

राष्ट्रीय राजमार्ग एवं अवसंरचना विकास निगम लिमिटेड
National Highways & Infrastructure Development Corporation Limited
MINISTRY OF ROAD TRANSPORT & HIGHWAYS,
GOVT. OF INDIA

Technical Schedule

Improvement/widening to Two-laning with earthen shoulder of Panda (Design Ch. 112.300 km) to Baghmara (Design Ch. 129.385 km) [R-M-B Package-VI] on SH-4 section of Ranikor- Maheshkhola-Baghmara Project in the state of Meghalaya on EPC basis

Panda (Km 112.3) – Baghmara (Km 129.385)

Schedule A

(See Clause 2.1 and 8.1)

SITE OF THE PROJECT**1 The Site**

- 1.1 Site of the Two-Lane Project Highway shall include the land, buildings, Structures and road works as described in Annex-I of this Schedule-A.
- 1.2 The dates of handing over the Right of Way to the Contractor are specified in Annex-II of this Schedule-A.
- 1.3 An inventory of the Site including the land, buildings, Structures, road works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority Representative and the Contractor, and such inventory shall form part of the memorandum referred to in Clause 8.2.1 of this Agreement.
- 1.4 The alignment plans of the Project Highway are specified in Annex-III. 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 modified.
- 1.5 The status of the environment clearances obtained or awaited is given in Annex-IV.

Annex – I

(Schedule-A)

Site**1. Site**

The site of the Two Lane project highway comprises the section of State Highway No 4 commencing from Km 119+800 to Km 139+000 i.e. the Panda-Baghmara road in the state of Meghalaya. The Land, carriageway and structures comprising the site are described below.

2. Land

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

S. No.	Chainage (Km)		Existing ROW (m)
	From	To	
1	119.800	120.769	11.6
2	120.769	121.764	9.70
3	121.764	122.722	10.60
4	122.722	123.692	9.90
5	123.692	124.764	12.60
6	124.764	125.724	9.50
7	125.724	126.807	10.8
8	126.807	127.800	16.60
9	127.800	128.956	10.8
10	128.956	129.950	9.40
11	129.950	130.932	10.00
12	130.932	131.930	12.00
13	131.930	132.920	10.60
14	132.920	133.946	9.3
15	133.946	134.943	9.70
16	134.943	135.942	8.70
17	135.942	137.272	9.4
18	137.272	137.664	9.5
19	137.664	139.000	10

3. Carriageway

The present carriageway of the Project Road is Single lane with average formation width of 6 m and carriageway width of 3.5 - 4.0 m with earthen shoulders of width 1.5 m on either side for the entire stretch. The type of the existing pavement is flexible.

4. Major Bridge

The Site includes the following Major Bridges:

S/no	Location in km	Type of Structures			Length of Bridge/ Span Arrangement (m)	Total width (m)
		Super Structure	Sub Structure	Foundation		
1	119.810	RCC Slab	Cement concrete	Well Foundation	66.85, 3 span of different length	8.00
2	137.272	Prestress three Longitudinal girder	RCC on well Foundation	Well Foundation	392.90m of 11 span of different length	8.00

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

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

SI No	Chainage(km)	Type of structure		No of Span with Span length(m)	width (m)	ROB/RUB
		Foundation	Superstructure			
NIL						

6. Grade separators

The Site includes the following grade separators:

SI No	Chainage (km)	Type of structure		No of Span with Span length(m)	width (m)
		Foundation	Superstructure		
NIL					

7. Railway level crossings

The Site includes the following railway level crossings:

SI No	Location(Km)	Remarks
NIL		

8. Underpass(Vehicular/Non-vehicular)

The Site includes the following railway level crossings:

SI No	Location (Km)	Remarks
NIL		

9. Truck Lay bays

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

SI No	Chainage(km)	Length(m)	Left Hand side	Right Hand side
NIL				

10. Road side drains

The details of the roadside drains are as follows:

S/NO	LOCATION IN KM	TYPE	REMARKS
NIL			

11. Minor Bridges

The Site includes the following Minor Bridges:

S. no	Location in km	Type of Structures			Length of Bridge/ Span Arrangement (m)	Total width (m)
		Super Structure	Sub Structure	Foundation		
1	135.565	SPT Bridge	Wooden logs braced together	Driven in river bed	35.40, 2 span of different length	8.00

12. Culvert

S/No.	Existing Chainage (km)	CD Width	Type of Culvert	Span arrangement (No x Span/dia)
1	120.270	7.20	HP	1 x 0.90
2	120.565	7.00	HP	1 x 0.90
3	120.760	7.00	HP	1 x 0.90
4	120.965	7.20	HP	1 x 0.90
5	121.265	7.20	HP	1 x 0.90
6	121.515	7.20	Slab	1 x 1.00
7	121.710	9.40	HP	1 x 0.90
8	121.850	6.40	HP	1 x 0.90
9	122.120	7.20	HP	1 x 0.90
10	122.375	7.20	Slab	1 x 1.50
11	122.690	7.20	HP	1 x 0.90
12	122.830	7.50	HP	1 x 0.90
13	123.065	7.20	Slab	1 x 1.00
14	123.250	7.50	HP	1 x 0.90
15	123.375	7.50	HP	1 x 0.90
16	123.515	7.20	HP	1 x 0.90
17	123.775	7.50	HP	1 x 0.90
18	123.830	7.50	HP	1 x 0.90
19	123.950	7.00	HP	1 x 0.90
20	124.060	7.50	HP	1 x 0.90
21	124.480	7.20	HP	1 x 0.90
22	124.665	7.20	HP	1 x 0.90
23	124.860	7.00	HP	1 x 0.90
24	125.050	7.00	HP	1 x 0.90
25	125.405	7.20	HP	1 x 0.90
26	125.595	7.00	HP	1 x 0.90

S/No.	Existing Chainage (km)	CD Width	Type of Culvert	Span arrangement (No x Span/dia)
27	126.115	7.00	HP	1 x 0.90
28	126.520	7.50	HP	1 x 0.90
29	127.220	7.50	HP	1 x 0.90
30	127.415	7.50	HP	1 x 0.90
31	127.925	7.20	HP	1 x 0.90
32	128.105	7.50	HP	1 x 0.90
33	128.375	7.00	HP	1 x 0.90
34	128.530	7.20	HP	1 x 0.90
35	128.630	7.40	Slab	1 x 1.00
36	128.800	7.20	HP	1 x 0.90
37	128.910	7.00	HP	1 x 0.90
38	129.005	7.50	HP	1 x 0.90
39	129.120	7.50	HP	1 x 0.90
40	129.460	7.00	HP	1 x 0.90
41	129.710	7.20	HP	1 x 0.90
42	129.820	7.00	HP	1 x 0.90
43	130.500	7.50	HP	1 x 0.90
44	130.600	7.50	HP	1 x 0.90
45	130.750	7.00	HP	1 x 0.90
46	130.880	7.50	HP	1 x 0.90
47	131.075	7.50	HP	1 x 0.90
48	131.225	7.50	HP	1 x 0.90
49	131.380	7.50	HP	1 x 0.90
50	131.705	6.20	HP	1 x 0.90
51	131.850	7.50	HP	1 x 0.90
52	132.075	7.20	HP	1 x 0.90
53	132.230	7.00	HP	1 x 0.90
54	132.400	7.20	HP	1 x 0.90
55	132.555	7.20	HP	1 x 0.90
56	132.625	7.20	HP	1 x 0.90
57	132.715	7.50	HP	1 x 0.90
58	132.780	6.40	HP	1 x 0.90
59	132.880	7.20	Slab	1 x 1.00
60	133.235	7.20	HP	1 x 0.90
61	133.470	7.50	HP	1 x 0.90
62	133.565	7.00	HP	1 x 0.90
63	133.670	6.40	HP	1 x 0.90
64	133.710	6.00	HP	1 x 0.90
65	133.820	6.40	HP	1 x 0.90

S/No.	Existing Chainage (km)	CD Width	Type of Culvert	Span arrangement (No x Span/dia)
66	133.885	6.00	HP	1 x 0.90
67	133.945	7.40	Slab	1 x 1.00
68	133.980	7.20	HP	1 x 0.90
69	134.105	6.40	HP	1 x 0.90
70	134.155	7.00	Slab	1 x 1.50
71	134.265	7.00	HP	1 x 0.90
72	134.385	7.00	HP	1 x 0.90
73	134.480	7.00	HP	1 x 0.90
74	134.560	7.00	HP	1 x 0.90
75	134.635	7.00	Slab	1 x 1.00
76	134.695	6.40	HP	1 x 0.90
77	134.730	6.40	HP	1 x 0.90
78	134.865	7.00	HP	1 x 0.90
79	134.920	7.20	HP	1 x 0.90
80	134.970	7.20	HP	1 x 0.90
81	135.030	7.20	HP	1 x 0.90
82	135.150	7.20	HP	1 x 0.90
83	135.470	6.50	Slab	1 x 2.00
84	135.805	6.40	HP	1 x 0.90
85	135.880	7.50	HP	1 x 0.90
86	135.940	6.00	Slab	1 x 1.50
87	135.965	6.00	HP	1 x 0.90
88	136.015	6.20	HP	1 x 0.90
89	136.095	7.00	Slab	1 x 3.00
90	136.160	7.00	Slab	1 x 1.00
91	136.185	7.00	HP	1 x 0.90
92	136.275	7.00	HP	1 x 0.90
93	135.380	7.00	HP	1 x 0.90
94	136.465	4.80	Slab	1 x 4.00
95	136.610	7.00	HP	1 x 0.90
96	136.680	7.00	HP	1 x 0.90
97	136.800	4.00	Slab	1 x 3.00
98	136.875	7.40	Slab	1 x 1.00
99	137.025	4.50	Slab	1 x 2.50
100	137.120	7.50	HP	1 x 0.90
101	137.165	6.80	Slab	1 x 3.00

13. Bus bays

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

SI No	Chainage(km)	Length(m)	Left Hand side	Right Hand side
NIL				

14. Major Intersections along project:

The details of the minor junctions are as follows:

Sn	Location	Name of Road	Type of Junction
4	Km 129.385 End Point	Ranikor – Tura - Dudhnoi	Y

15. Minor Intersections along project:

The details of the minor intersections are as follows:

S/no	Location in km	Type of Crossing	Link	Specification	Remarks
1	129.449	R	Village	VR	3.50m wide BT road
2	131.552	L	Border and Rongsora	VR	3.00m wide WBM road
3	135.310	R	Guriane village	VR	3.00m Earthen road
4	136.073	R	DC office of Baghmara	VR	3.00m wide BT road

16. Bypass

The details of Bypasses are as follows:

SI No	Name of bypass (town)	Chainage(km)		Length(in km)	Carriageway	
		Fom(km)	To (km)		width(m)	Type
NIL						

17. Other structures**Nil**

Annex II

(Schedule-A)

Dates for providing Right of Way

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

Sl.No.	Location stretch		Length(m)	Width(m)	Date of providing ROW
	From(km)	To(km)			
1	112+300	129+385	17.08	16 m to 30 m	Minimum 90% on Appointed Date and remaining within 150 days of Appointed Date

Annex – IV*(Schedule-A)***Environment Clearances**

The following environment clearances have been obtained:

- Environmental clearance is not required as per new notification of MoEF dated 22/08/2013.
- The muck dumping sites shall be identified by the EPC contractor in consultation with the Authority Engineer and forest department for dumping of muck, in addition to the applicable permissions and clearances as stated in Schedule F.

Schedule B**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 Two-Laning and strengthening of the Project Road as described in Annex-I of this Schedule-B and in Schedule-C.

3 Specifications and Standards

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

Annex – I

(Schedule-B)

Description of Two-Laning with earthen shoulder**1. Development of Panda–Baghmara road from Km 112.3 to Km 129.385 in Meghalaya to 2-Lane Standards.**

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 Hills/rolling terrain to the extent land is available.

1.1 Width of carriageway

Two-Laning with earthen shoulder shall be undertaken. The paved carriageway shall be 7 (seven) m wide in accordance with the typical cross sections drawings in the Manual.

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

S. No	Built-up stretch (Town ship)	Location (Km to km)		Width (m)	Typical cross section
		From (Km)	To (Km)		
1	Baghmara	127+800	129+385	7	TCS-5

The area between paved carriageway and drain in built-up area will be covered with paver block as per TCS-5.

1.2 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

2.1 General

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

2.2 Design speed

In general, the Project Highway has been designed for a speed 50 kmph for mountainous terrain but at few locations, 30kmph speed has been provided due to unavoidable circumstances such as steep terrain & sharp curves in accordance with table 6.1 of Hill Road Manual (IRC SP:48-1998)

2.3 Improvement of the existing road geometrics

In the following stretches, 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. The locations where the minimum design speed could not be proposed due to site constraints are as per the table below:

SI No.	Chainage		Length	Remarks
	From	To		
NIL				

2.4 Right of Way

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

2.5 Type of shoulders

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

S. No.	Stretch		Width(m)	Reference to cross section
	From (Km)	To (Km)		
1	127+800	129+385	7	TCS-5

The varied width between paved carriageway and drain in built-up area will be covered with paver block as per TCS-V.

(b) In open country section the earthen shoulders shall be covered with 150 mm thick compacted layer of granular material. The width of shoulder is 1.5m on both sides.

