Technical Schedule

Schedules - A

Schedule-A

(See Clauses 2.1 and 8.1)

Site of the Project

1 The Site

(i) Site of the Two-lane with paved shoulders Project Highway shall include the land, Buildings, structures and road works as described in Annex-I of this Schedule-A.

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

(iii) An inventory of the Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority Representative and the Contractor, and such inventory shall form part of the memorandum referred to in **Clause 8.2 (i) of this Agreement**.

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

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

Annex - I

(Schedule-A)

Site

[All the chainages/location referred to in Annex-I to Schedule-A are existing chainages.]

1.0 Site

The site of the Two-lane with paved shoulder Project Highway comprises the section of National Highway NH-717A commencing from km 61+100 (Lavamore) to km 79+700 (Start of Pedong Bypass) in the State of West Bengal. The land, carriageway and structures comprising the site are described below.

2.0 Land

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

Sr. No.	Existing Chainage		ROW (m)	Remarks
	From	To		
1	61+100	79+700	Varies from 20 to 107 m	Refer Annex-II of this Schedule-A

3.0 Carriageway

The present carriageway of the Project Highway varies from intermediate lane to two lane. The type of the existing pavement is flexible.

4.0 Major Bridges

The Site includes the following Major Bridge:

Sr.No.	Chainage (km)		Type of Structure			No of Spans with span length (m)	Width (m)
	Existing	Design	Foundation	Sub Structure	Super Structure		
Nil							

5.0 Road over-bridges (ROB)/ Road under-bridges (RUB)

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

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

6.0 Grade Separators

The Site includes the following grade separators:

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

7.0 Minor bridges

The Site includes the following minor bridges:

Sr. No.	Chainage (km)	Type of Structure			No of Spans with Span Length (m)	Width (m)
		Foundation	Sub-Structure	Super-Structure		
Nil						

8.0 Railway level crossings

The Site includes the following railway level crossings:

Sr. No.	Location (km)	Remarks
Nil		

9. Underpasses (vehicular, non-vehicular)

The Site includes the following underpasses:

Sr. No.	Chainage (km)	Type of Structure	No. of Spans with span length (m)	Width (m)
Nil				

10. Culverts

The Site has the following culverts:

S.No.	Existing Chainage (km)	Type of Culvert	Span/Opening with span length (m)	Width(m)
1	61+161	BOX	1x1.5	12.00
2	61+250	BOX	1x1.5	12.00
3	61+540	BOX	1x1.5	12.00
4	61+880	BOX (with Catchpit)	1x1.5	12.60
5	62+005	BOX (with Catchpit)	1x1.5	11.70
6	62+135	BOX	1x1.5	12.30
7	62+210	BOX (with Catchpit)	1x1.5	12.00
8	62+310	BOX (with Catchpit)	1x1.5	12.00
9	62+650	BOX	1x3	12.20
10	62+870	BOX (with Catchpit)	1x1.5	12.00
11	63+055	BOX	1x3	12.20
12	63+110	BOX (with Catchpit)	1x1.5	12.20
13	63+460	BOX (with Catchpit)	1x1.5	12.00
14	64+080	BOX (with Catchpit)	1x1.5	12.30
15	64+320	BOX (with Catchpit)	1x1.5	12.20
16	64+630	BOX	1x1.5	12.10

S.No.	Existing Chainage (km)	Type of Culvert	Span/Opening with span length (m)	Width(m)
17	64+778	BOX	1x3	12.00
18	65+070	BOX	1x1.5	11.50
19	65+205	BOX	1x1.5	12.00
20	65+320	BOX	1x1.5	12.00
21	65+455	BOX	1x1.5	12.00
22	65+551	BOX	1x1.5	12.00
23	65+795	HPC	1x0.6 (dia)	18.00
24	65+913	BOX	1x1.5	12.00
25	66+050	BOX	1x1.5	12.00
26	66+180	BOX	1x1.5	12.00
27	66+281	BOX	1x1.5	12.00
28	66+510	BOX	1x1.5	12.00
29	66+663	BOX	1x1.5	12.00
30	66+811	BOX	1x1.5	12.00
31	66+922	BOX	1x1.5	12.00
32	66+990	BOX	1x1.5	12.00
33	67+280	BOX	1x1.5	12.00
34	67+420	BOX	1x1.5	12.00
35	67+545	HPC	1x1.2 (dia)	12.50
36	67+630	HPC	1x1.2 (dia)	12.50
37	67+833	BOX	1x3	12.00
38	67+940	BOX	1x1.5	12.00
39	68+120	BOX	1x3x2	12.00
40	68+430	BOX	1x1.5	12.00
41	68+573	BOX	1x1.5	12.00
42	68+824	BOX	1x1.5	12.00
43	68+913	BOX	1x1.5	12.00
44	69+260	BOX (with Catchpit)	1x1.5	12.00
45	69+910	BOX	1x1.5	12.00
46	70+247	BOX (with Catchpit)	1x1.5	12.00
47	70+587	BOX (with Catchpit)	1x1.5	12.00
48	71+020	BOX	1x1.5	12.00
49	71+377	BOX	1x1.5	12.00
50	71+580	BOX	1x1.5	12.00
51	71+726	BOX	1x1.5	12.00
52	71+826	BOX	1x1.5	12.00
53	72+037	BOX	1x1.5	12.00
54	72+304	BOX	1x1.5	11.50
55	72+700	BOX	1x1.5	12.00
56	73+013	BOX	1x1.5	12.00
57	73+796	BOX	1x2	12.00
58	73+900	BOX	1x2	12.00
59	74+215	BOX	1x2	12.00

