SCHEDULE-A

(See Clauses 2.1 and 8.1)

SITE OF THE PROJECT

1. THE SITE

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

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

1.3 An inventory of the Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority Representative and the Contractor, and such inventory shall form part of the memorandum referred to in Clause 8.2.1 of this Agreement.

1.4 The alignment plans of the Project Highway are specified in Annex-III.

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

Annex – I

(Schedule-A)

Site

1. Site

The Site of the Four-Lane Project Highway comprises the sections from Dolabari (km 17.300 of NH-37A) to km 25.552 and from km 27.500 to 36.110 near Jamugurihat (km 182 of NH-52) i.e. the Dolabari-Jamuguri section in the State of Assam. The land, carriageway and structures comprising the Site are described below.

2. Land

The Site of the Project Highway comprises the land as described below:

S. No	Chainage (km)		ROW (m)	Remarks
	From	To		
1	17.300	25.552	60	60 m ROW to be provided
2	27.500	36.110	60	

3. Carriageway

The existing carriageway consists of the following which are incomplete and to be completed in all respect.

Existing Carriageway width.

Existing Chainage (km)		Side	Carriageway width (m)
From	To		
17.300	17.780	Centre	10.0
18.075	20.600	Centre	5.5
22.900	24.526	Centre	5.5
18360	18550	RHS	8.85
19380	19525	LHS	8.85
19900	20085	RHS	8.85
27503	30460	RHS	8.85
27503	31235	LHS	8.85
30510	31270	RHS	8.85
31375	31475	RHS	8.85
31375	31467	LHS	8.85
31570	32960	RHS	8.85
31565	32901	LHS	8.85

Existing Chainage (km)		Side	Carriageway width (m)
From	To		
33007	33100	RHS	8.85
33030	33100	LHS	8.85
33130	33380	RHS	8.85
33132	33383	LHS	8.85
33400	33725	LHS	8.85
33400	33750	RHS	8.85
33811	33999	RHS	8.85
33824	34000	LHS	8.85
34000	34072	RHS	8.85
34101	34325	LHS	8.85
34100	34176	RHS	8.85
34355	34560	RHS	8.85
34360	34497	LHS	8.85
34500	34564	LHS	8.85
34580	34700	LHS	8.85
34580	34700	RHS	8.85

4. Major Bridges

The Site includes the following Major Bridges which are incomplete and to be completed in all respect.

S. No.	Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-structure	Super-structure		
1	21.710	RCC Pile	RCC Solid shaft	24 Nos longitudinal girders concreting done and other works remaining		

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

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

S. No.	Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)	ROB/RUB
		Foundati	Superstructur			
NIL						

6. Grade separators

The Site includes the following grade separators:

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

7. Minor bridges

The Site includes the following minor bridges which are incomplete and to be completed in all respect.

S. No.	Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-structur	Super-structure		
1	21.956	RCC Pile	RCC solid shaft	-	-	-
2	32.986	RCC Raft	RCC wall	RCC solid slab	1 x10	28

8. Railway level crossings

The Site includes the following railway level crossings:

S. No.	Location (km)	Remarks
NIL		

9. Flyover

The Site includes the following flyovers which are incomplete and to be completed in all respect.
:

S. No.	Chainage (km)	Type of Structure	No. of Spans with span length (m)	Width (m)
1	17.868	Flyover	2 x 16	28.0
2	35.125	Flyover	2 x 16	28.0

10. Culverts

The Site has the following culverts which are incomplete and to be completed in all respect.

S. No	Chainage (Km)	Type of Culvert	Span/Opening with span length (m)	Width (m)
1	20.826	Box Culvert	1/3.0/4.0	26.4
2	22.316	Box Culvert	1/2.0/3.0	26.4
3	22.716	Box Culvert	1/2.0/2.0	44
4	24.816	Box Culvert	1/2.0/3.0	26.87
5	25.240	Box Culvert	1/2.0/3.0	26.4
6	25.716	Box Culvert	1/2.0/2.0	37.4
7	27.722	Box Culvert	1/2.0/2.0	27.8
8	27.890	Box Culvert	1/3.0/4.0	26.4
9	28.376	Box Culvert	1/2.0/2.0	31.2
10	29.340	Box Culvert	1/2.0/2.0	36.84
11	29.696	Box Culvert	1/3.0/4.0	26.4
12	30.032	Box Culvert	1/2.0/3.0	26.8
13	30.526	Box Culvert	1/3.0/4.0	26.4
14	30.761	Box Culvert	1/3.0/4.0	26.4
15	31.046	Box Culvert	1/2.0/2.0	30.8

S. No	Chainage (Km)	Type of Culvert	Span/Opening with span length (m)	Width (m)
16	31.846	Box Culvert	1/3.0/4.0	26.1
17	32.195	Box Culvert	1/2.0/2.0	28.92
18	32.521	Box Culvert	1/2.0/2.0	29.06
19	33.112	Box Culvert	1/3.0/4.0	26.55
20	33.768	Box Culvert	1/3.0/4.0	26.1
21	34.090	Box Culvert	1/3.0/4.0	26.65
22	35.249	Box Culvert	1/2.0/2.0	55.53
23	35.592	Box Culvert	1/2.0/2.0	46.62

11. Bus bays

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

S. No	Chainage (km)	Length (m)	Left hand side	Right hand side
NIL				

12. Truck Lay byes

The details of truck lay byes are as follows:

S. No	Chainage (km)	Length (m)	Left hand side	Right hand side
NIL				

13. Road side drains

The details of the roadside drains are as follows:

S. No	Location		Side	Type
	From km	To km		
1	17.910	18.025	LHS	RCC-Covered
2	17.925	18.300	RHS	RCC-Covered
3	18.310	18.354	RHS	RCC-Open
4	18.358	18.600	RHS	RCC-Open
5	18.366	18.405	LHS	RCC-Open
6	18.421	18.460	LHS	RCC-Open
7	18.472	18.486	LHS	RCC-Open
8	18.492	18.887	LHS	RCC-Open
9	18.625	18.687	RHS	RCC-Open

S. No	Location		Side	Type
	From km	To km		
10	18.702	18.890	RHS	RCC-Open
11	18.893	19.022	RHS	RCC-Open
12	18.898	19.020	LHS	RCC-Open
13	19.035	19.093	RHS	RCC-Open
14	19.065	19.110	LHS	RCC-Open
15	19.100	19.168	RHS	RCC-Open
16	19.125	19.135	LHS	RCC-Open
17	19.177	19.235	RHS	RCC-Open
18	19.241	19.420	RHS	RCC-Open
19	19.344	19.420	LHS	RCC-Open
20	19.424	19.730	RHS	RCC-Open
21	19.424	19.6475	LHS	RCC-Open
22	19.670	19.690	LHS	RCC-Open
23	19.778	19.885	RHS	RCC-Open
24	19.738	19.783	LHS	RCC-Open
25	19.790	19.855	LHS	RCC-Open
26	19.862	19.885	LHS	RCC-Open
27	19.900	20.048	LHS	RCC-Open
28	19.888	20.097	RHS	RCC-Open
29	20.056	20.145	LHS	RCC-Open
30	20.102	20.140	RHS	RCC-Open
31	20.161	20.283	LHS	RCC-Open
32	20.266	20.288	LHS	RCC-Open
33	22.860	22.978	LHS	RCC-Open
34	22.980	23.068	LHS	RCC-Open
35	22.920	22.978	RHS	RCC-Open
36	22.980	23.135	RHS	RCC-Open
37	23.071	23.135	LHS	RCC-Open
38	23.140	23.235	LHS	RCC-Open

S. No	Location		Side	Type
	From km	To km		
39	23.140	23.175	RHS	RCC-Open
40	23.180	23.215	RHS	RCC-Open
41	23.218	23.274	RHS	RCC-Open
42	23.239	23.274	LHS	RCC-Open
43	23.270	23.310	LHS	RCC-Open
44	23.270	23.345	RHS	RCC-Open
45	23.315	23.380	LHS	RCC-Open
46	23.350	23.380	RHS	RCC-Open
47	23.386	23.450	LHS	RCC-Open
48	23.390	23.460	RHS	RCC-Open

Note: Above existing drains may not be totally complete and may need to be completed in all respect and the same shall not qualify for any change of scope.