Earthen Shoulder on Valley side includes crash barrier, parapet wall, etc.

Earthen Shoulder on hill side includes road side drain.

(c) Design and specification of paved shoulders and granular material shall confirm to the requirements specified in paragraphs 5.11 of the Manual.

2.6 Lateral and vertical clearances at underpasses

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

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

S. No.	Description	Design Chainage (km)	Span length	Remarks
NIL				

2.7 Lateral and vertical clearance at overpasses

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

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

S. No.	Location (Chainage) From km to km	Number and length of spans	Remarks
NIL			

2.8 Service roads/Slip Road

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

S. No.	Length of Service road		Right hand side (RHS)/ Left hand side (LHS)/ or Both sides	Length (km) of service road
	(From	To		
NIL				

2.9 Grade separated structures

2.9.1 Grade separated structures shall be provided as per paragraph 2.14.1 of the Manual.

The requisite particulars are given below:

S. No.	Location of structure	Length (m)	Number and length of spans	Approach gradient
NIL				

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

S. No.	Location	Type of structure Length (m)	Cross road at		
			Existing level	Raised Level	Lowered Level
NIL					

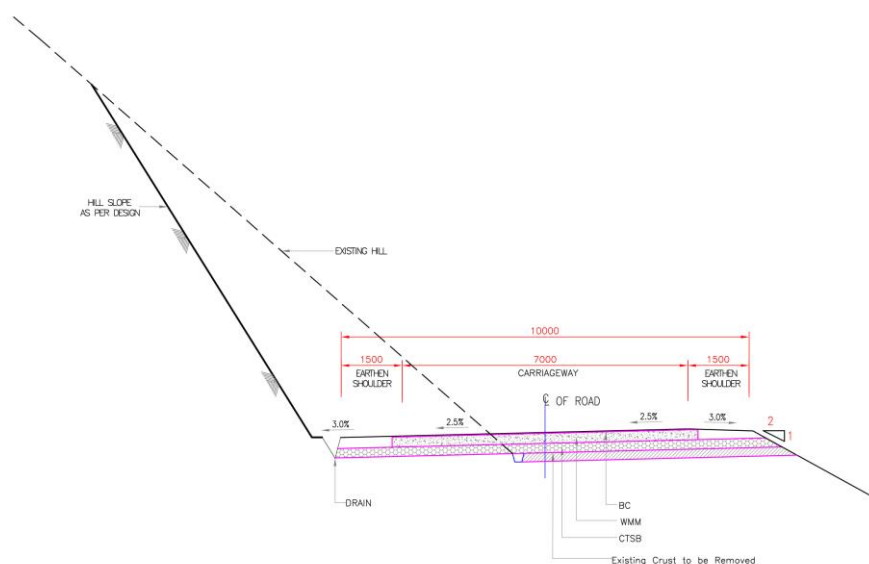
2.10 Cattle and Pedestrian under pass / over pass

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

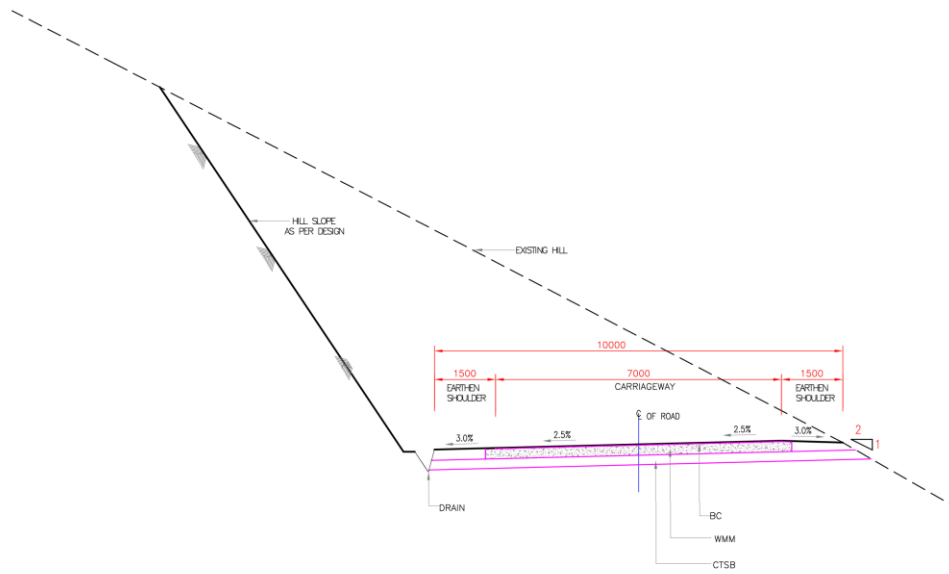
S. No.	Design Chainage (km)	Span	Type of crossing
1	113+770	1x12x5.5	Cattle Overpass
2	119+120	1x12x5.5	
3	120+750	1x12x5.5	

2.11 Typical cross-sections of the Project Highway

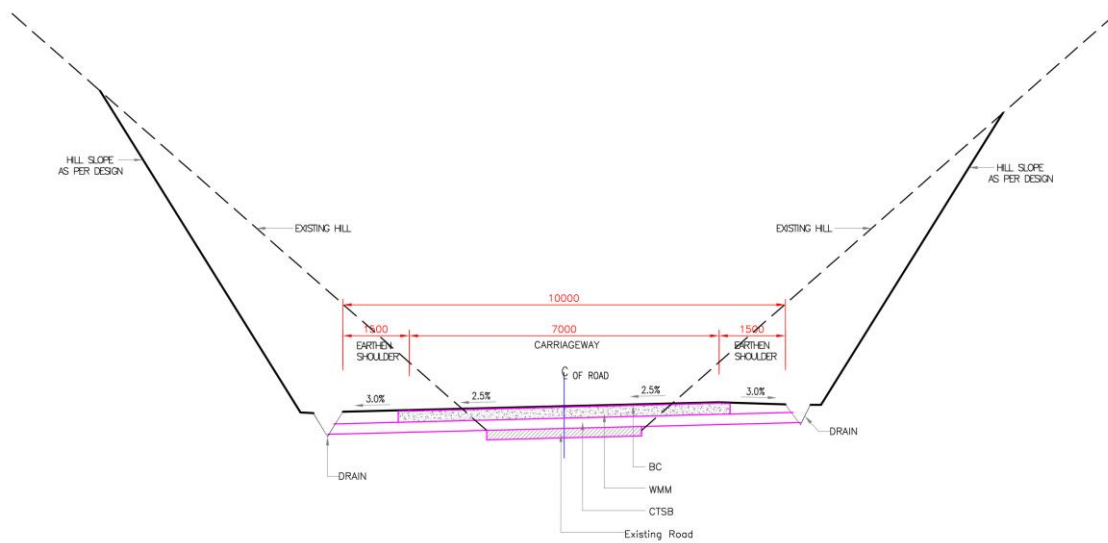
S.No.	Design Length(Km)	TCS Type	Remarks
1	8.865	1	Widening (One Side Hill)
2	2.035	2	New Construction (One Side Hill)
3	2.680	3	Widening (Box-Cut)
4	2.040	4	New Construction (Box-Cut)
5	1.465	5	Built-up



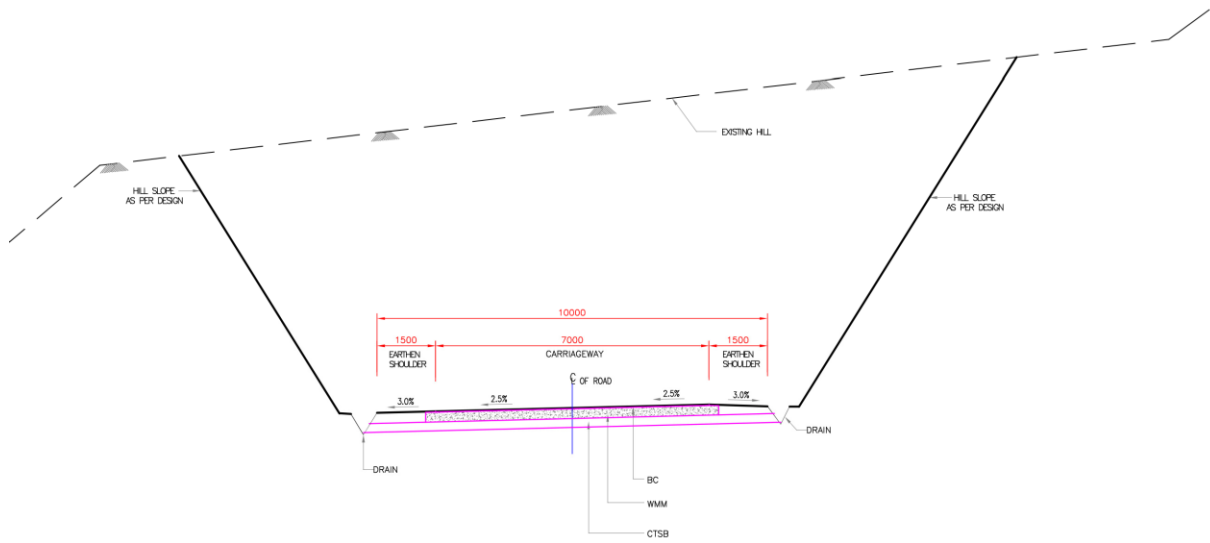
TCS-1 :- 2 LANE WITH EARTHEN SHOULDER FOR WIDENING (ONE SIDE HILL)



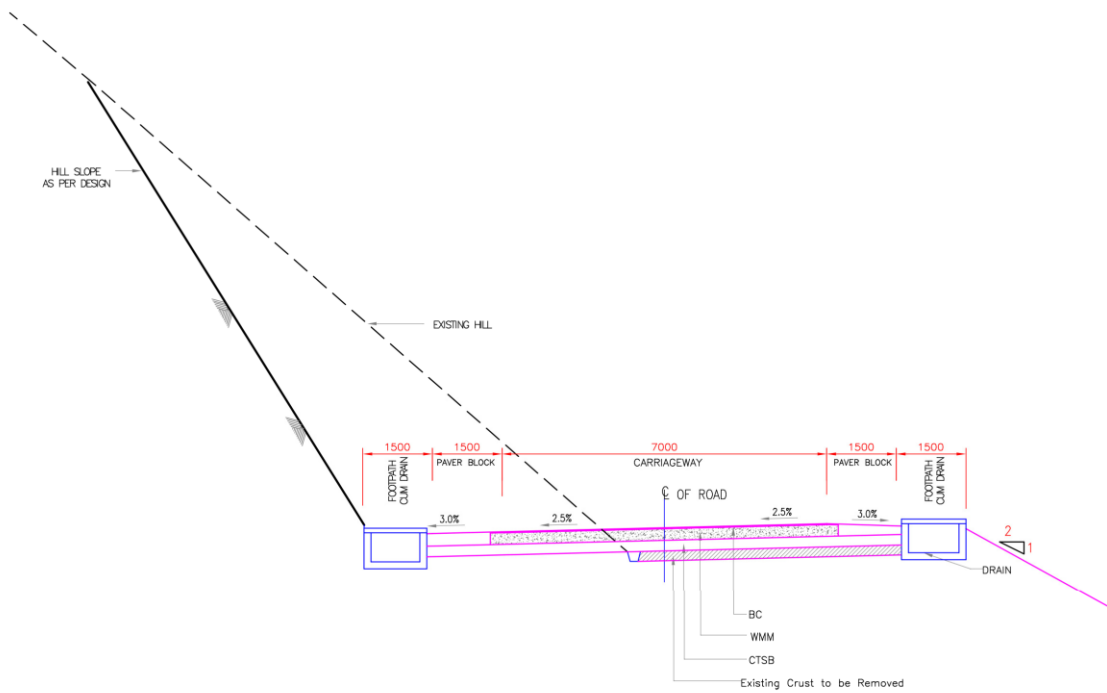
TCS-2 :- 2 LANE WITH EARTHEN SHOULDER FOR NEW CONSTRUCTION (ONE SIDE HILL)



TCS-3 :- 2 LANE WITH EARTHEN SHOULDER FOR WIDENING (BOTH SIDE HILL)



TCS-4 :- 2 LANE WITH EARTHEN SHOULDER FOR NEW CONSTRUCTION (BOX CUT SECTION)



TCS-5 :- 2 LANE FOR BUILT-UP SECTION

3. Intersections and grade separators

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

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

(a) At-grade intersections

Major Intersection

S. No.	Location of intersection (km)	Type of intersection	Other features
1	Km 129.385 End Point	Y	Ranikor – Tura - Dudhnoi

Minor Intersection

S. No	Location of Intersections	Type of Intersection	Other Features
1	120.785	T	Amphangree
2	123.8	Y	ODR.
3	127.288	Y	ODR.
4	127.51	Y	ODR.
5	128.97	Y	ODR.

Note: All other junctions, if any, identified during the execution of the work shall be developed as per the extant guidelines and shall not be treated as change in scope of work.

At the locations of geometric improvements, the connectivity of built-up area, along existing road, with the proposed highway shall be provided. All such locations shall be finalized as per site requirement in consultation with Authority Engineer and it will not be treated as change in scope of work.

