National Highway Infrastructure Development Corporation Limited
(Ministry of Road, Transport & Highways)
Government of India

BID DOCUMENT

Technical Schedules

For

Construction of Remedial Measures for treatment of Sinking Zone at 72 locations in between Km 85+000 to Km 95+000 & Km 101+000 to Km 145+000 of Tura-Dalu section of NH-51 in the State of Meghalaya on EPC Mode

On

Engineering Procurement & Construction (EPC) Mode

February, 2026

Schedules

Schedule-A

SCHEDULE – A for Construction of Landslide protection works and remedial measures at Sinking/Subsidence locations between Km 85+000 to 95+000 & Km 101+000 to 143+450 of Tura-Dalu Road Section on NH 217 (Old NH-51) in the State of Meghalaya

SITE

1. Site

The Site of 59 Land Slides locations and 106 Sinking/Subsidence locations from Km 85+000 to 95+000 & Km 101+000 to 143+450 of Tura Dalu road section on NH 217 (Old NH-51) in the State of Meghalaya.

2. Land

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

Sl. No.	Chainage (km)		Right of Way (m)	Remarks
	From	To		
Right of Way is detailed in Annexure I of Schedule A				

3. Carriageway

The sites are located along NH-217 (old NH-51) passing through the hilly terrain between Tura & Dalu.

4. Major Bridges - NIL

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

6. Grade separators - NIL

7. Minor bridges - NIL

8. Railway level crossings - NIL

9. Underpasses (Vehicular, Non-vehicular) - NIL

10. Culverts- NIL

11. Bus bays - NIL

12. Truck Lay byes- NIL

13. Road side drains- NIL

14. Major junctions- NIL

15. Minor junctions - NIL

16. Bypasses- NIL

17. Other Structures - NIL

18. Utilities - Nil

DATES FOR PROVIDING RIGHT OF WAY OF CONSTRUCTION ZONE

The details of ROW is attached in Annexure-I of Schedule A

(Schedule-A)

ALIGNMENT PLANS

Alignment plan is not required as the work pertains to landslides & sinking zones. However, cross sections at problematic locations are attached as Annexure-II of Schedule A.

Schedule – B

(See Clause 2.1)

CONSTRUCTION FOR MITIGATION MEASURES OF SLOPE PROTECTION WORK & SINKING/SUBSIDENCE ZONES

1. Construction for Mitigation Measures and Protection works

Survey, Identification of extent of instability, investigations, detailed designing and execution/ construction of mitigation measures as per approved design and standards (duly certified/vetted by the design director, Proof Consultant and vetted by IIT Patna & NIRM as stipulated under Article-10 and its maintenance for 10 years from the date of successful completion of the project / works with complete adherence of safety standards.

2. Specifications and Standards

Before Execution / Construction of Mitigation Measures, locations shall be surveyed, investigated /explored, designed and constructed in conformity with the Specifications and Standards specified in Annex-I of Schedule-D.

Annex – I

(Schedule-B)

DESCRIPTION

(i) Construction of Landslide protection works and remedial measures at Sinking/Subsidence locations between Km 85+000 to 95+000 & Km 101+000 to 143+450 of Tura-Dalu Road Section on NH 217 (Old NH-51) in the State of Meghalaya

1. Execution / Construction of Mitigation Measures

(i) The Project Highway refers to Construction of Landslide protection works and remedial measures at Sinking/Subsidence locations between Km 85+000 to 95+000 & Km 101+000 to 143+450 of Tura-Dalu Road Section on NH 217 (Old NH-51) in the State of Meghalaya

(iii) Design and development of mitigation measures shall be done in accordance with the relevant codes/manual/specification of Indian Standards Institution (ISI), IRC & its special publication, MoRTH circulars and guidelines. Wherever the Indian standards are not clear and sufficient for sound and safe design, other relevant codes of US / UK / European countries shall be used for design & development of mitigation measures and works shall be carried out as per the designs and drawing approved by the Authority/Authority Engineer's/NIRM/IIT Patna. General Arrangement of mitigation measures has been shown in the drawings folder.

6. Measurement for Urgent protection work in Sinking Zone

The Contractor, immediately within one week of Appointment, shall take immediate action for short term protection works on following project chainages till other measures as per the schedule are completed.

Sl. No.	Chainage (Km)	
	From	To
1	117+670	117+705
2	117+715	117+740
3	117+890	117+910
4	118+450	118+480
5	118+790	118+820
6	118+930	118+990
7	121+360	121+380
8	122+550	122+580
9	123+300	123+340
10	123+390	123+410
11	124+480	124+500
12	127+880	127+900

Sl. No.	Chainage (Km)	
	From	To
13	127+945	127+980
14	130+730	130+760
15	131+770	131+840
		Total 485m

6.1 Compacting original ground supporting subgrade (Loosening of the ground upto a level of 500 mm below the subgrade level, watered, graded and compacted in layers to meet requirement of table 300-2 for subgrade construction)

6.2. Construction of Embankment with Material Obtained from Borrow Pits (Construction of embankment with approved material obtained from borrow pits with all lifts and leads, transporting to site, spreading, grading to required slope and compacting to meet requirements of Tables 300.2)

6.3. Providing close bamboo toe walling consisting of 65mm to 75mm bamboos of length ranging from 1.2m to 3m driven at 150 mm centre to centre and provided with three horizontal split bamboo runner fixed with nails. All bamboos to be duly protected etc.

6.4. Construction of Subgrade and Earthen Shoulders with approved material obtained from borrow pits with all lifts and leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2.

6.5. Providing and laying jute bags filled with suitable earth/sand and mouth stitched with jute string to arrive to the requisite width and height maintaining proper slope or as directed by the Department including all carriage complete

2. General Features and Scope

The area is very prone to landslides and sinking/Subsidence towards valley side of existing roads. The Contractor has to carryout Survey, Identify the extent of instability, investigations, detailed designing (duly certified by the design director, Proof Consultant and vetted by IIT Patna/NIRM or one of the IITs as stipulated under Article-10 and Schedule-I) and execution/ construction of mitigation measures as per approved design and standards to be followed during construction stage and its maintenance for 10 years from the date of successful completion of the project / works with complete adherence of safety standards. The investigations comprise of geological, geo-physical and geotechnical exploration works required for stability analysis and design of mitigation measures. The locations of the landslide zones and the sinking zones are as under. All the works are to be carryout as per approved design and drawings of mitigation measures and as per technical specifications as given in Annexure-I of Schedule-D.

Details of protection works/Remedial measures are as under:-

(A) Location wise details of Sliding/Sinking/Subsidence identified:-

S. No	Chainage Start (Km)	Chainage End (Km)	Length (m)	Height of Hill Side Protection works (m)	Height of Valley Side Protection works (m)
Landslide Locations					
1	102+060	102+070	10	3	NA
2	102+650	102+680	30	3	NA
3	103+420	103+540	120	4	NA
4	127+400	127+770	370	3	NA
5	139+240	139+280	40	5	NA
6	101+000	101+050	50	2	NA
7	102+395	102+424	29	3	NA
8	102+572	102+650	78	3	NA
9	102+650	102+680	30	3	NA
10	102+900	102+950	50	2	NA
11	103+420	103+540	120	4	NA
12	105+450	105+550	100	2	NA
13	106+200	106+270	70	2	NA
14	107+650	107+740	90	3	NA
15	108+970	109+090	120	3	NA
16	116+095	116+165	70	2	NA
17	116+380	116+530	150	2	NA
18	117+060	117+180	120	2	NA
19	118+320	118+460	140	2	NA
20	119+170	119+270	100	5	NA
21	120+935	121+280	345	2	NA
22	121+320	121+405	85	2	NA
23	122+385	122+510	125	2	NA
24	123+160	123+250	90	2	NA
25	123+350	123+460	110	2	NA
26	123+930	123+990	60	2	NA

S. No	Chainage Start (Km)	Chainage End (Km)	Length (m)	Height of Hill Side Protection works (m)	Height of Valley Side Protection works (m)
27	124+649	124+689	40	3	NA
28	124+860	124+880	20	2	NA
29	125+232	125+245	13	6	NA
30	127+400	127+770	370	3	NA
31	128+550	128+600	50	2	NA
32	128+750	128+770	20	2	NA
33	129+150	129+180	30	2	NA
34	129+210	129+250	40	2	NA
35	130+120	130+155	35	2	NA
36	130+200	130+230	30	2	NA
37	130+230	130+290	60	2	NA
38	130+290	130+630	340	2	NA
39	131+760	131+800	40	2	NA
40	131+880	132+030	150	2	NA
41	132+060	132+100	40	2	NA
42	132+100	132+140	40	2	NA
43	132+760	132+790	30	2	NA
44	132+990	133+070	80	2	NA
45	135+100	135+250	150	2	NA
46	135+450	135+530	80	2	NA
47	135+570	135+800	230	2	NA
48	136+050	136+170	120	2	NA
49	136+350	136+410	60	2	NA
50	136+560	136+700	140	2	NA
51	136+800	136+940	140	2	NA
52	137+640	137+735	95	2	NA
53	138+090	138+350	260	3	NA
54	138+350	138+410	60	2	NA
55	138+590	138+714	124	2	NA

S. No	Chainage Start (Km)	Chainage End (Km)	Length (m)	Height of Hill Side Protection works (m)	Height of Valley Side Protection works (m)
56	138+720	138+780	60	2	NA
57	139+240	139+280	40	5	NA
58	139+280	139+390	110	2	NA
59	139+640	139+685	45	2	NA
B-Sinking/Subsidence locations					
1	090+075	090+100	25	NA	3
2	090+100	090+145	45	NA	4
3	090+164	090+175	11	NA	4
4	093+136	093+182	46	NA	4
5	093+600	093+610	10	NA	4
6	093+660	093+673	13	NA	3
7	101+080	101+110	30	NA	5
8	103+614	103+620	6	NA	5
9	104+170	104+230	60	NA	4
10	106+020	106+040	20	NA	5
11	107+047	107+067	20	NA	5
12	108+500	108+540	40	NA	6
13	111+840	111+870	30	NA	4
14	115+285	115+350	65	NA	2
15	115+350	115+405	55	NA	2
16	115+440	115+490	50	NA	3
17	115+490	115+550	60	NA	3
18	115+550	115+610	60	NA	3
19	115+610	115+635	25	NA	2
20	115+635	115+690	55	NA	2
21	115+690	115+730	40	NA	3
22	115+730	115+780	50	NA	3
23	115+780	115+900	120	NA	3
24	115+970	116+040	70	NA	2

S. No	Chainage Start (Km)	Chainage End (Km)	Length (m)	Height of Hill Side Protection works (m)	Height of Valley Side Protection works (m)
25	116+040	116+095	55	NA	2
26	116+095	116+165	70	NA	2
27	116+410	116+530	120	NA	3
28	117+060	117+180	120	NA	5
29	117+180	117+370	190	NA	3
30	117+370	117+440	70	NA	5
31	117+460	117+500	40	NA	4
32	117+500	117+660	160	NA	4
33	117+660	117+780	120.00	NA	4
34	117+840	117+870	30.00	NA	4
35	117+870	117+945	75	NA	5
36	118+000	118+230	230	NA	2
37	118+230	118+290	60	NA	3
38	118+320	118+460	140	NA	2
39	118+460	118+600	140	NA	3
40	118+650	118+740	90	NA	5
41	118+740	118+790	50	NA	3
42	118+790	118+900	110	NA	4
43	118+915	119+015	100	NA	5
44	119+015	119+160	145	NA	5
45	119+160	119+270	110	NA	5
46	119+270	119+450	180	NA	6
47	120+900	121+280	380	NA	5
48	121+320	121+405	85	NA	5
49	121+450	121+510	60	NA	5
50	121+510	121+705	195	NA	3
51	121+705	121+760	55	NA	4
52	121+800	121+880	80	NA	3
53	121+880	121+970	90	NA	4

S. No	Chainage Start (Km)	Chainage End (Km)	Length (m)	Height of Hill Side Protection works (m)	Height of Valley Side Protection works (m)
54	121+970	122+050	80	NA	4
55	122+050	122+078	28	NA	4
56	122+118	122+385	267	NA	3
57	122+385	122+535	150	NA	5
58	122+535	122+615	80	NA	3
59	122+615	122+780	165	NA	3
60	122+780	122+820	40	NA	4
61	122+820	122+870	50	NA	4
62	122+870	122+985	115	NA	3
63	122+985	123+090	105	NA	3
64	123+090	123+160	70	NA	3
65	123+160	123+250	90	NA	3
66	123+300	123+340	40	NA	11
67	123+360	123+400	40	NA	4
68	123+400	123+460	60	NA	4
69	123+500	123+680	180	NA	2
70	123+930	123+990	60	NA	4
71	124+070	124+135	65	NA	6
72	124+135	124+175	40	NA	3
73	124+175	124+255	80	NA	2
74	124+415	124+535	120	NA	3
75	124+555	124+613	58	NA	5
76	124+649	124+685	36	NA	5
77	124+800	124+870	70	NA	5
78	125+055	125+100	45	NA	3
79	125+170	125+200	15	NA	5
80	125+232	125+245	13	NA	5
81	125+390	125+430	35	NA	6
82	126+450	126+475	25	NA	7

