Ministry of Road Transport & Highways,
(Govt. of India)

SCHEDULES

For

"Widening & Upgradation to two lanes with paved shoulders road from Tamenglong to Mahur (NH-137) in the State of Assam starting from km 156.489 near P. Leikul to km 176.410 near Borowapu (Package-10) on EPC mode. (Project Length = 19.921 km)"

FEBRUARY, 2023

National Highways & Infrastructure Development Corporation Ltd
3rd floor, PTI Building, 4-Parliament Street,

New Delhi – 110001

Schedule-A

Schedule- A

(SeeClauses 2.1 and 8.1)

Site oftheProject

1. TheSite

(i) Site of the Two-Lane (proposed 4-lane divided carriageway)Project Highway shall include the land, buildings, structures and road works as described in Annex-I of this **Schedule-A**

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

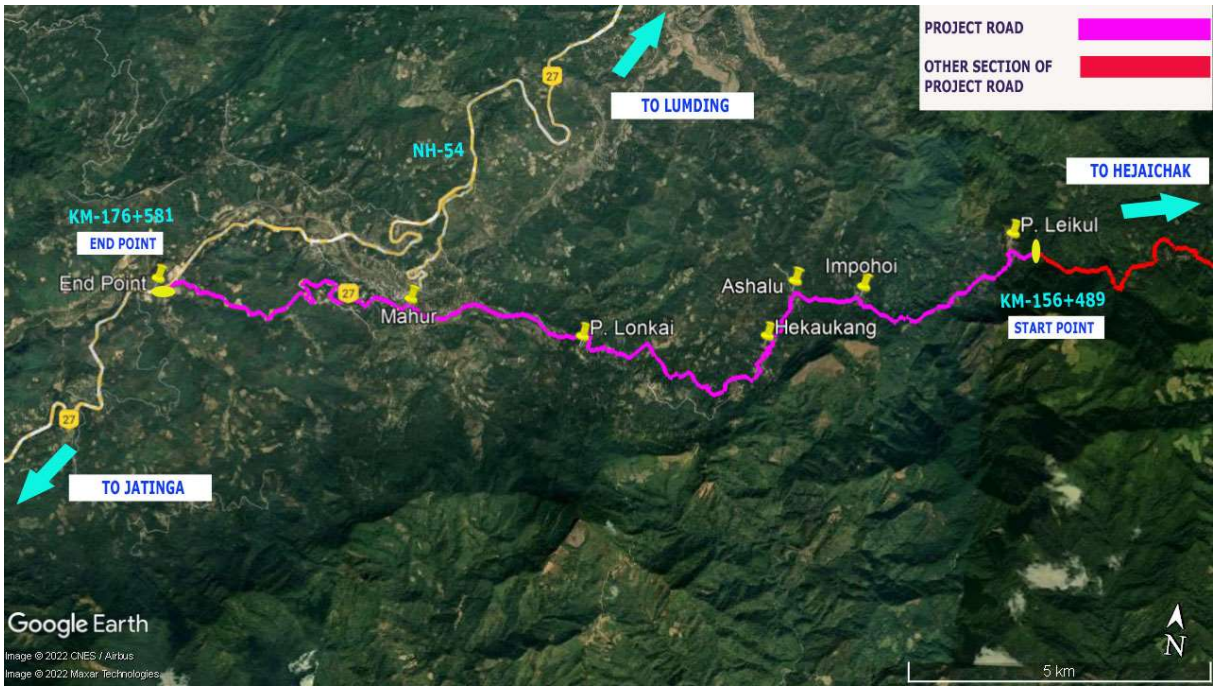
(iii) An inventoryof the Siteincludingtheland,buildings,structures,roadworks, treesandany otherimmovableproperty on,orattachedto,theSiteshallbe preparedjointlybytheAuthorityRepresentativeandtheContractor,and suchinventoryshallformpartofthememorandumreferredto InClause8.2.1 of this Agreement.

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

(v) The statusof theenvironmentclearancesobtainedorawaitedisgivenin AnnexIV.

Widening & Upgradation to two lanes with paved shoulders road from Tamenglong to Mahur (NH-137) in the State of Assam starting from km 156.489 near P. Leikul to km 176.410 near Borowapu (Package-10) on EPC mode. (Project Length = 19.921 km)

KEY PLAN



Annex-I
(Schedule-A)

Site

1. Site

The Site of the two-lane (proposed 2-lanewith paved shoulder carriageway)Project Highway starts nearP.Leikuland ends nearMahur(Borowapu)(Package-10) from Existing Chainagekm160+875 of NH-137 to km182+169 of NH 137 (Design Chainage 156+489 to 176+581) on Tamenglong-Mahur road in the state of Assam.The land, carriageway and structures comprising the Site are described below.

2. Land

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

S No.	Existing Chainage (km)		Length (m)	Right of Way (m)	Remarks
	From	To			
1	160875	161100	225	7	Agricultrure
2	161100	161800	700	7	Builtup
3	161800	164550	2750	7	Agricultrure
4	164550	165200	650	7	Builtup
5	165200	165800	600	7	Agricultrure
6	165800	166700	900	7	Builtup
7	166700	166850	150	7	Agricultrure
8	166850	167850	1000	7	Builtup
9	167850	171000	3150	7	Agricultrure
10	171000	172050	1050	7	Builtup
11	172050	172700	650	7	Agricultrure
12	172700	173350	650	7	Builtup
13	173350	174550	1200	7	Agricultrure
14	174550	175600	1050	7	Builtup
15	175600	177700	2100	10	Builtup
16	177700	182169	4469	10	Agricultrure

3. Carriageway

The present carriageway of the Project Highway is 7.0m wide. The type of the existing pavement is flexible. The detail is given below.

S No.	Existing Chainage (km)		Length (m)	Carriageway Width (m)	Remarks
	From	To			
1	160+875	182+169	21294	3.00	

4. Major Bridges

The Site includes the following Major Bridges:

S. No.	Chainage(km)	Type of super structures			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-structure	Superstructure		
NIL						

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

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

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

6. Grade separators

The Site includes the following grade separators:

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

7. Minor bridges

The Site includes the following minor bridges:

S. No.	Chainage (km)	Type of super structures			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-structure	Superstructure		
1	175+700	_	_	Bailey Bridge	1X20	5.4

8. Railway level crossings

The Site includes the following railway level crossings:

S. No.	Location (km)	Remarks
NIL		

9. Underpasses (vehicular, non-vehicular)

The Site includes the following underpasses:

S.No.	Chainage(km)	TypeofStructure	No. of Spans withspanlength(m)	Width(m)

NIL

10. Culverts

The Site has the following culverts:

S. No.	Chainage(km)	Type of Culvert	Span /Opening with span length (m)	Remarks
1	160895	HPC	1ROW900	
2	161100	HPC	1ROW900	
3	161510	HPC	1ROW900	
4	162015	HPC	1ROW900	
5	162495	HPC	1ROW900	
6	162650	HPC	1ROW900	
7	162975	HPC	1ROW900	
8	163310	FCW	_	
9	163625	HPC	1ROW900	
10	163770	HPC	1ROW900	
11	163900	HPC	1ROW900	
12	164010	HPC	1ROW900	
13	164130	HPC	1ROW900	
14	164245	HPC	1ROW900	
15	164455	HPC	1ROW900	
16	164500	HPC	1ROW900	
17	164720	HPC	1ROW900	
18	164845	HPC	1ROW900	
19	164900	HPC	1ROW900	
20	165040	FCW	_	
21	165100	HPC	1ROW900	
22	165275	HPC	1ROW900	
23	165475	HPC	1ROW900	
24	165550	HPC	1ROW900	
25	165630	HPC	1ROW900	
26	165740	HPC	1ROW900	
27	165795	HPC	1ROW900	
28	165920	HPC	1ROW900	
29	166170	HPC	1ROW900	
30	166250	HPC	1ROW900	
31	166360	HPC	1ROW900	
32	166395	HPC	1ROW900	
33	166500	RCC SLAB	1X1	
34	166715	HPC	1ROW900	
35	166810	HPC	1ROW900	
36	166925	HPC	1ROW900	
37	167330	HPC	1ROW900	

S. No.	Chainage(km)	Type of Culvert	Span /Opening with span length (m)	Remarks
38	167375	HPC	1ROW900	
39	167825	HPC	1ROW900	
40	167895	HPC	1ROW900	
41	167990	RCC SLAB	1X2	
42	168035	HPC	1ROW900	
43	168265	HPC	1ROW900	
44	168390	HPC	1ROW900	
45	168550	HPC	1ROW900	
46	168625	HPC	1ROW900	
47	168690	HPC	1ROW900	
48	168840	RCC SLAB	1X2	
49	168925	HPC	1ROW900	
50	168950	HPC	1ROW900	
51	169150	HPC	1ROW900	
52	169290	HPC	1ROW900	
53	164425	HPC	1ROW900	
54	169710	HPC	1ROW900	
55	170040	HPC	1ROW900	
56	170090	HPC	1ROW900	
57	170190	HPC	1ROW900	
58	170420	HPC	1ROW900	
59	171000	HPC	1ROW900	
60	171070	HPC	1ROW900	
61	171180	HPC	1ROW900	
62	171425	HPC	1ROW900	
63	171890	HPC	1ROW900	
64	172025	HPC	1ROW900	
65	172355	HPC	1ROW900	
66	173855	HPC	1ROW900	
67	174110	HPC	1ROW900	
68	174175	HPC	1ROW900	
69	174245	HPC	1ROW900	
70	174370	HPC	1ROW900	
71	174475	HPC	1ROW900	
72	174490	HPC	1ROW900	
73	174785	HPC	1ROW900	
74	174930	HPC	1ROW900	
75	175260	HPC	1ROW900	
76	175465	HPC	1ROW900	
77	175980	RCC SLAB	1X3	
78	176220	RCC SLAB	1X1	

S. No.	Chainage(km)	Type of Culvert	Span /Opening with span length (m)	Remarks
79	176505	RCC SLAB	1X3	
80	176550	RCC SLAB	1X3	
81	176615	HPC	1ROW900	
82	176990	RCC SLAB	1X1	
83	177045	HPC	1ROW900	
84	177090	RCC SLAB	1X1	
85	177130	RCC SLAB	1X1	
86	177265	RCC SLAB	1X1	
87	177415	RCC SLAB	1X1	
88	177510	HPC	1ROW900	
89	177725	RCC SLAB	1X1.5	
90	177975	RCC SLAB	1X1	
91	178220	FCW	_	
92	178890	RCC SLAB	1X1.5	
93	179050	FCW	_	
94	179250	RCC SLAB	1X1.5	
95	179350	HPC	1ROW900	
96	179635	HPC	1ROW900	
97	179695	RCC SLAB	1X1.5	
98	180190	FCW	_	
99	180695	RCC SLAB	1X1.5	
100	180820	HPC	1ROW900	
101	181070	HPC	1ROW900	
102	181185	HPC	1ROW900	
103	181340	HPC	1ROW900	
104	182170	HPC	1ROW900	

11. Bus bays

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

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

12. Truck Lay byes

The details of truck lay byes are as follows:

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

13. Roadside drains

The details of the roadside drains are as follows:

S. No.	Location	Type

	From km	to km	Masonry/cc (Pucca)	Earthen (Kutcha)
NIL				

14. Major Junctions

The details of major junctions are as follow.

S. No.	Location	At grade	Separated	Category of Cross Road			
	KM			NH	SH	MDR	Others
1	182+169	Y	-	Y	-	-	-

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

15. Minor Junctions

The details of the minor junctions are as follows:

S. No.	Existing Chainage	Type of Road (BT, CC, Gr.)	Type of Junctions (T,Y,+)	Side	Type of Road (SH/ MDR/ PMGSY/ VR)
1	161+150	ER	T	RHS	To P. Leikul Village
2	161+250	ER	X	BS	To P. Leikul Village
3	161+325	ER	X	BS	To P. Leikul Village
4	161+400	ER	Y	RHS	To P. Leikul Village
5	161+500	ER	Y	LHS	To P. Leikul Village
6	161+740	ER	Y	RHS	To P. Leikul Village
7	163+305	BT	Y	LHS	To Gamvom Village
8	164+880	ER	Y	LHS	To Impoi(H) Village
9	164+900	ER	Y	RHS	To Impoi(CH) Village
10	165+010	ER	Y	RHS	To Impoi(CH) Village
11	166+080	ER	X	BS	To Asalu Village
12	166+230	ER	Y	RHS	To Asalu Village
13	166+460	ER	Y	LHS	To Asalu Village
14	166+640	ER	Y	RHS	To Asalu Village

S. No.	Existing Chainage	Type of Road (BT, CC, Gr.)	Type of Junctions (T,Y,+)	Side	Type of Road (SH/ MDR/ PMGSY/ VR)
15	167+100	ER	Y	LHS	To Asalu Village
16	167+200	ER	Y	RHS	To Hekaukang Village
17	167+230	ER	Y	LHS	To Hekaukang Village
18	167+540	ER	Y	LHS	To Hekaukang Village
19	168+340	ER	Y	LHS	To Nakhojau Village
20	168+480	ER	Y	LHS	To Nakhojau Village
21	169+750	ER	Y	RHS	To Pangmol Village
22	171+175	ER	X	BS	To N. Lonkai Village
23	171+215	ER	Y	LHS	To N. Lonkai Village
24	171+345	ER	Y	RHS	To N. Lonkai Village
25	171+500	ER	Y	LHS	To N. Lonkai Village
26	171+775	ER	Y	LHS	To P. Lonkai Village
27	171+880	BT	Y	LHS	To P. Lonkai Village
28	172+080	BT	Y	RHS	To P. Lonkai Village
29	172+295	ER	Y	RHS	To Nirianam Village
30	172+740	ER	Y	RHS	To Nirianam Village
31	172+825	ER	Y	RHS	To Chudining Village
32	173+135	ER	Y	RHS	To Chudining Village
33	173+200	ER	Y	RHS	To Chudining Village
34	173+540	ER	X	BS	To NchureloaVillage
35	175+010	ER	Y	RHS	To Assam Rifles Camp
36	175+600	BT	Y	RHS	To NH-54(Old NH)
37	175+750	ER	T	RHS	To Mahur Town
38	175+815	ER	Y	LHS	To Mahur Town
39	175+875	ER	Y	RHS	To Mahur Town

S. No.	Existing Chainage	Type of Road (BT, CC, Gr.)	Type of Junctions (T,Y,+)	Side	Type of Road (SH/ MDR/ PMGSY/ VR)
40	175+910	ER	Y	LHS	To Mahur Town
41	176+010	ER	Y	RHS	To Mahur Town
42	176+245	ER	Y	LHS	To Mahur Town
43	167+515	ER	Y	LHS	To Daodung Village
44	176+675	ER	Y	RHS	To Daodung Village
45	176+800	ER	Y	LHS	To Daodung Village
46	176+845	ER	Y	RHS	To Daodung Village
47	177+595	ER	Y	LHS	To Daodung Village
48	177+800	ER	Y	RHS	To Daodung Village
49	178+325	ER	Y	RHS	To Daodung Village
50	178+735	ER	Y	LHS	To Daodung Village

16. Bypasses

The details of the bypasses are as follows:

S.No.	Name of bypass (town)	Chainage (km) From km to km	Length
NIL			

17. Details of Existing Utilities Schedule

The existing utilities schedules as below,

17.1 Electrical Utilities

The Site includes the following Electrical Utilities: -

(a) Extra High-Tension Lines (EHT Lines)

S. No	Chainage		Length of line(km)		Nos. of Crossings		Remarks
			Maintained by PGCIL Department		Maintained by PGCIL Department		
	From	To	400KV	132KV	400KV	132KV	
NIL							

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

S.No	Chainage		Length of Line(in m)				Nos. of Crossings				Transforme	
	From	To	HT 33KV	HT 11KV	LT 230V	LT 440V	HT 33KV	HT 11KV	LT 230V	LT 440V	No	Capaci
1	160875	182169	200	12000	3900			28	24		4/3	25/63K

9 nos. of Distribution Transformer

c) Public Health Utilities (Water/Sewage Pipelines)

(a) The Site includes the following Public Health Utilities: -

S.No	Chainage		Length (in m)				Crossings(IN M)				Remarks
			Water Supply Line		Sewage Line		Water Supply Line		Sewage Line		
	From	To	With Pumping	With Gravity Flow	With Pumping	With Gravity Flow	With Pumping	With Gravity Flow	With Pumping	With Gravity Flow	
1	160875	182169	-	14.525	-	-	-	1200	-	-	-

(b) Bore well/Hand Pump within RoW

Sl. No.	Bore Well**		Hand Pump	
	Chainage	Nos	Chainage	Nos
NIL				

(c) RCC INTAKE WIER- 1 NO.

d) **Any Other Lines: NIL**

18. Other Structures: NIL

Annex-II

(As per Clause 8.3 (i))

(Schedule-A)

Datesfor providing Rightof Way of Construction Zone

ThedatesonwhichtheAuthorityshallprovideRightofWay of Construction ZonetotheContractoron differentstretchesof theSitearestated below:

(i) Full Right of Way (full width)

Description	Design Chainage (km)		Length (km)	Width (m)	Date of Providing ROW
	From	To			
Full Right of Way (full width)	156.489	156.689	0.200	40.000	Within180 days after Appointed Date
	156.689	157.389	0.700	30.000	
	157.389	157.689	0.300	60.000	
	157.689	157.989	0.300	30.000	
	157.989	158.189	0.200	45.000	
	158.189	158.489	0.300	30.000	
	158.489	158.689	0.200	75.000	
	158.689	159.089	0.400	45.000	
	159.089	159.647	0.558	70.000	
	159.647	160.247	0.600	55.000	
	160.247	160.447	0.200	30.000	
	160.447	160.747	0.300	65.000	
	160.747	161.297	0.550	60.000	
	161.297	162.047	0.750	30.000	
	162.047	162.247	0.200	40.000	
	162.247	162.447	0.200	30.000	
	162.447	162.600	0.153	45.000	
	162.600	162.918	0.318	30.000	
	162.918	163.218	0.300	35.000	
	163.218	163.518	0.300	45.000	
	163.518	163.718	0.200	35.000	
	163.718	164.718	1.000	60.000	
	164.718	165.118	0.400	75.000	
	165.118	165.518	0.400	60.000	
	165.518	166.918	1.400	45.000	
Full Right of Way (full width)	166.918	167.018	0.100	55.000	Within180 days

Description	Design Chainage (km)		Length (km)	Width (m)	Date of Providing ROW
	From	To			
	167.018	167.618	0.600	115.000	after Appointed Date
	167.618	167.718	0.100	65.000	
	167.718	167.918	0.200	45.000	
	167.918	169.429	1.511	40.000	
	169.429	170.429	1.000	30.000	
	170.429	171.278	0.849	20.000	
	171.278	172.578	1.300	30.000	
	172.578	172.778	0.200	45.000	
	172.778	174.563	1.785	30.000	
	174.563	175.263	0.700	45.000	
	175.263	176.410	1.147	30.000	

Annex - III

(Schedule-A)

Alignment Plans

The alignment plan of the Project Highway is available on E - Tendering portal of NHIDCL

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

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

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

Annex - IV

(Schedule-A)

Environment Clearances

As per MOEF notification F. No. 21-270/2008-1A.III (dated 22 August 2013), Environmental Clearance is not required for Assam state.

Annexure -V

(Schedule -A)

Centre Line Coordinates of the Project Road

S.N.	CHAINAGE	NORTHING	EASTING
1	156+489	2786669.474	521924.636
2	156+450	2786672.537	521963.778
3	156+475	2786670.587	521938.854
4	156+500	2786668.636	521913.93
5	156+525	2786666.686	521889.006
6	156+550	2786664.735	521864.083
7	156+575	2786661.797	521839.274
8	156+600	2786652.695	521816.126
9	156+625	2786637.77	521796.098
10	156+650	2786621.931	521776.756
11	156+675	2786606.162	521757.356
12	156+700	2786593.288	521736.027
13	156+725	2786590.087	521711.492
14	156+750	2786597.22	521687.627
15	156+775	2786607.84	521664.997
16	156+800	2786618.566	521642.414
17	156+825	2786629.716	521620.046
18	156+850	2786643.935	521599.507
19	156+875	2786658.945	521579.515
20	156+900	2786671.298	521557.867
21	156+925	2786674.631	521533.282
22	156+950	2786671.041	521508.56
23	156+975	2786665.645	521484.176
24	157+000	2786650.335	521465.176
25	157+025	2786626.059	521463.063
26	157+050	2786603.157	521472.992
27	157+075	2786580.705	521483.988
28	157+100	2786557.83	521494.024
29	157+125	2786533.25	521497.901
30	157+150	2786508.306	521496.353
31	157+175	2786483.394	521494.252
32	157+200	2786458.51	521491.883
33	157+225	2786434.539	521485.152
34	157+250	2786414.285	521470.718
35	157+275	2786398.261	521451.551
36	157+300	2786382.979	521431.766
37	157+325	2786367.697	521411.981

S.N.	CHAINAGE	NORTHING	EASTING
38	157+350	2786352.411	521392.199
39	157+375	2786335.68	521373.676
40	157+400	2786315.423	521359.074
41	157+425	2786294.36	521345.606
42	157+450	2786273.298	521332.139
43	157+475	2786252.24	521318.664
44	157+500	2786232.311	521303.634
45	157+525	2786216.807	521284.124
46	157+550	2786207.248	521261.111
47	157+575	2786204.366	521236.359
48	157+600	2786207.303	521211.555
49	157+625	2786211.447	521186.901
50	157+650	2786215.591	521162.247
51	157+675	2786219.707	521137.588
52	157+700	2786221.258	521112.694
53	157+725	2786214.256	521088.883
54	157+750	2786199.096	521069.101
55	157+775	2786181.424	521051.418
56	157+800	2786163.694	521033.792
57	157+825	2786145.964	521016.167
58	157+850	2786128.234	520998.542
59	157+875	2786110.504	520980.917
60	157+900	2786092.774	520963.292
61	157+925	2786075.044	520945.667
62	157+950	2786057.314	520928.042
63	157+975	2786038.54	520911.584
64	158+000	2786016.473	520899.92
65	158+025	2785993.59	520889.851
66	158+050	2785970.707	520879.783
67	158+075	2785948.218	520868.902
68	158+100	2785929.219	520852.85
69	158+125	2785917.004	520831.189
70	158+150	2785911.537	520806.83
71	158+175	2785907.717	520782.124
72	158+200	2785903.898	520757.417
73	158+225	2785900.08	520732.711
74	158+250	2785895.711	520708.104

S.N.	CHAINAGE	NORTHING	EASTING
75	158+275	2785885.981	520685.226
76	158+300	2785868.56	520667.437
77	158+325	2785848.359	520652.713
78	158+350	2785828.04	520638.147
79	158+375	2785807.696	520623.618
80	158+400	2785784.292	520615.597
81	158+425	2785759.596	520618.685
82	158+450	2785734.925	520622.567
83	158+475	2785710.414	520618.871
84	158+500	2785690.525	520604.151
85	158+525	2785677.918	520582.652
86	158+550	2785668.114	520559.655
87	158+575	2785658.368	520536.633
88	158+600	2785649.762	520513.185
89	158+625	2785646.367	520488.463
90	158+650	2785645.224	520463.489
91	158+675	2785643.618	520438.548
92	158+700	2785636.723	520414.657
93	158+725	2785621.173	520395.282
94	158+750	2785601.055	520380.467
95	158+775	2785580.489	520366.255
96	158+800	2785562.292	520349.241
97	158+825	2785550.387	520327.337
98	158+850	2785541.172	520304.098
99	158+875	2785532.011	520280.836
100	158+900	2785522.84	520257.58
101	158+925	2785511.801	520235.197
102	158+950	2785495.224	520216.577
103	158+975	2785476.321	520200.217
104	159+000	2785457.353	520183.932
105	159+025	2785438.384	520167.647
106	159+050	2785419.416	520151.361
107	159+075	2785400.448	520135.076
108	159+100	2785381.57	520118.688
109	159+125	2785365.406	520099.735
110	159+150	2785357.409	520076.239
111	159+175	2785358.721	520051.367
112	159+200	2785363.888	520026.908
113	159+225	2785369.208	520002.481
114	159+250	2785374.528	519978.053
115	159+275	2785379.849	519953.626
116	159+300	2785385.169	519929.199
117	159+325	2785390.489	519904.771

S.N.	CHAINAGE	NORTHING	EASTING
118	159+350	2785395.81	519880.344
119	159+375	2785401.13	519855.917
120	159+400	2785401.695	519831.163
121	159+425	2785390.681	519808.942
122	159+450	2785376.4	519788.423
123	159+475	2785360.3	519769.472
124	159+500	2785337.535	519759.784
125	159+525	2785312.752	519756.778
126	159+550	2785297.194	519739.186
127	159+575	2785305.954	519716.375
128	159+600	2785319.968	519695.672
129	159+625	2785333.981	519674.969
130	159+650	2785347.995	519654.265
131	159+675	2785362.008	519633.562
132	159+700	2785376.018	519612.857
133	159+725	2785388.41	519591.191
134	159+750	2785393.714	519566.889
135	159+775	2785393.899	519541.895
136	159+800	2785393.682	519516.896
137	159+825	2785395.946	519492.055
138	159+850	2785405.938	519469.265
139	159+875	2785420.08	519448.654
140	159+900	2785434.474	519428.213
141	159+925	2785448.868	519407.773
142	159+950	2785463.262	519387.332
143	159+975	2785477.656	519366.892
144	160+000	2785492.05	519346.451
145	160+025	2785505.627	519325.481
146	160+050	2785512.789	519301.73
147	160+075	2785510.326	519276.935
148	160+100	2785504.553	519252.611
149	160+125	2785498.704	519228.305
150	160+150	2785494.295	519203.729
151	160+175	2785497.829	519179.203
152	160+200	2785512.485	519159.271
153	160+225	2785534.501	519147.708
154	160+250	2785558.503	519140.731
155	160+275	2785582.497	519133.724
156	160+300	2785604.719	519122.495
157	160+325	2785621.584	519104.237
158	160+350	2785630.632	519081.087
159	160+375	2785630.618	519056.232
160	160+400	2785621.545	519033.091

S.N.	CHAINAGE	NORTHING	EASTING
161	160+425	2785605.612	519013.895
162	160+450	2785588.014	518996.144
163	160+475	2785574.119	518975.49
164	160+500	2785567.252	518951.515
165	160+525	2785562.98	518926.883
166	160+550	2785557.994	518902.399
167	160+575	2785550.159	518878.661
168	160+600	2785542.082	518855.002
169	160+625	2785534.005	518831.342
170	160+650	2785527.032	518807.358
171	160+675	2785526.54	518782.479
172	160+700	2785531.468	518757.978
173	160+725	2785536.924	518733.581
174	160+750	2785540.238	518708.845
175	160+775	2785539.808	518683.852
176	160+800	2785539.118	518658.861
177	160+825	2785538.428	518633.871
178	160+850	2785537.738	518608.88
179	160+875	2785537.049	518583.89
180	160+900	2785536.325	518558.9
181	160+925	2785533.095	518534.153
182	160+950	2785527.049	518509.895
183	160+975	2785521.983	518485.435
184	161+000	2785523.594	518460.629
185	161+025	2785531.528	518436.939
186	161+050	2785540.33	518413.539
187	161+075	2785543.424	518389.265
188	161+100	2785530.537	518368.023
189	161+125	2785515.996	518347.687
190	161+150	2785503.601	518326.034
191	161+175	2785496.774	518302.052
192	161+200	2785496.094	518277.126
193	161+225	2785501.601	518252.807
194	161+250	2785512.674	518230.439
195	161+275	2785525.525	518208.995
196	161+300	2785538.382	518187.554
197	161+325	2785551.239	518166.114
198	161+350	2785564.096	518144.673
199	161+375	2785576.41	518122.927
200	161+400	2785584.102	518099.223
201	161+425	2785585.008	518074.32
202	161+450	2785579.049	518050.123
203	161+475	2785566.684	518028.487