S.No.	Existing Chainage (km)	Type of Culvert	Span/Opening with span length (m)	Width(m)
60	74+915	BOX	1x2	12.10
61	75+034	BOX	1x2	12.00
62	75+265	BOX	1x2	12.00
63	75+570	BOX	1x2	12.00
64	75+770	BOX	1x2	12.00
65	75+921	BOX	1x2	12.00
66	76+013	BOX	1x3	12.00
67	76+200	BOX	1x3	12.00
68	76+490	HPC	1x1.2 (dia)	7.50
69	76+740	BOX	1x2	7.50
70	76+948	BOX	1x1.2	7.50
71	77+490	BOX	1x1.5	7.50
72	77+648	BOX	1x1.5	7.50
73	77+816	BOX	1x1.5	7.50
74	77+914	BOX (with Catchpit)	1x2	7.50
75	78+090	HPC	1x1.2 (dia)	8.00
76	78+142	BOX	1x2.5	7.80
77	78+290	BOX	1x1.5	12.50
78	78+705	BOX	1x1.5	11.00
79	79+144	BOX	1x1.5	11.00
80	79+410	BOX	1x1.5	11.00

11. Bus bays

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

Sr. No.	Chainage (km)	Length (m)	Left Hand Side	Right Hand Side	Remarks
Nil					

12. Truck Lay byes

The details of truck lay byes are as follows:

Sr. No.	Chainage (km)	Length (m)	Right Hand Side	Left Hand Side
Nil				

13. Road side drains

The details of the roadside drains are as follows

Sr. No.	Location		Type	
	From km	To km	Masonry/CC (Pucca)	Earthen (Kutcha)
1	61+100	61+150	-	✓
2	61+150	61+200	-	✓
3	61+200	61+250	-	✓
4	61+250	61+300	-	✓

Sr. No.	Location		Type	
	From km	To km	Masonry/CC (Pucca)	Earthen (Kutcha)
5	61+300	61+350	-	✓
6	61+350	61+400	-	✓
7	61+400	61+450	-	✓
8	61+450	61+500	-	✓
9	61+500	61+550	-	✓
10	61+550	61+600	-	✓
11	61+600	61+650	-	✓
12	61+650	61+700	-	✓
13	61+700	61+750	-	✓
14	61+750	61+800	-	✓
15	61+800	61+850	-	✓
16	61+850	61+900	-	✓
17	61+900	61+950	-	✓
18	61+950	62+000	-	✓
19	62+000	62+050	-	✓
20	62+050	62+100	-	✓
21	62+100	62+150	-	✓
22	62+150	62+200	-	✓
23	62+200	62+250	-	✓
24	62+250	62+300	-	✓
25	62+300	62+350	-	✓
26	62+350	62+400	-	✓
27	62+400	62+450	-	✓
28	62+450	62+500	-	✓
29	62+500	62+550	-	✓
30	62+550	62+600	-	✓
31	62+600	62+650	-	✓
32	62+650	62+700	-	✓
33	62+700	62+750	-	✓
34	62+750	62+800	-	✓
35	62+800	62+850	-	✓
36	62+850	62+900	✓	-
37	62+900	62+950	✓	-
38	62+950	63+000	✓	-
39	63+000	63+050	✓	-
40	63+050	63+100	-	✓
41	63+100	63+150	-	✓
42	63+150	63+200	-	✓
43	63+200	63+250	-	✓
44	63+250	63+300	-	✓
45	63+300	63+350	-	✓

Sr. No.	Location		Type	
	From km	To km	Masonry/CC (Pucca)	Earthen (Kutcha)
46	63+350	63+400	-	✓
47	63+400	63+450	-	✓
48	63+450	63+500	-	✓
49	63+500	63+550	-	✓
50	63+550	63+600	-	✓
51	63+600	63+650	-	✓
52	63+650	63+700	-	✓
53	63+700	63+750	-	✓
54	63+750	63+800	-	✓
55	63+800	63+850	-	✓
56	63+850	63+900	-	✓
57	63+900	63+950	-	✓
58	63+950	64+000	-	✓
59	64+000	64+050	-	✓
60	64+050	64+100	-	✓
61	64+100	64+150	-	✓
62	64+150	64+200	✓	-
63	64+200	64+250	✓	-
64	64+250	64+300	✓	-
65	64+300	64+350	✓	-
66	64+350	64+400	✓	-
67	64+400	64+450	✓	-
68	64+450	64+500	✓	-
69	64+500	64+550	✓	-
70	64+550	64+600	✓	-
71	64+600	64+650	✓	-
72	64+650	64+700	✓	-
73	64+700	64+750	✓	-
74	64+750	64+800	✓	-
75	64+800	64+850	✓	-
76	64+850	64+900	✓	-
77	64+900	64+950	✓	-
78	64+950	65+000	✓	-
79	65+000	65+050	✓	-
80	65+050	65+100	✓	-
81	65+100	65+150	✓	-
82	65+150	65+200	✓	-
83	65+200	65+250	✓	-
84	65+250	65+300	✓	-
85	65+300	65+350	-	✓
86	65+350	65+400	-	✓
87	65+400	65+450	-	✓

Sr. No.	Location		Type	
	From km	To km	Masonry/CC (Pucca)	Earthen (Kutcha)
88	65+450	65+500	-	✓
89	65+500	65+550	✓	-
90	65+550	65+600	✓	-
91	65+600	65+650	✓	-
92	65+650	65+700	✓	-
93	65+700	65+750	✓	-
94	65+750	65+800	✓	-
95	65+800	65+850	✓	-
96	65+850	65+900	✓	-
97	65+900	65+950	✓	-
98	65+950	66+000	-	✓
99	66+000	66+050	✓	-
100	66+050	66+100	✓	-
101	66+100	66+150	✓	-
102	66+150	66+200	-	✓
103	66+200	66+250	-	✓
104	66+250	66+300	-	✓
105	66+300	66+350	-	✓
106	66+350	66+400	✓	-
107	66+400	66+450	✓	-
108	66+450	66+500	✓	-
109	66+500	66+550	✓	-
110	66+550	66+600	✓	-
111	66+600	66+650	-	✓
112	66+650	66+700	-	✓
113	66+700	66+750	-	✓
114	66+750	66+800	-	✓
115	66+800	66+850	-	✓
116	66+850	66+900	-	✓
117	66+900	66+950	-	✓
118	66+950	67+000	-	✓
119	67+000	67+050	-	✓
120	67+050	67+100	-	✓
121	67+100	67+150	-	✓
122	67+150	67+200	-	✓
123	67+200	67+250	-	✓
124	67+250	67+300	-	✓
125	67+300	67+350	-	✓
126	67+350	67+400	-	✓
127	67+400	67+450	-	✓
128	67+450	67+500	-	✓
129	67+700	67+750	✓	-