S. No	Chainage Start (Km)	Chainage End (Km)	Length (m)	Height of Hill Side Protection works (m)	Height of Valley Side Protection works (m)
83	127+880	127+900	20	NA	6.5
84	127+945	127+980	35	NA	7
85	128+190	128+220	30	NA	5
86	129+320	129+360	40	NA	10
87	129+769	129+779	10	NA	4
88	129+960	130+035	75	NA	4
89	130+120	130+155	35	NA	2
90	130+230	130+290	60	NA	29
91	130+485	130+515	30	NA	8
92	130+680	130+764	84	NA	7
93	130+850	130+900	50	NA	4
94	131+425	131+460	35	NA	6
95	131+770	131+810	70	NA	14
96	131+810	131+840	30	NA	35
97	131+945	131+954	9	NA	5
98	132+830	132+875	45	NA	6
99	133+010	133+020	10	NA	6
100	133+500	133+565	65	NA	38
101	135+425	135+460	35	NA	5
102	137+020	137+130	110	NA	4
103	138+250	138+270	20	NA	4
104	138+720	138+780	60	NA	5
105	139+096	139+106	10	NA	5
106	132+060	132+100	40	NA	14

Note: - The length of landslide/Sinking zone is minimum and indicative in nature. The contractor shall be responsible for accurate assessment as per the site condition and prepare the design for slope protection and stabilization as per specification and standard stipulated in schedule-D and submit the same to Authority's Engineer /Authority for review through the proof consultant and implement it accordingly, thereafter.

(b) Location wise details of Mechanically Stabilized Earth Wall (MSEW):

S.no.	Chainage (Km)		Length (m)	Height (m)
	From	To		
1	115+285	115+350	65	2
2	115+440	115+490	50	3
3	115+550	115+610	60	3
4	115+635	115+690	55	2
5	116+410	116+530	120	3
6	117+060	117+180	120	5
7	117+180	117+370	190	3
8	117+370	117+440	70	5
9	117+460	117+500	40	4
10	117+660	117+780	120	4
11	117+840	117+870	30	4
12	117+870	117+945	75	5
13	118+230	118+290	60	3
14	118+460	118+600	140	3
15	118+650	118+740	90 (Each both side)	5
16	118+790	118+900	110	4
17	118+915	119+015	100	5
18	119+160	119+270	110	5
19	119+270	119+450	180	6
20	120+900	121+280	380	5
21	121+320	121+405	85	5
22	121+705	121+760	55	4
23	121+970	122+050	80	4
24	122+535	122+615	80	3
25	123+090	123+160	70	3
26	123+160	123+250	90	3
27	123+360	123+400	40	4
28	123+930	123+990	60	4
29	124+070	124+135	65	6
30	124+415	124+535	120	3
31	126+450	126+475	25	7
32	127+880	127+900	20	6.5
33	127+945	127+980	35	7

S.no.	Chainage (Km)		Length (m)	Height (m)
	From	To		
34	130+680	130+764	84	7
		Total =	**3164**	

(c) Location wise details of Shored Hybrid Reinforced Soil Structure (SHRS) (i.e. MSEW +Soil Nailing):

S. no.	Chainage (Km)		Length (m)	Height (m)
	From	To		
1	123+300	123+340	40	11 (minimum nail length 3402 m)
2	131+770	131+810	40	14 (Minimum nail length 8909 m)
3	133+500	133+565	65	15 (Minimum nail length 16830 m)
		Total =	**145**	

- Spacing of nail to be provided with 1.5 each horizontally and vertically. Average depth of nail shall be 14 m.

(d) Location wise details of Soil Nailing With provision of wire mesh, Geo Mat :

S. no.	Chainage (Km)		Length (m)	Height (m)	Remarks
	From	To			
1	130+230	130+290	60	29 (minimum soil nail length 11280 m)	Isolated
2	130+485	130+515	30	8 (minimum soil nail length 1080 m)	Isolated
3	131+810	131+840	30	35 (Minimum soil nail length 7590 m)	Isolated
4	132+060	132+100	40	14 (Minimum soil nail length 3240 m)	Isolated
5	131+770	131+810	40	22	Below Shored Structure
6	133+500	133+565	65	23	Below Shored Structure
		Total =	265		

- Spacing of nail to be provided with 1.5 each horizontally and vertically. Avg depth of nail 14 m.

(e) Location wise details of Gabion Retaining Wall at sinking zone:-

S. no.	Chainage (Km)		Length (m)	Height (m)
	From	To		
1	115+350	115+405	55	2
2	115+490	115+550	60	3
3	115+610	115+635	25	2
4	115+690	115+730	40	3
5	115+730	115+780	50	3
6	115+780	115+900	120	3
7	115+970	116+040	70	2
8	116+040	116+095	55	2
9	116+095	116+165	70	2
10	117+500	117+660	160	4
11	118+000	118+230	230	2
12	118+320	118+460	140	2
13	118+740	118+790	50	3
14	119+015	119+160	145	5
15	121+450	121+510	60	5
16	121+510	121+705	195	3
17	121+800	121+880	80	3
18	121+880	121+970	90	4
19	122+050	122+078	28	4
20	122+118	122+385	267	3
21	122+385	122+535	150	5
22	122+615	122+780	165	3
23	122+780	122+820	40	4
24	122+820	122+870	50	4
25	122+870	122+985	115	3
26	122+985	123+090	105	3
27	123+400	123+460	60	4
28	123+500	123+680	180	2
29	124+135	124+175	40	3
30	124+175	124+255	80	2
31	124+555	124+613	58	5
32	124+649	124+685	36	5

S. no.	Chainage (Km)		Length (m)	Height (m)
	From	To		
33	124+800	124+870	70	5
34	125+055	125+100	45	3
35	125+170	125+200	15	5
36	125+232	125+245	13	5
37	125+390	125+430	35	6
38	129+960	130+035	75	4
39	130+120	130+155	35	2
40	130+850	130+900	50	4
41	131+425	131+460	35	6
42	132+830	132+875	45	6
43	133+010	133+020	10	6
44	138+720	138+780	60	5
45	139+240	139+280	13	3
		Total =	**3570**	

(f) Location wise details of Additional Gabion Retaining Wall outside sinking zone:

S. no.	Chainage (Km)		Length (m)	Height (m)
	From	To		
1	090+075	090+100	25	3
2	090+100	090+145	45	4
3	090+164	090+175	11	4
4	093+136	093+182	46	4
5	093+600	093+610	10	4
6	093+660	093+673	13	3
7	101+080	101+110	30	5
8	103+614	103+620	6	5
9	104+170	104+230	60	4
10	106+020	106+040	20	5
11	107+047	107+067	20	5
12	108+500	108+540	40	6
13	111+840	111+870	30	4
14	128+190	128+220	30	5
15	129+769	129+779	10	4

S. no.	Chainage (Km)		Length (m)	Height (m)
	From	To		
16	131+945	131+954	9	5
17	135+425	135+460	35	5
18	137+020	137+130	110	4
19	138+250	138+270	20	4
20	139+096	139+106	10	5
		Total =	**580**	

(g) Location wise details of Gabion Breast Wall at sinking zone:-

Ch. From	Ch. To	Length (m)	Height (m)	Side
116+095	116+165	70.00	2	LHS
116+380	116+530	150.00	2	RHS
117+060	117+180	120.00	2	RHS
118+320	118+460	140.00	2	RHS
120+935	121+280	345.00	2	RHS
121+320	121+405	85.00	2	RHS
122+385	122+510	125.00	2	RHS
123+160	123+250	90.00	2	RHS
123+350	123+460	110.00	2	RHS
123+930	123+990	60.00	2	RHS
130+120	130+155	35.00	2	RHS
130+230	130+290	60.00	2	RHS
132+060	132+100	40.00	2	RHS
138+720	138+780	60.00	2	LHS
124+649	124+689	40.00	3	RHS
103+420	103+540	120.00	4	LHS
119+170	119+270	100.00	5	RHS
127+400	127+770	370.00	3	RHS
139+240	139+280	40.00	5	LHS
125+232	125+245	13.00	6	LHS
		2173.00		

(h) Location wise details of Additional Gabion Breast Wall outside Sinking Zone:-

Ch. From	Ch. To	Length (m)	Height (m)	Side
101+000	101+050	50.00	2	LHS
102+900	102+950	50.00	2	LHS
105+450	105+550	100.00	2	RHS
106+200	106+270	70.00	2	RHS
124+860	124+880	20.00	2	LHS
128+550	128+600	50.00	2	RHS
128+750	128+770	20.00	2	RHS
129+150	129+180	30.00	2	RHS
129+210	129+250	40.00	2	RHS
130+200	130+230	30.00	2	RHS
130+290	130+630	340.00	2	RHS
131+760	131+800	40.00	2	RHS
131+880	132+030	150.00	2	RHS
132+100	132+140	40.00	2	RHS
132+760	132+790	30.00	2	RHS
132+990	133+070	80.00	2	RHS
135+100	135+250	150.00	2	RHS
135+450	135+530	80.00	2	RHS
135+570	135+800	230.00	2	RHS
136+050	136+170	120.00	2	RHS
136+350	136+410	60.00	2	RHS
136+560	136+700	140.00	2	RHS
136+800	136+940	140.00	2	RHS
137+640	137+735	95.00	2	RHS
138+350	138+410	60.00	2	LHS
138+590	138+714	124.00	2	LHS
139+280	139+390	110.00	2	LHS
139+640	139+685	45.00	2	LHS
102+395	102+424	29.00	3	LHS
102+572	102+650	78.00	3	LHS
107+650	107+740	90.00	3	LHS
108+970	109+090	120.00	3	LHS
138+090	138+350	260.00	3	LHS
		3071.00		

(i) Location wise details of specialized hill side protection work:-

Ch. From	Ch. To	Height (m)	Side	Length (m)	Remarks
102+060	102+070	6	LHS	10.00	Debris Flow Barrier
102+650	102+680	15	LHS	15.00	Wire Mesh + Soil Nailing+ Gabion Breast Wall
				25.00	

The details provided in table are indicative in nature. EPC Contractor has to assess exact length and height of above protection works locations.