S.N.	CHAINAGE	NORTHING	EASTING
204	161+500	2785548.86	518011.072
205	161+525	2785526.943	517999.212
206	161+550	2785502.615	517993.816
207	161+575	2785477.63	517993.838
208	161+600	2785452.647	517994.755
209	161+625	2785427.664	517995.671
210	161+650	2785402.681	517996.587
211	161+675	2785377.697	517997.503
212	161+700	2785352.714	517998.42
213	161+725	2785327.737	517998.187
214	161+750	2785303.534	517992.253
215	161+775	2785281.517	517980.486
216	161+800	2785260.37	517967.152
217	161+825	2785239.226	517953.813
218	161+850	2785218.081	517940.475
219	161+875	2785196.937	517927.136
220	161+900	2785175.792	517913.798
221	161+925	2785154.539	517900.637
222	161+950	2785131.599	517890.879
223	161+975	2785106.884	517887.692
224	162+000	2785082.211	517891.278
225	162+025	2785058.232	517898.347
226	162+050	2785034.263	517905.45
227	162+075	2785009.602	517909.006
228	162+100	2784985.203	517904.207
229	162+125	2784963.209	517892.403
230	162+150	2784942.108	517878.996
231	162+175	2784921.011	517865.584
232	162+200	2784900.841	517850.866
233	162+225	2784884.89	517831.721
234	162+250	2784874.121	517809.197
235	162+275	2784864.912	517785.955
236	162+300	2784853.533	517763.807
237	162+325	2784832.991	517750.282
238	162+350	2784808.351	517751.084
239	162+375	2784784.984	517759.949
240	162+400	2784761.574	517768.701
241	162+425	2784736.992	517772.83
242	162+450	2784711.998	517772.62
243	162+475	2784687.021	517771.666
244	162+500	2784662.861	517765.743
245	162+525	2784642.388	517751.568
246	162+550	2784624.405	517734.203

S.N.	CHAINAGE	NORTHING	EASTING
247	162+575	2784606.549	517716.706
248	162+600	2784588.692	517699.209
249	162+625	2784570.835	517681.713
250	162+650	2784552.954	517664.241
251	162+675	2784533.344	517648.834
252	162+700	2784509.753	517641.076
253	162+725	2784484.792	517640.168
254	162+750	2784459.793	517640.417
255	162+775	2784435.061	517637.753
256	162+800	2784415.341	517623.056
257	162+825	2784406.041	517600.009
258	162+850	2784399.201	517575.983
259	162+875	2784383.279	517557.455
260	162+900	2784359.017	517556.244
261	162+925	2784338.257	517569.937
262	162+950	2784319.088	517585.984
263	162+975	2784299.906	517602.018
264	163+000	2784279.294	517616.063
265	163+025	2784255.16	517621.562
266	163+050	2784231.197	517615.195
267	163+075	2784209.978	517602.018
268	163+100	2784189.36	517587.88
269	163+125	2784168.742	517573.741
270	163+150	2784148.124	517559.603
271	163+175	2784127.506	517545.464
272	163+200	2784106.888	517531.326
273	163+225	2784088.139	517515.118
274	163+250	2784089.636	517491.385
275	163+275	2784102.982	517470.248
276	163+300	2784116.378	517449.14
277	163+325	2784127.268	517426.681
278	163+350	2784133.491	517402.511
279	163+375	2784134.789	517377.587
280	163+400	2784131.123	517352.898
281	163+425	2784124.671	517328.745
282	163+450	2784118.144	517304.612
283	163+475	2784111.617	517280.479
284	163+500	2784105.091	517256.346
285	163+525	2784098.564	517232.213
286	163+550	2784091.711	517208.175
287	163+575	2784081.324	517185.481
288	163+600	2784067.214	517164.857
289	163+625	2784052.549	517144.61

S.N.	CHAINAGE	NORTHING	EASTING
290	163+650	2784037.884	517124.363
291	163+675	2784022.59	517104.604
292	163+700	2784003.262	517088.922
293	163+725	2783979.884	517080.395
294	163+750	2783954.97	517078.974
295	163+775	2783929.982	517079.739
296	163+800	2783904.99	517080.192
297	163+825	2783880.487	517075.874
298	163+850	2783859.585	517062.49
299	163+875	2783845.021	517042.279
300	163+900	2783833.542	517020.071
301	163+925	2783822.177	516997.803
302	163+950	2783810.813	516975.536
303	163+975	2783799.449	516953.268
304	164+000	2783789.332	516930.437
305	164+025	2783786.31	516905.792
306	164+050	2783792.38	516881.622
307	164+075	2783801.688	516858.421
308	164+100	2783811.131	516835.273
309	164+125	2783825.356	516815.076
310	164+150	2783849.072	516809.556
311	164+175	2783872.986	516816.68
312	164+200	2783897.326	516817.26
313	164+225	2783911.756	516798.119
314	164+250	2783906.653	516773.95
315	164+275	2783897.738	516750.594
316	164+300	2783889.664	516726.95
317	164+325	2783887.958	516702.166
318	164+350	2783895.589	516678.468
319	164+375	2783907.144	516656.3
320	164+400	2783918.885	516634.229
321	164+425	2783930.638	516612.164
322	164+450	2783944.206	516591.219
323	164+475	2783963.095	516574.996
324	164+500	2783984.862	516562.711
325	164+525	2784006.847	516550.809
326	164+550	2784028.832	516538.908
327	164+575	2784050.818	516527.007
328	164+600	2784072.201	516514.1
329	164+625	2784088.708	516495.602
330	164+650	2784094.633	516471.581
331	164+675	2784088.51	516447.573
332	164+700	2784074.956	516426.606

S.N.	CHAINAGE	NORTHING	EASTING
333	164+725	2784060.134	516406.473
334	164+750	2784045.311	516386.341
335	164+775	2784030.489	516366.209
336	164+800	2784015.96	516345.873
337	164+825	2784009.586	516322.197
338	164+850	2784020.952	516300.426
339	164+875	2784039.001	516283.133
340	164+900	2784053.631	516263.151
341	164+925	2784051.791	516238.938
342	164+950	2784032.825	516223.555
343	164+975	2784008.567	516217.597
344	165+000	2783985.883	516208.157
345	165+025	2783981.735	516184.599
346	165+050	2783988.034	516160.406
347	165+075	2783996.197	516136.854
348	165+100	2784013.211	516118.769
349	165+125	2784032.903	516103.366
350	165+150	2784052.732	516088.144
351	165+175	2784073.589	516074.374
352	165+200	2784095.52	516062.388
353	165+225	2784117.991	516051.431
354	165+250	2784140.464	516040.477
355	165+275	2784162.936	516029.523
356	165+300	2784184.82	516017.475
357	165+325	2784204.51	516002.118
358	165+350	2784221.381	515983.708
359	165+375	2784235.791	515963.282
360	165+400	2784249.959	515942.685
361	165+425	2784264.127	515922.087
362	165+450	2784278.296	515901.49
363	165+475	2784292.552	515880.954
364	165+500	2784308.451	515861.682
365	165+525	2784326.628	515844.541
366	165+550	2784346.8	515829.801
367	165+575	2784368.647	515817.68
368	165+600	2784391.287	515807.076
369	165+625	2784413.943	515796.508
370	165+650	2784436.595	515785.931
371	165+675	2784458.178	515773.416
372	165+700	2784473.787	515754.2
373	165+725	2784478.35	515729.884
374	165+750	2784470.731	515706.338
375	165+775	2784454.682	515687.254

S.N.	CHAINAGE	NORTHING	EASTING
376	165+800	2784436.597	515669.994
377	165+825	2784418.49	515652.756
378	165+850	2784400.382	515635.519
379	165+875	2784382.275	515618.282
380	165+900	2784364.168	515601.044
381	165+925	2784346.061	515583.807
382	165+950	2784327.953	515566.57
383	165+975	2784309.846	515549.332
384	166+000	2784291.739	515532.095
385	166+025	2784273.631	515514.858
386	166+050	2784255.584	515497.559
387	166+075	2784240.125	515478.019
388	166+100	2784233.818	515454.093
389	166+125	2784238.021	515429.55
390	166+150	2784246.069	515405.882
391	166+175	2784254.256	515382.261
392	166+200	2784262.444	515358.64
393	166+225	2784270.538	515334.987
394	166+250	2784275.323	515310.53
395	166+275	2784272.487	515285.764
396	166+300	2784266.573	515261.474
397	166+325	2784262.358	515236.946
398	166+350	2784277.146	515218.474
399	166+375	2784300.803	515210.42
400	166+400	2784315.647	515191.991
401	166+425	2784311.222	515167.512
402	166+450	2784304.922	515143.319
403	166+475	2784298.629	515119.124
404	166+500	2784298.914	515094.385
405	166+525	2784311.024	515072.811
406	166+550	2784331.33	515058.414
407	166+575	2784344.998	515037.966
408	166+600	2784344.118	515013.387
409	166+625	2784331.824	514991.664
410	166+650	2784321.127	514969.121
411	166+675	2784313.533	514945.303
412	166+700	2784306.077	514921.441
413	166+725	2784298.62	514897.579
414	166+750	2784291.164	514873.717
415	166+775	2784283.727	514849.848
416	166+800	2784278.731	514825.413
417	166+825	2784283.038	514801.039
418	166+850	2784298.454	514781.689

S.N.	CHAINAGE	NORTHING	EASTING
419	166+875	2784321.221	514771.926
420	166+900	2784346.119	514770.126
421	166+925	2784371.119	514769.983
422	166+950	2784396.118	514769.84
423	166+975	2784421.111	514770.22
424	167+000	2784445.991	514772.589
425	167+025	2784470.59	514777.008
426	167+050	2784495.04	514782.225
427	167+075	2784519.631	514781.132
428	167+100	2784538.962	514765.926
429	167+125	2784545.743	514742.284
430	167+150	2784539.012	514718.353
431	167+175	2784531.258	514694.617
432	167+200	2784528.062	514669.835
433	167+225	2784523.488	514645.332
434	167+250	2784512.144	514623.11
435	167+275	2784499.559	514601.509
436	167+300	2784486.974	514579.907
437	167+325	2784474.39	514558.306
438	167+350	2784461.805	514536.704
439	167+375	2784449.73	514514.839
440	167+400	2784446.621	514490.295
441	167+425	2784453.173	514466.201
442	167+450	2784459.323	514441.991
443	167+475	2784461.51	514417.115
444	167+500	2784459.54	514392.222
445	167+525	2784453.469	514368
446	167+550	2784445.507	514344.302
447	167+575	2784437.545	514320.604
448	167+600	2784430.068	514296.755
449	167+625	2784427.573	514271.984
450	167+650	2784432.792	514247.61
451	167+675	2784441.296	514224.102
452	167+700	2784449.752	514200.577
453	167+725	2784456.578	514176.534
454	167+750	2784461.604	514152.048
455	167+775	2784466.342	514127.501
456	167+800	2784471.098	514102.957
457	167+825	2784478.462	514079.125
458	167+850	2784491.408	514057.814
459	167+875	2784508.271	514039.369
460	167+900	2784525.501	514021.255
461	167+925	2784542.731	514003.141

S.N.	CHAINAGE	NORTHING	EASTING
462	167+950	2784559.96	513985.026
463	167+975	2784577.19	513966.912
464	168+000	2784594.42	513948.797
465	168+025	2784611.65	513930.683
466	168+050	2784628.191	513911.947
467	168+075	2784643.117	513891.901
468	168+100	2784656.323	513870.682
469	168+125	2784667.717	513848.438
470	168+150	2784677.22	513825.322
471	168+175	2784685.472	513801.723
472	168+200	2784693.7	513778.116
473	168+225	2784701.928	513754.509
474	168+250	2784710.156	513730.902
475	168+275	2784718.384	513707.294
476	168+300	2784725.853	513683.449
477	168+325	2784729.663	513658.77
478	168+350	2784729.327	513633.801
479	168+375	2784724.873	513609.229
480	168+400	2784718.258	513585.12
481	168+425	2784711.601	513561.023
482	168+450	2784704.944	513536.926
483	168+475	2784698.286	513512.828
484	168+500	2784691.629	513488.731
485	168+525	2784685.169	513464.581
486	168+550	2784679.757	513440.176
487	168+575	2784675.502	513415.544
488	168+600	2784672.414	513390.737
489	168+625	2784670.498	513365.813
490	168+650	2784669.76	513340.826
491	168+675	2784670.201	513315.833
492	168+700	2784671.82	513290.887
493	168+725	2784674.613	513266.046
494	168+750	2784678.575	513241.364
495	168+775	2784683.696	513216.897
496	168+800	2784689.964	513192.698
497	168+825	2784697.331	513168.81
498	168+850	2784705.011	513145.019
499	168+875	2784712.707	513121.233
500	168+900	2784720.824	513097.588
501	168+925	2784729.529	513074.153
502	168+950	2784738.806	513050.939
503	168+975	2784748.27	513027.799
504	169+000	2784757.733	513004.659

S.N.	CHAINAGE	NORTHING	EASTING
505	169+025	2784767.19	512981.517
506	169+050	2784775.512	512957.951
507	169+075	2784781.845	512933.773
508	169+100	2784786.188	512909.159
509	169+125	2784789.888	512884.435
510	169+150	2784793.589	512859.71
511	169+175	2784796.327	512834.879
512	169+200	2784793.764	512810.076
513	169+225	2784786.629	512786.124
514	169+250	2784779.018	512762.31
515	169+275	2784771.407	512738.497
516	169+300	2784763.795	512714.684
517	169+325	2784756.184	512690.871
518	169+350	2784748.572	512667.058
519	169+375	2784738.629	512644.248
520	169+400	2784720.671	512627.116
521	169+425	2784697.361	512618.489
522	169+450	2784673.125	512612.388
523	169+475	2784650.529	512601.844
524	169+500	2784631.245	512586.038
525	169+525	2784615.959	512566.291
526	169+550	2784601.766	512545.71
527	169+575	2784587.573	512525.13
528	169+600	2784573.38	512504.549
529	169+625	2784559.186	512483.969
530	169+650	2784544.993	512463.388
531	169+675	2784531.119	512442.596
532	169+700	2784519.511	512420.473
533	169+725	2784510.751	512397.075
534	169+750	2784504.674	512372.832
535	169+775	2784499.171	512348.445
536	169+800	2784493.669	512324.058
537	169+825	2784488.166	512299.672
538	169+850	2784482.02	512275.447
539	169+875	2784473.149	512252.091
540	169+900	2784461.895	512229.771
541	169+925	2784450.317	512207.614
542	169+950	2784438.74	512185.456
543	169+975	2784427.163	512163.298
544	170+000	2784415.586	512141.14
545	170+025	2784404.009	512118.982
546	170+050	2784392.431	512096.825
547	170+075	2784381.976	512074.143

S.N.	CHAINAGE	NORTHING	EASTING
548	170+100	2784376.777	512049.756
549	170+125	2784377.774	512024.841
550	170+150	2784384.59	512000.831
551	170+175	2784393.3	511977.397
552	170+200	2784402.015	511953.965
553	170+225	2784410.73	511930.534
554	170+250	2784419.445	511907.102
555	170+275	2784428.161	511883.67
556	170+300	2784436.872	511860.237
557	170+325	2784445.013	511836.602
558	170+350	2784452.271	511812.679
559	170+375	2784459.387	511788.713
560	170+400	2784466.502	511764.747
561	170+425	2784473.617	511740.781
562	170+450	2784480.732	511716.815
563	170+475	2784487.848	511692.849
564	170+500	2784494.963	511668.883
565	170+525	2784502.592	511645.084
566	170+550	2784514.549	511623.203
567	170+575	2784531.548	511604.96
568	170+600	2784552.527	511591.481
569	170+625	2784575.482	511581.587
570	170+650	2784597.471	511569.772
571	170+675	2784616.699	511553.859
572	170+700	2784632.382	511534.444
573	170+725	2784644.063	511512.374
574	170+750	2784654.287	511489.56
575	170+775	2784664.51	511466.746
576	170+800	2784674.733	511443.932
577	170+825	2784684.805	511421.052
578	170+850	2784692.208	511397.204
579	170+875	2784696.358	511372.556
580	170+900	2784700.119	511347.84
581	170+925	2784703.88	511323.124
582	170+950	2784707.64	511298.409
583	170+975	2784711.401	511273.693
584	171+000	2784715.162	511248.978
585	171+025	2784718.923	511224.262
586	171+050	2784722.64	511199.541
587	171+075	2784723.557	511174.622
588	171+100	2784715.778	511151.053
589	171+125	2784699.152	511132.615
590	171+150	2784677.627	511119.965

S.N.	CHAINAGE	NORTHING	EASTING
591	171+175	2784655.326	511108.666
592	171+200	2784633.025	511097.367
593	171+225	2784610.724	511086.068
594	171+250	2784588.423	511074.769
595	171+275	2784566.21	511063.311
596	171+300	2784553	511042.936
597	171+325	2784559.199	511019.457
598	171+350	2784580.34	511006.814
599	171+375	2784603.468	510997.33
600	171+400	2784624.389	510983.861
601	171+425	2784637.436	510962.839
602	171+450	2784640.843	510938.163
603	171+475	2784640.637	510913.165
604	171+500	2784640.432	510888.167
605	171+525	2784643.853	510863.494
606	171+550	2784656.921	510842.485
607	171+575	2784678.19	510829.669
608	171+600	2784702.096	510822.39
609	171+625	2784725.772	510814.493
610	171+650	2784743.194	510797.248
611	171+675	2784745.202	510772.859
612	171+700	2784730.743	510753.115
613	171+725	2784707.105	510745.688
614	171+750	2784682.307	510742.569
615	171+775	2784658.946	510734.101
616	171+800	2784641.039	510716.849
617	171+825	2784626.934	510696.214
618	171+850	2784613.119	510675.378
619	171+875	2784599.304	510654.541
620	171+900	2784585.832	510633.489
621	171+925	2784577.17	510610.189
622	171+950	2784579.311	510585.478
623	171+975	2784588.35	510562.19
624	172+000	2784598.313	510539.261
625	172+025	2784608.276	510516.332
626	172+050	2784618.239	510493.403
627	172+075	2784628.6	510470.658
628	172+100	2784643.567	510450.817
629	172+125	2784665.704	510439.768
630	172+150	2784690.427	510440.685
631	172+175	2784712.356	510452.409
632	172+200	2784731.584	510468.381
633	172+225	2784750.595	510484.615

S.N.	CHAINAGE	NORTHING	EASTING
634	172+250	2784769.607	510500.85
635	172+275	2784788.688	510517.001
636	172+300	2784809.838	510530.159
637	172+325	2784834.345	510533.561
638	172+350	2784857.483	510524.803
639	172+375	2784873.603	510506.03
640	172+400	2784881.04	510482.246
641	172+425	2784885.321	510457.616
642	172+450	2784889.531	510432.973
643	172+475	2784893.742	510408.33
644	172+500	2784897.953	510383.687
645	172+525	2784901.355	510358.934
646	172+550	2784898.134	510334.328
647	172+575	2784884.845	510313.312
648	172+600	2784867.474	510295.34
649	172+625	2784849.847	510277.612
650	172+650	2784832.22	510259.883
651	172+675	2784815.584	510241.259
652	172+700	2784805.524	510218.606
653	172+725	2784805.024	510193.693
654	172+750	2784807.852	510168.854
655	172+775	2784812.079	510144.241
656	172+800	2784821.026	510120.924
657	172+825	2784831.119	510098.052
658	172+850	2784841.212	510075.18
659	172+875	2784851.008	510052.183
660	172+900	2784856.038	510027.828
661	172+925	2784849.951	510003.848
662	172+950	2784833.113	509985.722
663	172+975	2784809.646	509977.887
664	173+000	2784785.295	509982.263
665	173+025	2784765.956	509997.72
666	173+050	2784753.243	510019.187
667	173+075	2784742.432	510041.729
668	173+100	2784730.107	510063.436
669	173+125	2784711.497	510079.816
670	173+150	2784688.332	510089.103
671	173+175	2784664.488	510096.615
672	173+200	2784640.814	510104.627
673	173+225	2784619.607	510117.604
674	173+250	2784603.871	510136.951
675	173+275	2784590.28	510157.934
676	173+300	2784576.719	510178.936

S.N.	CHAINAGE	NORTHING	EASTING
677	173+325	2784562.328	510199.263
678	173+350	2784538.947	510200.311
679	173+375	2784530.122	510178.4
680	173+400	2784532.724	510153.567
681	173+425	2784540.871	510130
682	173+450	2784554.565	510109.157
683	173+475	2784571.119	510090.425
684	173+500	2784587.787	510071.792
685	173+525	2784604.455	510053.16
686	173+550	2784621.121	510034.525
687	173+575	2784636.354	510014.753
688	173+600	2784645.569	509991.623
689	173+625	2784647.226	509966.779
690	173+650	2784641.166	509942.63
691	173+675	2784627.974	509921.513
692	173+700	2784609.091	509905.243
693	173+725	2784588.158	509891.576
694	173+750	2784567.179	509877.978
695	173+775	2784546.201	509864.38
696	173+800	2784525.222	509850.782
697	173+825	2784504.244	509837.184
698	173+850	2784483.265	509823.587
699	173+875	2784462.287	509809.989
700	173+900	2784441.308	509796.391
701	173+925	2784420.33	509782.793
702	173+950	2784399.66	509768.746
703	173+975	2784382.058	509751.084
704	174+000	2784369.323	509729.64
705	174+025	2784359.572	509706.621
706	174+050	2784349.931	509683.555
707	174+075	2784340.289	509660.489
708	174+100	2784330.648	509637.423
709	174+125	2784321.007	509614.357
710	174+150	2784311.365	509591.291
711	174+175	2784300.978	509568.567
712	174+200	2784285.069	509549.522
713	174+225	2784262.518	509539.079
714	174+250	2784238.087	509533.803
715	174+275	2784213.693	509528.377
716	174+300	2784191.454	509517.325
717	174+325	2784176.703	509497.462
718	174+350	2784173.281	509472.96
719	174+375	2784181.808	509449.691

S.N.	CHAINAGE	NORTHING	EASTING
720	174+400	2784197.252	509430.07
721	174+425	2784213.784	509411.316
722	174+450	2784230.316	509392.562
723	174+475	2784246.779	509373.749
724	174+500	2784260.688	509353.058
725	174+525	2784267.559	509329.141
726	174+550	2784266.227	509304.293
727	174+575	2784257.085	509281.117
728	174+600	2784244.296	509259.638
729	174+625	2784231.316	509238.272
730	174+650	2784219.172	509216.441
731	174+675	2784213.588	509192.272
732	174+700	2784219.837	509168.333
733	174+725	2784236.766	509150.277
734	174+750	2784259.324	509139.638
735	174+775	2784282.714	509130.831
736	174+800	2784303.4	509117.067
737	174+825	2784315.661	509095.578
738	174+850	2784318.011	509070.785
739	174+875	2784316.548	509045.829
740	174+900	2784314.956	509020.88
741	174+925	2784313.363	508995.931
742	174+950	2784311.771	508970.981
743	174+975	2784310.178	508946.032
744	175+000	2784309.068	508921.064
745	175+025	2784311.96	508896.272
746	175+050	2784317.494	508871.892
747	175+075	2784323.082	508847.525
748	175+100	2784328.967	508823.231
749	175+125	2784338.99	508800.43
750	175+150	2784355.72	508781.997
751	175+175	2784376.112	508767.553
752	175+200	2784396.642	508753.297
753	175+225	2784414.668	508736.034
754	175+250	2784428.904	508715.534
755	175+275	2784438.784	508692.614
756	175+300	2784443.914	508668.189
757	175+325	2784445.686	508643.254
758	175+350	2784447.265	508618.304
759	175+375	2784448.853	508593.354
760	175+400	2784452.478	508568.653
761	175+425	2784459.558	508544.68
762	175+450	2784466.9	508520.783

S.N.	CHAINAGE	NORTHING	EASTING
763	175+475	2784474.241	508496.885
764	175+500	2784481.583	508472.987
765	175+525	2784488.924	508449.089
766	175+550	2784494.875	508424.836
767	175+575	2784494.862	508399.917
768	175+600	2784488.016	508375.956
769	175+625	2784475.119	508354.602
770	175+650	2784461.452	508333.776
771	175+675	2784458.055	508309.27
772	175+700	2784466.822	508286.136
773	175+725	2784485.608	508270.036
774	175+750	2784508.084	508259.09
775	175+775	2784530.561	508248.145
776	175+800	2784552.212	508235.816
777	175+825	2784566.455	508215.587
778	175+850	2784569.257	508191.006
779	175+875	2784561.536	508167.299
780	175+900	2784555.803	508143.157
781	175+925	2784561.916	508119.183
782	175+950	2784576.578	508098.961

S.N.	CHAINAGE	NORTHING	EASTING
783	175+975	2784591.704	508079.056
784	176+000	2784605.41	508058.194
785	176+025	2784611.5	508034.169
786	176+050	2784608.764	508009.371
787	176+075	2784603.8	507984.869
788	176+100	2784598.825	507960.369
789	176+125	2784593.851	507935.869
790	176+150	2784588.633	507911.422
791	176+175	2784579.474	507888.256
792	176+200	2784563.569	507869.092
793	176+225	2784544.392	507853.058
794	176+250	2784524.996	507837.285
795	176+275	2784505.601	507821.511
796	176+300	2784486.276	507805.651
797	176+325	2784469.294	507787.404
798	176+350	2784458.809	507764.836
799	176+375	2784456.285	507740.08
800	176+400	2784461.198	507715.621
801	176+410	2784464.251	507705.612

Schedule-B

Schedule-B

(SeeClause2.1)

DevelopmentoftheProjectHighway

1. DevelopmentoftheProjectHighway

Development of the Project Highwayshallinclude designandconstructionof the Project Highway as described in this Schedule-B and inSchedule-C.

2. [Rehabilitation and augmentation]

[Rehabilitation and augmentation] shall include [Two-Laning and Strengthening] of the Project Highway as described in Annex-I of this Schedule-B and in Schedule-C.

3. Specifications and Standards

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

Annex- I

(Schedule-B)

Descriptionof[Two-Laning]$

[Note: DescriptionoftheProjectHighwayshallbegivenbytheAuthorityindetailtogether with explanatory drawings (where necessary) to explain the Authority's requirementsprecisely inordertoavoidsubsequentchangesintheScopeofthe Project. The particularsthatmust be specified inthisSchedule-B arelisted below as pertherequirementsoftheManualofSpecificationsandStandardsfor[TwoLaning ofHighways(IRC: SP:73-2018)],referredtoastheManual.Ifanystandards,specifications or details are not given in the Manual, the minimum design/construction requirementsshallbespecifiedinthisSchedule.In additiontotheseparticulars,all otheressentialprojectspecificdetails,asrequired,shouldbeprovided inorder to define the Scope of the Project clearlyand precisely.]

1. Widening of the Existing Highway

(i) TheProjectHighway shall followthe existingalignment unless otherwise specified by theAuthority andshowninthealignmentplansspecified inAnnex-IIIofSchedule-A. Geometricdeficiencies,if any, intheexistinghorizontalandverticalprofilesshallbe corrected as per theprescribedstandardsfor [plain/rolling] terrain to the extent land isavailable.