(b) Grade separated intersection with/without ramps

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

4. Road embankment and cut section

4.1 Widening and improvement of the existing road embankment/cuttings and construction of new road embankment / cuttings shall conform to the standards and specifications given in Section 4 of the Manual and the specified cross sectional details. Deficiencies in the plan and profile of the existing road shall be corrected.

4.2 Box cut section

The existing road shall be box cutting in the following sections.

S.No.	From(Km)	To (Km)	Length	Remarks
1	112+600	112+700	100	New Construction
2	112+700	112+855	155	Widening
3	112+855	112+950	95	New Construction
4	112+950	113+120	170	Widening
5	113+120	113+195	75	New Construction
6	113+195	113+350	155	Widening
7	113+350	113+520	170	New Construction
8	113+520	113+680	160	Widening
9	113+680	113+810	130	New Construction
10	113+810	114+140	330	Widening
11	114+140	114+225	85	New Construction
12	114+225	114+385	160	Widening
13	114+385	114+470	85	New Construction
14	114+470	114+510	40	Widening
15	115+000	115+055	55	Widening
16	115+055	115+125	70	New Construction
17	115+125	115+170	45	Widening
18	115+170	115+225	55	New Construction
19	115+225	115+800	575	Widening

S.No.	From(Km)	To (Km)	Length	Remarks
20	115+800	115+855	55	New Construction
21	115+855	115+880	25	Widening
22	115+880	116+000	120	New Construction
23	117+300	117+400	100	New Construction
24	117+400	117+500	100	Widening
25	117+700	117+750	50	Widening
26	119+100	119+330	230	New Construction
27	119+330	119+400	70	Widening
28	119+400	119+500	100	New Construction
29	120+050	120+200	150	Widening
30	120+605	120+640	35	New Construction
31	120+740	120+880	140	Widening
32	120+880	120+980	100	New Construction
33	124+145	124+445	300	Widening
34	124+445	124+680	235	New Construction
35	127+280	127+480	200	New Construction
Total (m)			4720	

Note: i) Type of soil of existing cutting section shall be verified as per actual site conditions.

Any variations in the type of soil specified in the table shall not constitute a Change of Scope or any deviation thereof.

ii) Contractor shall identify the locations and construct a boundary for proper disposal of cut material in consultation with Authority Engineer.

5. Pavement design

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

5.2 Type of pavement

Type of pavement shall be flexible.

5.3 Design requirements

Pavement design shall be as per Section 5 of IRC: SP 73-2018. Design of flexible pavement applies to the new carriageway and widening of existing carriageway. The methodologies recommended in IRC: 37-2018 shall be adopted.

5.3.1 Design Period and strategy

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

5.3.2 Design Traffic

Notwithstanding anything to contrary contained in this agreement or the Manual, the Contractor shall design the pavement for design traffic of 20 million standard axles for granular layers and 10 million standard axles for bituminous layer. In case the traffic is more than 10 MSA on Main Carriageway at the time of Traffic survey done by EPC contractor, then the higher traffic will be adopted for design. However, in any case, the proposed pavement design at Main Carriageway shall not be less than that given below:

-

Main new Carriageway (flexible):-

The minimum thickness of various layers shall be as given as: -

BC = 40 mm WMM =150 mm CTSB = 200 mm.

5.3 Reconstruction of stretches

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

SI No.	Chainage		Length
	From	To	
1	112+300	112+400	100
2	112+500	112+600	100
3	112+700	112+855	155
4	112+950	113+120	170
5	113+195	113+350	155
6	113+520	113+680	160
7	113+810	114+140	330
8	114+225	114+385	160
9	114+470	114+510	40
10	114+580	114+660	80
11	114+750	115+055	305
12	115+125	115+170	45
13	115+225	115+800	575

SI No.	Chainage		Length
	From	To	
14	115+855	115+880	25
15	116+070	116+225	155
16	116+300	117+000	700
17	117+100	117+175	75
18	117+400	119+045	1645
19	119+330	119+400	70
20	119+500	119+900	400
21	120+020	120+050	30
22	120+050	120+200	150
23	120+200	120+605	405
24	120+685	120+880	195
25	120+980	121+430	450
26	121+510	121+600	90
27	121+660	121+690	30
28	121+770	122+330	560
29	122+410	122+700	290
30	122+845	124+445	1600
31	124+700	125+120	420
32	125+180	125+630	450
33	125+680	125+945	265
34	126+035	126+200	165
35	126+340	126+380	40
36	126+470	126+505	35
37	126+760	127+245	485
38	127+480	127+920	440
Total(m)			11545

6. Roadside drainage

An effective drainage system for drainage of road shall be designed as per stipulations of IRC SP: 42-2014.

V shaped earthen drain with CC lining shall be provided at all locations except built-up area (see Clause 2.5(a) of Schedule-B) where CC drains shall be provided. The superstructure of bridges shall be drained with suitable drainage spouts.

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

The EPC Contractor shall ensure proper functioning of the roadside drains by designing them as per site conditions and considering the outfall locations.

7. Design of structures

7.1 General

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

7.1.2 Width of the carriage way of new/Reconstruction bridge and structures shall be follows:

S No	Bridge at Km	Deck Width	Carriageway Width	Span Arrangement
NIL				

7.1.3 The following structures shall be provided with footpaths:

S. No.	Location at km	Remarks
NIL		

7.1.4 All bridges shall be high-level bridges

This shall be as per site condition

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

S. No.	Bridge at km	Utility service to be carried	Remarks
All Bridges shall have provisions for utility services to be carried over			

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

7.2 Culverts

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

7.2.2 Reconstruction of existing culverts:

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

S.No	Existing Chainage	Proposed Chainage	No of Span/Row	Length of Span/Dia	Proposed Type of Culvert
1	120.270	112.760	1	1.5	Box
2	120.565	113.005	1	1.5	Box
3	120.760	113.200	1	1.5	Box
4	120.965	113.410	1	1.5	Box
5	121.265	113.655	1	1.5	Box
6	121.515	113.885	1	1.5	Box
7	121.710	114.085	1	1.5	Box
8	121.850	114.220	1	1.5	Box
9	122.120	114.470	1	1.5	Box
10	122.375	114.660	1	1.5	Box
11	122.690	114.980	1	1.5	Box
12	122.830	115.115	1	1.5	Box
13	123.065	115.310	1	1.5	Box
14	123.250	115.505	1	1.5	Box
15	123.375	115.625	1	1.5	Box
16	123.515	115.765	1	1.5	Box
17	123.775	116.000	1	1.5	Box
18	123.830	116.055	1	1.5	Box
19	123.950	116.165	1	1.5	Box
20	124.060	116.265	1	1.5	Box
21	124.480	116.690	1	1.5	Box

S.No	Existing Chainage	Proposed Chainage	No of Span/Row	Length of Span/Dia	Proposed Type of Culvert
22	125.050	117.180	1	1.5	Box
23	125.405	117.465	1	1.5	Box
24	125.595	117.650	1	1.5	Box
25	126.115	118.170	1	1.5	Box
26	126.520	118.580	1	1.5	Box
27	127.220	119.310	1	1.5	Box
28	127.415	119.495	1	1.5	Box
29	127.925	120.000	1	1.5	Box
30	128.105	120.180	1	1.5	Box
31	128.375	120.435	1	1.5	Box
32	128.630	120.670	1	1.5	Box
33	128.800	120.825	1	1.5	Box
34	129.005	120.975	1	1.5	Box
35	129.120	121.100	1	1.5	Box
36	129.460	121.410	1	1.5	Box
37	129.710	121.655	1	1.5	Box
38	130.500	122.415	1	1.5	Box
39	130.600	122.525	1	1.5	Box
40	130.750	122.670	1	1.5	Box
41	130.880	122.790	1	1.5	Box
42	131.075	122.980	1	1.5	Box
43	131.225	123.135	1	1.5	Box
44	131.380	123.280	1	1.5	Box
45	131.705	123.600	1	1.5	Box
46	131.850	123.755	1	1.5	Box
47	132.075	123.960	1	1.5	Box
48	132.230	124.135	1	1.5	Box
49	132.400	124.295	1	1.5	Box
50	132.555	124.445	1	1.5	Box
51	132.625	124.530	1	1.5	Box
52	132.715	124.610	1	1.5	Box
53	132.880	124.705	1	1.5	Box
54	133.235	125.065	1	1.5	Box
55	133.470	125.280	1	1.5	Box
56	133.565	125.365	1	1.5	Box
57	133.670	125.475	1	1.5	Box
58	133.710	125.515	1	1.5	Box
59	133.820	125.625	1	1.5	Box
60	133.885	125.685	1	1.5	Box
61	133.945	125.755	1	1.5	Box
62	133.980	125.785	1	1.5	Box
63	134.105	125.905	1	1.5	Box
64	134.155	125.950	1	1.5	Box
65	134.265	126.030	1	1.5	Box

S.No	Existing Chainage	Proposed Chainage	No of Span/Row	Length of Span/Dia	Proposed Type of Culvert
66	134.385	126.170	1	1.5	Box
67	134.480	126.250	1	1.5	Box
68	134.560	126.330	1	1.5	Box
69	134.695	126.460	1	1.5	Box
70	134.730	126.500	1	1.5	Box
71	134.865	126.600	1	1.5	Box
72	134.920	126.650	1	1.5	Box
73	134.970	126.705	1	1.5	Box
74	135.030	126.760	1	1.5	Box
75	135.150	126.890	1	1.5	Box
76	135.470	127.210	1	3	Box
77	135.805	127.540	1	1.5	Box
78	135.880	127.615	1	1.5	Box
79	135.940	127.680	1	1.5	Box
80	135.965	127.700	1	1.5	Box
81	136.015	127.750	1	1.5	Box
82	136.095	127.830	1	3	Box
83	136.160	127.895	1	1.5	Box
84	136.185	127.920	1	1.5	Box
85	136.275	127.975	1	1.5	Box
86	135.380	128.075	1	1.5	Box
87	136.610	128.310	1	1.5	Box
88	136.680	128.385	1	1.5	Box
89	136.800	128.500	1	3	Box
90	136.875	128.575	1	1.5	Box
91	137.025	128.725	1	3	Box
92	137.120	128.815	1	1.5	Box
93	137.165	128.855	1	3	Box

Note –

- i) The proposed locations are minimum. Any change in number (as per site requirement) /length/span/height shall not be treated as change in scope of work.
- ii) The culvert location planned as Table above shall be adjusted accordingly to the exact location of cross-water stream or existing culvert located based on the topographic survey performed by the Contractor for the final drawings of the Detailed Design.
- iii) Cross road culvert to be provided at the location of Major Junction/ Minor Junctions for proper drainage facilities and utility purposes etc. as per manual and shall not be treated as change of scope.

7.2.3 Widening of existing culverts

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

S. No	Existing Chainage	Proposed Chainage	No of Span/ Row	Span Length/Dia	Type of Culvert
Nil					

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

S.No	Proposed Chainage	No of Span/Row	Length of Span/Dia	Proposed Type of Culvert
1	116.860	1	1.5	Box
2	117.045	1	1.5	Box
3	120.605	1	1.5	Box
4	120.920	1	1.5	Box
5	121.745	1	1.5	Box
6	124.650	1	1.5	Box
7	126.410	1	1.5	Box
8	128.165	1	4	Box

Note –

- i) The proposed locations are minimum. Any change in number (as per site requirement) /length/span/height shall not be treated as change in scope of work.
- ii) The culvert location planned as Table above shall be adjusted accordingly to the exact location of cross-water stream or existing culvert located based on the topographic survey performed by the Contractor for the final drawings of the Detailed Design.
- iii) Cross road culvert to be provided at the location of Major Junction/ Minor Junctions for proper drainage facilities and utility purposes etc. as per manual and shall not be treated as change of scope.

7.2.5 Repairs/replacements of railing/parapets, flooring and protection works of the existing culverts shall be undertaken as per site condition.

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

7.3 Bridges

7.3.1 Existing bridges to be re-constructed/widened

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

S. No	Location (km)	Proposed Deck Width	Span Arrangement
NIL			

- (ii) The following narrow bridges shall be widened:

S. No	Location (km)	Proposed Deck Width	Span Arrangement
NIL			

7.3.2 Additional new bridges

New bridges at the following locations on the Project Highway shall be constructed.

S No	Proposed Chainages	Span arrangement
NIL		

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

SI No	Location at Km	Type of bridge
NIL		

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

SI No	Location at Km	Remarks
1	112.325	Painting, Wearing coat, cleaning of expansion joint, drainage spouts & waterway
2	127.32	Painting, cleaning of expansion joint and drainage spouts
3	129.17	Painting, Wearing coat, cleaning of expansion joint, drainage spouts & waterway

7.3.5 Drainage system for bridge decks

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

7.3.6 Structures in marine environment

Nil

7.4 Rail-road bridges

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

7.4.2 Road over bridges (road over rail) shall be provided at the following level crossing

SI No	Location at Km	Length of Bridge
Nil		

7.4.3 Road under bridges (road under railway line) shall be provided at the following level crossings:

S. No.	Location of level crossing	Number and length of span
NIL		

7.5 Grade separated structures

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

7.6 Repairs and strengthening of structures

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

A – Bridges

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

B – ROB / RUB

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

C – Overpasses/Underpasses and other structures

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

7.7 List of Major Bridges and Structures

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

SI No	Location at Km	Remarks
1	112.325	Retain
2	129.17	Retain

8. Traffic control devices and road safety works

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

8.2 Specifications of the reflecting sheeting shall be provided as per Manual.

Note: For safe crossing of animals at 11 locations (both sides) in the project stretch the contractor shall provide adequate number of cautionary traffic signs and construct stone paved rough surface to reduce the speed of the vehicles.