(j) Reconstruction of damaged existing road:-

Sl. No.	Stretch		Type of deficiency
	From Km	To Km	
1	115+280	115+340	Half width damage (Top layer GSB)
2	115+440	115+490	Half width damage
3	115+550	115+610	1.0 m width DBM, crack & settlement up to half width & Shoulder
4	115+635	115+690	Damage
5	117+660	117+780	2.0 m width DBM & Shoulder
6	117+840	117+870	Damage
7	117+870	117+945	2.0 m width DBM & Shoulder
8	118+270	118+290	2.0 m width WMM & Shoulder
9	118+460	118+600	Half width damage
10	118+650	118+740	Half width damage
11	118+790	118+900	Half width damage
12	119+000	119+015	Half width damage (Top layer GSB)
13	119+160	119+280	LHS Half width damage & RHS Cracks
14	119+410	119+450	Half width damage (Top layer GSB)
15	121+970	121+980	Half width damage (Top layer GSB)
16	122+535	122+615	Half width damage
17	123+155	123+250	3.0 m width DBM & Shoulder
18	123+300	123+340	Half width damage
19	123+360	123+400	Half width damage

Sl. No.	Stretch		Type of deficiency
	From Km	To Km	
20	123+980	123+990	0.5 m width DBM & Shoulder
21	124+070	124+135	Half width damage
22	124+415	124+535	Half width damage
23	115+280	115+340	Balance New Work
24	117+660	117+870	Balance New Work
25	117+870	117+945	Balance New Work
26	118+270	118+290	Balance New Work
27	123+460	123+520	Balance New Work
28	123+950	123+990	Balance New Work
29	126+450	126+475	Only Shoulder (BC Top)
30	127+880	127+900	2.0 m width BC & Shoulder
31	127+945	127+980	1.0 m width BC & Shoulder
32	130+680	130+764	Half width damage
33	131+770	131+840	0.5 m width BC & Shoulder
	Total Length		**= 2144 m**

(k) Right of Way

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

(l) Construction of paved shoulders between paved carriageway and face of protection work at hill as well as valley side:-

Sl. No.	Stretch		Fully paved shoulders	Remarks
	from km	to km		
1	102+010	102+060	Hill/Valley	Width as per site requirement and Paved shoulder to be provided with provisions of GSB as base material and wearing coat of PCC M 20 of min. 75 mm thick.
2	102+060	102+070	Hill/Valley	
3	102+070	102+100	Hill/Valley	
4	102+650	102+680	Hill/Valley	
5	103+420	103+540	Hill/Valley	
6	115+285	115+440	Hill/Valley	
7	115+440	115+540	Hill/Valley	
8	115+540	115+550	Hill/Valley	
9	115+550	115+635	Hill/Valley	
10	115+635	115+730	Hill/Valley	

Sl. No.	Stretch		Fully paved shoulders	Remarks
	from km	to km		
11	115+730	115+780	Hill/Valley	
12	115+780	115+900	Hill/Valley	
13	115+970	116+095	Hill/Valley	
14	116+095	116+165	Hill/Valley	
15	116+410	116+530	Hill/Valley	
16	117+060	117+180	Hill/Valley	
17	117+180	117+370	Hill/Valley	
18	117+370	117+460	Hill/Valley	
19	117+460	117+870	Hill/Valley	
20	117+870	117+945	Hill/Valley	
21	118+000	118+320	Hill/Valley	
22	118+320	118+460	Hill/Valley	
23	118+460	118+600	Hill/Valley	
24	118+650	118+740	Hill/Valley	
25	118+740	118+915	Hill/Valley	
26	118+915	119+160	Hill/Valley	
27	119+160	119+170	Hill/Valley	
28	119+170	119+270	Hill/Valley	
29	119+270	119+450	Hill/Valley	
30	120+900	121+280	Hill/Valley	
31	121+320	121+405	Hill/Valley	
32	121+450	121+705	Hill/Valley	
33	121+705	121+760	Hill/Valley	
34	121+800	121+880	Hill/Valley	
35	121+880	122+050	Hill/Valley	
36	122+050	122+078	Hill/Valley	
37	122+118	122+385	Hill/Valley	
38	122+385	122+510	Hill/Valley	
39	122+510	122+525	Hill/Valley	
40	122+525	122+780	Hill/Valley	
41	122+780	122+870	Hill/Valley	
42	122+870	122+985	Hill/Valley	
43	122+985	123+160	Hill/Valley	

Sl. No.	Stretch		Fully paved shoulders	Remarks
	from km	to km		
44	123+160	123+250	Hill/Valley	
45	123+300	123+350	Hill/Valley	
46	123+350	123+460	Hill/Valley	
47	123+500	123+680	Hill/Valley	
48	123+930	123+990	Hill/Valley	
49	124+070	124+175	Hill/Valley	
50	124+175	124+255	Hill/Valley	
51	124+415	124+535	Hill/Valley	
52	124+535	124+613	Hill/Valley	
53	124+649	124+685	Hill/Valley	
54	124+800	124+870	Hill/Valley	
55	125+055	125+100	Hill/Valley	
56	125+170	125+200	Hill/Valley	
57	125+232	125+245	Hill/Valley	
58	125+390	125+430	Hill/Valley	
59	126+450	126+475	Hill/Valley	
60	127+400	127+770	Hill/Valley	
61	127+890	127+900	Hill/Valley	
62	127+945	127+980	Hill/Valley	
63	129+320	129+360	Hill/Valley	
64	129+960	130+035	Hill/Valley	
65	130+120	130+155	Hill/Valley	
66	130+230	130+290	Hill/Valley	
67	130+485	130+515	Hill/Valley	
68	130+680	130+700	Hill/Valley	
69	130+700	130+764	Hill/Valley	
70	130+850	130+900	Hill/Valley	
71	131+425	131+460	Hill/Valley	
72	131+770	131+840	Hill/Valley	
73	132+060	132+100	Hill/Valley	
74	132+830	132+875	Hill/Valley	
75	133+010	133+020	Hill/Valley	
76	133+450	133+600	Hill/Valley	

Sl. No.	Stretch		Fully paved shoulders	Remarks
	from km	to km		
77	138+720	138+780	Hill/Valley	
78	139+240	139+280	Hill/Valley	

(m) Applicable cross section for slope protection work

S. No	Chainage Start (Km)	Chainage End (Km)	Length (m)	Height of Hill Side Protection	Height of Valley Side Protection	Items wise description
A	**Land Slide Zone**					
1	102+060	102+070	10	3	NA	LS-5
2	102+650	102+680	30	3	NA	LS-3
3	103+420	103+540	120	4	NA	LS-6
4	127+400	127+770	370	3	NA	LS-3
5	139+240	139+280	40	5	NA	LS-7
6	101+000	101+050	50	2	NA	LS-1
7	102+395	102+424	29	3	NA	LS-3
8	102+572	102+650	78	3	NA	LS-3
9	102+650	102+680	30	3	NA	LS-3
10	102+900	102+950	50	2	NA	LS-1
11	103+420	103+540	120	4	NA	LS-6
12	105+450	105+550	100	2	NA	LS-1
13	106+200	106+270	70	2	NA	LS-1
14	107+650	107+740	90	3	NA	LS-3
15	108+970	109+090	120	3	NA	LS-3
16	116+095	116+165	70	2	NA	LS-4
17	116+380	116+530	150	2	NA	LS-4
18	117+060	117+180	120	2	NA	LS-4
19	118+320	118+460	140	2	NA	LS-4
20	119+170	119+270	100	5	NA	LS-7
21	120+935	121+280	345	2	NA	LS-4
22	121+320	121+405	85	2	NA	LS-4
23	122+385	122+510	125	2	NA	LS-4
24	123+160	123+250	90	2	NA	LS-4
25	123+350	123+460	110	2	NA	LS-4

S. No	Chainage Start (Km)	Chainage End (Km)	Length (m)	Height of Hill Side Protection	Height of Valley Side Protection	Items wise description
26	123+930	123+990	60	2	NA	LS-4
27	124+649	124+689	40	3	NA	LS-5
28	124+860	124+880	20	2	NA	LS-1
29	125+232	125+245	13	6	NA	LS-8
30	127+400	127+770	370	3	NA	LS-5
31	128+550	128+600	50	2	NA	LS-1
32	128+750	128+770	20	2	NA	LS-1
33	129+150	129+180	30	2	NA	LS-1
34	129+210	129+250	40	2	NA	LS-1
35	130+120	130+155	35	2	NA	LS-4
36	130+200	130+230	30	2	NA	LS-1
37	130+230	130+290	60	2	NA	LS-4
38	130+290	130+630	340	2	NA	LS-1
39	131+760	131+800	40	2	NA	LS-1
40	131+880	132+030	150	2	NA	LS-1
41	132+060	132+100	40	2	NA	LS-4
42	132+100	132+140	40	2	NA	LS-1
43	132+760	132+790	30	2	NA	LS-1
44	132+990	133+070	80	2	NA	LS-1
45	135+100	135+250	150	2	NA	LS-1
46	135+450	135+530	80	2	NA	LS-1
47	135+570	135+800	230	2	NA	LS-1
48	136+050	136+170	120	2	NA	LS-1
49	136+350	136+410	60	2	NA	LS-1
50	136+560	136+700	140	2	NA	LS-1
51	136+800	136+940	140	2	NA	LS-1
52	137+640	137+735	95	2	NA	LS-1
53	138+090	138+350	260	3	NA	LS-3
54	138+350	138+410	60	2	NA	LS-1
55	138+590	138+714	124	2	NA	LS-1
56	138+720	138+780	60	2	NA	LS-4
57	139+240	139+280	40	5	NA	LS-7
58	139+280	139+390	110	2	NA	LS-1

S. No	Chainage Start (Km)	Chainage End (Km)	Length (m)	Height of Hill Side Protection	Height of Valley Side Protection	Items wise description
59	139+640	139+685	45	2	NA	LS-1
B	**Sinking Zone**					
1	090+075	090+100	25	NA	3	SZ-14
2	090+100	090+145	45	NA	4	SZ-15
3	090+164	090+175	11	NA	4	SZ-15
4	093+136	093+182	46	NA	4	SZ-15
5	093+600	093+610	10	NA	4	SZ-15
6	093+660	093+673	13	NA	3	SZ-14
7	101+080	101+110	30	NA	5	SZ-16
8	103+614	103+620	6	NA	5	SZ-16
9	104+170	104+230	60	NA	4	SZ-15
10	106+020	106+040	20	NA	5	SZ-16
11	107+047	107+067	20	NA	5	SZ-16
12	108+500	108+540	40	NA	6	SZ-17
13	111+840	111+870	30	NA	4	SZ-15
14	115+285	115+350	65	NA	2	SZ-19
15	115+350	115+405	55	NA	2	SZ-9
16	115+440	115+490	50	NA	3	SZ-19
17	115+490	115+550	60	NA	3	SZ-10
18	115+550	115+610	60	NA	3	SZ-19
19	115+610	115+635	25	NA	2	SZ-9
20	115+635	115+690	55	NA	2	SZ-19
21	115+690	115+730	40	NA	3	SZ-10
22	115+730	115+780	50	NA	3	SZ-10
23	115+780	115+900	120	NA	3	SZ-10
24	115+970	116+040	70	NA	2	SZ-9
25	116+040	116+095	55	NA	2	SZ-9
26	116+095	116+165	70	NA	2	SZ-9
27	116+410	116+530	120	NA	3	SZ-19
28	117+060	117+180	120	NA	5	SZ-19
29	117+180	117+370	190	NA	3	SZ-19
30	117+370	117+440	70	NA	5	SZ-19
31	117+460	117+500	40	NA	4	SZ-19

S. No	Chainage Start (Km)	Chainage End (Km)	Length (m)	Height of Hill Side Protection	Height of Valley Side Protection	Items wise description
32	117+500	117+660	160	NA	4	SZ-11
33	117+660	117+780	120	NA	4	SZ-19
34	117+840	117+870	30	NA	4	SZ-19
35	117+870	117+945	75	NA	5	SZ-19
36	118+000	118+230	230	NA	2	SZ-9
37	118+230	118+290	60	NA	3	SZ-19
38	118+320	118+460	140	NA	2	SZ-9
39	118+460	118+600	140	NA	3	SZ-19
40	118+650	118+740	90	NA	5	SZ-19
41	118+740	118+790	50	NA	3	SZ-10
42	118+790	118+900	110	NA	4	SZ-19
43	118+915	119+015	100	NA	5	SZ-19
44	119+015	119+160	145	NA	5	SZ-12
45	119+160	119+270	110	NA	5	SZ-19
46	119+270	119+450	180	NA	6	SZ-19
47	120+900	121+280	380	NA	5	SZ-19
48	121+320	121+405	85	NA	5	SZ-19
49	121+450	121+510	60	NA	5	SZ-12
50	121+510	121+705	195	NA	3	SZ-10
51	121+705	121+760	55	NA	4	SZ-19
52	121+800	121+880	80	NA	3	SZ-10
53	121+880	121+970	90	NA	4	SZ-11
54	121+970	122+050	80	NA	4	SZ-19
55	122+050	122+078	28	NA	4	SZ-11
56	122+118	122+385	267	NA	3	SZ-10
57	122+385	122+535	150	NA	5	SZ-12
58	122+535	122+615	80	NA	3	SZ-19
59	122+615	122+780	165	NA	3	SZ-10
60	122+780	122+820	40	NA	4	SZ-11
61	122+820	122+870	50	NA	4	SZ-11
62	122+870	122+985	115	NA	3	SZ-10
63	122+985	123+090	105	NA	3	SZ-10
64	123+090	123+160	70	NA	3	SZ-19