(ii) Width of Carriageway

a) **Two Lane Road with Paved shoulders in Hilly Terrain with Hill side drain & without Retaining Wall: -** The Carriageway shall be 7.0 m wide with 1.5 m paved shoulder both side and 1.0 m earthen shoulder valley side shall be provided. The width of carriageway specified following table-

S.No.	Built-up stretch (Township)	Design Chainage		Width (m)	Length (km)	Typical cross section (Ref. to Manual)
1.	-	156489	156900	7+1.5x2+1x1=11 m	0.411	2.9
2.	-	157100	158500	7+1.5x2+1x1=11 m	1.400	2.9
3.	-	159850	160550	7+1.5x2+1x1=11 m	0.700	2.9
4.	-	161350	162250	7+1.5x2+1x1=11 m	0.900	2.9
5.	-	162350	162450	7+1.5x2+1x1=11 m	0.100	2.9
6.	-	162750	162930	7+1.5x2+1x1=11 m	0.180	2.9
7.	-	163130	163680	7+1.5x2+1x1=11 m	0.550	2.9
8.	-	163780	163980	7+1.5x2+1x1=11 m	0.200	2.9
9.	-	164530	164930	7+1.5x2+1x1=11 m	0.400	2.9

S.No.	Built-up stretch (Township)	Design Chainage		Width (m)	Length (km)	Typical cross section (Ref. to Manual)
10.	-	165230	165430	7+1.5x2+1x1=11 m	0.200	2.9
11.	-	166430	166530	7+1.5x2+1x1=11 m	0.100	2.9
12.	-	171330	171830	7+1.5x2+1x1=11 m	0.500	2.9
13.	-	172030	172330	7+1.5x2+1x1=11 m	0.300	2.9
14.	-	172630	172730	7+1.5x2+1x1=11 m	0.100	2.9
15.	-	173030	173230	7+1.5x2+1x1=11 m	0.200	2.9
16.	-	173530	174230	7+1.5x2+1x1=11 m	0.700	2.9
17.	-	175230	175730	7+1.5x2+1x1=11 m	0.500	2.9
18.	-	175930	176129	7+1.5x2+1x1=11 m	0.199	2.9
		Total Length			**7.640km**	

b) **Two-Lane with paved shoulder in Hilly Terrain with Hill side Drain on Both sides in open Country area (Box cut): -** The Carriageway shall be 7.0 m wide with 1.5 m. paved shoulder both sides shall be provided. The width of carriage way shall be specified in following table:

S.No.	Built-up stretch (Township)	Design Chainage		Width (m)	Length (km)	Typical cross section (Ref. to Manual)
1.	-	156900	157100	7+1.5x2=10 m	0.200	2.11(new)
2.	-	158500	159850	7+1.5x2=10 m	1.350	2.11(new)
3.	-	160550	161350	7+1.5x2=10 m	0.800	2.11(new)
4.	-	164080	164130	7+1.5x2=10 m	0.050	2.11(new)
5.	-	164280	164530	7+1.5x2=10 m	0.250	2.11(new)
6.	-	164930	165230	7+1.5x2=10 m	0.300	2.11(new)
7.	-	165430	166030	7+1.5x2=10 m	0.600	2.11(new)
8.	-	166130	166430	7+1.5x2=10 m	0.300	2.11(new)
9.	-	166530	166830	7+1.5x2=10 m	0.300	2.11(new)
10.	-	167030	167930	7+1.5x2=10 m	0.900	2.11(new)
11.	-	172730	173030	7+1.5x2=10 m	0.300	2.11(new)
12.	-	174330	174930	7+1.5x2=10 m	0.600	2.11(new)
13.	-	175030	175230	7+1.5x2=10 m	0.200	2.11(new)
		Total Length			**6.150km**	

c) **Two Lane Road with Paved shoulders in Hilly Terrain with Hill side drain& Retaining Wall: -** The Carriageway shall be 7.0 m wide with 1.5 m paved shoulder both side and 1.0 m earthen shoulder valley side shall be provided. The width of

carriageway specified following table-

S.No.	Built-up stretch (Township)	Design Chainage		Width (m)	Length (km)	Typical cross section (Ref. to Manual)
1.	-	162250	162350	7+1.5x2+1x1=11 m	0.100	2.8
2.	-	162450	162750	7+1.5x2+1x1=11 m	0.300	2.8
3.	-	162930	163130	7+1.5x2+1x1=11 m	0.200	2.8
4.	-	163680	163780	7+1.5x2+1x1=11 m	0.100	2.8
5.	-	163980	164080	7+1.5x2+1x1=11 m	0.100	2.8
6.	-	164130	164280	7+1.5x2+1x1=11 m	0.150	2.8
7.	-	166030	166130	7+1.5x2+1x1=11 m	0.100	2.8
8.	-	166830	167030	7+1.5x2+1x1=11 m	0.200	2.8
9.	-	167930	169430	7+1.5x2+1x1=11 m	1.500	2.8
10.	-	170430	171330	7+1.5x2+1x1=11 m	0.900	2.8
11.	-	171830	172030	7+1.5x2+1x1=11 m	0.200	2.8
12.	-	172330	172630	7+1.5x2+1x1=11 m	0.300	2.8
13.	-	173230	173530	7+1.5x2+1x1=11 m	0.300	2.8
14.	-	174230	174330	7+1.5x2+1x1=11 m	0.100	2.8
15.	-	174930	175030	7+1.5x2+1x1=11 m	0.100	2.8
16.	-	175730	175930	7+1.5x2+1x1=11 m	0.200	2.8
17.	-	176129	176410	7+1.5x2+1x1=11 m	0.281	2.8
		Total Length			**5.131km**	

d) **Two-Lane Carriageway with Paved Shoulder in Hilly Terrain with both side Retaining Wall on Valley side:** The Carriageway shall be 7.0 m wide with 1.5 m paved shoulder both side and 1.0m Earthen Shoulder both side shall be provided. The Stretch specified following table.

S.No.	Built-up stretch (Township)	Design Chainage		Width (m)	Length (km)	Typical cross section (Ref. to Manual)
1.	-	169430	170430	7+1.5x2+ 1.0X2=12 m	1.000	Fig 2.12 (new)
		Total Length			**1.000km**	

$ The contents of this Annex-I may be modified in accordance with the structure of the Project.

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

2. Geometric Design and General Features

(i) General

GeometricdesignandgeneralfeaturesoftheProjectHighway shallbeinaccordance with Section 2 of the Manual.

(ii) Design speed

The design speed shall be the minimum design speed of [40 km per hr for Mountainous terrain] with some restrictions mentioned in Clause 2(iii).

(iii) Improvement of the existing road geometrics

[Refer to paragraph 2.1 (v) of the Manual and provide details]

Inthefollowingsections,whereimprovementoftheexistingroadgeometricstothe prescribedstandardsisnotpossible,theexistingroadgeometricsshallbeimproved totheextentpossiblewithinthegivenrightofwayandproperroadsignsandsafetymeasuresshal l beprovided:

Sl. No.	Stretch		Radius (m)	Speed(km/h)
	From	To		
1.	156958.107	157043.431	30	30
2.	159512.323	159574.004	20	30
3.	161056.285	161085.735	30	20
4.	162275.543	162363.440	40	20
5.	162748.983	162827.267	40	20
6.	162834.303	162924.877	30	30
7.	163206.122	163256.889	20	30
8.	164093.543	164169.461	30	20
9.	164170.752	164247.766	25	30
10.	164787.538	164861.104	30	20
11.	164870.699	164966.040	30	30
12.	164977.689	165030.036	20	30
13.	165052.411	165103.427	40	30
14.	166308.748	166358.896	20	20
15.	166366.176	166416.588	20	30
16.	166542.092	166608.008	40	30
17.	167052.432	167138.022	40	30
18.	171271.701	171340.499	30	30
19.	171604.848	171731.709	35	20
20.	173318.446	173370.696	20	30

At above locations Safety features like Traffic Sign boards, Crash Barrier, Road Delineators, etc.as per IRC 67: 2022 shall be provided.

(iv) Right of Way

[Refertoparagraph2.3oftheManual].DetailsoftheRightofWayaregiveninAnnex II of Schedule-A.

(v) Type ofshoulders

[Refer to paragraph 2.5.2of the Manual and specify]

(a) In open country paved shoulder of 1.5m both side & earthen shoulder of 1.0m width on valley side shall be provided (Hilly terrain).

S.No.	Design Chainage		Length (in m)	Paved Shoulder	Earthen Shoulder	Reference to cross section
	From	To				
1.	156489	156900	411	2x1.5=3.0m	1x1=1.0m	Fig 2.9
2.	156900	157100	200	2x1.5=3.0m	-	Fig 2.11(new)
3.	157100	158500	1400	2x1.5=3.0m	1x1=1.0m	Fig 2.9
4.	158500	159850	1350	2x1.5=3.0m	-	Fig 2.11(new)
5.	159850	160550	700	2x1.5=3.0m	1x1=1.0m	Fig 2.9
6.	160550	161350	800	2x1.5=3.0m	-	Fig 2.11(new)
7.	161350	162250	900	2x1.5=3.0m	1x1=1.0m	Fig 2.9
8.	162250	162350	100	2x1.5=3.0m	1x1=1.0m	Fig 2.8
9.	162350	162450	100	2x1.5=3.0m	1x1=1.0m	Fig 2.9
10.	162450	162750	300	2x1.5=3.0m	1x1=1.0m	Fig 2.8
11.	162750	162930	180	2x1.5=3.0m	1x1=1.0m	Fig 2.9
12.	162930	163130	200	2x1.5=3.0m	1x1=1.0m	Fig 2.8
13.	163130	163680	550	2x1.5=3.0m	1x1=1.0m	Fig 2.9
14.	163680	163780	100	2x1.5=3.0m	1x1=1.0m	Fig 2.8
15.	163780	163980	200	2x1.5=3.0m	1x1=1.0m	Fig 2.9
16.	163980	164080	100	2x1.5=3.0m	1x1=1.0m	Fig 2.8
17.	164080	164130	50	2x1.5=3.0m	-	Fig 2.11(new)
18.	164130	164280	150	2x1.5=3.0m	1x1=1.0m	Fig 2.8
19.	164280	164530	250	2x1.5=3.0m	-	Fig 2.11(new)
20.	164530	164930	400	2x1.5=3.0m	1x1=1.0m	Fig 2.9
21.	164930	165230	300	2x1.5=3.0m	-	Fig 2.11(new)
22.	165230	165430	200	2x1.5=3.0m	1x1=1.0m	Fig 2.9

S.No.	Design Chainage		Length (in m)	Paved Shoulder	Earthen Shoulder	Reference to cross section
	From	To				
23.	165430	166030	600	2x1.5=3.0m	-	Fig 2.11(new)
24.	166030	166130	100	2x1.5=3.0m	1x1=1.0m	Fig 2.8
25.	166130	166430	300	2x1.5=3.0m	-	Fig 2.11(new)
26.	166430	166530	100	2x1.5=3.0m	1x1=1.0m	Fig 2.9
27.	166530	166830	300	2x1.5=3.0m	-	Fig 2.11(new)
28.	166830	167030	200	2x1.5=3.0m	1x1=1.0m	Fig 2.8
29.	167030	167930	900	2x1.5=3.0m	-	Fig 2.11(new)
30.	167930	169430	1500	2x1.5=3.0m	1x1=1.0m	Fig 2.8
31.	169430	170430	1000	2x1.5=3.0m	2x1=2.0m	Fig 2.12 (new)
32.	170430	171330	900	2x1.5=3.0m	1x1=1.0m	Fig 2.8
33.	171330	171830	500	2x1.5=3.0m	1x1=1.0m	Fig 2.9
34.	171830	172030	200	2x1.5=3.0m	1x1=1.0m	Fig 2.8
35.	172030	172330	300	2x1.5=3.0m	1x1=1.0m	Fig 2.9
36.	172330	172630	300	2x1.5=3.0m	1x1=1.0m	Fig 2.8
37.	172630	172730	100	2x1.5=3.0m	1x1=1.0m	Fig 2.9
38.	172730	173030	300	2x1.5=3.0m	-	Fig 2.11(new)
39.	173030	173230	200	2x1.5=3.0m	1x1=1.0m	Fig 2.9
40.	173230	173530	300	2x1.5=3.0m	1x1=1.0m	Fig 2.8
41.	173530	174230	700	2x1.5=3.0m	1x1=1.0m	Fig 2.9
42.	174230	174330	100	2x1.5=3.0m	1x1=1.0m	Fig 2.8
43.	174330	174930	600	2x1.5=3.0m	-	Fig 2.11(new)
44.	174930	175030	100	2x1.5=3.0m	1x1=1.0m	Fig 2.8
45.	175030	175230	200	2x1.5=3.0m	-	Fig 2.11(new)
46.	175230	175730	500	2x1.5=3.0m	1x1=1.0m	Fig 2.9
47.	175730	175930	200	2x1.5=3.0m	1x1=1.0m	Fig 2.8
48.	175930	176129	199	2x1.5=3.0m	1x1=1.0m	Fig 2.9
49.	176129	176410	281	2x1.5=3.0m	1x1=1.0m	Fig 2.8
	Total		**=19921m**			

(vi) Lateral and verticalclearances at underpasses

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

(b) Lateralclearance:Thewidthoftheopeningat theunderpassesshallbeas follows:

S. No.	Location (Chainage) (fromkmtokm)	Span/opening (m)	Remarks
Nil			

(vii) Lateral and verticalclearances at overpasses

(a) Lateraland vertical clearancesatoverpassesshallbeasthe provision of relevant Manual.

(b) Lateralclearance:Thewidthoftheopeningattheoverpasses shallbeas follows:

S. No.	Location (Chainage) (fromkmtokm)	Span/opening (m)	Remarks
Nil			

(viii) Service roads

Serviceroadsshallbeconstructedatthelocationsandforthelengthsindicatedbelow: [Refer to the provision of relevant Manual and provided details]

S. No.	Location ofserviceroad (Fromkmtokm)	Righthandside(RHS)/Left handside(LHS)/orBothsides	Length(km)of service road
Nil			

(ix) Grade separatedstructures

(a) Gradeseparatedstructuresshallbeprovidedasperprovision of the relevant Manual. The requisite particulars are givenbelow:

[Refer to the provision of relevant Manual and providedetails]

S. No.	Location of structure	Length (m)	Number andlengthofspans (m)	Approach gradient	Remarks, ifany

Nil

(b) In thecase ofgradeseparated structures,the type ofstructure andthe level of theProjectHighwayandthecrossroads shallbeasfollows:[Referto the provision of relevant Manual andspecifythetypeofvehicularunderpass/ overpassstructureandwhetherthecrossroadistobecarriedattheexisting level, raisedorlowered]

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

(x) Cattle and pedestrian underpass /overpass

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

S.No.	Location	Typeofcrossing
Nil		

(xi) Typical cross-sections of the Project Highway

[GivetypicalcrossSectionsoftheProjectHighwaybyreferencetotheManual]

As per attached Drawings

Sr. No.	Description	Design Length (Km.)	Proposed TCS Type
1	Reconstruction in Two-Lane Carriageway with Paved Shoulder in Hilly Terrain with both side Retaining Wall on Valley side	1.000	TCS-2.12(new)
2	Reconstruction in Two-Lane Carriageway with Paved Shoulder in Hilly Terrain with both side drain on hill side	6.15	TCS-2.11(new)
3	Two Lane Road with Paved shoulders in Hilly Terrain with Trapezoidal Drains on Hill side and Retaining wall on Valley Side in open country area	5.131	TCS-2.8
4	Reconstruction in Two-Lane Carriageway with Paved Shoulder in Hilly Terrain without retaining wall	7.64	TCS-2.9

Sr. No.	Description	Design Length (Km.)	Proposed TCS Type
	Total	**19.921km**	

3. Intersections and Grade Separators

Allintersectionsandgradeseparatorsshallbe asper the provision of relevant Manual.Existing intersections which are deficientshall be improvedto the prescribed standards.

[Referto theprovision of relevant Manual andspecifytherequirements. Explain where necessarywith drawings/sketches/general arrangement]

Properlydesignedintersectionsshallbeprovidedatthelocationsandofthetypes and features given in the tables below:

(i) At-gradeintersections

a. Major Intersections

S.No.	Intersection at km	Type ofintersection	Otherfeatures
1	176+410	3 legged	(L/s Jatinga R/s Maibong)

b. Minor Intersections

S.No.	Intersection at km	Type ofintersection	Otherfeatures
1.	156770	3 legged	To P. Leikul Village
2.	165870	4 legged	To P. Leikul Village
3.	156950	4 legged	To P. Leikul Village
4.	157010	3 legged	To P. Leikul Village
5.	157100	3 legged	To P. Leikul Village
6.	157330	3 legged	To P. Leikul Village
7.	158815	3 legged	To Gamvom Village
8.	160280	3 legged	To Impoi(H) Village
9.	160300	3 legged	To Impoi(CH) Village
10.	160400	3 legged	To Impoi(CH) Village
11.	161450	4 legged	To Asalu Village

S.No.	Intersection at km	Type ofintersection	Otherfeatures
12.	161590	3 legged	To Asalu Village
13.	161820	3 legged	To Asalu Village
14.	162000	3 legged	To Asalu Village
15.	162460	3 legged	To Asalu Village
16.	162500	3 legged	To Hekaukang Village
17.	162550	3 legged	To Hekaukang Village
18.	162780	3 legged	To Hekaukang Village
19.	163540	3 legged	To Nakhojau Village
20.	163670	3 legged	To Nakhojau Village
21.	164900	3 legged	To Pangmol Village
22.	166285	4 legged	To N. Lonkai Village
23.	166330	3 legged	To N. Lonkai Village
24.	166450	3 legged	To N. Lonkai Village
25.	166600	3 legged	To N. Lonkai Village
26.	166830	3 legged	To P. Lonkai Village
27.	166915	3 legged	To P. Lonkai Village
28.	167115	3 legged	To P. Lonkai Village
29.	167330	3 legged	To Nirianam Village
30.	167755	3 legged	To Nirianam Village
31.	167850	3 legged	To Chudining Village
32.	168130	3 legged	To Chudining Village
33.	168200	3 legged	To Chudining Village
34.	168520	4 legged	To NchureloaVillage
35.	169830	3 legged	To Assam Rifles Camp
36.	170630	3 legged	To Mahur Town
37.	170720	3 legged	To Mahur Town
38.	170805	3 legged	To Mahur Town
39.	171030	3 legged	To Mahur Town

S.No.	Intersection at km	Type ofintersection	Otherfeatures
40.	171300	3 legged	To Daodung Village
41.	171360	3 legged	To Daodung Village
42.	171580	3 legged	To Daodung Village
43.	171630	3 legged	To Daodung Village
44.	172345	3 legged	To Daodung Village
45.	172520	3 legged	To Daodung Village
46.	173030	3 legged	To Daodung Village
47.	173330	3 legged	To Daodung Village

(ii) Grade separatedintersection with/without ramps

S. No.	Location (km)	Salient features	Minimumlengthofvia duct tobeprovided	Roadtobecarriedover /underthestructures
Nil				

4. Road Embankment and Cut Section

(i) Widening and improvement of the existing road embankment/cuttings and constructionofnewroad embankment/cuttingsshallconformtotheSpecifications andStandards giveninSection4oftheManualandthespecifiedcross-sectional details. Deficiencies in theplan and profile of the existing roadshall be corrected.

Note: -
1. Disposal of extra earth (Muck) obtained by cutting is sole responsibility of contractor.
2. Identification & finalization of muck disposal site is sole responsibility of contractor in consultation with Authority Engineer & without violating Guidelines of MoEFCC.
3. Any financial implication related to the muck disposal & muck disposal site will not be considered as Change of Scope.

(ii) Raising of the existing road [Refer to the provision of relevant Manual and specify sections to be raised]

The existing road shall beraised in the followingsections:

S. No.	Section (Fromkmtokm)	Length	Extentofraising [Top offinishedroadlevel]
Nil			

5. Pavement Design

(i) Pavement design shall be carried out in accordance with Section 5 of the Manual.

Homogenous Section (Km)			CBR (%)	MSA	Adopted Pavement Composition In Widening Position (mm)			
From	To	Length (in Km)		Adopted	BC	DBM	WMM	GSB
156+489	176+410	19.921	8	20	30	50	150	200

Note:- Subgrade of 500mm shall be provided using Soil Stabilization.

(ii) Type of pavement

[Refer to paragraph 5.1 of the Manual and state specific requirement, if any, of providing cement concrete pavement.]

Homogenous Section (Km)			Type of Pavement
From	To	Length (in Km)	
156+489	176+410	19.921	Flexible Pavement

(i) Design requirements

[Refertothe provision of relevant Manual andspecifydesignrequirements and strategy]

a) Design Period and strategy

Flexiblepavementfornewpavement orfor wideningandstrengtheningof the existing pavement shallbe designed for a minimum design period of20 years. Stage construction shall not bepermitted.

b) Design Traffic

Notwithstanding anything to the contrary contained in this Agreement or the Manual, the Contractor shall design the pavement for design traffic of 20 million standard axles.

(ii) Reconstruction of stretches

[Refer tothe provision of relevant Manual and specifythestretches, ifany, tobe reconstructed.]

Thefollowingstretches of the existingroadshallbereconstructed.Theseshall be designedas newpavement.

S.No.	Stretch		Remark
	From km	To km	
1.	156+489	176+410	Reconstruction

6. Roadside Drainage

Drainagesystemincludingsurfaceandsubsurfacedrainsfortheproject Highway shall be providedas perthe provision of relevant Manual.

a) PCC Catch water drain: 38781m

S. No.	Chainage		Length (in m)	Catch Water Drain at no.of bench (LHS)	Catch Water Drain at no.of bench (RHS)	Total Length (in m)
	From	To				
1	156489	156700	211	1.000	0.000	**211**
2	156700	156900	200	1.000	0.000	**200**
3	156900	157100	200	1.000	1.000	**400**
4	157100	157400	300	1.000	0.000	**300**
5	157400	157500	100	3.000	0.000	**300**
6	157500	157700	200	4.000	0.000	**800**
7	157700	158100	400	1.000	0.000	**400**
8	158100	158200	100	2.000	0.000	**200**
9	158200	158500	300	1.000	0.000	**300**
10	158500	158700	200	4.000	1.000	**1000**
11	158700	158900	200	1.000	1.000	**400**
12	158900	159200	300	2.000	1.000	**900**
13	159200	159650	450	4.000	1.000	**2250**
14	159650	159750	100	1.000	1.000	**200**
15	159750	159850	100	3.000	1.000	**400**
16	159850	160050	200	1.000	0.000	**200**
17	160050	160250	200	3.000	0.000	**600**
18	160250	160450	200	1.000	0.000	**200**
19	160450	160550	100	2.000	0.000	**200**
20	160550	161350	800	3.000	1.000	**3200**
21	161350	162050	700	1.000	0.000	**700**
22	162050	162250	200	1.000	0.000	**200**
23	162250	162450	200	1.000	0.000	**200**
24	162450	162550	100	2.000	0.000	**200**
25	162550	162650	100	1.000	0.000	**100**
26	162650	162750	100	2.000	0.000	**200**
27	162750	163230	480	2.000	0.000	**960**
28	163230	163730	500	2.000	0.000	**1000**
29	163730	164080	350	3.000	0.000	**1050**
30	164080	164130	50	3.000	1.000	**200**
31	164130	164280	150	2.000	0.000	**300**
32	164280	164530	250	3.000	1.000	**1000**
33	164530	164730	200	2.000	0.000	**400**
34	164730	164930	200	4.000	0.000	**800**
35	164930	165230	300	3.000	1.000	**1200**
36	165230	165430	200	3.000	0.000	**600**
37	165430	165630	200	2.000	1.000	**600**
38	165630	165830	200	1.000	1.000	**400**
39	165830	166030	200	1.000	1.000	**400**
40	166030	166130	100	2.000	0.000	**200**

S. No.	Chainage		Length (in m)	Catch Water Drain at no.of	Catch Water Drain at no.of bench (RHS)	Total Length (in m)
41	166130	166230	100	2.000	1.000	**300**
42	166230	166330	100	1.000	1.000	**200**
43	166330	166430	100	1.000	1.000	**200**
44	166430	166530	100	2.000	0.000	**200**
45	166530	166830	300	1.000	1.000	**600**
46	166830	166930	100	1.000	1.000	**200**
47	166930	167030	100	3.000	1.000	**400**
48	167030	167330	300	4.000	3.000	**2100**
49	167330	167530	200	5.000	2.000	**1400**
50	167530	167730	200	3.000	2.000	**1000**
51	167730	167930	200	1.000	1.000	**400**
52	167930	169430	1500	1.000	0.000	**1500**
53	170600	171330	730	1.000	0.000	**730**
54	171330	172730	1400	1.000	0.000	**1400**
55	172730	173030	300	1.000	1.000	**600**
56	173030	174330	1300	1.000	0.000	**1300**
57	174330	174930	600	1.000	1.000	**1200**
58	174930	175030	100	1.000	0.000	**100**
59	175030	175230	200	1.000	1.000	**400**
60	175230	176410	1180	1.000	0.000	**1180**
Total Length (in m)						**38781**

b) Hill Side Drain: 25071m

S.No.	TCS Type	Chainage prop.		Side	Length in (m)
		From	To		
1	Fig 2.9	156489	156900	One Side	**411**
2	Fig 2.11(new)	156900	157100	Both Side	**400**
3	Fig 2.9	157100	158500	One Side	**1400**
4	Fig 2.11(new)	158500	159850	Both Side	**2700**
5	Fig 2.9	159850	160550	One Side	**700**
6	Fig 2.11(new)	160550	161350	Both Side	**1600**
7	Fig 2.9	161350	162250	One Side	**900**
8	Fig 2.8	162250	162350	One Side	**100**
9	Fig 2.9	162350	162450	One Side	**100**
10	Fig 2.8	162450	162750	One Side	**300**
11	Fig 2.9	162750	162930	One Side	**180**
12	Fig 2.8	162930	163130	One Side	**200**
13	Fig 2.9	163130	163680	One Side	**550**
14	Fig 2.8	163680	163780	One Side	**100**
15	Fig 2.9	163780	163980	One Side	**200**
16	Fig 2.8	163980	164080	One Side	**100**
17	Fig 2.11(new)	164080	164130	Both Side	**100**
18	Fig 2.8	164130	164280	One Side	**150**

	TCS Type	Chainage prop.		Side	Length in (m)
19	Fig 2.11(new)	164280	164530	Both Side	**500**
20	Fig 2.9	164530	164930	One Side	**400**
21	Fig 2.11(new)	164930	165230	Both Side	**600**
22	Fig 2.9	165230	165430	One Side	**200**
23	Fig 2.11(new)	165430	166030	Both Side	**1200**
24	Fig 2.8	166030	166130	One Side	**100**
25	Fig 2.11(new)	166130	166430	Both Side	**600**
26	Fig 2.9	166430	166530	One Side	**100**
27	Fig 2.11(new)	166530	166830	Both Side	**600**
28	Fig 2.8	166830	167030	One Side	**200**
29	Fig 2.11(new)	167030	167930	Both Side	**1800**
30	Fig 2.8	167930	169430	One Side	**1500**
31	Fig 2.8	170430	171330	One Side	**900**
32	Fig 2.9	171330	171830	One Side	**500**
33	Fig 2.8	171830	172030	One Side	**200**
34	Fig 2.9	172030	172330	One Side	**300**
35	Fig 2.8	172330	172630	One Side	**300**
36	Fig 2.9	172630	172730	One Side	**100**
37	Fig 2.11(new)	172730	173030	Both Side	**600**
38	Fig 2.9	173030	173230	One Side	**200**
39	Fig 2.8	173230	173530	Both Side	**300**
40	Fig 2.9	173530	174230	One Side	**700**
41	Fig 2.8	174230	174330	One Side	**100**
42	Fig 2.11(new)	174330	174930	Both Side	**1200**
43	Fig 2.8	174930	175030	One Side	**100**
44	Fig 2.11(new)	175030	175230	Both Side	**400**
45	Fig 2.9	175230	175730	One Side	**500**
46	Fig 2.8	175730	175930	One Side	**200**
47	Fig 2.9	175930	176129	One Side	**199**
48	Fig 2.8	176129	176410	One Side	**281**
			Total		**25071m**

7. Design of Structures

(i) General

(a) All bridges, culvertsandstructuresshallbedesignedandconstructedin accordancewiththeprovision of relevant Manual and shallconformtothecross-sectional features andother detailsspecifiedtherein.

(b) Width of the carriagewayof new bridges and structures shall be asfollows:

[Referto the provision of relevant Manual andspecifythe width ofcarriageway

ofnewbridgesandstructuresofmorethan60(sixty)metrelength, ifthe carriagewaywidthisdifferentfrom7.5(sevenpointfive)metresinthetable below.]

Sl. No.	Bridge atkm	Widthofcarriagewayand cross-sectionalfeatures*
NIL		

(c) The following structuresshall be providedwith footpaths:

[Refer to the provision of relevant Manual and provide details of new Structures with footpath.]

S. No.	Bridge atkm	Widthofcarriagewayand cross-sectionalfeatures*
1.	157+490	**Carriageway Width = 11.0 m** Footpath width= 3.0m (2x1.5m) Width of Crash Barrier = 2.0m (2x1m) Width of Railings = 2.0m (2x1m) Overall width = 18 m
2.	165+085	
3.	170+040	
4.	170+265	
5.	174+540	

(d) All bridges shall be high-level bridges.
[Refer to the provision of relevant Manual and state if there is any exception]

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

[Refer to the provision of relevant Manual and provide details]

S.No.	Bridgeatkm	Utilityservicetobecarried	Remarks
Nil			

(f) Cross-sectionofthenewculvertsandbridgesatdecklevelfortheproject Highwayshall confirmtothetypicalcross-sectionsgiven inthe provision of relevant Manual.

(ii) Culverts

(a) Overall widthofallculvertsshould not be less than theroadwaywidthofthe approaches.