14. **Major Junctions:**

The details of major junctions are as follows:

S. No	Location		At Grade	Separated	Category of Cross Road			
	From km	To Km			NH	SH	MDR	Others
1	17.865		Yes		NH			
2	23.840		Yes					Other
3	34.930		Yes		NH			
4	35.795		Yes		NH			

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

15. Minor Juntions :

The details of the minor intersections are as follows:

S. No	Location (km)	Type of Junction	Remarks
1	18.450	T	ODR
2	20.200	T	ODR
3	22.850	T	ODR
4	24.600	T	ODR

16. Bypasses

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

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

17. Other structures: NIL

18. All detail shown above are indicative and shall be verified by joint survey of existing inventories with the Authority at the time of Appointed date.

Annex – II

(Schedule-A)

Dates for providing Right of Way

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

Sl.No.	From km to km	Length (km)	Width (m)	Date of Providing ROW
1	2	3	4	5
Full Right of Way (full width)	17.300	25.552	60 m (proposed)	On appointed date
	27.500	36.110		

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 and profile indicated below: As per attached drawings

(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 Annexure-III based on site/design requirement.

Annex – IV

(Schedule-A)

Environment Clearances

The following environment clearance have been obtained: NA

The following environment clearance are awaited: NA

Schedule - B

(See Clause 2.1)

Development of the Project Highway

1. Development of the Project Highway

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

2. Rehabilitation and augmentation

Rehabilitation and augmentation shall include Four-Laning 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)

1. Widening of the Existing Highway

1.1.1 The project road starts from Dolabari at km 17.300 of NH-37A to km 25.552 and from km 27.500 to km 36.110 (km 182.00 of NH-52) near Jamugurihat. The total length of the project is 16.862 km. The Proposed alignment follows existing road from Dolabari at km 17.300 of NH 37A to km 17.780, km 18.075 to km 20.600, km 22.900 to km 24.526 and from km 36.000 to km 36.110(km 182.00 of NH-52). The Proposed project alignment follows new alignment from km 17.780 to km 18.075, km 20.600 to km 22.900, km 24.526 to km 25.552 and km 27.500 to km 36.000. Geometric deficiencies if any in the existing horizontal and vertical profile shall be corrected as per Section 2 of the Manual IRC SP 84-2019.

1.2 Width of Carriageway

1.2.1 Four laning with paved shoulders shall be undertaken. The paved carriageway shall be 7.0 m wide with 0.25 m median shy away and 1.50 m paved shoulders in accordance with the typical cross sections given in Annex-II of Schedule B.

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

2 Geometric Design and General Features:

2.1 General

Geometric design and general features of the Project Highway shall be in accordance with Section 2 of the Manual IRC SP 84-2019.

2.2 Design speed

The design speed shall be as per clause 2.2 of IRC: SP: 84-2019.

2.3 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:

Sl. No.	Stretch (from km to km)	Type of deficiency	Remarks
NIL			

2.4 Right of Way

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

2.5 Type of shoulders

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

Sl. No.	Stretch (from km to km)	Fully paved shoulders/footpath	Reference to cross section
As per TCS			

(b) In open country, Paved Shoulders of 1.50 m width and Earthen Shoulders for a width of 2.00 m will be provided.

(c) Design and specifications of paved shoulders and granular material shall conform to the requirements specified in paragraphs 5.10, 5.11 and 5.12 of the manual.

2.6 Lateral and vertical clearances at underpasses

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

2.6.2 Lateral clearance: The width of the opening at the underpasses shall be as follows:

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

2.7 Lateral and vertical clearances at overpasses

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

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

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

2.8 Service roads

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

Sl.No.	Location of service road		Right hand side (RHS)/Left hand side(LHS)/or Both sides	Length (km) of service road
	From (km)	To (Km)		
1	17.300	20.500	Both	6.4
2	22.800	23.800	Both	2.0
3	34.702	35.526	Both	1.648

2.9 Grade separated structures

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

S. No.	Location of structure	length (m)	Number and length of spans (m)	Approach gradient	Remarks, if any
NIL					

2.9.2 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:

Sl. No.	Location	Type of structure	Cross road at			Remarks, if any
			Existing Level	Raised Level	Lowered Level	
Not Applicable						

2.10 Cattle and pedestrian underpass /overpass

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

Sl. No.	Location	Type of crossing
NIL		

2.11 Typical cross-sections of the Project Highway

S. No.	Design length (in km)	TCS Type	TCS Description
1	3.455	Type VI	LHS widening with service road at built up area
2	3.455	Type VI	RHS widening with service road at built up area
3	0.70	Type II	RHS widening
4	9.965	Type III	New Alignment
	1.173	Type IV	Bridge approaches and high embankment location
5	1.569	Type V	Underpass approaches

2.12.1 **Status of balance work (Highway):** Reconstruction/rectification of lower layers including shoulder, embankment slope etc. complete in all respect to be carried out wherever required and the same shall not qualify for any Change of Scope.

2.12.2The existing roadworks to be rectified/maintained during construction as per Technical Specification.

2.12.3 The items mentioned are inclusive of shoulder as per manual

Sub grade balance quantity			
From km	**To km**	**Side**	**Length m)**
17.300	18.300	RHS	1000
17.300	18.920	LHS	1620
18.550	19.900	RHS	1350
19.010	19.350	LHS	340
19.540	25.552	LHS	6012
20.090	25.552	RHS	5462
31.300	31.360	LHS	60
31.300	31.360	RHS	60
31.475	31.550	LHS	75
31.480	31.560	RHS	80
32.965	32.995	RHS	30
33.105	33.117	LHS	12
33.105	33.117	RHS	12
33.385	33.395	LHS	10
33.385	33.395	RHS	10
33.725	33.820	LHS	95
34.000	34.100	LHS	100
34.080	34.100	RHS	20
34.185	34.350	RHS	165
34.330	34.346	LHS	16
34.700	36.110	LHS	1410
34.700	36.110	RHS	1410
		Total	**19349**

Note:

(i) From km 17.550 to km 17.852, km 17.884 to km 18.310, km 34.700 to km 35.109 and km 35.141 to km 35.525, earthwork up to sub grade top to be executed along with reinforced earth panel and the same shall not qualify for any Change of Scope.

(ii) In some of the above mentioned chainages partial earthwork has been executed and need to be completed in all respect up to subgrade top. In other stretches work is yet to be started and to be completed in all respect.

Granular Sub Base (GSB) balance quantity			
From km	**To km**	**Side**	**Length m)**
17.300	18.300	RHS	1000
17.300	18.920	LHS	1620
18.550	19.900	RHS	1350
19.010	19.350	LHS	340
19.540	25.552	LHS	6012
20.090	25.552	RHS	5462
31.330	31.360	LHS	30
31.290	31.370	RHS	80
31.475	31.560	LHS	85
31.475	31.570	RHS	95
32.965	32.975	LHS	10
32.965	32.995	RHS	30
33.100	33.130	LHS	30
33.100	33.130	RHS	30
33.385	33.395	LHS	10
33.385	33.395	RHS	10
33.725	33.820	LHS	95
34.000	34.100	LHS	100
34.080	34.100	RHS	20
34.185	34.350	RHS	165
34.330	34.350	LHS	20
34.565	34.580	RHS	15
34.700	36.110	LHS	1410
34.700	36.110	RHS	1410
		Total	**19429**

Wet Mix Macadam (WMM) balance quantity			
From km	**To km**	**Side**	**Length (m)**
17.300	18.300	RHS	1000
17.300	18.920	LHS	1620
18.550	19.900	RHS	1350
19.010	19.350	LHS	340
19.540	25.552	LHS	6012
20.090	25.552	RHS	5462
31.260	31.360	LHS	100
31.290	31.375	RHS	85
31.475	31.560	LHS	85
31.475	31.570	RHS	95
32.975	32.995	LHS	20
32.965	32.995	RHS	30
33.100	33.130	LHS	30
33.100	33.130	RHS	30
33.380	33.395	LHS	15
33.380	33.395	RHS	15
33.725	33.820	LHS	95
34.000	34.100	LHS	100