Sr. No.	Location		Type	
	From km	To km	Masonry/CC (Pucca)	Earthen (Kutcha)
130	67+750	67+800	✓	-
131	67+800	67+850	✓	-
132	67+850	67+900	✓	-
133	67+900	67+950	✓	-
134	67+950	68+000	✓	-
135	68+000	68+050	✓	-
136	68+050	68+100	✓	-
137	68+100	68+150	-	✓
138	68+150	68+200	✓	-
139	68+200	68+250	✓	-
140	68+250	68+300	✓	-
141	68+300	68+350	✓	-
142	68+350	68+400	✓	-
143	68+400	68+450	✓	-
144	68+450	68+500	✓	-
145	68+500	68+550	✓	-
146	68+550	68+600	✓	-
147	68+600	68+650	✓	-
148	68+650	68+700	✓	-
149	68+700	68+750	✓	-
150	68+750	68+800	✓	-
151	68+800	68+850	-	✓
152	68+850	68+900	✓	-
153	68+900	68+950	✓	-
154	68+950	69+000	-	✓
155	69+000	69+050	-	✓
156	69+050	69+100	-	✓
157	69+100	69+150	-	✓
158	69+150	69+200	-	✓
159	69+200	69+250	-	✓
160	69+250	69+300	-	✓
161	69+300	69+350	-	✓
162	69+350	69+400	-	✓
163	69+400	69+450	-	✓
164	69+450	69+500	-	✓
165	69+500	69+550	✓	-
166	69+550	69+600	✓	-
167	69+600	69+650	✓	-
168	69+650	69+700	✓	-
169	69+700	69+750	✓	-
170	69+750	69+800	✓	-
171	69+800	69+850	✓	-

Sr. No.	Location		Type	
	From km	To km	Masonry/CC (Pucca)	Earthen (Kutcha)
172	69+850	69+900	✓	-
173	69+900	69+950	✓	-
174	69+950	70+000	✓	-
175	70+000	70+050	✓	-
176	70+050	70+100	✓	-
177	70+100	70+150	✓	-
178	70+150	70+200	✓	-
179	70+200	70+250	✓	-
180	70+250	70+300	✓	-
181	70+300	70+350	✓	-
182	70+350	70+400	✓	-
183	70+400	70+450	✓	-
184	70+450	70+500	✓	-
185	70+500	70+550	✓	-
186	70+550	70+600	✓	-
187	70+600	70+650	✓	-
188	70+650	70+700	✓	-
189	70+700	70+750	✓	-
190	70+750	70+800	✓	-
191	70+800	70+850	✓	-
192	70+850	70+900	-	✓
193	70+900	70+950	-	✓
194	70+950	71+000	-	✓
195	71+000	71+050	-	✓
196	71+050	71+100	-	✓
197	71+100	71+150	-	✓
198	71+150	71+200	-	✓
199	71+200	71+250	-	✓
200	71+250	71+300	-	✓
201	71+300	71+350	-	✓
202	71+350	71+400	-	✓
203	71+400	71+450	✓	-
204	71+450	71+500	✓	-
205	71+500	71+550	✓	-
206	71+550	71+600	✓	-
207	71+600	71+650	✓	-
208	71+650	71+700	✓	-
209	71+700	71+750	✓	-
210	71+750	71+800	✓	-
211	71+800	71+850	✓	-
212	71+850	71+900	✓	-
213	71+900	71+950	-	✓

Sr. No.	Location		Type	
	From km	To km	Masonry/CC (Pucca)	Earthen (Kutcha)
214	71+950	72+000	-	✓
215	72+000	72+050	-	✓
216	72+050	72+100	-	✓
217	72+100	72+150	-	✓
218	72+150	72+200	-	✓
219	72+200	72+250	✓	-
220	72+250	72+300	✓	-
221	72+300	72+350	✓	-
222	72+350	72+400	✓	-
223	72+400	72+450	✓	-
224	72+450	72+500	✓	-
225	72+500	72+550	✓	-
226	72+550	72+600	✓	-
227	72+600	72+650	✓	-
228	72+650	72+700	✓	-
229	72+700	72+750	✓	-
230	72+750	72+800	✓	-
231	72+800	72+850	✓	-
232	72+850	72+900	✓	-
233	72+900	72+950	✓	-
234	72+950	73+000	✓	-
235	73+000	73+050	✓	-
236	73+050	73+100	✓	-
237	73+100	73+150	✓	-
238	73+150	73+200	✓	-
239	73+200	73+250	✓	-
240	73+250	73+300	✓	-
241	73+300	73+350	-	✓
242	73+350	73+400	-	✓
243	73+400	73+450	-	✓
244	73+450	73+500	✓	-
245	73+500	73+550	✓	-
246	73+550	73+600	✓	-
247	73+600	73+650	✓	-
248	73+650	73+700	✓	-
249	73+700	73+750	✓	-
250	73+750	73+800	✓	-
251	73+800	73+850	✓	-
252	73+850	73+900	✓	-
253	73+900	73+950	✓	-
254	73+950	74+000	✓	-
255	74+000	74+050	✓	-