(b) Reconstruction of existingculverts:

Theexistingculvertsatthefollowinglocationsshallbere-constructedasnew culverts:

[Refer to the provision of relevant Manual and provide details]

Sl.No.	Culvert location (km)	Span/Opening(m)	Remarks,ifany*
1.	156510	1X3X3	Box Culvert
2.	156705	1X3X3	Box Culvert
3.	157100	1X3X3	Box Culvert
4.	157960	1X2X2	Box Culvert
5.	158075	1X3X3	Box Culvert
6.	158490	1X3X3	Box Culvert
7.	158810	1X3X3	Box Culvert
8.	159115	1X3X3	Box Culvert
9.	159260	1X3X3	Box Culvert
10.	159335	1X3X3	Box Culvert
11.	159540	1X3X3	Box Culvert
12.	159645	1X2X2	Box Culvert
13.	159840	1X3X3	Box Culvert
14.	160095	1X3X3	Box Culvert
15.	160235	1X3X3	Box Culvert
16.	160475	1X3X3	Box Culvert
17.	160650	1X3X3	Box Culvert
18.	160840	1X3X3	Box Culvert
19.	160975	1X3X3	Box Culvert
20.	161085	1X3X3	Box Culvert
21.	161140	1X3X3	Box Culvert
22.	161270	1X3X3	Box Culvert
23.	161605	1X3X3	Box Culvert
24.	161710	1X3X3	Box Culvert
25.	161855	1X3X3	Box Culvert
26.	162065	1X3X3	Box Culvert
27.	162215	1X2X2	Box Culvert
28.	162285	1X2X2	Box Culvert
29.	162500	1X3X3	Box Culvert
30.	162560	1X3X3	Box Culvert
31.	163030	1X3X3	Box Culvert
32.	163235	1X3X3	Box Culvert
33.	163460	1X2X2	Box Culvert
34.	163570	1X2X2	Box Culvert
35.	163730	1X3X3	Box Culvert

Sl.No.	Culvert location (km)	Span/Opening(m)	Remarks,ifany*
36.	163805	1X2X2	Box Culvert
37.	163945	1X3X3	Box Culvert
38.	164025	1X3X3	Box Culvert
39.	164100	1X3X3	Box Culvert
40.	164120	1X3X3	Box Culvert
41.	164320	1X3X3	Box Culvert
42.	164450	1X3X3	Box Culvert
43.	164580	1X2X2	Box Culvert
44.	164855	1X3X3	Box Culvert
45.	165240	1X3X3	Box Culvert
46.	165335	1X3X3	Box Culvert
47.	165555	1X3X3	Box Culvert
48.	165635	1X2X2	Box Culvert
49.	166115	1X3X3	Box Culvert
50.	166280	1X3X3	Box Culvert
51.	166320	1X3X3	Box Culvert
52.	166520	1X2X2	Box Culvert
53.	166665	1X3X3	Box Culvert
54.	166740	1X3X3	Box Culvert
55.	166825	1X3X3	Box Culvert
56.	166915	1X3X3	Box Culvert
57.	167380	1X3X3	Box Culvert
58.	167820	1X3X3	Box Culvert
59.	168820	1X2X2	Box Culvert
60.	169065	1X2X2	Box Culvert
61.	169120	1X2X2	Box Culvert
62.	169190	1X3X3	Box Culvert
63.	169300	1X3X3	Box Culvert
64.	169390	1X3X3	Box Culvert
65.	169815	1X3X3	Box Culvert
66.	170775	1X3X3	Box Culvert
67.	171010	1X3X3	Box Culvert
68.	171290	1X3X3	Box Culvert
69.	171340	1X3X3	Box Culvert
70.	171440	1X2X2	Box Culvert
71.	171810	1X3X3	Box Culvert
72.	171910	1X3X3	Box Culvert

Sl.No.	Culvert location (km)	Span/Opening(m)	Remarks,ifany*
73.	172040	1X3X3	Box Culvert
74.	172200	1X3X3	Box Culvert
75.	172290	1X2X2	Box Culvert
76.	172450	1X3X3	Box Culvert
77.	172690	1X3X3	Box Culvert
78.	172870	1X2X2	Box Culvert
79.	173470	1X3X3	Box Culvert
80.	173560	1X3X3	Box Culvert
81.	173790	1X3X3	Box Culvert
82.	174210	1X3X3	Box Culvert
83.	174630	1X3X3	Box Culvert
84.	174945	1X3X3	Box Culvert
85.	175095	1X3X3	Box Culvert
86.	175305	1X2X2	Box Culvert
87.	175415	1X2X2	Box Culvert
88.	175580	1X2X2	Box Culvert
89.	176400	1X2X2	Box Culvert

Note:-

1. The cushion over the culverts should be aligned symmetrically on both sides of road along the road way width.

2. Minimum Width of Culvert should be 12.0m & Maximum Width should be calculated as per applicable TCS, Earth Cushion & Site conditions.

3. Proposed Span Arrangement of Culverts mentioned above may vary as per site conditions. All Culverts shall be designed and provided as per the technical requirement in consultation with the Authority Engineer.

(c) Wideningofexistingculverts:

Allexistingculvertswhicharenottobereconstructedshallbewidenedtothe roadway width ofthe Project Highwayas per the typical cross section given in the provision of relevant Manual. Repairs andstrengtheningofexistingstructures where required shall be carriedout.

Sl. No.	Culvert location	Type,span,heightandwidthofexistingculvert (m)	Repairstobecarriedout[specify]
Nil			

(d) Additionalnewculvertsshallbeconstructedasperparticularsgiveninthe table below:

Sl.No.	Culvert location (km)	Span/Opening(m)	Remarks,ifany*
1.	165820	1X2X2	Box Culvert
2.	168020	1X2X2	Box Culvert
3.	168220	1X2X2	Box Culvert
4.	168420	1X2X2	Box Culvert
5.	168615	1X2X2	Box Culvert
6.	169660	1X3X3	Box Culvert
7.	170040	1X3X3	Box Culvert
8.	170430	1X3X3	Box Culvert
9.	173130	1X2X2	Box Culvert
10.	173240	1X2X2	Box Culvert
11.	173980	1X2X2	Box Culvert
12.	174410	1X3X3	Box Culvert
13.	174855	1X2X2	Box Culvert
14.	175680	1X2X2	Box Culvert
15.	176020	1X2X2	Box Culvert
16.	176190	1X2X2	Box Culvert

Note:-

1. The cushion over the culverts should be aligned symmetrically on both sides of road along the road way width.

2. Minimum Width of Culvert should be 12.0m & Maximum Width should be calculated as per applicable TCS, Earth Cushion & Site conditions.

3. Proposed Span Arrangement of Culverts mentioned above may vary as per site conditions. All Culverts shall be designed and provided as per the technical requirement in consultation with the Authority Engineer.

(e) Repairs/replacementsofrailing/parapets,flooringandprotectionworksof the existingculvertsshall be undertaken as follows:

[Refer to the provision of relevant Manual and provide details]

S.No.	Location atkm	Typeofrepairrequired
NIL		

(f) FloorprotectionworksshallbeasspecifiedintherelevantIRCCodesandSpecifications.

(iii) Bridges

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

(i) Theexistingbridgesatthefollowinglocationsshallbere-constructed as

newStructures]

[Refer to the provision of relevant Manual and provide details]

Major Bridge - NIL

Sl. No.	Bridge location (km)	Salient details of existingbridge		Adequacyorotherwiseof the existingwaterway,verticalclearance,etc*	Proposed Span Arrangement (m)
		Type of Structures	Span Arrangement and Total Vent way (No. x Length) (m)		
NIL					

Minor Bridge – 2no.

Sl. No.	Bridge location (km)	Salient detailsofexistingbridge		Adequacyorotherwiseof the existingwaterway,verticalclearance,etc*	Proposed Span Arrangement (m)
		Type of Structures	Span Arrangement and Total Vent way (No. x Length) (m)		
1	157+490	BOX	1X3X3	-	3x16
2	165+085	BOX	2X3X4	-	2X4X4

*Attach GAD

Note: -

1. **During reconstruction of existing bridges, traffic movement should not be obstructed. Hence for movement of traffic, diversions shall be constructed as per site conditions.**
2. **Proposed Span Arrangement of Bridges mentioned above may vary as per site conditions. All Minor Bridges shall be designed and provided as per the technical requirement in consultation with the Authority Engineer.**

The following narrow bridges shall be widened:

S. No.	Location (km)	Existing width(m)	Extent of widening(m)	Cross-sectionatdecklevelforwidening@
NIL				

@ Attach cross-section

(b) Additional new bridges

[Specify additional newbridgesif required, and attach GAD]

New bridgesatthefollowinglocationsontheProjectHighwayshallbe constructed.GADs for the new bridges are attachedin the drawings folder.

Minor Bridge – 3Nos.

S.No.	Location (km)	Span Arrangements	Remarks,ifany
1	170+040	3X16	T -Beam Girder
2	170+265	1X25	T -Beam Girder
3	174+540	1X25	T -Beam Girder

Note: -

1. **During reconstruction of existing bridges, traffic movement should not be obstructed. Hence for movement of traffic, diversions shall be constructed as per site conditions.**
2. **Proposed Span Arrangement of Bridges mentioned above may vary as per site conditions. All Minor Bridges shall be designed and provided as per the technical requirement in consultation with the Authority Engineer**

Major Bridge – NIL

S.No.	Location (km)	Span Arrangements	Remarks,ifany
NIL			

(c) The railings of existingbridgesshall bereplacedby crash barriersat the followinglocations:

[Refer to the provision of relevant Manual and provide details:]

Sl.No.	Location atkm	Remarks
NIL		

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

[Refer to the provision of relevant Manual and providedetails]

Sl.No.	Location atkm	Remarks
NIL		

(e) Drainagesystemforbridge decks

An effective drainagesystemforbridgedecks shall beprovidedas specified in the provision of relevant Manual.

(f) Structures in marine environment

[Refertothe provision of relevant Manualandspecify thenecessarymeasures/treatments for protecting structuresin marine environment, where applicable]

(iv) Rail-roadbridges

(a) Design,constructionanddetailingofROB/RUBshallbeasspecifiedinthe provision of relevant Manual. [Refer to the provision of relevant Manual and specify modification, if any]

(b) **Road over-bridges**

Roadover-bridges(roadoverrail)shall beprovidedatthefollowinglevel crossings, as per GAD drawings attached:

S. No.	Location ofLevelcrossing (Chainagekm)	Lengthofbridge(m)
NIL		

(c) Road under-bridges

Road under-bridges (road underrailwayline) shallbeprovidedatthe followinglevel crossings, as per GAD drawings attached:

S. No.	Location ofLevelcrossing (Chainage km)	Number andlengthofspan(m)
Nil		

(v) Grade separatedstructures

[Refer to the provision of relevant Manual]
Thegradeseparatedstructuresshallbeprovidedatthelocationsandofthetypeand length specified in paragraphs 2 (ix) and3 of this Annex-I.

(vi) Repairs andstrengthening of bridges andstructures

[Refer to the provision of relevant Manualand provide details]

Theexistingbridgesandstructurestoberepaired/strengthened,andthenatureand extent of repairs /strengtheningrequired are given below:

(a) Bridges

S. No.	Location ofbridge (km)	Natureandextentofrepairs/ strengthening tobecarriedout

NIL

(b) ROB / RUB

S. No.	Location of ROB/RUB (km)	Natureandextentofrepairs/ strengtheningtobecarriedout
Nil		

(c) Overpasses/Underpasses and otherstructures

S. No.	Location of Structure(km)	Natureandextent ofrepairs/ Strengtheningtobe carriedout
Nil		

(vii) List of Major Bridges

The following is the list ofthe Major Bridges:

S.No.	Location (Km)
NIL	

8. Traffic Control Devices and Road Safety Works

i. Trafficcontroldevicesandroadsafetyworksshallbeprovidedinaccordancewiththe provision of relevant Manual.

ii. Specificationsofthereflectivesheeting.[Refertothe provision of relevant Manualand specify]

9. Roadside Furniture

(i) Roadsidefurnitureshallbeprovidedinaccordancewiththeprovisionsofthe relevant Manual.

(ii) Overhead trafficsigns: at each village start and end border, etc.

[Refer to the provision of relevant Manualand provide details]

10. Compulsory Afforestation

[Refertothe provision of relevant Manualandspecifythenumberoftreeswhichare required to be plantedby the Contractor as compensatoryafforestation.]

11. Hazardous Locations

THRIE- Beam crash barriers shall also be provided at the following hazardous locations:

S. No.	Type of TCS	Location stretch		Side	Total Length (m)
		From (m)	To (m)		
1.	Fig 2.9	156489	156900	One Side	411
2.	Fig 2.9	157100	158500	One Side	1400
3.	Fig 2.9	159850	160550	One Side	700
4.	Fig 2.9	161350	162250	One Side	900
5.	Fig 2.8	162250	162350	One Side	100
6.	Fig 2.9	162350	162450	One Side	100
7.	Fig 2.8	162450	162750	One Side	300
8.	Fig 2.9	162750	162930	One Side	180
9.	Fig 2.8	162930	163130	One Side	200
10.	Fig 2.9	163130	163680	One Side	550
11.	Fig 2.8	163680	163780	One Side	100
12.	Fig 2.9	163780	163980	One Side	200
13.	Fig 2.8	163980	164080	One Side	100
14.	Fig 2.8	164130	164280	One Side	150
15.	Fig 2.9	164530	164930	One Side	400
16.	Fig 2.9	165230	165430	One Side	200
17.	Fig 2.8	166030	166130	One Side	100
18.	Fig 2.9	166430	166530	One Side	100
19.	Fig 2.8	166830	167030	One Side	200
20.	Fig 2.8	167930	169430	One Side	1500
21.	Fig 2.12(new)	169430	170430	Both Side	2000
22.	Fig 2.8	170430	171330	One Side	900
23.	Fig 2.9	171330	171830	One Side	500
24.	Fig 2.8	171830	172030	One Side	200
25.	Fig 2.9	172030	172330	One Side	300
26.	Fig 2.8	172330	172630	One Side	300
27.	Fig 2.9	172630	172730	One Side	100
28.	Fig 2.9	173030	173230	One Side	200
29.	Fig 2.8	173230	173530	One Side	300
30.	Fig 2.9	173530	174230	One Side	700
31.	Fig 2.8	174230	174330	One Side	100
32.	Fig 2.8	174930	175030	One Side	100
33.	Fig 2.9	175230	175730	One Side	500
34.	Fig 2.8	175730	175930	One Side	200
35.	Fig 2.9	175930	176129	One Side	199
36.	Fig 2.8	176129	176410	One Side	281
37.	Fig 2.9	156489	156900	One Side	411
38.	Fig 2.9	157100	158500	One Side	1400
39.	Fig 2.9	159850	160550	One Side	700
40.	Fig 2.9	161350	162250	One Side	900
41.	Fig 2.8	162250	162350	One Side	100
42.	Fig 2.9	162350	162450	One Side	100
43.	Fig 2.8	162450	162750	One Side	300

S. No.	Type of TCS	Location stretch		Side	Total Length (m)
		From (m)	To (m)		
44.	Fig 2.9	162750	162930	One Side	**180**
45.	Fig 2.8	162930	163130	One Side	**200**
46.	Fig 2.9	163130	163680	One Side	**550**
47.	Fig 2.8	163680	163780	One Side	**100**
48.	Fig 2.9	163780	163980	One Side	**200**
49.	Fig 2.8	163980	164080	One Side	**100**
50.	Fig 2.8	164130	164280	One Side	**150**
Total Length					**14771m**

12. SPECIAL REQUIREMENT FOR HILL ROADS

[Refer to paragraphs 14.5 and 14.8 of the Manual and provide details where relevant and required.] Special requirement for hill roads in accordance with the provisions of section 14 of the manual shall be provided in the following locations: -

a) RCC Retaining Wall

Sl. No.	Location stretch		Side	Total Length (m)
	From (m)	To (m)		
1.	162250	162350	One side	100
2.	162450	162750	One side	300
3.	162930	163130	One side	200
4.	163680	163780	One side	100
5.	163980	164080	One side	100
6.	164130	164280	One side	150
7.	166030	166130	One side	100
8.	166830	167030	One side	200
9.	167930	169430	One side	1500
10.	169430	170430	Both side	2000
11.	170430	171330	One side	900
12.	171830	172030	One side	200
13.	172330	172630	One side	300
14.	173230	173530	One side	300
15.	174230	174330	One side	100
16.	174930	175030	One side	100
17.	175730	175930	One side	200
18.	176129	176410	One side	281
	Total			**7131m**

Note: - Retaining wall shall be designed and provided as per the technical requirement in consultation with the Authority Engineer subject to minimum length of 7131meter. Increase in length of Retaining wall will not be treated as change of Scope.

b) PCC Breast wall

Sl. No.	Location stretch		Side	Total Length (m)
	From (m)	To (m)		
1	156489	166930	One side	10441
2	166930	167930	Both side	2000
3	167930	169600	One side	1670
4	170600	176400	One side	5800
		Total		**19911 m**

Note: - 1. Breast wallshall be designed and provided as per the technical requirement in consultation

with the Authority Engineer subject to minimum length of 19911 meter. Increase in length of Breast wall will not be treated as change of Scope.

2. For Height of Breast Wall following parameters shall be adopted: -

(a) For cutting height of hill side slopes till 10m – minimum height of breast wall should be 2.0m above GL.
(b) For cutting height of hill side slopes 10-20m – minimum height of breast wall should be 3.0m above GL.
(c) For cutting height of hill side slopes 20-30m – minimum height of breast wall should be 4.0mabove GL.
(d) For cutting height of hill side slopes above 30m – minimum height of breast wall should be 5.0m above GL.

c) Hydroseeding& Mulching

S. No.	Location stretch		Side	Total Length (m)
	From (m)	To (m)		
1	156489	166930	One side	**10441**
2	166930	167930	Both side	**2000**
3	167930	169600	One side	**1670**
4	171500	176400	One side	**4900**
		Total		**19011 m**

Note: - Hydroseeding& Mulching are provided as per the technical requirement in consultation with the Authority Engineer subject to minimum length of 19011 meter. Increase in length of Hydroseeding& Mulching shall not be treated as change of Scope.

d) Special Protection for Sinking Zone

S. No.	Location stretch		Length (in m)	Area in Sq.m.	Detail of Special Protection
	From (m)	To (m)			
1	156600	156700	100	1000	At Sinking locations, the hill surface/ slope to be protected / treated with Soil/ Rock nailing & High Strength Wire Mesh having of minimum diameter 3 mm twisted or straight of high tensile steel wire as per IRC & BS specifications. The System should be tailor made according to the site conditions and requirements with accessories like Connection Clips / Press Claws / Shackles/ Boundary Ropes / Wire Rope Anchors etc. Equivalent / Higher Protection system will be Technically Evaluated by Approving Authority. The Final Type of product to be used shall be decided upon approval of final design / drawing as per IRC & BS specification.
2	159100	159600	500	20000	
3	160100	160300	200	4000	
4	162750	162800	50	1000	
5	163950	164300	350	10500	
6	165300	165700	400	10000	
7	166200	166400	200	3000	
8	166900	167100	200	2000	
9	167100	167300	200	4000	
10	167300	167800	500	25000	
11	168000	168500	500	5000	
12	173300	173550	250	2500	
13	174600	175100	500	7500	
Total				**95500**	

Note: - Special Protection for Sinking Zone shall be provided as per the technical requirement in consultation with the Authority Engineer subject to minimum area of 95500Sq.m. Increase in Area will not be treated as change of Scope. The specification and methodology adopted for special protection works on sinking zone should be as per Annexure D2 of Schedule D.

13. Change of Scope

ThelengthofStructuresandbridgesspecifiedhereinaboveshallbetreated asan approximateassessment. Theactuallengthsasrequiredonthebasisofdetailed

investigationsshallbedeterminedby theContractorinaccordance withthe SpecificationsandStandards.AnyvariationsinthelengthsspecifiedinthisSchedule-BshallnotconstituteaChangeofScope,saveand exceptanyvariationsinthelength arisingoutofaChange ofScopeexpresslyundertakeninaccordancewiththe provisions of Article 13.

14. Utility Shifting

Shifting of obstructing existing utilities indicated in Schedule A to an appropriate location in accordance with the standards and specification of concerned Utility Owning Department is part of the scope of work of the Contractor/Concessionaire*. The bidders may visit the site and assess the quantum of shifting of utilities for the projects before submission of their bid. Copy of utility relocation plan is enclosed. The specification of concerned Utility Owning Department shall be applicable and followed.

Notes:

a) The type/spacing/size/specifications of poles/towers/lines/cables to be used in shifting work shall be as per the guidelines of utility owning department and it is to be agreed solely between the contractor/Concessionaire* and the utility owning department. No change of scope shall be admissible and no cost shall be paid for using different type/spacing/size/specifications in shifted work in comparison to those in the existing work or for making any overhead crossing to underground as per requirement of utility owning department and/or construction of project highway. The contractor/concessionaire* shall carry out joint inspection with utility owning department and get the estimates from the utility owning department. The assistance of the Authority is limited to giving forwarding letter on the proposal of contractor/concessionaire* to utility owning department whenever asked by the contractor/concessionaire*. The decision/ approval of utility owning department shall be on the contractor/concessionaire*.

b) The supervision charges at the rates/charges applicable of the utility owning department shall be paid directly by the Authority to the utility Owning department as and when contractor/concessionaire*furnishes demand of utility Owning Department along with a copy of estimated cost given by later.

c) The dismantled material/scrap of existing Utility to be shifted/Dismantled shall belong to the contractor/concessionaire* who would be free to dispose-off the dismantled material as deemed fit by them unless the contractor/concessionaire* is required to deposit the dismantled material may be availed by the contractor/concessionaire* as per estimate agreed between them.

d) The utilities shall be handed over after shifting work is completed to utility Owning Department to their entire satisfaction. The maintenance liability shall rest with the Utility Owning Department after Handing over Process is complete as far as utility shifting works are concerned.

Schedule B-1

Sr. No	Type of Utility	Unit	Quantity	Remarks
A	**Electrical Utilities**			
	Items for 33KV Line			
1.	GI Steel SP 66 tubular pole	Nos	6	The details of items/quantities/works to be executed for shifting of utilities is tentative. All
2.	GI Channel cross arm (100x50x6x3200)mm	Nos	12	
3.	GI angle (50x50x6)mm	Nos	18	

4.	Hot Dip GI Wire Stay Wire 7/10 SWG for HT	KG	18	works/quantities/ miscellaneous items to be executed at site as per detailed estimate of utility owning department, without any additional claim/COS.
5.	Polymeric Pin insulator - FRP 34mm	Nos	9	
6.	Polymeric Disc insulator - 90kN (T&C Type)	Nos	18	
7.	Jointing Sleeve for Raccon	Nos	18	
8.	ACSR Raccoon conductor	Km	0.6	
9.	HT stay set	Nos	6	
10.	HT Guy Insulator	Nos	6	
11.	Tension Clamp for ASCR Raccon	no	18	
12.	pole clamp for GI flat, 50x6mm	Nos	24	
13.	Hot Dip GI wire , 6 SWG	Kg	5	
14.	CI earth pipe 1.8 mm inner dia 100mm	Nos	6	
15.	GI nuts-bolts & GI washer(assorted)	Kg	30	
16.	PG clamp for ACSR Racoon	No.	18	
17.	GI Barbered Wire Type A	Kg	5	
18.	33KVA Danger Plate	No.	6	
19.	Stay grouting	No.	6	
20.	Grouting and steel Tubular Poles	No.	6	
A2	**Items for 11KV Line**			The details of items/quantities/works to be executed for shifting of utilities is tentative. All works/quantities/ miscellaneous items to be executed at site as per detailed estimate of utility owning department, without any additional claim/COS.
1.	GI Steel SP 66 tubular pole	Nos	332	
2.	11KV GI Channel cross arm (100x50x6x2200)mm	Nos	618	
3.	GI 11 kv T cross arm (50x50x6)mm	Nos	67	
4.	GI Channel (150x75x6)mm	Nos	308	
5.	11 kv Pin insulator-polymeric	Nos	617	
6.	11KV Polymeric Disc insulator - 70kN	Nos	764	
7.	H/W fitting for 11 KV DISC 70 KN	Nos	764	
8.	ACSR Raccoon conductor	Km	36	
9.	HT stay set	Nos	220	
10.	HT Guy Insulator	Nos	220	
11.	GI Stay Wire 7/10 SWG	Kg	450	
12.	pole clamp for GI flat, 50x6mm	Nos	1010	
13.	GI wire for earthing, 6 SWG	Kg	970	
14.	GI pipe 50 mm dia 3 mtr length	Nos	130	
15.	GI nuts-bolts & GI washer(assorted)	Kg	1150	
16.	PG clamp for ACSR Racoon	No.	764	
17.	GI Barbered Wire Type A	Kg	420	
18.	GI Channel (75x40x6) mm	Mtr	50	
19.	Stay grouting	No.	332	
20.	Grouting and steel Tubular Poles	No.	220	
A3	**Items for LT Line**			
1.	GI Steel SP 30 tubular pole	Nos	126	
2.	GI Pole round clamp pf GI Flate 50x6mm	Nos	252	
3.	LT stay set	Nos	126	
4.	GI Stay Wire 7/14 SWG	Kg	252	
5.	LT Guy Insulator (Porcelain)	Nos	126	
6.	LT XLPE 1 core 120mm sq (Al)	Mtr	7800	

	armoured			
7.	MS LT Angle Cross Arm (40x40x5x500)mm	Nos	252	
8.	I hook GI	Nos	252	
9.	GI Shackle Streps with bolts	Nos	504	
10.	MS Nuts & Bolts with washers (assorted)	Kg	150	
11.	LT Pin Insulater(Porcelain)	Nos	252	
12.	Shackle Insulater(Porcelain)	Nos	252	
13.	LT Danger Plate	Set	126	
14.	Stay grouting	Nos	60	
15.	Grouting and mufflering of steel Tubular Poles	Nos	60	

Sr. No	Type of Utility	Unit	Quantity	Remarks
A4	**Items for 25KVA Sub station**			The details of items/quantities/works to be executed for shifting of utilities is tentative. All works/quantities/ miscellaneous items to be executed at site as per
1.	11/0.4 KV 25KVA DTR (4 star) BIS level-2	Nos	4	
2.	GI Steel Tubular Pole SP 60	Nos	8	
3.	GI Channel Crossing arm 10x50x6x2200 mm	Nos	16	
4.	PG Clamp for AAAC "Recon"	Nos	24	
5.	GI ground Pole clamp 50x50x6 mm	Nos	24	
6.	ACSR recon conductor	KM	0.12	

7.	HT stay set complete	Set	8	detailed estimate of utility owning department, without any additional claim/COS.
8.	HT Guy Insulator	Nos	8	
9.	GI Stay Wire 7/10 SWG	Kg	50	
10.	11 kv Pin insulator-polymeric	Nos	24	
11.	GI pipe 50 mm dia 3 mtr length	Nos	24	
12.	GI nuts-bolts & GI washer(assorted)	Kg	35	
13.	11KV Polymeric Disc insulator - 70kN (tension clamp)	Nos	24	
14.	H/W fitting for DISC insulator B&S 70 KN tension	Nos	24	
15.	11 KV DEO fuse- 150A	Set	4	
16.	11KV GOAB Switch- 150A	Set	4	
17.	11KV Lightening arrester 9KA line type	Set	4	
18.	LT XLPE single core cable 50 Sq.mm.	mtr	240	
19.	Aluminum lug (assorted)	Nos	65	
20.	DTR cubical for 25KVA DTR (comprising MCCB static TVM, CT, volt metre, ammeter,etc.)	Nos	4	
21.	11kV Danger Plate	Nos	8	
22.	GI Barbered Wire for Anticlimbing device	Kg	25	
23.	Stay grouting	Nos	8	
24.	Grouting and mufflering of steel Tubular Poles as per Specification	Job	8	
25.	DTR fencing as per REC standard specification complete with material &labour	Job	4	

Sr. No	Type of Utility	Unit	Quantity	Remarks
A5	**Items for 63KVA Sub station**			The details of items/quantities/works to be executed for shifting of utilities is tentative. All works/quantities/ miscellaneous items to be executed at site as per detailed estimate of
1.	11/0.4 KV 63KVA DTR (4 star) BIS level-2	Nos	3	
2.	GI Steel Tubular Pole SP 60	Nos	6	
3.	GI Channel Crossing arm 10x50x6x2200 mm	Nos	12	
4.	PG Clamp for AAAC “Recon”	Nos	18	
5.	GI ground Pole clamp 50x50x6 mm	Nos	21	
6.	ACSR recon conductor	KM	0.12	
7.	HT stay set complete	Set	6	

8.	HT Guy Insulator	Nos	6	utility owning department, without any additional claim/COS.
9.	GI Stay Wire 7/10 SWG	Kg	65	
10.	11 kv Pin insulator-polymeric	Nos	18	
11.	GI pipe 50 mm dia 3 mtr length	Nos	18	
12.	GI nuts-bolts & GI washer(assorted)	Kg	20	
13.	11KV Polymeric Disc insulator - 70kN (tension clamp)	Nos	18	
14.	H/W fitting for DISC insulator B&S 70 KN tension	Nos	18	
15.	11 KV DEO fuse- 150A	Set	3	
16.	11KV GOAB Switch- 150A	Set	3	
17.	11KV Lightening arrester 9KA line type	Set	3	
18.	LT XLPE single core cable 50 Sq.mm.	mtr	180	
19.	Aluminum lug (assorted)	Nos	50	
20.	DTR cubical for 63KVA DTR (comprising MCCB static TVM, CT, volt metre, ammeter,etc.)	Nos	3	
21.	11kV Danger Plate	Nos	12	
22.	GI Barbered Wire for Anticlimbing device	Kg	18	
23.	Stay grouting	Nos	6	
24.	Grouting and mufflering of steel Tubular Poles as per Specification	Job	6	
25.	DTR fencing as per REC standard specification complete with material &labour	Job	3	

Sr. No	Type of Utility	Unit	Quantity	Remarks
B	**Water/Sewage pipeline**			
B1	**Water supply pipeline (Drinking & Water Supply Dept., PHED)**			The details of items/quantities/works to be executed for shifting of utilities is tentative. All works/quantities/ miscellaneous items to be executed at site as per detailed estimate of utility owning department, without any additional claim/COS.
1.	GI Pipes 40mm(RWGM)	m	5145	
2.	GI Pipes 50mm (RWGM)	m	3110	
3.	GI Pipes 80mm (RWGM)	m	3050	
4.	GI Pipes 100mm (RWGM)	m	2070	
5.	HDPE Pipes 50mm Dia(CWGM)	m	1200	
6.	RCC Intake weir	No.	1	

Schedule-C

Schedule-C

(SeeClause2.1)

Project Facilities

1. ProjectFacilities

TheContractorshall construct theProjectFacilitiesinaccordancewiththeprovisions of this Agreement. Such Project Facilities shallinclude:

(a) Toll plaza[s];

(b) Roadsidefurniture;

(c) Pedestrianfacilities;

(d) Treeplantation;

(e) Trucklay-byes;

(f) Bus-bays and busshelters;

(g) Rest areas;and

(h) Others to bespecified

2. DescriptionofProjectFacilities

Each of theProject Facilities is described below:

(a) Toll Plaza: Nil

(b) Roadside Furniture:

S. No.	ProjectFacility	Location	Design Requirements	Otheressential details
1	Traffic Sign & Pavement marking	Entire Length	As per Schedule D	
2	Km stone, Hectometer Stone, 5thkilometre stone	Entire Length	As per Schedule D	
3	Boundary Stone	Entire Length	As per Schedule D	
4	Roadside Delineator, marker & Road Stud	As per manual	As per Schedule D	

Note: Provideadequate detailsof eachProjectFacility toensuretheirdesignand completioninaccordancewiththeproject-specificrequirementsandtheprovisions of the Manual.