9. Roadside furniture

Roadside furniture shall be provided in accordance with the provisions of section 11 of the Manual.

9.1 Overhead traffic signs: location and size

SI No.	Design Chainage (km)	Remarks
1	129.300	2 lane with both side sheeting

10. Compulsory afforestation

Total of 398 trees are identified to be affected in the proposed ROW. As per latest guideline, new trees to be planted by the contractor. The number of trees to be cut is an approximate number and any variation in the number shall not constitute a change of scope.

11. Hazardous locations

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

S. No.	Location stretch from (km) to (km)	LHS/RHS
NIL		

12. Special requirements for hill roads

The Breast wall shall be constructed as per table given below but not limited to.

Height (m)	Length (m)
6	550
Total	550

The retaining wall shall be constructed as per table given below but not limited to

Height (m)	Length (m)
1.5	200
2.5	220
3	60
4	20
Total	500

Note: Length of retaining wall and breast wall is minimum and additional length shall be provided by the contractor as per site requirement and shall not be treated as change of scope. Location and height of retaining/breast wall may be finalized as per site requirement and in consultation with Authority Engineer and increase in height, if required, shall not be treated as Change of Scope.

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 or any deviation thereof.

(Schedule B-1)

“Improvement/widening to Two-laning with earthen shoulder from Panda to Baghmara existing chainage from Ch. 119.800 to Ch. 139.000 (Design Ch. 112.300 to Ch. 129.385) of SH-4 Ranikor- Baghmara Project (Package-VI) in the state of Meghalaya on EPC basis under NH(O)-NE”.

Sr. No	Type of Utility	Unit	Quantity	Location/Stretch LHS/RHS
A	Electrical Utilities			
A1	Electrical Poles			
(i)	S.T Pole 12 m N/D (Galvanised)	Nos.	405.00	
(ii)	S.T Pole 9.5 m N/D (Galvanised)	Nos.	105.00	
(iii)	S.T Pole 8 m (Galvanised)	Nos.	30.00	
A2	Electrical cables			
i	ACSR Racocon Conductor	kms	26.30	
ii	ACSR Wolf Conductor	kms	1.42	
ii	ACSR Weasel Conductor	kms	15.05	
iv	GI Stay wire	Kgs	1656.00	
A3	Re-construction/shifting of 11/0.4 KV, 100KVA Transformer	Nos.	1.00	
B	Water/Sewage pipeline			
B1	Water supply pipeline (Public Health Engineering Dept., PHED)			
a	Supplying fitting fixing and Laying of G.I. pipes in trenches including carriage of pipes from stock yard to the site within a distance of 8 km. Except socket joints, all fittings required for the work will be paid extra as per current schedule of rates. Trenching and earth filling is also exclusive and shall be paid extra. (Medium quality). (New pipes)			
(i)	15mm dia	meters	100.00	
(ii)	25mm dia	meters	200.00	
(iii)	40mm dia	meters	200.00	
(iv)	50mm dia	meters	680.00	
b	Labour charge for taking out of GI Pipe with G.I special including fitting, fixing and relaying the same after clearing the pipe and special complete. Relaying of Servicable GI Pipes			

NHIDCL

Schedule B

(i)	15mm dia	meters	300.00	
(iii)	25mm dia	meters	300.00	
(iv)	40mm dia	meters	500.00	
(v)	50mm dia	meters	1200.00	
B2	Providing RCC S/Pillars as per PHE Specification all complete	meters	190.00	
B3	Construction CC Plat form as per PHE Specification all complete	Nos.	10.00	

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 plazas;
- b) roadside furniture;
- c) pedestrian facilities;
- d) tree plantation;
- e) truck lay-bys;
- f) bus-bays and bus shelters;
- g) rest areas;

2 Description of Project Facilities

Each of the Project Facilities is described below:

a) Toll Plaza:

Toll Plaza shall be designed as per the guidelines prescribed on following locations:-

Sr No	Project Facility	Toll Location (Design Ch.)	Design Requirements	Other Essential Details
NIL				

b) Roadside Furniture

The roadside furniture shall include the provision of the;

i. Traffic Signs

Traffic signs include roadside signs, overhead signs and curb mounted signs along the entire Project Highway as per Section 9.2 of the Manual.

ii. Pavement Markings

Pavement markings shall cover road marking for the entire Project Highway as per Section 9.3 of

the Manual.

iii. LED Traffic Blinkers

LED traffic blinker signal shall be provided on entire project length.

iv. Crash barrier

W-beam crash barrier shall be provided along the project highway at the locations as suggested in Manual.

v. Delineators

Delineators for the entire Project Highway at the locations as suggested in relevant IRC Manual shall be provided

vi. Boundary stones

For the entire Project Highway as suggested in Manual.

vii. Hectometer / Kilometer stones

For the entire Project Highway as suggested in Manual.

c) Pedestrian Facilities

The pedestrian facilities shall be provided as per Manual.

d) Tree Plantation

The landscaping and tree plantation shall be provided as per IRC:SP:21-2009.

e) Truck Lay byes:

Truck lay byes shall be provided at the following locations:-

S. No.	Design Chainage	Location
NIL		

f) Bus Stops

2 nos of bus stops shall be provided. Location shall be finalized in consultation with Authority Engineer.

g) Rest Areas :NIL

3. Facilities for the Authority and the Authority's Engineer

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 Standards and Specifications for Two Laning of State Highways published by the Indian Roads Congress – IRC: SP: 73-2018.

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-Lane Highways published by IRC (referred to as “Manual” in this Schedule) 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

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.

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

S. No	Item	Description of deviation	Clause reference of IRC SP 73:2018
1	Minimum Desirable Radius	Details of curves with radius less than 150 are given in Appendix 1	Clause 2.9.4 Minimum desirable radius of horizontal curves is 150 m in mountaneous and steep terrain.
2	Width of carriageway	Roadway(Carriageway + Earthen Shoulders) width is 10m (7+1.5*2)	Fig. 2.8, 2.9 and 2.10. Roadway width shall be 11m,11m and 10.5m respectively.

S. No .	Item	Description of deviation	Clause reference of I SP 73:2018
3	Deck width of bridges	Deck width of bridges is 12m	Fig. 7.6 , deck width of bridges shall be 18m

MAINTENANCE REQUIREMENTS

1 Maintenance Requirements

- (i) The Contractor shall, at all times maintain the Project Highway in accordance with the provisions of this Agreement, Applicable Laws and Applicable Permits.
- (ii) The Contractor shall repair or rectify any Defect or deficiency set forth in Paragraph 2 of this Schedule-E within the time limit specified therein and any failure in this behalf shall constitute non-fulfillment of the Maintenance obligations by the Contractor. Upon occurrence of any breach hereunder, the Authority shall be entitled to effect reduction in monthly 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 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.

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/Repair	Maintenance Specifications
		Desirable	Acceptable					
		Flexible Pavement (Pavement of MCW, Service Road, approaches of Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	Potholes					
Cracking	Nil		< 5 % subject to limit of 0.5 sqm for any 50 m length	Daily		7-15 days	MORT&H Specification 3004.3	
Rutting	Nil		< 5 mm	Daily	Straight Edge	15 -30 days	MORT&H Specification 3004.2	
Corrugations and Shoving	Nil		< 0.1 % of area	Daily	Length Measurement Unit like	2-7 days	IRC:82- 2015	
Bleeding	Nil		< 0.1 % of area	Daily	Scale, Tape, odometer etc.	3-7 days	MORT&H Specification 3004.4	
Raveling / Stripping	Nil		< 0.1 % 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, restricted to 30 cm from the edge	Daily	Scale, Tape, odometer etc.		IRC:82- 2015	
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	180 days	IRC:82-2015
Skid Number	60SN		50SN	Bi-	SCRIM		180 days	BS: 7941-1: 2006

				Annually	(Sideway-force	Travelled Surfaces with Accelerometer		
	Pavement Condition Index	3	2.1	Bi-Annually	Coefficient Routine Investigation Machine or equivalent)	Established Inertial Profiling Reference ASTM E1656 -94: 2000- Standard Guide for Classification of Automatic Pavement Condition Survey Equipment	180 days	IRC:82- 2015
	Other Pavement Distresses			Bi-Annually			2-7 days	IRC:82- 2015
	Deflection/ Remaining Life			Annually	Falling Weight Deflect meter	IRC 115: 2014	180 days	IRC:115-2014
Rigid Pavement (Pavement of MCW, Service Road, Grade Structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	Roughness BI	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 Coefficient Routine Investigation Machine or equivalent)	RC:SP:83-2008	180 days	IRC:SP:83-2008
		Minimum SN	Traffic Speed (Km/h)					
		36	50					
		33	65					
		32	80					
		31	95					
		31	110					

Embankment/ Slope	Edge drop at shoulders	Nil	40 mm	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 side slope	Daily			7-15 days	MORT&H Specification 408.4
	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 $d < D/2$ Short Term	For the case $d > D/2$ Long Term
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		
			3	w = 0.5 - 1.5 mm, discernible from fast-moving car		
			4	w = 1.5 - 3.0 mm		
			5	w > 3 mm.	Seal without delay	Seal, and stitch if L > 1m. Within 7days
					Seal, and stitch if L > 1 m.	Staple or Dowel Bar Retrofit, FDR for affected portion. Within 15days
					Within 7 days	
2.	Single Transverse (or Diagonal) Crack intersecting with one or more joints	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.2 mm, hair cracks	Route and seal with epoxy.	Staple or Dowel Bar Retrofit.
			2	w = 0.2 - 0.5 mm, discernible from slow vehicle	Within 7 days	Within 15 days
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route, seal and stitch, if L > 1 m. Within 7 days	
			4	w = 3.0 - 6.0 mm	Dowel Bar Retrofit.	Full Depth Repair Dismantle and

					Within 15 days	reconstruct affected.
			5	w > 6 mm, usually associated with spalling, and/or slab rocking under traffic	Not Applicable, as it may be full depth	Portion with norms and specifications - See Para 5.5 & 9.2 Within 15days
3	Single Longitudinal Crack intersecting with one or more joints	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.5 mm, discernible from slow moving vehicle	Seal with epoxy, if L > 1 m. Within 7 days	Staple or dowel bar retrofit. Within 15days
			2	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route seal and stitch, if L > 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 15days
			4	w = 6.0 - 12.0 mm, usually associated with spalling		
			5	w > 12 mm, usually associated with spalling, and/or slab rocking under traffic	Not Applicable, as it may be full depth	Full Depth Repair Dismantle and reconstruct affected portion as per norms and specifications - See Para 5.6.4 Within 15days

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, Reinstatement Sub-base, Reconstruct whole slab as per specifications within 30 days
			4	w = 3.0 - 6.0 mm panel broken into 2 or 3 pieces		
5	w > 6 mm and/or panel broken into more than 4 pieces					
5	Corner Break	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
			3	w < 1.5 mm; L < 0.6 m, two corners broken	Partial Depth (Refer Figure 8.3 of	Full depth repair
			4	w > 1.5 mm; L > 0.6 m or three corners broken	IRC:SP: 83-2008)	
5	three or four corners broken	Within 15 days	Reinstate sub-base, and reconstruct the			

						slab as per norms and specifications within 30days
6	Punchout (Applicable to Continuous Reinforced Concrete Pavement (CRCP) only)	w = width of crack L = length (m/m ²)	0	Nil, not discernible	Not Applicable, as it may be full depth	No Action
			1	w < 0.5 mm; L < 3 m/m ²		Seal with low viscosity epoxy to secure broken parts.
			2	either w > 0.5 mm or L < 3 m/m ²		Within 15 days
			3	w > 1.5 mm and L < 3 m/m ²		Full depth repair - Cut out and replace damaged area taking care not to damage Reinforcement.
			4	w > 3 mm, L < 3 m/m ² and deformation		
5	w > 3 mm, L > 3 m/m ² and deformation	Within 30days				
7	Raveling or Honeycomb type surface	r = area damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	No Action	
			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 Within 30 days	
			5	r > 50% and h > 25 mm	Reconstruct slabs, 4 or more slabs if affecting. Within 30 days	
8	Scaling	r = damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	Short Term No Action	Long Term
			1	r < 2 %	Local repair of areas Damaged and liable to be damaged. Within 7days Bonded Inlay within 15 Days	
			2	r = 2 - 10 %		
			3	r = 10 - 20%		
			4	r = 10 - 30%	Reconstruct slab within 30 days	
5	r > 30 % and h > 25mm					
9	Polished Surface/Glazing	t = texture depth, sand patch test	0		No action	
			1	t > 1 mm		

