7+590	7+620	30.000
			7+710	7+740	30.000
			8+250	8+260	10.000
			8+430	8+460	30.000
			8+490	8+500	10.000
			8+730	8+750	20.000
			8+780	8+790	10.000
			8+800	8+810	10.000
			8+890	8+920	30.000
			9+300	9+310	10.000
			9+850	9+860	10.000
			9+910	9+920	10.000
			10+080	10+110	30.000
			10+270	10+300	30.000
			10+820	10+830	10.000
			11+300	11+310	10.000
			11+750	11+780	30.000
			11+900	11+930	30.000
			11+940	11+950	10.000
			12+070	12+080	10.000
			12+090	12+100	10.000
			13+210	13+220	10.000
			13+440	13+450	10.000
	TOTAL	**210.000**		**TOTAL**	**1230.000**

Above length of the Retaining Wall is indicative and minimum specified. The actual length of the Retaining Wall shall be determined by the Contractor in accordance with the Manual requirements with approval from the Authority's Engineer. Any increase in the length specified in this Clause of Schedule B shall not constitute a Change of Scope.

b) Breast Wall: Breast Retaining Wall shall be constructed as per typical

cross sections as per Schedule D and at other locations mentioned below:

Breast Wall Chainages (HT 1.5m)

RHS			LHS		
From	**To**	**Length**	**From**	**To**	**Length**
Package – I : From De. Ch 0.000 to Ch. 13.510 (Seling to Keifang)					
0+120	0+160	40.000	3+750	3+760	10.000
0+260	0+270	10.000	5+540	5+550	10.000
0+290	0+310	20.000	6+030	6+040	10.000
0+580	0+590	10.000	6+420	6+430	10.000
0+640	0+650	10.000	6+830	6+850	20.000
0+820	0+830	10.000	6+920	6+930	10.000
1+130	1+140	10.000	7+990	8+000	10.000
1+190	1+200	10.000	8+020	8+030	10.000
1+770	1+780	10.000	8+220	8+230	10.000
1+870	1+880	10.000	8+320	8+330	10.000
1+960	1+970	10.000	8+610	8+620	10.000
1+980	1+990	10.000	10+620	10+630	10.000
2+060	2+070	10.000	11+200	11+210	10.000
2+160	2+170	10.000	11+570	11+590	20.000
2+240	2+250	10.000	11+850	11+860	10.000
2+290	2+310	20.000	12+280	12+290	10.000
2+400	2+410	10.000	12+450	12+460	10.000
2+570	2+580	10.000	12+660	12+670	10.000
2+590	2+600	10.000	12+900	12+910	10.000
2+630	2+650	20.000	13+110	13+140	30.000
2+710	2+730	20.000			
2+950	2+960	10.000			
2+970	2+980	10.000			
3+050	3+090	40.000			
3+100	3+120	20.000			
3+230	3+240	10.000			
3+250	3+270	20.000			
4+030	4+050	20.000			
4+240	4+250	10.000			
4+330	4+340	10.000			
4+390	4+400	10.000			
4+460	4+470	10.000			
4+560	4+580	20.000			
4+630	4+650	20.000			
4+860	4+870	10.000			
4+900	4+910	10.000			
4+980	4+990	10.000			
5+170	5+190	20.000			
5+240	5+250	10.000			
5+300	5+320	20.000			
5+340	5+390	50.000			
5+550	5+560	10.000			
5+640	5+660	20.000			
6+140	6+150	10.000			
6+810	6+830	20.000			
6+980	6+990	10.000			
7+450	7+460	10.000			

RHS			LHS		
From	To	Length	From	To	Length
7+620	7+630	10.000			
7+670	7+680	10.000			
7+910	7+950	40.000			
8+040	8+050	10.000			
8+060	8+070	10.000			
8+110	8+120	10.000			
8+270	8+280	10.000			
8+390	8+410	20.000			
8+580	8+590	10.000			
8+710	8+720	10.000			
8+800	8+870	70.000			
9+110	9+120	10.000			
9+160	9+180	20.000			
9+350	9+360	10.000			
9+450	9+480	30.000			
9+500	9+510	10.000			
9+670	9+680	10.000			
9+720	9+740	20.000			
9+970	9+980	10.000			
10+610	10+620	10.000			
10+680	10+690	10.000			
10+840	10+850	10.000			
11+260	11+270	10.000			
11+460	11+500	40.000			
11+550	11+560	10.000			
11+720	11+730	10.000			
12+110	12+120	10.000			
12+300	12+320	20.000			
12+460	12+470	10.000			
12+550	12+560	10.000			
12+880	12+890	10.000			
	TOTAL	**1,190.000**		**TOTAL**	**240.000**

Breast Wall Chainages (HT 3m)

RHS			LHS		
From	To	Length	From	To	Length
Package – I : From De. Ch 0.000 to Ch. 13.510 (Seling to Keifang)					
0+180	0+200	20.000	1+540	1+550	10.000
0+230	0+260	30.000	1+730	1+740	10.000
0+270	0+280	10.000	1+830	1+860	30.000
0+310	0+340	30.000	2+430	2+470	40.000
0+390	0+410	20.000	3+310	3+340	30.000
0+470	0+490	20.000	3+410	3+450	40.000
0+590	0+640	50.000	3+510	3+540	30.000
0+810	0+820	10.000	3+680	3+700	20.000
0+950	0+960	10.000	3+740	3+750	10.000
1+020	1+070	50.000	3+950	3+970	20.000
1+140	1+190	50.000	4+300	4+310	10.000
1+530	1+580	50.000	4+920	4+940	20.000
1+600	1+630	30.000	5+520	5+540	20.000
1+700	1+770	70.000	6+040	6+140	100.000

RHS			LHS		
From	**To**	**Length**	**From**	**To**	**Length**
1+820	1+870	50.000	6+430	6+440	10.000
2+070	2+130	60.000	6+860	6+920	60.000
2+170	2+210	40.000	8+000	8+020	20.000
2+260	2+290	30.000	8+180	8+220	40.000
2+410	2+510	100.000	8+300	8+320	20.000
2+610	2+620	10.000	9+620	9+650	30.000
2+650	2+660	10.000	9+780	9+820	40.000
2+700	2+710	10.000	10+000	10+050	50.000
2+820	2+830	10.000	10+700	10+730	30.000
2+980	3+040	60.000	10+960	10+990	30.000
3+090	3+100	10.000	11+150	11+200	50.000
3+120	3+130	10.000	12+270	12+280	10.000
3+140	3+220	80.000	12+460	12+570	110.000
3+310	3+880	570.000	12+850	12+900	50.000
3+940	4+030	90.000			
4+150	4+240	90.000			
4+250	4+330	80.000			
4+410	4+430	20.000			
4+830	4+860	30.000			
4+910	4+950	40.000			
4+990	5+000	10.000			
5+060	5+070	10.000			
5+150	5+160	10.000			
5+190	5+240	50.000			
5+330	5+340	10.000			
5+510	5+550	40.000			
6+020	6+140	120.000			
6+300	6+330	30.000			
6+400	6+460	60.000			
6+770	6+800	30.000			
6+830	6+920	90.000			
6+990	7+010	20.000			
7+250	7+290	40.000			
7+410	7+450	40.000			
7+630	7+670	40.000			
7+990	8+040	50.000			
8+120	8+240	120.000			
8+280	8+390	110.000			
8+590	8+650	60.000			
8+980	9+000	20.000			
9+120	9+150	30.000			
9+420	9+450	30.000			
9+610	9+670	60.000			
9+770	9+820	50.000			
9+980	10+060	80.000			
10+480	10+520	40.000			
10+580	10+600	20.000			
10+690	10+750	60.000			
10+850	10+900	50.000			
10+950	11+060	110.000			
11+140	11+260	120.000			
11+560	11+620	60.000			