(c) Pedestrian Facilities:

Pedestrian facilities in the form of footpath cum drain shall be provided in the built-up area (refer typical cross-section drawing). Pedestrian facilities shall be provided at the locations of urban sections in order to ensure safety of pedestrians while crossing in consultation with Authority.

(d) Tree Plantation:4994 nos. of trees should be planted & maintained by EPC Contractor @4mc/c in Single ROW within Proposed ROW as per IRC :SP:21-2009

(e) Truck Lay Byes:1no.

S. No.	Project Facility	Location (km)	Design Requirements	Other Essential Details
1	Truck Lay Bye	157+800-157+900	One side	-

Note:- The Design &Specifications of Truck Lay-bye shall follow IRC :SP-73:2018 & finalized in consultation with Authority Engineer.

(f) Bus Bay & Shelter:6no(Both Side).

S. No.	Project Facility	Location (km)	Design Requirements	Other Essential Details
1	Bus Bay & Shelter	157+600-157+700(LHS & RHS)	Separation from main carriageway	Start Taper-100 m, Straight-30 m, End Taper-100 m
2	Bus Bay & Shelter	159+900-160+000(LHS & RHS)	Separation from main carriageway	Start Taper-100 m, Straight-30 m, End Taper-100 m
3	Bus Bay & Shelter	161+550-161+650(LHS & RHS)	Separation from main carriageway	Start Taper-100 m, Straight-30 m, End Taper-100 m
4	Bus Bay & Shelter	163+080-163+180(LHS & RHS)	Separation from main carriageway	Start Taper-100 m, Straight-30 m, End Taper-100 m
5	Bus Bay & Shelter	165+930-166+030(LHS & RHS)	Separation from main carriageway	Start Taper-100 m, Straight-30 m, End Taper-100 m
6	Bus Bay & Shelter	166+680-166+780(LHS & RHS)	Separation from main carriageway	Start Taper-100 m, Straight-30 m, End Taper-100 m

S. No.	Project Facility	Location (km)	Design Requirements	Other Essential Details
7	Bus Bay & Shelter	169+130-169+230 (LHS & RHS)	Separation from main carriageway	Start Taper-100 m, Straight-30 m, End Taper-100 m
8	Bus Bay & Shelter	172+030-172+130 (LHS & RHS)	Separation from main carriageway	Start Taper-100 m, Straight-30 m, End Taper-100 m

Note:- The Design & Specifications of Bus Bay & Shelter shall follow IRC :SP-73:2018 & finalized in consultation with Authority Engineer.

(g) Rest areas: 1no.

S. No.	Project Facility	Location (km)	Design Requirements	Other Essential Details
1	Rest Area with Public Toilet	157+800-157+900	One side	-

Note:- The Design & Specifications of Rest Area with Public Toilet shall follow IRC :SP-73:2018 & finalized in consultation with Authority Engineer.

(h) Others:

(i) Street Lighting

Street lighting shall be provided in the built-up area, bus bay, truck lay bye and major junction location.

(j) Environment

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

Schedule-D

Schedule-D

(SeeClause2.1)

SpecificationsandStandards

1. Construction

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

2. Design Standards

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

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

[Note: Specify the relevant Manual, Specifications and Standards]

.

Annex- I

(Schedule-D)

Specifications and Standards for Construction

1. Specifications and Standards

All Materials, worksandconstruction operations shallconformtotheManual of SpecificationsandStandardsfor[Two-LaningofHighways(IRC: SP:73-2018)],referredto astheManual,andMORTHSpecificationsforRoadandBridgeWorks. Wherethe specificationforaworkisnotgiven, GoodIndustryPracticeshallbeadoptedtothe satisfaction of the Authority'sEngineer.

2. DeviationsfromtheSpecificationsandStandards

(i) The terms"Concessionaire", "Independent Engineer" and"Concession Agreement" usedintheManualshallbedeemedtobesubstitutedbytheterms "Contractor", "Authority's Engineer" and"Agreement"respectively.

(ii) [Notwithstanding anythingtothecontrarycontainedinParagraph-1above, the followingSpecificationsandStandardsshallapplytotheProjectHighway,and for purposes ofthisAgreement,theaforesaidSpecificationsandStandardsshallbe deemed to be amended totheextentsetforthbelow:]

(iii) [Note1: Deviations fromtheaforesaidSpecificationsand Standards shallbelistedout here. Suchdeviations shall bespecified only ifthey are considered essential in viewof project-specific requirements.]

Sr. No.	Cl. No.	Provisions in Clause	Deviation from Manual
1	TCS-2.11 (New)	New Typical Cross Section	Two-Lane with paved shoulder in Hilly Terrain with Hill side Drain on Both sides in open Country area (Box cut)
2	TCS-2.12 (New)	New Typical Cross Section	Two-Lane Carriageway with Paved Shoulder in Hilly Terrain with both side Retaining Wall on Valley side

(iv) Locations where Speed is less than 40km/hr.

Sl. No.	Stretch		Radius (m)	Speed(km/h)
	From	To		
1.	156958.107	157043.431	30	30
2.	159512.323	159574.004	20	30
3.	161056.285	161085.735	30	20
4.	162275.543	162363.440	40	20
5.	162748.983	162827.267	40	20
6.	162834.303	162924.877	30	30

Sl. No.	Stretch		Radius (m)	Speed(km/h)
7.	163206.122	163256.889	20	30
8.	164093.543	164169.461	30	20
9.	164170.752	164247.766	25	30
10.	164787.538	164861.104	30	20
11.	164870.699	164966.040	30	30
12.	164977.689	165030.036	20	30
13.	165052.411	165103.427	40	30
14.	166308.748	166358.896	20	20
15.	166366.176	166416.588	20	30
16.	166542.092	166608.008	40	30
17.	167052.432	167138.022	40	30
18.	171271.701	171340.499	30	30
19.	171604.848	171731.709	35	20
20.	173318.446	173370.696	20	30

At above locations Safety features like Traffic Sign boards, Crash Barrier, Road Delineators, etc.as per IRC 67: 2022 shall be provided.

Annexure- D-I

Typical Cross Sections

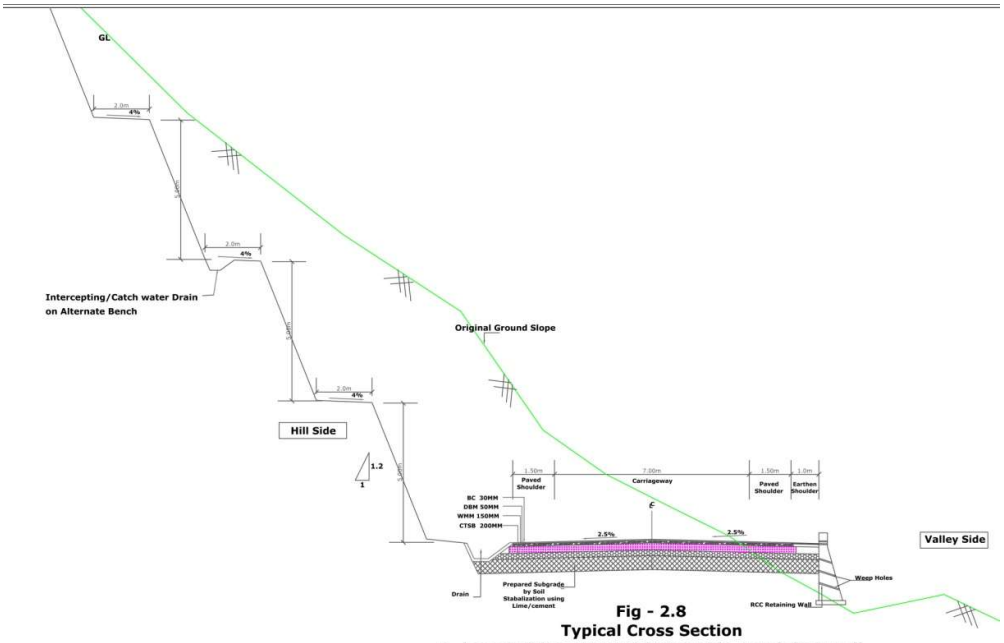


Fig - 2.8
Typical Cross Section
2- lane Carriageway WithOne Side Retaining Wall
(Open Country - Mountainous Terrain)

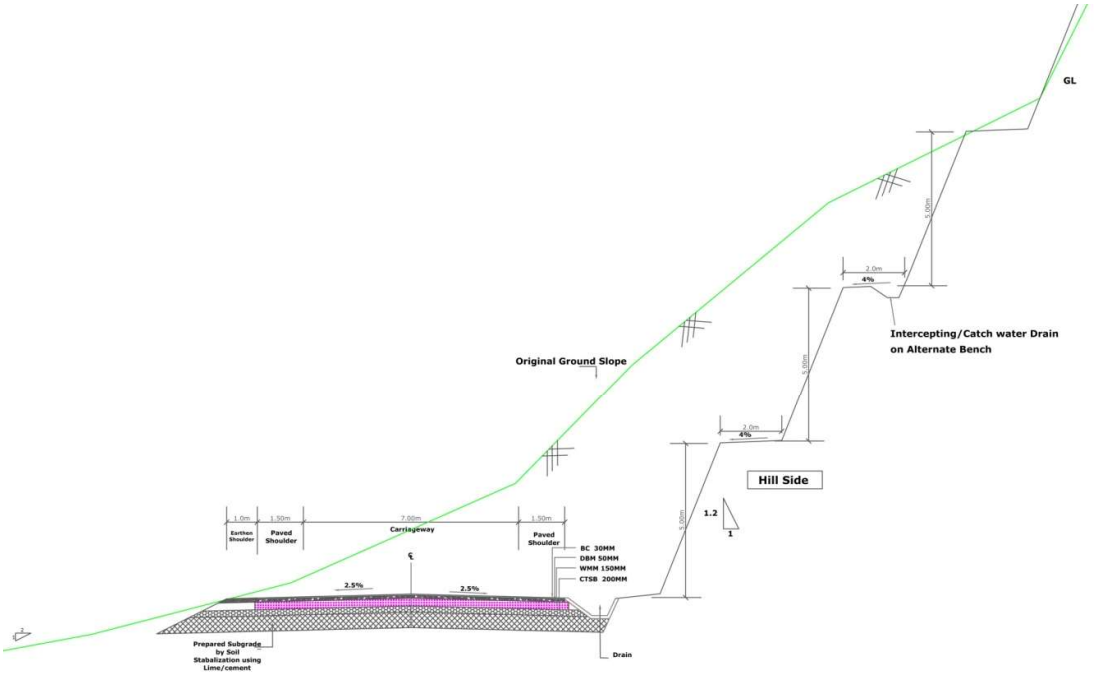


Fig - 2.9
Typical Cross Section
2- lane Carriageway Without Retaining Wall
(Open Country - Mountainous Terrain)

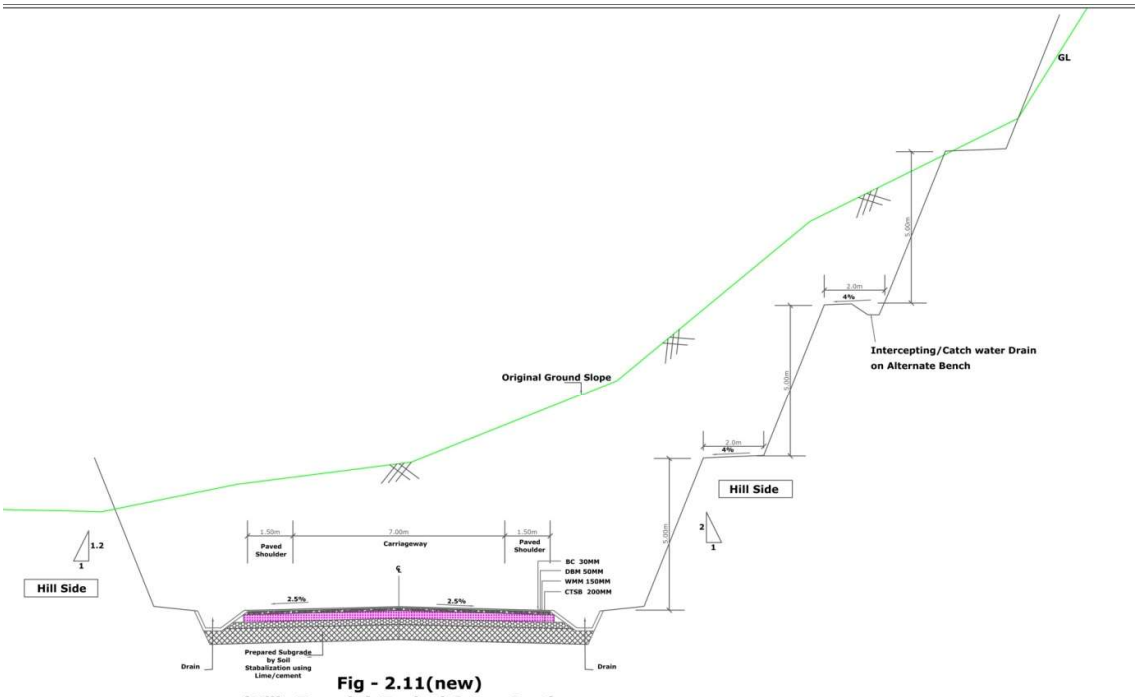


Fig - 2.11(new)
(Hilly Terrain) Typical Cross Section
2- lane Carriageway With Paved Shoulders
(Through Cut) Hill Section

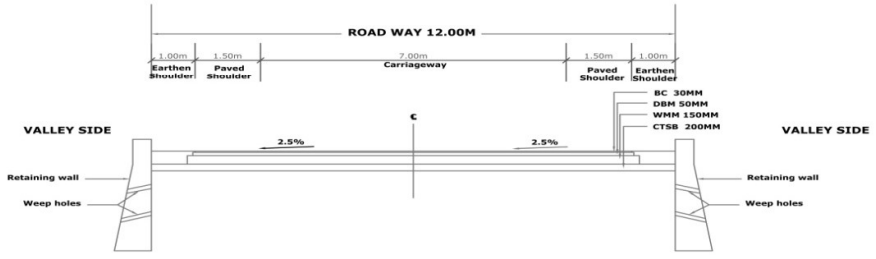


Fig - 2.12 (new)
Typical Cross Section (Hilly Terrain)
2- lane carriageway (With Paved Shoulder)
(With Retaining Wall on both Side)

Annexure D-II

Specification & Methodology for Special Protection of Sinking Zone

1. INTRODUCTION:

SELFDRILLING ANCHORBARS:

Self-drilling hollow injection anchor bolt is an advanced anchor system, which is composed by hollowanchor bar, nut, plate, coupler, drill bit, centralizer and anchor bars can be cut & lengthened bycoupling according to the demands. This anchor system can be integrated with the functions ofdrilling, groutingandanchoring.It alsocan ensuretheanchoring forcomplexgroundconditions.

For projects facing such ground conditions, self-drilling anchors should be considered as the mainproductivity solution. Self-Drilling Anchors from are designed for optimized installation, tailored to theproject'sneeds.

By drilling a hole in collapsing soil or loose rock, with a sacrificial drill bit and a hollow rod, and afterthe drilling operation injecting cementitious grout or resin into the hollow rod and surrounding cavity,self-drillinganchorsareatopproductivitysolution.

Self-drilling anchor boltsfromconsistsof:

- Ahexagonalnut
- Abearingplate
- Extension couplings, iftheanchorconsistsofseveralanchorrodsections
- Hollowanchorrod(s)
- Asacrificialdrillbit

2. ApplicationsofSelf-DrillingAnchorsSlope stabilization

Self-Drilling Anchors are used to stabilize unstable rock/soil formations. The unconsolidated orweathered ground conditions favor the SDA technique for a fast and simple method of installationcompared to thetraditionalmethods.

3. SDA Anchor Components

i).Hollowanchorrods

The anchor rod features a hollow bore for flushing, or simultaneous drilling and grouting, and has aleft-hand thread for connection to standard drill tooling. It is manufactured from API standard thickwall steel tubing, cold rolled to a standard ISO rope thread profile. The rolling process refines thecrystallinestructureofthe steel, increasingtheyield strength, andproducinga durable drill rodsuitable forawiderangeofapplications.Thestandard rope thread oftheanchorrodproduces anexcellentbondbetween therodandgrout,aswellas enabling connectiontothedrillingrigsandawiderangeofdrillsteelaccessories.

ii). Extensioncouplings

Thecouplingfeaturesa patenteddesignthatenablesdirectend to-end energytransmissionbetween each bar, reducinglosses and ensuringmaximumpercussive energy at thedrill bit.Toenable the correct seating of each bar within the coupler, all bars are chamfered with precision toenablethebarendstohaveface-to-facecontact.

iii). Bearingplates

The bearing plates are forged steel plates with a center hole, allowing articulation of seven degreesinalldirections.

iv). Hexagonalnuts

The hexagonal nuts are manufactured from high precision steel with chamfered edges on both endsfrom high precision steel, and tempered to meet the stringent demands on anchor specifications andthedailyoperations ofundergroundwork.Allnutsexceedthe ultimatestrengthofthebar.

v). Shanks

Rotarypercussionisthepreferredmethodofinstallation.Either a hydraulicorairhammer issuitable. To transfer the rotation and percussion from the hammer to the bar‘s system, there is aneedforashankadapter.

vi). Grout coupling

Afterusingstandard flushingmedia (waterorair),groutingmust bedone.Forconnectingthegrouting hose from the pump with the anchor bar, the grout coupling is used. The grout coupling willberemovedandreusedafterthe groutingprocessisdone.

vii) Sacrificialdrill bits

Thesacrificialdrill bitis themostcrucial partoftheanchoringsystem and isresponsible fortheproductivity of the installation. Intech Anchoring offers a large range of drill bits to suit the changinggeology encountered during projects. In order to improve on performance and cost efficiency, data iscollected from projects around the world and incorporated into the design with the goal to improvepenetrationrateand bitqualityandtoreducemanufacturingandapplicationcosts.

viii) Theselectionofdrillbits

A successful installationoftheSDA systemdependsontheselection of the most suitabledrill bit.Compared to conventional drill bit types offered globally for maximum standing performance for rockorsoil,thecriteria for SDAdrillbitsaredefinedbyconsiderationofthefollowingfactors:

- Geology
- Geometry

4) BRIEFINSTALLATIONMETHODOLOGYOFSDA

Thefollowingstepsareinvolvedinthe installationofnails:

i). Scalingworks:

All theloose debris&unwantedmaterialsaretobeproperlyremovedfrom thesurfaceofslopeandinthelocationofSDAapplications.

ii). Identifications:

Identification and marking the nail locations on the slope surface based on the spacing specified indrawing(ReferFig-1)

Figure 1: Marking of drill locations on the slope

Sacrificialdrill bitofrequiredsize,shall be attached atthefront ofnail (ReferFig-2)

Figure 2: Drill bit for self-drilling anchors (typical cross bit)

iii) Drillingshall be done for the specified length and diameter as mentioned in thedrawing.Grouting operation shall be carried out simultaneously with the drilling andinstallation ofself-drillinganchor(refer fig3-4). Theusualwater-cement ratiorangesfrom0.40to0.50.

Figure3:Drillingoperationontheslope

Figure 4: Grouting operation

iv. If required, coupler joint can be provided to match the required nail length.The coupler joint shall be firmly fixed to its full threadcentralizers shall be installed at the outer end after full penetration of nail in to the surface as per the requirement (Fig -5)

Figure 5: Centralizers at the outer end of nail

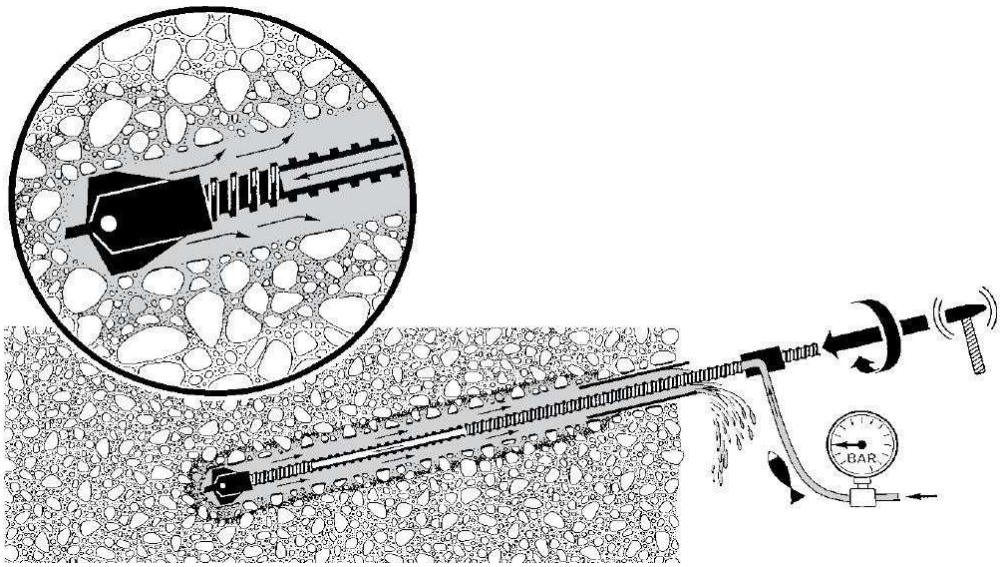


Figure 6: Drilling of SDA

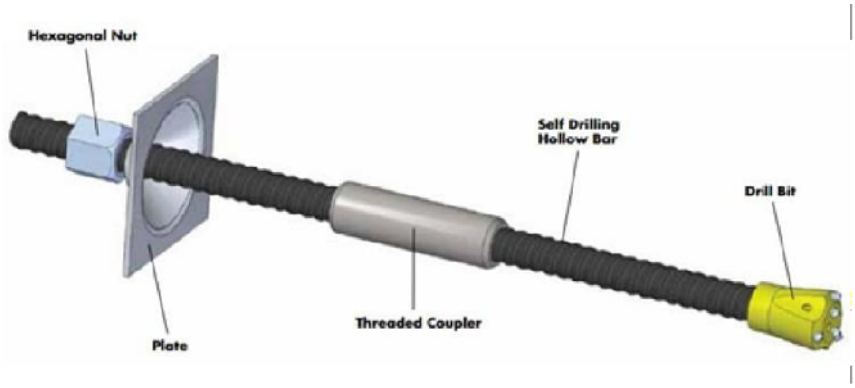


Figure 7: Components of SDA

vii) Bearing plate with sufficient thickness of steel plates are installed having a central hole requiredatthefaceofSDA.Themain functionofthisplateisto transfer thetensionloadofSDAtotheground.

viii) Afterthisthehexagonal nutsmadeofhighstrengthsteel withproperlymadebyall edges tosatisfy the demandsofanchorspecificationsis to beinstalled.

SDA installation,rotarypercussionprocessestherotation, andpercussiontransfer from thehammertohollow barsystem usingtheshankconnector.

HYDROSEEDINGONSLOPEAFTERNAILING:

Soil Reinforcement Geo-composite is a Hydro-seeding method that was widely accepted by, manyagency and landscape engineers due to its high performance. Hydro-seeding is a complementaryapplication used together with other kinds of geosynthetic products such as the 3D Geo-compositemat.Theslurryconsistsoffertilizer,signalgrassseeds,mulchingmaterial.Itoutperformsandismore cost-effectivethanconventionalerosion control methods.

As compared to conventional turfing, hydro-seeding is more effective, installation friendly and it hasdeeper root zone with better coverage. Employing the most superior erosion control blanket and thequalityservice;3DGeo-composite matisable toprovidetheoutstandingSlope Protectionsolution.

Steps ofHydroseeding

Step 1: Preparesite: Fillanyrillsor gullies causedbypreviouserosion.

Step 2: Hydroseed Mix:Fill the hydro-seeder tank with water, and add the normal mix of seed,fertilizer,fibermulch,etc.

Step 3: Add Silt Stop:Slowly add the Silt Stop polymer as the final additive to the hydroseed mixwhiletheagitatorisrunning toensuremixing.Allow5 minutesof mixingbeforebeginning toapply.

Step 4: Apply Hydroseed:Apply the hydroseed mixture over the top of the dressed slope. Properapplicationshouldresult incompletecoveragewithnobaresoilvisible.

The matting and polymer will help hold the seed and fertilizer in place and prevent the soil fromerodinguntilthevegetationcan germinateandestablishrootstructure.

REINFORCED GEOMATS

(3D Geocomposite mat)

i). General

All thenaturalslopes andsurfaces are subjecttocontinuous erosionforcesofwater andwinds. Protectionofslopesbygrowing locallygrownvegetation,intheformofturfing,is thebest methodto protect theslopes againstthe erosion becauseoncetherootsofthisvegetationpenetrateintotheslopeby75-100mm,theyproviderootreinforcementagainsttheslopeerosion.The3DGeo-compositematsareinstalledafterhydroseedingprocess iscompleted overslope.