34.080	34.100	RHS	20
34.185	34.352	RHS	167
34.325	34.350	LHS	25
34.565	34.580	LHS	15
34.565	34.580	RHS	15
34.700	36.110	LHS	1410
34.700	36.110	RHS	1410
		Total	**19546**

Dense Bituminous Macadam (DBM) balance quantity			
From km	**To km**	**Side**	**Length m)**
17.300	19.380	LHS	2080
17.300	18.360	RHS	1060
18.550	19.900	RHS	1350
19.525	25.552	LHS	6027
20.085	25.552	RHS	5467
27.500	27.503	LHS	3
27.500	27.503	RHS	3
30.460	30.510	RHS	50
31.235	31.375	LHS	140
31.270	31.375	RHS	105
31.467	31.565	LHS	98
31.475	31.570	RHS	95
32.901	32.979	LHS	78
32.960	32.979	RHS	19
32.993	33.030	LHS	37
32.993	33.007	RHS	14
33.100	33.132	LHS	32
33.100	33.130	RHS	30
33.383	33.400	LHS	17
33.380	33.400	RHS	20
33.725	33.824	LHS	99
33.750	33.811	RHS	61
34.000	34.101	LHS	101
34.072	34.100	RHS	28
34.176	34.355	RHS	179
34.325	34.360	LHS	35
34.497	34.500	LHS	3
34.564	34.580	LHS	16
34.560	34.580	RHS	20
34.700	36.110	LHS	1410
34.700	36.110	LHS	1410
		Total	**20087**

Bituminous concrete (BC) balance quantity			
From km	**To km**	**Side**	**Length m)**
17.300	25.552	LHS	8252
17.300	25.552	RHS	8252
27.500	29.035	LHS	1535
30.140	30.380	LHS	240
30.970	36.110	LHS	5140
27.500	36.110	RHS	8610
		Total	**32029**

Median kerb/Channel Kerb and Median Filling			
Start	**End**	**Length(m)**	**Remarks**
17.300	25.552	8252	Median kerb/channel kerb and median filling shall be provided throughout the project stretch wherever required
27.500	36.110	8610	

Median and Avenue Plantation			
Start	**End**	**Length(m)**	**Remarks**
17.300	25.552	8252	Median and Avenue plantation shall be provided throughout the project stretch as per manual
27.500	36.110	8610	

3. INTERSECTIONS AND GRADE SEPARATORS

All intersections and grade separators shall be as per the provision of Section 3 of the Manual. Existing intersections which are deficient shall be improved to the prescribed standards to the extent of land availability.

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

(a) At-Grade Intersections

Major Intersections/junctions with NH/SH/MDR/ODR/VR

S. No.	Location of intersection (km)	Type of intersection	Other features
1	Dolabari, 17.865	Y	LHS
2	Napam, 23.840	Y	LHS
3	Jamuguri, 35.116	X	BS
4	Jamuguri, 35.955	Y	RHS

Minor Intersections/junctions with NH/SH/MDR/ODR/VR

S. No.	Location of intersection (km)	Type of intersection	Other features
1	18.465	T	LHS
2	20.135	T	LHS
3	20.640	T	LHS
4	21.615	X	BS
5	22.070	X	BS
6	22.855	T	LHS
7	24.603	T	LHS
8	24.826	T	BS

(b) Grade separated intersection with/without ramps

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

4. ROAD EMBANKMENT AND CUT SECTION

4.1 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.

4.2 Raising of the existing road

The existing road shall be raised in the following sections:

Sl. No.	Section		Length(m)	Extent of raising [Top of finished road level]
	From km	To km		
1	17.300	17.780	480	As per finished road level mentioned in plan & profile drawing attached in Annexure-II
2	18.075	20.600	2525	
3	22.900	24.526	1626	
4	36.000	36.110	110	

5. PAVEMENT DESIGN

5.1 Pavement design shall be carried out in accordance with the section 5 of the Manual and shall not be inferior to the existing crust combination as specified in the plan and profile drawing attached in Annexure II.

5.2 Type of pavement

The pavement shall be Flexible pavement.

5.3 Design requirements

5.3.1 *Design Period and strategy*

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

5.3.2 *Design Traffic*

Notwithstanding anything to the contrary contained in this Agreement or the Manual, the Contractor shall design the pavement for a design traffic of not less than 75.5 million standard axles.

5.4 Reconstruction/New construction of stretches

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

S. No.	From Chainage	To Chainage	Length (m)
1	17.300	17.500	200
2	18.075	20.600	2.525
3	22.900	24.526	1626
4	36.000	36.110	110

6. ROADSIDE DRAINAGE

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

Roadside drains shall be constructed as per type and in the chainages as mentioned in the attached drawing in Annexure-II and in lengths as tabulated below:

Drain Type	Length(m)	Remarks
RCC Covered		
RCC Open		

Note:

(i) Unlined drain is to be constructed in all other location as per Manual and as per drawings attach in Annexure II

(ii) Median drain to be provided in locations as per Manual and as per drawings attach in Annexure II

7. DESIGN OF STRUCTURES

7.1 General

7.1.1 All bridges, culverts and structures shall be designed and constructed in accordance with section 7 of the manual and the existing design of partially completed structures. These together shall conform to the cross-sectional features and other details:

7.1.2 Width of the carriageway and cross-sectional features of new bridges and structures shall be as follows and as per attached drawing in Annexure-II:

Sl. No.	Bridge at km	Width of carriageway and cross-sectional features
1	21.710	8.50 with 1.50 m wide footpath and crash barrier
2	21.956	8.50 with 1.50 m wide footpath and crash barrier
3	31.521	8.50 with 1.50 m wide footpath and crash barrier
4	32.986	8.50 with 1.50 m wide footpath and crash barrier
Sl. No.	**Fly over at km**	**Width of carriageway and cross-sectional features**
1	17.868	8.50 with 1.50 m wide footpath and crash barrier
2	35.125	8.50 with 1.50 m wide footpath and crash barrier
Sl. No.	**VUP at km**	**Width of carriageway and cross-sectional features**
3	21+615	8.50 with 1.50 m wide footpath and crash barrier

7.1.3 The following structures shall be provided with footpaths:

Sl. No.	Location at km	Remarks
All new bridges/bridges proposed to be widened shall have provisions for footpath		

7.1.4 All bridges shall be high-level bridges.

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

Sl. No.	Bridge at km	Utility service to be carried	Remarks
All new bridges shall have provisions for utility services to be carried over			

7.1.6 Cross-section of the new culverts and bridges at deck level for the Project Highway shall conform to the typical cross-sections given in the Section 7 of the Manual.

7.2 Culverts

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

7.2.2 **Balance work of already constructed culverts:**

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

Sl. No.	Culvert locations	Span/Opening (m)	Remarks
1	18.356	1/3.0/4.0	Remaining balance work in all respect
2	18.896	1/2.0/3.0	Remaining balance work in all respect
3	19.421	1/3.0/3.0	Remaining balance work in all respect
4	19.736	1/3.0/3.0	Remaining balance work in all respect
5	19.886	1/2.0/2.0	Remaining balance work in all respect
6	20.290	1/2.0/2.0	Remaining balance work in all respect
7	20.505	1/2.0/3.0	Remaining balance work in all respect
8	20.826	1/3.0/4.0	Remaining balance work in all respect
9	22.316	1/2.0/3.0	Remaining balance work in all respect
10	22.716	1/2.0/2.0	Remaining balance work in all respect
11	22.986	1/2.0/2.0	Remaining balance work in all respect
12	23.276	1/2.0/2.0	Remaining balance work in all respect
13	23.690	1/2.0/2.0	Remaining balance work in all respect
14	24.126	1/2.0/3.0	Remaining balance work in all respect
15	24.526	1/2.0/3.0	Remaining balance work in all respect

16	24.816	1/2.0/3.0	Remaining balance work in all respect
17	25.240	1/2.0/3.0	Remaining balance work in all respect
18	25.716	1/2.0/2.0	Remaining balance work in all respect
19	27.722	1/2.0/2.0	Remaining balance work in all respect
20	27.890	1/3.0/4.0	Remaining balance work in all respect
21	28.376	1/2.0/2.0	Remaining balance work in all respect
22	29.340	1/2.0/2.0	Remaining balance work in all respect
23	29.696	1/3.0/4.0	Remaining balance work in all respect
24	30.032	1/2.0/3.0	Remaining balance work in all respect
25	30.526	1/3.0/4.0	Remaining balance work in all respect
26	30.761	1/3.0/4.0	Remaining balance work in all respect
27	31.046	1/2.0/2.0	Remaining balance work in all respect
28	31.846	1/3.0/4.0	Remaining balance work in all respect
29	32.195	1/2.0/2.0	Remaining balance work in all respect
30	32.521	1/2.0/2.0	Remaining balance work in all respect
31	33.112	1/3.0/4.0	Remaining balance work in all respect
32	33.768	1/3.0/4.0	Remaining balance work in all respect
33	34.090	1/3.0/4.0	Remaining balance work in all respect
34	34.341	1/3.0/4.0	Remaining balance work in all respect
35	35.249	1/2.0/2.0	Remaining balance work in all respect
36	35.592	1/2.0/2.0	Remaining balance work in all respect

7.2.3 **Widening of existing culverts:**

All existing culverts which are not to be reconstructed shall be widened to the roadway width of the Project Highway as per the typical cross section given in section 7 of the manual. Repairs and strengthening of existing structures where required shall be carried out.

