

**National Highways & Infrastructure Development Corporation Ltd.
(Ministry of Road Transport & Highways)**

**Engineering Procurement and Construction (EPC)
Agreement
For**

**Improvement & widening of existing NH-08 from Champak Nagar to
Khayerpur to 4-lane (Four-lane) (Km 242+500 to Km 261+610) in the state
of Tripura on EPC basis.**

Schedule A

November -2023

Schedule

Schedule-A

(See Clauses 2.1 and 8.1)

Site of the Project

The Site

- (i) 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.
- (ii) The dates of handing over the Right of Way to the Contractor are specified in Annex-II of this Schedule-A.
- (iii) An inventory of the Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority Representative and the Contractor, and such inventory shall form part of the memorandum referred to in Clause 8.2 (i) of this Agreement.
- (iv) The alignment plans of the Project Highway are specified in Annex-III. In the case of sections where no modification in the existing alignment of the Project Highway is contemplated, the alignment plan has not been provided. Alignment plans have only been given for sections where the existing alignment is proposed to be upgraded. The proposed profile of the Project Highways shall be followed by the contractor with minimum FRL as indicated in the alignment plan. The Contractor, however, improve/upgrade the Road Profile as indicated in Annex-III based on site/design requirement.
- (v) The status of the Environment/forest clearances obtained or awaited is given in Annex-IV.

Annex – I

(Schedule-A)

Site

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

1. Site

The Site of the Four-Lane Project Highway comprises the section of National Highway 08 commencing from existing km 456.500 at (Near Sadhupara) to existing km 475.000 (Near Khayerpur Tri-Junction) and Agartala bypass from km 0.000 (Khayerpur-Tri-Junction) to Km 1.300 (At Uttar Champamura) in the State of Tripura. The land, carriageway and structures comprising the site are described below.

2. Land

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

Sl. No.	Chainage (Km)		Right of Way (m)	Remarks
	From	To		
1	Existing: 456+500 Design: 242+500	Design: 261+610	46.5m	

3. Carriageway

The present carriageway of the Project Highway is Two Lane. The type of the existing pavement is flexible.

4. Major Bridges

The Site includes the following Major Bridges:

Sl. No.	Chainage (Km)	Type of Structure			No. of Spans with span length (m)	Total Length (m)	Width (m)
		Foundati on	Sub-structure	Super-structure			
1	Existing: 0.075 Design: The section are being bypassed.	RCC	-	Steel Girder	2x36	72	13

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
		Foundation	Superstructure			
1	Existing: 471+000 Design: 257+456	Not visible	RCC girder	1 x 17.600	5.5	RUB

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:

S. No.	Existing Location (km)	Type of Existing Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-structure	Super-structure		
1	Existing: 463+543 Design: The section is being bypassed.	Open	RCC	RCC girder	3x13.5	8
2	Existing: 473+050 Design: The section is being bypassed.	Raft	RCC	RCC	1x32	7.5

8. Railway Level Crossings

The site includes the following level crossings:

S. No.	Location (Km)	Remarks
Nil		

9. Underpasses (vehicular, non-vehicular)

The Site includes the following underpasses:

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

10. Culverts

The Site has the following culverts:

S. No.	Existing Chainage (km)	Design Chainage (Km)	Type of Culvert	Span/Opening with span length (m)	Width (m)
1	457.460	243.589	Slab Culvert	1x2	12
2	459.676	245.214	Box Culvert	1X3.5	12.5
3	460.027	245.565	Box Culvert	1X3.3	7.5
4	459.885	245.809	RCC Slab	1x3.3	7.5
5	459.956	246.134	Box Culvert	1X2	16.5
6	460.849	247.027	Pipe Culvert	1X1.2	7.5
7	461.981	248.251	Pipe Culvert	1x1.2	12.5
8	462.331	248.587	Pipe Culvert	1x1.2	12.5
9	465.430	Bypass	RCC Slab	1x4	12
10	465.700	Bypass	RCC Slab	1x2	12
11	466.000	252.300	Box Culvert	1X2	12.3
12	466.500	252.800	RCC Slab	1x2	12
13	466.679	253.006	RCC Slab	1x3	12
14	467.329	253.458	RCC Slab	1x1.5	12
15	467.650	253.766	RCC Slab	1x3	11
16	467.875	253.991	Box Culvert	1X4.5	12
17	468.400	254.445	Box Culvert	1x2.5	11
18	468.900	254.966	Box Culvert	1X5	10
19	468.966	255.032	Box Culvert	1X4	8.5
20	469.270	255.457	Box Culvert	1X3.2	12.3
21	469.800	256.197	RCC Slab	1x3.2	12.3
22	1.000	Bypass	Box Culvert	1x2.3	12
23	1.115	Bypass	Box Culvert	1x4.1	12
24	1.227	Bypass	Box Culvert	1x5.8	12.1
25	1.578	261.580	Box Culvert	1x4.3	30.5

11. Bus bays/Bus Shelters

The details of 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. Roadside drains

The details of the roadside drains are as follows:

Sl. No.	Location		Type	
	From km	to km	Masonry/cc (Pucca)	Earthen (Kutcha)
1	Existing: 456.500 Design: 242.500	Existing: 475.000	2.820 Km	-
2	0.00	1.300	0.830 Km	-
			3.650 Km	-

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	Existing: 458.500 Design: 244+450		-	-	-	-	Y	-
2	Existing: 475.000 Design: The section is being bypassed.		-	-	Y	-	-	-

15. Minor junctions

The details of minor junctions are as follows:

Sr. No.	Location		Type	
	Existing	Design	T-Junction	Cross Road
1	457.830	243.845	T-Junction	-
2	458.330	244.500	Y-Junction	-
3	459.970	246.150	T-Junction	-
4	460.970	247.150	Y-Junction	-
5	461.710	247.750	Y-Junction	-
6	467.640	253.850	Y-Junction	-
7	468.590	254.800	Y-Junction	-
8	468.880	255.100	Y-Junction	-
9	469.280	255.490	T-Junction	-
10	469.950	256.160	T-Junction	-
11	470.960	257.185	T-Junction	-
12	0.185	Bypass	-	3-Legged
13	0.195	Bypass	-	3-Legged
14	0.480	Bypass	-	3-Legged
15	0.488	Bypass	-	3-Legged
16	0.550	Bypass	-	3-Legged
17	0.660	Bypass	-	3-Legged

16. Bypasses

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

S. No.	Name of Bypass (Town)	Chainage (Km) from km to km	Length (In Km)
1	Jirania	Existing: 462.300 to 466.600 Design: 249+300 to 252+300	Existing: 4.300 Km Design: 3.00 Km
2	Ranibazar	Existing: 471+000 to 475+100 & 0.00 to 1.300 Design: 257+600 to 261+600	Existing: 5.400 Km Design: 4.00 Km

17. Other Structure (Retaining Wall / Breast Wall)

Sr. No.	Existing Km		Side	Length
	From	To		

Sr. No	Existing Km	Side	Length
Nil			

18. Electrical Utilities (tentative Locations)

- (i) The Site includes the following Electrical Utilities: -
(a) Extra High-Tension Lines (EHT Lines):

Start of Sadhupara to Jirania (Ch 242+500 to 249+500)

Sl. No	Design Chainage (Km)		Length (in m)	Crossing (in Nos)
	From	To	132	132
1	246+600	247+000	0.300	1

End of Jirania to Ranirbazar Bypass (Ch.251+600 to 257+261)

Sl No	Design Chainage (Km)		No. of Crossings
	From	To	400
1	252+000	253+000	1

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

Start Point at Sadhupara to Jirania (Ch. 242+500 to 249+500):

S No	Design Chainage (Km)		Length (in m)			No. of Crossings			Transformer	
	From	To	LT	11KV	33KV	LT	11KV	33KV	No.	Capacity KV
1	242+500	243+000	1.200	0.450	0.750	2	1	1	4	250KVA 3 NO.S,100 KVA 1NO.
2	243+000	244+000	1.350	0.200	0.250	4	2	1	2	250KVA
3	244+000	245+000	1.800	0.100	0.400	3	1	-	8	250KVA 5NO.S, 100 KVA 3NO.S
4	245+000	246+000	1.400	0.100	0.450	2	1	-	5	250 KVA
5	246+000	247+000	1.460	0.300	-	3	2	-	4	250KVA
6	247+000	248+000	0.660	0.300	-	2	3	-	0	NA
7	248+000	249+000	1.500	0.250	0.750	2	1	-	3	250KVA 1NO., 100KVA 2 NO.S
8	249+000	249+500	0.450	0.150	0.350	-	1	-	2	100KVA 2 NO.S

End of Jirania to Ranirbazar Bypass (Ch.251+600 to 257+261)

S No	Design Chainage (Km)		Length (in m)			No. of Crossings			Transformer	
	From	To	33 KV	11 KV	LT LINE	33 KV	11 KV	LT	No.	Capacity KV
1	251+600	252+00	-	-	-	-	-	-	-	250KVA
2	252+000	253+000	1.200	0.600	1.500	-	-	4	2	250KVA
3	253+000	254+00	0.900	0.400	1.700	-	-	8	2	250KVA
4	254+000	255+000	-	-	1.300	-	-	13	5	250KVA 3NO.S, 100KVA 2 NO.S
5	255+000	256+000	0.300	-	1.830	-	-	21	1	250KVA
6	256+00	257+000	1.040	-	1.800	-	-	4	5	250KVA 3NO.S, 100KVA 2 NO.S
7	257+000	257+261	-	-	-	-	-	-	0	250KVA

(ii) Public health utilities (Tentative Locations):

The site includes the following public health utilities:

End of Sadhupara to Jirania (Ch. 242+500 to 249+500)

Sl No	Design Chainage (Km)		Length (in Km)		Crossings		
	From	To	Water Supply Line		Hand pump/ Tube well (Nos.)	Water Supply Line	
			With Pumping	With gravity flow		With Pumping	With gravity flow
1	242+500	249+500	12.8	-	0	30 Nos	-

End of Jirania to Ranirbazar Bypass (Ch.251+600 to 257+261)

Sl No	Design Chainage (Km)		Length (in Km)		Hand pump/ Tube well (Nos.)	Crossings	
	From	To	Water Supply Line			Water Supply Line	
			With Pumping	With gravity flow		With Pumping	With gravity flow
1	251+600	257+260	7.8	-	0	50 Nos	-

(As per Clause 8.3 (i))

(Schedule-A)**Dates for providing Right of Way of Construction Zone**

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

SL No.	From Km to Km		Length (Km)	Width (m)	Date of providing Right of Way*
1	2		3	4	5
(i)	Full Right of Way (Full width)				90% of ROW At Appointment Date. Balance Right of way Within 150 days after the Appointed Date
a	242+500	244+640	2.140	45	
b	244+640	245+540	0.900	46.5	
c	245+540	253+700	8.160	45	
d	253+700	257+300	3.600	46.5	
e	257+300	261+580	4.280	45	
f	261+580	261+610	0.030	46.5	

Annex – III

(Schedule-A)

Alignment Plans

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

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

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

(iii) rove/upgrade upon the traffic signage plan as indicated in Annex-III based on site/design requirement as per the relevant specifications/IRC Codes/Manual

Annex – IV

(Schedule-A)

Environment Clearances

Not Required

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 improve and widening to Four-Laning 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)

Improvement & widening of existing NH-08 from Champak Nagar to Khayerpur section to 4-lane (Four lane with Paved Shoulder) (design Km 242+500 to Km 261+610) in the state of Tripura on EPC Basis.

1. Widening of the Existing Highway

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

(ii) Width of Carriageway

Four Lane with Paved shoulders shall be undertaken. The paved carriageway shall be 14 m wide in accordance with the typical cross section's drawings in the Manual.

Provided that in built-up areas [refer to paragraphs 2.1(ii) (a) of the Manual and provide necessary details]: the width of the carriageway shall be as specified in the following table:

Sl. No.	Built-up stretch (Township)	Location (km to km)	Width (m)	Typical cross section (Ref. to Manual)
1	Majlispur	From Km 254+621 to Km 257+300	-	TCS-3

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

2. Geometric Design and General Features

(i) General

Geometric design and general features of the Project Highway shall be in accordance with Section 2 of the Manual.

(ii) Design speed

The design speed shall be the minimum design speed of 80 km per hr for plain/ rolling terrain in four lane section.

(iii) Improvement of the existing road geometrics

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

(iv) Right of Way

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

(v) Type of shoulders

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

Built-up Sections			
Sr. No.	Stretch (from Km to Km)	Fully paved Shoulders/footpaths	Reference to Cross Section
1	254+621 to 257+300	Yes	TCS-3

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

(vi) **Lateral and vertical clearances at underpasses**

Lateral and vertical clearances at underpasses and provision of guard rails/crash barriers shall be as per the provision of relevant Manual.