			2	$t = 1 - 0.6 \text{ mm}$		Not Applicable
			3	$t = 0.6 - 0.3 \text{ mm}$	Monitor rate of deterioration	
			4	$t = 0.3 - 0.1 \text{ mm}$	Diamond Grinding if Affecting	
			5	$t < 0.1 \text{ mm}$	50% or more slabs in a	
					Continuous stretch of minimum 5 km. Within 30 days	
10	Popout (Small Hole), Pothole Refer Para 8.4	n = number/m ² d = diameter h = maximum depth	0	$d < 50 \text{ mm}; h < 25 \text{ mm}; n < 1 \text{ per } 5 \text{ m}^2$	No action.	Not Applicable
			1	$d = 50 - 100 \text{ mm}; h < 50 \text{ mm}; n < 1 \text{ per } 5 \text{ m}^2$	Partial depth repair 65 mm deep.	
			2	$d = 50 - 100 \text{ mm}; h > 50 \text{ mm}; n < 1 \text{ per } 5 \text{ m}^2$	Within 15 days	
			3	$d = 100 - 300 \text{ mm}; h < 100 \text{ mm}; n < 1 \text{ per } 5 \text{ m}^2$	Partial depth repair 110mm	
			4	$d = 100 - 300 \text{ mm}; h > 100$	i.e.10 mm more than the depth of the hole.	

				mm; n < 1 per 5 m ²	Within 30 days	
			5	d > 300 mm; h > 100 mm: n > 1 per 5 m ²	Full depth repair. Within 30 days	
11	Joint Seal Defects	loss or damage L = Length as % total joint length	0	Difficult to discern.	No action.	Not Applicable
			1	Discernible, L < 25% but of little immediate consequence with regard to ingress of water or trapping incompressible material.	Clean joint, inspect later.	
			2	Notable. L > 25% insufficient protection against ingress of water and trapping incompressible material.	Clean and reapply sealant in Selected locations. Within 7 days	
			4	Severe; w > 3 mm negligible protection against ingress of water and trapping incompressible material.	Clean, widen and reseal the joint. Within 7 days	
12	Spalling of Joints	w = width on either side of the joint L = length of spalled portion (as % joint	0	Nil, not discernible	No action.	
			1	w < 10 mm	Apply low viscosity epoxy resin/ mortar	

		length)			in cracked portion.	
			2	w = 10 - 20 mm, L < 25%	Within 7 days Partial Depth Repair.	Not Applicable
			3	w = 20 - 40 mm, L > 25%	Within 15 days	
			4	w = 40 - 80 mm, L > 25%	30 - 50 mm deep, h = w + 20% of w, within 30 days	
			5	w > 80 mm, and L > 25%	50 - 100 mm deep repair. H = w + 20% of w. Within 30 days	
13	Faulting (or Stepping) in Cracks or Joints	f = difference of level	0	not discernible, < 1 mm	No action.	No action.
			1	f < 3 mm		
			2	f = 3 - 6 mm	Determine cause and observe, take action for diamond grinding	Replace the slab as appropriate.
			3	f = 6 - 12 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 = vertical displacement from normal profile	0	Nil, not discernible	No Action	
			1	$h < 6 \text{ mm}$	Install Signs to Warn Traffic within 7 days	
			2	$h = 6 - 12 \text{ mm}$		
			3	$h = 12 - 25 \text{ mm}$		
			4	$h > 25 \text{ mm}$	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, $h < 5 \text{ mm}$	No action.	
			1	$h = 5 - 15 \text{ mm}$		

			2	h = 15-30 mm, Nos <20% joints	Install Signs to Warn Traffic within 7 days	Not Applicable
			3	h = 30 - 50 mm		
			4	h > 50 mm or > 20% joints	Strengthen subgrade. Reinstate pavement at normal level if L < 20 m. Within 30 days	
			5	h > 100 mm		
16	Heave	h = positive vertical displacement from normal profile. L = length	0	Not discernible. h < 5 mm	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.	
			5	h > 100 mm		

					Within 30 days		
17	Bump	h = vertical displacement from normal profile	0	h < 4 mm	No action	Construction Limit for New Construction.	
			1	h = 4 - 7 mm	Grind, in case of new construction within 7 days		
			3	h = 7 - 15 mm	Grind, in case of ongoing Maintenance within 15 days		Replace in case of new construction. Within 30days
			4	h > 15 mm	Full Depth Repair. Within 30 days		Full Depth Repair. Within 30days
18	Lane to Shoulder Dropoff	f = difference of level	0	Nil, not discernible < 3mm	Short Term No Action	Long Term	
			1	f = 3 - 10 mm	Spot repair of shoulder		
			2	f = 10 - 25 mm	within 7 days		

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

			3 to 4	Blockages observed in drains, but water flowing	Clean drains etc within 7 days, Follow up	Action required to stop water damaging foundation within 30 days.
			5	Ponding, accumulation of water observed	-do	

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

Asset Type	Performance Parameter	Level of Service (LOS)			Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Highway	Availability of Safe Sight Distance	As per IRC SP :84-2014, a minimum of safe stopping sight distance shall be available throughout.			Monthly	Manual Measurements with Odometer along with video/ image backup	Removal of obstruction within 24 hours, in case of sight line affected by temporary objects such as trees, temporary encroachments. In case of permanent structure or design deficiency: Removal of obstruction/improvement of deficiency at the earliest Speed Restriction boards and suitable traffic calming measures such as transverse bar marking, blinkers, etc. shall be applied during the period of rectification.		IRC:SP 84-2014
		Design Speed, kmph	Desirable Minimum Sight Distance (m)	Safe Stopping Sight Distance (m)					
		100	360	180					
		80	260	130					
Pavement Marking	Wear	<70% of marking remaining			Bi-Annually	Visual Assessment as per Annexure-F	Re - painting	Cat-1 Defect - within 24 hours Cat-2 Defect -	IRC:35-2015

				of IRC:35-2015		within 2 months		
	Day time Visibility	During expected life Service Time Cement Road - 130mcd/m ² /lux Bituminous Road - 100mcd/m ² /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/m ² /lux)
		Up to 65						200 80
		65-100						250 120
		Above 100						350 150
		Initial and Minimum Performance for Night Visibility under wet condition (Retro reflectivity):						
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	IRC:67-2012	

						Gantry/Cantilever Sign boards	
	Retro reflectivity	As per specifications in IRC:67-2012	Bi-Annually	Testing of Each signboard using Retro Reflectivity Measuring Device. In accordance with ASTM D 4956-09.	Change of signboard	48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs) 1 Month in case of Gantry/Cantilever Sign boards	IRC:67-2012
Kerb	Kerb Height	As per IRC 86:1983 depending upon type of Kerb	Bi-Annually	Use of distance measuring tape	Raising Kerb Height	Within 1 Month	IRC 86:1983
	Kerb Painting	Functionality: Functioning of Kerb painting as intended	Daily	Visual with video/image backup	Kerb Repainting	Within 7-days	IRC 35:2015
Other Road Furniture	Reflective Pavement Markers (Road Studs)	Numbers and Functionality as per specifications in IRC:SP:84-2014 and IRC:35-2015, unless specified in Schedule-B.	Daily	Counting	New Installation	Within 2 months	IRC:SP:84-2014, IRC:35-2015
	Pedestrian Guardrail	Functionality: Functioning of guardrail as intended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:SP:84-2014
	Traffic Safety Barriers	Functionality: Functioning of Safety Barriers as intended	Daily	Visual with video/image	Rectification	Within 7 days	IRC:SP:84-2014,

				backup			IRC:119- 2015						
	End Treatment of Traffic Safety Barriers	Functionality: Functioning of End Treatment as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84-2014, IRC:119- 2015						
	Attenuators	Functionality: Functioning of Attenuators as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP-2014, IRC:119- 2015						
	Guard Posts and Delineators	Functionality: Functioning of Guard Posts and Delineators as intended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC: 79 - 1981						
	Overhead Sign Structure	Overhead sign structure shall be structurally adequate	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:67-2012						
	Traffic Blinkers	Functionality: Functioning of Traffic Blinkers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84-2014						
	Highway Lighting System	Highway Lights	Illumination: Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC:SP:84-2014					
No major failure in the lighting system									Daily	-	Rectification of failure	24 hours	IRC:SP:84-2014
No minor failure in the lighting system									Monthly	-	Rectification of failure	8 hours	IRC:SP:84-2014
Toll Plaza Canopy Lights		Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC:SP:84-2014						
								No major/minor failure in the lighting system	Daily	-	Rectification of failure	8 hours	IRC:SP:84-2014

	<u>Obstruction</u>						
Trees and Plantation including median plantation	in a minimum head-room of 5.5 m above carriageway or obstruction in visibility of road signs	No obstruction due to trees	Monthly	Visual with video/image backup	Removal of trees	Immediate	IRC:SP:84-2014
	Deterioration in health of trees and bushes	Health of plantation shall be as per requirement of specifications & instructions issued by Authority from time to time	Daily	Visual with video/image backup	Timely watering and treatment. Or Replacement of Trees and Bushes.	Within 90 days	IRC:SP:84-2014
	Vegetation affecting sight line and road structures	Sight line shall be free from obstruction by vegetation	Daily	Visual with video/image backup	Removal of trees	Immediate	IRC:SP 84-2014
Rest Areas	Cleaning of toilets	-	Daily	-	-	Every 4 hours	
	Defects in electrical, water and sanitary installations	-	Daily	-	Rectification	24 hours	
Other Project Facilities and Approach roads	Damage or deterioration in Approach Roads, pedestrian facilities, truck lay-bys, bus-bays, busshelters, cattle crossings, Traffic Aid Posts, Medical Aid Posts and other works		Daily	-	Rectification	15 days	IRC:SP 84-2014

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Pipe/box/slab culverts	Free waterway/unobstructed flow section	85% of culvert normal flow area to available.	2 times in a year (before and after rainy season)	Inspection by Bridge Engineer as per IRC SP: 35-1990 and recording of depth of silting and area of vegetation.	Cleaning silt up soils and debris in culvert barrel after rainy season, removal of bushes and vegetation, U/s of barrel, under barrel and D/s of barrel before rainy season.	15 days before onset of monsoon and within 30 days after end of rainy season.	IRC 5-2015, IRC SP:40-1993 and IRC SP:13-2004
	Leak-proof expansion joints if any	No leakage through expansion joints	Bi-Annually	Physical inspection of expansion joints as per IRC SP: 35-1990 if any, for leakage strains on walls at joints.	Fixing with sealant suitably	30 days or before onset of rains whichever comes earlier	IRC SP:40-1993 and IRC SP:69-2011
	Structurally sound	Spalling of concrete not more than 0.25 sqm	Bi-Annually	Detailed inspection of all components of culvert as per IRC SP:35-1990 and recording the defects	Repairs to spalling, cracking, delamination, rusting shall be followed as per IRC:SP:40-1993.	15 days	IRC SP 40-1993 and MORTH Specification s clause 2800
Delamination of concrete not more than 0.25 sq.m.							
Cracks wider than 0.3 mm not							

		more than 1m aggregatelength					
	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sqm, damage to solid apron (concreteapron) not more than 1 sqm	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier.	IRC: SP 40-1993 and IRC:SP:13-2004.
Bridges including ROBs Flyover etc. as applicable	Riding quality or user comfort	No pothole in wearing coat on bridge deck	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC or wearing coat	15 days	MORT&H Specification 2811
Bridge -Super Structure	Bumps	No bump at expansion joint	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC on either side of expansion joints, profile correction course on approach slab in case of settlement to approach embankment	15 days	MORT&H Specification 3004.2 & 2811.
	User safety (condition of crash barrier and guard rail)	No damaged or missing stretch of crash barrier or pedestrian hand railing	Daily	Visual inspection and detailed condition survey as per IRC SP: 35-1990.	Repairs and replacement of safety barriers as the case may be	3 days	IRC: 5-1998, IRC SP: 84-2014 and IRC SP: 40-1993.

	Rusted reinforcement	Not more than 0.25 sq.m	Bi- Annually	Detailed condition survey as per 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 live loads	Within design limits.	Once in every 10 years for spans more than 40 m	Load test method	Carry out major rehabilitation works on bridge to retain original design loads	6 months	IRC SP: 51-1999.

					capacity		
	Vibrations in bridge deck due to moving trucks	Frequency of vibrations shall not be more than 5 Hz	Once in every 5 years for spans more than 30m and every 10 years for spans between 15 to 30 m	Laser displacement sensors or laser vibro-meters	Strengthening of super structure	4 months	AASHTO LRFD specifications
	Leakage in Expansion joints	No damage to elastomeric sealant compound in strip seal expansion joint, no leakage of rain water through expansion joint in case of buried and asphalt plug and copper strip joint	Bi-Annually	Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge Inspection Unit	Replace of seal in expansion joint	15 days	MORTH specifications 2600 and IRC SP: 40-1993.
	Debris and dust in strip seal expansion joint	No dust or debris in expansion joint gap.	Monthly	Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge Inspection Unit	Cleaning of expansion joint gaps thoroughly	3 days	MORTH specifications 2600 and IRC SP: 40-1993.
	Drainage spouts	No down take pipe missing/broken below soffit of the deck slab. No	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using	Cleaning of drainage spouts thoroughly. Replacement of missing/broken down take pipes	3 days	MORTH specification 2700.

		silt, debris, clogging of drainage spout collection chamber.		Mobile Bridge Inspection Unit	with a minimum pipe extension of 500mm below soffit of slab. Providing sealant around the drainage spout if any leakages observed		
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	Delaminating of bearing reinforcement not more than 5%, cracking or tearing of rubber not more than 2 locations per	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	3 months	MORTH specification 2810 and IRC SP: 40-199.

		side, no rupture of reinforcement or rubber			load transfer on to bearings.		
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 oubt, use Underwater camera for inspection of deep wells in major Rivers.	suitable protection works around pier/abutment	1 months	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 sq.m, damage to solid apron (concrete apron) not more than 1 sq.m	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching.	30 days After defect observation or 2 weeks before onset of rainy season whichever is earlier.	IRC: SP 40-1993 and IRC:SP:13-2004.
<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
(vi)	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		
(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
(vi)	Trees and bushes requiring replacement	30 (thirty) days
(v)	Removal of vegetation affecting sight line and	15 (fifteen) days

	road structures	
(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		
(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)
(vi)	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
(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 3.1.7(a))

APPLICABLE PERMITS

1 Applicable Permits

1.1 The Contractor shall obtain, as required under the Applicable Laws, the following Applicable Permits:

- (a) Permission of the State Government for extraction of boulders / stones 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.