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

7.2.4 Additional new culverts shall be constructed as per particulars given in the table below and as per Annexure-II

Sl.No.	Culvert locations	Span/opening (m)	Remarks
1	21.310	1/3.0/4.0	Complete Box culvert with minor protection work
2	22.069 (LHS on Cross road)	2/3.0/3.0	Complete Box culvert with minor protection work
3	31.350	1/2.0/2.0	Complete Box culvert with minor protection work
4	33.390	1/3.0/3.0	Complete Box culvert with minor protection work
5	34.571	1/3.0/3.0	Complete Box culvert with minor protection work
6	35.776	1/3.0/4.0	Complete Box culvert with minor protection work

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

Sl. No.	Location at km	Type of repair
Nil		

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

7.3 Bridges

7.3.1 Existing bridges to be re- constructed/widened

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

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

(ii) The following narrow bridges shall be widened:

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

7.3.2 Additional new bridges and Structures

New bridges and structures at the following locations on the Project Highway shall be constructed. GADs for the new bridges are attached in Annexure-II.

Sl. No.	Location	Type	Length (m)	Remarks
1	21.710	Major Bridge	3x35	Remaining balance work in all respect
2	21.615	VUP	1x13.6	Complete structure work in all respect
3	21.956	Minor Bridge	1x24	Remaining balance work in all respect
4	31.521	Minor Bridge	1x27	Complete bridge work in all respect
5	32.986	Minor Bridge	1x10	Remaining balance work in all respect
6	17.868	Fly over	2x16.00	Remaining balance work in all respect
7	35.125	Fly over	2x16.00	Remaining balance work in all respect

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

Sl. No.	Location at km	Remarks
Nil		

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

Sl. No.	Location at km	Remarks
Nil		

7.3.5 Drainage system for bridge decks

An effective drainage system for bridge decks shall be provided as specified in Paragraph 7.2 of the Manual

7.3.6 Structures in marine environment

Not Applicable

7.4 Rail-road bridges

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

7.4.2 *Road over-bridges*

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

Sl. No.	**Location of Level crossing (Chainage km)**	**Length of bridge (m)**
Nil		

7.4.3 *Road under-bridges*

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

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

7.5 Grade separated structures

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

7.6 Repairs and strengthening of bridges and structures

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

A. Bridges

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

B. ROB / RUB

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

C. Overpasses/Underpasses and other structures

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

7.7 Protection work-

Protection work for the project Highway shall be provided as detailed below:-

7.7.1 Details of retaining wall- Retaining wall wherever required shall be provided as per site requirement.

7.7.2 Details of Toe Wall- Toe wall wherever required shall be provided as per site requirement.

7.7.3 River Training Works: - This shall include construction of Flood Embankment, Guide Bund, Channel Closing Dyke etc. along with slope protection, launching apron etc. as per design and drawings. Design and drawing of River Training / Protection Work attached at Annex-II of Schedule B are indicative and minimum. However, the Contractor has to design the river training works according to latest codal provisions with approved new technology.

Description	Quantity
NIL	

8 TRAFFIC CONTROL DEVICES AND ROAD SAFETY WORKS

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

8.2 Specifications of the reflective sheeting shall be provided as per Section 9 of Manual IRC: 84-2019.

Retro reflective sheeting should be of high intensity grade with encapsulated lens or with micro prismatic retro reflective element in accordance with ASTM standard D 4956-04.

9. ROADSIDE FURNITURE

9.1 Roadside furniture shall be provided in accordance with the provision of Section 9 of the Manual.

9.2 Overhead traffic signs: location and size

Overhead Signs shall be provided in accordance with the provisions of the Manual

10. COMPULSORY AFFORESTATION

Compulsory / Compensatory afforestation to be carried out at locations as directed by the Authority

11. HAZARDOUS LOCATIONS

Safety barrier / W-Beam Crash Barrier to be provided as per provisions provided in manual recommended in Schedule D

12. SPECIAL REQUIREMENTS FOR HILL ROADS

Special requirement for hill roads shall be as per Section 13 of the Manual

13. CHANGE OF SCOPE

The length of structures and bridges specified herein above 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 variation in the length arising out of a Change of Scope expressly undertaken in accordance with provision of Article 13.

14. DISCLAIMER

Any other rectification/repair work not mentioned herein and required at site already in the already executed work shall be assessed and carried out as per specification and standards and shall not constitute a Change of Scope or deviation or be payable.

Being balance work there may be some variation in above said work, Hence the corrected balance work will be determined at the time of preparation of joint inventory on appointed date. This modification will be dealt according to the Article 13 of Contract Agreement after exclusion of 13.4 (ii).

Annex – II

(Schedule-B)

Typical Cross-section as per drawing folder attached

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; and

(h) Others to be specified

2. Description of Project Facilities

Each of the Project Facilities is described below:

a) Toll plaza:

Sl.No	Location	Design Requirement	Other essential details
NIL			

b) **Road Furniture;**

The roadside furniture shall include the provision of:

(i) Traffic Signs

Traffic signs and Pavement markings shall include road side signs, overhead signs, curve mounted signs, tree reflectors and road markings along the project highway. The location for these provisions shall be finalized in consultation with Authority and Manual.

(ii) Pavement Markings:

Pavement markings shall cover road marking for the entire project highway as per the manual of specification.

(iii) LED Traffic Blinkers:

LED Traffic blinkers for the entire project highway at the locations as suggested in the manual

(iv) Crash Barrier

As per IRC: SP-84:2019 and as per details given in Schedule - B

(v) Delineators

Delineators and studs for the entire project highway as per locations as suggested in Manual

(vi) Hectometer / Kilometer stones/Boundary stones:

Hectometer / Kilometer stones for the entire project highway at the locations as suggested in the manual

(c) Pedestrian Facilities

The pedestrian facilities shall be provided as per Manual

(d) Landscaping &Tree plantation

Landscaping & tree plantation shall be as per Manual of Specification & IRC Standards.

(e) Truck lay-byes;

Sl.No	Existing Chainage	Design Chainage (km)	Side	Remarks
NIL				

(f) Bus-bays and Bus Shelter,

Bus-bays and Bus Shelters shall be provided at following locations conforming to clause of the Four Lane Manual of Standards and Specifications:

Design Chainage	Side	Remarks
At 3 locations	BS	Location will be finalized as per site requirement subject to land availability during the construction period

(g) Rest areas;

Design Chainage	Side	Remarks
NIL		

(h) Others:

1.1 **Highway Lighting**

Lighting shall be provided as per clause 12.5 of the Manual

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 Four Lanning of Highways (IRC: SP-84-2019), 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 Four-Lane Highways (IRC: SP-84-2019), 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

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

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

Sl. No.	Item	Clause referred in Manual	Provision as per Manual	Modified Provision
1	Typical Cross section	IRC: SP: 84-2019	Typical Cross Section	Typical Cross section shall be as per Annexure-II of schedule B

Schedule - E

(See Clauses 2.1 and 14.2)

Maintenance Requirements

1. Maintenance Requirements

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

(ii) The Contractor shall repair or rectify any Defect or deficiency set forth in Paragraph 2 of this Schedule-E within the time limit specified therein and any failure in this behalf shall constitute non-fulfilment of the Maintenance obligations by the Contractor. Upon occurrence of any breach hereunder, the Authority shall be entitled to effect reduction in monthly lump sum payment as set forth in Clause 14.6 of this Agreement, without prejudice to the rights of the Authority under this Agreement, including Termination thereof.