Sr. No.	Location		Type	
	From km	To km	Masonry/CC (Pucca)	Earthen (Kutcha)
256	74+050	74+100	-	✓
257	74+100	74+150	-	-
258	74+150	74+200	✓	-
259	74+200	74+250	✓	-
260	74+250	74+300	✓	-
261	74+300	74+350	✓	-
262	74+350	74+400	✓	-
263	74+400	74+450	✓	-
264	74+450	74+500	✓	-
265	74+500	74+550	✓	-
266	74+550	74+600	✓	-
267	74+600	74+650	✓	-
268	74+650	74+700	✓	-
269	74+700	74+750	✓	-
270	74+750	74+800	✓	-
271	74+800	74+850	✓	-
272	74+850	74+900	✓	-
273	74+900	74+950	✓	-
274	74+950	75+000	✓	-
275	75+000	75+050	✓	-
276	75+050	75+100	✓	-
277	75+100	75+150	✓	-
278	75+150	75+200	✓	-
279	75+200	75+250	✓	-
280	75+250	75+300	✓	-
281	75+300	75+350	✓	-
282	75+350	75+400	✓	-
283	75+400	75+450	✓	-
284	75+450	75+500	✓	-
285	75+500	75+550	✓	-
286	75+550	75+600	✓	-
287	75+600	75+650	✓	-
288	75+650	75+700	✓	-
289	75+700	75+750	✓	-
290	75+750	75+800	✓	-
291	75+800	75+850	✓	-
292	75+850	75+900	✓	-
293	75+900	75+950	✓	-
294	75+950	76+000	✓	-
295	76+000	76+050	✓	-
296	76+050	76+100	✓	-
297	76+100	76+150	-	✓

Sr. No.	Location		Type	
	From km	To km	Masonry/CC (Pucca)	Earthen (Kutcha)
298	76+150	76+200	-	✓
299	76+200	76+250	✓	-
300	76+250	76+300	✓	-
301	76+300	76+350	✓	-
302	76+350	76+400	✓	-
303	76+400	76+450	✓	-
304	76+450	76+500	✓	-
305	76+500	76+550	✓	-
306	76+550	76+600	✓	-
307	76+600	76+650	✓	-
308	76+650	76+700	✓	-
309	76+700	76+750	✓	-
310	76+750	76+800	✓	-
311	76+800	76+850	✓	-
312	76+850	76+900	✓	-
313	76+900	76+950	✓	-
314	76+950	77+000	✓	-
315	77+000	77+050	✓	-
316	77+050	77+100	✓	-
317	77+100	77+150	✓	-
318	77+150	77+200	✓	-
319	77+200	77+250	✓	-
320	77+250	77+300	✓	-
321	77+300	77+350	✓	-
322	77+350	77+400	✓	-
323	77+400	77+450	✓	-
324	77+450	77+500	✓	-
325	77+500	77+550	✓	-
326	77+550	77+600	✓	-
327	77+600	77+650	✓	-
328	77+650	77+700	✓	-
329	77+700	77+750	✓	-
330	77+750	77+800	✓	-
331	77+800	77+850	✓	-
332	77+850	77+900	✓	-
333	77+900	77+950	✓	-
334	77+950	78+000	✓	-
335	78+000	78+050	✓	-
336	78+050	78+100	✓	-
337	78+100	78+150	✓	-
338	78+150	78+200	✓	-
339	78+200	78+250	✓	-

Sr. No.	Location		Type	
	From km	To km	Masonry/CC (Pucca)	Earthen (Kutcha)
340	78+250	78+300	✓	-
341	78+300	78+350	✓	-
342	78+350	78+400	✓	-
343	78+400	78+450	✓	-
344	78+450	78+500	✓	-
345	78+500	78+550	✓	-
346	78+550	78+600	✓	-
347	78+600	78+650	✓	-
348	78+650	78+700	✓	-
349	78+700	78+750	✓	-
350	78+750	78+800	✓	-
351	78+800	78+850	✓	-
352	78+850	78+900	✓	-
353	78+900	78+950	✓	-
354	78+950	79+000	✓	-
355	79+000	79+050	✓	-
356	79+050	79+100	✓	-
357	79+100	79+150	✓	-
358	79+150	79+200	✓	-
359	79+200	79+250	✓	-
360	79+250	79+300	✓	-
361	79+300	79+350	✓	-
362	79+350	79+400	✓	-
363	79+400	79+450	✓	-
364	79+450	79+500	✓	-
365	79+500	79+550	✓	-
366	79+550	79+600	✓	-

14.0 Major junctions

The details of major junctions are as follows:

Sr. No.	Location at	At grade	Separated	Category of Cross Road			
				NH	SH	MDR	Others
1	61+100	✓	-	-	✓	-	✓
2	72+650	✓	-	-	-	✓	-
3	75+700	✓	-	-	-	✓	-

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

15.0 Minor junctions

The details of the minor junctions are as follows:

Sr. No.	Location at	Type	
		T- junction	Cross road
1	65+550	✓	-
2	67+900	✓	-
3	70+000	✓	-
4	72+500	✓	-
5	73+800	✓	-
6	77+650	-	✓
7	79+250	-	✓
8	79+350	✓	-
9	79+450	✓	-
10	79+543	✓	-

16. Bypasses

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

Sr. No.	Name of bypass (town)	Chainage		Length (in Km)
		From km	To km	
1	Pedong town Bypass	76+360	79+700	3.340

17. Other structure:

(i) Overhead Gantry Sign Boards **:** 02 nos

(ii) Retaining wall

The details of the retaining wall are as follows:

Sr. No.	Existing Chainage		Length (m)
	From km	To km	
1	61+130	61+150	20m
2	61+170	61+190	20m
3	62+080	62+110	30m
4	62+200	62+205	5m
5	62+300	62+305	5m
6	62+315	62+320	5m
7	62+440	62+460	20m
8	62+850	62+865	15m
9	62+875	62+890	15m
10	63+100	63+105	5m

Sr. No.	Existing Chainage		Length (m)
	From km	To km	
11	63+115	63+120	5m
12	63+445	63+455	10m
13	63+465	63+480	15m
14	63+700	64+025	325m
15	64+070	64+100	30m
16	64+195	64+220	25m
17	64+240	64+260	20m
18	64+285	64+295	10m
19	64+310	64+335	25m
20	64+510	64+530	20m
21	64+570	64+600	30m
22	64+620	64+640	20m
23	64+810	64+845	35m
24	64+985	64+995	10m
25	65+050	65+080	30m
26	65+150	65+180	30m
27	65+250	65+290	40m
28	65+550	65+555	5m
29	65+925	65+970	45m
30	66+015	66+035	20m
31	66+250	66+280	30m
32	66+285	66+380	95m
33	66+400	66+450	50m
34	66+500	66+505	5m
35	66+515	66+520	5m
36	67+470	67+700	230m
37	68+505	68+525	20m
38	68+560	68+580	20m
39	68+905	68+920	15m
40	69+270	69+300	30m
41	69+470	69+485	15m
42	69+520	69+580	60m