RHS			LHS		
From	To	Length	From	To	Length
11+690	11+720	30.000			
11+830	11+880	50.000			
12+120	12+140	20.00			
12+170	12+300	130.000			
12+470	12+550	80.000			
12+870	12+880	10.000			
	TOTAL	**3,840.000**		**TOTAL**	**940.000**

Above length of the Breast Wall is indicative and minimum specified. The actual length of the Breast Wall shall be determined by the Contractor in accordance with the Manual requirements with approval from the Authority's Engineer. Any increase in the length specified in this Clause of Schedule B shall not constitute a Change of Scope.

RE WALL

RHS			LHS		
From	To	Length	From	To	Length
Package – I : From De. Ch 0.000 to Ch. 13.510 (Seling to Keifang)					
13+440	13+450	10.000	0+530	0+560	30.000
			2+900	2+910	10.000
			4+530	4+540	10.000
			5+030	5+040	10.000
			5+110	5+120	10.000
			6+260	6+280	20.000
			6+650	6+670	20.000
			8+760	8+780	20.000
			10+810	10+820	10.000
			11+930	11+940	10.000
			12+080	12+090	10.000
	TOTAL	**10.000**		**TOTAL**	**160.000**

ROCKFILL

S. No.	Chainage		Length
	From	To	
Package – I : From De. Ch 0.000 to Ch. 13.510 (Seling to Keifang)			
1	4+500	4+530	30.000
2	6+210	6+260	50.000
3	13+220	13+250	30.000
4	13+450	13+460	10.000
		TOTAL	**120.000**

12. Special Requirement for Hill Roads

The special requirements for Hill road as per Section 13 of Manual IRC: SP-73-2018 and IRC: SP-48-1988 Hill Road Manual, shall be constructed & provided as per requirements with approval from the Authority's Engineer.

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.

Schedule - C

(See Clause 2.1)

Project Facilities

1. Project Facilities

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

(a) toll plaza[s];

(b) roadside furniture;

(c) pedestrian facilities;

(d) tree plantation;

(e) truck lay-byes;

(f) bus-bays and bus shelters;

(g) rest areas

(h) street lighting & high mast lighting

(i) Advanced Traffic Management System (ATMS)

(j) Rain Water Harvesting

(k) others

2. Description of Project Facilities

Each of the Project Facilities is described below:

a) Toll Plazas : Nil

Toll Plaza	Design Chainage (in km)
Package I	
NIL	

The tentative location is mentioned as above however the exact location identified shall be finalised in consultation with the Authority Engineer.
Specifications and other requirements of the toll plazas shall be strictly as per Section 10 of Manual IRC SP 73-2018. Toll Plaza should be design such that roof canopy fixed with solar panels.

b) Road side Furniture shall be provided as follows: -

(i) Traffic Signs and Pavement Markings.

Traffic signs and pavement markings shall include road side signs, overhead signs, curve mounted signs and road marking along the project highway. The locations for these provisions shall be finalised in consultation with Authority's Engineer and as per latest IRC Standard.

(ii) Concrete Crash Barrier, Metal beam crash barrier, Separators (MS railings) The minimum length of **(1.750+0.3) =2.050** Metal beam crash barrier, shall be provided as per Schedule D and for safety of traffic & users.

(iii) Traffic Safety Devices in consultation with Authority's Engineer & Latest IRC standards

(iv) Boundary Stones shall be placed throughout the project road as per schedule 'D'

(v) Hectometer /Kilometer Stones as per schedule 'D'

(vi) Solar Traffic blinker signal (L.E.D) shall be provided at intersections.

c) Pedestrian Facilities

The additional pedestrians' facilities in the form of guard rails, footpath, lighting etc. shall be provided in built-up area.

d) Landscaping and Tree Plantation

Landscaping and road side plantation shall be provided in accordance with the Manual of Specifications and Standards as referred in Schedule B and D. Contractor Shall be responsible for implementation of Environment management Plan (EMP) on the project. The cost of EMP shall be Bourne by Contractor.

e) Truck Lay-byes

Truck Lay byes shall be provided at locations given below on both side of highway on each location as per Manual.

S. No.	Existing Chainage (km)	Design Chainage (km)	Side	Remark
Package I				
NIL				

The tentative location is mentioned as above however the exact location identified shall be finalised in consultation with the Authority Engineer.

f) Bus-bays and Bus Shelter:

Bus Lay bye with bus shelter & bus shelter shall be provided at locations given below.

S. No.	Existing Chainage (km)	Design Chainage (Km)	Side	Village Name
Package I				
1	0+310	0.340	RHS	SELING
2	6+000	5.480	LHS	--
3	13+655	12.200	RHS	TUITUI

N

Note: The locations of Bus Lay byes with bus shelter/Bus shelter are tentative & shall be got approved/provided in consultation with the Authority/Authority's Engineer.

g) Rest Area: **NIL**

h) Street Lighting & High Mast Lighting

i. Street/Highway Lighting

Street Light: Street lighting on decorative lamp post with LED /energy efficient lighting system of standard make with minimum 40 Lux capacities shall be provided @ 30m interval for entire project highway. Street lights shall be provided with dual lights on single pole and single lights on single pole. The height of street light pole shall be about 9m above FRL and that of high mast shall be 25m. The street light arrangement is given in following table:

Sr. No	Chainage		Length (km)	Spacing (m)	Height of Pole (m)	No of One way Light Poles	No of Two way Light Poles
	From	To					
Package I							
--NIL--							

ii. High Mast Lighting

High mast lighting shall be provided at Major junctions, Flyovers toll plaza and Bus Bay /Truck Lay byes using LED / energy efficient lighting system. The high mast shall be provided at following locations:

S. No	Design Chainage	Location	Height of HM (m)	Qty (Nos)
Package – I				
--NIL--				

iii. Solar lights blinkers shall be provided at major & minor junctions etc.

iv. The lighting work shall be got done from the qualified specialised agency.

v. The scope include providing entire lighting systems, trenching, underground / building in cabling, transformers etc and obtaining electric supply / approval from concern Govt. department etc.

i) Advanced Traffic Management System (ATMS)

ATMS shall be provided as per para 12.15 of the Manual (IRS SP 73 2018).

j) Rain Water Harvesting System

Rain Water Harvesting System shall be provided at bus bay with bus shelter, truck lay byes locations.

k) Slope protection

The slope protection by lawn or any other method using green technology will be provided as per Manual and as directed by Authority.

l) Utility pipe ducts

(14 Nos.) Utility pipe ducts in C.C. Pipe – 600mm @ 1000.00m c/c for rural & urban length of project road across road with proper inlet and chamber for crossing service lines such as irrigation pipe lines and cables. In urban areas the ducts shall be constructed along the project road for linear underground utility lines. The ducts shall be laid at a suitable depth as approved by Authority Engineer

m) Utilities

Utilities to be identified at site and certified by the Authority Engineer then shifting may be taken by contractor.

Note: In case of any discrepancy in numbers or locations of any of the project facilities mentioned in this Schedule C, shall be constructed and provided in consultation with the Authority Engineer as per site/design requirement.

Schedule - D

(See Clause 2.1)

Specifications and Standards

1. Construction

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

2. Design Standards

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

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

Annex – I

(Schedule-D)

Specifications and Standards for Construction

1. Specifications and Standards

All Materials, works and construction operations shall conform to the Manual of Specifications and Standards for Two-Laning with Paved Shoulder of Highways (IRC:SP:73-2018) and Hill Road manual (IRC:SP:48-1988) referred to as the Manual, and MORTH Specifications for Road and Bridge Works. Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Authority's Engineer.

2. Deviations from the Specifications and Standards

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

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

S No.	Clause No.	Provisions in Clause	Variation Proposed in Brief
1	Clause 2.2	For Mountainous and Steep terrain, Ruling and Minimum Speed is 60kmph and 40kmph respectively.	For Mountainous and Steep terrain, Ruling and Minimum Speed is 40kmph and 30kmph respectively.
2	Clause 2.16	Typical Cross Sections	Fig. 1, 2A, 2B, 3, 4 & 5 as Per Schedule-B

(iii) Note 1: Deviations from the aforesaid Specifications and Standards shall be listed out here. Such deviations shall be specified only if they are considered essential in view of project-specific requirements.

Schedule-E

(See Clauses2.1 and 14.2)

Maintenance Requirements

1. Maintenance Requirements

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

(ii) The Contractor shall repair or rectify any Defect or deficiency set forth in Paragraph 2 of this Schedule-E within the time limit specified therein and any failure in this behalf shall constitute non-fulfillment of the Maintenance obligations by the Contractor. Upon occurrence of any breach hereunder, the Authority shall be entitled to effect reduction in monthly lumpsum 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.

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, inconformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards, and any deviation or deterioration beyond the permissible limit shall be repaired or rectified by the Contractor within the time limit specified by the Authority's Engineer.

4. Extension of time limit

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

time shall be determined by the Authority's Engineer and conveyed to the Contractor and the Authority with reasons thereof.

5. Emergency repairs/ restoration

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

6. Daily inspection by the Contractor

The Contractor shall, through its engineer, undertake a daily visual inspection of the Project Highway and maintain are cord there of 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 anytime during office hours.

7. Pre-monsoon inspection / Post-monsoon inspection

The Contractor shall carryout 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 willful default or neglect of the Authority shall be undertaken by the Authority at its own cost. The Authority may instruct the Contractor to undertake the repairs at the rates agreed between the Parties.

Annex– I

(Schedule-E)

Repair/rectification of Defects and deficiencies

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

Table -1: Maintenance Criteria for Pavements:

Asset Type	Performance Parameter	Level of Service(LOS)		Frequency of Inspect ion	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/Repair	Maintenance Specifications
		Desirable	Acceptable					
Flexible Pavement (Pavement of MCW, Service Road, Approaches of Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	Potholes	Nil	< 0.1 % of area and subject to limit of 10 mm in depth	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC 82: 2015 and Distress Identification Manual for Long Term Pavement Performance Program, FHWA 2003	24-48 hours	MORT&H Specification 3004.2
	Cracking	Nil	< 5 % subject to limit of 0.5 sqm for any 50 m length	Daily			7-15 days	MORT&H Specification 3004.3
	Rutting	Nil	< 5 mm	Daily	Straight Edge		15 -30 days	MORT&H Specification 3004.2
	Corrugations and Shoving	Nil	< 0.1 % of area	Daily	Length Measurement Unit like		2 -7 days	IRC:82-2015
	Bleeding	Nil	< 1 % of area	Daily				
	Ravelling / Stripping	Nil	< 1 % of area	Daily				
	Edge Deformation/ Breaking	Nil	< 1 m for any 100m section and width < 0.1 m at any location, restricted to 30 cm from the edge	Daily				
	Roughness BI	2000 mm/km	2400 mm/km	Bi-Annually	Class I Profilometer	Class I Profilometer	180 days	IRC:82-2015

Asset Type	Performance Parameter	Level of Service(LOS)		Frequency of Inspect ion	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/Repair	Maintenance Specifications
		Desirable	**Acceptable**					
	Skid Number	60SN	50 SN	Bi-Annually	SCRIM (Sideway force Coefficient Routine Investigation Machine or equivalent)	: ASTM E950 (98) :2004 –Standard Test Method for measuring Longitudinal Profile of Travelled Surfaces with Accelerometer Established Inertial Profiling Reference ASTM E1656 -94: 2000- Standard Guide for Classification of Automatic Pavement Condition Survey Equipment	180 days	BS: 7941-1:2006
	Pavement Condition Index	3	2.1	Bi-Annually			180 days	IRC:82-2015
	Other Pavement Distresses			Bi-Annually			2-7 days	IRC:82-2015
	Deflection/ Remaining Life			Bi-Annually	Falling Weight Deflectometer	IRC 115: 2014		IRC:115-2014
Rigid Pavement (Pavement of MCW, Service Road, Grade structure approaches of connecting roads, Slip roads, lay byes etc. as applicable)	Roughness BI	2000 mm/km	2400 mm/km	Bi-Annually	Class I Profilometer	ASTM E950 (98) :2004 and ASTM E1656 - 94: 2000	180 days	IRC:SP:83-2008
	Skid	Skid Resistance no. at different speed of vehicles		Bi-Annually	SCRIM (Sideway force Coefficient Routine Investigation Machine or equivalent)	IRC:SP:83-2008	180 days	IRC:SP:83-2008
		Minimum SN	**Traffic Speed (Km/h)**	Bi-Annually			180 days	
		36	50					
		33	65					
		32	80					
		31	95					
		31	110					
	Edge drop at shoulders	Nil	40mm	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	**IRC**	7-15 days	MORT&H Specification 408.4
		Nil	<2% variation in prescribed slope of camber/cross fall	Daily			7-15 days	MORT&H Specification 408.4
		Nil		Daily			7-15 days	MORT&H Specification 408.4