1.2 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 7.1.1, 7.5.3 and 19.2)

FORM OF BANK GUARANTEE

Annex-I

(See Clause 7.1.1)

Performance Security

To,

Authority

.....,

.....

.....,

.....

WHEREAS:

(A) _____ [name and address of contractor] (hereinafter called the Contractor") and _____, (hereinafter called the "Authority") have entered into an agreement (hereinafter called the "Agreement") for the "**Improvement/widening to Two-laning with earthen shoulder of Panda (Design Ch. 112.300 km) to Baghmara (Design Ch. 129.385 km) [R-M-B Package-VI] on SH-4 section of Ranikor- Maheshkhola-Baghmara Project in the state of Meghalaya on EPC basis**", subject to and in accordance with the provisions of the Agreement

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

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

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

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor's obligations during the Construction Period/ Defects Liability Period and Maintenance Period under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of [General Manager in the National Highways Authority of India], that the Contractor has committed default in the due and faithful performance of all or any of its obligations under and in accordance with the Agreement shall

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

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

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

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

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.
12. This guarantee shall also be 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. Intimation regarding issuance of this Bank Guarantee shall be sent to Authority's Bank through SFMS gateway as per the details below:

S.No.	Particulars	Details
1	Name of Beneficiary	National Highways & Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC CNRB0019062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Canara Bank (erstwhile Syndicate Bank), Transport Bhawan, 1st Parliament Street, NewDelhi110001

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 7.5.3)

Form for Guarantee for Withdrawal of Retention Money

To,

Authority

.....

WHEREAS:

(A) name and address of contractor] (hereinafter called the “**Contractor**”) has executed an agreement (hereinafter called the “**Agreement**”) with (hereinafter called the “**Authority**”) for the “Improvement/widening to Two-laning with earthen shoulder of Panda (Design Ch. 112.300 km) to Baghmara (Design Ch. 129.385 km) [R-M-B Package-VI] on SH-4 section of Ranikor- Maheshkhola-Baghmara Project in the state of Meghalaya on EPC basis”, subject to and in accordance with the provisions of the Agreement.

(B) In accordance with Clause 7.5.3 of the Agreement, the Contractor may withdraw the retention money (hereinafter called the “**Retention Money**”) after furnishing to the Authority a bank guarantee for an amount equal to the proposed withdrawal.

(C) We, through our branch at (the “**Bank**”) have agreed to furnish this bank guarantee (hereinafter called the “**Guarantee**”) for the amount of Rs. ----- cr. (Rs-----Crore) (the “**Guarantee Amount**”).

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

1. The Bank hereby unconditionally and irrevocably 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, 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 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 Retention Money and 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 Retention Money.
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 90 (ninety) days after the date of the Completion Certificate specified in Clause 12.4 of the Agreement.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.
12. This guarantee shall also be operatable at our..... Branch at New Delhi, 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. Intimation regarding issuance of this Bank Guarantee shall be sent to Authority's Bank through SFMS gateway as per the details below:

S.No.	Particulars	Details
1	Name of Beneficiary	National Highways & Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC CNRB0019062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Canara Bank (erstwhile Syndicate Bank), Transport Bhawan, 1st Parliament Street, NewDelhi110001

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 – III (Schedule - G)
(See Clause 19.2)

Form for Guarantee for Advance Payment

To, Authority

.....
.....
.....,
.....

WHEREAS:

(A) _____ name and address of contractor] (hereinafter called the "Contractor") has executed an agreement (hereinafter called the "Agreement") with _____, (hereinafter called the "Authority") for the "Improvement/widening to Two-laning with earthen shoulder of Panda (Design Ch. 112.300 km) to Baghmara (Design Ch. 129.385 km) [R-M-B Package-VI] on SH-4 section of Ranikor- Maheshkhola-Baghmara Project in the state of Meghalaya on EPC basis", subject to and in accordance with the provisions of the Agreement

(B) In accordance with Clause 19.2 of the Agreement, the Authority shall make to the Contractor an interest free advance payment (herein after called "**Advance Payment**") equal to 10% (ten per cent) of the Contract Price; and that the Advance Payment shall be made in three 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/third} 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 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 National Highways Authority of India), that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the installment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences

[§] The Guarantee Amount should be equivalent to 110% of the value of the applicable instalment.
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 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.
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 Advance Payment.
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 on or before the aforesaid date, the Bank shall be discharged from its liabilities hereunder.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.
12. This guarantee shall also be operatable at our..... Branch at New Delhi, 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. Intimation regarding issuance of this Bank Guarantee shall be sent to Authority's Bank through SFMS gateway as per the details below:

S.No.	Particulars	Details
1	Name of Beneficiary	National Highways & Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC CNRB0019062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Canara Bank (erstwhile Syndicate Bank), Transport Bhawan, 1st Parliament Street, NewDelhi110001

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

SIGNED, SEALED AND DELIVERED

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

(Name) (Designation)

(Code Number)

(Address) NOTES:

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

Schedule-H

(See Clauses 10.1 (iv) and 19.3)

Contract Price Weightages

1.1 The Contract Price for this Agreement is Rs -----

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

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage
1	2	3	4
Road works including culverts, widening and repair of culverts.	75.30%	A- Widening and strengthening of existing road	
		(1) Earthwork up to top of the sub-grade	33.74%
		(2) Sub-base Course	4.42%
		(3) Non Bituminous Base Course	4.47%
		(4) Bituminous Base Course	0.60%
		(5) Wearing Coat	4.01%
		(6) Widening and repair of culvert	0.00%
		B1- Reconstruction/ New 2-Lane realignment/bypass (Flexible Pavement)	
		(1) Earthwork up to top of the sub-grade	27.60%
		(2) Sub-base Course	4.42%
		(3) Non Bituminous Base Course	4.47%
		(4) Bituminous Base Course	0.60%
		(5) Wearing Coat	4.01%
		B2- Reconstruction/ New 2-Lane	

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage
1	2	3	4
		<p>realignment/bypass (Rigid Pavement)</p> <p>(1) Earthwork up to top of the sub-grade 0.00%</p> <p>(2) Sub-base Course 0.00%</p> <p>(3) Dry Lean Concrete (DLC) Course 0.00%</p> <p>(4) Pavement Quality Control (PQC) Course 0.00%</p> <p>C1- Reconstruction/ New Service Road (Flexible Pavement)</p> <p>(1) Earthwork up to top of the sub-grade 0.00%</p> <p>(2) Sub-base Course 0.00%</p> <p>(3) Non Bituminous Base Course 0.00%</p> <p>(4) Bituminous Base Course 0.00%</p> <p>(5) Wearing Coat 0.00%</p> <p>C2- Reconstruction/ New Service Road (Rigid Pavement)</p> <p>(1) Earthwork up to top of the sub-grade 0.00%</p> <p>(2) Sub-base Course 0.00%</p> <p>(3) Dry Lean Concrete (DLC) Course 0.00%</p> <p>(4) Pavement Quality Control (PQC) Course 0.00%</p> <p>D - Re-Construction and new culverts on existing road, realignments on existing road,</p>	

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage
1	2	3	4
		<p>On completion of Guide Bund and River Training Works complete in all respect.</p> <p>B.1- Widening and repair of Underpasses/overpasses</p> <p>Underpasses/Overpasses</p> <p>B.2- New Underpasses/overpasses</p> <p>(1) Foundation+Sub Structure: On completion of the foundation work including foundations for wing and return walls ,abutments,piers upto the abutment/pier cap</p> <p>(2) Super Structure: On completion of the super structure in all respect including wearing coat, bearings, expansion joints, hand rails, crash barriers,road sign & markings, tests on completion etc. complete in all respect.</p> <p>Wearing Coat (a) in case of Overpass- wearing coat including expansion joint complete in all respect as specified and (b) in case of underpass rigid pavement including drainage facility complete in all respects as specified.</p> <p>(3) Approaches:</p>	<p>0.00%</p> <p>0.00%</p> <p>54.36%</p> <p>39.54%</p>

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage
1	2	3	4
		<p>retaining walls, stone pitching and protection works)</p> <p>B.1-Widening and repair of</p> <p>(a) ROB</p> <p>(b) RUB</p> <p>(1) Foundation 0.00%</p> <p>(2) Sub-structure 0.00%</p> <p>(3) Super-structure (including bearings) 0.00%</p> <p>(4) Wearing Coat (a) in case of ROB - wearing coat including expansion joint complete in all respect as specified and (b) in case of RUB rigid pavement under RUB including drainage facility complete in all respects as specified. 0.00%</p> <p>(5) Miscellaneous items like hand rails, crash barriers, road markings etc. 0.00%</p> <p>(6) Wing walls/Return Walls 0.00%</p> <p>(7) Approaches (including retaining walls, stone pitching and protection works) 0.00%</p> <p>B.2-New ROB/RUB</p> <p>(a) ROB</p> <p>(b) RUB</p> <p>(1) Foundation 0.00%</p> <p>(2) Sub-structure 0.00%</p> <p>(3) Super-structure (including bearings) 0.00%</p> <p>(4) Wearing Coat (a) in case of ROB - wearing coat including expansion joint complete in all respect as specified and (b) in case of</p>	

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage
1	2	3	4
		<p>RUB rigid pavement under RUB including drainage facility complete in all respects as specified.</p> <p>(5) Miscellaneous items like hand rails, crash barriers, road markings etc. 0.00%</p> <p>(6) Wing walls/Return Walls 0.00%</p> <p>(7) Approaches (including retaining walls, stone pitching and protection works) 0.00%</p> <p>C.1- Widening and repair of Elevated Sections/Flyovers/Grade Separators</p> <p>(1) Foundation 0.00%</p> <p>(2) Sub-structure 0.00%</p> <p>(3) Super-structure (including bearings) 0.00%</p> <p>(4) Wearing Coat including expansion joints. 0.00%</p> <p>(5) Miscellaneous items like hand rails, crash barriers, road markings etc. 0.00%</p> <p>(6) Wing walls/Return Walls 0.00%</p> <p>(7) Approaches (including retaining walls, stone pitching and protection works) 0.00%</p> <p>C.2- New Elevated Sections/Flyovers/Grade Separators</p> <p>(1) Foundation 0.00%</p> <p>(2) Sub-structure 0.00%</p> <p>(3) Super-structure (including bearings) 0.00%</p> <p>(4) Wearing Coat including expansion joints. 0.00%</p> <p>(5) Miscellaneous items like 0.00%</p>	

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage
1	2	3	4
		hand rails, crash barriers, road markings etc. (6) Wing walls/Return Walls (7) Approaches (including retaining walls, stone pitching and protection works)	0.00% 0.00%
Other works	17.70%	(i) Toll Plaza	0.00%
		(ii) Road side drains	15.32%
		(iii) Road signs, markings, km stones, safety devices, ...	25.76%
		(iv) Project facilities	0.00%
		a) Bus bays	1.90%
		b) Truck lay bye	0.00%
		c) Rest Areas	0.00%
		d) Others (Miscellaneous items and Site Clearance)	14.02%
		(v) Road side plantation	0.00%
		(vi) Repair of protection works other than approaches to the bridges, elevated sections/ flyovers/grade separators and ROBs/RUBs	0.00%
(vii) Safety and traffic management during construction	0.00%		
(viii) Protection works	43.00%		
Utility Shifting	2.98%	PHED	4.81%
		Electric Shifting	95.19%
		Others	

1.3 Procedure of estimating the value of work done.

1.3.1 Road works

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

Table 1.3.1

Stage of Payment	Percentage - weightage	Payment Procedure
A- Widening and strengthening of existing road		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 for equivalent 2 laning of not less than 5 (five) percent for equivalent 2 -laning length..
(1) Earthwork up to top of the sub-grade	33.74%	
(2) Sub-base Course	4.42%	
(3) Non Bituminous Base Course	4.47%	
(4) Bituminous Base Course	0.60%	
(5) Wearing Coat	4.01%	
(6) Widening and repair of culvert	0.00%	Cost of completed culverts shall be determined pro rate with respect to the total number of culverts. Payment shall be made on the completion of atleast one culverts.
B1- Reconstruction/ New 2-Lane realignment/bypass (Flexible Pavement)		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 0.5 (zero point five) km length whichever is less.
(1) Earthwork up to top of the sub-grade	27.60%	
(2) Sub-base Course	4.42%	
(3) Non Bituminous Base Course	4.47%	
(4) Bituminous Base Course	0.60%	
(5) Wearing Coat	4.01%	
B2- Reconstruction/ New 2-Lane realignment/bypass (Flexible Pavement)		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 0.5 (zero point five) km length whichever is less.
(1) Earthwork up to top of the sub-grade	0.00%	
(2) Sub-base Course	0.00%	

Stage of Payment	Percentage - weightage	Payment Procedure
(3) Dry Lean Concrete (DLC) Course	0.00%	
(4) Pavement Quality Control (PQC) Course	0.00%	
C1- Reconstruction/ New Service Road (Flexible Pavement)		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 0.5 (zero point five) km length whichever is less.
(1) Earthwork up to top of the sub-grade	0.00%	
(2) Sub-base Course	0.00%	
(3) Non Bituminous Base Course	0.00%	
(4) Bituminous Base Course	0.00%	
(5) Wearing Coat	0.00%	
C2- Reconstruction/ New Service Road (Rigid Pavement)		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 0.5 (zero point five) km length whichever is less.
(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 - Re-Construction and new culverts on existing road, realignments on existing road, realignments, bypasses:		Cost of each culvert shall be determined on pro rata basis with respect to the total number of culverts. Payment shall be made on the completion of one nos. culverts corresponding to equivalent Two laning.
Culverts(Length<6m)	11.66%	

@ For calculation of payment stage for main carriageway the project length shall be converted into equivalent 2 lane length . For example, if the total length of 4 lane main carriageway is 100km , then the equivalent length for calculation of payment stage will be 2x100km. Now, if the total length of bituminous work to be done is 100km, the cost per km of bituminous work shall be determined as follows :

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

Where P = Contract Price

L = Total equivalent 2-Lane length in km as defined above.