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
1	245+081	20	VUP
2	250+059	7	SVUP
3	254+099	20	VUP
4	260+260	7	SVUP
5	260+804	7	SVUP

(vii) **Lateral and vertical clearances at overpasses**

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

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

Sl. No.	Design Chainage (Km) (From km to km)	Span/ opening (m)	Remarks
Nil			

(viii) **Service Roads, Slip Roads**

service road / slip roads shall be constructed at the locations and for the lengths indicated below:

Sl. No.	Location of service/slip road (from Km to Km)		Right hand side (RHS)/Left hand side (LHS) or Both sides	Length (Km) of service/slip road
1	244+643	245+543	Both Side	0.900
2	249+900	250+300	Both Side	0.400
3	253+711	254+621	Both Side	0.910
4	259+950	261+610	Both Side	1.660

(ix) **Grade separated structures**

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

Sl. No.	Location of structure	Length (m)	Number and length of spans (m)	Approach gradient	Remarks, if any
1	245+081	22.5	1x22.5	-	VUP
2	250+059	7	1x7	-	SVUP
3	254+099	22.5	1x22.5	-	VUP
4	260+260	7	1x7	-	SVUP
5	260+804	7	1x7	-	SVUP

(b) In the case of grade separated structures, the type of structure and the level of the Project Highway and the cross roads shall be as follows: [Refer to the provision of relevant Manual and specify the type of vehicular under pass/overpass structure and whether the cross road is to be carried at the existing level, raised or lowered]

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

(x) Cattle and pedestrian underpass /overpass

Cattle and pedestrian underpass/ overpass shall be constructed as follows: [Refer to the provision of relevant Manual and specify the requirements of cattle and pedestrian underpass/ overpass]

Sl. No.	Location	Type of crossing
Nil		

(xi) **Typical cross-sections of the Project Highway**

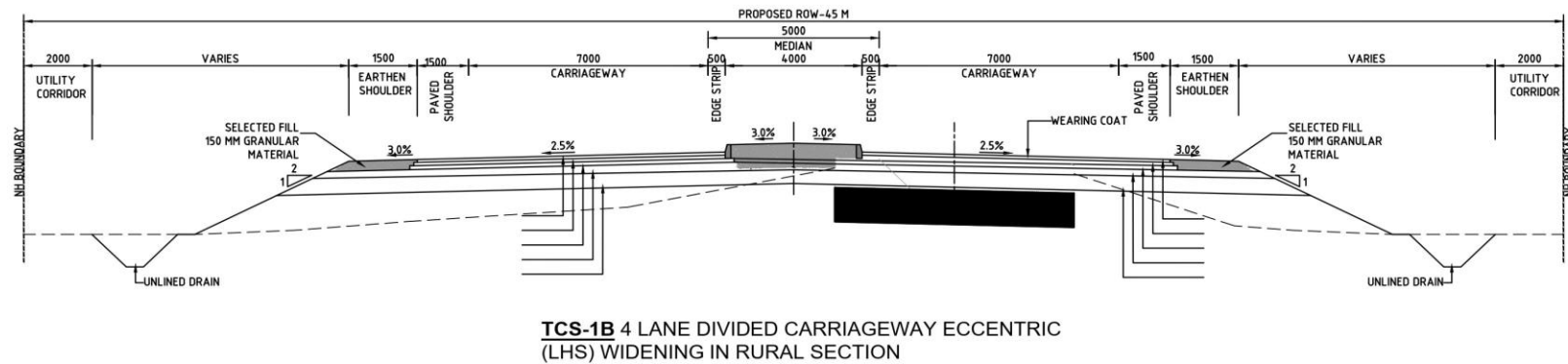
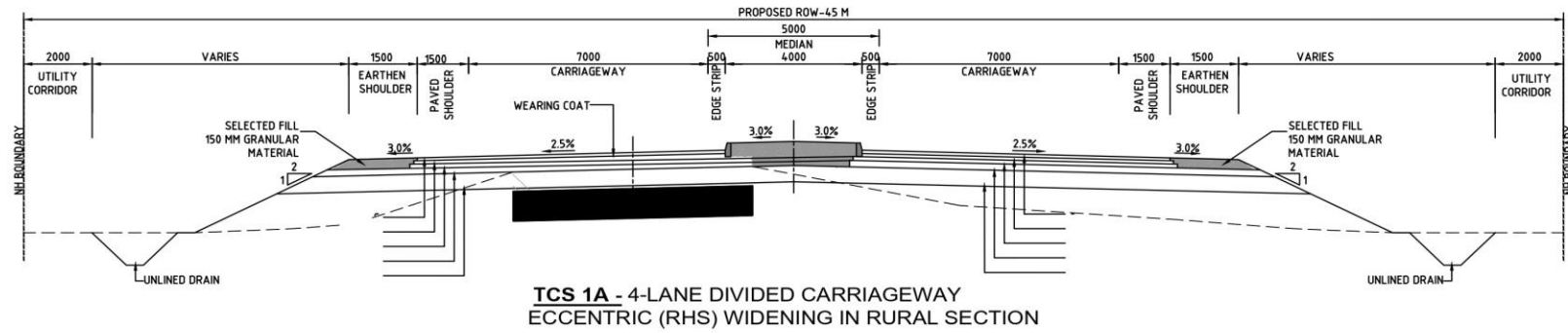
TCS TYPE	DESCRIPTION
TCS-1A	4 LANE DIVIDED CARRIAGEWAY ECCENTRIC (RHS) WIDENING IN RURAL SECTION
TCS-1B	4 LANE DIVIDED CARRIAGEWAY ECCENTRIC (LHS) WIDENING IN RURAL SECTION
TCS-2a	4 LANE DIVIDED CARRIAGEWAY ECCENTRIC (RHS) WIDENING WITH SERVICE ROAD IN BUILT-UP SECTION
TCS-3	4 LANE DIVIDED CARRIAGEWAY FOR RECONSTRUCTION WITH SERVICE ROAD IN BUILT-UP SECTION
TCS-4	4 LANE DIVIDED CARRIAGEWAY FOR NEW CONSTRUCTION (BYPASS/ REALIGNMENT/ CURVE IMPROVEMENT) IN RURAL SECTION
TCS-6	4 LANE DIVIDED CARRIAGEWAY IN HILLY SECTION (BOX CUTTING)
TCS-7	4 LANE DIVIDED CARRIAGEWAY FOR APPROACH OF FLYOVER/ VUP/ SVUP WITH SLIP ROAD
TCS-10	4 LANE DIVIDED CARRIAGEWAY FOR NEW CONSTRUCTION LEFT SIDE RETAINING WALL (BYPASS/ REALIGNMENT/ CURVE IMPROVEMENT) IN RURAL SECTION
TCS-10A	4 LANE DIVIDED CARRIAGEWAY FOR NEW CONSTRUCTION RIGHT SIDE RETAINING WALL (BYPASS/ REALIGNMENT/ CURVE IMPROVEMENT) IN RURAL SECTION

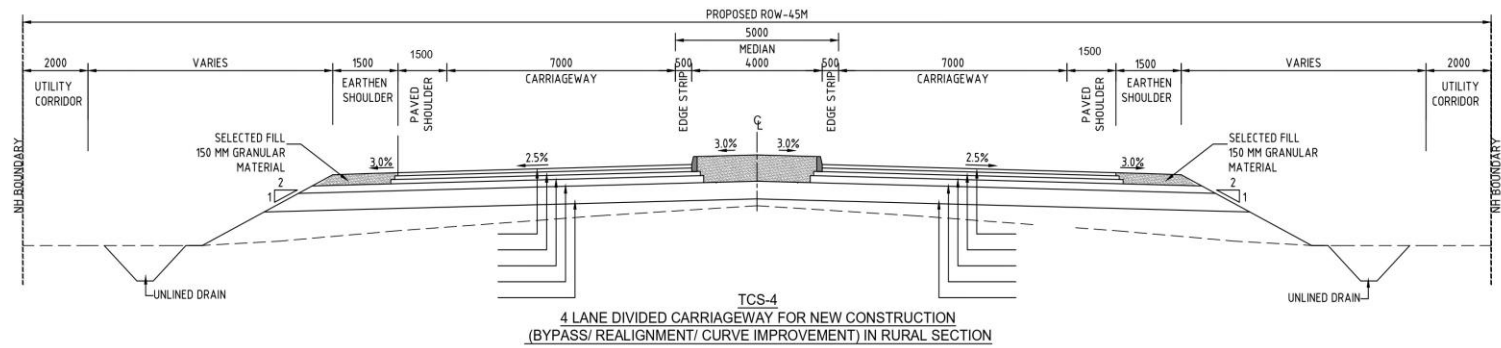
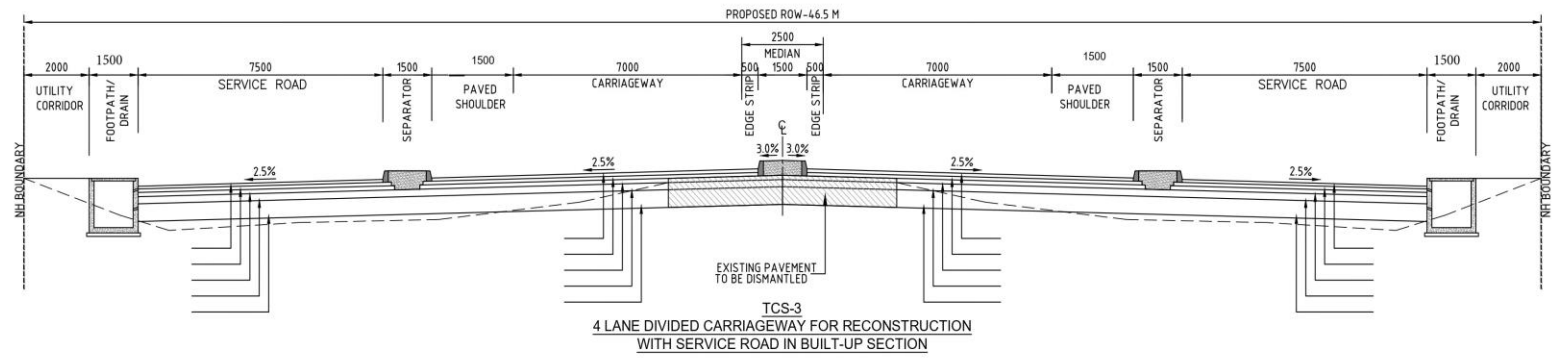
TCS-10B	4 LANE DIVIDED CARRIAGEWAY FOR NEW CONSTRUCTION BOTH SIDE RETAINING WALL (BYPASS/ REALIGNMENT/ CURVE IMPROVEMENT) IN RURAL SECTION
TCS-15	4 LANE DIVIDED CARRIAGEWAY IN BOTH SIDE HILLY SECTION WITHOUT BREAST WALL
TCS-18	4 LANE DIVIDED CARRIAGEWAY AT EXISTING RUB RETAINED

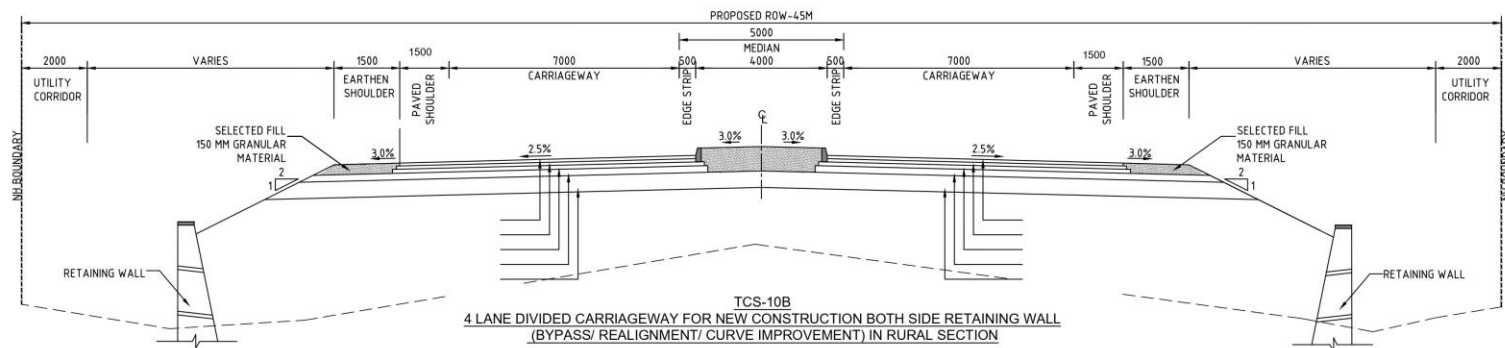
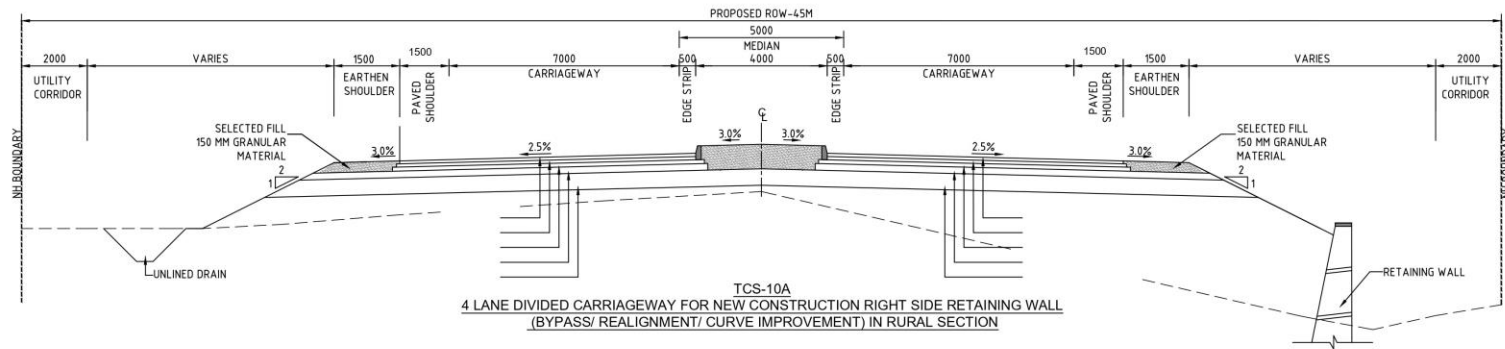
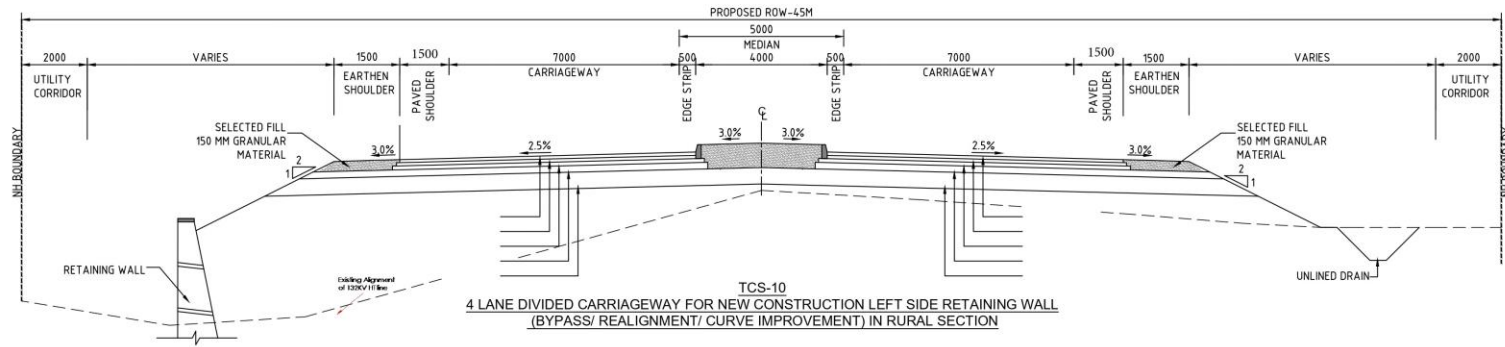
Typical cross-sections schedule of the Main Highway: -