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

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

Table -2: Maintenance Criteria for Rigid Pavements

S. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
CRACKING						
1	Single Discrete Cracks Not intersecting with any joint	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	Not applicable
			1	w < 0.2 mm. hair cracks		
			2	w = 0.2 - 0.5 mm, discernible from slow-moving car	Seal without delay	Seal, and stitch if L >lm. 3 Within 7days
			3	w = 0.5 - 1.5 mm, discernible from fast-moving car		
			4	w = 1.5 - 3.0 mm	Seal, and stitch if L > l m. Within 7 days	Staple or Dowel Bar Retrofit, FDR for affected portion. Within 15days
			5	w > 3 mm.		
2	Single Transverse (or Diagonal) Crack intersecting with one or more joints	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.2 mm. hair cracks	Route and seal with epoxy. Within 7 days	Staple or Dowel Bar Retrofit. Within 15days
			2	w = 0.2 - 0.5 mm, discernible from slow-moving car		
			3	w = 0.5 - 1.5 mm, discernible from fast-moving car	Route, seal and stitch, if L > 1 m. Within 7 days	
			4	w = 1.5 - 3.0 mm	Dowel Bar Retrofit Within 15 days	Full Depth Repair Dismantle and reconstruct affected
			5	w > 3 mm.	Not Applicable, as it may be full depth	Portion with norms and specifications - See Para 5.5 & 9.2

S. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
						Within 15days
3	Single Longitudinal Crack intersecting with one or more joints	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.5 mm, discernable from slow moving vehicle	Seal with epoxy, if L > 1m. Within 7 days	Staple or dowel bar retrofit. Within 15days
			2	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route seal and stitch, if L > l m. Within 15 days	
			3	w = 3.0 - 6.0 mm	Not Applicable, as it may be full depth	Partial Depth Repair with stapling. Within 15 days
			4	w = 6.0 - 12.0 mm, usually associated with spalling		
			5	w > 12 mm, usually associated with spalling, and/or slab rocking under traffic		Full Depth Repair Dismantle and reconstruct affected portion as per norms and specifications See Para 5.6.4 Within 15 days
4	Multiple Cracks intersecting with one or more joints	w = width of crack	0	Nil, not discernible	No Action	
			1	w < 0.2 mm, hair cracks	Seal, and stitch if L > l m. Within 15 days	
			2	w = 0.2 - 0.5 mm. discernible from slow vehicle		
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Full depth repair within 15 days	Dismantle, Reinstate sub base, Reconstruct whole slab as per specifications within 30 days
			4	w = 3.0 - 6.0 mm panel broken into 2 or 3 pieces		
			5	w > 6 mm and/or panel broken into more than 4 pieces		
5	Corner Break		0	Nil, not discernible	No Action	
			1	w < 0.5 mm; only 1 corner broken	Seal with low viscosity epoxy to secure broken parts Within 7 days	Seal with epoxy seal with epoxy Within 7days Full depth repair
			2	w < 1.5 mm; L < 0.6 m, only one corner broken		
			3	w < 1.5 mm; L < 0.6 m, two corners broken	Partial Depth (Refer Figure 8.3 of IRC:SP: 83-2008) Within 15 days	
			4	w > 1.5 mm; L > 0.6 m or three corners broken		
			5	three or four corners broken		Reinstate sub-base, and reconstruct the slab as per norms and specifications

S. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
						within 30days
6	Punchout (Applicable to Continuous Reinforced Concrete Pavement (CRCP) only)	w = width of crack L = length (m/m2)	0	Nil, not discernible	Not Applicable, as it may be full depth	No Action
			1	w < 0.5 mm; L < 3 m/m2		Seal with low viscosity epoxy to secure broken parts. Within 15days
			2	either w > 0.5 mm or L < 3 m/m2		
			3	w > 1.5 mm and L < 3 m/m2		
			4	w > 3 mm, L < 3 m/m2 and deformation		Full depth repair - Cut out and replace damaged area taking care not to damage reinforcement. Within 30days
			5	w > 3 mm, L > 3 m/m2 and deformation		
SURFACE DEFECTS						
					Short Term	**Long Term**
7	Ravelling or Honeycomb type surface	r = area damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	No action.	Not Applicable
			1	r < 2 %	Local repair of areas Damaged and liable to be damaged. Within 15 days	
			2	r = 2 - 10 %		
			3	r = 10-25%	Bonded Inlay, 2 or 3 slabs if affecting. Within 30 days Reconstruct slabs, 4 or more slabs if affecting. Within 30 days	
			4	r = 25 - 50 %		
			5	r > 50% and h > 25 mm		
8	Scaling	r = damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	No action.	Not Applicable
			1	r < 2 %	Local repair of areas Damaged and liable to be damaged Within 7days	
			2	r = 2 - 10 %		
			3	r = 10-25%	Bonded Inlay within 15 days	
			4	r = 25 - 50 %		
			5	r > 50% and h > 25 mm	Reconstruct slab within 30 days	
9	Polished Surface/Glazing	t= texture depth, sand patch test	0		No action.	Not Applicable
			1	t > 1 mm		
			2	t = 1 - 0.6 mm	Monitor rate of deterioration	
			3	t = 0.6 - 0.3 mm		
			4	t = 0.3 - 0.1 mm		

S. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
			5	t < 0.1 mm	Diamond Grinding if Affecting 50% or more slabs in a continuous stretch of minimum 5 km. Within 30 days	
10	Popout (Small Hole), Pothole Refer Para 8.4	n = number/m2 d = diameter h = maximum depth	0	d < 50 mm; h < 25 mm; n < 1 per 5 m2	No action	Not Applicable
			1	d = 50 - 100 mm; h < 50 mm; n < 1 per 5 m2	Partial depth repair 65 mm deep Within 15 days	
			2	d = 50 - 100 mm; h > 50 mm; n < 1 per 5 m2		
			3	d = 100 - 300 mm; h < 100 mm n < 1 per 5 m2	Partial depth repair 110mm i.e.10 mm more than the Depth of the hole. Within 30 days Full depth repair Within 30 days	
			4	d = 100 - 300 mm; h > 100 mm; n < 1 per 5 m2		
			5	d > 300 mm; h > 100 mm: n > 1 per 5 m2		
JOINT DEFECTS						
11	Joint Seal Defects	loss or damage L = Length as % total joint length	0	Difficult to discern.	No action.	Not Applicable
			1	Discernible, L< 25% but of little immediate consequence with regard to ingress of water or trapping incompressible material.	Clean joint, inspect later.	
			3	Notable. L > 25% insufficient protection against ingress of water and trapping incompressible material.	Clean and reapply sealant in selected locations. Within 7 days	
			5	Severe; w > 3 mm negligible protection against ingress of water and trapping incompressible material	Clean, widen and reseal the joint. Within 7 days	
12	Spalling of Joints	w = width on either side of the joint L = length of spalled portion (as % joint	0	Nil, not discernible	No action	Not Applicable
			1	w < 10 mm	Apply low viscosity epoxy resin/ mortar in cracked	
			2	w = 10 - 20 mm, L < 25%		

S. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
		length)			portion Within 7 days	
			3	w = 20 - 40 mm, L > 25%	Partial Depth Repair. Within 15 days	
			4	w = 40 - 80 mm, L > 25%	30 - 50 mm deep, h = w + 20% of w, within 30 days	
			5	w > 80 mm, and L > 25%		
13	Faulting (or Stepping) in Cracks or Joints	f = difference of level	0	not discernible, < 1 mm	No action	No action
			1	f < 3 mm	Determine cause and observe, take action for diamond grinding Diamond Grinding	Replace the slab as appropriate. Within 30days
			2	f = 3 - 6 mm		
			3	f = 6 - 12 mm	Diamond Grinding	
			4	f = 12 - 18 mm	Raise sunken slab.	
			5	f> 18 mm		
14	Blowup or Buckling	h = vertical displacement from normal profile	0	Nil, not discernible	Short Term	Long Term
			1	h < 6 mm	No Action	
			2	h = 6 - 12 mm	Install Signs to Warn Traffic within 7 days	
			3	h = 12 - 25 mm		
			4	h > 25 mm	Full Depth Repair. Within 30 days	
			5	shattered slabs, ie 4 or more pieces	Replace broken slabs. Within 30 days	
15	Depression	h = negative vertical displacement from normal profile L =length	0	Not discernible, h < 5 mm	No action.	Not Applicable
			1	h = 5 - 15 mm		
			2	h = 15-30 mm, Nos <20% joints	Install Signs to Warn Traffic within 7 days	
			3	h = 30 - 50 mm	Strengthen subgrade Reinstate pavement at normal level if L < 20 m. Within 30 days	
			4	h > 50 mm or > 20% joints		
			5	h > 100 mm		
16	Heave	h = positive vertical displacement from normal profile. L = length	0	Not discernible. h < 5 mm	Short Term No action	Long Term scrabble
			1	h = 5 - 15 mm	Follow up.	
			2	h = 15 - 30 mm, Nos <20% joints	Install Signs to Warn Traffic within 7 days	
			3	h = 30 - 50 mm		
			4	h > 50 mm or > 20% joints	Stabilise subgrade. Reinstate pavement at normal level if length	
			5	h > 100 mm		

S. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
					< 20 m. Within 30 days	
17	Bump	h = vertical displacement from normal profile	0	h < 4 mm	No action	
			1	h = 4 - 7 mm	Grind, in case of new construction within 7 days	Construction Limit for New Construction
			3	h = 7 - 15 mm	Grind, in case of ongoing Maintenance within 15 days	Replace in case of new construction Within 30days
			5	h > 15 mm	Full Depth Repair within 30 days	Full Depth Repair Within 30days
18	Lane to Shoulder Dropoff	f = difference of level	0	Nil, not discernible < 3mm	Short Term No action	Long Term
			1	f = 3 - 10 mm	Spot repair of shoulder within 7 days	For any 100 m Stretch Reconstruct shoulder, if affecting 25% or more of stretch. Within 30days
			2	f = 10 - 25 mm		
			3	f = 25 - 50 mm		
			4	f = 50 - 75 mm	Fill up shoulder within 7 days	
			5	f > 75 mm		
DRAINAGE						
19	Pumping	quantity of fines and water expelled through open joints and cracks Nos	0	not discernible	No Action	
			1 to 2	slight/ occasional Nos < 10%	Repair cracks and joints Without delay.	Inspect and repair sub-drainage at distressed sections and upstream
			3 to 4	appreciable/ Frequent 10 - 25%	Lift or jack slab within 30 days	
			5	abundant, crack development > 25%	Repair distressed pavement sections. Strengthen subgrade And sub base. Replace slab. Within 30 days	
20	Ponding	Ponding on slabs due to blockage of drains	0 - 2	No discernible problem	No Action	
			3 to 4	Blockages observed in drains, but water flowing	Clean drains etc within 7 days, Follow up	Action required to stop water damaging foundation within 30 days.
			5	Ponding, accumulation of water observed		

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

Asset Type	Performance Parameter	Level of Service (LOS)			Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Highway	Availability of Safe Sight Distance	As per IRC SP :84-2014, a minimum of safe stopping sight distance shall be available throughout.			Monthly	Manual Measurements with Odometer along with video/ image backup	Removal of obstruction within 24 hours, in case of sight line affected by temporary objects such as trees, temporary encroachments. In case of permanent structure or design deficiency: Removal of Obstruction / improvement of deficiency at the earliest Speed Restriction boards and suitable traffic calming measures such as transverse bar marking, blinkers, etc. shall be applied during the period of rectification.		IRC:SP 84-2014
		Design Speed, kmph	**Desirable Minimum Sight Distance (m)**	**Safe Stopping Sight Distance (m)**					
		100	360	180					
		80	260	130					
Pavement Marking	Wear	<70% of marking remaining			Bi-Annually	Visual Assessment as per Annexure-F of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect - within 2 months	IRC:35-2015
	Day time Visibility	During expected life Service Time Cement Road - 130mcd/m2/lux Bituminous Road - 100mcd/m2/lux			Monthly	As per Annexure-D of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect within 2 months	IRC:35-2015
	Night Time Visibility	Initial and Minimum Performance for Dry Retro reflectivity during night time:			Bi-Annually	As per Annexure-E of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hoursCat-2 Defect -within 2 months	IRC:35-2015
		Design Speed	(RL) Retro Reflectivity (mcd/m2/lux)						
			Initial (7 days)	Minimum Threshold level (TL) &warranty period					