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 including the length not handed over to contractor under clause 8.3 of this Contract Agreement due to which the contractor is unable to execute the work, may be deducted from the total project length for payment purpose. The total length calculated here is only for payment purpose and will not affect and referred in other clauses of the contract agreement.

1.3.2 Minor Bridge and Underpasses/Overpasses

Procedure for estimating the value of Minor Bridge works and Underpasses/Overpasses shall be stated in table 1.3.2

Table 1.3.2

Stage of Payment	Percentage - weightage	Payment Procedure
1	2	3
<u>A1-Widening and Repairs of Minor Bridges (Length>6m and <60m)</u>	1.16%	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 the completion of widening and repair works of a minor bridge.
<u>A2-New Minor Bridges</u>		
<p>(i) Foundation+Sub Structure: On completion of the foundation work including foundations for wing and return walls ,abutments,piers upto the abutment/pier cap</p> <p>(ii) Super Structure: On completion of the super structure in all respect including wearing coat, bearings, expansion joints, hand rails, crash barriers,road sign & markings, tests on</p>	0.00%	<p>(i) Foundation+Sub Structure: Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length (m) of the minor bridges. Payment against foundation+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 atleast two foundations along with sub structure upto 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.</p> <p>(ii) Super Structure: Payment shall be made on pro rata basis on completion of a stage i.e. completion of super structure of atleast one span in all respect as specified in the column of " Stage of Payment" in this sub clause.</p>
	0.00%	

Stage of Payment	Percentage - weightage	Payment Procedure
<p>completion etc. complete in all respect,</p> <p>(iii) Approaches: On completion of approaches including Retaining walls, stone pitching, protection works complete in all respect and fit for use</p> <p>(iv) Guide Bund and River Training Works: On completion of Guide Bund and River Training Works complete in all respect.</p>	<p>0.00%</p> <p>0.00%</p>	<p>(iii) 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.</p> <p>(iv) Guide Bund and River Training Works: Payment shall be made on pro rata basis on completion of a stage i.e. completion of Guide Bunds and River Training Works in all respect as specified.</p>
<p>B.1- Widening and repair of Underpasses/overpasses</p>	<p>0.00%</p>	<p>Cost of each overpass/underpass shall be determined on pro rata basis with respect to the total linear length of the underpass/overpass.</p> <p>Payment shall be made on the completion of widening & repair works of a underpass/overpass.</p>
<p>B.2- New Underpasses/overpasses</p> <p>(i) Foundation+Sub Structure: On completion of the foundation work including foundations for wing and return walls ,abutments,piers upto the abutment/pier cap</p> <p>(ii) Super Structure:</p>	<p>54.36%</p>	<p>(i) Foundation+Sub Structure: Cost of each Underpass/Overpass shall be determined on pro rata basis with respect to the total linear length (m) 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 atleast two foundations along with sub structure upto abutment/pier cap level of each Underpass/Overpass.</p> <p>In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.</p> <p>(ii) Super Structure:</p>

Stage of Payment	Percentage - weightage	Payment Procedure
<p>On completion of the super structure in all respect including wearing coat, bearings, expansion joints, hand rails, crash barriers, road sign & markings, tests on completion etc. complete in all respect.</p> <p>Wearing Coat (a) in case of Overpass- wearing coat including expansion joint complete in all respect as specified and (b) in case of underpass rigid pavement including drainage facility complete in all respects as specified.</p>	39.54%	<p>Payment shall be made on pro rata basis on completion of a stage i.e. completion of super structure of atleast one span in all respect as specified in the column of " Stage of Payment" in this sub clause.</p>
<p>(iii) Approaches:</p> <p>On completion of approaches including Retaining Walls, stone pitching, protection works complete in all respect and fit for use</p>	4.94%	<p>(iii) Approaches:</p> <p>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.</p>

1.3.3 Major Bridge Works, ROB/RUB and Structures.

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

Table 1.3.3

Stage of Payment	Percentage - weightage	Payment Procedure
1	2	3
<p>A1-Widening and Repairs of Major Bridges</p> <p>(i) Foundation:</p> <p>(ii) Sub Structure:</p> <p>(iii) Super Structure (including bearings)</p> <p>(iv) Wearing Coat including expansion joints.</p> <p>(v) Miscellaneous items like hand rails, crash barriers, road markings etc.</p>	<p>0.00%</p> <p>0.00%</p> <p>30.00%</p> <p>60.00%</p>	<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 bridges. Payment against foundation shall be made on pro rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of Major Bridge subject to completion of atleast two foundations of the Major Bridge.</p> <p>In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.</p> <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 Major Bridge subject to completion of atleast two sub structure of the abutment/pier upto abutment/pier cap level of the major bridge.</p> <p>(iii) Super Structure: Payment shall be made on pro rata basis on completion of a stage i.e. completion of super structure including bearings of atleast one span in all respect as specified.</p> <p>Wearing Coat</p> <p>Payment shall be made on completion of wearing coat including expansion joints complete in all respect as specified.</p> <p>(v) Miscellaneous</p>

Stage of Payment	Percentage - weightage	Payment Procedure
1	2	3
<p>(vi) Wing walls/Return Walls</p> <p>(vii) Guide bunds, River Training Works etc</p> <p>(viii) Approaches (including retaining walls, stone pitching and protection works)</p>	<p>10.00%</p> <p>0.00%</p> <p>0.00%</p> <p>0.00%</p>	<p>Payment shall be made on completion of all Miscellaneous works like hand rails, crash barriers, road markings etc.complete in all respect as specified.</p> <p>(vi) Wing walls/Return Walls</p> <p>Payment shall be made on completion of all Wing walls/Return Walls complete in all respect as specified.</p> <p>(vii) Guide bunds, River Training Works etc</p> <p>Payment shall be made on completion of all Guide bunds/River Training Works etc. complete in all respect as specified.</p> <p>(viii) Approaches:</p> <p>Payment shall be made on completion of both approaches including stone pitching, protection works,etc. complete in all respects as specified.</p>
<p>A2-New Major Bridges</p> <p>(i) Foundation:</p> <p>(ii) Sub Structure:</p>	<p>0.00%</p>	<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 bridges. Payment against foundation shall be made on pro rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of Major Bridge subject to completion of atleast two foundations of the Major Bridge.</p> <p>In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.</p> <p>(ii) Sub Structure:</p>

Stage of Payment	Percentage - weightage	Payment Procedure
1	2	3
(iii) Super Structure (including bearings)	0.00%	<p>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 Major Bridge subject to completion of atleast two sub structure of the abutment/pier upto abutment/pier cap level of the major bridge.</p> <p>(iii) Super Structure:</p>
(iv) Wearing Coat including expansion joints.	0.00%	<p>Payment shall be made on pro rata basis on completion of a stage i.e. completion of super structure including bearings of atleast one span in all respect as specified.</p> <p>Wearing Coat</p>
(v) Miscellaneous items like hand rails, crash barriers, road markings etc.	0.00%	<p>Payment shall be made on completion of wearing coat including expansion joints complete in all respect as specified.</p> <p>(v) Miscellaneous</p>
(vi) Wing walls/Return Walls	0.00%	<p>Payment shall be made on completion of all Miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respect as specified.</p> <p>(vi) Wing walls/Return Walls</p>
(vii) Guide bunds, River Training Works etc	0.00%	<p>Payment shall be made on completion of all Wing walls/Return Walls complete in all respect as specified.</p> <p>(vii) Guide bunds, River Training Works etc</p>
(viii) Approaches (including retaining walls, stone pitching and protection works)	0.00%	<p>Payment shall be made on completion of all Guide bunds/River Training Works etc. complete in all respect as specified.</p> <p>(viii) Approaches:</p>

Stage of Payment	Percentage - weightage	Payment Procedure
1	2	3
	0.00%	Payment shall be made on completion of both approaches including stone pitching, protection works,etc. complete in all respects as specified.
<p>B1 - Widening and repairs of (a) ROB (b) RUB</p> <p>(i) Foundation:</p> <p>(ii) Sub Structure:</p> <p>(iii) Super Structure (including bearings)</p> <p>(iv) Wearing Coat including expansion joints in case of ROB. In case of RUB, rigid pavement under RUB including drainage facility as specified.</p>	<p>0.00%</p> <p>0.00%</p> <p>0.00%</p>	<p>(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 ROB/RUB subject to completion of atleast two foundations of the ROB/RUB.</p> <p>In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.</p> <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 ROB/RUB subject to completion of atleast two sub structure of the abutment/pier upto abutment/pier cap level of the ROB/RUB.</p> <p>(iii) Super Structure: Payment shall be made on pro rata basis on completion of a stage i.e. completion of super structure including bearings of atleast one span in all respect as specified.</p> <p>(iv) Wearing Coat:</p>

Stage of Payment	Percentage - weightage	Payment Procedure
1	2	3
<p>(v) Miscellaneous items like hand rails, crash barriers, road markings etc.</p> <p>(vi) Wing walls/Return Walls</p> <p>(vii) Approaches (including retaining walls, stone pitching and protection works)</p>	<p>0.00%</p> <p>0.00%</p> <p>0.00%</p> <p>0.00%</p>	<p>Payment shall be made on completion of (a) in case of ROB - wearing coat including expansion joint complete in all respect as specified and (b) in case of RUB rigid pavement under RUB including drainage facility complete in all respects as specified.</p> <p>(v) Miscellaneous</p> <p>Payment shall be made on completion of all Miscellaneous works like hand rails, crash barriers, road markings etc.complete in all respect as specified.</p> <p>(vi) Wing walls/Return Walls</p> <p>Payment shall be made on completion of all Wing walls/Return Walls complete in all respect as specified.</p> <p>(viii) Approaches:</p> <p>Payment shall be made on completion of both approaches including stone pitching, protection works,etc. complete in all respects as specified.</p>
<p>B2 - New</p> <p>(a) ROB</p> <p>(b) RUB</p> <p>(i) Foundation:</p>	<p>0.00%</p>	<p>(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 ROB/RUB subject to completion of atleast two foundations of the ROB/RUB.</p> <p>In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.</p>

Stage of Payment	Percentage - weightage	Payment Procedure
1	2	3
<p>(ii) Sub Structure:</p> <p>(iii) Super Structure (including bearings)</p> <p>(iv) Wearing Coat including expansion joints in case of ROB. In case of RUB, rigid pavement under RUB including drainage facility as specified.</p> <p>(v) Miscellaneous items like hand rails, crash barriers, road markings etc.</p> <p>(vi) Wing walls/Return Walls</p>	<p>0.00%</p> <p>0.00%</p> <p>0.00%</p> <p>0.00%</p> <p>0.00%</p>	<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 ROB/RUB subject to completion of atleast two sub structure of the abutment/pier upto abutment/pier cap level of the ROB/RUB.</p> <p>(iii) Super Structure: Payment shall be made on pro rata basis on completion of a stage i.e. completion of super structure including bearings of atleast one span in all respect as specified.</p> <p>(iv) Wearing Coat: Payment shall be made on completion of (a) in case of ROB - wearing coat including expansion joint complete in all respect as specified and (b) in case of RUB rigid pavement under RUB including drainage facility complete in all respects as specified.</p> <p>(v) Miscellaneous Payment shall be made on completion of all Miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respect as specified.</p> <p>(vi) Wing walls/Return Walls Payment shall be made on completion of all Wing walls/Return Walls complete in all respect as specified.</p>