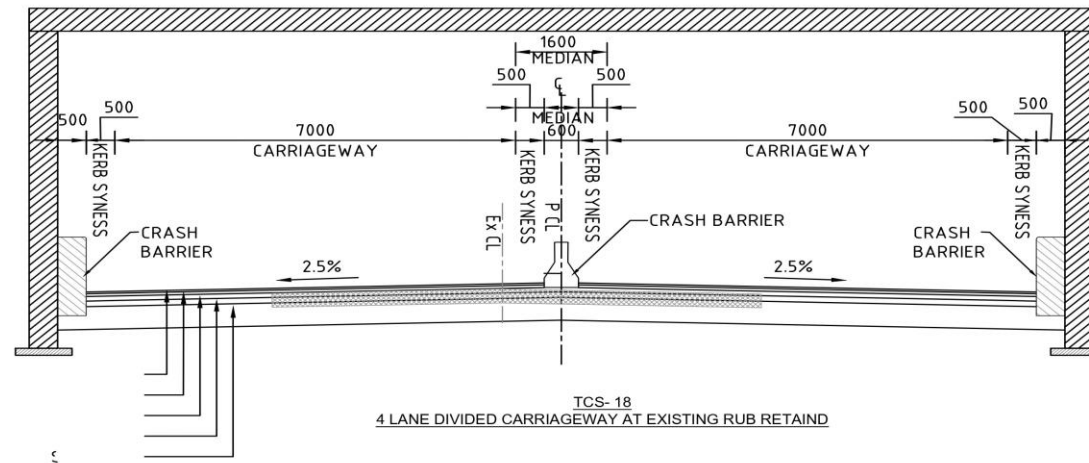
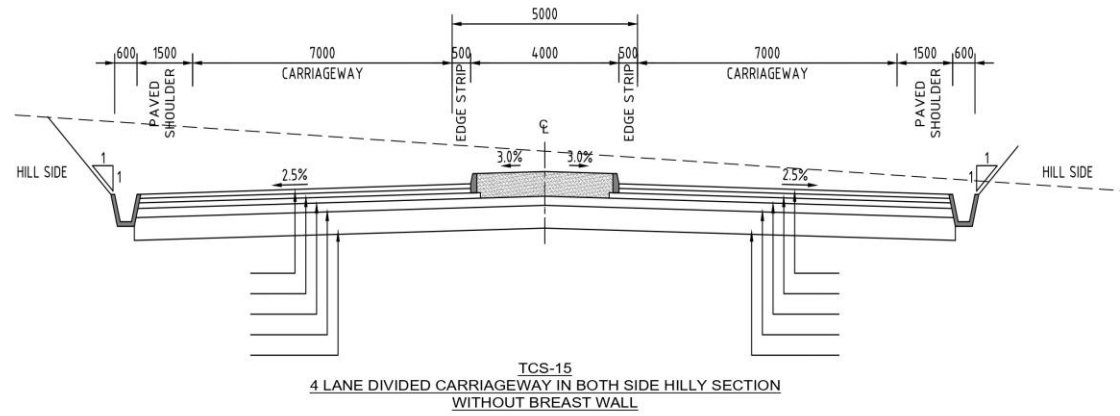
Sl. No.	Design Chainage (Km)		Length	TCS
	From Km	To Km		
1	242+500	244+643	2143	TCS-1A
2	244+643	245+543	900	TCS-7
3	245+543	246+110	567	TCS-1B
4	246+110	246+170	60	TCS-1A
5	246+170	247+005	835	TCS-1B
6	247+005	247+103	98	TCS-10
7	247+103	247+200	97	TCS-4
8	247+200	247+300	100	TCS-10A
9	247+300	247+413	113	TCS-4
10	247+413	247+473	60	TCS-4
11	247+473	247+663	190	TCS-10B
12	247+663	247+753	90	TCS-4
13	247+753	247+893	140	TCS-10A
14	247+893	247+983	90	TCS-1A
15	247+983	248+250	267	TCS-1B
16	248+250	248+393	143	TCS-1A
17	248+393	248+603	210	TCS-1B
18	248+603	248+850	247	TCS-1A
19	248+850	248+933	83	TCS-1B
20	248+933	249+200	267	TCS-1A
21	249+200	249+370	170	TCS-15
22	249+370	249+470	100	TCS-4
23	249+470	249+900	430	TCS-10B
24	249+900	250+300	400	TCS-7
25	250+300	250+410	110	TCS-10B
26	250+410	250+470	60	TCS-10A
27	250+470	251+500	1030	TCS-10B
28	251+500	251+590	90	TCS-4
29	251+590	251+970	380	TCS-10B
30	251+970	253+711	1741	TCS-4
31	253+711	254+621	910	TCS-7
32	254+621	257+300	2679	TCS-3
33	257+300	257+740	440	TCS-18
34	257+740	258+800	1060	TCS-10B
35	258+800	258+950	150	TCS-4
35	258+950	259+320	370	TCS-10B
36	259+320	259+550	230	TCS-4
37	259+550	259+950	400	TCS-10B
38	259+950	261+610	1660	TCS-7
Total Length			19+110	

Figure of Typical Cross Section: -









3. Intersections and Grade Separators

All intersections and grade separators shall be as per the provision of relevant Manual. Existing intersections which are deficient shall be improved to the prescribed standards.

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

(i) At-grade intersections

a. Major Junction: -

Sl. No.	Location of Intersection	Type of Intersections	Other features
1	249+357	Y-Junction	
2	251+988	Y-Junction	
3	257+718	Y-Junction	
4	261+305	Y-Junction	

b. Minor Junction: -

Sl. No.	Location of Intersection	Type of Intersections	Other features
1	243+845	T-Junction	
2	244+500	Y-Junction	
3	246+150	T-Junction	
4	247+150	Y-Junction	
5	247+750	Y-Junction	
6	250+495	X-Junction	
7	250+860	T-Junction	
8	253+850	Y-Junction	
9	254+800	Y-Junction	
10	255+100	Y-Junction	
11	255+490	T-Junction	
12	256+160	T-Junction	
13	257+185	T-Junction	

(ii) Grade separated intersections 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

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

(ii) Raising of the existing road The existing road shall be raised in the following sections:

Sl. No.	Section (From km to km)	Length	Extent of raising [Top of finished road level]
As per the TCS attached.			

5. Pavement Design

(i) Pavement design shall be carried out in accordance with the provision of relevant Manual.

(ii) Type of Pavement-Flexible

(iii) Design requirements

Notwithstanding anything to the contrary contained in this agreement, the contractor shall design the pavement of main carriageway for design traffic of 62 MSA with a minimum design period of 20 years. CBR taken for the road is 8%.

(a) 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 20 years. Stage construction shall not be permitted.

(b) Design Traffic

Notwithstanding anything to the contrary contained in this Agreement or the Manual, the Contractor shall design the pavement for a design traffic of 62 million standard axle for main carriageway & 10 million standard axles (MSA) for Service/Slip Road.

(iv) Reconstruction of stretches

The following stretches of the existing road shall be reconstructed. These shall be designed as new pavement.-Refer to TCS drawings.

6. Roadside Drainage

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

RCC Drain along Project Road (1.0m wide):				
TCS Details	Unit	Side	Length	Total Length
For TCS Type 3	Rm	Both	2,679	5358.00
Total of RCC Drain				5358.00
PCC U Shape Drain (0.6m wide)				
For TCS Type 15	Rm	Both	170	340.00
Total of PCC U Shape Drain				340.00
Unlined surface drains:				
For TCS Type 1A	Rm	Both	2,950	5900.00
For TCS Type 1B	Rm	Both	1,962	3924.00

For TCS Type 4	Rm	Both	2,663	5326.00
For TCS Type 10	Rm	Right	98	98.00
For TCS Type 10A	Rm	Left	300	300.00
Total of Unlined Drain				15548.00

7. Design of Structures

(i) General

- (a) All bridges, culverts and structures shall be designed and constructed in accordance with the provision of relevant Manual and shall conform to the cross-sectional features and other details specified therein.
- (b) Width of the carriageway of new bridges and structures shall be as follows:

Sl. No.	Bridge at km	Width of carriageway and cross-sectional features*
1	Major Bridge at Km 250+963	2x12.5m
2	Major Bridge at Km 258+190	2x12.5m
3	Minor Bridge at Km 253+676	2x12.5m
4	Minor Bridge at Km 249+565	2x12.5m
5	Minor Bridge at Km 249+859	2x12.5m
6	Minor Bridge at Km 259+575	2x12.5m

* GAD attached.

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

Sl. No.	Location at Km	Remarks
1	Major Bridge at Km 250+963	All Bridges to be Designed with footpaths & carry utility services.
2	Major Bridge at Km 258+190	
3	Minor Bridge at Km 253+676	
4	Minor Bridge at Km 249+565	
5	Minor Bridge at Km 249+859	
6	Minor Bridge at Km 259+575	

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

- (e) 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 Bridges to be Designed to carry Utility Services.			

- (f) Cross-section of the new culverts and bridges at deck level for the Project Highway shall conform to the typical cross-sections given in the provision of relevant Manual.

(ii) Culverts

- (a) Overall width of all culverts shall be equal to the roadway width of the approaches.
- (b) Reconstruction of existing culverts:

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

Sl. No.	Culvert location	Span/Opening (m)	Remarks, if any*
1	243+589	1X2X1.5	BOX CULVERT
2	245+214	1X3.5X2.	BOX CULVERT
3	246+134	1X2X2	BOX CULVERT
4	248+251	1X1.2	PIPE CULVERT
5	248+587	1X1.2	PIPE CULVERT
6	252+802	1x2x2	BOX CULVERT
7	253+458	1X1.5X2.7	BOX CULVERT
8	253+766	1X3X2	BOX CULVERT
9	253+991	1X4.5X1.5	BOX CULVERT
10	254+445	1X2.5X1.5	BOX CULVERT
11	254+966	1X5X2	BOX CULVERT
12	255+032	1X4X2.2	BOX CULVERT

* [Specify modifications, if any, required in the road level, etc.]

(c) Widening of existing culverts:

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

Sr. No.	Culvert Location	Type, span, height and width of existing culvert (m)	Repairs to be carried out [specify]
1	245+565	1X3.3X2	Concentric Widening
2	245+809	1X3.3X1.2	LHS Widening
3	247+027	2X1.2	LHS Widening
4	252+300	1X2X1.7	LHS Widening
5	253+006	1X3X2	Concentric Widening
6	255+457	1X3.2X1	Concentric Widening
7	256+197	1X3.2X0.9	Concentric Widening

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

Sl. No.	Culvert location	Span/Opening (m)
1	242+843	1X2X2
2	243+143	1X2X2
3	243+973	1X2X2
4	244+283	1X2X2
5	244+683	1X2X2
6	246+509	1X1.2

Sl. No.	Culvert location	Span/Opening (m)
7	246+659	1X1.2
8	247+323	1X2X2
9	247+523	1X2X2
10	247+653	1X2X2
11	248+093	1X2X2
12	248+543	1X2X2
13	248+953	1X2X2
14	249+143	1X2X2
15	258+762	1X2X2

(e) 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 required
Nil		

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

(iii) Bridges

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

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

Sl. No	Bridge Location (Km)	Salient Details of existing bridge	Adequacy or otherwise of the existing waterway, vertical clearance, etc.*	Remarks
1	253+676	-	-	Proposed Span arrangement: 1x8m Proposed width: 2x12.5m Proposed Skew Angle: 25°

* Attach GAD.

(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 @	Remarks
Nil					

@ Attach cross-section.