Asset Type	Performance Parameter	Level of Service (LOS)			Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
				required up to 2 years					
		Up to 65	**250**	**80**					
		65 - 100	**250**	**120**					
		Above 100	**300**	**150**					
		Initial and Minimum Performance for Night Visibility under wet condition (Retro reflectivity): Initial 7 days Retro reflectivity: 100 mcd/m2/lux Minimum Threshold Level: 50 mcd/m2/lux							
	Skid Resistance	Initial and Minimum performance for Skid Resistance: Initial (7days): 55BPN Min. Threshold: 44BPN *Note: shall be considered under urban/city traffic condition encompassing the locations like pedestrian crossings, bus bay, bus stop, cycle track intersection delineation, transverse bar markings etc			Bi-Annually	As per Annexure-G of IRC:35-2015		Within 24 hours	
Road Signs	Shape and Position	Shape and Position as per IRC:67-2012. Signboard should be clearly visible for the design speed of the section.			Daily	Visual with video/image backup	Improvement of shape, in case if shape is damaged. Relocation as per requirement	48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs) 15 Days in case of Gantry/ Cantilever Sign boards	IRC:67-2012
	Retro reflectivity	As per specifications in IRC:67-2012			Bi-Annually	Testing of each signboard using Retro Reflectivity Measuring Device. In accordance with ASTM D	Change of signboard	48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs)1 Month in case of Gantry / Cantilever Sign	IRC:67-2012

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
				4956-09.		boards	
Kerb	Kerb Height	As per IRC 86:1983 depending upon type of Kerb	Bi-Annually	Use of distance measuring tape	Raising Kerb Height	Within 1 Month	IRC 86:1983
	Kerb Painting	Functionality: Functioning of Kerb painting as intended	Daily	Visual with video/image backup	Kerb Repainting	Within 7-days	IRC 35:2015
Other Road Furniture	Reflective Pavement Markers (Road Studs)	Numbers and Functionality as per specifications in IRC:SP:84-2014 and IRC:35-2015, unless specified in Schedule-B.	Daily	Counting	New Installation	Within 2 months	IRC:SP:84-2014, IRC:35-2015
	Pedestrian Guardrail	Functionality: Functioning of guardrail as intended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:SP:84-2014
	Traffic Safety Barriers	Functionality: Functioning of Safety Barriers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84-2014, IRC:119-2015
	End Treatment of Traffic Safety Barriers	Functionality: Functioning of End Treatment as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84-2014, IRC:119-2015
	Attenuators	Functionality: Functioning of Attenuators as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP-2014, IRC:119-2015
	Guard Posts And Delineators	Functionality: Functioning of Guard Posts and Delineators as intended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC: 79 - 1981
	Overhead Sign Structure	Overhead sign structure shall be structurally adequate	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:67-2012
	Traffic Blinkers	Functionality: Functioning of Traffic Blinkers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84-2014
HighwayLightingSystem	Highway Lights	Illumination: Minimum 40 Lux illumination on theroad surface	Daily	The illumination level shall be measured with lux	Improvement in Lighting System	24 hours	IRC:SP:84-2014

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
				meter			
		No major failure in the lighting system	Daily	-	Rectification of failure	24 hours	IRC:SP:84-2014
		No minor failure in the lighting system	Monthly	-	Rectification of failure	8 hours	IRC:SP:84-2014
	Toll Plaza Canopy Lights	Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with lux meter	Improvement in Lighting System	24 hours	IRC:SP:84-2014
		No major/minor failure in the lightingsystem	Daily	-	Rectification of failure	8 hours	IRC:SP:84-2014
Trees andPlantation Includingmedianplantation	Obstruction in a minimum head-room of 5.5 m above Carriageway orobstruction in visibility of road signs	No obstruction due to trees	Daily		Removal of trees	Immediate	IRC:SP:84-2014
	Deterioration in health of trees and bushes	Health of plantation shall be as per requirement of specifications & instructions issued by Authority from time to time	Daily	Visual with video/image backup	Timely watering and treatment. Or Replacement of Trees and Bushes.	Within 90 days	IRC:SP:84-2014
	Vegetation affecting sight line and road structures	Sight line shall be free fromobstruction by vegetation	Daily	Visual with video/image backup	Removal of trees	Immediate	IRC:SP:84-2014
RestAreas	Cleaning of toilets		Daily			Every 4 hours	
	Defects in electrical, water and sanitary installations		Daily		Rectification	24 hours	
OtherProjectFacilities AndApproach	Damage or deterioration in Approach Roads, pedestrian facilities, truck lay-bys, bus-bays, bus shelters, cattle crossings, Traffic Aid Posts, Medical Aid Posts and other works		Daily		Rectification	15 days	IRC:SP:84-2014

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
roads							
Pipe/box/slab culverts	Freewaterway/ unobstructed flow section	85% of culvert normal flow area to available.	2 times in ayear (beforeand afterrainy season)	Inspection by BridgeEngineer as per IRCSP: 35-1990 andrecording of depth ofsilting and area ofvegetation.	Cleaning silt up soils anddebris in culvert barrelafter rainyseason, removalof bushes andvegetation,U/s ofbarrel, under barrel and D/s of barrelbeforerainy season.	15 days before onset of monsoon and within 30 days after end of rainy season.	IRC 5-2015, IRC SP:40-1993 and IRC SP:13-2004
	Leak-proof expansion joints if any	No leakage through expansion joints.	Bi-Annually	Physical inspection of expansion joints as per IRC SP: 35-1990 if any, for leakage strains on walls at joints.	Fixing with sealant suitably	30 days or before onset of rains whichever comes earlier	IRC SP:40-1993 and IRC SP:69-2011
	Structurally sound	Spalling of concrete not more than 0.25 sqm Delamination of concrete not more than 0.25 sq.m Cracks wider than 0.3 mm not more than 1m aggregate length	Bi-Annually	Detailed inspection of all components of culvert as per IRC SP:35-1990 and recording the defects	Repairs to spalling, cracking, delamination, rusting shall be followed as per IRC:SP:40-1993	**15 Days**	IRC SP 40-1993 andMORTH Specifications clause 2800
	Protectionworks ingood condition	Damaged of rough stone apron or bank revetment not more than 3 sqm, damage to solid apron(concrete apron) not more than 1 sqm	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching	30 days after defect observation or 2 weeks before onset	IRC: SP 40-1993 and IRC:SP:13-2004.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
						of rainy season whichever is earlier.	
Bridges including ROBs Fly over etc. as applicable	Riding quality or User comfort	No pothole in wearing coat on bridge deck	**Daily**	Visual inspection as per IRC SP:35-1990	Repairs to BC or wearing coat	15 days	MORT&H Specification 2811
Bridge – SuperStructure	Bumps	No bump at expansion joint	**Daily**	Visual inspection as per IRC SP:35-1990	Repairs to BC on either side of expansion joints, profile correction course on approach slab in case of settlement to approach embankment	15 days	MORT&H Specification 3004.2 & 2811.
	User safety(condition of crash barrier and guard rail)	No damaged or missing stretch of crash barrier or pedestrian hand railing	**Daily**	Visual inspection and detailed condition survey as per IRC SP: 35-1990.	Repairs and replacementof safety barriers as the case may be	3 days	IRC: 5-1998, IRC SP: 84-2014 and IRC SP: 40-1993.
	Rusted reinforcement	Not more than 0.25 sq.m	Bi-Annually	Detailed condition survey as per IRCSP: 35-1990 usingMobile BridgeInspection Unit	All the corrodedreinforcement shall needto be thoroughly cleanedfrom rusting and appliedwith anti-corrosivecoating before carryingout the repairs to affected concrete portion withepoxy mortar /concrete.	15 days	IRC SP: 40-1993 andMORTH Specification 1600.
	Spalling of concrete	Not more than 0.50 sq.m					
	Delamination	Not more than 0.50 sq.m					
	Cracks wider than 0.30 mm	Not more than 1m total length	Bi-Annually	Detailed condition survey as per IRCSP: 35-1990 usingMobile BridgeInspe	Grouting with epoxy mortar, investigating causes for cracks development and carry out necessary rehabilitation.	48 Hours	IRC SP: 40-1993 and MORTH Specification 2800.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
				ction Unit			
	Rainwater seepage through deck slab	Leakage - nil	Quarterly	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Grouting of deck slab at leakage areas, waterproofing, repairs to drainage spouts	1 month	MORTH specifications 2600 & 2700
	Deflection due to permanent loads and live loads	Within design limits.	Once in every 10 years for spans more	Load test method	Carry out major rehabilitation works on bridge to retain original design loads capacity	6 months	IRC SP: 51-1999.
	Vibrations in bridge deck due to moving trucks	Frequency of vibrations shall not be more than 5 Hz	Once in every 5 years for spans more than 30m and every 10 years for spans between 15 to 30 m	Laserdisplacement sensors or laser vibro-meters	Strengthening of super structure	4 months	AASHTO LRFD specifications
	Leakage in Expansion joints	No damage to elastomeric sealant compound in strip seal expansion joint, no leakage of rain waterthrough expansion joint in case of buried and asphalt plug and copper strip joint	Bi-Annually	Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge Inspection Unit	Replace of seal in expansion joint	15 days	MORTHspecifications 2600 and IRCSP: 40-1993
	Debris and dust in strip seal expansion joint	No dust or debris in expansion joint gap	Monthly	Detailedconditionsurvey as per IRCSP:35-1990 using	Cleaning of expansion joint gaps thoroughly	3 days	MORTH specifications 2600 and IRC SP: 40-1993.
	Drainage	No down take pipe missing/broken	Monthly	Detailed	Cleaning of drainage	3 days	MORTH