Sr. No.	Existing Chainage		Length (m)
	From km	To km	
43	70+075	70+090	15m
44	70+255	70+260	5m
45	70+515	70+525	10m
46	70+580	70+590	10m
47	71+000	71+030	30m
48	71+380	71+390	10m
49	71+505	71+525	20m
50	71+540	71+575	35m
51	71+650	71+680	30m
52	71+715	71+730	15m
53	72+520	72+580	60m
54	72+705	72+710	5m
55	73+000	73+030	30m
56	73+275	73+300	25m
57	75+660	75+700	40m
58	76+975	76+995	20m

(iii) Breast wall

The details of the Breast wall are as follows:

Sr. No.	Existing Chainage		Length (m)
	From km	To km	
1	61+150	61+175	25m
2	61+210	61+245	35m
3	61+255	61+640	385m
4	61+680	61+700	20m
5	61+885	61+910	25m
6	61+945	61+990	45m
7	62+030	62+070	40m
8	62+150	62+180	30m
9	62+215	62+305	90m
10	62+400	62+450	50m

Sr. No.	Existing Chainage		Length (m)
	From km	To km	
11	62+590	62+645	55m
12	62+660	62+675	15m
13	62+710	62+715	5m
14	62+880	62+990	110m
15	63+240	63+270	30m
16	63+470	63+550	80m
17	63+600	63+660	60m
18	63+720	63+810	90m
19	64+020	64+080	60m
20	64+700	64+760	60m
21	64+910	64+940	30m
22	65+080	65+160	80m
23	65+250	65+290	40m
24	65+380	65+430	50m
25	65+490	65+530	40m
26	65+565	65+610	45m
27	65+640	65+795	155m
28	65+870	65+910	40m
29	66+005	66+210	205m
30	66+250	66+270	20m
31	66+285	66+400	115m
32	66+410	66+445	35m
33	66+450	66+505	55m
34	66+520	66+550	30m
35	66+560	66+620	60m
36	66+630	66+805	175m
37	66+840	66+925	85m
38	66+935	66+980	45m
39	67+060	67+140	80m
40	67+170	67+260	90m
41	67+290	67+410	120m
42	67+670	67+730	60m

Sr. No.	Existing Chainage		Length (m)
	From km	To km	
43	67+860	67+935	75m
44	67+950	67+980	30m
45	68+000	68+110	110m
46	68+210	68+400	190m
47	68+440	68+500	60m
48	68+525	68+565	40m
49	68+585	68+810	225m
50	68+830	68+905	75m
51	68+920	69+000	80m
52	69+510	69+550	40m
53	69+700	69+780	80m
54	69+795	69+905	110m
55	69+920	70+230	310m
56	70+255	70+280	25m
57	70+290	70+560	270m
58	70+590	70+620	30m
59	70+870	71+000	130m
60	71+105	71+190	85m
61	71+235	71+300	65m
62	71+390	71+570	180m
63	71+585	71+660	75m
64	71+730	71+770	40m
65	71+830	71+930	100m
66	72+230	72+300	70m
67	72+310	72+450	140m
68	72+460	72+470	10m
69	72+475	72+500	25m
70	72+580	72+690	110m
71	72+705	72+780	75m
72	72+860	73+005	145m
73	73+460	73+470	10m
74	73+610	73+620	10m

Sr. No.	Existing Chainage		Length (m)
	From km	To km	
75	73+910	74+030	120m
76	74+220	74+280	60m
77	74+320	74+380	60m
78	74+420	74+490	70m
79	74+505	74+530	25m
80	74+630	74+730	100m
81	74+740	74+910	170m
82	74+930	75+010	80m
83	75+155	75+220	65m
84	75+250	75+260	10m
85	75+270	75+565	295m
86	75+600	75+620	20m
87	75+630	75+650	20m
88	75+720	75+740	20m
89	75+815	75+910	95m
90	75+925	75+950	25m
91	76+020	76+150	130m
92	77+885	77+900	15m

18. Details of Existing Utilities: The details of existing utilities are given in Sheet-I.

Sheet-I (Annex-I of Schedule-A)

(i) ELECTRICAL UTILITIES

The site includes the following electrical utilities: -

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

Sr. No	Chainage		Length along NH (in Km)				ROW Crossings (in km)			
	From km	To km	400KV	220KV	110KV	66KV	400KV	220KV	110KV	66KV
Nil										

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

Sr. No	Chainage		Length (in Km)				Crossings (no's)				Transformer	
	From	To	33KV	22KV	11KV	LT	33KV	22KV	11KV	LT	No	Capacity
1	61+100	79+700	1.00	-	19.00	2.03	-	-	-	-	4	160 Kva -1 No. & 25 Kva-3 Nos

(c) Public Health Utilities (Water Pipelines)

(a) The site includes the following public health utilities: -

Sr. No	Chainage(km)		Type	Length (in Km)				Crossings				Remarks
	From	To		Water Supply line		Sewage line		With pumping		Sewage line		
				With Pumping	With Gravity	With Pumping	With Gravity	With Pumping	With Gravity	With Pumping	With Gravity	
1	64+950	65+450	GI 25mm		0.500							01 - Tank
2	65+550	66+400	HDPE 20mm		5.400							
3	66+250	72+650	GI 50 mm		5.900							
4	66+400	77+650	GI 80mm		1.250							
5	68+500	68+750	GI 80mm		0.500							
6	68+000	72+650	GI 40mm		4.65				01 No.			01 No. Tank
7	68+000	70+150	GI 40mm		1.75							01 No. Tank
8	68+550	68+600			-				01 no			
9	68+700	68+750			-				01 no			
10	68+750	68+350	GI 80mm		1.200							
11	72+250	72+300	GI 80mm						01 no			
12	72+250	72+600	GI 80mm		0.800							
			GI 80mm		0.800							
			GI 80mm		0.800							