(b) Additional new bridges

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

Sr. No.	Location (Km)	Total length (m)	Remarks, if any
1	250+963	2x46 m	PSC Box Girder
2	258+190	2X35m	PSC I Girder
3	249+565	1X20	RCC I Girder
4	249+859	2X5	Box
5	259+575	1X15	RCC I Girder

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

Sl. No.	Location at km	Remarks
NIL		

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

Sl. No.	Location at km	Remarks
Nil		

(e) Drainage system for bridge decks

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

(f) Structures in marine environment-NIL

(iv) Rail-road bridges

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

(b) Road over-bridges

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

Sr. No.	Location of Level crossing (Chainage Km)	Length of Bridge
Nil		

(c) Road Under Bridges

Sr. No.	Location of Level crossing (Chainage Km)	Number and length of span (m)
Nil		

(v) Grade separated structures

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

(vi) Repairs and strengthening of bridges and structures

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

(a) Bridges:

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		

(vii) List of Major Bridges and Structures

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

Sl. No.	Location
1	Major bridge at Km 250+963
2	Major Bridge at Km 258+190

8. Traffic Control Devices and Road Safety Works

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

Specifications of the reflective sheeting. [Refer to the provision of relevant Manual and specify]

Safety Barrier:

- New Jersey Crash Barrier – shall be provided in minimum 440 m length (Refer TCS – 18 for locations),
- Cement Concrete Kerb:

TCS Type	Unit	Side	Length	Total Length
For TCS Type 1A	Rm	2	2,950	5900.00
For TCS Type 1B	Rm	2	1,962	3924.00
For TCS Type 3	Rm	6	2,679	16074.00
For TCS Type 4	Rm	2	2,671	5342.00
For TCS Type 7	Rm	4	3,870	15480.00
For TCS Type 10	Rm	2	98	196.00
For TCS Type 10A	Rm	2	300	600.00
For TCS Type 10B	Rm	2	3,970	7940.00
For TCS Type 15	Rm	2	170	340.00
For TCS Type 18	Rm	-	440	0.00
Total Cement Concrete Kerb				55796.00

- c) RCC Crash barrier - shall be provided in minimum 880m length
(Refer TCS -18 for locations),

- d) Providing PCC kerb cum footpath at service / slip road:

Providing PCC kerb cum footpath at service / slip road:				
For TCS Type 7	Cum	2	3,870	7,740
Total PCC kerb cum footpath along service road/RE wall				7,740

- e) Thrie beam crash barrier - shall be provided in minimum 10,550 m length, the length w.r.t TCS are as below –

Location	Unit	Side	Length	Total Length
Km 250.059 to km 250.228	Rm	2	169	338.00
Km 250.290 to km 250.390	Rm	2	100	200.00
Km 250.580 to km 250.710	Rm	2	130	260.00
Km 251.072 to Km 251.472	Rm	2	400	800.00
Km 253.900 to Km 253.991	Rm	2	91	182.00
Km 254.000 to Km 254.410	Rm	2	410	820.00
Km 257.840 to Km 258.440	Rm	2	600	1200.00
Km 258.976 to Km 258.310	Rm	2	760	1520.00
Km 259.590 to Km 259.840	Rm	2	250	500.00
Km 244.743 to Km 245.418	Rm	2	675	1350.00
Km 249.360 to Km 249.800	Rm	2	440	880.00
Km 260.100 to km 260.390	Rm	2	290	580.00
Km 260.420 to Km 261.380	Rm	2	960	1920.00
Total of Thrie Beam Crash Barrier				10550.00

9. Road Side Furniture

- Roadside furniture shall be provided in accordance with the provision of relevant manual.
- Overhead traffic signs: Minimum 2 no of Overhead signs shall be provided. [Refer to the provision of relevant Manual and provide details]

10. Compulsory Afforestation

Approx. 4000 no. of trees needs to be felled. Plantation should be done as per the forest norms by the contractor in accordance with IRC: SP:84-2019 keeping in view of IRC: SP: 21-2009.

11. Hazardous Locations

The safety barriers shall also be provided at the following hazardous locations:

Retaining Wall cum toe wall: Retaining Wall shall be provided as per the requirement of site conditions to restrict the right of way. however minimum 7924 m length shall be provided.

Sl. No.	Location stretch from (Km) to (Km)		LHS/RHS
1	247+005	247+103	LHS
2	247+200	247+300	RHS
3	247+473	247+663	BHS
4	247+753	247+893	RHS
5	249+470	249+900	BHS
6	250+300	250+410	BHS
7	250+410	250+470	RHS
8	250+470	251+500	BHS
9	251+590	251+970	BHS
10	257+740	258+800	BHS
11	258+950	259+320	BHS
12	259+550	259+950	BHS

Breast Wall: Breast Wall shall be provided as per the requirement of site conditions to restrict the hill slope.

Reinforced Earth Wall: Reinforced Earth Wall shall be provided as per the requirement of site conditions; however minimum 7618 m length shall be provided between Main carriageway and Slip Road.

Sl. No.	Location stretch from (Km) to (Km)		Side
1	244+643	245+543	BHS
2	249+900	250+300	BHS
3	253+711	254+621	BHS
4	259+950	261+610	BHS

12. Special Requirement for Hill Roads:

Refer to the provision of relevant Manual

13. Change of Scope

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

(Schedule B-1)

1. The shifting of utilities and felling of trees shall be carried out by the Contractor. The cost of the same shall be borne by the Authority. The details of utilities are as follows:

Sr. no.	Type of Utility	Unit	Quantity	Location/stretch (LHS/RHS)
A	Electrical Utilities			
A1	Electrical Poles	Nos.	1833	-
A2	Electrical cables	meters	81500	-
A3	132KV towers	Nos.	3	-
A4	Transformers	Nos.	55	-
B	Water/Sewage pipeline			
B1	Sewage	meters	-	-
B2	Water supply	meters	37294	LHS: 16542m RHS: 20752m
C	Felling of Tress	Nos.	4000	

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.	Project Facility	Location	Design Requirements	Other essential details
1	Toll Plaza	253+160	As per relevant Manual	8-lane

b) Roadside furniture,

Sl no.	Project Facility	Location	Design Requirements	Other essential details
1	Traffic Sign & Pavement marking	Entire length	As per Schedule D	-
2	Km stone, Hectometer Stone, 5th kilometre stone	Entire length	As per Schedule D	-
3	Boundary Stone	Entire length	As per Schedule D	-
4	LED Traffic Blinkers	Entire length	As per Schedule D	-
5	Roadside Delineator, marker & Road Stud.	Entire length	As per Schedule D	-
6	Metal beam crash barrier	Both approaches of structure locations	As per Schedule D	-
7	Advance Traffic Management System (ATMS)	Entire length	As per Schedule D	-

c) Pedestrian facilities,

Pedestrian facilities in the form of footpath cum drain shall be provided in the built-up area (refer typical cross-section drawing). Pedestrian facilities shall be provided at the locations of urban sections

in order to ensure safety of pedestrians while crossing in consultation with Authority.

d) Bus Bay/Bus shelters,

Sl no.	Project Facility	Location	Design Requirements	Other essential details
1	Bus Bay with Bus Shelter	244963 (LHS)	(Both side) Separation from main carriageway	Start Taper-100 m, Straight-30 m, End Taper-100 m
2	Bus Bay with Bus Shelter	245193 (RHS)		
3	Bus Bay with Bus Shelter	249200 (LHS)		
4	Bus Bay with Bus Shelter	249450 (RHS)		
5	Bus Bay with Bus Shelter	252100 (BHS)		
6	Bus Bay with Bus Shelter	254011 (LHS)		
7	Bus Bay with Bus Shelter	254211 (RHS)		
8	Bus Bay with Bus Shelter	255861 (BHS)		
9	Bus Bay with Bus Shelter	257650 (LHS)		
10	Bus Bay with Bus Shelter	257800 (RHS)		
11	Bus Bay with Bus Shelter	261200 (LHS)		
12	Bus Bay with Bus Shelter	261400 (RHS)		

e) Truck lay-byes,

Truck lay-byes shall be provided at given below locations.

Sl no.	Project Facility	Location	Design Requirements	Other essential details
Nil				

f) Tree Plantation and Landscaping,

Approx. 4000 no. of trees needs to be felled. Plantation should be done as per the forest norms by the contractor in accordance with IRC: SP:84-2019 keeping in view of IRC: SP: 21-2009.

g) Rest Areas: Nil

h) Others,

i. Environment

The Project Highway during design, construction and maintenance during implementation period shall conform to the environmental rules and regulations in force. The Construction Contractor shall be responsible for the same.

ii. Street Lighting

Lighting shall be provided at Built up areas, Toll Plaza, Bus Bays, Bus Shelters, Truck lay-byes, LVUP, VUP, Grade Separator, Interchange locations as per relevant manual. High Mast Lighting shall be provided at all Major Junctions, Grade Separator / Interchange locations, Toll Plaza locations, Truck lay-byes locations Bus Shelter locations.

iii. Rain Water harvesting

Rain Water harvesting shall be provided in 19 locations in the project highway as per relevant 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 Two Laning 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 [Two-Laning of 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

- (i) The terms "Concessionaire", "Independent Engineer" and "Concession Agreement" used in the Manual shall be deemed to be substituted by the terms "Contractor", "Authority's Engineer" and "Agreement" respectively.
- (ii) [Notwithstanding anything to the contrary contained in Paragraph 1 above, the following Specifications and Standards shall apply to the Project Highway, and for purposes of this Agreement, the aforesaid Specifications and Standards shall be deemed to be amended to the extent set forth below:]
- (iii) [Note 1: Deviations from the aforesaid Specifications and Standards shall be listed out here. Such deviations shall be specified only if they are considered essential in view of project-specific requirements.]

Schedule - E

(See 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.

[Specify all the relevant documents]

2. Repair/rectification of Defects and deficiencies

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

3. Other Defects and deficiencies

In respect of any Defect or deficiency not specified in Annex - I of this Schedule-E, the Authority's Engineer may, in conformity with Good Industry Practice, 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	Perform ance Paramet er	Level of Service (LOS)		Freque ncy of Inspect ion	Tools/Equip ment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintena nce Specificati ons
		Desirable	Accepta ble					
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 Measuremen t Unit like Scale, Tape, odometer etc.	IRC 82: 2015 and Distress Identification Manual for Long Term Pavement Performance Program, FHWA 2003 (http://www.tfhrcc.com/pavement/ltp/reports/03031/)	24-48 hours	MORT&H Specificatio n 3004.2

Asset Types of Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	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					
	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					
			up to 30 cm from the edge					
	Roughness BI	2000 mm/km	2400 mm/km	Bi-Annually	Class I Profilometer	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	SCRIM (Sideway-force Coefficient Routine Investigation Machine or equivalent)		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	2200m m/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	40m m	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 $L > 1m$. Within 7days
			3	$w = 0.5 - 1.5$ mm, discernible from fast-moving car		

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	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	4	w = 1.5 - 3.0 mm	Seal, and stitch if L > 1 m.	Staple or Dowel Bar Retrofit, FDR for affected portion.
			5	w > 3 mm.	Within 7 days	Within 15days
			0	Nil, not discernible	No Action	
			1	w < 0.2 mm, hair cracks	Route and seal with epoxy.	Staple or Dowel Bar Retrofit.
			2	w = 0.2 - 0.5 mm, discernible from slow vehicle	Within 7 days	Within 15days
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route, seal and stitch, if L > 1m. 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 $d > D/2$
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	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
			5	w > 6 mm, usually associated with spalling, and/or slab rocking under traffic	Not Applicable, as it may be full depth	Within 15days
			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 $L > 1$ 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	Full Depth Repair Dismantle and reconstruct affected portion as per norms and specifications -
			5	$w > 12$ mm, usually associated with spalling, and/or slab rocking under traffic		

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 $L > 1$ m.	
			2	$w = 0.2 - 0.5$ mm. discernible from slow vehicle	Within 15 days	
			3	$w = 0.5 - 3.0$ mm, discernible from fast vehicle	Full depth repair within 15 days	Dismantle, Reinststate subbase, Reconstruct whole slab as per specifications within 30 days
			4	$w = 3.0 - 6.0$ mm panel broken into 2 or 3pieces		
			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	Seal with epoxy seal with epoxy
			2	$w < 1.5$ mm; $L < 0.6$ m, only one corner broken	secure broken parts Within 7 days	Within 7 days
			3	$w < 1.5$ mm; $L < 0.6$ m, two corners broken	Partial Depth (Refer Figure 8.3 of IRC:SP: 83-2008) Within 15 days	Full depth repair
			4	$w > 1.5$ mm; $L > 0.6$ m or three corners broken		
			5	three or four corners broken		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	Punch out (Applicable to Continuous Reinforced Concrete Pavement (CRCP) only)	w = width of crack L = length(m/m ²)	0	Nil, not discernible		No Action
			1	$w < 0.5 \text{ mm}; L < 3 \text{ m/m}^2$	Not Applicable, as it may be full depth	Seal with low viscosity epoxy to secure broken parts.
			2	either $w > 0.5 \text{ mm}$ or $L < 3 \text{ m/m}^2$		Within 15days
			3	$w > 1.5 \text{ mm}$ and $L < 3 \text{ m/m}^2$		
			4	$w > 3 \text{ mm}$, $L < 3 \text{ m/m}^2$ and deformation		Full depth repair - Cut out and replace damaged area taking care not to damage reinforcement.
			5	$w > 3 \text{ mm}$, $L > 3 \text{ m/m}^2$ and deformation		Within 30days

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 Honeycomb surface	r = area damaged or 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	
			2	$r = 2 - 10 \%$	and liable to be damaged. Within 15 days	
			3	$r = 10-25\%$	Bonded Inlay, 2 or 3 slabs if	
			4	$r = 25 - 50 \%$	affecting.	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
					Within 30 days	
			5	$r > 50\%$ and $h > 25\text{ mm}$	Reconstruct slabs, 4 or more slabs if affecting. Within 30 days	
8	Scaling	$r = \frac{\text{damaged surface}}{\text{total surface of slab}} (\%)$ $h = \text{maximum depth of damage}$	0	Nil, not discernible	Short Term	Long Term
					No action.	Not Applicable
			1	$r < 2\%$	Local repair of areas damaged	
			2	$r = 2 - 10\%$	and liable to be damaged. 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 $d > D/2$
			3	$r = 10 - 20\%$	Bonded Inlay within 15 days	
			4	$r = 20 - 30 \%$		
			5	$r > 30 \%$ and $h > 25 \text{ mm}$	Reconstruct slab within 30 days	
9	Polished Surface/Glazing	$t = \text{texture depth, sand patchtest}$	0		No action.	Not Applicable
			1	$t > 1 \text{ mm}$		
			2 '	$t = 1 - 0.6 \text{ mm}$	Monitor rate of deterioration	
			3	$t = 0.6 - 0.3 \text{ mm}$		
			4	$t = 0.3 - 0.1 \text{ mm}$		