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	spouts	below soffit of the deck slab. No silt, debris, clogging of drainage spout collection chamber.		condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	spouts thoroughly. Replacement of missing/broken down take pipes with a minimum pipe extension of 500mm below soffit of slab. Providing sealant around the drainage spout if any leakages observed.		specification 2700.
Bridge substructure	Cracks/spalling of concrete/ rusted steel	No cracks, spalling of concrete and rusted steel	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out repairs to substructure by grouting/guniting and micro concreting depending on type of defect noticed	30 days	IRC SP: 40-1993 and MORTH specification 2800.
	Bearings	Delamination of bearing reinforcement not more than 5%, cracking or tearing of rubber not more than 2 locations per side, no rupture of reinforcement or rubber	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	In case of failure of even one bearing on any pier/abutment, all the bearings on that pier/abutment shall be replaced, in order to get uniform load transfer on to bearings.	3 months	MORTH specification 2810 and IRC SP: 40-199.
Bridge Foundations	Scouring Around foundations	Scouring shall not be lower than maximum scour level for the bridge	Bi-Annually	Condition survey and visual inspection as	Suitable protection works around pier/abutment	1 month	IRC SP: 40-1993, IRC 83-2014, MORTH

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
				per IRC SP:35-1990 using Mobile Bridge Inspection Unit. In case of doubt, use Underwater camera for inspection of deep wells in major Rivers.			specification 2500
	Protect on works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sq.m, damage to solid apron (concrete apron) not more than 1 sq.m	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier.	IRC: SP 40-1993 and IRC:SP:13-2004.
Note: Any Structure during the entire contract period which is found that does not complies with all requirements of this Table will be prepared, rehabilitated or even reconstructed under the scope of the contractor							

Table 4: Maintenance Criteria for Structures and Culverts:

Table 5: Maintenance Criteria for Hill Roads

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

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

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

A. Flexible Pavement

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

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

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

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

Schedule- F

(See Clause4.1 (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) License for use of explosives;

(d) Permission of theState Governmentfor drawingwaterfromriver/reservoir;

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

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

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

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

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

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

Schedule – G

(See Clauses 7.1 and 19.2)

Annex-I

(See Clause 7.1)

Form of Bank Guarantee

[Performance Security/Additional Performance Security]

[DG(RD)&SS,

Ministry of Road Transport & Highways Transport Bhawan, New Delhi]
WHEREAS:

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

(B) 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 Authority of India], 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.

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.

Signed and sealed this ……. day of ……., 20…… at …….
SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:
(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

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

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

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

Annex – II

(Schedule - G)

(See Clause 19.2)

Form for Guarantee for Advance Payment

[DG(RD)&SS,

Ministry of Road Transport & Highways Transport Bhawan, New Delhi]

WHEREAS:

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

(B) In accordance with Clause 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

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

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

A letter from the Authority, under the hand of an officer not below the rank of [General Manager in the National Highways Authority of India], that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the installment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

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

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

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

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

6. Notwithstanding anything contained hereinbefore, the liability of the Bank under

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

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

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

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

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

Signed and sealed this ……. day of ……., 20……. at ……. SIGNED,
SEALED AND DELIVERED

For and on behalf of the Bank by: (Signature)

(Name)

(Designation)

(Code Number)

(Address) NOTES:

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

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

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

SCHEDULE-H

(See Clause 19.3)

Contract Price Weightages

1.1 The Contract Price for this Agreement is Rs (**** Cr.).

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

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage to Particular item (col.2)
1	**2**	**3**	**4**
Road works including culverts, widening and repair of culverts.	69.85%	**A-** Widening and reconstruction of existing road (Flexible Pavement)	
		(1) Earthwork up to top of the sub-grade	7.80%
		(2) Sub-base Course	5.81%
		(3) Non Bituminous Base Course	7.17%
		(4) Bituminous Base Course	8.43%
		(5) Wearing Coat	3.13%
		(6) Shoulder	0.75%
		TOTAL	**33.09%**
		B.1 Reconstruction/New 2 - lane realignment/ bypass (Flexible Pavement)	
		(1) Earthwork up to top of the sub-grade	19.03%
		(2) Sub-base Course	7.43%
		(3) Non Bituminous Base Course	8.20%
		(4) Bituminous Base Course	9.65%
		(5) Wearing Coat	3.59%
		TOTAL	**47.9%**
		B.2- Reconstruction/New 2 - lane realignment/ bypass (Rigid Pavement)	0.00%
		C.1 - Reconstruction/New Service Road (Flexible Pavement)	0.00%
		C.2 - Reconstruction/New Service Road (Rigid Pavement)	0.00%
		D - Reconstruction/New Culverts on existing road, realignment, bypasses	
		Culverts (length <6m)	**19.01%**