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

2. Repair/rectification of Defects and deficiencies

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

3. Other Defects and deficiencies

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

4. Extension of time limit

Notwithstanding anything to the contrary specified in this Schedule-E, if the nature and extent of any Defect or deficiency justifies more

time for its repair or rectification than the time specified herein, the Contractor shall be entitled to additional time in conformity with Good Industry Practice. Such additional time shall be determined by the Authority's Engineer and conveyed to the Contractor and the Authority with reasons thereof.

5. Emergency repairs/restoration

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

6. Daily inspection by the Contractor

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

7. Pre-monsoon inspection / Post-monsoon inspection

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

8. Repairs on account of natural calamities

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

Annex – I

(Schedule-E) **Repair/rectification of Defects and deficiencies**

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

Table -1: Maintenance Criteria for Pavements:

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
Flexible Pavement (Pavement of MCW, Service Road, approache	Potholes	Nil	< 0.1 % of area and subject to limit of 10 mm in depth	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC 82: 2015 and Distress Identification Manual for Long Term Pavement Performance Program, FHWA 2003 (http://www.tfhrc.com/pavement/lttp/reports/03031/)	24-48 hours	MORT&H Specification 3004.2

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
s of Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	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

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	**Acceptable**					
	Bleeding	Nil	< 1 % of area	Daily	Scale, Tape, odometer etc.		3-7 days	MORT&H Specification 3004.4
	Ravelling / Stripping	Nil	< 1 % of area	Daily			7-15 days	IRC:82-2015 read with IRC SP 81
	Edge Deformation/ Breaking	Nil	< 1 m for any 100 m section and width < 0.1 m at any location, restricte	Daily			7- 15 days	IRC:82-2015

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	**Acceptable**					
			d to 30 cm from the edge					
	Roughness BI	2000 mm/km	2400 mm/km	Bi-Annually	Class I Profilometer SCRIM (Sideway-force Coefficient Routine Investigation Machine or equivalent)	Class I Profilometer : ASTM E950 (98) :2004 –Standard Test Method for measuring Longitudinal Profile of Travelled Surfaces with Accelerometer Established Inertial Profiling Reference ASTM E1656 -94: 2000- Standard Guide for Classification of Automatic Pavement Condition Survey Equipment	180 days	IRC:82-2015
	Skid Number	60SN	50SN	Bi-Annually			180 days	BS: 7941-1: 2006
	Pavement Condition Index	3	2.1	Bi-Annually			180 days	IRC:82-2015

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	**Acceptable**					
	Other Pavement Distresses			Bi-Annually			2-7 days	IRC:82-2015
	Deflection/ Remaining Life			Annually	Falling Weight Deflectometer	IRC 115: 2014	180 days	IRC:115-2014
Rigid Pavement (Pavement of MCW, Service Road, Grade structure,	Roughness BI	2200mm/km	2400mm/km	Bi-Annually	Class I Profilometer	ASTM E950 (98) :2004 and ASTM E1656 - 94: 2000	180 days	IRC:SP:83-2008
	Skid	Skid Resistance no. at different speed of vehicles		Bi-Annually	SCRIM (Sideway-force	IRC:SP:83-2008	180 days	IRC:SP:83-2008

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
approaches of connecting roads, slip roads, lay byes etc. as applicable)		Minimum SN	Traffic Speed (Km/h)		Coefficient Routine Investigation Machine or equivalent)			
		36	50					
		33	65					
		32	80					
		31	95					
		31	110					

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
Embankment/ Slope	Edge drop at shoulders	Nil	40mm	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC	7-15 days	MORT&H Specification 408.4
	Slope of camber/cross fall	Nil	<2% variation in prescribed slope of camber /cross fall	Daily			7-15 days	MORT&H Specification 408.4
	Embankment Slopes	Nil	<15 % variation in prescribe	Daily			7-15 days	MORT&H Specification 408.4

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	**Acceptable**					
			side slope					
	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	w = 0.5 - 1.5 mm, discernible from fast-moving car		Within 7days

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**
			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 vehicle		
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route, seal and stitch, if L > 1 m. Within 7 days	

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**
			4	w = 3.0 - 6.0 mm	Dowel Bar Retrofit. Within 15 days	Full Depth Repair Dismantle and reconstruct affected. Portion with norms and specifications - See Para 5.5 & 9.2 Within 15days
			5	w > 6 mm, usually associated with spalling, and/or slab rocking under traffic	Not Applicable, as it may be full depth	
3	**Single Longitudinal Crack intersecting with one or more joints**	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.5 mm, discernable from slow moving vehicle	Seal with epoxy, if L > 1 m. Within 7 days	Staple or dowel bar retrofit. Within 15days

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**
			2	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route seal and stitch, if L > l m. Within 15 days	-
			3	w = 3.0 - 6.0 mm	Staple, if L > 1 m. Within 15 days	Partial Depth Repair with stapling. Within 15 days
			4	w = 6.0 - 12.0 mm, usually associated with spalling	Not Applicable, as it may be full depth	
			5	w > 12 mm, usually associated with spalling, and/or slab rocking under traffic		Full Depth Repair Dismantle and reconstruct affected portion as per norms and specifications -

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**
						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 subbase, Reconstruct whole slab as per specifications within 30 days
			4	w = 3.0 - 6.0 mm panel broken into 2 or 3 pieces		
			5	w > 6 mm and/or panel broken		

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**
				into more than 4 pieces		
5	**Corner Break**	w = width of crack L = length of crack	0	Nil, not discernible	No Action	-
			1	w < 0.5 mm; only 1 corner broken	Seal with low viscosity epoxy to secure broken parts Within 7 days	Seal with epoxy seal with epoxy Within 7days
			2	w < 1.5 mm; L < 0.6 m, only one corner broken		
			3	w < 1.5 mm; L < 0.6 m, two corners broken	Partial Depth (Refer Figure 8.3 of IRC:SP: 83-2008) Within 15 days	Full depth repair
			4	w > 1.5 mm; L > 0.6 m or three corners broken		
			5	ree or four corners broken		Reinstate sub-base, and reconstruct the

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**
						slab as per norms and specifications within 30days
6	**Punchout (Applicable to Continuous Reinforced Concrete Pavement (CRCP) only)**	w = width of crack L = length (m/m2)	0	Nil, not discernible		No Action
			1	w < 0.5 mm; L < 3 m/m^2	Not Applicable, as it may be full depth	Seal with low viscosity epoxy to secure broken parts. Within 15days
			2	either w > 0.5 mm or L < 3 m/m^2		
			3	w > 1.5 mm and L < 3 m/m^2		
			4	w > 3 mm, L < 3 m/m^2 and deformation		Full depth repair - Cut out and replace damaged area taking care not to damage reinforcement. Within 30days
			5	w > 3 mm, L > 3 m/m^2 and deformation		

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
Surface Defects						
7	Ravelling or Honeycomb type surface	r = area damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	**Short Term** No action.	**Long Term** 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.	
			4	r = 25 - 50 %		

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 30 days	
			5	r > 50% and h > 25 mm	Reconstruct slabs, 4 or more slabs if affecting. Within 30 days	
8	**Scaling**	r = damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	**Short Term**	**Long Term**
					No action.	Not Applicable
			1	r < **2 %**	Local repair of areas damaged and liable to be damaged. Within 7days	
			2	r = 2 - 10 %		

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
			3	r = 10 - 20%	Bonded Inlay within 15 days	
			4	r = 20 - 30 %		
			5	r > 30 % and h > 25 mm	Reconstruct slab within 30 days	
9	**Polished Surface/Glazing**	t = texture depth, sand 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/m^2 d = diameter h = maximum depth	0	d < 50 mm; h < 25 mm; n < 1 per 5 m^2	No action.	Not Applicable
			1	d = 50 - 100 mm; h < 50 mm; n < 1 per 5 m^2	Partial depth repair 65 mm deep. Within 15 days	
			2	d = 50 - 100 mm; h > 50 mm; n < 1 per 5 m^2		