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	$t < 0.1 \text{ mm}$	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	$n = \frac{\text{number}}{\text{m}^2}$ d = diameter h = maximum depth	0	$d < 50 \text{ mm}; h < 25 \text{ mm}; n < 1 \text{ per } 5 \text{ m}^2$	No action.	Not Applicable
			1	$d=50\text{-}100\text{mm}; h<50\text{mm}; n<1 \text{ per } 5 \text{ m}^2$	Partial depth repair 65 mm deep.	
			2	$d=50\text{-}100\text{mm}; h>50\text{mm}; n<1 \text{ per } 5 \text{ m}^2$	Within 15 days	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
			3	$d = 100 - 300 \text{ mm}; h < 100 \text{ mm}$ $n < 1$ per 5m^2	Partial depth repair 110mm	
			4	$d = 100 - 300 \text{ mm}; h > 100 \text{ mm}; n < 1$ per 5m^2	i.e.10 mm more than the depth of the hole. Within 30 days	
			5	$d > 300 \text{ mm}; h > 100 \text{ mm}; n > 1$ per 5m^2	Full depth repair. Within 30 days	

Joint Defects						
11	Joint Seal Defects	loss or damage L = Length as % total jointlength	0	Difficult to discern.	Short Term	Long Term
					No action.	Not Applicable
			1	Discernible, L < 25% but of little immediate consequence with regard to ingress of water or trapping incompressible material.	Clean joint, inspect later.	
			3	Notable. L > 25% insufficient protection against ingress of water and trapping incompressible material.	Clean and reapply sealant in selected locations. Within 7 days	
			5	Severe; w > 3 mm negligible protection against ingress of water	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.	
			2	w = 10 - 20 mm, L < 25%	Within 7 days	
			3	w = 20 - 40 mm, L > 25%	Partial Depth Repair. Within 15 days	
			4	w = 40 - 80 mm, L > 25%	30 - 50 mm deep, h = w + 20% of w, within 30 days	
			5	w > 80 mm, and L > 25%	50 - 100 mm deep repair. H = w + 20% of w. Within 30 days	
13	Faulting (orStepping)	f = difference of level	0	not discernible, < 1 mm	No action.	No action.

	in Cracks or Joints		1	$f < 3 \text{ mm}$		
			2	$f = 3 - 6 \text{ mm}$	Determine cause and observe, take action for diamond grinding	Replace the slab as appropriate.
			3	$f = 6 - 12 \text{ mm}$	Diamond Grinding	Within 30days
			4	$f = 12 - 18 \text{ mm}$	Raise sunken slab.	Replace the slab as appropriate. Within 30days
			5	$f > 18 \text{ mm}$	Strengthen sub grade and sub-base by grouting and raising sunken slab	
14	Blowup or Buckling	$h = \text{vertical displacement from normal profile}$	0	Nil, not discernible	Short Term	Long Term
			1	$h < 6 \text{ mm}$	No Action	
			2	$h = 6 - 12 \text{ mm}$		
					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 from normal profile	1	$h = 4 - 7 \text{ mm}$	Grind, in case of new construction within 7 days	Construction Limit for New Construction.
			3	$h = 7 - 15 \text{ mm}$	Grind, in case of ongoing Maintenance within 15 days	Replace in case of new construction. Within 30days
			5	$h > 15 \text{ mm}$	Full Depth Repair. Within 30 days	Full Depth Repair. Within 30days
18	Lane Shoulder Dropoff	to f = difference of level	0	Nil, not discernible $< 3\text{mm}$	Short Term	Long Term
					No action.	
			1	$f = 3 - 10 \text{ mm}$	Spot repair of shoulder within 7 days	
			2	$f = 10 - 25 \text{ mm}$		
			3	$f = 25 - 50 \text{ mm}$	Fill up shoulder	

			4	f = 50 - 75 mm	within 7 dayss	For any 100 m stretch Reconstruct shoulder, if affecting 25% or more of stretch. Within 30days
			5	f > 75 mm		
Drainage						
19	Pumping	quantity of fines and water expelled through open joints and cracks Nos	0	not discernible	No Action	Inspect and repair sub-drainage at distressed sections and upstream.
			1 to 2	slight/ occasional Nos < 10%	Repair cracks and joints Without delay.	
			3 to 4	appreciable/ Frequent 10 -25%	Lift or jack slab within 30 days.	
		Nos/100 m stretch	5	abundant, crack development >25%	Repair distressed pavement sections. Strengthen subgrade and subbase. Replace slab. Within 30 days	

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

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

Asset Type	Performance Parameter	Level of Service (LOS)			Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Highway	Availability of Safe Sight Distance	As per IRC SP :73-2018, a minimum of safe stopping sight distance shall be available throughout.			Monthly	Manual Measurements with Odometer along with video/ image backup	Removal of obstruction within 24 hours, in case of sight line affected by temporary objects such as trees, temporary encroachments.		IRC SP :73-2018
		Design Speed, km ph	Desirable Minimum Sight Distance(m)	Safe Stopping Sight Distance (m)			In case of permanent structure or design deficiency: Removal of obstruction/improvement of deficiency at theearliest Speed Restriction boards and suitable traffic calming measures such as transverse bar marking, blinkers, etc. shall be applied during the period of rectification.		
		100	360	180					
		80	240	120					
Pavement Marking	Wear	<70% of marking remaining			Bi-Annually	Visual Assessment as per Annexure-F of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect - within 2months	IRC:35-2015

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards	
	Day time Visibility	During expected life Service Time Cement Road - 130mcd/m²/lux Bituminous Road - 100mcd/m²/lux		Monthly	As per Annexure-D of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect – within 2 months	IRC:35-2015	
	Night Time Visibility	<u>Initial and Minimum Performance for Dry Retro reflectivity during night time:</u>		Bi-Annually	As per Annexure-E of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect – within 2 months	IRC:35-2015	
		Design Speed	(RL) Retro Reflectivity (mcd/m²/lux)						
			Initial (7 days)						Minimum Threshold level (TL) & warranty period required up to 2 years
		Up to 65	200						80
		65 - 100	250						120
		Above 100	350						150
		<u>Initial and Minimum Performance for Night Visibility under wet condition(Retro reflectivity):</u>							

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/m ² /lux Minimum Threshold Level: 50 mcd/m ² /lux					
	Skid Resistance	Initial and Minimum performance for SkidResistance: 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	Change of sign board	48 hours in case of Mandatory	IRC:67-2012

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
				signboard using Retro Reflectivity Measuring Device. In accordance with ASTM D 4956-09.		Signs, Cautionary and Informatory Signs (Single and Dual postsigns) 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	<u>Functionality</u> : Functioning of Kerb painting as intended	Daily	Visual with video/image backup	Kerb Repainting	Within 7-days	RC 35:2015
Other Road Furniture	Reflective Pavement Markers (Road Studs)	Numbers and Functionality as per specifications in IRC:SP:73-2018 and IRC:35-2015, unless specified in Schedule-B.	Daily	Counting	New Installation	Within 2 months	IRC SP :73-2018,IRC:35-2015
	Pedestrian Guardrail	<u>Functionality</u> : Functioning of guardrail asintended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC SP :73-2018
	Traffic Safety Barriers	<u>Functionality</u> : Functioning of Safety Barriers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC SP :73-2018, IRC:119-2015
	End Treatment of	<u>Functionality</u> : Functioning of End Treatment as intended	Daily	Visual with video/image	Rectification	Within 7 days	IRC SP :73-2018,

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	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-73: 2018, 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 :73-2018
Highway Lighting System	Highway Lights	Illumination: Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC SP :73-2018
		No major failure in the lighting system	Daily	-	Rectification of failure	24 hours	IRC SP :73-2018
		No minor failure in the lighting system	Monthly	-	Rectification of failure	8 hours	IRC SP :73-2018
	Toll Plaza Canopy Lights	Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC SP :73-2018
		No major/minor failure in the lighting system	Daily	-	Rectification of failure	8 hours	IRC SP :73-2018

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Trees and Plantation including median plantation	Obstruction in a minimum head-room of 5.5 m above carriageway or obstruction in visibility of road signs	No obstruction due to trees	Monthly	Visual with video/image backup	Removal of trees	Immediate	IRC SP :73-2018
	Deterioration in health of trees and bushes	Health of plantation shall be as per requirement of specifications & instructions issued by Authority from time to time	Daily	Visual with video/image backup	Timely watering and treatment. Or Replacement of Trees and Bushes.	Within 90 days	IRC SP :73-2018
	Vegetation affecting sight line and road structures	Sight line shall be free from obstruction by vegetation	Daily	Visual with video/image backup	Removal of Trees	Immediate	IRC:SP 73-2018
Rest Areas	Cleaning of toilets	-	Daily	-	-	Every 4 hours	
	Defects in electrical, water and sanitary installations	-	Daily	-	Rectification	24 hours	

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 73-2018

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Pipe/box/slab culverts	Free waterway/ unobstructed flow section	85% of culvert normal flow area to be 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	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 Specifications clause 2800
		Delamination of concrete not more than 0.25 sq.m.					
		Cracks wider than 0.3 mm not more than 1m aggregate length					

	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sqm, damage to solid apron (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 ROB's Flyover etc. as applicable	Riding quality or user comfort	No pothole in wearing coat on bridge deck	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC or wearing coat	15 days	MORT&H Specification 2811
Bridge -Super Structure	Bumps	No bump at expansion joint	Daily	Visual inspection as per IRC SP:35- 1990	Repairs to BC on either side of expansion joints, profile correction course on approach slab in case of settlement to approach embankment	15 days	MORT&H Specification 3004.2 & 2811.
	User safety (condition of crash barrier and guard rail)	No damaged or missing stretch of crash barrier or pedestrian hand railing	Daily	Visual inspection and detailed condition survey as per IRC SP: 35-1990.	Repairs and replacement of safety barriers as the case may be	3days	IRC: 5-1998, IRC SP: 73-2018 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 vibrometers	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 drainages pout 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.	
<p>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.</p>							

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 before issuing the bidding document, with the approval of the competent authority.]

Schedule - F

(See Clause 4.1 (vii)(a))

Applicable Permits

1. Applicable Permits

- (i) The Contractor shall obtain, as required under the Applicable Laws, the following Applicable Permits:
 - (a) Permission of the State Government for extraction of boulders from quarry;
 - (b) Permission of Village Panchayats and Pollution Control Board for installation of crushers;
 - (c) License for use of explosives;
 - (d) Permission of the State Government for drawing water from river/reservoir;
 - (e) License from inspector of factories or other competent Authority for setting up batching plant;
 - (f) Clearance of Pollution Control Board for setting up batching plant;
 - (g) Clearance of Village Panchayats and Pollution Control Board for setting up asphalt plant;
 - (h) Permission of Village Panchayats and State Government for borrow earth; and
 - (i) Any other permits or clearances required under Applicable Laws.
- (ii) Applicable Permits, as required, relating to environmental protection and conservation shall have been procured by the Authority in accordance with the provisions of this Agreement.

Schedule – G

(See Clauses 7.1 and 19.2)

Annex-I

(See Clause 7.1)

Form of Bank Guarantee

[Performance Security/Additional Performance Security]

The Managing Director,
National Highways & Infrastructural Development Corporation Ltd.
PTI Building, 3rd Floor,
4, Parliament Street
New Delhi - 110001
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 Intermediate Lane Road with hard Shoulder from design Km 0.000 to Km 46.704(Total length:46.704 Km) of Zido –Singha section on NH-913 (Frontier Highway) in the State of Arunachal Pradesh on EPC Mode**” 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 MaintenancePeriod}(asdefinedintheAgreement)inasumofRs.....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 Limited], 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 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.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.
12. This Guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.
13. This guarantee shall also be operatable at our Branch at New Delhi, from whom confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.
14. The guarantor/bank hereby confirms that it is on the SFMS (Structural Finance Messaging System) platform & shall invariably send an advice of this Bank Guarantee to the designated bank of NHIDCL, details of which is as under:

(Insert date at least 2 (two) years from the date of issuance of this Guarantee (in accordance with Clause 2.21 of the RFP). The Contractors can submit the BG for periods of two years at one time and keep on renewing the same till the DLP is over if they have problems in getting the BG in one go for the entire DLP.)