Sr. No	Chainage(km)		Type	Length (in Km)				Crossings				Remarks
	From	To		Water Supply line		Sewage line		With pumping		Sewage line		
				With Pumping	With Gravity	With Pumping	With Gravity	With Pumping	With Gravity	With Pumping	With Gravity	
			GI 65mm		0.800							
			CI 150mm		0.800							
			CI 250mm		0.800							
			CI 250mm		0.800							
13	72+050	72+450	MS 254mm		0.385							
14	72+450	72+750	MS 254 mm		0.320				01 no			
15	72+550	72+460	GI 65mm		-				01 no			
			CI 150mm		-				01 no			
16	72+700	73+450	CI 65mm		0.750							
			CI 150mm		0.750							
17	72+700	74+650	GI 80mm		2.000							
18	74+100	75+700	GI 65mm		1.600							
			CI 150mm		1.600							
19	74+900	75+800	GI 40mm & 15mm		(2x0.8) = 1.70							01 No. Tank
20	74+900	75+650	GI 100mm		0.35				01 No.			01 No. Tank
21	75+550	75+600	GI 65mm		-				01 no			
22	75+350	75+700	GI 80mm		0.350							
			GI 40mm		0.350							
			GI 40mm		0.350							
			GI 40mm		0.350							
			GI 40mm		0.350							
23	75+700	75+750	GI mm		-				01 no			
			CI mm		-				01 no			
24	76+150	76+200	GI 25mm		-				01 no			
25	76+550	76+600	GI 25mm		-				01 no			
26	77+000	77+100	CI 150mm		-				01 no			
			GI 65mm		-				01 no			
			GI 80mm		-				01 no			
27	77+300	77+650	GI 65mm		0.350							
			CI 80mm		0.350							
28	77+650	77+700	CI 150mm		-				01 no			
29	78+300	78+400	CI 150mm		0.100							
30	78+400	78+450	GI 40mm		-				01 no			01-Tank
			GI 25mm		-				01 no			

Sr. No	Chainage(km)		Type	Length (in Km)				Crossings				Remarks
	From	To		Water Supply line		Sewage line		With pumping		Sewage line		
				With Pumping	With Gravity	With Pumping	With Gravity	With Pumping	With Gravity	With Pumping	With Gravity	
31	78+500	78+600	GI 25mm		-				01 no			01-Tank
			GI 25mm		-				01 no			
			GI 25mm		-				01 no			

(ii) **Any Other Line:** OFC cable line (BSNL) - 12KM

Annex – II
(As per Clause 8.3 (i))
(Schedule-A)

Annex-II Dates for providing Right of Way of Construction Zone

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

Sl. No.		From km to km	Length (Km)	Width (m)	Date of providing Right of Way*
(1)		(2)	(3)	(4)	(5)
(i) Full Right of Way (full width)					
(a)	Stretch-I	Km 61+100 to 61+120	0.02	24	On Appointed Date
		Km 61+120 to 61+130	0.01	29	
		Km 61+130 to 61+140	0.01	34	
		Km 61+140 to 61+150	0.01	37	
		Km 61+150 to 61+160	0.01	47	
		Km 61+160 to 61+170	0.01	54	
		Km 61+170 to 61+180	0.01	67	
		Km 61+180 to 61+190	0.01	63	
		Km 61+190 to 61+200	0.01	60	
		Km 61+200 to 61+210	0.01	56	
		Km 61+210 to 61+220	0.01	47	
		Km 61+220 to 61+250	0.03	43	
		Km 61+250 to 61+270	0.02	45	
		Km 61+270 to 61+290	0.02	46	
		Km 61+290 to 61+300	0.01	44	
		Km 61+300 to 61+310	0.01	39	
		Km 61+310 to 61+320	0.01	33	
		Km 61+320 to 61+330	0.01	27	
		Km 61+330 to 63+580	2.25	24	
		Km 63+580 to 63+590	0.01	22	
		Km 63+590 to 63+620	0.03	21	
		Km 63+620 to 63+640	0.02	22	
		Km 63+640 to 63+690	0.05	24	
		Km 63+690 to 63+710	0.02	22	
		Km 63+710 to 63+830	0.12	24	
		Km 63+830 to 63+840	0.01	22	
		Km 63+840 to 63+860	0.02	21	
		Km 63+860 to 63+870	0.01	22	
		Km 63+870 to 63+880	0.01	23	
		Km 63+880 to 65+070	1.19	24	
		Km 65+070 to 65+080	0.01	28	
		Km 65+080 to 65+090	0.01	35	
		Km 65+090 to 65+100	0.01	43	

Sl. No.		From km to km	Length (Km)	Width (m)	Date of providing Right of Way*
(1)		(2)	(3)	(4)	(5)
		Km 65+100 to 65+110	0.01	54	
		Km 65+110 to 65+120	0.01	60	
		Km 65+120 to 65+130	0.01	66	
		Km 65+130 to 65+140	0.01	68	
		Km 65+140 to 65+180	0.04	69	
		Km 65+180 to 65+190	0.01	67	
		Km 65+190 to 65+200	0.01	65	
		Km 65+200 to 65+210	0.01	62	
		Km 65+210 to 65+220	0.01	60	
		Km 65+220 to 65+230	0.01	58	
		Km 65+230 to 65+240	0.01	54	
		Km 65+240 to 65+250	0.01	49	
		Km 65+250 to 65+260	0.01	44	
		Km 65+260 to 65+270	0.01	40	
		Km 65+270 to 65+280	0.01	38	
		Km 65+280 to 65+290	0.01	33	
		Km 65+290 to 65+300	0.01	27	
		Km 65+300 to 65+750	0.45	24	
		Km 65+750 to 65+760	0.01	23	
		Km 65+760 to 65+780	0.02	22	
		Km 65+780 to 65+820	0.04	20	
		Km 65+820 to 65+850	0.03	21	
		Km 65+850 to 65+860	0.01	22	
		Km 65+860 to 66+070	0.21	23	
		Km 66+070 to 66+080	0.01	24	
		Km 66+080 to 66+100	0.02	22	
		Km 66+100 to 66+120	0.02	21	
		Km 66+120 to 66+180	0.06	22	
		Km 66+180 to 66+340	0.16	23	
		Km 66+340 to 66+350	0.01	24	
		Km 66+350 to 66+370	0.02	23	
		Km 66+370 to 66+380	0.01	22	
		Km 66+380 to 67+600	1.22	23	
		Km 67+600 to 67+610	0.01	24	
		Km 67+610 to 67+620	0.01	63	
		Km 67+620 to 67+630	0.01	66	
		Km 67+630 to 67+640	0.01	70	
		Km 67+640 to 67+660	0.02	73	
		Km 67+660 to 67+670	0.01	75	