S. No	Chainage Start (Km)	Chainage End (Km)	Length (m)	Height of Hill Side Protection	Height of Valley Side Protection	Items wise description
65	123+160	123+250	90	NA	3	SZ-19
66	123+300	123+340	40	NA	11	SZ-18
67	123+360	123+400	40	NA	4	SZ-19
68	123+400	123+460	60	NA	4	SZ-11
69	123+500	123+680	180	NA	2	SZ-9
70	123+930	123+990	60	NA	4	SZ-19
71	124+070	124+135	65	NA	6	SZ-19
72	124+135	124+175	40	NA	3	SZ-10
73	124+175	124+255	80	NA	2	SZ-9
74	124+415	124+535	120	NA	3	SZ-19
75	124+555	124+613	58	NA	5	SZ-12
76	124+649	124+685	36	NA	5	SZ-12
77	124+800	124+870	70	NA	5	SZ-12
78	125+055	125+100	45	NA	3	SZ-10
79	125+170	125+200	15	NA	5	SZ-12
80	125+232	125+245	13	NA	5	SZ-12
81	125+390	125+430	35	NA	6	SZ-13
82	126+450	126+475	25	NA	7	SZ-19
83	127+880	127+900	20	NA	6.5	SZ-19
84	127+945	127+980	35	NA	7	SZ-19
85	128+190	128+220	30	NA	5	SZ-16
86	129+320	129+360	40	NA	10	SZ-20
87	129+769	129+779	10	NA	4	SZ-15
88	129+960	130+035	75	NA	4	SZ-11
89	130+120	130+155	35	NA	2	SZ-9
90	130+230	130+290	60	NA	29	SZ-20
91	130+485	130+515	30	NA	8	SZ-20
92	130+680	130+764	84	NA	7	SZ-19
93	130+850	130+900	50	NA	4	SZ-11
94	131+425	131+460	35	NA	6	SZ-13
95	131+770	131+810	40	NA	14	SZ-18
96	131+810	131+840	30	NA	35	SZ-18
97	131+945	131+954	9	NA	5	SZ-16

S. No	Chainage Start (Km)	Chainage End (Km)	Length (m)	Height of Hill Side Protection	Height of Valley Side Protection	Items wise description
98	132+830	132+875	45	NA	6	SZ-13
99	133+010	133+020	10	NA	6	SZ-13
100	133+500	133+565	65	NA	15	SZ-18
101	135+425	135+460	35	NA	5	SZ-16
102	137+020	137+130	110	NA	4	SZ-15
103	138+250	138+270	20	NA	4	SZ-15
104	138+720	138+780	60	NA	5	SZ-12
105	139+096	139+106	10	NA	5	SZ-16
106	132+060	132+100	40	NA	14	SZ-20

The details provided in table are indicative in nature.

Note:

*- start and end location of slope protection work in above table shall be as per site requirements during execution of work.

** Location and height required protection shall vary as per site condition at the time of execution.

TCS wise description of Slope Protection Measures are described hereunder:

The Contractor shall provide the items as shown in the Drawings.

Various treatment proposed for slope protection work is as below:

Applicable Section LS-1

a) Galvanized steel wire of 4mm thick
b) Galvanizing coating conforming to IS:4826
c) Non-woven geotextile having mass/unit area - 250gsm
d) PVC Weep Hole of 100 mm dia
e) Back Filling with selected material
f) PCC M20 leveling course

Applicable Section LS-3

a) Galvanized steel wire of 4mm thick
b) Galvanizing coating conforming to IS:4826
c) Non-woven geotextile having mass/unit area - 250gsm
d) PVC Weep Hole of 100 mm dia
e) Back Filling with selected material
f) PCC M20 levelling course

Applicable Section LS-4

a) Galvanized steel wire of 4mm thick
b) Galvanizing coating conforming to IS:4826
c) Non-woven geotextile having mass/unit area - 250gsm
d) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm Internal dia (ID).
e) Back Filling with selected material
f) PCC M 20 Levelling course

Applicable Section LS-5

a) Galvanized steel wire of 4mm thick
b) Galvanizing coating conforming to IS:4826
c) Non-woven geotextile having mass/unit area - 250gsm
d) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.
e) Back Filling with selected material
f) PCC M 20 Levelling course

Applicable Section LS-6

a) Galvanized steel wire of 4mm thick
b) Galvanizing coating conforming to IS:4826
c) Non-woven geotextile having mass/unit area - 250gsm
d) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven

geotextile) of 100 mm ID.

e) Back Filling with selected material

f) PCC M 20 Levelling course

Applicable Section LS-7

a) Galvanized steel wire of 4mm thick

b) Galvanizing coating conforming to IS:4826

c) Non-woven geotextile having mass/unit area - 250gsm

d) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.

e) Back Filling with selected material

f) PCC M 20 Levelling course

Applicable Section LS- 8

a) Galvanized steel wire of 4mm thick

b) Galvanizing coating conforming to IS:4826

c) Non-woven geotextile having mass/unit area - 250gsm

d) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.

e) Back Filling with selected material

f) PCC M 20 Levelling course

Applicable Section SZ -9

a) Galvanized steel wire of 4mm thick

b) Galvanizing coating conforming to IS:4826

c) Non-woven geotextile having mass/unit area - 250gsm

d) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.

e) Back Filling with selected material

f) PCC M 20 Levelling course

Applicable Section SZ -10

a) Galvanized steel wire of 4mm thick

b) Galvanizing coating conforming to IS:4826

c) Non-woven geotextile having mass/unit area - 250gsm

d) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.

e) Back Filling with selected material

f) PCC M 20 Levelling course

Applicable Section SZ- 11

a) Galvanized steel wire of 4mm thick

b) Galvanizing coating conforming to IS:4826

c) Non-woven geotextile having mass/unit area - 250gsm

d) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.

e) Back Filling with selected material

f) PCC M 20 Levelling course

Applicable Section SZ- 12

a) Galvanized steel wire of 4mm thick

b) Galvanizing coating conforming to IS:4826

c) Non-woven geotextile having mass/unit area - 250gsm

d) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.

e) Back Filling with selected material

f) PCC M 20 Levelling course

Applicable Section SZ- 13

a) Galvanized steel wire of 4mm thick

b) Galvanizing coating conforming to IS:4826

c) Non-woven geotextile having mass/unit area - 250gsm

d) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.

e) Back Filling with selected material

f) PCC M 20 Levelling course

Applicable Section SZ- 14

a) Galvanized steel wire of 4mm thick

b) Galvanizing coating conforming to IS:4826

c) Non-woven geotextile having mass/unit area - 250gsm

d) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.

e) Back Filling with selected material

f) PCC M 20 Levelling course

Applicable Section SZ- 15

a) Galvanized steel wire of 4mm thick

b) Galvanizing coating conforming to IS:4826

c) Non-woven geotextile having mass/unit area - 250gsm

d) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.

e) Back Filling with selected material

f) PCC M 20 Levelling course

Applicable Section SZ- 16

a) Galvanized steel wire of 4mm thick

b) Galvanizing coating conforming to IS:4826

c) Non-woven geotextile having mass/unit area - 250gsm

d) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.

e) Back Filling with selected material

f) PCC M 20 Levelling course

Applicable Section SZ- 17

a) Galvanized steel wire of 4mm thick

b) Galvanizing coating conforming to IS:4826

c) Non-woven geotextile having mass/unit area - 250gsm

d) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.

e) Back Filling with selected material

f) PCC M 20 Levelling course

Applicable Section SZ- 18

a) Geosynthetic strap

b) Hot dip galvanized Front Mesh as Fascia with min. 400 mm width

c) Galvanized steel connectors - To connect mesh and polymeric strap

d) Galvanized steel connectors - To connect Nail and polymeric strap

e) High tensile steel wire mesh at slope

f) Non-woven geotextile having mass/unit area - 250gsm

g) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.

h) 120mm to 150mm rectangular shaped or broken boulders (average thickness 400mm) inside Steel front facia

i) PCC M20 Levelling course

j) Back Fill with selected materials

k) Admixture

l) Catch Water Drain

Applicable Section SZ- 19

a) Geosynthetic strap

b) Hot dip galvanized Front Mesh as Fascia with min. 400 mm width

c) Galvanized steel connectors - To connect mesh and polymeric strap

d) High tensile wire mesh at slope

e) Non-woven geotextile having mass/unit area - 250gsm

f) Geo-Jute mat for erosion control

g) Drainage composite

h) Soil Bags for vegetation inside Front steel facia

i) PCC M 20 levelling course

j) Back Fill with selected materials

k) Admixture

l) Catch Water Drain

m) Fully Threaded Soil Nail having yield strength ≥ 670 Mpa, ultimate tensile strength ≥ 800 Mpa and minimum galvanization of 500 grams per sqm (and minimum 25 mm dia)

n) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.

Applicable Section SZ- 20

a) Fully Threaded Soil Nail having yield strength ≥ 670 Mpa, ultimate tensile strength ≥ 800 Mpa and minimum galvanization of 500 grams per sqm (and Minimum 25 mm dia)

b) Welded 6mm wire mesh at slope

c) Sub-surface drainage pipe semi perforated, PVC pipe (lined with Non-woven geotextile) of 100 mm ID.

2.2 Lateral and vertical clearances at underpasses- NIL

2.3 Lateral and vertical clearances at overpasses-NIL

2.4 Service/Slip roads : Not Applicable

2.5 Grade separated structures : Not Applicable

Vehicular Underpass : Not applicable

Flyovers : Not applicable

2.6 Cattle and pedestrian underpass /overpass : Not applicable

2.7 Road Over Bridge (ROB): Not applicable

2.8 Limited Height Subway: Not Applicable

2.9 Typical cross-sections of the Project Highway:

Project Section	From (km)	To (km)	Length (Km)	TCS	Description
Tura-dalu	85+000	94+268	9.268	A	
Tura-dalu	101+000	143+268	42.268	B	

3. Intersections and Grade Separators: - Not applicable

4. Road Embankment and Cut Section: - Not applicable

5. Pavement :

~~5.1 Pavement design shall be carried out in accordance with IRC: 37- 2018~~

~~5.2 Provision for rehabilitation of sunk road stretches~~

~~**Type of Pavement**~~

Grouting for Cracks:

Grouting for Cracks				
Sl. No	Change	Chainage	Length	Mitigation Measure
	Start	End	(m)	
1	115+350	115+405	55	As per the Design & Drawing approved by the Authority/Authority Engineers. The minimum mitigation measure to be carried with provision of Grouting with Cement with min. depth of 5 m and max. spacing of 3 m along the cracks on road surface.
2	115+490	115+550	60	
3	115+610	115+635	25	
4	115+690	115+730	40	
5	115+730	115+780	50	
6	115+780	115+900	120	
7	115+970	116+040	70	
8	116+040	116+095	55	
9	116+095	116+165	70	
10	117+500	117+660	160	

Grouting for Cracks				
Sl. No	Change	Chainage	Length	Mitigation Measure
	Start	End	(m)	
11	118+000	118+230	230	
12	118+320	118+460	140	
13	118+740	118+790	50	
14	119+015	119+160	145	
15	121+450	121+510	60	
16	121+510	121+705	195	
17	121+800	121+970	170	
18	122+050	122+078	28	
19	122+118	122+385	267	
20	122+385	122+535	150	
21	122+615	122+780	165	
22	122+780	122+820	40	
23	122+820	122+870	50	
24	122+870	122+985	115	
25	122+985	123+090	105	
26	123+400	123+460	60	
27	123+500	123+680	180	
28	124+135	124+175	40	
29	124+175	124+255	80	
30	124+555	124+613	58	
31	124+649	124+685	36	
32	124+800	124+870	70	
33	125+055	125+100	45	
34	125+170	125+200	15	
35	125+232	125+245	13	
36	125+390	125+430	35	
37	129+960	130+035	75	
38	130+120	130+155	35	
39	130+850	130+900	50	
40	131+425	131+460	35	
41	132+830	132+875	45	
42	133+010	133+020	10	

Grouting for Cracks				
Sl. No	Change	Chainage	Length	Mitigation Measure
	Start	End	(m)	
43	138+720	138+780	60	
44	139+240	139+280	13	
	Total Length		3570	

Foundation Soil Treatment below Gabion retaining Wall:

Foundation Treatment				
Sl. No	Change	Chainage	Length	Mitigation Measure
	Start	End	(m)	
1	115+350	115+405	55	As per the Design & Drawing approved by the Authority / Authority Engineer. The minimum mitigation measure to be carried out with provisions of 3 layers of 400 mm thick selected material and 2 layers of 200 mm Geocell (filled with aggregate).
2	115+490	115+550	60	
3	115+610	115+690	80	
4	115+690	115+730	40	
5	115+730	115+780	50	
6	115+780	115+900	120	
7	115+970	116+040	70	
8	116+095	116+165	70	
9	117+500	117+660	160	
10	118+000	118+230	230	
11	118+320	118+460	140	
12	118+740	118+790	50	
13	119+015	119+160	145	
14	121+450	121+510	60	
15	121+510	121+705	195	
16	121+800	121+880	80	
17	121+880	121+970	90	
18	122+050	122+078	28	
19	122+118	122+385	267	
20	122+385	122+535	150	
21	122+615	122+780	165	
22	122+780	122+820	40	
23	122+820	122+870	50	
24	122+870	122+985	115	

Foundation Treatment				
Sl. No	**Change**	**Chainage**	**Length**	**Mitigation Measure**
	Start	**End**	**(m)**	
25	122+985	123+090	105	
26	123+400	123+460	60	
27	123+500	123+680	180	
28	124+135	124+175	40	
29	124+175	124+255	80	
30	124+555	124+613	58	
31	124+649	124+685	36	
32	124+800	124+870	70	
33	125+055	125+100	45	
34	125+170	125+200	15	
35	125+232	125+245	13	
36	125+390	125+430	35	
37	129+960	130+035	75	
38	130+120	130+155	35	
39	130+850	130+900	50	
40	131+425	131+460	35	
41	132+830	132+875	45	
42	133+010	133+020	10	
43	138+720	138+780	60	
44	139+240	139+280	13	
	Total Length		**3570**	
1	093+136	093+182	46	As per the Design & Drawing approved by the Authority. The minimum mitigation measure to be carried out is shown in the drawing.
2	093+600	093+610	10	
3	093+660	093+673	13	
4	106+020	106+040	20	
5	107+047	107+067	20	
6	111+840	111+870	30	
7	129+769	129+779	10	
8	131+945	131+954	9	
9	135+425	135+460	35	
10	137+020	137+130	110	
11	090+075	090+100	25	

Foundation Treatment				
Sl. No	Change	Chainage	Length	Mitigation Measure
	Start	End	(m)	
12	090+100	090+145	45	
13	090+164	090+175	11	
14	101+080	101+110	30	
15	103+614	103+620	6	
16	104+170	104+230	60	
17	108+500	108+540	40	
18	128+190	128+220	30	
19	138+250	138+270	20	
20	139+096	139+106	10	
	Total Length		**580**	

6. Traffic Control Devices and Road Safety Works

Not Applicable

7. Roadside Furniture

To be made good the damaged roadside furniture during the execution.