S.No.	Particulars	Details
1	Name of Beneficiary	National Highways & Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	CNRB0019062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Canara Bank (erstwhile Syndicate Bank) transport Bhawan, 1st Parliament Street, New Delhi-110001

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature) (Name)

(Designation) (Code Number)

(Address)

NOTES:

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

Annex – II (Schedule - G)

(See Clause 19.2)

Form for Guarantee for Advance Payment

The Managing Director,
National Highways & Infrastructural Development Corporation Ltd.
PTI Building, 3rd Floor,
4, Parliament Street
New Delhi – 110001

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 Intermediate Lane Road with hard Shoulder from design Km 0.000 to Km 46.704 (Total length: 46.704 km) of Zido – Singha section on NH-913 (Frontier Highway) in the State of Arunachal Pradesh on EPC Mode**”, 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 percent) 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 installment of the Advance Payment under and in accordance with the Agreement, and agrees and undertakes to pay to then 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 instalment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the

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

2. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
3. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
4. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Advance Payment or to extend the time or period of its repayment or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
5. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Advance Payment.
6. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
7. The Guarantee shall cease to be in force and effect on ****.* Unless a demand or claim under this Guarantee is made in writing on or before the aforesaid date, the Bank shall be discharged from its liabilities hereunder.
8. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
9. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

10. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.
11. This Guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.
12. This guarantee shall also be operable at our..... Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation
13. The guarantor/bank hereby confirms that it is on the SFMS (Structural Finance Messaging System) platform & shall invariably send an advice of this Bank Guarantee to the designated bank of NHIDCL, details of which is as under:

S.No.	Particulars	Details
1	Name of Beneficiary	National Highways & Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	CNRB0019062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Canara Bank (erstwhile Syndicate Bank) transport Bhawan, 1st Parliament Street, New Delhi-110001

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature) (Name)

(Designation) (Code Number)

(Address) NOTES:

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

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

SCHEDULE - H

See Clauses 10.1 (iv) and 19.3

Contract Price Weightages

1.1 The Contract Price for this Agreement is Rs.

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

Section I			
ITEM	WEIGHTAGE IN PERCENTAGE TO THE CONTRACT PRICE	STAGE FOR PAYMENT	PERCENTAGE WEIGHTAGE vis a vis overall Project
1	2	3	5
Road works including culverts, widening and repair of culverts.	61.30%	A-Widening and Strengthening of existing road	
		(1) Earthwork up to top of the sub-grade	3.99%
		(2) Sub Base courses	11.49%
		(3) Non-Bituminous Base Course	5.98%
		(4) Bituminous Base Course	6.01%
		(5) Wearing coat	3.74%
		(6) Widening and repair of culverts	0.00%
		B 1- Reconstruction / New four lane alignment / bypass (Flexible pavement)	
		(1) Earthwork up to top of the sub-grade	2.22%
		(2) Sub Base Course	6.38%
		(3) Non-Bituminous Base Course	3.32%
		(4) Bituminous Base Course	3.34%
		(5) Wearing coat	2.08%
		B 2- Reconstruction / New two lane alignment / bypass (Rigid pavement)	
		(1) Earthwork up to top of the sub-grade	0.00%
		(2) Sub Base Course	0.00%
		(3) Dry Lean Concrete (DLC) Course	0.00%
		(4) Pavement Quality Control (PQC) course	0.00%
		C 1- Reconstruction / New Service road/ Slip Road (Flexible pavement)	
		(1) Earthwork up to top of the sub-grade	0.35%
		(2) Sub Base Course	3.74%
		(3) Non-Bituminous Base Course	3.05%

		(4) Bituminous Base Course	0.00%
		(5) Wearing coat	2.55%
		C 2- Reconstruction / New Service road (Rigid pavement)	
		(1) Earthwork up to top of the sub-grade	0.00%
		(2) Sub Base Course	0.00%
		(3) Dry Lean Concrete (DLC) Course	0.00%
		(4) Pavement Quality Control (PQC) course	0.00%
		D - Reconstruction and New culverts on existing road, Realignments, bypasses:	
		Culverts (Length <6m)	
		a - Pipe Culverts	0.17%
		b - Box Culverts	2.90%
Minor Bridges / underpasses / over passes	5.35%	A 1- Widening and repairs of Minor Bridges (length >6m and <60m)	
		Minor Bridges	0.00%
		A 2- New Minor Bridges (length >6m and <60m)	
		(1) Foundation + Sub-structure: on completion of foundation work including foundation for wing and return wall, abutments, piers upto the abutment/pier cap.	1.19%
		(2) Superstructure: on completion of super-structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road sign & markings, tests on completion etc. complete in all respect.	1.19%
		(3) Approaches: on completion of approaches including Retaining walls (excluding RE wall), stone pitching, protection works complete in all respect, test on completion in all respects and fit for use.	1.19%
		(4) Guide bunds and river training works: on completion of guide bunds and repair training works complete in all respects.	0.40%
		B 1 - Widening and repair of underpasses / overpasses	
		Underpasses / Overpasses	0.00%
		B 2 - New Underpasses / Overpasses	
		(1) Foundation + Sub-structure: on completion of foundation work including foundation for wing and return wall, abutments, piers upto the abutment/pier cap.	0.41%

		(2) Superstructure: on completion of super-structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road sign & markings, tests on completion etc. complete in all respect.	0.41%
		Wearing coat (a) in case of overpass- wearing coat including expansion joints complete in all respects as specified and (b) in case of underpass - rigid pavement including drainage facility complete in all respects as specified.	0.41%
		(3) Approaches: On completion of approaches including Retaining walls (excluding Reinforced earth walls), stone pitching, protection works complete in all respect and fit for use.	0.14%
Major bridge (length > 60m) works and RoB / RUB / Elevated sections / Flyovers including viaducts, if any	14.62%	A 1 - Widening and repair of major bridges	
		(1) Foundation	0.00%
		(2) Sub-structure	0.00%
		(3) Super-structure (including bearings)	0.00%
		(4) Wearing Coat including expansion joints	0.00%
		(5) Miscellaneous Items like hand rails, crash barrier, road markings etc.	0.00%
		(6) Wing walls/return walls	0.00%
		(7) Guide bunds, River Training works etc.	0.00%
		(8) Approaches (including Retaining walls, stone pitching and protection works)	0.00%
		A 2 - New Major bridges	
		(1) Foundation	4.83%
		(2) Sub-structure	2.92%
		(3) Super-structure (including bearings)	3.66%
		(4) Wearing Coat including expansion joints	0.44%
		(5) Miscellaneous Items like hand rails, crash barrier, road markings etc.	0.73%
		(6) Wing walls/return walls up to top	0.88%
		(7) Guide bunds, River Training works etc.	0.44%
		(8) Approaches (including Retaining walls, RE WALL, stone pitching and protection works)	0.73%
		B 1 - Widening and repair of	
		a) RoB	
		b) RuB	
		1) Foundation	0.00%

		2) Sub Structure	0.00%
		3) Super Structure (Including bearings)	0.00%
		4) Wearing coat (a) in case of RoB - wearing coat including expansion joints complete in all respect as specified and (b) in case of RuB - rigid pavement under RuB including drainage facility complete in all respect as specified	0.00%
		5) miscellaneous items like hand rails, crash barrier, road markings etc.	0.00%
		6) wing walls / return walls	0.00%
		7) Approaches (including Retaining walls, stone pitching and protection works)	0.00%
		B 2 - New RoB / RuB	
		a) RoB	
		b) RuB	
		1) Foundation	0.00%
		2) Sub Structure	0.00%
		3) Super Structure (Including bearings)	0.00%
		4) Wearing coat (a) in case of RoB - wearing coat including expansion joints complete in all respect as specified and (b) in case of RuB - rigid pavement under RuB including drainage facility complete in all respect as specified	0.00%
		5) miscellaneous items like hand rails, crash barrier, road markings etc.	0.00%
		6) wing walls / return walls	0.00%
		7) Approaches (including Retaining walls, RE WALL, stone pitching and protection works)	0.00%
		C 1 - Widening and repair of Elevated sections / Fly overs / Grade Separators	
		1) Foundation	0.00%
		2) Sub Structure	0.00%
		3) Super Structure (Including bearings)	0.00%
		4) Wearing coat including expansion joints	0.00%
		5) miscellaneous items like hand rails, crash barrier, road markings etc.	0.00%
		6) wing walls / return walls	0.00%
		7) Approaches (including Retaining walls, stone pitching and protection works)	
		C 2 - New Elevated sections / Fly overs / Grade Separators	
		1) Foundation	0.00%
		2) Sub Structure	0.00%
		3) Super Structure (Including bearings)	0.00%
		4) Wearing coat including expansion joints	0.00%

		5) miscellaneous items like hand rails, crash barrier, road markings etc.	0.00%
		6) wing walls / return walls	0.00%
		7) Approaches (including Retaining walls, stone pitching and protection works)	0.00%
Other Works	16.80%	(i) Toll Plaza	1.27%
		(ii) Road side drains	0.00%
		a) RCC Drain	1.10%
		b) PCC Drain	0.03%
		c) Unlined drain	0.02%
		(iii) Road Signs, markings, km stones, safety devices, Road furniture's, Metal beam crash barrier, ATMS etc.	0.31%
		(iv) Project facilities	
		(a) Bus Bay with Shelters	0.09%
		(b) Rain water harvesting	0.03%
		(d) Others	
		a) Clearing n Grubbing & Dismantling works	0.21%
		b) improvement of Junctions	1.47%
		c) Turfing and hydroseeding	0.12%
		d) Lighting works	0.37%
		(v) Road side Plantation	0.22%
		(vi) Protection works other than approaches to the bridges, elevated sections / flyovers / grade separators and RoBs/RuBs	
		(a) Thrie Beam Crash Barrier	1.04%
		(b) RE wall with Friction Slab	5.07%
		(c) RCC Crash Barrier	0.10%
		(d) New Jersey Crash Barrier	0.05%
		e) Retaining wall	3.07%
		(f) Pitching work on Emb slope	1.04%
		g) PCC Kerb at median/Footpath etc.	1.18%
Electrical utilities and public Health Utilities (water pipe lines and	1.93%	(i) EHT Lines	0.23%
		(ii) EHT Crossings	0.04%
		(iii) HT/LT line	0.46%

sewage lines)	(iv) HT/LT crossings	0.56%
	(v) Transformer	0.01%
	(vi) Water pipeline	0.59%
	(vii) Water pipeline crossings	0.03%
	(viii) BSNL	0.00%

1.3 Procedure of estimating the value of work done

1.3.1 Road works.

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

Table 1.3.1

STAGE FOR PAYMENT	PERCENTAGE WEIGHTAGE	PAYMENT PROCEDURE
A-Widening and Strengthening of existing road		
(1) Earthwork up to top of the sub-grade	6.51%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length.
(2) Sub Base courses	18.75%	
(3) Non-Bituminous Base Course	9.75%	
(4) Bituminous Base Course	9.80%	
(5) Wearing coat	6.11%	
(6) Widening and repair of culverts	0.00%	Cost of completed culverts shall be determined on pro rata basis with respect to the total no. of culverts. The payment shall be made on the completion of at least five culverts.
B 1- Reconstruction / New two lane alignment / bypass (Flexible pavement)		
(1) Earthwork up to top of the sub-grade	3.62%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 5 (five) km. length, whichever is less.
(2) Sub Base Course	10.41%	
(3) Non-Bituminous Base Course	5.41%	
(4) Bituminous Base Course	5.44%	
(5) Wearing coat	3.39%	
B 2- Reconstruction / New two lane alignment / bypass (Rigid pavement)		
(1) Earthwork up to top of the sub-grade	0.00%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 5 (five) km. length, whichever is less.
(2) Earthwork in shoulders	0.00%	
(3) Sub Base Course	0.00%	
(4) Dry Lean Concrete (DLC) Course	0.00%	
(5) Pavement Quality Control (PQC)	0.00%	

course		
C 1- Reconstruction / New Service road/ Slip Road (Flexible pavement)		
(1) Earthwork up to top of the sub-grade including shoulder	0.57%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 5 (five) km. length, whichever is less.
(2) Sub Base Course	6.11%	
(3) Non-Bituminous Base Course	4.97%	
(4) Bituminous Base Course	0.00%	
(5) Wearing coat	4.17%	
C 2- Reconstruction / New Service road (Rigid pavement)		
(1) Earthwork up to top of the sub-grade	0.00%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 5 (five) km. length, whichever is less.
(2) Sub Base Course	0.00%	
(3) Dry Lean Concrete (DLC) Course	0.00%	
(4) Pavement Quality Control (PQC) course	0.00%	
D - Reconstruction and New culverts on existing road, Realignment, bypasses:		
Culverts (Length <6m)		Cost of each culvert shall be determined on pro rata basis with respect to the total no. of culverts. The payment shall be made on the completion of at least five culverts.
a - Pipe Culverts	0.27%	
b - Box Culverts	4.72%	

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

Cost per km = $P \times \text{weightage for road work} \times \text{weightage for bituminous work} \times (1/L)$

Where P= Contract Price L = Total

length in km

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

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

1.1.1 Minor Bridges and Underpasses/Overpasses.

Procedure for estimating the value of Minor bridge and Underpasses/Overpasses shall be as stated in table 1.3.2:

Table 1.3.2

STAGE of PAYMENT	PERCENTAGE WEIGHTAGE	Payment Procedure
A 1- Widening and repairs of Minor Bridges (length >6m and <60m)		
Minor Bridges	0.00%	Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length of the minor bridges. Payment shall be made on completion of widening and repair works of a minor bridge.
A 2- New Minor Bridges (length >6m and <60m)		
(1) Foundation + Sub-structure: on completion of foundation work including foundation for wing and return wall, abutments, piers upto the abutment/pier cap.	22.25%	(1) Foundation + Sub Structure: Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length of the minor bridges. Payment against Foundation + Sub Structure shall be made on pro rata basis on completion of a stage i.e. not less than 25% of the scope of Foundation + Sub Structure of each bridge subject to completion of at least two foundations along with sub structure up to abutment/pier cap level of each bridge. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(2) Superstructure: on completion of super-structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs & markings, tests on completion etc. complete in all respect.	22.25%	(2) Super structure: Payment shall be made on pro-rata basis on completion of a stage i.e., completion of super-structure of at least one span in all respects as specified in the column of "Stage of Payment" In this sub-clause excluding any payment made in pursuance to here in under : - If precast girders / segments are used, on casting of all such girders and segments for at least one span and on submission of Indemnity Bond by the Contractor, 40% of the actual cost of such precast girders / segments determined based on SoR prevalent on the Base date within 30 days of submission of the bill therefor. In case the Contract Price is lower / higher than the Estimated Project Cost as per RFP, then the SOR rates shall be reduced / increased in the same proportion accordingly. Balance payment shall be after erection of /launching of these elements as per stage payment stipulations.
(3) Approaches: on completion of approaches including Retaining walls (excluding RE Walls), stone pitching, protection works complete in all respect and fit for use.	22.25%	(3) Approaches: Payment shall be made on pro rata basis on completion of a stage i.e., completion of approaches in all respect as specified in the column of "Stage of Payment" in this Sub-clause.