Sl. No.		From km to km	Length (Km)	Width (m)	Date of providing Right of Way*
(1)		(2)	(3)	(4)	(5)
		Km 67+670 to 67+680	0.01	74	
		Km 67+680 to 67+690	0.01	72	
		Km 67+690 to 67+700	0.01	70	
		Km 67+700 to 67+710	0.01	68	
		Km 67+710 to 67+720	0.01	63	
		Km 67+720 to 67+730	0.01	57	
		Km 67+730 to 67+740	0.01	54	
		Km 67+740 to 70+580	2.84	50	
		Km 70+580 to 70+590	0.01	24	
		Km 70+590 to 70+600	0.01	22	
		Km 70+600 to 70+610	0.01	21	
		Km 70+610 to 70+620	0.01	23	
		Km 70+620 to 70+630	0.01	25	
		Km 70+630 to 70+640	0.01	51	
		Km 70+640 to 70+650	0.01	54	
		Km 70+650 to 70+660	0.01	53	
		Km 70+660 to 70+680	0.02	51	
		Km 70+680 to 73+910	3.23	47	
		Km 73+910 to 73+920	0.01	43	
		Km 73+920 to 73+930	0.01	39	
		Km 73+930 to 73+940	0.01	26	
		Km 73+940 to 73+950	0.01	24	
		Km 73+950 to 73+960	0.01	26	
		Km 73+960 to 73+970	0.01	42	
		Km 73+970 to 73+980	0.01	56	
		Km 73+980 to 73+990	0.01	63	
		Km 73+990 to 74+000	0.01	67	
		Km 74+000 to 74+010	0.01	71	
		Km 74+010 to 74+020	0.01	75	
		Km 74+020 to 74+030	0.01	79	
		Km 74+030 to 74+040	0.01	83	
		Km 74+040 to 74+050	0.01	87	
		Km 74+050 to 74+060	0.01	91	
		Km 74+060 to 74+070	0.01	95	
		Km 74+070 to 74+080	0.01	99	
		Km 74+080 to 74+090	0.01	103	
		Km 74+090 to 76+950	2.86	107	
(b)	Stretch-II	km 76+950 to 79+490	2.54	24	
		km 79+490 to 79+510	0.02	25	

Sl. No.		From km to km	Length (Km)	Width (m)	Date of providing Right of Way*
(1)		(2)	(3)	(4)	(5)
		km 79+510 to 79+520	0.01	24	
(ii) Part Right of Way (part width) : NIL					
(iii) Balance Right of Way (width) : NIL					

*The dates specified herein shall in no case be beyond 150 (one hundred and fifty) days after the Appointed Date.

Annex - III
(Schedule-A)
Alignment Plans

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

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

(ii) Traffic Signage plan of the Project Highway showing numbers & location of traffic signs are enclosed. The contractor 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, in addition to MoRTH Circular no. RT-25035/07/2023-RS (Part) (221534), dated 20.07.2023.

Annex – IV

(Schedule-A)

Annex-IV **Environment Clearances**

Sr.No.	Clearances	Present Status
1	Environment clearance	Not Applicable

Schedule - B

Schedule - B

(See Clause2.1)

Development of Project Highway

1 Development of the Project Highway

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

2 Widening & Up-gradation of Project Highway

Widening & upgradation of Project Highway shall include two laning with paved shoulders of the Project Highway as described in Annex-I of this Schedule B and Schedule-C.

3 Specifications and Standards

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

Annex –I
(Schedule-B)
Description of Two-Laning with Paved Shoulders

1. Widening of the Existing Highway

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

(ii) Width of Carriageway

(a) Two Laning with paved shoulder shall be undertaken. The paved carriageway shall be 7.0m wide in accordance with the typical cross section drawings shown/attached.

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

Sr. No.	Built-up Stretch (Township)	Location		Width (m)	Typical cross section
		From	To		
Nil					

(b) Except as otherwise provided in this Agreement, the width of the paved carriageway and cross-sectional features shall conform to paragraph 1(i) above.

2. Geometric Design and General Features

(i) General

Geometric design and general features of the Project Highway shall be in accordance with Section 2 of the Manual, referred to as the Manual in Sch-D or any other relevant IRC codes.

(ii) Design Speed

The design speed shall be the minimum design speed of 40 km per hour for steep terrain, except at hair pin bends.

(iii) Improvement of the Existing Road Geometrics

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

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

(iv) ***Details of Bypasses are specified as under:***

Sl.No.	Name of Bypass	Existing Chainage (km)		Design Chainage (km)		Design Length (km)
		From	To	From	To	
1	Pedong Town Bypass	76+360	79+700	75+750	79+380	3.63

(v) ***Details of Realignment:***

Sr. No.	Chainage (Design)		Length	Remarks
	From km	To km		
1	76+310	76+470	160.00	Realignment for design speed of 40-50kmph
2	77+070	77+160	90.00	Realignment for design speed of 40-50kmph
3	77+160	77+200	40.00	Realignment for design speed of 40-50kmph
4	77+200	77+260	60.00	Realignment for design speed of 40-50kmph
5	77+260	77+280	20.00	Realignment for design speed of 40-50kmph
6	77+300	77+340	40.00	Realignment for design speed of 40-50kmph
7	77+540	77+640	100.00	Realignment for design speed of 40-50kmph
8	77+780	77+800	20.00	Realignment for design speed of 40-50kmph
9	77+840	77+880	40.00	Realignment for design speed of 40-50kmph
10	78+260	78+380	120.00	Realignment for design speed of 40-50kmph
11	79+300	79+320	20.00	Realignment for design speed of 40-50kmph
12	79+320	79+340	20.00	Realignment for design speed of 40-50kmph
	Total		**2470**	