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**
			3	d = 100 - 300 mm; h < 100 mm n < 1 per 5 m^2	Partial depth repair 110mm i.e.10 mm more than the depth of the hole. Within 30 days	
			4	d = 100 - 300 mm; h > 100 mm; n < 1 per 5 m^2		
			5	d > 300 mm; h > 100 mm: n > 1 per 5 m^2	Full depth repair. Within 30 days	

Joint Defects						
11	**Joint Seal Defects**	loss or damage L = Length as % total joint length	0	Difficult to discern.	**Short Term** No action.	**Long Term** Not Applicable
			1	Discernible, L< 25% but of little immediate consequence with regard to ingress of water or trapping incompressible material.	Clean joint, inspect later.	
			3	Notable. L > 25% insufficient protection against ingress of water and trapping incompressible material.	Clean and reapply sealant in selected locations. Within 7 days	
			5	Severe; w > 3 mm negligibleprotection against ingress of water	Clean, widen and reseal the joint. Within 7 days	

				and trapping incompressible material.		
12	**Spalling of Joints**	w = width on either side of the joint L = length of spalled portion (as % joint length)	0	Nil, not discernible	No action.	Not Applicable
			1	w < 10 mm	Apply low viscosity epoxy resin/ mortar in cracked portion. Within 7 days	
			2	w = 10 - 20 mm, L < 25%		
			3	w = 20 - 40 mm, L > 25%	Partial Depth Repair. Within 15 days	
			4	w = 40 - 80 mm, L > 25%	30 - 50 mm deep, h = w + 20% of w, within 30 days	
			5	w > 80 mm, and L > 25%	50 - 100 mm deep repair. H = w + 20% of w. Within 30 days	
13	**Faulting (or Stepping)**	f = difference of level	0	not discernible, < 1 mm	No action.	No action.

	in Cracks or Joints		1	f < 3 mm		
			2	f = 3 - 6 mm	Determine cause and observe, take action for diamond grinding	Replace the slab as appropriate. Within 30days
			3	f = 6 - 12 mm	Diamond Grinding	
			4	f= 12 - 18 mm	Raise sunken slab.	Replace the slab as appropriate. Within 30days
			5	f> 18 mm	Strengthen subgrade and sub-base by grouting and raising sunken slab	
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	

			3	h = 12 - 25 mm	within 7 days	
			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		
			4	h > 50 mm or > 20% joints	Strengthen subgrade. Reinstate pavement at normal level	

			5	h > 100 mm	if L < 20 m. Within 30 days	
16	**Heave**	h = positive vertical displacement from normal profile. L = length	0	Not discernible. h < 5 mm	**Short Term**	**Long Term**
					No action.	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 < 20 m. Within 30 days	
			5	h > 100 mm		
17	**Bump**	h = vertical	0	h < 4 mm	No action	

		displacement fro m normal profile	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**	**Long Term**
					No action.	
			1	f = 3 - 10 mm	Spot repair of shoulder within 7 days	
			2	f = 10 - 25 mm		
			3	f = 25 - 50 mm	Fill up shoulder	

			4	f = 50 - 75 mm	within 7 dayss	For any 100 m stretch Reconstruct shoulder, if a
			5	f > 75 mm		Within 30days
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.	
		Nos/100 m stretch	5	abundant, crack development > 25%	Repair distressed pavement sections. Strengthen subgrade and subbase. Replace slab. Within 30 days	

20	**Ponding**	Ponding on slabs due to blockage of drains	0-2	No discernible problem	No action.	
			3 to 4	Blockages observed in drains, but water flowing	Clean drains etc within 7 days, Follow up	Action required to stop water damaging foundation within 30 days.
			5	Ponding, accumulation of water observed	-do-	

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

<table>
<tr><th>Asset Type</th><th>Performance Parameter</th><th colspan="3">Level of Service (LOS)</th><th>Frequency of Measurement</th><th>Testing Method</th><th>Recommended Remedial measures</th><th>Time limit for Rectification</th><th>Specifications and Standards</th></tr>
<tr><td rowspan="5">Highway</td><td rowspan="5">Availability of Safe Sight Distance</td><td colspan="3">As per IRC SP :84-2014, a minimum of safe stopping sight distance shall be available throughout.</td><td rowspan="5">Monthly</td><td rowspan="5">Manual Measurements with Odometer along with video/ image backup</td><td colspan="2" rowspan="5">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.</td><td rowspan="5">IRC:SP 84-2014</td></tr>
<tr><td>Design Speed, kmph</td><td>Desirable Minimum Sight Distance (m)</td><td>Safe Stopping Sight Distance (m)</td></tr>
<tr><td>100</td><td>360</td><td>180</td></tr>
<tr><td>80</td><td>260</td><td>130</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td>Pavement Marking</td><td>Wear</td><td colspan="3"><70% of marking remaining</td><td>Bi-Annually</td><td>Visual Assessment as per Annexure-F of IRC:35-2015</td><td>Re - painting</td><td>Cat-1 Defect – within 24 hours
Cat-2 Defect - within 2 months</td><td>IRC:35-2015</td></tr>
</table>

<table>
<tr><th>Asset Type</th><th>Performance Parameter</th><th colspan="3">Level of Service (LOS)</th><th>Frequency of Measurement</th><th>Testing Method</th><th>Recommended Remedial measures</th><th>Time limit for Rectification</th><th>Specifications and Standards</th></tr>
<tr><td rowspan="11"></td><td>Day time Visibility</td><td colspan="3">During expected life Service Time
Cement Road - 130mcd/m^2/lux
Bituminous Road - 100mcd/m^2/lux</td><td>Monthly</td><td>As per Annexure-D of IRC:35-2015</td><td>Re - painting</td><td>Cat-1 Defect – within 24 hours
Cat-2 Defect – within 2 months</td><td>IRC:35-2015</td></tr>
<tr><td rowspan="10">Night Time Visibility</td><td colspan="3"><u>Initial and Minimum Performance for Dry Retro reflectivity during night time:</u></td><td rowspan="10">Bi-Annually</td><td rowspan="10">As per Annexure-E of IRC:35-2015</td><td rowspan="10">Re - painting</td><td rowspan="10">Cat-1 Defect – within 24 hours
Cat-2 Defect – within 2 months</td><td rowspan="10">IRC:35-2015</td></tr>
<tr><td>Design Speed</td><td colspan="2">(RL) Retro Reflectivity (mcd/m^2/lux)</td></tr>
<tr><td></td><td>Initial (7 days)</td><td>Minimum Threshold level (TL) & warranty period required up to 2 years</td></tr>
<tr><td>Up to 65</td><td>200</td><td>80</td></tr>
<tr><td>65 - 100</td><td>250</td><td>120</td></tr>
<tr><td>Above 100</td><td>350</td><td>150</td></tr>
<tr><td colspan="3"><u>Initial and Minimum Performance for Night Visibility under wet condition (Retro reflectivity):</u></td></tr>
</table>

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		Initial 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	IRC:35-2015
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	hange of ignboard	48 hours in case of Mandatory	RC: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
				signboard using Retro Reflectivity Measuring Device. In accordance with ASTM D 4956-09.		Signs, Cautionary and Informatory Signs (Single and Dual post signs) 1 Month in case of Gantry/Cantilever Sign 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	RC 86:1983
	Kerb Painting	Functionality: Functioning of Kerb painting as intended	Daily	Visual with video/image backup	Kerb Repainting	Within 7-days	RC 35:2015
Other Road Furniture	Reflective Pavement Markers (Road Studs)	Numbers and Functionality as per specifications in IRC:SP: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	Functionality: Functioning of End Treatment as intended	Daily	Visual with video/image	Rectification	Within 7 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
	Traffic Safety Barriers			backup			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
Highway Lighting System	Highway Lights	Illumination: Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC:SP:84-2014
		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 luxmeter	Improvement in Lighting System	24 hours	IRC:SP:84-2014
		No major/minor failure in the lighting system	Daily	-	Rectification of failure	8 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
Trees and Plantation including median plantation	Obstruction in a minimum head-room of 5.5 m above carriageway or obstruction in visibility of road signs	No obstruction due to trees	Monthly	Visual with video/image backup	Removal of trees	Immediate	IRC:SP:84-2014
	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 from obstruction by vegetation	Daily	Visual with video/image backup	Removal of Trees	Immediate	IRC:SP 84-2014
Rest Areas	Cleaning of toilets	-	Daily	-	-	Every 4 hours	
	Defects in electrical, water and sanitary installations	-	Daily	-	Rectification	24 hours	