8. Compulsory Afforestation

Not Applicable.

9. Hazardous Locations

The safety barriers shall also be provided in accordance with the provision of relevant Manual.

10. Special Requirement for Hill Roads: Contractor shall follow shall be followed in accordance with hill road manual.

11. Change of Scope

a) Applicable for Hill Side Slope Protection Work

The length, slope angle and height of Special slope protection work, remedial measures at sinking/subsidence zone, breast wall, retaining wall and other items specified herein above shall be treated as per the design requirements. Any variations in quantity up to 5 % (increase) for each location mentioned in this Schedule -B shall not constitute a Change

of Scope, save and except any variations in the quantities arising out of a Change of Scope expressly undertaken in accordance with the provisions of Article 13 of the EPC Contract Agreement.

12. Shifting of Utilities

Not Applicable

SCHEDULE - C

(See Clause 2.1)

PROJECT FACILITIES

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

(a) Toll plaza[s]; (Not Applicable)

(b) Roadside furniture; (Not Applicable)

(c) Pedestrian facilities; (Not Applicable)

(d) Tree plantation / Afforestation (Applicable)

(e) Truck lay-byes; (Not Applicable)

(f) Bus-bays and bus shelters; (Not Applicable)

(g) Rest areas (Not Applicable)

(h) Others to be specified:

(i) Street lighting & high mast lighting; (Not Applicable)

(j) Emergency Medical Services/ Medical Aid Post; (Not Applicable)

(k) Highway Patrol Unit/ Traffic Aid Post; (Not Applicable)

(l) Crane Services; (Not Applicable)

(m) Communication System; (Not Applicable)

(n) Advanced Traffic Management System (ATMS); (Not Applicable)

(o) Rain Water Harvesting; (Not Applicable)

2. Description of Project Facilities

Each of the Project Facilities is briefly described below:

(a) Toll Plaza – Not Applicable

(b) Road side furniture

(i) Traffic Signs and Pavement Markings:- Traffic signs and pavement markings shall include, overhead signs, curve mounted signs and road marking along the project highway. The locations for these provisions shall be finalized as per Manual, IRC-67, IRC 35-2015 and other IRC codes if

applicable- NA

(ii) Boundary Stones provide in entire length as per Manual and IRC:25. - NA

(iii) Kilometer Stones stone for entire project stretch as per Manual and IRC:8 - NA

(iv) Overhead signs: To be provided at all locations as per Manual and IRC 67 - NA

(v) Delineators and Studs: Delineators for the entire Project Highway at the locations as per Manual- NA

(c) Pedestrian Facilities: Not Applicable

(d) Tree Plantation: Not Applicable

(e) Seeding, mulching & shrub plantation: Not Applicable

(f) Truck lay-byes: - Not Applicable

(g) Bus-bays and bus shelters: Not Applicable

(h) Rest areas–Not Applicable

(i) Others – Not Applicable

(i) Street Lighting & High Mast Lighting: - Not Applicable

(ii) Emergency Medical Services/Medical Aid Post: - Not Applicable

(iii) Highway Patrol Unit (s)/Traffic Aid Post: - Not Applicable

(iv) Crane Services: - Not Applicable

(v) Communication System: - Not Applicable

(vi) Advanced Traffic Management System (ATMS):- Not Applicable

(vii) Rainwater Harvesting System: - Not Applicable

SCHEDULE – D

See Clause 2.1

SPECIFICATIONS AND STANDARDS

1. Construction of Mitigation Measures

The Contractor shall comply with the Specification sand Standards set for the Annex-I of this Schedule-D.

Annex – I

(Schedule-D)

1. SPECIFICATIONS AND STANDARDS FOR CONSTRUCTION

1.1 Specification and Standards

GENERAL:

"Specifications for Road and Bridge Works (Latest Revision) Issued by Ministry of Road Transport & Highways" shall be adopted for works covered in these specifications. NH Specification as per IRC-SP-73-2018 and IRC-SP- 48-1998 and MoRTH circulars shall be used as per their applicability.

The standards in following priorities shall be used for design and execution & construction in order of this preference.

(i) MoRTH Specification

(ii) IRC Codes

(iii) IS & BIS codes

(iv) MoRTH guidelines

(v) Internationally applicable codes (US & European), FHWA/ ETA etc.

(vi) Highway research Bulletin

1.2. Design Standards

1.2.1. Design standard and codes for Landslides Zones

1. IRC- HRB- Special Report-23 -State of the Art: Design and Construction of Rock fall Mitigation systems, Chapter-3.
2. IRC: SP: 42 – 2014, Guidelines of Road Drainage.
3. IRC SP:116-2018 – Guidelines for Design and Installation of Gabion Structures.
4. BS 8006-1:2010+A1:2016–Code of Practice for Strengthened /Reinforced Soil& other fills.
5. BS 8081:2015+A2:2018 – Code of Practice for Grouted Anchors.
6. FHWA-NHI-14-007 – Soil Nail Walls Reference Manual (FHWA GEC 007), 2015.

7. FHWA-IF-99-015 – Ground Anchors and Anchored System (GEC No. 4), 1999.

8. Geological, geotechnical& Geophysical investigations as per IRC:78, Specifications for drilling, coring testing etc. issued by ISI. BIS, MoRTH and other relevant codes are applicable.

9- Other Indian / International Standards applicable for sound and Safe Design.

1.2.2. Design standard and codes for Sinking Zone

1. IRC SP: 116-2018 – Guidelines for Design and Installation of Gabion Structures.

2. IS 16014:2018, Mechanically Woven, Double-Twisted, Hexagonal Wire Mesh Gabions, Revet Mattresses, Rock Fall Netting and Other Products for Civil Engineering Purposes (Galvanized Steel Wire or Galvanized Steel Wire with Polymer Coating) — Specification.

3. IRC HRB Special Report 23 (2014), —State of the Art: Design and Construction of Rockfall Mitigation Systems‖, IRC Highway Research Board, New Delhi.

4. IRC: SP: 42 – 2014, Guidelines of Road Drainage.

5. IS: 1893-1 (2016), —Criteria for Earthquake Resistant Design of Structures‖, Bureau of Indian Standards, and New Delhi.

6. Ministry of Road Transport and Highways (MORTH), —Specifications for Road and Bridges Works – Fifth Revision.

7. BS 8006-1:2010+A1:2016–Code of Practice for Strengthened /Reinforced Soil and other fills.

8. BS 8081:2015+A2:2018 –Code of Practice for Ground Anchors.

9. FHWA-NHI-14-007 – Soil Nail Walls Reference Manual (FHWA GEC 007), 2015.

10. FHWA-NHI-10-24 - Design and Construction of mechanically stabilized earth walls and reinforced soil slopes-Volume-I, 2009.

11. FHWA-IF-99-015 – Ground Anchors and Anchored System (GEC No. 4), 1999.

12. Geo Report No. 175, Soil Nail Head Review by Geotechnical Engineering Office, Civil Engineering and Development Department, Government of the Hongkong.

13. Geological, geophysical and geotechnical investigation shall be carried out precisely for a safe and sound design as per standards of IRC, BIS, MoRTH and other relevant codes are applicable.

14. IRC:SP:102-2014 " Guidelines for Design and Construction of Reinforced Soil Walls"

15. MoRTH 5th Revision.

16. Report of IIT Patna and NIRM

1.3. MATERIALS

i. All materials should conform to the approved design by the Authority. Contractor has to take prior approval of the materials from the Authority/Authority' Engineer at least 2 months before the intended date of purchases satisfying all parameters of the designs. Lot wise testing shall be conducted done by the Independent laboratories for checking its conformity. Sample size and frequency of testing shall be got approved, while taking the approval of materials.

ii. The materials should conform to the relevant specifications of Indian Standards issued by BIS and other international codes of US, Europe or British wherever applicable

1.4. Execution & Finishes

Similar to items or analogues to items covered in MORTH Specifications and other international specifications.

2. Deviation from the Specifications and Standards

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

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

NIL

Schedule - E

(See Clauses 2.1 and 14.2)

Maintenance Requirements

1. Maintenance Requirements

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

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

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

2. Repair / rectification of Defects and deficiencies

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

3. Other Defects and deficiencies

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

4. Extension of time limit

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

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

5. Emergency repairs / restoration

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

6. Daily inspection by the Contractor

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

7. Pre-monsoon inspection / post-monsoon inspection

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

8. Repairs on account of natural calamities

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

Annex – I

(Schedule-E)

Repair / rectification of Defects and deficiencies

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

Table -1: Maintenance Criteria for Pavements:

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools / Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification / Repair	Maintenance Specifications
		Desirable	Acceptable					
Flexible Pavement (Pavement of MCW, Service Road, approaches of Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	Potholes	Nil	< 0.1 % of area and subject to limit of 10 mm in depth	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC 82: 2015 and Distress Identification Manual for Long Term Pavement Performance Program, FHWA 2003 reports / 03031 /)	24-48 hours	MORT&H Specification 3004.2
	Cracking	Nil	< 5 % subject to limit of 0.5 sqm for any 50 m length	Daily			7-15 days	MORT&H Specification 3004.3
	Rutting	Nil	< 5 mm	Daily	Straight Edge		15 -30 days	MORT&H Specification 3004.2
	Corrugations and Shoving	Nil	< 0.1 %of area	Daily	Length Measurement Unit like		2-7 days	IRC:82-2015
	Bleeding	Nil	< 1 % of area	Daily	Scale, Tape, odometer etc.		3-7 days	MORT&H Specification 3004.4
	Ravelling / Stripping	Nil	< 1 % of area	Daily			7-15 days	IRC:82-2015 read with IRC SP81

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					
	Edge Deformation / Breaking	Nil	< 1 m for any 100 m section and width <0.1 m at any location, restricted to 30cm from the edge	Daily			7- 15 days	IRC:82-2015
	Roughness BI	2000 mm / km	2400 mm / km	Bi- Annually	Class I Profilometer SCRIM (Sideway-force Coefficient Routine Investigation Machine or equivalent)	Class I Profilometer : ASTM E950 (98):2004 –Standard Test Method for measuring Longitudinal Profile of Travelled Surfaces with Accelerometer Established Inertial Profiling Reference ASTM E1656 -94: 2000- Standard Guide for Classification of Automatic Pavement Condition Survey Equipment	180 days	IRC:82-2015
	Skid Number	60SN	50SN	Bi- Annually			180 days	BS: 7941-1:2006
	Pavement Condition Index	3	2.1	Bi- Annually			180 days	IRC:82-2015
	Other Pavement Distresses						2-7 days	IRC:82-2015
	Deflection / Remaining Life			Annually	Falling Weight Deflectometer	IRC 115: 2014	180 days	IRC:115-2014
Rigid Pavement (Pavement of MCW, Service Road, Grade structure, approaches of connecting roads, slip roads, lay byes etc. as	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)	IRC:SP:83-2008	180 days	IRC:SP:83-2008
		Minimum SN	Traffic Speed (Km / h)					
		36	50					
		33	65					
		32	80					

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**					
applicable)		31	95					
		31	110					
Embankment / Slope	Edge drop at shoulders	Nil	40mm	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC	7-15 days	MORT&H Specification 408.4
	Slope of camber / cross fall	Nil	<2% variation in prescribed slope of camber / cross fall	Daily			7-15 days	MORT&H Specification 408.4
	Embankment Slopes	Nil	<15 % variation in prescribed side slope	Daily			7-15 days	MORT&H Specification 408.4
	Embankment Protection	Nil	Nil	Daily			7-15 days	MORT&H Specification
	Rain Cuts / Gullies in slope	Nil	Nil	Daily Specially During Rainy Season			7-15 days	MORT&H Specification

[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.]