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage to Particular item (col.2)
1	2	3	4
Minor Bridges/Underpasses/Over passes	0.00%	**A.1** - Widening and Repair of Minor Bridges (Length > 6m and < 60m)	0.00%
		A.2 - New Major Bridges (Length > 6m and < 60m)	0.00%
		B.1- Widening and Repair of underpasses/overpasses	
		Underpasses/ Overpasses	0.00%
		B.2- New underpasses/overpasses	0.00%
Major Bridge (length >60m.) works and ROB/RUB/Elevated Sections/flyovers including viaducts, if any	0.00%	**A.1**- Widening and repairs of Major Bridges	0.00%
		A.2 - New Major Bridges	0.00%
		B.1 - Widening and repair of Major Bridges	0.00%
		B.2 - New ROB/RUB	0.00%
		C.1 - Widening and repair of Elevated Section/Flyovers/Grade Separators	0.00%
		C.2 - New Elevated Section/Flyovers/Grade Separators	0.00%
Other works	30.15%	(i) Road side drains	11.27%
		(ii) Road signs, markings, km stones, safety devices,	9.90%
		(iii) Project facilities	
		(a) Bus Bays	0.39%
		(b) OTHERS	
		i) Stone Masonry Retaining wall	18.89%
		ii) Stone Masonry Breast wall (1.50m Height)	7.20%
		iii) Stone Masonry Breast wall (3.00m Height)	45.77%
		iv) RE Wall including Anchor Bolts	3.17%
		v) Stone Masonry Toe wall (1.00m Height)	0.37%
		vi) Turfing with Sods	0.13%
		vii) Junction Improvement	1.03%
		viii) Utility Pipe Ducts	0.21%
		ix)Dismantling of Structures	1.67%

1.3 Procedure of estimating the value of work done.

1.3.1 Road works including approaches to Minor bridges, Major Bridges and Structures (excluding service roads).

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 reconstruction of existing road (Flexible Pavement)		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 500 m length.
(1) Earthwork up to top of the sub-grade	7.80%	
(2) Sub-base Course	5.81%	
(3) Non Bituminous Base Course	7.17%	
(4) Bituminous Base Course	8.43%	
(5) Wearing Coat	3.13%	
(6) Shoulder	0.75%	
B.1- Reconstruction/New 2 - lane realignment/ bypass (Flexible Pavement)		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 500 m length.
(1) Earthwork up to top of the sub-grade	19.03%	
(2) Sub-base Course	7.43%	
(3) Non Bituminous Base Course	8.20%	
(4) Bituminous Base Course	9.65%	
(5) Wearing Coat	3.59%	
B.2- Reconstruction/New 2 - lane realignment/ bypass (Rigid Pavement)	0.00%	
C.1 - Reconstruction/New Service Road (Flexible Pavement)	0.00%	
C.2 - Reconstruction/New Service Road (Rigid Pavement)	0.00%	
D - Reconstruction/New Culverts on existing road, realignment, bypasses		Cost of each culvert shall be determined on pro rata basis with respect to the total number of culverts. Payment shall be made on the completion of each culvert.
Culverts (length <6m)	19.01%	

@ 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 stages (1), (2) and (4) above shall be worked out.

1.3.2 Major Bridge works-

Procedure for estimating the value of Major Bridge works shall be as stated in table 1.3.2:

Table 1.3.2- Deleted

1.3.3 Rail-road bridges

Procedure for estimating the value of Rail-road bridges works shall be as stated in table 1.3.3:

Table 1.3.3- Deleted

1.3.4 Other Works

Procedure for estimating the value of other work done shall be as stated in table 1.3.4:

Table 1.3.4

Stage of Payment	Percentage - weightage	Payment Procedure
(i) Road side drains	11.27%	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 500 m.
(ii) Road signs, markings, km stones, safety devices,	9.90%	
(iii) Project facilities		
(a) Bus Bays	0.39%	Payment shall be made on pro rata basis for completed facilities.
(b) OTHERS		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 500 m.
i) Stone Masonry Retaining wall	18.89%	
ii) Stone Masonry Breast wall (1.50m Height)	7.20%	
iii) Stone Masonry Breast wall (3.00m Height)	45.77%	
iv) RE Wall including Anchor Bolts	3.17%	
v) Stone Masonry Toe wall (1.00m Height)	0.37%	
vi) Turfing with Sods	0.13%	Payment shall be made on pro rata basis

Stage of Payment	Percentage - weightage	Payment Procedure
vii) Junction Improvement	1.03%	for completed facilities.
viii) Utility Pipe Ducts	0.21%	
ix) Dismantling of Structures	1.67%	

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

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

Schedule - J

(See Clause 10.3 (ii))

Project Completion Schedule

1. Project Completion Schedule

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

2. Project Milestone-I

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

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

(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.

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

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

Schedule - L

(See Clause 12.2)

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 [construction of the ****section (km ** to km **) of National Highway No. ***] (the "**Project Highway**") on Engineering, Procurement and Construction (EPC) basis through …….. (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement, and I am satisfied that the Project Highway can be safely and reliably placed in service of the Users thereof.

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

SIGNED, SEALED AND DELIVERED

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

(Signature)

(Name)

(Designation) (Address)

Schedule - M

(See Clauses 14.6, 15.2 and 19.7)

Payment Reduction for Non-Compliance

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

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

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

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

2. Percentage reductions in lump sum payments on monthly basis

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

S. No.	Item/Defect/Deficiency	Percentage
(a)	**Carriageway/Pavement**	
(i)	Potholes, cracks, other surface defects	15%
(ii)	Repairs of Edges, Rutting	5%
(b)	**Road, Embankment, Cuttings, Shoulders**	
(i)	Edge drop, inadequate cross fall, undulations, settlement, potholes, ponding, obstructions	10%
(ii)	Deficient slopes, raincuts, disturbed pitching, 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:

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

Where,

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

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

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

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

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

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

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

Schedule - N

(See Clause 18.1 (i))

Selection of Authority's Engineer

1. Selection of Authority's Engineer

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

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

2. Terms of Reference

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

3. Appointment of Government entity as Authority's Engineer

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

Annex – I

(Schedule - N)

Terms of Reference for Authority's Engineer

1. Scope

(i) These Terms of Reference (the "**TOR**") for the Authority's Engineer are being specified pursuant to the EPC Agreement dated ..... (the "**Agreement**), which has been entered into between the [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 kilometer.

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)

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