(4) Guide bunds and river training works: on completion of guide bunds and repair training works complete in all respects.	7.42%	(4) Guide bunds and river training works: Payment shall be made on pro rata basis on completion of a stage ie. completion of guide bunds and river training works in all respect as specified.
B 1 - Widening and repair of underpasses / overpasses		
Underpasses / Overpasses	0.00%	Cost of each underpass / overpass shall be determined on pro rata basis with respect to the total linear length of the underpass / overpass. Payment shall be made on completion of widening and repair works of a underpass / overpass.
B 2 - New Underpasses / Overpasses		
(1) Foundation + Sub-structure: on completion of foundation work including foundation for wing and return wall, abutments, piers up to the abutment/pier cap.	7.75%	(1) Foundation + Sub Structure: Cost of each underpass / overpass shall be determined on pro rata basis with respect to the total linear length of the underpass / overpass. Payment against Foundation + Sub Structure shall be made on pro rata basis on completion of a stage i.e. not less than 25% of the scope of Foundation + Sub Structure of each underpass / overpass subject to completion of at least two foundations along with sub structure up to abutment/pier cap level of each underpass / overpass. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(2) Superstructure: on completion of super-structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs & markings, tests on completion etc. complete in all respect.	7.75%	(2) Super structure: Payment shall be made on pro-rata basis on completion of a stage i.e., completion of super-structure of at least one span in all respects as specified in the column of "Stage of Payment" In this sub-clause excluding any payment made in pursuance to here in under : - If precast girders / segments are used, on casting of all such girders and segments for at least one span and on submission of Indemnity Bond by the Contractor, 40% of the actual cost of such precast girders / segments determined based on SoR prevalent on the Base date within 30 days of submission of the bill therefor. In case the Contract Price is lower / higher than the Estimated Project Cost as per RFP, then the SOR rates shall be reduced / increased in the same proportion accordingly. Balance payment shall be after erection of /launching of these elements as per stage payment stipulations.
Wearing coat (a) in case of overpass- wearing coat including expansion joints complete in all respects as specified and (b) in case of underpass - rigid pavement including drainage facility complete in all respects as specified.	7.75%	(iv)Wearing Coat: Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified.

<p>(3) Approaches: on completion of approaches including Retaining walls (excluding Reinforced Earth walls), stone pitching, protection works complete in all respect and fit for use.</p>	<p>2.58%</p>	<p>(3) Approaches: Payment shall be made on pro rata basis on completion of a stage i.e. completion of approaches in all respect as specified excluding any payment made in pursuance to here in under: If Reinforced earth wall is used with facia panels/blocks, on casting of all the facia Panels/Blocks of all approaches and on submission of Indemnity Bond by the Contractor, 40% of the actual cost of such precast girders/segments determined based on SoR prevalent on the base date within 30 days of submission of the bill therefor. In case the Contract Price is lower/higher than the Estimated Project Cost as per RFP, then the SoR rates shall be reduced / increased in the same proportion accordingly. Balance payment shall be after erection of / launching of these elements as per stage payment stipulations.</p>
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1.3.3 Major Bridge works, ROB/RUB and Structures.

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

Table 1.3.3

STAGE of PAYMENT	PERCENTAGE WEIGHTAGE	Payment Procedure
A 1 - Widening and repair of major bridges		
(1) Foundation	0.00%	<p>(i) Foundation: Cost of each Major Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridge. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e., not less than 25% of the scope of foundation of the major Bridge subject to completion of at least two foundations of the major bridge. In case where load testing is required for foundation, the trigger of first payment shall include load testing also were specified.</p>
(2) Sub-structure	0.00%	<p>(ii) Sub-Structure: Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of sub-structure of the major bridge subject to completion of at least two sub structures of abutment / pier cap level of the major bridge.</p>

(3) Super-structure (including bearings)	0.00%	(2) Super structure: Payment shall be made on pro-rata basis on completion of a stage i.e., completion of super-structure of at least one span in all respects as specified in the column of "Stage of Payment" In this sub-clause excluding any payment made in pursuance to here in under : - If precast girders / segments are used, on casting of all such girders and segments for at least one span and on submission of Indemnity Bond by the Contractor, 40% of the actual cost of such precast girders / segments determined based on SoR prevalent on the Base date within 30 days of submission of the bill therefor. In case the Contract Price is lower / higher than the Estimated Project Cost as per RFP, then the SOR rates shall be reduced / increased in the same proportion accordingly. Balance payment shall be after erection of /launching of these elements as per stage payment stipulations.
(4) Wearing Coat including expansion joints	0.00%	(iv)Wearing Coat: Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified.
(5) Miscellaneous Items like hand rails, crash barrier, road markings etc.	0.00%	(v) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified.
(6) Wing walls/return walls upto top	0.00%	(vi) Wing walls/return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
(7) Guide bunds, River Training works etc.	0.00%	(vii) Guide Bunds, River Training works: Payments shall be made on completion of all guide bunds/river training works etc. complete in all respects as specified.
(8) Approaches (including Retaining walls, stone pitching and protection works)	0.00%	(viii) Approaches: Payment shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified.
A 2 - New Major bridges		
(1) Foundation	33.00%	(i)Foundation: Cost of each Major Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridge. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e., not less than 25% of the scope of foundation of the major Bridge subject to completion of at least two foundations of the major bridge. In case where load testing is required for foundation, the trigger of first payment shall include load testing also were specified.

(2) Sub-structure	20.00%	(ii) Sub-Structure: Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e., not less than 25% of the scope of sub-structure of the major bridge subject to completion of at least two sub structures of abutment / pier cap level of the major bridge.
(3) Super-structure (including bearings)	25.00%	(2) Super structure: Payment shall be made on pro-rata basis on completion of a stage i.e., completion of super-structure of at least one span in all respects as specified in the column of "Stage of Payment" In this sub-clause excluding any payment made in pursuance to here in under : - If precast girders / segments are used, on casting of all such girders and segments for at least one span and on submission of Indemnity Bond by the Contractor, 40% of the actual cost of such precast girders / segments determined based on SoR prevalent on the Base date within 30 days of submission of the bill therefor. In case the Contract Price is lower / higher than the Estimated Project Cost as per RFP, then the SOR rates shall be reduced / increased in the same proportion accordingly. Balance payment shall be after erection of /launching of these elements as per stage payment stipulations.
(4) Wearing Coat including expansion joints	3.00%	(iv)Wearing Coat: Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified.
(5) Miscellaneous Items like hand rails, crash barrier, road markings etc.	5.00%	(v) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified.
(6) Wing walls/return walls upto top	6.00%	(vi) Wing walls/return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
(7) Guide bunds, River Training works etc.	3.00%	(vii) Guide Bonds, River Training works: Payments shall be made on completion of all guide bunds/river training works etc. complete in all respects as specified.
(8) Approaches (including Retaining walls, stone pitching and protection works)	5.00%	(viii) Approaches: Payment shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified.
B 1 - Widening and repair of		
a) RoB		
b) RuB		

1) Foundation	0.00%	(i) Foundation: Cost of each RoB / RuB shall be determined on pro rata basis with respect to the total linear length (m) of the RoB / RuB. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of the RoB / RuB subject to completion of at least two foundations of the RuB/ROB. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
2) Sub Structure	0.00%	(ii) Sub-Structure: Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e. Not less than 25% of the scope of sub-structure of the RoB / RuB subject to completion of at least two sub structure of abutments / pier cap level of the RuB/ROB.
3) Super Structure (Including bearings)	0.00%	(2) Super structure: Payment shall be made on pro-rata basis on completion of a stage i.e., completion of super-structure of at least one span in all respects as specified in the column of "Stage of Payment" In this sub-clause excluding any payment made in pursuance to here in under : - If precast girders / segments are used, on casting of all such girders and segments for at least one span and on submission of Indemnity Bond by the Contractor, 40% of the actual cost of such precast girders / segments determined based on SoR prevalent on the Base date within 30 days of submission of the bill therefor. In case the Contract Price is lower / higher than the Estimated Project Cost as per RFP, then the SOR rates shall be reduced / increased in the same proportion accordingly. Balance payment shall be after erection of /launching of these elements as per stage payment stipulations.
4) Wearing coat (a) in case of RoB - wearing coat including expansion joints complete in all respect as specified and (b) in case of RuB - rigid pavement under RuB including drainage facility complete in all respect as specified	0.00%	(iv) Wearing Coat: Payment shall be made on completion of (a) in case of ROB- wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB-rigid pavement under RUB including drainage facility complete in all respects as specified.
5) miscellaneous items like hand rails, crash barrier, road markings etc	0.00%	(v) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified.
6) wing walls / return walls	0.00%	(vi) Wing walls/return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
7) Approaches (including Retaining walls, stone pitching and protection works)	0.00%	(vii) Approaches: Payment shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified.
B 2 - New RoB / RuB		

1) Foundation	0.00%	(i) Foundation: Cost of each RoB / RuB shall be determined on pro rata basis with respect to the total linear length (m) of the RoB / RuB. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e., not less than 25% of the scope of foundation of the RoB / RuB subject to completion of at least two foundations of the RuB/ROB. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
2) Sub Structure	0.00%	(ii) Sub-Structure: Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e. Not less than 25% of the scope of sub-structure of the RoB / RuB subject to completion of at least two sub structure of abutments / pier cap level of the RuB/ROB.
3) Super Structure (Including bearings)	0.00%	(2) Super structure: Payment shall be made on pro-rata basis on completion of a stage i.e., completion of super-structure of at least one span in all respects as specified in the column of "Stage of Payment" In this sub-clause excluding any payment made in pursuance to here in under : - If precast girders / segments are used, on casting of all such girders and segments for at least one span and on submission of Indemnity Bond by the Contractor, 40% of the actual cost of such precast girders / segments determined based on SoR prevalent on the Base date within 30 days of submission of the bill therefor. In case the Contract Price is lower / higher than the Estimated Project Cost as per RFP, then the SOR rates shall be reduced / increased in the same proportion accordingly. Balance payment shall be after erection of /launching of these elements as per stage payment stipulations.
4) Wearing coat (a) in case of RoB - wearing coat including expansion joints complete in all respect as specified and (b) in case of RuB - rigid pavement under RuB including drainage facility complete in all respect as specified	0.00%	(iv) Wearing Coat: Payment shall be made on completion of (a) in case of ROB- wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB-rigid pavement under RUB including drainage facility complete in all respects as specified.
5) miscellaneous items like hand rails, crash barrier, road markings etc	0.00%	(v) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified.
6) wing walls / return walls	0.00%	(vi) Wing walls/return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.

7) Approaches (including Retaining walls/Reinforced Earth wall, stone pitching and protection works)	0.00%	(3) Approaches: Payment shall be made on pro rata basis on completion of a stage i.e. completion of approaches in all respect as specified excluding any payment made in pursuance to here in under: If Reinforced earth wall is used with facia panels/blocks, on casting of all the facia Panels/Blocks of all approaches and on submission of Indemnity Bond by the Contractor, 40% of the actual cost of such precast girders/segments determined based on SoR prevalent on the base date within 30 days of submission of the bill therefor. In case the Contract Price is lower/higher than the Estimated Project Cost as per RFP, then the SoR rates shall be reduced / increased in the same proportion accordingly. Balance payment shall be after erection of / launching of these elements as per stage payment stipulations.
C 1 - Widening and repair of Elevated sections / Fly overs / Grade Separators		
1) Foundation	0.00%	(i) Foundation: Cost of each RoB / RuB shall be determined on pro rata basis with respect to the total linear length (m) of the structure. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e., not less than 25% of the scope of foundation of the structure subject to completion of at least two foundations of the structure. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
2) Sub Structure	0.00%	(ii) Sub-Structure: Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e., not less than 25% of the scope of sub-structure of the structure subject to completion of at least two sub structure of abutments / pier cap level of the structure.
3) Super Structure (Including bearings)	0.00%	(2) Super structure: Payment shall be made on pro-rata basis on completion of a stage i.e., completion of super-structure of at least one span in all respects as specified in the column of "Stage of Payment" In this sub-clause excluding any payment made in pursuance to here in under : - If precast girders / segments are used, on casting of all such girders and segments for at least one span and on submission of Indemnity Bond by the Contractor, 40% of the actual cost of such precast girders / segments determined based on SoR prevalent on the Base date within 30 days of submission of the bill therefor. In case the Contract Price is lower / higher than the Estimated Project Cost as per RFP, then the SOR rates shall be reduced / increased in the same proportion accordingly. Balance payment shall be after erection of /launching of these elements as per stage payment stipulations.