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:

Sl. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D / 2	For the case d > D / 2
CRACKING						
1	Single Discrete Cracks Not intersecting with any joint	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	Not applicable
			1	w < 0.2 mm. hair cracks		
			2	w = 0.2 - 0.5 mm, discernible from slow-moving car	Seal without delay	Seal, and stitch if L >lm. Within 7days
			3	w = 0.5 - 1.5 mm, discernible from fast-moving car		
			4	w = 1.5 - 3.0 mm	Seal, and stitch if L > l m. Within 7 days	Staple or Dowel Bar Retrofit, FDR for affected portion. Within 15days
			5	w > 3 mm.		
2	Single Transverse (or Diagonal) Crack intersecting with one or more joints	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.2 mm, hair cracks	Route and seal with epoxy. Within 7 days	Staple or Dowel Bar Retrofit. Within 15days
			2	w = 0.2 - 0.5 mm, discernible from slow vehicle		
			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. Within 15 days	Full Depth Repair Dismantle and reconstruct affected. Portion with norms and specifications - See
			5	w > 6 mm, usually associated with spalling, and / or slab rocking under traffic	Not Applicable, as it may be full depth	

Sl. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D / 2	For the case d > D / 2
						Para 5.5 & 9.2Within 15days
3	Single Longitudinal Crack intersecting with one or more joints	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.5 mm, discernable from slow moving vehicle	Seal with epoxy, if L > 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> l m. Within 15 days	-
			3	w = 3.0 - 6.0 mm	Staple, if L > 1 m. Within 15 days	Partial Depth Repair with stapling. Within 15 days
			4	w = 6.0 - 12.0 mm, usually associated with spalling	Not Applicable, as it may be full depth	
			5	w > 12 mm, usually associated with spalling, and / or slab rocking under traffic		Full Depth Repair Dismantle and reconstruct affected portion as per norms and specifications -
4	Multiple Cracks intersecting with one or more joints	w = width of crack	0	Nil, not discernible	No Action	-
			1	w < 0.2 mm, hair cracks	Seal, and stitch if L > l m. Within 15 days	
			2	w = 0.2 - 0.5 mm. discernible from slow vehicle		
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Full depth repair within15 days	Dismantle, Reinstate subbase, Reconstruct whole slab as per specifications within30 days
			4	w = 3.0 - 6.0 mm panel broken into2 or 3 pieces		
			5	w > 6 mm and / or panel broken into more than 4 pieces		

Sl. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D / 2	For the case d > D / 2
5	Corner Break	w = width of crack L = length of crack	0	Nil, not discernible	No Action	-
			1	w < 0.5 mm; only 1 corner broken	Seal with low viscosity epoxy to secure broken parts Within 7 days	Seal with epoxy seal with epoxy Within 7days
			2	w < 1.5 mm; L < 0.6 m, only one corner broken		
			3	w < 1.5 mm; L < 0.6 m, two corners broken	Partial Depth (Refer Figure 8.3 of IRC:SP: 83-2008) Within 15 days	Full depth repair
			4	w > 1.5 mm; L > 0.6 m or three corners broken		
			5	ree or four corners broken		Reinstate sub-base, and reconstruct the slab as per norms and specifications within 30days
6	Punchout(Applicable to Continuous Reinforced Concrete Pavement (CRCP) only)	w = width of crackL = length (m / m2)	0	Nil, not discernible		No Action
			1	w < 0.5 mm; L < 3 m / m2	Not Applicable, as it may be full depth	Seal with low viscosity epoxy to secure broken parts. Within 15days
			2	either w > 0.5 mm or L < 3 m / m2		
			3	w > 1.5 mm and L < 3 m / m2		
			4	w > 3 mm, L < 3 m / m2 and deformation		Full depth repair - Cut out and replace damaged area taking care not to damage reinforcement. Within 30days
			5	w > 3 mm, L > 3 m / m2 and deformation		
Surface Defects						
7	Ravelling or Honeycomb type surface	r = area damaged surface / total surface of slab (%) h =	0	Nil, not discernible	Short Term	Long Term
					No action.	Not Applicable
			1	r < 2 %	Local repair of areas	

Sl. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D / 2	For the case d > D / 2
		maximum depth of damage	2	r = 2 - 10 %	damaged and liable to be damaged. Within 15 days	
			3	r = 10-25%	Bonded Inlay, 2 or 3 slabs if affecting.	
			4	r = 25 - 50 %		
					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 Not Applicable
			1	r < 2 %	Local repair of areas	
			2	r = 2 - 10 %	damaged and liable to be damaged. Within 7days	
			3	r = 10 - 20%	Bonded Inlay within 15 days	
			4	r = 20 - 30 %		
			5	r > 30 % and h > 25 mm	Reconstruct slab within30 days	
9	Polished Surface / Glazing	t = texture depth, sand patch test	0		No action.	Not Applicable
			1	t > 1 mm		
			2 '	t = 1 - 0.6 mm	Monitor rate of deterioration	
			3	t = 0.6 - 0.3 mm		
			4	t = 0.3 - 0.1 mm		
			5	t < 0.1 mm	Diamond Grinding if affecting50% or more slabs in a continuous stretch ofminimum5 km. Within 30 days	

Sl. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D / 2	For the case d > D / 2
10	Popout (Small Hole), Pothole Refer Para8.4	n = number / m2 d = diameter h = maximum depth	0	d < 50 mm; h < 25 mm; n < 1 per 5 m2	No action.	Not Applicable
			1	d = 50 - 100 mm; h < 50 mm; n < 1 per 5 m2	Partial depth repair 65 mm deep. Within 15 days	
			2	d = 50 - 100 mm; h > 50 mm; n < 1 per 5 m2		
			3	d = 100 - 300 mm; h < 100 mm n <1 per 5 m2	Partial depth repair110mmi.e.10 mm more than the depth of the hole. Within 30 days	
			4	d = 100 - 300 mm; h > 100 mm; n <1 per 5 m2		
			5	d > 300 mm; h > 100 mm: n > 1 per5 m2	Full depth repair. Within 30 days	
Joint Defects						
11	Joint Seal Defects	loss or damage L = Length as % total joint length	0	Difficult to discern.	Short Term No action.	Long Term Not Applicable
			1	Discernible, L< 25% but of little immediate consequence with regard to ingress of water or trapping incompressible material.	Clean joint, inspect later.	
			3	Notable. L > 25% insufficient protection against ingress of water and trapping incompressible material.	Clean and reapply sealant in selected locations. Within 7 days	
			5	Severe; w > 3 mm negligible protection against ingress of water and trapping in compressible material	Clean, widen and reseal the joint. Within 7 days	
12	Spalling of Joints	w = width on either side of the joint L =	0	Nil, not discernible	No action.	Not Applicable
			1	w < 10 mm	Apply low viscosity epoxy	

Sl. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D / 2	For the case d > D / 2
		length of spalled portion (as % joint length)	2	w = 10 - 20 mm, L < 25%	resin / mortar in cracked portion. Within 7 days	
			3	w = 20 - 40 mm, L > 25%	Partial Depth Repair. Within 15 days	
			4	w = 40 - 80 mm, L > 25%	30 - 50 mm deep, h = w + 20% of w, within 30 days	
			5	w > 80 mm, and L > 25%	50 - 100 mm deep repair. H = w + 20% of w. Within 30 days	
13	Faulting (or Stepping)	f = difference of level	0	not discernible, < 1 mm	No action.	No action.
	in Cracks or Joints		1	f < 3 mm		
			2	f = 3 - 6 mm	Determine cause and observe, take action for diamond grinding	Replace the slab as appropriate. Within 30days
			3	f = 6 - 12 mm	Diamond Grinding	
			4	f= 12 - 18 mm	Raise sunken slab.	Replace the slab as appropriate. Within 30days
			5	f> 18 mm	Strengthen subgrade and sub-base by grouting and raising sunken slab	
14	Blowup or Buckling	h = vertical displacement from normal profile	0	Nil, not discernible	Short Term	Long Term
					No Action	
			1	h < 6 mm		
			2	h = 6 - 12 mm	Install Signs to Warn Traffic	
			3	h = 12 - 25 mm	within 7 days	

Sl. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D / 2	For the case d > D / 2
			4	h > 25 mm	Full Depth Repair. Within 30 days	
			5	shattered slabs, ie 4 or more pieces	Replace broken slabs. Within 30 days	
15	Depression	h = negative vertical displacement from normal profile L=length	0	Not discernible, h < 5 mm	No action.	Not Applicable
			1	h = 5 - 15 mm		
			2	h = 15-30 mm, Nos <20%joints	Install Signs to Warn Traffic within 7 days	
			3	h = 30 - 50 mm		
			4	h > 50 mm or > 20%joints	Strengthen subgrade. Reinstate pavement at normal level	
			5	h > 100 mm	if L < 20 m. Within 30 days	
16	Heave	h = positive vertical displacement from normal profile.L = length	0	Not discernible. h < 5 mm	Short Term	Long Term
					No action.	scrabble
			1	h = 5 - 15 mm	Follow up.	
			2	h = 15 - 30 mm, Nos<20% joints	Install Signs to Warn Traffic within 7 days	
			3	h = 30 - 50 mm		
			4	h > 50 mm or > 20%joints	Stabilise subgrade. Reinstate pavement at normal level if length< 20 m. Within 30 days	
			5	h > 100 mm		
17	Bump	h = vertical	0	h < 4 mm	No action	
		displacement fromnormal profile	1	h = 4 - 7 mm	Grind, in case of new construction within 7 days	Construction Limit for New Construction.
			3	h = 7 - 15 mm	Grind, in case of ongoing Maintenance within 15 days	Replace in case of new construction. Within 30days

Sl. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D / 2	For the case d > D / 2
			5	h > 15 mm	Full Depth Repair. Within 30 days	Full Depth Repair. Within 30days
18	Lane to Shoulder Dropoff	f = difference of level	0	Nil, not discernible< 3mm	Short Term	Long Term
					No action.	
			1	f = 3 - 10 mm	Spot repair of shoulder within 7 days	
			2	f = 10 - 25 mm		
			3	f = 25 - 50 mm	Fill up shoulder	
			4	f = 50 - 75 mm	within 7 days	For any 100 m stretch Reconstruct shoulder, if affecting 25% or more of stretch. Within 30days
			5	f > 75 mm		
Drainage						
19	Pumping	quantity of fines and water expelled through open joints and cracks Nos	0	not discernible	No Action	
			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 / Frequent10 - 25%	Lift or jack slab within 30 days.	
		Nos / 100 m stretch	5	abundant, crack development > 25%	Repair distressed pavement sections. Strengthen subgrade and subbase. Replace slab. Within 30 days	
20	Ponding	Ponding on slabs due to blockage of drains	0-2	No discernible problem	No action.	
			3 to 4	Blockages observed in drains, but water flowing	Clean drains etc within 7 days, Follow up	Action required to stop water damaging foundation within 30
			5	Ponding, accumulation of water	-do-	

Sl. No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D / 2	For the case d > D / 2
				observed		days.