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Other Project Facilities and Approach roads	Damage or deterioration in Approach Roads, pedestrian facilities, truck lay-bys, bus-bays, bus-shelters, cattle crossings, Traffic Aid Posts, Medical Aid Posts and other works		Daily	-	Rectification	15 days	IRC:SP 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
Pipe/ box/slab culverts	Free waterway/ unobstructed flow section	85% of culvert normal flow area to available.	2 times in a year (before and after rainy season)	Inspection by Bridge Engineer as per IRC SP: 35-1990 and recording of depth of silting and area of vegetation.	Cleaning silt up soils and debris in culvert barrel after rainy season, removal of bushes and vegetation, U/s of barrel, under barrel and D/s of barrel before rainy season.	15 days before onset of monsoon and within 30 days after end of rainy season.	IRC 5-2015, IRC SP:40-1993 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 and MORTH Specification s clause 2800

	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sqm, damage to solid apron (concrete apron) not more than 1 sqm	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons 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.
Bridges including ROBs Flyover etc. as applicable	Riding quality or user comfort	No pothole in wearing coat on bridge deck	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC or wearing coat	15 days	MORT&H Specification 2811
Bridge -Super Structure	Bumps	No bump at expansion joint	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC on either side of expansion joints, profile correction course on approach slab in case of settlement to approach embankment	15 days	MORT&H Specification 3004.2 & 2811.
	User safety (condition of crash barrier and guard rail)	No damaged or missing stretch of crash barrier or pedestrian hand railing	Daily	Visual inspection and detailed condition survey as per IRC SP: 35-1990.	Repairs and replacement of safety barriers as the case may be	3days	IRC: 5-1998, 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 IRC SP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out the repairs to affected concrete portion with epoxy mortar / concrete.	15 days	IRC SP: 40-1993 and MORTH 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 IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Grouting with epoxy mortar, investigating causes for cracks development and carry out necessary rehabilitation.	48 Hours	IRC SP: 40-1993 and MORTH Specification 2800.
	Rainwater seepage through deck slab	Leakage - nil	Quarterly	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Grouting of deck slab at leakage areas, waterproofing, repairs to drainage spouts	1 months	MORTH specifications 2600 & 2700.
	Deflection due to permanent loads and	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.

	live loads		than 40 m				
	Vibrations in bridge deck due to moving trucks	Frequency of vibrations shall not be more than 5 Hz	Once in every 5 years for spans more than 30m and every 10 years for spans between 15 to 30 m	Laser displacement sensors or laser vibro-meters	Strengthening of super structure	4 months	AASHTO LRFD specifications
	Leakage in Expansion joints	No damage to elastomeric sealant compound in strip seal expansion joint, no leakage of rain water through 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	MORTH specifications 2600 and IRC SP: 40-1993.
	Debris and dust in strip seal	No dust or debris in expansion joint	Monthly	Detailed condition survey as per IRC SP:35-1990 using	Cleaning of expansion joint gaps thoroughly	3 days	MORTH specification s 2600 and

	expansion joint	gap.		Mobile Bridge Inspection Unit			IRC SP: 40-1993.
	Drainage spouts	No down take pipe missing/broken below soffit of the deck slab. No silt, debris, clogging of drainage spout collection chamber.	Monthly	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Cleaning of drainage spouts thoroughly. Replacement of missing/broken down take pipes with a minimum pipe extension of 500mm below soffit of slab. Providing sealant around the drainage spout if any leakages observed.	3 days	MORTH specification 2700.
Bridge-substructure	Cracks/spalling of concrete/ rusted steel	No cracks, spalling of concrete and rusted steel	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out repairs to substructure by grouting/guniting and micro concreting depending on type of defect noticed	30 days	IRC SP: 40-1993 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 per IRC SP:35-1990 using Mobile Bridge Inspection Unit. In case of doubt, use Underwater camera for inspection of deep wells in major Rivers.	Suitable protection works around pier/abutment	1 month	IRC SP: 40-1993, IRC 83-2014, MORTH specification 2500
	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching.	30 days after defect observation or 2	IRC: SP 40-1993 and IRC:SP:13-2004.

		sq.m, damage to solid apron (concrete apron) not more than 1 sq.m				weeks before onset of rainy season whichever is earlier.	
Note: Any Structure during the entire contract period which is found that does not complies with all requirements of this Table will be prepared, rehabilitated or even reconstructed under the scope of 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 herewith) along with MoRTH specifications shall be binding for all maintenance activities

A. Flexible Pavement

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

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

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

Nature of Defect or deficiency		Time limit for repair/ rectification
(iii)	Snow requiring clearance	24 (twenty four) hours

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

Schedule - F

(See Clause 4.1 (vii)(a))

Applicable Permits

1. Applicable Permits

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

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

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

(c) Licence for use of explosives;

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

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

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

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

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

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

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

Schedule – G

(See Clauses 7.1 and 19.2)

Annex-I

(See Clause 7.1)

Form of Bank Guarantee

[Performance Security/Additional Performance Security]

To,
Managing Director, NHIDCL
National Highways & Infrastructure Development Corporation Ltd. 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 & Infrastructure Development Corporation Ltd], that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall be

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

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

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

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

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

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

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

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

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.

Annex – II

(Schedule - G)

(See Clause 19.2)

Form for Guarantee for Advance Payment

To,
Managing Director, NHIDCL
National Highways & Infrastructure Development Corporation Ltd. 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 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 authorized to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

10. This 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.

SCHEDULE -H

See Clauses10.1 (iv) and 19.3

Contract Price Weightages

1.1 The Contract Price for this Agreement is Rs. _____Crore

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 Original contract price	Stage for payment		Percentage weightage to Particular Item
1	2	3		4
		A) New 4-lane realignment/bypass		
Road works including culverts, minor bridges, underpasses, Overpasses, Reinforced Earth walls, approaches to ROB/RUB/Major Bridges/Structures including (but excluding service roads)	74.900 %	1. Earthwork up to top of the subgrade		22.376 %
		2. Granular Sub-base(GSB)		10.999 %
		3. Base Course(WMM, Shoulders)		16.658 %
		4. Bituminous work	DBM(Shoulders)	19.088 %
			BC(Shoulders)	14.228 %
		B- New culverts, minor bridges, underpasses, overpasses on existing road, realignment, bypasses		
		1) (i) Box Culvert (New)		4.715 %
		1) (ii) Box Culvert (Balance work)		
		a) For balance part of culvert barrel		2.231%
		b) For balance part of minor protection work(retaining wall, parapet wall etc)		1.090%
		c)) For balance part of minor protection work(Slope pitching, curtain wall, apron etc)		1.105%
		2) Minor Bridge		
		i) Foundation		1.221%
		ii) Sub-structure		0.798%
		iii) Super-structure		5.491%
Major bridges works	3.290 %	**A) New major bridge**		
		1) Super-structure(Girder launching, including crash barrier, road furniture, etc. complete in all respect)		100%
Structure (VUP)	2.240%	**A) VUP**		
		i) Foundation		21.210%
		ii) Sub-structure		12.530%
		iii) Super-structure (including crash barrier, wearing coat, etc. complete in all respect)		66.260%
Fly over	0.110 %	**A)- Fly over**		
		i) Superstructure (Wearing coat, Drainage spout fixing, Test on completion,, complete in all respect and fit to use)		100%
Other works	19.460 %	i) Service Road		55.565 %
		ii) Roadside drain(RCC Drain)		17.242 %
		iii) Road signs, markings, km stone, boundary stone, safety devices etc.		17.416 %
		iv) Roadside and median plantation,		0.733 %
		v) Safety and traffic management during construction		3.211 %
		(vi) Miscellaneous items (Major and Minor road junctions, traffic management during execution, EMP laying tiles on kerbs, etc.)		5.833 %