4) Wearing coat including expansion joints	0.00%	(iv) Wearing Coat: Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified.
5) miscellaneous items like hand rails, crash barrier, road markings etc	0.00%	(v) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified.
6) wing walls / return walls	0.00%	(vi) Wing walls/return walls: Payments shall be made on completion of all wing walls / return walls complete in all respects as specified.
7) Approaches (including Retaining walls/Reinforced Earth wall, stone pitching and protection works)	0.00%	(3) Approaches: Payment shall be made on pro rata basis on completion of a stage ie. completion of approaches in all respect as specified excluding any payment made in pursuance to here in under: If Reinforced earth wall is used with facia panels/blocks, on casting of all the facia Panels/Blocks of all approaches and on submission of Indemnity Bond by the Contractor, 40% of the actual cost of such precast girders/segments determined based on SoR prevalent on the base date within 30 days of submission of the bill therefor. In case the Contract Price is lower/higher than the Estimated Project Cost as per RFP, then the SoR rates shall be reduced / increased in the same proportion accordingly. Balance payment shall be after erection of / launching of these elements as per stage payment stipulations.
C 2 - New Elevated sections / Fly overs / Grade Separators		
1) Foundation	0.00%	(i) Foundation: Cost of each RoB / RuB shall be determined on pro rata basis with respect to the total linear length (m) of the structure. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e., not less than 25% of the scope of foundation of the structure subject to completion of at least two foundations of the structure. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
2) Sub Structure	0.00%	(ii) Sub-Structure: Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e. Not less than 25% of the scope of sub-structure of the structure subject to completion of at least two sub structure of abutments / pier cap level of the structure.

3) Super Structure (Including bearings)	0.00%	(2) Super structure: Payment shall be made on pro-rata basis on completion of a stage i.e., completion of super-structure of at least one span in all respects as specified in the column of "Stage of Payment" In this sub-clause excluding any payment made in pursuance to here in under : - If precast girders / segments are used, on casting of all such girders and segments for at least one span and on submission of Indemnity Bond by the Contractor, 40% of the actual cost of such precast girders / segments determined based on SoR prevalent on the Base date within 30 days of submission of the bill therefor. In case the Contract Price is lower / higher than the Estimated Project Cost as per RFP, then the SOR rates shall be reduced / increased in the same proportion accordingly. Balance payment shall be after erection of /launching of these elements as per stage payment stipulations.
4) Wearing coat including expansion joints	0.00%	(iv) Wearing Coat: Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified.
5) miscellaneous items like hand rails, crash barrier, road markings etc	0.00%	(v) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified.
6) wing walls / return walls	0.00%	(vi) Wing walls/return walls: Payments shall be made on completion of all wing walls / return walls complete in all respects as specified.
7) Approaches (including Retaining walls/Reinforced Earth wall, stone pitching and protection works)	0.00%	(3) Approaches: Payment shall be made on pro rata basis on completion of a stage ie. completion of approaches in all respect as specified excluding any payment made in pursuance to here in under: If Reinforced earth wall is used with facia panels/blocks, on casting of all the facia Panels/Blocks of all approaches and on submission of Indemnity Bond by the Contractor, 40% of the actual cost of such precast girders/segments determined based on SoR prevalent on the base date within 30 days of submission of the bill therefor. In case the Contract Price is lower/higher than the Estimated Project Cost as per RFP, then the SoR rates shall be reduced / increased in the same proportion accordingly. Balance payment shall be after erection of / launching of these elements as per stage payment stipulations.

Note: (1) In case of innovate Major Bridge projects like cable suspension/cable stayed/ Extra Dozed and exceptionally long span bridges, the schedule may be modified as per site requirements before bidding with due approval of Competent Authority.

(2) The Schedule for exclusive tunnel projects may be prepared as per site requirements before bidding with due approval of Competent Authority.

1.3.4 Other works.

Procedure for estimating the value of other works done shall be as stated in table 1.3.4.

Table 1.3.4

STAGE FOR PAYMENT	PERCENTAGE WEIGHTAGE	PAYMENT PROCEDURE
Other Works		
(i) Toll Plaza	7.57%	Unit of measurement is each completed Toll Plaza. Payment of each Toll Plaza shall be made on pro rata basis with respect to the total of all Toll Plaza.
(ii) Road side drains		
Lined Drain (RCC)	6.57%	Unit of measurement is linear length in km. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10% (ten percent) of the total length.
Lined Drain (PCC)	0.15%	
Unlined Drain	0.13%	
(iii) Road Signs, markings, km stones, safety devices, Road furnitures, etc	1.82%	
(iv) Project facilities		
(a) Bus Shelter	0.55%	Payment shall be made on pro rata basis for completed facilities.
(b) Rain water harvesting	0.15%	
(d) Others		
a) Clearing n Grubbing & Dismantling works	1.25%	
b) improvement of Junctions	8.74%	
c) Turfing and hydroseeding	0.74%	
d) Lighting works	2.18%	
(v) Road side Plantation	1.32%	
(vi) Protection works other than approaches to the bridges, elevated sections / flyovers / grade separators and RoBs/RuBs		Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10% (ten percent) of the total length.
(a) Thrie Beam Crash Barrier	6.20%	
(b) RE wall with Friction Slab	30.17%	
(c) RCC Crash Barrier	0.61%	
(d) New Jersey Crash Barrier	0.32%	
e) Retaining wall	18.30%	
(f) Pitching work on Emb slope	6.19%	
g) PCC Kerb at median/Footpath etc.	7.03%	

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

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

Table 1.3.5		
STAGE FOR PAYMENT	PERCENTAGE WEIGHTAGE	PAYMENT PROCEDURE
Electrical utilities and public Health Utilities (water pipe lines and sewage lines)		
(i) EHT Lines	11.92%	Unit of measurement is as per completed activities. Cost per activity shall be determined on pro-rata basis as per its weightage with reference to total cost of EHT line. Payment shall be made for completed activity. (The average weightage of major activities (Only for payment purpose) in shifting work is (i) Erection of Poles - 20% (ii) Conductor stringing including laying of cable-30%, (iii) DTR erection (if involved)-15% and (iv) Charging of line including dismantling and site clearance -35% (with DTR) and 50% without DTR.
(ii) EHT crossings	2.24%	Cost of each crossing shall be determined on pro rata basis with reference to total no. of crossings. Payment shall be made for not less than 25% of the crossings subject to a minimum of 4 crossings
(iii) HT/LT Lines	23.73%	Unit of measurement is as per completed activities. Cost per activity shall be determined on pro-rata basis as per its weightage with reference to total cost of LT/HT line. Payment shall be made for completed activity. (The average weightage of major activities (Only for payment purpose) in shifting work is (i) Erection of Poles - 20% (ii) Conductor stringing including laying of cable-30%, (iii) DTR erection (if involved)-10% and (iv) Charging of line including dismantling and site clearance -40% (with DTR) and 50% without DTR.
(iv) HT/LT Crossings	29.00%	Cost of each crossing shall be determined on pro rata basis with reference to total no. of crossings. Payment shall be made for not less than 25% of the crossings subject to a minimum of 10 crossings
(v) Transformer	0.75%	Cost of each transformer shall be determined on pro rata basis with reference to total no. of transformers. Payment shall be made for completion of each unit shifting.
(v) Water pipelines	30.74%	Unit of measurement is as per completed activities. Cost per activity shall be determined on pro -rata basis as per its weightage with reference to total cost of pipe line. Payment shall be made for completed activity. (The average weightage of major activities (Only for payment purpose) in shifting work is laying pipe - 50%, charging of line including all miscellaneous works and dismantling and site clearance - 50%)
(vi) Water pipeline crossings	1.62%	Cost of each crossing shall be determined on pro rata basis with reference to total no. of crossings. Payment shall be made for not less than 25% of the crossings subject to a minimum of 8 crossings.

(viii) BSNL	0.00%	Unit of measurement is as per completed activities. Cost per activity shall be determined on pro -rata basis as per its weightage with reference to total cost of pipe line. Payment shall be made for completed activity. (The average weightage of major activities (Only for payment purpose) in shifting work is laying pipe - 50%, charging of line including all miscellaneous works and dismantling and site clearance - 50%)
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2. Procedure for payment for Maintenance

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

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

Schedule - I

(See Clause 10.2 (iv))

Drawings

1. Drawings

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

2. Additional Drawings

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

Annex - I

(Schedule - I)

List of Drawings

[Note: All the Drawings that the Contractor is required to furnish under Clause 10.2.]

Schedule - J

(See Clause 10.3 (ii))

Project Completion Schedule

1. Project Completion Schedule

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

2. Project Milestone-I

- (i) Project Milestone-I shall occur on the date falling on the 256th **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 438th **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 621st 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 730th day from the Appointed Date.
- (ii) On or before the Scheduled Completion Date, the Contractor shall have completed construction in accordance with this Agreement.

6. Extension of time

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

Schedule - K
(See Clause 12.1 (ii))
Tests on Completion

1. Schedule for Tests

- (i) The Contractor shall, no later than 30 (thirty) days prior to the likely completion of construction, notify the Authority's Engineer and the Authority of its intent to subject the Project Highway to Tests, and no later than 10(ten) days prior to the actual date of Tests, furnish to the Authority's Engineer and the Authority detailed inventory and particulars of all works and equipment forming part of Works.
- (ii) The Contractor shall notify the Authority's Engineer of its readiness to subject the Project Highway to Tests at any time after 10 (ten) days from the date of such notice, and upon receipt of such notice, the Authority's Engineer shall, in consultation with the Contractor, determine the date and time for each Test and notify the same to the Authority who may designate its representative to witness the Tests. The Authority's Engineer shall thereupon conduct the Tests itself or cause any of the Tests to be conducted in accordance with Article 12 and this Schedule-K.

2. Tests

- (i) Visual and physical test: The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include [***].
- (ii) Riding quality test: Riding quality of each lane of the carriageway shall be checked with the help of a Network Survey Vehicle (NSV) fitted with latest equipments and the maximum permissible roughness for purposes of this Test shall be [2,000 (two thousand)] mm for each kilometre.
- (iii) Tests for bridges: All major and minor bridges shall be subjected to the rebound hammer and ultrasonic pulse velocity tests, to be conducted in accordance with the procedure described in Special Report No. 17: 1996 of the IRC Highway Research Board on Nondestructive Testing Techniques, at two spots in every span, to be chosen at random by the Authority's Engineer. Bridges with a span of 15 (fifteen) metres or more shall also be subjected to load testing.
- (iv) Other tests: The Authority's Engineer may require the Contractor to carry out or cause to be carried additional tests, in accordance with Good Industry Practice, for determining the compliance of the Project Highway with Specifications and Standards, except tests as specified in clause 5, but shall include measuring the reflectivity of road markings and road signs; and measuring the illumination level (lux) of lighting using requisite testing equipment.

- (v) Environmental audit: The Authority's Engineer shall carry out a check to determine conformity of the Project Highway with the environmental requirements set forth in Applicable Laws and Applicable Permits.
- (vi) Safety Audit: The Authority's Engineer shall carry out, or cause to be carried out, a safety audit to determine conformity of the Project Highway with the safety requirements and Good Industry Practice.

3. **Agency for conducting Tests**

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

4. **Completion Certificate**

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

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

Sr. No.	Key metrics of Asset	Equipment to be used	Frequency of condition survey
1	Surface defects of pavement	Network Vehicle Survey (NSV)	At least twice a year (As per survey months defined for the state basis rainy season)
2	Roughness of pavement	Network Vehicle Survey (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-reflect meter	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 Intermediate Lane Road with hard Shoulder from design Km 0.000 to Km 46.704 (Total length: 46.704 km) of Zido – Singha section on NH-913 (Frontier Highway) in the State of Arunachal Pradesh on EPC Mode " work an Engineering, Procurement and Construction (EPC) Contract (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/5 th km stones	5%
(f)	Miscellaneous Items	
(i)	Removal of dead animals, broken down/accidented vehicles, fallen trees, road blockades or malfunctioning of mobile crane	10%
(ii)	Any other Defects in accordance with paragraph 1.	5%
(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:

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

Where,

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

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

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

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

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

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

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

Schedule - N

(See Clause 18.1 (i))

Selection of Authority's Engineer

1. Selection of Authority's Engineer

- (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 Construction of Intermediate Lane Road with hard Shoulder from design Km 0.000 to Km 46.704 (Total length: 46.704 km) of Zido – Singha section on NH-913 (Frontier Highway) in the State of Arunachal Pradesh on EPC Mode, 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.

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- (ii) The Authority's Engineer shall review and approve any revised Drawings sent to it by the Contractor and furnish its comments within 10 (ten) days of receiving such Drawings.
 - (iii) The Authority's Engineer shall review and approve the Quality Assurance Plan submitted by the Contractor and shall convey its comments to the Contractor within a period of 21 (twenty one) days stating the modifications, if any, required thereto.
 - (iv) The Authority's Engineer shall complete the review and approve of the methodology proposed to be adopted by the Contractor for executing the Works, and convey its comments to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed methodology from the Contractor.
 - (v) The Authority's Engineer shall grant written approval to the Contractor, where necessary, for interruption and diversion of the flow of traffic in the existing lane(s) of the Project Highway for purposes of maintenance during the Construction Period in accordance with the provisions of Clause 10.4.
 - (vi) The Authority's Engineer shall review the monthly progress report furnished by the Contractor and send its comments thereon to the Authority and the Contractor within 7 (seven) days of receipt of such report.
 - (vii) The Authority's Engineer shall inspect the Construction Works and the Project Highway and shall submit a monthly Inspection Report bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. In particular, the Authority's Engineer shall include in its Inspection Report, the compliance of the recommendations made by the Safety Consultant.
 - (viii) The Authority's Engineer shall conduct the pre-construction review of manufacturer's test reports and standard samples of manufactured Materials, and such other Materials as the Authority's Engineer may require.
 - (ix) For determining that the Works conform to Specifications and Standards, the Authority's Engineer shall require the Contractor to carry out, or cause to be carried out, tests at such time and frequency and in such manner as specified in the Agreement and in accordance with Good Industry Practice for quality 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.

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- (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.

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- (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 Intermediate Lane Road with hard Shoulder from design Km 0.000 to Km 46.704(Total length:46.704 km) of Zido –Singha section on NH-913 (Frontier Highway) in the State of Arunachal Pradesh on EPC Mode" (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)