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. Design Speed, kmph / Desirable Minimum Sight Distance (m) / Safe Stopping Sight Distance (m) 100 / 360 / 180 80 / 260 / 130	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:SP84-2014
Pavement Marking	Wear	<70% of marking remaining	Bi- Annually	Visual Assessment as per Annexure-F of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hoursCat-2 Defect - within 2 months	IRC:35-2015
	Day time Visibility	During expected life Service Time Cement Road -130mcd / m2 / lux Bituminous Road -	Monthly	As per Annexure-D of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect –	IRC:35-2015

<table>
<tr><th>Asset Type</th><th>Performance Parameter</th><th colspan="4">Level of Service (LOS)</th><th>Frequency of Measurement</th><th>Testing Method</th><th>Recommended Remedial measures</th><th>Time limit for Rectification</th><th>Specifications and Standards</th></tr>
<tr><td></td><td></td><td colspan="4">100mcd / m2 / lux</td><td></td><td></td><td></td><td>within 2 months</td><td></td></tr>
<tr><td></td><td>Night Time Visibility</td><td colspan="4"><u>Initial and Minimum Performancefor Dry Retro reflectivity duringnight time:</u></td><td>Bi-Annually</td><td>As per Annexure-E of IRC:35-2015</td><td>Re - painting</td><td>Cat-1 Defect – within 24 hours
Cat-2 Defect – within 2 months</td><td>IRC:35-2015</td></tr>
<tr><td></td><td></td><td>Design Speed</td><td colspan="3">(RL) Retro Reflectivity (mcd / m2 / lux)</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td>Initial (7 days)</td><td>Minimum Threshold level (TL) & warranty period required up to 2 years</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>Up to 65</td><td>200</td><td>80</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>65 - 100</td><td>250</td><td>120</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>Above100</td><td>350</td><td>150</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="4"><u>Initial and Minimum Performance forNight Visibility under wet condition(Retro reflectivity):</u></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td colspan="4">Initial 7 days Retro reflectivity: 100 mcd / m2 / lux Minimum Threshold Level: 50mcd / m2 / lux</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Skid Resistance	Initial and Minimum performance for Skid Resistance: Initial (7days): 55BPNMin. Threshold: 44BPN*Note: shall be considered under urban / city traffic condition encompassing the locations like pedestrian crossings, bus bay, bus stop, cycle track intersection delineation, transverse bar markings etc	Bi-Annually	As per Annexure-G of IRC:35-2015		Within 24 hours	IRC:35-2015
Road Signs	Shape and Position	Shape and Position as per IRC:67-2012.Signboard should be clearly visible for the design speed of the section.	Daily	Visual with video / image backup	Improvement of shape, in case if shape is damaged. Relocation as per requirement	48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs)15 Days in case of Gantry / Cantilever Sign boards	IRC:67-2012
	Retro reflectivity	As per specifications in IRC:67-2012	Bi-Annually	Testing of each	change of signboard	48 hours in case of	RC:67-2012

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
						Mandatory	
				signboard using Retro Reflectivity Measuring Device. In accordance with ASTM D4956-09.		Signs, Cautionary and Informatory Signs (Single and Dual post signs)1 Month in case of Gantry / Cantilever Sign boards	
Kerb	Kerb Height	As per IRC 86:1983 depending upon type of Kerb	Bi-Annually m	Use of distance Reassuring tape H	raising Kerb eight	Within 1 Month	RC 86:1983
	Kerb Painting	Functionality: Functioning of Kerb painting as intended	Daily	Visual with video / image K backup	Kerb Repainting	Within 7-days	RC 35:2015
Other Road Furniture	Reflective Pavement Markers (Road Studs)	Numbers and Functionality as per specifications in IRC:SP:84-2014 and IRC:35-2015, unless specified in Schedule-B.	Daily	Counting	New Installation	Within 2 months	IRC:SP:84-2014, IRC:35-2015
	Pedestrian Guardrail	Functionality: Functioning of guardrail as intended	Daily	Visual with video / image backup	Rectification	Within 15 days	IRC:SP:84-2014
	Traffic Safety Barriers	Functionality: Functioning of Safety Barriers as intended	Daily	Visual with video / image backup	Rectification	Within 7 days	IRC:SP:84-2014, IRC:119-2015
	End Treatment of	Functionality: Functioning of End Treatment as intended	Daily	Visual with video / image	Rectification	Within 7 days	IRC:SP:84-2014,

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Traffic Safety Barriers			backup			IRC:119-2015
	Attenuators	Functionality: Functioning of Attenuators as intended	Daily	Visual with video / image backup	Rectification	Within 7 days	IRC:SP-2014, IRC:119-2015
	Guard Posts and Delineators	Functionality: Functioning of Guard Posts and Delineators as intended	Daily	Visual with video / image backup	Rectification	Within 15 days	IRC: 79 -1981
	Overhead Sign Structure	Overhead sign structure shall be structurally adequate	Daily	Visual with video / image backup	Rectification	Within 15 days	IRC:67-2012
	Traffic Blinkers	Functionality: Functioning of Traffic Blinkers as intended	Daily	Visual with video / image backup	Rectification	Within 7 days	IRC:SP:84-2014
Highway Lighting System	Highway Lights	Illumination: Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC:SP:84-2014
		No major failure in the lighting system	Daily	-	Rectification of failure	24 hours	IRC:SP:84-2014
		No minor failure in the lighting system	Monthly	-	Rectification of failure	8 hours	IRC:SP:84-2014
	Toll Plaza Canopy Lights	Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC:SP:84-2014
		No major / minor failure in the lighting system	Daily	-	Rectification of failure	8 hours	IRC:SP:84-2014
Trees and Plantation	Obstruction in a minimum headroom	No obstruction due to trees	Monthly	Visual with video / image backup	Removal of trees	Immediate	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
including median plantation	of5.5 m above carriageway or obstruction in visibility of road signs						
	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, bus- shelters, cattle crossings, Traffic Aid Posts, Medical Aid Posts and other works		Daily	-	Rectification	15 days	IRC:SP 84-2014

Table 4: Maintenance Criteria for Structures and Culverts:

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 Specifications clause 2800
		Delamination of concrete not more than 0.25 sq.m.					
		Cracks wider than 0.3 mm not more than 1m aggregate length					
	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sqm, damage to solid apron (concrete apron) not more than 1	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	IRC: SP 40-1993 and IRC:SP:13-2004.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		sqm				onset of rainy season whichever is earlier.	
Bridges including ROBs Flyover etc. as applicable	Riding quality or user comfort	No pothole in wearing coat on bridge deck	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC or wearing coat	15 days	MORT&H Specification 2811
Bridge - Super Structure	Bumps	No bump at expansion joint	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC on either side of expansion joints, profile correction course on approach slab in case of settlement to approach embankment	15 days	MORT&H Specification 3004.2 & 2811.
	User safety (condition of crash barrier and guard rail)	No damaged or missing stretch of crash barrier or pedestrian hand railing	Daily	Visual inspection and detailed condition survey as per IRC SP: 35-1990.	Repairs and replacement of safety barriers as the case may be	3days	IRC: 5-1998, IRC SP: 84-2014 and IRC SP: 40-1993.
	Rusted reinforcement	Not more than 0.25 sq.m	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive	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					

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
					coating before carrying out the repairs to affected concrete portion with epoxy mortar / concrete		
	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 40m	Load Test Method	Carry out major rehabilitation works on bridge to retain original design loads capacity	6 months	IRC SP: 51-1999.
	Vibrations in bridge deck due to moving trucks	Frequency of vibrations shall not be more than5 Hz	Once in every 5 years for spans more than 30m and every 10 years for spans	Laser displacement sensors or laser vibro-meters	Strengthening of super structure	4 months	AASHTO LRFD specifications

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
			between 15 to 30m				
	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	MORTHspecifications2600 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 silt, debris, clogging of drainage spout collection chamber.	Monthly	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Cleaning of drainage spouts thoroughly. Replacement of missing / broken down take pipes with a minimum pipe extension of 500mm below soffit of slab. Providing sealant around the drainage spout if any leakages observed.	3 days	MORTHspecification2700.
Bridge-substructure	Cracks / spalling of	No cracks, spalling of concrete and rusted steel	Bi-Annually	Detailed condition survey as per IRC	All the corroded reinforcement shall need	30 days	IRC SP: 40-1993 and

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	concrete / rusted steel			SP: 35-1990 using Mobile Bridge Inspection Unit	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		MORTH specification2800.
	Bearings	Delamination of bearing reinforcement not more than5%, cracking or tearing of rubber not more than 2 locations per side, no rupture of reinforcement or rubber	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	In case of failure of even one bearing on any pier / abutment, all the bearings on that pier / abutment shall be replaced, in order to get uniform load transfer on to bearings.	3 months	MORTH specification 2810 and IRC SP: 40-199.
Bridge Foundations	Scouring around foundations	Scouring shall not be lower than maximum scour level for the bridge	Bi-Annually	Condition survey and visual inspection as per IRC SP:35-1990 using Mobile Bridge Inspection Unit. In case of doubt, use Underwater camera for inspection of deep wells in major Rivers.	Suitable protection works around pier / abutment	1 month	IRC SP: 40-1993, IRC83-2014, MORTH specification 2500

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	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.
Note: Any Structure during the entire contract period which is found that does not comply with all requirements of this Table will be prepared, rehabilitated or even reconstructed under the scope of the contractor.							

Table 5: Maintenance Criteria for Hill Roads

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

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

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

A. Flexible Pavement

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

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

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

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

Schedule - F

(See Clause 4.1 (vii)(a))

Applicable Permits

1. Applicable Permits

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 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 and 19.2)

Annex-I

(See Clause 7.1)

Form of Bank Guarantee

[Performance Security / Additional Performance Security]

To

Managing Director
National Highway & Infrastructure Development Corporation Limited
1st & 2nd Floor, Tower A, World Trade Centre,
Nauroji Nagar, New Delhi – 110029
Phone No: 011-26768950
Email: gmtmeghalaya@nhidcl.com

WHEREAS:

(a) _____ [name and address of contractor] (hereinafter called the "**Contractor"**) and **Managing Director, National Highway & Infrastructure Development Corporation Limited, 1st & 2nd Floor, Tower A, World Trade Centre, Nauroji Nagar, New Delhi – 110029 (the "Authority")** have entered into an agreement (hereinafter called the "**Agreement**") for "**Construction of Remedial Measures for treatment of Sinking Zone at 72 locations in between Km 85+000 to Km 95+000 & Km 101+000 to Km 145+000 of Tura-Dalu section of NH-51 in the State of Meghalaya on EPC Mode"** subject to and in accordance with the provisions of the Agreement

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

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

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

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

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

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

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

5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfillment and / or performance of all or any of the obligations of the Contractor contained in the Agreement or to postpone for

any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and / or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

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

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

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

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

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

signed by an officer of the Authority that the envelope was so posted shall be conclusive.

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

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)
(Name)
(Designation)
(Code Number)
(Address)

NOTES:

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

2. 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.

3. The Performance Security shall have additional one year claim period beyond validity period.

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

Annex – II

(Schedule - G)

(See Clause 19.2)

Form for Guarantee for Advance Payment

To

Managing Director, NHIDCL
National Highway & Infrastructure Development Corporation Limited
1st & 2nd Floor, Tower A, World Trade Centre,
Nauroji Nagar, New Delhi – 110029
Phone No: 011-26768950
Email: gmtmeghalaya@nhidcl.com

WHEREAS:

(A) [name and address of contractor] (hereinafter called the "**Contractor**") has executed an agreement (hereinafter called the "Agreement") with the **Managing Director, National Highway & Infrastructure Development Corporation Limited, 1st & 2nd Floor, Tower A, World Trade Centre, Nauroji Nagar, New Delhi – 110029 (the "Authority")** for "**Construction of Remedial Measures for treatment of Sinking Zone at 72 locations in between Km 85+000 to Km 95+000 & Km 101+000 to Km 145+000 of Tura-Dalu section of NH-51 in the State of Meghalaya on EPC Mode"**, subject to and in accordance with the provisions of the Agreement.

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

(C) We, ……..through our branch at …… (the "**Bank**") have agreed to furnish this bank guarantee (hereinafter called the "**Guarantee**") for the 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 guarantees the due and faithful repayment on time of the aforesaid instalment of the Advance Payment under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and / or for the sum specified therein.

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

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

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.

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:

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

2. 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.

3. The bank shall be any bank listed in the list of nationalized / Govt banks only but not any scheduled commercial private banks.

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

Annex-III

(See Clause 7.1)

Form of Insurance Surety Bonds

[Performance Security / Additional Performance Security]

To

Managing Director, NHIDCL
National Highway & Infrastructure Development Corporation Limited
1st & 2nd Floor, Tower A, World Trade Centre,
Nauroji Nagar, New Delhi – 110029
Phone No: 011-26768950
Email: gmtmeghalaya@nhidcl.com

WHEREAS:

(a) _____ [name and address of contractor] (hereinafter called the "**Contractor"**) has undertaken, in pursuance of Letter of Acceptance (LOA) No. _____ dated _____ for Construction of **"Construction of Remedial Measures for treatment of Sinking Zone at 72 locations in between Km 85+000 to Km 95+000 & Km 101+000 to Km 145+000 of Tura-Dalu section of NH-51 in the State of Meghalaya on EPC Mode"** (hereinafter called the "Contract").