Stage of Payment	Percentage - weightage	Payment Procedure
1	2	3
<p>(v) Miscellaneous items like hand rails, crash barriers, road markings etc.</p> <p>(vi) Wing walls/Return Walls</p> <p>(vii) Approaches (including retaining walls, stone pitching and protection works)</p>	<p>0.00%</p> <p>0.00%</p> <p>0.00%</p> <p>0.00%</p>	<p>Payment shall be made on completion of wearing coat including expansion joints complete in all respect as specified.</p> <p>(v) Miscellaneous</p> <p>Payment shall be made on completion of all Miscellaneous works like hand rails, crash barriers, road markings etc.complete in all respect as specified.</p> <p>(vi) Wing walls/Return Walls</p> <p>Payment shall be made on completion of all Wing walls/Return Walls complete in all respect as specified.</p> <p>(viii) Approaches:</p> <p>Payment shall be made on completion of both approaches including stone pitching, protection works,etc. complete in all respects as specified.</p>
<p>C2 - New Elevated Section/Flyovers/ Grade Separators</p> <p>(i) Foundation:</p> <p>(ii) Sub Structure:</p>	<p>0.00%</p>	<p>(i) Foundation: Cost of each Structure shall be determined on pro rata basis with respect to the total linear length (m) of the structures. 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 structures subject to completion of atleast two foundations of the structures.</p> <p>In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.</p> <p>(ii) Sub Structure:</p>

Stage of Payment	Percentage - weightage	Payment Procedure
1	2	3
(iii) Super Structure (including bearings)	0.00%	<p>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 structures subject to completion of atleast two sub structure of the abutment/pier upto abutment/pier cap level of the structures.</p> <p>(iii) Super Structure:</p>
(iv) Wearing Coat including expansion joints.	0.00%	<p>Payment shall be made on pro rata basis on completion of a stage i.e. completion of super structure including bearings of atleast one span in all respect as specified.</p> <p>Wearing Coat</p>
(v) Miscellaneous items like hand rails, crash barriers, road markings etc.	0.00%	<p>Payment shall be made on completion of wearing coat including expansion joints complete in all respect as specified.</p> <p>(v) Miscellaneous</p>
(vi) Wing walls/Return Walls	0.00%	<p>Payment shall be made on completion of all Miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respect as specified.</p> <p>(vi) Wing walls/Return Walls</p>
(vii) Approaches (including retaining walls, stone pitching and protection works)	0.00%	<p>Payment shall be made on completion of all Wing walls/Return Walls complete in all respect as specified.</p> <p>(viii) Approaches:</p> <p>Payment shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified.</p>

Note: (1) In case of innovative major bridge projects like cable suspension/cable stayed/Extra dozed and exceptionally long span bridges , the schedule may be modified as per site requirement before bidding with due approval of DG(RD)&SS ,MoRT&H.

(2)The Schedule for exclusive tunnel projects may be prepared as per site requirement before bidding with due approval of DG(RD)&SS ,MoRT&H.

1.3.4 Other works.

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

Table 1.3.4

Stage of Payment	Weightage	Payment Procedure
(i) Toll Plaza	0.00%	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 plazas.
(ii) Road side drains	15.32%	Unit of measurement is linear length in km. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5% (five per cent) of the total length.
(iii) Road signs, markings, km stones, safety devices, etc.	25.76%	
(iv) Project facilities	0.00%	Payment shall be made on pro rata basis for completed facilities.
a) Bus Bays	1.90%	
b) Truck Lay Bye	0.00%	
c) Rest Areas	0.00%	
d) Others	14.02%	
(v) Road side plantation	0.00%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5% (five per cent) of the total length.
(vi) Repair of Protection works other than approaches to the bridges, elevated sections/ flyovers/ grade separators and ROBs/RUBs.	0.00%	
(vii) Safety and traffic management during construction	0.00%	Payment shall be made on prorata basis every six month.
(viii) Protection works	43.00%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5% (five per cent) of the total length.

1.3.5 Utility Shifting

Procedure for estimating the value of utility shifting works done shall be as stated in table 1.3.5

Table 1.3.5

Stage of Payment	Weightage	Payment Procedure	
PHED	4.81%	Payment is divided in following activities and Payment of each activity shall be made on pro rata basis on completion of 5km of linear project length.	
		Removal of existing utility	30%
		Erection/Laying	30%
		Commissioning	40%
Electric Utility Shifting	95.19%	Dismantling will include proper listing and stocking of usable and non-usable items.	
Water resource shifting	0.00%	Commissioning will be completed on furnishing the commissioning certificate from concerned utility owning department.	

2. Procedure for payment for Maintenance

2.1 The cost for maintenance shall be as stated in Clause 14.1(v).

2.2 Payment for Maintenance shall be made in Monthly basis in accordance with the provisions of Clause 19.6 & 19.7 of the Contract Agreement.

SCHEDULE - I

(See Clause 2.1)

DRAWINGS**1 Drawings**

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

2 Additional Drawings

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

Annex - I (Schedule-I)

List of Drawings

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

- a) Drawings of horizontal alignment, vertical profile and cross section.
- b) Drawings of drainage plan and profile.
- c) Drawing of cross drainage works.
- d) Drawings of major intersections and ROB.
- e) Drawing of toll plaza layout, toll collection systems and roadway near toll plaza
- f) Drawings of bus-bay and bus shelters with furniture and drainage system.
- g) Drawing of road furniture items including traffic signage, markings, safety barriers, etc.
- h) Drawings of traffic diversion plans and traffic control measures.
- i) Drawings of road drainage measures
- j) Drawing of typical details slope protection measures.
- k) Drawing of a landscaping and horticulture.
- l) Drawings of pedestrian crossings
- m) Drawings of street lighting.
- n) General arrangement of Base camp and Administrative Block
- o) Drawings of catch water drains check drains.
- p) Any other drawings which Authority's Engineer may review.

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 192nd 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 329th 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 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 466st 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% (sixty 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 548th 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 12.1.2)

Tests on Completion

1. Schedule for Tests

- 1.1 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.
- 1.2 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

- 2.1 Visual and physical test: The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include (to be decided with Authority's Engineer at the time of physical tests as per relevant IRC/ Code Manual).
- 2.2 Riding quality test: Riding quality of each lane of the carriageway shall be checked with the help of **NSV** and the maximum permissible roughness for purposes of this Test shall be 2,000 (two thousand) mm for each kilometer.
- 2.3 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 Non-destructive 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) meters or more shall also be subjected to load testing.
- 2.4 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.

- 2.5 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.
- 2.6 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.

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

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

The First testing with the help of NSV shall be conducted at the time of issue of completion certificate.

SCHEDULE - L
(See Clause 12.2 and 12.4)

PROVISIONAL 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 the **"Improvement/widening to Two-laning with earthen shoulder of Panda (Design Ch. 112.300 km) to Baghmara (Design Ch. 129.385 km) [R-M-B Package-VI] on SH-4 section of Ranikor- Maheshkhola-Baghmara Project in the state of Meghalaya on EPC basis**(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 undertaken to determine compliance of the Project Highway with the provisions of the Agreement.
- 2 Works that are incomplete on account of Time Extension have been specified in the Punch List appended hereto, and the Contractor has agreed and accepted that it shall complete all such works in the time and manner set forth in the Agreement. In addition, certain minor works are incomplete and these are not likely to cause material inconvenience to the Users of the Project Highway or affect their safety. The Contractor has agreed and accepted that as a condition of this Provisional Certificate, it shall complete such minor works within 30 (thirty) days hereof. These minor works have also been specified in the aforesaid Punch List.
- 3 In view of the foregoing, I am satisfied that the **Project Highway "Improvement/widening to Two-laning with earthen shoulder of Panda (Design Ch. 112.300 km) to Baghmara (Design Ch. 129.385 km) [R-M-B Package-VI] on SH-4 section of Ranikor- Maheshkhola-Baghmara Project in the state of Meghalaya on EPC basis"** can be safely and reliably placed in service of the Users thereof, and in terms of the Agreement, the Project Highway is hereby provisionally declared fit for entry into operation on this the day of 20.....

ACCEPTED, SIGNED, SEALED

AND DELIVERED

For and on behalf of

CONTRACTOR by:

by:

(Signature)

SIGNED, SEALED AND

DELIVERED

For and on behalf of

AUTHORITY'S ENGINEER

(Signature)

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 the “Improvement/widening to Two-laning with earthen shoulder of Panda (Design Ch. 112.300 km) to Baghmara (Design Ch. 129.385 km) [R-M-B Package-VI] on SH-4 section of Ranikor- Maheshkhola-Baghmara Project in the state of Meghalaya on EPC basis”** (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.....

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

- 1.1 Monthly lump sum payments for maintenance shall be reduced in the case of non-compliance with the Maintenance Requirements set forth in Schedule-E.
- 1.2 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.
- 1.3 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

2.1 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, rain cuts, 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%
S. No.	Item/Defect/Deficiency	Percentage
(ii)	Any Defects in superstructures, bearings and sub-structures	10%
(iii)	Painting, repairs/replacement kerbs, railings, parapets, guideposts/crash barriers	5%
(d)	Roadside Drains	
(i)	Cleaning and repair of drains	5%
(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/accidental 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%

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

$$R = P / 100 \times M \times L1 / L$$

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

deduction M = Monthly lump-sum payment in accordance with the

Bid

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 18.1.1)

SELECTION OF AUTHORITY'S ENGINEER

1 Selection of Authority's Engineer

- 1.1 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.
- 1.2 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

- 1.1 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 **Authority**”) and (the “**Contractor**”) for the “**Improvement/widening to Two-laning with earthen shoulder of Panda (Design Ch. 112.300 km) to Baghmara (Design Ch. 129.385 km)**][R-M-B Package-VI] on SH-4 section of Ranikor- Maheshkhola-Baghmara Project in the state of Meghalaya on EPC basis and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.
- 1.2 The TOR shall apply to construction and maintenance of the Project Highway.

2 Definitions and interpretation

- 2.1 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.
- 2.2 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.
- 2.3 The rules of interpretation stated in Clauses 1.2, 1.3 and 1.4 of the Agreement shall apply, *mutatis mutandis*, to this TOR.

3. General

- 3.1 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.
- 3.2 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) any other matter which is not specified in (a), (b) or (c) above and which creates an obligation or liability on either Party for a sum exceeding Rs. 5,000,000 (Rs. fifty lakh).
- 3.3 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.

- 3.4 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.
- 3.5 The Authority's Engineer shall aid and advise the Authority on any proposal for Change of Scope under Article 13.
- 3.6 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

- 4.1 During the Construction Period, the Authority's Engineer shall review 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 10.1.6. The Authority's Engineer shall complete such review 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 up to 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.
- 4.2 The Authority's Engineer shall review any revised Drawings sent to it by the Contractor and furnish its comments within 10 (ten) days of receiving such Drawings.
- 4.3 The Authority's Engineer shall review 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.
- 4.4 The Authority's Engineer shall complete the review 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.
- 4.5 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.
- 4.6 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.
- 4.7 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.
- 4.8 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.

- 4.9 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 4.9, 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.
- 4.10 The Authority's Engineer shall test check at least 20 (twenty) percent of the quantity or number of tests prescribed for each category or type of test for quality control by the Contractor.
- 4.11 The timing of tests referred to in Paragraph 4.9, 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.
- 4.12 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.
- 4.13 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.
- 4.14 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.
- 4.15 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 12.4.
- 4.16 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.
- 4.17 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.
- 4.18 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 or Provisional Certificate, as the case may be. For carrying out its functions under this Paragraph 4.18 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

5.1 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.
- 5.2 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.
- 5.3 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.
- 5.4 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.
- 5.5 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

- 6.1 The Authority's Engineer shall determine the costs, and/or their reasonableness, that are required to be determined by it under the Agreement.
- 6.2 The Authority's Engineer shall determine the period of Time Extension that is required to be determined by it under the Agreement.
- 6.3 The Authority's Engineer shall consult each Party in every case of determination in accordance with the provisions of Clause 18.5.

7. Payments

- 7.1 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 10.2.4 (d).
- 7.2 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.
- 7.3 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.
- 7.4 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

- 9.1 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.
- 9.2 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.
- 9.3 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.
- 9.4 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.
- 9.5 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 19.4.1, 19.6.1, and 19.8.1)
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 19.3.1 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 13.2.3 (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
- (g) Total of (i) and (ii) above.
- (h) Net claim: (e) – (f) (iii);
- (i) 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

1.1. The Contractor shall effect and maintain at its own cost, from the Appointed Date till the date of issue of the last 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.

1.2. The insurance under paragraph 1.1 (a) and (b) above shall cover the Authority and the Contractor against all loss or damage from whatsoever 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 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

3.1 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 the value of the Contract Price.

3.2 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 **"Improvement/widening to Two-laning with earthen shoulder of Panda (Design Ch. 112.300 km) to Baghmara (Design Ch. 129.385 km)[R-M-B Package-VI] on SH-4 section of Ranikor-Maheshkhola-Baghmara Project in the state of Meghalaya on EPC basis"** (the "Project Highway") on Engineering, Procurement and Construction (EPC) basis through (Name of Contractor), hereby certify that the Tests on completion of Maintenance Period in accordance with Article 14 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement and I hereby certify that the Authority has taken over the Project highway from the Contractor on this day.....

SIGNED, SEALED AND DELIVERED

(Signature)

(Name and designation of Authority's Representative)

(Address)

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