Geo-mats

Inmanyareas,growingofvegetation/turfingon theslope isdifficultornotpossibledue toinfertilenatureofthesoil ontheslopesand/or duetoscantyor very heavyrainfallinthatarea. In such cases, the three-dimensional erosion control mats, called as Geomats, areuseful as they increase the soil's resistance to erosion and some fertile soil layer can alsobeplacedinthesematstopromotegrowthofvegetation.Byreinforcingsoilduringvegetationgrowth,theysignificantlyimprove developmentofastrong anddeeperrootsystem.

Geomat isalightflexible material, analternativeto massiveandecologically-unfriendlyconcrete,stone or asphalt constructions.Duetoopensurfaceandstriphardness geomatcan beeasilyfilledwithsoil all overits

area and depth anditencourages rootgermination,quick vegetationofslopes and thusguaranteeserosioncontrol.Withrightchoiceofthematerial and observation of assembling technique erosion damages can be eliminated evenondifficultareasandsteepslopes.

ii). <u>InstallationMethodology</u>

3DGeo-composite matmustbe installed starting from thehighestpoint.

- Inorderto attachthemesh,a20cmwideand20cmdeep trench mustbe dugatleast1maway fromthe slope'sedge.
- Insert the3DGeo-compositematinsidethetrenchwithgroundpegs.Next,thetrenchshouldbecoveredand compactedto increase itsresistance.
- Please ensure toleavenomorethan1m eithersideofeach ground pegwhenattachingthe3Dmesh.
- Onceinstalledandsecuredtothetrench,the3D Geo-composite matcanbeunrolledontopoftheslopefollowingitsdownwarddirection.
- Please ensuretoleave between 10and 20cmoverlap between rolls. Likewise,we must alsoplacegroundpegs alongthejointsleavingnomorethan1moneitherside.Whenjoiningtheendsoftwoseparate rolls,please ensure toleaveatleasta10cmoverlap aswellastoprovide further strengthening by installing additional ground pegs no further apart than 50cmoneitherside.
- Oncefinishedinstallingthe3DGeocomposite mat,wemustproceedtoassess thegroundpegs installedinbetweenthe endsoftwoseparaterolls.

3 <u>HighTensileSteelWire Mesh</u>

Wire meshes have a composition of different percentages of high carbon steel, which iscomprised of different diameters of wire and different geometries. Nowadays, high tensilesteelwiremeshesareusedworldwideindifferentapplicationslikesecurityfences,architecture, natural hazard protection, blast protection during tunneling and road wideningactivitiesinhilly terrain,slopeprotectionworks.

In most conditions, high tensile wire meshes are used to protect the surface of the soil/ rockslope stabilization. Where the slope of soil/rock profile required cutting to meet the degree ofroad expansion, their surface is required to protect using nail/ SDA/ rock bolt system withhigh tensile wire mesh system to secure the region between the soil nail/SDA/ rock boltreinforced system. Slopesurfaceprotectionusingthehightensilewiremeshsystemisveryeconomicalcomparedtotraditional protectionsystems.Thiswiremeshsystemhasfreedomofarrangement forinstallationdue toitsflexible nature.

Thehightensilewire meshhasconsiderabletensilestrengthofapproximately100kN/m, meshpunching strength 160kN. The high tensile wire mesh with their special properties provided fortheslopesurfacestabilizationissubstantially moreeconomicalthanwireropesnetsystems.

The high tensile wire mesh system is commonly used in geotechnical engineering solutions.Theseare typicallyusedintherockfall protectionkits,rock/soil slopesurfaceprotections,attenuator, secure drapery systems, debris flows, and prevention of avalanche, mudflow,andlandslideprotectionapplications.

After 3D Geo-composite mat are installed then high tensile wire mesh system are laid over theslope. This is fixed with bearing plates. Nut & plates are applied over the anchor to tightenthe mesh&3DGeocomposite mat.

Drain pipes or weep hole pipes (50mm dia.) PVC perforated pipes wrapped with non-wovengeotextileare also installed parallellywith SDAbarsalongtheslope asper GFCdrawings.

Forallthe above-mentioned items refer:MORT&H (Section 3200) – Soil NailingMORT&H(Section700)–Geosynthetics

Schedule-E

SCHEDULE - E

(See Clauses 2.1 and 14.2)

MAINTENANCE REQUIREMENTS

1 Maintenance Requirements

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

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

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

[Specify all the relevant documents]

2. Repair/rectification of Defects and deficiencies

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

3. Other Defects and deficiencies

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

4. Extension of time limit

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

5. Emergency repairs/restoration

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

6. Daily inspection by the Contractor

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

7. Pre-monsoon inspection / Post-monsoon inspection

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

8. Repairs on account of natural calamities

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

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
Flexible Pavement (Pavement of MCW, Service Road, approaches of Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	Potholes	Nil	< 0.1 % of area and subject to limit of 10 mm indepth	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC 82: 2015 and Distress Identification Manual for Long Term Pavement Performance Program, FHWA 2003 (http://www.tfhrc.com/pavement/lttp/ reports/03031/)	24-48 hours	MORT&H Specification 3004.2
	Cracking	Nil	< 5 % subject to limit of 0.5 sqm for any 50 m length	Daily			7-15 days	MORT&H Specification 3004.3
	Rutting	Nil	< 5 mm	Daily	Straight Edge		15 -30 days	MORT&H Specification 3004.2
	Corrugations and Shoving	Nil	< 0.1 % of area	Daily	Length Measurement Unit like		2-7 days	IRC:82- 2015
	Bleeding	Nil	< 0.1 % of area	Daily	Scale, Tape, odometer etc.		3-7 days	MORT&H Specification 3004.4
	Raveling / Stripping	Nil	< 0.1 % of area	Daily			7-15 days	IRC:82- 2015 read with IRC SP 81

Asset Type	Performance	Level of Service (LOS)		Frequency of	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for	Maintenance
	Edge Deformation/ Breaking	Nil	< 1 m for any 100 m section and width < 0.1 m at any location, restricted to 30 cm from the edge	Daily	Scale, Tape, odometer etc.			IRC:82- 2015
	Roughness BI	2000 mm/km	2400 mm/km	Bi-Annually	Class I Profilometer 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			Bi-Annually			2-7 days	IRC:82- 2015
	Deflection/			Annually	Falling	IRC 115: 2014	180 days	IRC:115-

Asset Type	Performance	Level of Service (LOS)		Frequency of	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for	Maintenance
	Remaining Life				Weight Deflect meter			2014
Rigid Pavement (Pavement of MCW, Service Road, Grade Structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	Roughness BI	2200mm/km	2400mm/km	Bi-Annually	Class I Profilometer	ASTM E950 (98) :2004 and ASTM E1656 - 94: 2000	180 days	IRC:SP:83-2008
	Skid	Skid Resistance no. at different speed of vehicles		Bi-Annually	SCRIM (Sideway-force Coefficient Routine Investigation Machine or equivalent)	RC:SP:83-2008	180 days	IRC:SP:83-2008
		Minimum SN	**Traffic Speed (Km/h)**					
		36	50					
		33	65					

Asset Type	Performance	Level of Service (LOS)		Frequency of	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for	Maintenance
		32	80					
		31	95					
		31	110					
Embankment/ Slope	Edge drop at shoulders	Nil	40 mm	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC	7-15 days	MORT&H Specification 408.4
	Slope of camber/cross fall	Nil	<2% variation in prescribed slope of camber /cross fall	Daily			7-15 days	MORT&H Specification 408.4
	Embankment Slopes	Nil	<15 % variation in prescribe sidslope	Daily			7-15 days	MORT&H Specification 408.4
	Embankment Protection	**Nil**	**Nil**	**Daily**	**NA**		**7-15 days**	**MORT&H Specification**
	Rain Cuts/ Gullies in slope	Nil	Nil	Daily Specially During	NA		7-15 days	MORT&H Specification

Asset Type	Performance	Level of Service (LOS)		Frequency of	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for	Maintenance
				Rainy Season				

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

Table -2: Maintenance Criteria for Rigid Pavements:

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
			CRACKING			
1.	Single Discrete Cracks Not intersecting with any joint	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	Not applicable
			1	w < 0.2 mm. hair cracks		
			2	w = 0.2 - 0.5 mm, discernible from slow-moving car		Seal, and stitch if L > lm.
			3	w = 0.5 - 1.5 mm, discernible from fast-moving car	Seal without delay	Within 7days
			4	w = 1.5 - 3.0 mm	Seal, and stitch if L > l m.	Staple or Dowel Bar
			5	w > 3 mm.	Within 7 days	Retrofit, FDR for affected portion.

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
						Within 15days
2.	**Single Transverse (or Diagonal) Crack intersecting with one or more joints**	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.2 mm, hair cracks	Route and seal with epoxy.	Staple or Dowel Bar Retrofit.
			2	w = 0.2 - 0.5 mm, discernible from slow vehicle	Within 7 days	Within 15 days
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route, seal and stitch, if L > 1 m. Within 7 days	
			4	w = 3.0 - 6.0 mm	Dowel Bar Retrofit. Within 15 days	Full Depth Repair Dismantle and reconstruct affected.
			5	w > 6 mm, usually associated with spelling, and/or slab rocking under traffic	Not Applicable, as it may be full depth	Portion with norms and specifications - See Para 5.5 & 9.2 Within 15days
3	Single Longitudinal Crack intersecting with one or more	w = width of crack L = length of crack d = depth of crack	0	Nil, not discernible	No Action	
			1	w < 0.5 mm, discernable from slow moving vehicle	Seal with epoxy, if L > 1	Staple or dowel bar

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
	joints	D = depth of slab			m.	retrofit.
			2	w = 0.5 - 3.0 mm, discernible from fast vehicle	Within 7 days Route seal and stitch, if L > l m. Within 15 days	Within 15days
			3	w = 3.0 – 6.0 mm	Staple, if L > 1 m. Within 15 days	Partial Depth Repair with stapling.
			4	w = 6.0 - 12.0 mm, usually associated with spalling	Not Applicable, as it may be full depth	Within 15days
			5	w > 12 mm, usually associated with spalling, and/or slab rocking under traffic		Full Depth Repair Dismantle and reconstruct affected portion as per norms and specifications - See Para 5.6.4 Within 15days

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
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.	
			2	w = 0.2 - 0.5 mm. discernible from slow vehicle	Within 15 days	
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Full depth repair within 15 days	Dismantle, Reinstate Sub-base, Reconstruct whole slab as per specifications within 30 days
			4	w = 3.0 - 6.0 mm panel broken into 2 or 3 pieces		
			5	w > 6 mm and/or panel broken into more than 4 pieces		
5	**Corner Break**	w = width of crack L = length of crack	0	Nil, not discernible	No Action	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
			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 7 days
			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		
			4	w > 1.5 mm; L > 0.6 m or three corners broken	Partial Depth (Refer Figure 8.3 of IRC:SP: 83-2008) Within 15 days	Full depth repair
			5	three 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 crack L = length (m/m2)	0	Nil, not discernible	**Not Applicable, as it**	No Action
			1	w < 0.5 mm; L < 3 m/m2		Seal with low viscosity epoxy to secure broken
			2	either w > 0.5 mm or L < 3		

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
				m/m2	**may be full depth**	parts. Within 15 days
			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		
7	Raveling or Honeycomb type surface	r = area damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	No Action	
			1	r < 2 %	Local repair of areas Damaged	
			2	r = 2 - 10 %	and liable to be damaged. Within 15 days	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
			3	r = 10-25%	Bonded Inlay, 2 or 3 slabs if	
			4	r = 25 - 50 %	Affecting Within 30 days	
			5	r > 50% and h > 25 mm	Reconstruct slabs, 4 or more slabs if affecting. Within 30 days	
8	Scaling	r = damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	Short Term No Action	Long Term
			1	r < 2 %	Local repair of areas Damaged	
			2	r = 2 - 10 %	and liable to be damaged. Within 7days	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
			3	r = 10 - 20%	Bonded Inlay within 15 Days	
			4	r = 10 - 30%		
			5	r>30 % and h> 25mm	Reconstruct slab within 30 days	
9	Polished Surface/Glazing	t = texture depth, sand patch test	0		No action	Not Applicable
			1	t > 1 mm		
			2	t = 1 – 0.6 mm		
			3	t = 0.6 – 0.3 mm	Monitor rate of deterioration	
			4	t = 0.3 – 0.1 mm	Diamond Grinding if Affecting	
			5	t < 0.1 mm	50% or more slabs in a	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
					Continuous stretch of minimum 5 km. Within 30 days	
10	Popout (Small Hole), Pothole Refer Para 8.4	n = number/m2 d = diameter h = maximum depth	0	d < 50 mm; h < 25 mm; n < 1 per 5 m2	No action.	Not Applicable
			1	d = 50 - 100 mm; h < 50 mm; n < 1 per 5 m2	Partial depth repair 65 mm deep. Within 15 days	
			2	d = 50 - 100 mm; h > 50 mm; n < 1 per 5 m2	Partial depth repair 110mm	
			3	d = 100 - 300 mm; h < 100 mm n < 1 per 5 m2	i.e.10 mm more than the depth of the hole. Within 30 days	
			4	d = 100 - 300 mm; h > 100 mm; n < 1 per 5 m2	Full depth repair.	
			5			

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
				d > 300 mm; h > 100 mm: n > 1 per 5 m2	Within 30 days	
11	Joint Seal Defects	loss or damage L = Length as % total joint length	0	Difficult to discern.	No action.	Not Applicable
			1	Discernible, L< 25% but of little immediate consequence with regard to ingress of water or trapping incompressible material.	Clean joint, inspect later.	
			2	Notable. L > 25% insufficient protection against ingress of water and trapping incompressible material.	Clean and reapply sealant in Selected locations. Within 7 days	
			4	Severe; w > 3 mm negligible protection against ingress of water and trapping incompressible material.	Clean, widen and reseal the joint. Within 7 days	
12	Spalling of Joints	w = width on either side of the joint L =	0	Nil, not discernible	No action.	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
		length of spalled portion (as % joint length)	1	w < 10 mm	Apply low viscosity epoxy resin/ mortar in cracked portion.	
			2	w = 10 - 20 mm, L < 25%	Within 7 days Partial Depth Repair.	
			3	w = 20 - 40 mm, L > 25%	Within 15 days	Not Applicable
			4	w = 40 - 80 mm, L > 25%	30 - 50 mm deep, h = w + 20% of w, within 30 days	
			5	w > 80 mm, and L > 25%	50 - 100 mm deep repair. H = w + 20% of w. Within 30 days	
13	Faulting (or Stepping) in Cracks or Joints	f = difference of level	0	not discernible, < 1 mm	No action.	No action.
			1	f < 3 mm		
					Determine cause and	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
			2	f = 3 - 6 mm	observe, take action for diamond grinding	Replace the slab as appropriate.
			3	f = 6 - 12 mm	Diamond Grinding	Within 30days
			4	f= 12 - 18 mm	Raise sunken slab.	Replace the slab as appropriate.
			5	f> 18 mm	Strengthen sub-grade and sub-base by grouting and raising sunken slab	Within 30days
14	Blowup or Buckling	h = vertical displacement from normal profile	0	Nil, not discernible	No Action	
			1	h < 6 mm		
			2	h = 6 - 12 mm	Install Signs to Warn Traffic	
			3	h = 12 - 25 mm	within 7 days	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
			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	Install Signs to Warn Traffic within 7 days	
			2	h = 15-30 mm, Nos<20% joints		
			3	h = 30 - 50 mm		
			4	h > 50 mm or > 20% joints	Strengthen subgrade. Reinstate pavement	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
			5	h > 100 mm	at normal level if L < 20 m. Within 30 days	
16	Heave	h = positive vertical displacement from normal profile. L = length	0	Not discernible. h < 5 mm	No action.	scrabble
			1	h = 5 - 15 mm	Follow up.	
			2	h = 15 - 30 mm, Nos<20% joints	Install Signs to Warn Traffic	
			3	h = 30 - 50 mm	within 7 days	
			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 displacement from	0	h < 4 mm	No action	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
		normal profile	1	h = 4 - 7 mm	Grind, in case of new construction within 7 days	Construction Limit for New Construction.
			3	h = 7 - 15 mm	Grind, in case of ongoing Maintenance within 15 days	Replace in case of new construction. Within 30days
			4	h > 15 mm	Full Depth Repair. Within 30 days	Full Depth Repair. Within 30days
18	**Lane to Shoulder Dropoff**	f = difference of level			**Short Term**	**Long Term**
			0	Nil, not discernible < 3mm	No Action	
			1	f = 3 - 10 mm	Spot repair of shoulder	
			2	f = 10 - 25 mm	within 7 days	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
			3	f = 25 - 50 mm	Fill up shoulder	For any 100 m Stretch Reconstruct shoulder, if affecting 25% or more of stretch. Within 30days
			4	f = 50 - 75 mm	within 7 dayss	
			5	f > 75 mm		
Drainage						
19	Pumping	quantity of fines and water expelled through open joints and cracks Nos	0	not discernible	No Action	
			1 to 2	slight/ occasional Nos< 10%	Repair cracks and joints Without delay.	Inspect and repair sub-drainage at distressed sections and upstream.
			3 to 4	appreciable/ Frequent 10 - 25%	Lift or jack slab within 30 days.	
			5	abundant, crack development > 25%	Repair distressed pavement sections. Strengthen subgrade andsubbase. Replace	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2 Short Term	For the case d > D/2 Long Term
					slab. Within 30 days	
20	Ponding	Ponding on slabs due to blockage of drains	0-2	No discernible problem	No action.	
			3 to 4	Blockages observed in drains, but water flowing	Clean drains etc within 7 days, Follow up	Action required to stop water damaging foundation within 30 days.
			5	Ponding, accumulation of water observed	-do	

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

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Highway	Availability of Safe Sight Distance	As per IRC SP :84-2014, a minimum of safe stopping sight distance shall be available throughout.	Monthly	Manual Measurements with O dometer	Removal of obstruction within 24 hours, in case of sight line affected by temporary objects such as trees, temporary		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
		Design Speed, kmph	**Desirable Minimum Sight Distance (m)**	**Safe Stopping Sight Distance (m)**		along with video/ image backup	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.		
		100	360	180					
		80	260	130					
Pavement Marking	Wear	<70% of marking remaining			Bi-Annually	**Visual Assessment as per Annexure-F of IRC:35-2015**	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect - within 2 months	IRC:35-2015
	Day time Visibility	During expected life Service Time Cement Road - 130mcd/m2/lux Bituminous Road - 100mcd/m2/lux			Monthly	As per Annexure-D of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect – within 2 months	IRC:35-2015
	Night Time Visibility	Initial and Minimum Performance for Dry Retro reflectivity during night time:			Bi-Annually	As per Annexure-E of IRC:35-2015	Re - painting	Cat-1 Defect – within 24 hours Cat-2 Defect – within 2 months	IRC:35-2015
		Design Speed	(RL) Retro Reflectivity (mcd/m2/lux)						

Asset Type	Performance Parameter	Level of Service (LOS)			Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		Up to 65	200	80					
		65-100	250	120					
		Above 100	350	150					
		Initial and Minimum Performance for Night Visibility under wet condition (Retro reflectivity):							
Road Signs	Shape and Position	Shape and Position as per IRC:67-2012. Signboard should be clearly visible for the design speed of the section.			Daily	Visual with video/image backup	Improvement of shape, in case if shape is damaged. Relocation as Per requirement	48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs) 15 Days in case of Gantry/Cantilever Sign boards	IRC:67-2012
	Retro reflectivity	As per specifications in IRC:67-2012			Bi-Annually	Testing of Each signboard using Retro Reflectivity Measuring Device. In accordance with ASTM D 4956-09.	Change of signboard	48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs) 1 Month in case of Gantry/ Cantilever Sign boards	IRC:67-2012

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Kerb	Kerb Height	As per IRC 86:1983 depending upon type of Kerb	Bi-Annually	Use of distance measuring tape	Raising Kerb Height	Within 1 Month	IRC 86:1983
	Kerb Painting	Functionality: Functioning of Kerb painting as intended	Daily	Visual with video/image backup	Kerb Repainting	Within 7-days	IRC 35:2015
Other Road Furniture	Reflective Pavement Markers (Road Studs)	Numbers and Functionality as per specifications in IRC:SP:84-2014 and IRC:35-2015, unless specified in Schedule-B.	Daily	Counting	New Installation	Within 2 months	IRC:SP:84-2014, IRC:35-2015
	Pedestrian Guardrail	Functionality: Functioning of guardrail as intended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:SP:84-2014
	Traffic Safety Barriers	Functionality: Functioning of Safety Barriers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84-2014, IRC:119- 2015
	End Treatment of Traffic Safety Barriers	Functionality: Functioning of End Treatment as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84-2014, IRC:119- 2015
	Attenuators	Functionality: Functioning of Attenuators as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP-2014, IRC:119- 2015
	Guard Posts and	Functionality: Functioning of Guard Posts and Delineators as	Daily	Visual with video/image	Rectification	Within 15 days	IRC: 79 - 1981

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Delineators	intended		backup			
	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 including	Obstruction in a minimum	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
median plantation	head-room of 5.5 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	

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Other Project Facilities and Approach roads	Damage or deterioration in Approach Roads, pedestrian facilities, truck lay-bys, bus-bays, busshelters, cattle crossings, Traffic Aid Posts, Medical Aid Posts and other works		Daily	-	Rectification	15 days	IRC:SP 84-2014

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Pipe/box/slab culverts	Free waterway/ unobstructed flow section	85% of culvert normal flow area to available.	2 times in a year (before and after rainy season)	Inspection by Bridge Engineer as per IRC SP: 35-1990 and recording of depth of silting and area of vegetation.	Cleaning silt up soils and debris in culvert barrel after rainy season, removal of bushes and vegetation, U/s of barrel, under barrel and D/s of barrel before rainy season.	15 days before onset of monsoon and within 30 days after end of rainy season.	IRC 5-2015, IRC SP:40-1993 and IRC SP:13-2004
	Leak-proof expansion joints if any	No leakage through expansion joints	Bi-Annually	Physical inspection of expansion joints as per IRC SP: 35-1990	Fixing with sealant suitably	30 days or before onset of rains whichever comes	IRC SP:40-1993 and IRC SP:69-2011

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
				if any, for leakage strains on walls at joints.		earlier	
	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 aggregatelength					
	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sqm, damage to solid apron (concreteapron) not more than 1 sqm	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier.	IRC: SP 40-1993 and IRC:SP:13-2004.
Bridges	Riding	No pothole in	Daily	Visual	Repairs to BC or	15 days	MORT&H

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
including ROBs Flyover etc. as applicable	quality or user comfort	wearing coat on bridge deck		inspection as per IRC SP:35-1990	wearing coat		Specification 2811
Bridge -Super Structure	Bumps	No bump at expansion joint	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC on either side of expansion joints, profile correction course on approach slab in case of settlement to approach embankment	15 days	MORT&H Specification 3004.2 & 2811.
	User safety (condition of crash barrier and guard rail)	No damaged or missing stretch of crash barrier or pedestrian hand railing	Daily	Visual inspection and detailed condition survey as per IRC SP: 35-1990.	Repairs and replacement of safety barriers as the case may be	**3** days	IRC: 5-1998, IRC SP: 84-2014 and IRC SP: 40-1993.
	Rusted reinforcement	Not more than 0.25 sq.m	Bi- Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating	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
					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 40 m	Load test method	Carry out major rehabilitation works on bridge to retain original design loads capacity	6 months	IRC SP: 51-1999.
	Vibrations	Frequency of	Once in every 5	Laser	Strengthening of	4 months	AASHTO

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	in bridge deck due to moving trucks	vibrations shall not be more than 5 Hz	years for spans more than 30m and every 10 years for spans between 15 to 30 m	displacement sensors or laser vibro-meters	super structure		LRFD specifications
	Leakage in Expansion joints	No damage to elastomeric sealant compound in strip seal expansion joint, no leakage of rain water through expansion joint in case of buried and asphalt plug and copper strip joint	Bi-Annually	Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge Inspection Unit	Replace of seal in expansion joint	15 days	MORTH specifications 2600 and IRC SP: 40-1993.
	Debris and dust in strip seal expansion joint	No dust or debris in expansion joint gap.	Monthly	Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge Inspection Unit	Cleaning of expansion joint gaps thoroughly	3 days	MORTH specifications 2600 and IRC SP: 40-1993.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Drainage spouts	No down take pipe missing/broken below soffit of the deck slab. No silt, debris, clogging of drainage spout collection chamber.	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Cleaning of drainage spouts thoroughly. Replacement of missing/broken down take pipes with a minimum pipe extension of 500mm below soffit of slab. Providing sealant around the drainage spout if any leakages observed	3 days	MORTH specification 2700.
Bridge-substructure	Cracks/ spalling of concrete/ Rusted steel	No cracks, spalling of concrete and rusted steel	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out repairs to substructure by grouting/guniting and micro	30 days	IRC SP: 40-1993 and MORTH specification 2800.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
					concreting depending on type of defect noticed		
	Bearings	Delaminating of bearing reinforcement not more than 5%, cracking or tearing of rubber not more than 2 locations per side, no rupture of reinforcement or rubber	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	In case of failure of even one bearing on any pier/abutment, all the bearings on that pier/ abutment shall be replaced, in order to get uniform load transfer on to bearings.	3 months	MORTH specification 2810 and IRC SP: 40-199.
Bridge Foundations	Scouring around foundations	Scouring shall not be lower than maximum scour level for the bridge	Bi-Annually	Condition survey and visual Inspection as per IRC SP:35-1990 using Mobile Bridge Inspection Unit. In case of oubt, use Underwater	suitable protection works around pier/abutment	1 months	IRC SP: 40-1993, IRC 83-2014, 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
				camera for inspection of deep wells in major Rivers.			
	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 complies with all requirements of this Table will be prepared, rehabilitated or even reconstructed under the scope of the contractor.

Table 4: Maintenance Criteria for Structures and Culverts:

Table 5: Maintenance Criteria for Hill Roads

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

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

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

A. Flexible Pavement

Nature of Defect or deficiency		**Time limit for repair/ rectification**
(b) Granular earth shoulders, side slopes, drains and culverts		
(i)	Variation by more than 1 % in the prescribed slope of camber/cross fall (shall not be less than the camber on the main carriageway)	7 (seven) days
(ii)	Edge drop at shoulders exceeding 40 mm	7 (seven) days
(iii)	Variation by more than 15% in the prescribed side (embankment) slopes	30 (thirty) days
(iv)	Rain cuts/gullies in slope	7 (seven) days
(v)	Damage to or silting of culverts and side drains	7 (seven) days
(vi)	Desilting of drains in urban/semi- urban areas	24 (twenty four) hours
(vii)	Railing, parapets, crash barriers	7 (seven) days (Restore immediately if causing safety hazard)
(c) Road side furniture including road sign and pavement marking		
(i)	Damage to shape or position, poor visibility or loss of retro- reflectivity	48 (forty eight) hours
(ii)	Painting of km stone, railing, parapets, crash barriers	As and when required/ Once every year
(iii)	Damaged/missing signs road requiring replacement	7 (seven) days
(vi)	Damage to road mark ups	7 (seven) days
(d) Road lighting		
(i)	Any major failure of the system	24 (twenty four) hours
(ii)	Faults and minor failures	8 (eight) hours
(e) Trees and plantation		
(i)	Obstruction in a minimum head- room of 5 m above carriageway or obstruction in visibility of road signs	24 (twenty four)hours
(ii)	Removal of fallen trees from carriageway	4 (four) hours
(iii)	Deterioration in health of trees and bushes	Timely watering and treatment
(vi)	Trees and bushes requiring replacement	30 (thirty) days
(v)	Removal of vegetation affecting sight line and 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 year
(e) Joints		
(i)	Malfunctioning of joints	15 (fifteen) days
(f) Other items		
(i)	Deforming of pads in elastomeric bearings	7 (seven) days
(ii)	Gathering of dirt in bearings and joints; or clogging of spouts, weep holes and vent-holes	3 (three) days
(iii)	Damage or deterioration in kerbs, parapets, handrails and crash barriers	3 (three) days (immediately within 24 hours if posing danger to safety)
(vi)	Rain-cuts or erosion of banks of the side slopes of approaches	7 (seven) days
(v)	Damage to wearing coat	15 (fifteen) days
(vi)	Damage or deterioration in approach slabs, pitching, apron, toes, floor or guide bunds	30 (thirty) days
(vii)	Growth of vegetation affecting the structure orobstructing 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

SCHEDULE - F

(See Clause 3.1.7(a))

APPLICABLE PERMITS

1 Applicable Permits

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

j) 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

SCHEDULE – G

(See Clauses 7.1 and 19.2)

FORM OF BANK GUARANTEE
Annex-I
(See Clause 7.1)

[Performance Security/Additional Performance Security]

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

WHEREAS:

(A) _____ [name and address of contractor] (hereinafter called the "**Contractor**") and [name and address of the authority], (hereinafter called the **"Authority"**) have entered into an agreement (hereinafter called the "**Agreement**") for the construction of **"Widening & Upgradation to two lanes with paved shoulders road from Tamenglong to Mahur (NH-137) in the State of Assam starting from km 156.489 near P. Leikul to km 176.410 near Borowapu (Package-10) on EPC mode. (Project Length = 19.921 km)"**subject to and in accordance with the provisions of the Agreement

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

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

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

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

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

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

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

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

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

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

rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

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

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

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

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

12. This guarantee shall also be operatable at our ……. Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment amounts so demanded under the said invocation.