1.2 Procedure of estimating the value of work done.

1.3.1Road works

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

Table 1.3.1

Stage for payment		Percentage weightage	Payment procedure
A) New 4-lane realignment/bypass			Unit of measurement is linear length for two lanes. Payment of each stage shall be made on pro rata basis on completion of a stage in a minimum length of 0.250 Km in Two Lane width.
1. Earthwork up to top of the subgrade		22.376 %	
2. Granular Sub-base(GSB)		10.999 %	
3. Base Course(WMM, Shoulders)		16.658 %	
4. Bituminous work	DBM	19.088 %	
	BC	14.228 %	
B) New culverts, minor bridges, underpasses, overpasses on existing road, realignments, bypasses:			
(1) (i) Culverts(New)		4.715 %	Cost of each culvert shall be determined on pro – rata basis with respect to total number of culverts. Payment shall be made on completion of two culverts in 2-lane or 1 culvert in 4 Lane for 80% cost of each culvert, pending minor protection work. Out of 20% balance, 15% shall be eligible on completion of Retaining wall/ parapet wall etc. Balance 5% shall be eligible on completion of slope pitching etc, complete in all respect.
(1) (ii) Culverts(Balance work)			
(a) For balance part of culvert barrel		2.231%	Payment shall be made on completion of culvert in 4-lane width. Cost of balance part of the culvert barrel shall be determined on pro-rata basis in running meter
(b) For balance part of minor protection work(retaining wall, parapet wall etc)		1.090%	Payment shall be eligible on completion of minor protection work on either side. Cost of minor protection shall be determined on pro-rata basis with respect to total no of culvert in 2-lane width.
(c) For balance part of minor protection work(Slope pitching, curtain wall, apron etc)		1.105%	Payment shall be eligible on completion of minor protection work on either side. Cost of minor protection shall be determined on pro-rata basis with respect to total no of culvert in 2-lane width.
(2) Minor bridges			
a) 21+956			
i) Foundation		0.000 %	Payment shall be eligible on completion of pile cap.
ii) Sub structure (Balance part)		0.077 %	Payment shall be eligible on completion of each pier / abutment
iii) Super structure		1.535 %	Payment shall be eligible on completion of the super-structure in all respects including hand rails,/crash barriers, wing walls, return walls, road furniture works, tests on completion etc., complete in all respects
b) 31+521			
i) Foundation		1.221 %	Payment shall be eligible on completion of raft.
ii) Sub structure		0.721 %	Payment shall be eligible on completion of each pier / abutment
iii) Super structure		3.815 %	Payment shall be eligible on completion of the super-structure in all respects including hand rails,/crash barriers, wing walls, return walls, road furniture works, tests on completion etc., complete in all respects

c) 32+986		
i) Super structure (Misc. works like railing, return wall, pitching, wearing cot, drainage spout etc.)	0.141 %	Payment shall be eligible on completion of the super-structure in all respects including hand rails,/crash barriers, wing walls, return walls, road furniture works, tests on completion etc., complete in all respects

For example, if the total length of bituminous work to be done in 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 (3) 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

Stage for payment	Percentage weightage	Payment procedure
A) New major bridge works		
(1) Super structure: On completion of the superstructure in all respects including hand rails/crash barrier, wing walls, return walls, road furniture works, tests on completion etc. complete in all respects	100%	Payment shall be eligible on completion of an individual span. Payment shall be made on pro rata basis for completion of each span for 80% of the total cost of each span and balance 20% shall be paid on completion of the span in all respect.

1.3.3 Structure (VUP):

Procedure for estimating the value of VUP works shall be as stated in table 1.3.3

Table 1.3.3

Stage for payment	Percentage weightage	Payment procedure
A) VUP works		
(1) Foundation: On completion of the foundation work in all respect.	21.210%	Payment shall be eligible on completion of each stage of a structure as per weightage given in the table.
(2) Substructure: On completion of abutment up to abutment cap, including wing wall and return walls complete all respect.	12.530%	
(3) Super structure: On completion of the superstructure in all respects including hand rails/crash barrier, wing walls, return walls, road furniture works, tests on completion etc. complete in all respects	66.260%	

1.3.4 Structures (Fly over):

Procedure for estimating the value of Flyover works shall be as stated in table 1.3.4

Table 1.3.4

Stage for payment	Percentage weightage	Payment procedure
A) New major bridge works		
(1) Super structure: On completion of the superstructure in all respects including road furniture works, wearing coat, Drainage spout fixing, Test on completion,, complete in all respect and fit to use	100%	Payment shall be eligible on completion of the super-structure in all respect

1.3.5 Other works:

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

Table 1.3.5

Stage for payment	Percentage weightage	Payment procedure
Other works		
i) Service Road	55.565 %	Unit of measurement shall be linear length in km. Payment shall be made on completion of a stage in a length of not less than 2.5% of the total scope length.
ii) Roadside drain	17.242 %	Unit of measurement shall be linear length in km. Payment shall be made on pro-rata basis on completion of a stage in a length not less than 2.5% of the total scope length.
iiiii) Road signs, markings, km stone, boundary stone, safety devices etc.	17.416 %	Unit of measurement shall be linear length in km. Payment shall be made on pro-rata basis on completion of a stage in a length not less than 5% of the total scope length.
iv) Roadside plantation	0.733 %	Unit of measurement shall be linear length in km. Payment shall be made on pro-rata basis on completion of a stage in a length not less than 5% of the total scope length.
v) Safety and traffic management during construction	3.211 %	Payment shall be made on pro-rata basis every three months.
(vi) Miscellaneous items (Major and Minor road junctions, traffic management during execution, EMP laying tiles on kerbs, etc.)	5.833 %	

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.]

A minimum list of the drawings of the various components / elements of the Project

Highway and project facilities required to be submitted by the Contractors given below:

a) Drawings of horizontal alignment, vertical profile and detailed cross sections.

b) Drawings of all Major and Minor Bridges.

c) Drawings of cross-drainage works.

d) Drawings of Major intersections.

e) Drawing of Toll Plaza layout and building.

f) Drawing of bus-bay and bus shelters.

g) Drawing of road furniture including traffic signage, marking, safety barriers etc.

h) Drawing of traffic diversion plan.

i) Drawing as per instruction of Authority's Engineer.

j) General arrangement showing area of base camp and administrative block

Schedule - J

(See Clause 10.3 (ii))

Project Completion Schedule

1. Project Completion Schedule

During Construction period, the Contractor shall comply with the requirements set forth in this Schedule-J for each of the Project Milestones and the **Scheduled Completion Date**. Within 15 (fifteen) days of the date 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 **190th** 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 **325th** 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 **465th** day from the Appointed Date (the "**Project Milestone- III**").

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

5. Scheduled Completion Date

(i) The Scheduled Completion Date shall occur on the **550th** 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 [to be decided in consultation with Authority's Engineer as per relevant IRC Code/Manual].

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

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

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

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

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

3. Agency for conducting Tests

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

4. Completion Certificate

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

5. The Contractor will carry out tests with following equipment in the presence of Authority's Engineer.

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

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

Schedule - L

(See Clause 12.2)

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%

S. No.	Item/Defect/Deficiency	Percentage
(iii)	Painting, repairs/replacement kerbs, railings, parapets, guideposts/crash barriers	5%
(d)	**Roadside Drains**	
(i)	Cleaning and repair of drains	5%
(e)	**Road Furniture**	
(i)	Cleaning, painting, replacement of road signs, delineators, road markings, 200 m/km/5th 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 kilometre.

2. Visual and physical test:

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

Schedule-R

(See Clause 14.10)

Taking Over Certificate

I, ... (Name and designation of the Authority's Representative) under and in accordance with the Agreement dated ..... (the "Agreement"), for [construction of the ****section (km ** to km **) of

****] (the "**Project Highway**") on Engineering, Procurement and Construction (EPC) basis through (Name of Contractor), hereby certify that the Tests on completion of Maintenance Period in accordance with Article 14 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement and I hereby certify that the Authority has taken over the Project highway from the Contractor on this day

SIGNED, SEALED AND DELIVERED

(Signature)

(Name and designation of Authority's Representative)

(Address)

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