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

(c) We, ……..through our branch at ……. (the "**Surety Insurer**") have agreed to furnish this Surety Bond by way of Performance Security.

NOW, THEREFORE, the **Surety Insurer** hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The **Surety Insurer** 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 **Surety Bond** 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 **Surety Insurer**. The **Surety Insurer** 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 **Surety Insurer**, 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 **Surety Bond**, the Authority shall be entitled to act as if the **Surety Insurer** were the principal debtor and any change in the constitution of the Contractor and / or the **Surety Insurer**, 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 **Surety Insurer** under this **Surety Bond**.

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

5. The Authority shall have the liberty, without affecting in any manner the liability of the **Surety Insurer** under this **Surety Bond**, 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 **Surety Insurer** 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 **Surety Insurer** from its liability and obligation under this **Surety Bond** and the **Surety Insurer** hereby waives all of its rights under any such law.

6. This **Surety Bond** is in addition to and not in substitution of any other **Surety Bond** 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 **Surety Insurer** under this **Surety Bond** is restricted to the **Surety Bond** Amount and this **Surety Bond** 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 **Surety Insurer** under this **Surety Bond** all rights of the Authority under this **Surety Bond** shall be forfeited and the **Surety Insurer** shall be relieved from its liabilities hereunder.

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

9. The **Surety Insurer** undertakes not to revoke this **Surety Bond** 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 **Surety Bond** and the undersigned has full powers to do so on behalf of the **Surety Insurer**.

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the **Surety Insurer** 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 **Surety Bond** shall come into force with immediate effect and shall remain in force and effect for up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the **Surety Insurer** by:

(Signature)
(Name)
(Designation)
(Code Number)
(Address)

NOTES:

1. The **Surety Bond** should contain the name, designation and code number of the officer(s) signing the **Surety Bond**.
2. The address, telephone number and other details of the head office of the **Surety Insurer** as well as of issuing branch should be mentioned on the covering letter of issuing branch.
3. The Performance Security shall have additional one year claim period beyond validity period.

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

SCHEDULE – H

(See Clauses10.1.4 and 19.3)

Contract Price Weightages

1.1 The Contract Price for this Agreement is _____.

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	Scope Length (m)	Percentage weightage
1	2	3	4
A. Mechanically Stabilized Earth Wall (MSEW)	28.71%	3,164	100.00%
B. Shored Hybrid Reinforced Soil Structure (SHRS)	18.51%	145	100.00%
C. Soil nail including Grouting with Wire mesh and erosion Control Mat	11.04%	23,190	100.00%
C. Special Protection work on Hill Side	0.45%		
(i) Debris Flow Barrier		10	55.60%
(ii) Wire mesh + Nailing with Gabion Breast Wall		15	44.40%
D. Gabion Breast Wall	8.93%		
2m ht		3,984	68.78%
3m ht		1,017	31.04%
4m ht		120	7.77%
5m ht		140	12.86%
6m ht		13	1.60%
E. Gabion Retaining Wall Including foundation soil treatment	25.88%		
2m ht		940	15.67%
3m ht		1,383	33.46%
4m ht		895	29.58%
5m ht		767	33.41%
6m ht		165	9.22%
F. Road Works	2.01%		100.00%
G. Other Works	4.02%		

(i) Paved portion		7,921	64.54%
(ii) Grouting for Cracks on road surface		6,510	35.46%
G. Short term protection measures on sinking zone locations	0.45%	485	100%
	100.00%		

1.3 Procedure of estimating the value of work done.

1.3.1 Road works including culverts and service roads

Procedure for estimating the value of road work including culverts and service roads shall be as follows:

Table 1.3.1

Item	Weightage in percentage to the Contract Price	Percentage weightage	Payment Procedure
1	**2**	**4**	**5**
A. Mechanically Stabilized Earth Wall (MSEW)	28.71%	100.00%	Unit of measurement is linear length. Payment of each stage shall be made on pro-rata basis on completion of a stage in a length of not less than 5%(five percent) of the total length of MSE in all respect.
B. Shored Hybrid Reinforced Soil Structure (SHRS)	18.51%	100.00%	Unit of measurement is linear length. Payment of each stage shall be made on pro-rata basis on completion of a stage in a length of not less than 10%(ten percent) of the total length of shored structure in all respect.
C. Soil nail including Grouting with	11.04%	100.00%	Unit of measurement is linear length. Payment of each stage shall be made

Item	Weightage in percentage to the Contract Price	Percentage weightage	Payment Procedure
Wire mesh and erosion Control Mat			on pro-rata basis on completion of a stage in a length of not less than 10%(ten percent) of the total nail length in all respect.
C. Special Protection work on Hill Side	0.45%		
(i) Debris Flow Barrier		55.60%	Unit of measurement is unit. Payment of each stage shall be made on completion of stage in all respect.
(ii) Wire mesh + Nailing with Gabion Breast Wall		44.40%	
D. Gabion Breast Wall	8.93%		
2m ht		56.35%	Unit of measurement is linear length. Payment of each stage shall be made on pro-rata basis on completion of a stage in a length of not less than 10%(ten percent) of the total length of Gabion Breast Wall in all respect.
3m ht		25.43%	
4m ht		6.37%	
5m ht		10.54%	
6m ht		1.31%	
E. Gabion Retaining Wall Including foundation soil treatment	25.88%		
2m ht		12.92%	Unit of measurement is linear length. Payment of each stage shall be made on pro-rata basis on completion of a stage in a
3m ht		27.57%	
4m ht		24.38%	
5m ht		27.53%	
6m ht		7.60%	

Item	Weightage in percentage to the Contract Price	Percentage weightage	Payment Procedure
			length of not less than 10%(ten percent) of the total length of Gabion retaining Wall in all respect.
F. Road Works	2.01%	100.00%	Unit of measurement is linear length. Payment of each stage shall be made on pro-rata basis on completion of a stage in a length of not less than 5%(five percent) of the total length of road in all respect.
G. Other Works	4.02%		
(i) Paved portion		70.27%	Unit of measurement is linear length. Payment of each stage shall be made on pro-rata basis on completion of a stage in a length of not less than 5%(five percent) of the total length of grouting in all respect.
(ii) Grouting for Cracks on road surface		29.73%	
H. Short term protection measures on sinking zone locations	0.45%	100.00%	On completion of entire work item

2. Procedure for payment for Maintenance

(a) The cost for maintenance shall be as stated in Clause 14.1.1

(b) Payment for Maintenance shall be made in accordance with the provisions of Clause 19.7.

Schedule - I

(See Clause 10.2 (iv))

Drawings

1. Drawings

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

2. Additional Drawings

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

Annex – I

(Schedule - I)

List of Drawings

As per the Manuals and Good Industry Practice.

Schedule - J

(See Clause 10.3 (ii))

Project Completion Schedule

1. Project Completion Schedule – 06 months (180 Days) **from appointed date.**

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

2.1 Project Milestone-I shall occur on the date falling on the 63rd day [35% of the Scheduled Construction Period] day from the Appointed Date (the "Project Milestone- I").

2.2 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

3.1 Project Milestone-II shall occur on the date falling on the 108th day [60%of the Scheduled Construction Period] day from the Appointed Date (the "Project Milestone- II").

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

4. Project Milestone-III

1.1. Project Milestone-III shall occur on the date falling on the 153rd day [85%of the Scheduled Construction Period] day from the Appointed Date (the "Project Milestone- III").

1.2. Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with construction of the Project Highway and submitted to the

Authority duly and validly prepared Stage Payment Statements for an amount not less than 70% (seventy per cent) of the Contract Price and should have started construction of all project facilities.

5. Scheduled Completion Date

5.1 The Scheduled Completion Date shall occur on the 180th day [Scheduled Construction Period] from the Appointed Date.

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

6. Extension of time

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

Schedule - K

(See Clause 12.1 (ii))

Tests on Completion

1. Schedule for Tests

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 [***].

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

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) metres 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, except tests as specified in clause 5, but shall include measuring the reflectivity of road markings and road signs; and measuring the illumination level (lux) of lighting using requisite testing equipment.

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.

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

Sr. No.	Key metrics of Asset	Equipment to be used	Frequency of condition survey
1	Surface defects of pavement	Network Survey Vehicle (NSV)	At least twice a year (As per survey months defined for the state basis rainy season) **NSV shall be conducted (as per guidelines of Ministry vide OM No. RW/NH-33044/32/2019-S&R (P&B) dated 13.11.2019 and OM No. RW/NH-33044/32/2019-S&R (P&B) dated 13.11.2019) before issue of provisional/final completion certificate, & at every six months**

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

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

Schedule - L

(See Clause 12.2)

Completion Certificate

1. I, …… (Name of the Authority's Engineer), acting as the Authority's Engineer, under and in accordance with the Agreement dated …… (the "Agreement"), for "**Construction of Remedial Measures for treatment of Sinking Zone at 72 locations in between Km 85+000 to Km 95+000 & Km 101+000 to Km 145+000 of Tura-Dalu section of NH-51 in the State of Meghalaya on EPC Mode**" through …… (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement, and I am satisfied that the Project Highway can be safely and reliably placed in service of the Users thereof.

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

SIGNED, SEALED AND DELIVERED

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

(Signature)

(Name)

(Designation) (Address)

Schedule - M

(See Clauses 14.6, 15.2 and 19.7)

Payment Reduction for Non-Compliance

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

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

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

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

2. Percentage reductions in lump sum payments on monthly basis

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

Sl. 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%
(ii)	Any Defects in superstructures, bearings and sub-structures	10%
(iii)	Painting, repairs / replacement kerbs, railings, parapets,	5%

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

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

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

Where,

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

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

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

L1= Non-complying length

L = Total length of the road,

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

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

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

Schedule - N

(See Clause 18.1 (i))

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

2.1 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 [name and address of the Authority] (the "Authority") and..... (the "Contractor")# for "**Construction of Remedial Measures for treatment of Sinking Zone at 72 locations in between Km 85+000 to Km 95+000 & Km 101+000 to Km 145+000 of Tura-Dalu section of NH-51 in the State of Meghalaya on EPC Mode"**, and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.

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

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 Article 1 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) issuance of Completion Certificate or

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

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 and approve the Drawings furnished by the Contractor along with supporting data, including the geo-technical and hydrological investigations, characteristics of materials from borrow areas and quarry sites, topographical surveys, and the recommendations of the Safety Consultant in accordance with the provisions of Clause 10.1 (vi). The

Authority's Engineer shall complete such review and approval and send its observations to the Authority and the Contractor within 15 (fifteen) days of receipt of such Drawings; provided, however that in case of a Major Bridge or Structure, the aforesaid period of 15 (fifteen) days may be extended upto 30 (thirty) days. In particular, such comments shall specify the conformity or otherwise of such Drawings with the Scope of the Project and Specifications and Standards.

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

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

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

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 (ix), the tests specified in the IRC Special Publication-11 (Handbook of Quality Control for Construction of Roads and Runways) and the Specifications for Road and Bridge Works issued by MORTH (the "Quality Control Manuals") or any modification / substitution thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance.

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

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

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 12.2.

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, as the case may be. For carrying out its functions under this Paragraph 4 (xviii) and all matters incidental thereto, the Authority's Engineer shall act under and in accordance with the provisions of Article 12 and Schedule-K.

5. Maintenance Period

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 (iv) (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 (i), 19.6 (i), and 19.8 (i))

Forms of Payment Statements

1. Stage Payment Statement for Works

The Stage Payment Statement for Works shall state:

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

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

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

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

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

(f) Deductions:

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

(ii) Any amount towards deduction of taxes; and

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

(g) Net claim: (e) – (f) (iii);

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

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

(ii) For Change of Scope Orders, and

(iii) Taxes deducted

2. Monthly Maintenance Payment Statement

The monthly Statement for Maintenance Payment shall state:

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

(b) the deductions for maintenance work not done;

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

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

(e) amount towards deduction of taxes

3. Contractor's claim for Damages

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

Schedule - P

(See Clause 20.1)

Insurance

1. Insurance during Construction Period

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

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

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

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

2. Insurance for Contractor's Defects Liability

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

3. Insurance against injury to persons and damage to property

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: Rs. [*****]

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 "**Construction of Remedial Measures for treatment of Sinking Zone at 72 locations in between Km 85+000 to Km 95+000 & Km 101+000 to Km 145+000 of Tura-Dalu section of NH-51 in the State of Meghalaya on EPC Mode"** 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 ****