13. Bank Guarantee has been sent to authority's bank through SFMS gateway as per the details below:-

S. No.	Particulars	Details
1	Name of the Beneficiary	National Highways and Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC CNRB0019062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Syndicate Bank, Transport Bhawan, 1st Parliament street, New Delhi-110001

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:
(Signature)
(Name)
(Designation)
(Code Number)
(Address)

NOTES:

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

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

Annex – II
(Schedule - G)
(See Clause 19.2)

Form for Guarantee for Withdrawal of Retention Money

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

WHEREAS:

(A) [name and address of contractor] (hereinafter called the "**Contractor**") has executed an agreement (hereinafter called the "Agreement") with the NHIDCL, (hereinafter called the "**Authority**") for the construction of the **"Widening & Upgradation to two lanes with paved shoulders road from Tamenglong to Mahur (NH-137) in the State of Assam starting from km 156.489 near P. Leikul to km 176.410 near Borowapu (Package-10) on EPC mode. (Project Length = 19.921 km)"**subject to and in accordance with the provisions of the Agreement.

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

(C) We, ……..through our branch at ……. (the "**Bank**") have agreed to furnish this bank guarantee (hereinafter called the "**Guarantee**") for the **Guarantee Amount.**

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

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful repayment on time of the aforesaid instalment of the Advance Payment under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
A letter from the Authority, under the hand of an officer not below the rank of [General Manager in the National Highways & Infrastructure Development Corporation Limited], that the Contractor has committed default in the due and faithful performance of all or any of its obligations for under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the

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

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

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

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

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

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

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

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

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

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

11. This guarantee shall also be operatable at our ……. Branch at Guwahati, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment amounts so demanded under the said invocation.

12. Bank Guarantee has been sent to authority's bank through SFMS gateway as per the details below:-

S. No.	Particulars	Details
1	Name of the Beneficiary	RO NHIDCL PROJECTS
2	Beneficiary Bank Account No.	73653210000013
3	Beneficiary Bank Branch	Canara Bank [IFSC : CNRB0017365]
4	Beneficiary Bank Branch Name	Dispur, Guwahati
5	Beneficiary Bank Address	Upasana Complex, Dr. R. P. Road, Ganeshguri, Dispur, Guwahati

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:
(Signature)
(Name)
(Designation)
(Code Number)
(Address)

NOTES:

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

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

Schedule-H

Schedule-H

(See Clauses10.1 (iv) and 19.3)

1 Contract Price Weightages

1.1 The Contract Price for this Agreement is Rs. ……/-

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

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage
1	2	3	4
Road works including culverts, widening and repair of culverts.	41.03%	**A - Widening and strengthening of existing road**	
		(1) Earthwork upto Subgrade top	
		(2) Subbase course (GSB)	
		(3) Non bituminous base course (WMM)	
		(4) Bituminous base (Prime and DBM)	
		(5) Wearing coat (Tack coat, BC)	
		(6) widening and repair of culverts	
		B.1 - Reconstruction/ New 2/4-lane realignment/bypass (Flexible pavement)	
		(1) Earthwork upto Subgrade top	56.39%
		(2) Subbase course (GSB)	8.06%
		(3) Non bituminous base course (WMM)	5.30%
		(4) Bituminous base (Prime and DBM)	6.17%
		(5) Wearing coat (Tack coat, BC)	2.74%
		B.2 - Reconstruction/ New 2/4-lane realignment/bypass (Rigid Pavement)	
		(1) Earthwork upto Subgrade top	
		(2) Subbase course (GSB)	
		(3) Dry lean concrete (DLC)	
		(4) Pavement quality concrete (PQC) course	
		C.1 - Reconstruction/ New Service road (flexible Pavement)	
		(1) Earthwork upto Subgrade top	
		(2) Subbase course (GSB)	

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage
1	2	3	4
		(3) Non bituminous base course (WMM)	
		(4) Bituminous base (Prime and DBM)	
		(5) wearing coat (Tack coat, BC)	
		C.2 - Reconstruction/ New Service road (Rigid Pavement)	
		(1) Earthwork upto Subgrade top	
		(2) Subbase course (GSB)	
		(3) Dry lean concrete (DLC)	
		(4) Pavement quality concrete (PQC) course	
		D. - Reconstruction/ New culverts on existing road and realignments, bypasses	21.34%
Minor Bridges/ Underpasses/ Overpasses	3.54%	**A.1 - Widening and repairs of Minor Bridges**	
		Widening of existing bridges	
		Rehabilitation of existing bridges	
		A.2 - New of Minor Bridges	
		(1) Foundation: (on completion of the foundation work including foundation for wing wall, return wall, abutments, piers.	38.97%
		(2) Sub-structure: (on completion of abutments, piers upto abutment/pier cap.)	18.25%
		(3) Super-structure (on completion of the super structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barrier road sign, & marking, tests on completion etc. completion in all respect)	39.92%
		(4) Approaches (on completion of approaches including retaining walls, stone pitching, protection works complete in all respect and fit for use.	2.86%
		(5) Guide Bunds and River Training works: (On completion of Guide Bunds and river training works complete in all respects.)	
		B.1 - Widening and repairs of Underpasses/Overpasses	
		B.2 - New Underpasses/Overpasses	
		(1) Foundation: on completion of the foundation work including foundation for wing wall, return wall, abutments, piers.	

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage
1	2	3	4
		(2) Sub-structure: on completion of abutments, piers upto the abutment/pier cap	
		(3) Super-structure: on completion of the super structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barrier road sign, & marking, tests on completion etc. completion in all respect.	
		(4) Approaches: on completion of approaches including RE wall, retaining walls stone pitching, protection works complete in all respect and fit for use.	
Major Bridge works and ROB/RUB/elevated sections/flyovers including viaducts, if any	-	**A.1 - Widening and repairs of existing major bridges**	
		(1) Foundation	
		(2) Sub structure	
		(3) Superstructure (including bearing)	
		(4) wearing coat (including expansion joint)	
		(5) Miscellaneous items (like hand rails, crash barriers, road markings etc.)	
		(6) wing walls/return walls	
		(7) Guide bunds, river training works etc.	
		(8) Approaches (including retaining walls, stone pitching, protection works).	
		A.2 - New/ Reconstruction major bridges	
		(1) Foundation	
		(2) Sub structure	
		(3) Superstructure (including bearing)	
		(a) casting of girder	
		(b) casting of segments	
		(c) erection of girder	
		(4) Other ancillary works: wearing coat, including expansion joint, hand rails, crash barriers, tests on completion in all respect.	
		(5) Miscellaneous works: stone pitching, protection works excluding retaining/ reinforced earth wall etc.	

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage
1	2	3	4
		(6) wing walls/return walls upto full height	
		(7) Guide bunds, river training works etc.	
		(8) Retaining wall/ Reinforced earth wall etc.	
		(8.a) Panel casting	
		(8.b) Erection of panel/ construction of retaining wall	
		B.1 - Widening and repairs of (a) ROB and (b) RUB	
		(1) Foundation	
		(2) Sub structure	
		(3) Superstructure (including bearing)	
		(4) wearing coat: (a) in case of ROB - wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB - rigid pavement under RUB including drainage facility complete in all respect as specified.	
		(5) Miscellaneous items (like hand rails, crash barriers, road markings etc.)	
		(6) wing walls/return walls	
		(7) Approaches (including retaining walls, stone pitching, protection works).	
		B.2 - New ROB / RUB	
		(1) Foundation	
		(2) Sub structure	
		(3) Superstructure (including bearing)	
		(a) casting of girder	
		(b) casting of segments	
		(C)erection of girder	
		(4) Other ancillary works: wearing coat, expansion joint, hand railing, crash barriers tests on completion etc. completion in all respect.	
		(5) Miscellaneous items (like hand rails, crash barriers, road markings etc.)	
		(6) wing walls/return walls upto full height	
		(7) Retaining wall/ Reinforced earth wall etc.	

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage
1	2	3	4
		(7.a) RE wall Panel casting	
		(7.b) Erection of RE wall panel/ construction of retaining wall	
		C.1 - Widening and repairs of Elevated section/Flyover/Grade Separators	
		(1) Foundation	
		(2) Sub structure	
		(3) Superstructure (including bearing)	
		(4) wearing coat including expansion joint	
		(5) Miscellaneous items (like hand rails, crash barriers, road markings etc.)	
		(6) wing walls/return walls	
		(7) Approaches (including retaining walls/ Reinforced earth walls, stone pitching, protection works).	
		C.2 - New Elevated section/Flyover/Grade Separators	
		(1) Foundation	
		(2) Sub structure	
		(3) Superstructure: including girder, deck slab, bearing (excluding wearing coat and expansion joints)	
		(a) casting of girder	
		(b) casting of segments	
		(c) erection of girder	
		(4) Other ancillary works: wearing coat, expansion joint, hand railing, crash barriers tests on completion etc. completion in all respect.	
		(5) Miscellaneous items (like hand rails, crash barriers, road markings etc.)	
		(6) wing walls/return walls upto full height	
		(7) Retaining wall/ Reinforced earth wall etc.	
		(7.a) Panel casting	
		(7.b) Erection of panel/ construction of retaining wall	
Other works	54.19%	(i) Toll plaza including it's approach	

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage
1	2	3	4
		(ii) Road side drains	
		a) Hill Side Trapezoidal/V Type Drain	1.37%
		b) Catch Water Drain	1.13%
		(iii) Road signs, markings, km stones, safety devices etc.	4.20%
		(iv) Project facilities	
		(a) Bus Bay with Bus Shelter	0.85%
		(b) Truck laybyes	0.09%
		(c) Rest area with Toilet Block	0.10%
		(d) others to specified	
		(v) Road side plantation	0.30%
		(vi) Repair of Protection works other than approaches to the bridges, elevated sections, flyovers/ grade separators and ROBs/RUBs.	
		(vii) Retaining Wall	18.03%
		(viii) Breast Wall	30.96%
		(ix) Hydro-seeding& Mulching	5.82%
		(x) Special Protection of Sinking Zone	33.73%
		(xi) Junction Improvement	3.42%
Electrical utilities and public Health Utilities (Water pipe lines and sewage lines)	1.24%	(i) EHT line / (ii) EHT crossings	
		(iii) HT/ LT line / (iv) HT/ LT crossings over ground	86.2%
		(iv) HT/ LT line / (vi) HT/ LT crossings Under ground	
		(vii) Water pipeline / (viii) Water pipeline crossings	13.8%
		(ix) Sewage lines / (x) Sewage line crossings	

1.3 Procedure of estimating the value of work done.

1.3.1 Road works

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

Table1.3.1

Stage of Payment	Percentage -weightage	Payment Procedure
A - Widening and strengthening of existing road		
(1) Earthwork upto top of the Subgrade including excavation in Soil, soft rock and hard rock, removal of unserviceable soil etc.		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 500m. In case of Hill cutting, the payment procedure will be as under: Hill Cutting : 40% of weightage of A(1) Preparation of Sub-Grade: 60% of weightage of A(1)
(2) Subbase course (GSB)		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 500 m.
(3) Non bituminous base course (WMM)		
(4) Bituminous base (Prime and DBM)		
(5) wearing coat (Tack coat, BC)		
(6) widening and repair of culverts		Cost of ten completed culverts shall be determined pro rata with respect to the total number of culverts. Payment shall be made on the completion of at least five culverts.
B.1 - Reconstruction/ New 2/4-lane realignment/bypass (Flexible pavement)		
(1) Earthwork upto top of the Subgrade including excavation in Soil, soft rock and hard rock, removal of unserviceable soil etc.	56.39%	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 500m. In case of Hill cutting, the payment procedure will be as under: Hill Cutting : 40% of weightage of A(1) Preparation of Sub-Grade: 60% of weightage of A(1)
(2) Subbase course (GSB)	8.06%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 500 m.
(3) Non bituminous base course (WMM)	5.30%	
(4) Bituminous base (Prime and DBM)	6.17%	
(5) wearing coat (Tack coat, BC)	2.74%	

Stage of Payment	Percentage -weightage	Payment Procedure
B.2 - Reconstruction/ New 2/4-lane realignment/bypass (Rigid Pavement)		
(1) Earthwork upto top of the Subgrade including excavation in Soil, soft rock and hard rock, removal of unserviceable soil etc.		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 500m.In case of Hill cutting, the payment procedure will be as under:Hill Cutting : 40% of weightage of A(1)Preparation of Sub-Grade: 60% of weightage of A(1)
(2) Subbase course (GSB)		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 500 m.
(3) Dry lean concrete (DLC)		
(4) Pavement quality concrete (PQC) course		
C.1 - Reconstruction/ New Service road/ Slip Road (flexible Pavement)		
(1) Earthwork upto top of the Subgrade including Shoulder		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 500m. In case of Hill cutting, the payment procedure will be as under: Hill Cutting : 40% of weightage of A(1) Preparation of Sub-Grade: 60% of weightage of A(1)
(2) Subbase course (GSB)		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 500 m.
(3) Non bituminous base course (WMM)		
(4) Bituminous base (Prime and DBM)		
(5) wearing coat (Tack coat, BC)		
C.2 - Reconstruction/ New Service road/ Slip road (Rigid Pavement)		
(1) Earthwork upto top of the Subgrade		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 500m. In case of Hill cutting, the payment procedure will be as under: Hill Cutting : 40% of weightage

Stage of Payment	Percentage -weightage	Payment Procedure
		of A(1) Preparation of Sub-Grade: 60% of weightage of A(1)
(2) Subbase course (GSB)		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 500 m.
(3) Dry lean concrete (DLC)		
(4) Pavement quality concrete (PQC) course		
D. - Reconstruction/ New culverts on existing road, Realignments, bypasses:	21.34%	Cost of each culvert shall be determined on pro rata basis with respect to the total number of culverts. Payment shall be made on the completion of at least one culvert.

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

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

Where P= Contract Price. And L = Total length in km.

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

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

1.3.2 Minor Bridges and Underpasses/Overpasses.

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

Table1.3.2

Stage of Payment	Weightage	Payment Procedure
A.1 - Widening and repairs of Minor Bridges		Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length of the minor bridges. Payment shall be made on the completion of widening & repair
Widening of existing bridges		
rehabilitation of existing bridges		

Stage of Payment	Weightage	Payment Procedure
A.2 - New of Minor Bridges		works of a minor bridge.
(1) Foundation: on completion of the foundation work including foundation for wing wall, return wall, abutments, piers.	38.97%	(1) Foundation: Payment against foundation shall be made on prorata basis on completion of at least two foundations. In case where load testing is required for foundation, trigger of first payment shall include load testing also where specified.
(2) Sub-structure: on completion of abutments, piers upto abutment/pier cap.	18.25%	(2) Substructure: Payment against substructure shall be made on prorata basis on completion of at least two substructures upto abutment/pier cap level of each bridges.
(3) Super-structure: on completion of the super structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barrier road sign, & marking, tests on completion etc. completion in all respect.	39.92%	(3) Super structure: Payment shall be made on prorata basis on completion of a stage i.e., completion of super structure of at least one span in all respects as specified in the column of Stage payment in this sub clause.
(4) Approaches: on completion of approaches including retaining walls, stone pitching, protection works complete in all respect and fit for use.	2.86%	(4) Approaches: Payment shall be made on prorata basis on completion of a stage i.e., completion of approaches in all respect as specified in the column of "stage Payment" in this sub clause.
(5) Guide Bunds and River Training works: On completion of Guide Bunds and river training works complete in all respects.		(5) Guide bunds and river training works: Payment shall be made on proratabasison completion of a stage i.e., completion of guide bunds and river training works in all respect as specified.
B.1 - Widening and repairs of Underpasses/Overpasses		Cost of each underpass/overpass shall be determined on pro rata basis with respect to the total linear length of the underpass/overpasses. Payment shall be made on the completion of widening & repair works of a underpass/overpasses.
B.2 - New Underpasses/Overpasses		
(1) Foundation: on completion of the foundation work including foundation for wing wall, return wall, abutments, piers.		(1) Foundation: Payment against foundation shall be made on prorata basis on comletion of at least two foundations. In case where load testing is required for foundation, trigger of fisrt payment shall include load testing also where specified.

Stage of Payment	Weightage	Payment Procedure
(2) Sub-structure: on completion of abutments, piers upto the abutment/pier cap		(2) Substructure: Payment against substructure shall be made on prorata basis on comletion of at least two substructures upto abutment/pier cap level of each underpass/overpass.
(3) Super-structure: on completion of the ssuper structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barrier road sign, & marking, tests on completion etc. completion in all respect)		(3) Super structure: Payment shall be made on prorata basis on completion of a stage i.e. completion of super structure of at least one span in all respects as specified in the column of Stage payment in this sub clause.
(4) Approaches: on completion of approaches including RE wall, retaining walls/ Reinforced earth wall, stone pitching, protection works complete in all respect and fit for use.		(4) Approaches: Payment shall be made on prorata basis on completion of a stage i.e. completion of approaches in all respect as specified in the column of "stage Payment" in this sub clause.

1.3.3 Major Bridge works, ROB/RUB and Structures

Procedure for estimating the value of major Bridge works, ROB/RUB and structure work shall be as stated in table 1.3.3

Table 1.3.3

Stage of payment	Weightage	Payment procedure
A.1 - Widening and repairs of existing major bridges		
(1) Foundation		(1) Foundation: Cost of each major bridge shall be determined on pro rata basis with respect to the total linear length (m) of the major bridges. Payment against foundation shall be made on prorata basis on completion of a stage i.e. not less than 25% of the scope of foundation of the major bridge subject to completion of at least two foundations of the major bridge. In case where load testing is required for foundation, the trigger of the first payment

Stage of payment	Weightage	Payment procedure
		shall include load testing also where specified.
(2) Sub structure		(2) Sub structure: Payment against sub-structure shall be made on prorata basis on completion of a stage i.e. not less than 25% of the scope of sub-structure of the major bridge subject to completion of at least two substructures of abutment/piers upto abutment/piers cap level of the major bridge.
(3) Superstructure (including bearing)		(3) Suer structure: Payment shall be made on prorata basis on completion of a stage i.e. completion of super structure including bearings of at least one span in all respects as specified.
(4) wearing coat (including expansion joint)		(4) wearing coat: Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified.
(5) Miscellaneous items (like hand rails, crash barriers, road markings etc.)		(5) Miscellaneous: Payment shall be made on completion of all miscellaneous works like hand rail, crash barrier, road markings, etc. complete in all respects as specified.
(6) wing walls/return walls upto top		(6) wing wall/ return wall: Payment shall be made on completion of wing wall/return wall complete in all respects as specified.
(7) Guide bunds, river training works etc.		(7) Guide bund, River training works: Payment shall be made on completion of all guide bunds/ river

Stage of payment	Weightage	Payment procedure
		training works etc.complete in all respect as specified.
(8) Approaches (including retaining walls, stone pitching, protection works).		(8) Approaches: Payment shall be made on prorata basis on completion of both approaches including stone pitching, protection works, etc. complete in all respect as specified.
A.2 - New/ Reconstruction major bridges		Cost of each structure shall be determined on prorata basis with respect to the total linear length (m) of all the structures. Payments shall be made on completion of each stage of structures as per weightage given in this table.
(1) Foundation: foundation of abutment/piers		(1) Foundation: Payment against foundation shall be made on pro rata basis on completion of a stage i.e., not less than 25% of the scope of foundation of a bridge as per weightage given in this table, subject to completion of at least two foundations in all respect. In case where load testing is required for foundation, the trigger of the first payment shall include load testing also where specified.
(2) Sub structure: Substructure for abutment, piers upto the abutment/pier cap level.		(2) Substructure: Payment against sub structure shall be made on prorata basis on completion of a stage i.e., not less than 25% of the scope of sub-structure of a bridge as per weightage given in this table,subject to completion of at least two substructure of abutment/piers upto abutment/piers cap level of a bridge.

Stage of payment	Weightage	Payment procedure
(3) Superstructure: including girder, deck slab, bearings (excluding wearing coat and expansion joints)		
(3.a) Super Structure: Casting of girder/ fabrication of girders (steel)		(a) Super structure (casting of girder): Unit of measurement is number. Payment against casting of girder shall be made on prorata basis with respect to total number of girders required in the structure on completion of a stage i.e., not less than completion of casting of at least five girders of the structure.
(3.b) Super structure: casting of segments		(b) Super structure (casting of segment): Unit of measurement is number. Payment against casting of segments shall be made on prorata basis with respect to total number of segments required in the structure on completion of a stage i.e., not less than completion of casting of at least 10 (ten) segments of the structure.
(3.c) Super structure: erection of girder, deck dlab and bearings		(c) Super structure (erection of girders, deck slab and bearing): Payment shall be made on prorata basis on completion of a stage i.e., completion of super structure including bearings at least one span in all respect as specified.
(4) Other ancillary works: wearing coat, including expansion joint, hand rails, carsh barriers, tests on completion in all respect.		(4) Other ancillary work: Payment shall be made on prorata basis on completion of the stage in all respect as specified, for each structure.
(5) Miscellaneous works: stone pitching, protection works excluding retaining/ reinforced earth wall etc.		(5) Miscellaneous works: Payment shall be made on prorata basis on completion of the stage in all respects as specified, for each structure.

Stage of payment	Weightage	Payment procedure
(6) wing walls/return walls upto full height		(6) Wing wall/ return wall: Payment shall be made on completion of wing wall/return walls for a bridge as per weightage given in this table complete in all respects as specified.
(7) Guide bunds, river training works etc.		(7) Guid bund, river training works: Payment shall be made on onprorata basis on completion of the stages in all respect as specified.
(8) Retaining wall/ Reinforced earth wall etc.		Payment shall be made on prorata basis on completion of both approaches including stone pitching, protection works, etc. complete in all respect as specified.
(8.a) Panel casting		(a) Panel casting: Unit of measurement is area in Sqm. Payment against casting of panels shall be made on prorata basis with respect to total area panels required for the structure on completion of a stage i.e., not less than completion of casting of 25% of the scope of RE wall panel of each bridge.
(8.b) Erection of panel/ construction of retaining wall		(b) Erection of panel/ Construction of retaining wall: Unit of measurement is area in Sqm. Payment against casting of panels shall be made on prorata basis on completion of a stage i.e. completion of erection of panels/ construction of retainning wall complete in all respect for at least 25% scope of work for each structure.
B.1 - Widening and repairs of (a) ROB and (b) RUB		

Stage of payment	Weightage	Payment procedure
(1) Foundation		(1) Foundation: Cost of each ROB/RUB shall be determined on pro rata basis with respect to the total linear length (m) of the ROB/RUBs. Payment against foundation shall be made on prorata basis on completion of a stage i.e. not less than 25% of the scope of foundation of the ROB/RUB subject to completion of at least two foundations of the ROB/RUB. In case where load testing is required for foundation, the trigger of the first payment shall include load testing also where specified.
(2) Sub structure		(2) Substructure: Payment against sub-structure shall be made on prorata basis on completion of a stage i.e., not less than 25% of the scope of sub-structure of the ROB/RUB subject to completion of at least two substructure of abutment/piers upto abutment/piers cap level of the ROB/RUB.
(3) Superstructure (including bearing)		(3) Super structure: Payment shall be made on prorata basis on completion of a stage i.e., completion of super structure including bearings of at least one span in all respects as specified.
(4) wearing coat : (a) in case of ROB - wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB - rigid pavement under RUB including drainage facility complete in all respect as specified.		(4) wearing coat: Payment shall be made on completion of (a) in case of ROB - wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB - rigid pavement under RUB including drainage facility complete in all respect as specified.

Stage of payment	Weightage	Payment procedure
(5) Miscellaneous items (like hand rails, crash barriers, road markings etc.)		(5) Miscellaneous: Payment shall be made on completion of all miscellaneous works like hand rail, crash barrier, road markings, etc. complete in all respects as specified.
(6) wing walls/return walls		(6) Wing wall/return wall: Payment shall be made on completion of wing wall/return wall complete in all respects as specified.
(7) Approaches (including retaining walls, stone pitching, protection works).		(7) Approaches: Payment shall be made on prorata basis on completion of both approaches including stone pitching, protection works, etc. complete in all respect as specified.
B.2 - New ROB / RUB		Cost of each structure shall be determined on prorata basis with respect to the total linear length (m) of all the structures. Payments shall be made on completion of each stage of structures as per weightage given in this table.
(1) Foundation: foundation of abutment/piers		(1) Foundation: Payment against foundation shall be made on prorata basis on completion of a stage i.e., not less than 25% of the scope of foundation of the ROB/RUB as per weightage given in this table,subject to completion of at least two foundations of the ROB/RUB in all respect. In case where load testing is required for foundation, the trigger of the first payment shall include load testing also where specified.

Stage of payment	Weightage	Payment procedure
(2) Sub structure: Substructure for abutment, piers upto the abutment/pier cap level.		(2) Substructure: Payment against sub-structure shall be made on prorata basis on completion of a stage i.e., not less than 25% of the scope of sub-structure of the ROB/RUB as per weightage given in tis table, subject to completion of at least two substructures of abutment/piers upto abutment/piers cap level of the ROB/RUB.
(3) Superstructure: including girder, deck slab, bearing (excluding wearing coat and expansion joints)		
(3.a) Super Structure: Casting of girder/ fabrication of girders (steel)		(a) Super structure (casting of girder): Unit of measurement is number. Payment against casting of girder shall be made on prorata basis with respect to total number of girders required in the structure on completion of a stage i.e., not less than completion of casting of at least five girders of the structure.
(3.b) Super structure: casting of segments		(b) Super structure (casting of segment): Unit of measurement is number. Payment against casting of segments shall be made on prorata basis with respect to total number of segments required in the structure on completion of a stage i.e., not less than completion of casting of at least 10 (ten) segments of the structure.
(3.c) Super structure: erection of girder, deck dlab and bearings		(c) Super structure (erection of girders, deck slab and bearing): Payment shall be made on prorata basis on completion of a stage i.e. completion of super structure including bearings at least one span in all respect as specified.

Stage of payment	Weightage	Payment procedure
(4) Other ancillary works: wearing coat, expansion joint, hand railing, crash barriers tests on completion etc. completion in all respect.		(4) Other ancillary works: Payment shall be made on prorata basis on completion of a stage in all respect as specified, for each structure.
(5) Miscellaneous items (like hand rails, crash barriers, road markings etc.)		(5) Miscellaneous: Payment shall be made on completion of all miscellaneous works like hand rail, crash barrier, road markings, etc. complete in all respects as specified.
(6) wing walls/return walls upto full height		(6) wing walls/return walls upto full height: Payment shall be made on completion of wing wall/return wall complete for rach ROB/RUB asper weightage given in the table, completion in all respects as specified.
(7) Retaining wall/ Reinforced earth wall etc.		Payment shall be made on prorata basis on completion of both approaches including stone pitching, protection works, etc. complete in all respect as specified.
(7.a) Panel casting		(a) Panel casting: Unit of measurement is area in Sqm. Payment against casting of panels shall be made on prorata basis with respect to total area panels required for the structure on completion of a stage i.e., not less than completion of casting of 25% of the scope of RE wall panel of each ROB/RUB.
(7.b) Erection of panel/ construction of retaining wall		(b) Erection of panel/ Construction of retaining wall: Unit of measurement is area in Sqm. Payment against casting of panels shall be made on prorata basis on completion of a stage i.e., completion of erection of panels/ construction of retaining

Stage of payment	Weightage	Payment procedure
		wall complete in all respect for at least 25% scope of work for each ROB/RUB.
C.1 - Widening and repairs of Elevated section/Flyover/Grade Separators		
(1) Foundation		(1) Foundation: Cost of each structure shall be determined on pro rata basis with respect to the total linear length (m) of the structures. Payment against foundation shall be made on prorata basis on completion of a stage i.e., not less than 25% of the scope of foundation of the structure subject to completion of at least two foundations of the structure. In case where load testing is required for foundation, the trigger of the first payment shall include load testing also where specified.
(2) Sub structure		(2) Sub structure: Payment against sub-structure shall be made on prorata basis on completion of a stage i.e., not less than 25% of the scope of sub-structure of the structure subject to completion of at least two substructure of abutment/piers upto abutment/piers cap level of the structure.
(3) Superstructure (including bearing)		(3) Super Structure: Payment shall be made on prorata basis oncompletion of a stage i.e., completion of super structure including bearings of at least one span in all respects as specified.
(4) wearing coat including expansion joint		(4) wearing coat including expansion joint: Payment shall be made on completion

Stage of payment	Weightage	Payment procedure
		of wearing coat including expansion joints complete in all respects as specified.
(5) Miscellaneous items (like hand rails, crash barriers, road markings etc.)		(5) Miscellaneous: Payment shall be made on completion of all miscellaneous works like hand rail, crash barrier, road markings, etc. complete in all respects as specified.
(6) wing walls/return walls		(6) wing walls/return walls: Payment shall be made on completion of wing wall/return wall complete in all respects as specified.
(7) Approaches (including retaining walls, stone pitching, protection works).		(7) Approaches: Payment shall be made on prorata basis on completion of both approaches including stone pitching, protection works, etc. complete in all respect as specified.
C.2 - New Elevated section/Flyover/Grade Separators		Cost of each structure shall be determined on prorata basis with respect to the total linear length (m) of all the structures. Payments shall be made on completion of each stage of structures as per weightage given in this table.
(1) Foundation: foundation of abutment/piers		(1) Foundation: Payment against foundation shall be made on prorata basis on completion of a stage i.e., not less than 25% of the scope of foundation of each structure as per weightage given in this table,subject to completion of at least two foundations in allrespect. In case where load testing is required for foundation, the trigger of the first payment shall include load testing also where specified.

Stage of payment	Weightage	Payment procedure
(2) Sub structure: Substructure for abutment, piers upto the abutment/pier cap level.		(2) Substructure: Payment against sub-structure shall be made on prorata basis on completion of a stage i.e., not less than 25% of the scope of sub-structure of each structure as per weightage given in tis table, subject to completion of at least two substructures of abutment/piers upto abutment/piers cap level.
(3) Superstructure: including girder, deck slab, bearing (excluding wearing coat and expansion joints)		
(3.a) Super Structure: Casting of girder/ fabrication of girders (steel)		(a) Super structure (casting of girder): Unit of measurement is number. Payment against casting of girder shall be made on prorata basis with respect to total number of girders required in the structure on completion of a stage i.e., not less than completion of casting of at least five girders of the structure.
(3.b) Super structure: casting of segments		(b) Super structure (casting of segment): Unit of measurement is number. Payment against casting of segments shall be made on prorata basis with respect to total number of segments required in the structure on completion of a stage i.e., not less than completion of casting of at least 10 (ten) segments of the structure.
(3.c) Super structure: erection of girder, deck Slab and bearings		(c) Super structure (erection of girders, deck slab and bearing): Payment shall be made on prorata basis on completion of a stage i.e., completion of super structure including bearings at least one span in all respect as specified.

Stage of payment	Weightage	Payment procedure
(4) Other ancillary works: wearing coat, expansion joint, hand railing, crash barriers tests on completion etc. completion in all respect.		(4) Other ancillary works: Payment shall be made on prorata basis on completion of a stage in all respect as specified, for each structure.
(5) Miscellaneous items (like hand rails, crash barriers, road markings etc.)		(5) Miscellaneous: Payment shall be made on completion of all miscellaneous works like hand rail, crash barrier, road markings, etc. complete in all respects as specified.
(6) wing walls/return walls upto full height		(6) wing walls/return walls upto full height: Payment shall be made on completion of wing wall/return wall complete for rach ROB/RUB asper weightage given in the table, completion in all respects as specified.
(7) Retaining wall/ Reinforced earth wall etc.		Payment shall be made on prorata basis on completion of both approaches including stone pitching, protection works, etc. complete in all respect as specified.
(7.a) Panel casting		(a) Panel casting: Unit of measurement is area in Sqm. Payment against casting of panels shall be made on prorata basis with respect to total area panels required for the structure on completion of a stage i.e., not less than completion of casting of 25% of the scope of RE wall panel of each ROB/RUB.
(7.b) Erection of panel/ construction of retaining wall		(b) Erection of panel/ Construction of retaining wall: Unit of measurement is area in Sqm. Payment against casting of panels shall be made on prorata basis on completion of a stage i.e., completion of erection of panels/

Stage of payment	Weightage	Payment procedure
		construction of retaining wall complete in all respect for at least 25% scope of work for each ROB/RUB.

1.3.4 Other works.

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

Table 1.3.4

Stage of Payment	Weightage	Payment Procedure
(i) Toll plaza		Unit of measurement is each completed toll plaza. Payment of each toll plaza shall be made on pro rata basis as per following completed stages: (i) Rigid pavement upto DLC (LHS) - 12.5% (ii) Rigid pavement upto DLC (RHS) - 12.5% (iii)PQC (LHS) - 25% (iv) PQC (RHS) - 25% (v) Admin Building, Maintenance Building & Misc - 10% (vi) Canopy, Toll Booth, Safety Items & Miscellaneous works - 12.5% (vii) Toll plaza Tunnel/over head bridge - 2.5%
(ii) Road side drains		Unit of measurement is linear length in km. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5 % (five per cent) of the total length.
a) Hill Side Trapezoidal/V Type Drain	1.37%	
b) Catch Water Drain	1.13%	
(iii) Road signs, markings, km stones, safety devices	4.20%	
(iv) Project Facilities		Payment shall be made on pro rata basis for completed facilities.
a) Bus bays& shelter	0.85%	
b) Truck lay-byes	0.09%	
c) Rest areas with toilet Block	0.10%	
d) Others		
(v) Roadside Plantation	0.30%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 5% (five percent) of the total length.
(vi) Repair of Protection works other than approaches to the bridges, elevated sections, flyovers/ grade separators and ROBs/RUBs.		
(a) Retaining wall	18.03%	
(vii) Breast Wall	30.96%	

Stage of Payment	Weightage	Payment Procedure
(ix) Hydro-seeding& Mulching	5.82%	
(x) Special Protection for Sinking Zone	33.73%	
(x) Junction Improvement	3.42%	

1.3.5 Electrical utilities and public Health Utilities (Water pipelines and sewage lines)

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

Table 1.3.5

Stage of Payment	Weightage	Payment Procedure
(i) EHT line	0.00%	Unit of measurement is as per completed activities. Cost per activity shall be determined on pro-rate basis as per its weightage with reference to total cost of EHT line. Payment shall be made for completed activity. (The average weightage of major activities (only for payment purpose) in shifting work is (i)Erection of Poles-20%, (ii) Conductor stringing including laying of cable- 30%, (iii) DTR erection (if involved)-15% and (iv) Charging of line including dismantling and site clearance-35% (with DTR) and 50% without DTR)
(ii) EHT crossings		Cost of each crossing shall be determined on pro-rata basis with reference to total no. of crossings. Payment shall be made for not less than 25% of the crossings subject to a minimum of 4.
(iii) HTI LT line (including transformers if any)	86.20%	Unit of measurement is as per completed activities. Cost per activity shall be determined on pro-rata basis as per its weightage with reference to total cost of LT/ HT line. Payment shall be made for completed activity. (The average weightage of major activities (only for payment purpose) in shifting work is (i) Erection of Poles-20% (ii) Conductor stringing including laying of cable- 30%, (iii) DTR erection (if involved)-10% and (iv) Charging of line including dismantling and site clearance-40% (with DTR) and 50% without DTR)
(iv) HT/ LT crossings/ Under Ground Cable Crossings		Cost of each crossing shall be determined on pro-rata basis with reference to total no. of crossings. Payment shall be made for not less than 25% of the crossings subject to completion

Stage of Payment	Weightage	Payment Procedure
		of minimum of 1 crossings.
(v) Water pipeline	13.80%	Unit of measurementis as per completed activities. Cost per activity shall be determined on pro-rata basis as per its weightage with reference to total cost of pipe line. Payment shall be made for completed activity. (The average weightage of major activities (only for payment purpose) in shifting work is laying of pipe-50%, Charging of line including all miscellaneous works and dismantling and site clearance-50%)
(vi) water pipeline crossings		Cost of each crossing shall be determined on pro-rata basis with reference to total no. of crossings. Payment shall be made for not less than 25% of the crossings subject to a minimum of 8 crossings.
(vii) Sewage lines	0.00%	Unit of measurement is as per completed activities. Cost per activity shall be determined on pro-rata basis as per its weightage with reference to total cost of pipe line. Payment shall be made for completed activity. (The average weightage of major activities (only for payment purpose) in shifting work is laying of pipe-50%, Charging of line including all miscellaneous works and dismantling and site clearance-50%)
(viii) Sewage line crossings		Cost of each crossing shall be determined on pro-rata basis with reference to total no. of crossings. Payment shall be made for completed activity. (The average weightage of major activities in shifting work is laying pipe-50%, Charging of line including all miscellaneous works and dismantling and site clearance-50%)

2 Procedure for payment for Maintenance.

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

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

Schedule-I

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.

(Schedule-I)

ListofDrawings

1. A minimum list of the drawings of the various components/elements of the project highway and project facility required to be submitted by the Contractor is given below:

(a) Drawing of horizontal alignment & vertical profile and detailed cross sections

(b) Drawings of cross drainage works i.e. Bridges/Culverts/Flyovers and Other Structures.

(c) Drawings for River Training works

(d) Drawings of interchanges, major intersections and underpasses

(e) Drawing of control centre

(f) Drawings of road furniture items including traffic signage, marking, safety barriers, etc.

(g) Drawings of traffic diversions plans and traffic control measures

(h) Drawings of road drainage measures

(i) Drawings of typical details slope protection measures

(j) Drawings of landscaping and horticulture

(k) Drawings of pedestrian crossing

(l) Drawings of street lighting

(m) Any other drawings as per instruction of Authority Engineer

(m) General Arrangement showing Base Camp and Administrative Block

Schedule-J

Schedule - J

(See Clause 10.3 (ii))

Project Completion Schedule

1. Project Completion Schedule

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

2. Project Milestone-I

(i) Project Milestone-I shall occur on the date falling on the 256th day from then Appointed Date (the "Project Milestone-I").

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

3. Project Milestone-II

(i) Project Milestone-II shall occur on the date falling on the 438th day from the Appointed Date (the "Project Milestone- II").

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

4. Project Milestone-III

(i) Project Milestone-III shall occur on the date falling on the 621st day from the Appointed Date (the "Project Milestone-III").

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

5. Scheduled Completion Date

(i) The Scheduled Completion Date shall occur on the 730th day from the Appointed Date.

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

6. Extension of Time

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

Schedule-K

SCHEDULE - K
(See Clause 12.1 (ii))

Tests on Completion

1 Schedule for Tests

(i) The Contractor shall, no later than 30 (thirty) days prior to the likely completion of construction, notify the Authority's Engineer and the Authority of its intent to subject the Project Highway to Tests, and no later than 10 (ten) days prior to the actual date of Tests, furnish to the Authority's Engineer and the Authority detailed inventory and particulars of all works and equipment forming part of Works.

(ii) The Contractor shall notify the Authority's Engineer of its readiness to subject the Project Highway to Tests at any time after 10 (ten) days from the date of such notice, and upon receipt of such notice, the Authority's Engineer shall, in consultation with the Contractor, determine the date and time for each Test and notify the same to the Authority who may designate its representative to witness the Tests. The Authority's Engineer shall thereupon conduct the Tests itself or cause any of the Tests to be conducted in accordance with Article 12 and this Schedule-K.

2 Tests

(i) Visual and physical test: The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include [***].

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

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

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

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

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

3 Agency for conducting Tests

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

4 Completion Certificate

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

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

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

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

Schedule-L

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 "Widening & Upgradation to two lanes with paved shoulders road from Tamenglong to Mahur (NH-137) in the State of Assam starting from km 156.489 near P. Leikul to km 176.410 near Borowapu (Package-10). (Project Length = 19.921 km)"** (the "Project Highway") on Engineering, Procurement and Construction (EPC) basis through …… (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement, and I am satisfied that the Project Highway can be safely and reliably placed in service of the Users thereof.

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

SIGNED, SEALED AND DELIVERED

For and on behalf of

The Authority's Engineer by:

(Signature)

(Name)

(Designation)

(Address)

Schedule-M

SCHEDULE - M

(See Clauses 14.6, 15.2 and 19.7)

PAYMENT REDUCTION FOR NON-COMPLIANCE

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

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

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

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

2. Percentage reductions in lump sum payments

- The following percentages shall govern the payment reduction:

S. No.	Item/Defect/Deficiency	Percentage
(a)	**Carriageway/Pavement**	
(i)	Potholes, cracks, other surface defects	15%
(ii)	Repairs of Edges, Rutting	5%
(b)	**Road, Embankment, Cuttings, Shoulders**	
(i)	Edge drop, inadequate crossfall, undulations, settlement, potholes, ponding, obstructions	10%
(ii)	Deficient slopes, raincuts, disturbed pitching, vegetation growth, pruning of trees	5%
(c)	**Bridges and Culverts**	
(i)	Desilting, cleaning. vegetation growth, damaged pitching, flooring, parapets, wearing course, footpaths, any damage to foundations	20%
(ii)	Any Defects in superstructures, bearings and sub-structures	10%
(iii)	Painting, repairs/replacement kerbs, railings, parapets, guideposts/crash barriers	5%
(d)	**Roadside Drains**	
(i)	Cleaning and repair of drains	5%
(e)	**Road Furniture**	

(i)	Cleaning, painting, replacement of road signs, delineators, road markings, 200 m/km/5th km stones	5%
(f)	**Miscellaneous Items**	
(i)	Removal of dead animals, broken down/accidented vehicles, fallen trees, road blockades or malfunctioning of mobile crane	10%
(ii)	Any other Defects in accordance with paragraph 1.	5%
(g)	**Defects in Other Project Facilities**	5%

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

$$R=P/100 \times (M_1 \text{ or } M_2) \times L1/L$$

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

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

L1 = Non-complying length

L = Total length of the road,

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

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

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

Schedule-N

SCHEDULE - N
(See Clause 18.1.1)

SELECTION OF AUTHORITY'S ENGINEER

1 Selection of Authority's Engineer

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

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

2 Terms of Reference

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

3 Appointment of Government entity as Authority's Engineer

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

Annex - I
(Schedule - N)

TERMS OF REFERENCE FOR AUTHORITY'S ENGINEER

1 Scope

(i) These Terms of Reference (the "TOR") for the Authority's Engineer are being specifiedpursuant to the EPC Agreement dated ..... (the "Agreement), which has been entered into between the NHIDCL(the "Authority") and ..... (the "Contractor")# **"Widening & Upgradation to two lanes with paved shoulders road from Tamenglong to Mahur (NH-137) in the State of Assam starting from km 156.489 near P. Leikul to km 176.410 near Borowapu (Package-10) on EPC mode. (Project Length = 19.921 km)"**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 EP project, then the status of bidding of EPC project only to be indicated

(ii) The TOR shall apply to construction and maintenance of the Project Highway.

2 Definitions and interpretation

(i) The words and expressions beginning with or in capital letters and not defined herein but defined in the Agreement shall have, unless repugnant to the context, the meaning respectively assigned to them in the Agreement.

(ii) References to Articles, Clauses and Schedules in this TOR shall, except where the context otherwise requires, be deemed to be references to the Articles, Clauses and Schedules of the Agreement, and references to Paragraphs shall be deemed to be references to Paragraphs of this TOR.

(iii) The rules of interpretation stated in Article 1 of the Agreement shall apply, mutatis mutandis, to this TOR.

3. General

(i) The Authority's Engineer shall discharge its duties in a fair, impartial and efficient manner, consistent with the highest standards of professional integrity and Good Industry Practice.

(ii) The Authority's Engineer shall perform the duties and exercise the authority in accordance with the provisions of this Agreement, but subject to obtaining prior written approval of the Authority before determining:

(a) any Time Extension;
(b) any additional cost to be paid by the Authority to the Contractor;
(c) the Termination Payment; or
(d) any other matter which is not specified in (a), (b) or (c) above and which creates an obligation or liability on either Party for a sum exceeding Rs. 5,000,000 (Rs. fifty lakh).

(iii) The Authority's Engineer shall submit regular periodic reports, at least once every month, to the Authority in respect of its duties and functions under this Agreement. Such reports shall be submitted by the Authority's Engineer within 10 (ten) days of the

beginning of every month.

(iv) The Authority's Engineer shall inform the Contractor of any delegation of its duties and responsibilities to its suitably qualified and experienced personnel; provided, however, that it shall not delegate the authority to refer any matter for the Authority's prior approval in accordance with the provisions of Clause 18.2.

(v) The Authority's Engineer shall aid and advise the Authority on any proposal for Change of Scope under Article 13.

(vi) In the event of any disagreement between the Parties regarding the meaning, scope and nature of Good Industry Practice, as set forth in any provision of the Agreement, the Authority's Engineer shall specify such meaning, scope and nature by issuing a reasoned written statement relying on good industry practice and authentic literature.

4 **Construction Period**

(i) During the Construction Period, the Authority's Engineer shall review and approve the Drawings furnished by the Contractor along with supporting data, including the geo-technical and hydrological investigations, characteristics of materials from borrow areas and quarry sites, topographical surveys, and the recommendations of the Safety Consultant in accordance with the provisions of Clause 10.1 (vi). The Authority's Engineer shall complete such review and approval and send its observations to the Authority and the Contractor within 15 (fifteen) days of receipt of such Drawings; provided, however that in case of a Major Bridge or Structure, the aforesaid period of 15 (fifteen) days may be extended upto 30 (thirty) days. In particular, such comments shall specify the conformity or otherwise of such Drawings with the Scope of the Project and Specifications and Standards.

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

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

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

(v) The Authority's Engineer shall grant written approval to the Contractor, where necessary, for interruption and diversion of the flow of traffic in the existing lane(s) of the Project Highway for purposes of maintenance during the Construction Period in accordance with the provisions of Clause 10.4.

(vi) The Authority's Engineer shall review the monthly progress report furnished by the Contractor and send its comments thereon to the Authority and the Contractor within 7 (seven) days of receipt of such report.

(vii) The Authority's Engineer shall inspect the Construction Works and the Project Highway and shall submit a monthly Inspection Report bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. In particular, the Authority's Engineer shall include in its Inspection Report, the compliance of the recommendations made by the Safety Consultant.

(viii) The Authority's Engineer shall conduct the pre-construction review of manufacturer's test

reports and standard samples of manufactured Materials, and such other Materials as the Authority's Engineer may require.

(ix) For determining that the Works conform to Specifications and Standards, the Authority's Engineer shall require the Contractor to carry out, or cause to be carried out, tests at such time and frequency and in such manner as specified in the Agreement and in accordance with Good Industry Practice for quality assurance. For purposes of this Paragraph 4.9, the tests specified in the IRC Special Publication-11 (Handbook of Quality Control for Construction of Roads and Runways) and the Specifications for Road and Bridge Works issued by MORTH (the "Quality Control Manuals") or any modification/substitution thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance.

(x) The Authority's Engineer shall test check at least 20 (twenty) percent of the quantity or number of tests prescribed for each category or type of test for quality control by the Contractor.

(xi) The timing of tests referred to in Paragraph 4.9, and the criteria for acceptance/ rejection of their results shall be determined by the Authority's Engineer in accordance with the Quality Control Manuals. The tests shall be undertaken on a random sample basis and shall be in addition to, and independent of, the tests that may be carried out by the Contractor for its own quality assurance in accordance with Good Industry Practice.

(xii) In the event that results of any tests conducted under Clause 11.10 establish any Defects or deficiencies in the Works, the Authority's Engineer shall require the Contractor to carry out remedial measures.

(xiii) The Authority's Engineer may instruct the Contractor to execute any work which is urgently required for the safety of the Project Highway, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work required on account of a Force Majeure Event, the provisions of Clause 21.6 shall apply.

(xiv) In the event that the Contractor fails to achieve any of the Project Milestones, the Authority's Engineer shall undertake a review of the progress of construction and identify potential delays, if any. If the Authority's Engineer shall determine that completion of the Project Highway is not feasible within the time specified in the Agreement, it shall require the Contractor to indicate within 15 (fifteen) days the steps proposed to be taken to expedite progress, and the period within which the Project Completion Date shall be achieved. Upon receipt of a report from the Contractor, the Authority's Engineer shall review the same and send its comments to the Authority and the Contractor forthwith.

(xv) The Authority's Engineer shall obtain from the Contractor a copy of all the Contractor'squality control records and documents before the Completion Certificate is issued pursuant to Clause 12.4.

(xvi) Authority's Engineer may recommend to the Authority suspension of the whole or part of the Works if the work threatens the safety of the Users and pedestrians. After the Contractor has carried out remedial measure, the Authority's Engineer shall inspect such remedial measures forthwith and make a report to the Authority recommending whether or not the suspension hereunder may be revoked.

(xvii) In the event that the Contractor carries out any remedial measures to secure the safety of suspended works and Users, and requires the Authority's Engineer to inspect such works, the Authority's Engineer shall inspect the suspended works within 3 (three) days of receiving such notice, and make a report to the Authority forthwith, recommending

whether or not such suspension may be revoked by the Authority.

(xviii) The Authority's Engineer shall carry out, or cause to be carried out, all the Tests specified in Schedule-K and issue a Completion Certificate or Provisional Certificate, as the case may be. For carrying out its functions under this Paragraph 4.18 and all matters incidental thereto, the Authority's Engineer shall act under and in accordance with the provisions of Article 12 and Schedule-K.

5. Maintenance Period

(i) The Authority's Engineer shall aid and advise the Contractor in the preparation of its monthly Maintenance Programme and for this purpose carry out a joint monthly inspection with the Contractor.

(ii) The Authority's Engineer shall undertake regular inspections, at least once every month, to evaluate compliance with the Maintenance Requirements and submit a Maintenance Inspection Report to the Authority and the Contractor.

(iii) The Authority's Engineer shall specify the tests, if any, that the Contractor shall carry out, or cause to be carried out, for the purpose of determining that the Project Highway is in conformity with the Maintenance Requirements. It shall monitor and review the results of such tests and the remedial measures, if any, taken by the Contractor in this behalf.

(iv) In respect of any defect or deficiency referred to in Paragraph 3 of Schedule-E, the Authority's Engineer shall, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards and shall also specify the time limit for repair or rectification of any deviation or deterioration beyond the permissible limit.

(v) The Authority's Engineer shall examine the request of the Contractor for closure of any lane(s) of the Project Highway for undertaking maintenance/repair thereof, and shall grant permission with such modifications, as it may deem necessary, within 5 (five) days of receiving a request from the Contractor. Upon expiry of the permitted period of closure, the Authority's Engineer shall monitor the reopening of such lane(s), and in case of delay, determine the Damages payable by the Contractor to the Authority under Clause 14.5.

6 Determination of costs and time

(i) The Authority's Engineer shall determine the costs, and/or their reasonableness, that are required to be determined by it under the Agreement.

(ii) The Authority's Engineer shall determine the period of Time Extension that is required to be determined by it under the Agreement.

(iii) The Authority's Engineer shall consult each Party in every case of determination in accordance with the provisions of Clause 18.5.

7. Payments

(i) The Authority's Engineer shall withhold payments for the affected works for which the Contractor fails to revise and resubmit the Drawings to the Authority's Engineer in accordance with the provisions of Clause 10.2.4 (d).

(ii) Authority's Engineer shall –

(a) within 10 (ten) days of receipt of the Stage Payment Statement from the Contractor pursuant to Clause 19.4, determine the amount due to the Contractor and recommend the release of 90 (ninety) percent of the amount so determined as part payment, pending issue of the Interim Payment Certificate; and

(b) within 15 (fifteen) days of the receipt of the Stage Payment Statement referred to in Clause 19.4, deliver to the Authority and the Contractor an Interim Payment Certificate certifying the amount due and payable to the Contractor, after adjustments in accordance with the provisions of Clause 19.10.

(iii) The Authority's Engineer shall, within 15 (fifteen) days of receipt of the Monthly Maintenance Statement from the Contractor pursuant to Clause 19.6, verify the Contractor's monthly statement and certify the amount to be paid to the Contractor in accordance with the provisions of the Agreement.

(iv) The Authority's Engineer shall certify final payment within 30 (thirty) days of the receipt of the final payment statement of Maintenance in accordance with the provisions of Clause 19.16.

8. Other duties and functions

The Authority's Engineer shall perform all other duties and functions as specified in the Agreement.

9 Miscellaneous

(i) A copy of all communications, comments, instructions, Drawings or Documents sent by the Authority's Engineer to the Contractor pursuant to this TOR, and a copy of all the test results with comments of the Authority's Engineer thereon, shall be furnished by the Authority's Engineer to the Authority forthwith.

(ii) The Authority's Engineer shall retain at least one copy each of all Drawings and Documents received by it, including „as-built" Drawings, and keep them in its safe custody.

(iii) Within 90 (ninety) days of the Project Completion Date, the Authority's Engineer shall obtain a complete set of as-built Drawings, in 2 (two) hard copies and in micro film form or in such other medium as may be acceptable to the Authority, reflecting the Project Highway as actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Project Highway and setback lines, if any, of the buildings and structures forming part of Project Facilities; and shall hand them over to the Authority against receipt thereof.

(iv) The Authority's Engineer, if called upon by the Authority or the Contractor or both, shall mediate and assist the Parties in arriving at an amicable settlement of any Dispute between the Parties.

(v) The Authority's Engineer shall inform the Authority and the Contractor of any event of Contractor's Default within one week of its occurrence.

Schedule-O

SCHEDULE – O

(See Clauses 19.4.1, 19.6.1, and 19.8.1)

Forms of Payment Statements

1. Stage Payment Statement for Works

The Stage Payment Statement for Works shall state:

(a) the estimated amount for the Works executed in accordance with Clause 19.3(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

SCHEDULE - P
(See Clause 20.1)

INSURANCE

1. Insurance during Construction Period

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

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

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

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

2. Insurance for Contractor's Defects Liability

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

3. Insurance against injury to persons and damage to property

(i) The Contractor shall insure against its liability for any loss, damage, death or bodily Injury, or damage to any property (except things insured under Paragraphs 1 and 2 of this Schedule or to any person (except persons insured under Clause 20.9), which may arise out of the Contractor's performance of this Agreement. This insurance shall be for a limit per occurrence of not less than the amount stated below with no limit on the number of occurrences. The insurance cover shall be not less than: Rs. [*****]

(ii) The insurance shall be extended to cover liability for all loss and damage to the Authority's property arising out of the Contractor’s performance of this Agreement excluding:

(a) the Authority's right to have the construction works executed on, over, under, in or through any land, and to occupy this land for the Works; and

(b) Damage which is an unavoidable result of the Contractor's obligations to execute the Works.

4. **Insurance to be in joint names**

The insurance under paragraphs 1 to 3 above shall be in the joint names of the Contractor and the Authority.

Schedule-Q

Schedule - Q

(See Clause14.10)

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 Two Hundred Only) mm for each kilometer.

2. Visual and physical test:

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

Schedule-R

Schedule - R

(See Clause14.10)

Taking Over Certificate

I, …… (Name and designation of the Authority's Representative) under and in accordance with the Agreement dated …… (the "Agreement"), for **"Widening & Upgradation to two lanes with paved shoulders road from Tamenglong to Mahur (NH-137) in the State of Assam starting from km 156.489 near P. Leikul to km 176.410 near Borowapu (Package-10) (Project Length = 19.921 km)"** (the "Project Highway") on Engineering, Procurement and Construction (EPC) basis through …… (Name of Contractor), hereby certify that the Tests on completion of Maintenance Period in accordance with Article 14 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement and I hereby certify that the Authority has taken over the Project highway from the Contractor on this day.....

SIGNED, SEALED AND DELIVERED

(Signature)

(Name and Designation of Authority's Representative)

(Address)