(vi) Right of Way

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

(vii) Type of Shoulders

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

Sr. No.	Design Chainage Stretch (in km)		Length (m)	Fully paved shoulders	Footpaths	Reference to cross section
	Start	End				
Nil						

(b) Paved shoulders of 1.0m width shall be provided on both hill and valley side. The Earthen shoulder, as given below, at valley side shall be covered with 150mm thick compacted layer of granular material:

Description	Width of Earthen Shoulder (m)
Open Country normal section	3.00 m (0.50 m ES + 1.00 m for Thrie beam installation + 1.50 m for Utility Corridor)
Open country box cut section	1.50 m (for Utility Corridor)

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

(viii) Lateral and vertical clearances at underpasses

a) Lateral and vertical clearances at underpasses and provision of guardrails/crash barriers shall be as per the provision of Manual.

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

Sr. No.	Design Chainage (km)	Silent features	Minimum length of Viaduct to be provided	Road to be carried over/under the structure	Type of Structure	Location	Remarks
Nil							

(ix) Lateral and vertical clearances at overpasses

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

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

Sr. No.	Location (Chainage) (from km to km)	Span/ opening (m)	Remarks
Nil			

(x) Service Roads

Service roads width shall be constructed as per relevant manual at the locations and for the lengths indicated below:

Sl. No	Design Chainage (Km)		Bridge Length (m)	Length (km)	Side
	From	To			
Nil					

(xi) Grade Separated Structures

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

Sr. No.	Locations	Length	Number of Span	Approach		Remarks, if any
				A1	A2	
Nil						

(b) In the case of grade separated structures, the type of structure and the level of the Project Highway and the cross roads shall be as follows: [Refer to the 156 provision of relevant Manual and specify the type of vehicular under pass/ overpass structure and whether the cross road is to be carried at the existing level, raised or lowered]

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

(xii) Cattle and pedestrian underpass/overpass:

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

Sr. No.	Location	Type of crossing
Nil		

(xiii) Typical Cross section of the Project Highway

TCS Type	Description	Length (km)	Remarks
TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)	1.030	Refer Chainage-wise details for respective typical cross section, as furnished in the table below.
TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)	1.640	
TCS-1B	Typical Cross Section -1B, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS) (New Construction)	0.300	
TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)	2.240	
TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)	2.430	
TCS-2B	Typical Cross Section -2B, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS) (New Construction)	0.040	
TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)	0.210	
TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)	0.960	
TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)	0.430	
TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley	5.570	

TCS Type	Description	Length (km)	Remarks
	Side Slope (LHS) And Hill Side Breast Wall (RHS)		
TCS-4B	Typical Cross Section -4B, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS) (New Construction)	0.120	
TCS-4C	Typical Cross Section -4C, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS) (New Construction)	0.020	
TCS-5	Typical Cross Section -5, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Both Side Breast Wall (New Construction)	1.740	
TCS-6	Typical Cross Section -6, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS) (Sinking Zone)	0.140	
TCS-7	Typical Cross Section -7, 2 Lane Highway (Open Country Mountainous/Steep Terrain) U-Type Retaining Wall (New Construction)	0.250	
VIADUCT	VIADUCT	1.300	
	Total Proposed length of project road	**18.420**	

Typical Cross section of the Project Highway with chainage:

S.No.	Design Chainage		Length (m)	Type of TCS
	From km	To km		
1	61+100	61+180	80.00	TCS-3A
2	61+180	61+240	60.00	TCS-2A
3	61+240	61+340	100.00	TCS-4A
4	61+340	61+360	20.00	TCS-2A
5	61+360	61+420	60.00	TCS-4A
6	61+420	61+440	20.00	TCS-1A
7	61+440	61+520	80.00	TCS-4A
8	61+520	61+540	20.00	TCS-1A
9	61+540	61+620	80.00	TCS-4A
10	61+620	61+640	20.00	TCS-2A
11	61+640	61+780	140.00	TCS-4A
12	61+780	61+800	20.00	TCS-1A
13	61+800	61+840	40.00	TCS-4A
14	61+840	61+880	40.00	TCS-1A
15	61+880	61+940	60.00	TCS-4A
16	61+940	61+960	20.00	TCS-1A
17	61+960	61+980	20.00	TCS-2A
18	61+980	62+040	60.00	TCS-4A
19	62+040	62+080	40.00	TCS-2A

S.No.	Design Chainage		Length (m)	Type of TCS
	From km	To km		
20	62+080	62+120	40.00	TCS-4A
21	62+120	62+140	20.00	TCS-1A
22	62+140	62+160	20.00	TCS-2A
23	62+160	62+240	80.00	TCS-4A
24	62+240	62+280	40.00	TCS-3A
25	62+280	62+300	20.00	TCS-4A
26	62+300	62+330	30.00	TCS-3A
27	62+330	62+360	30.00	TCS-4A
28	62+360	62+380	20.00	TCS-1A
29	62+380	62+420	40.00	TCS-4A
30	62+420	62+460	40.00	TCS-2A
31	62+460	62+520	60.00	TCS-4A
32	62+520	62+560	40.00	TCS-2A
33	62+560	62+620	60.00	TCS-4A
34	62+620	62+760	140.00	TCS-2A
35	62+760	62+780	20.00	TCS-1A
36	62+780	62+900	120.00	TCS-4A
37	62+900	62+930	30.00	TCS-1A
38	62+930	63+040	110.00	TCS-4A
39	63+040	63+080	40.00	TCS-2A
40	63+080	63+100	20.00	TCS-3A
41	63+100	63+300	200.00	TCS-4A
42	63+300	63+320	20.00	TCS-1A
43	63+320	63+400	80.00	TCS-4A
44	63+400	63+460	60.00	TCS-1A
45	63+460	63+550	90.00	TCS-4A
46	63+550	63+560	10.00	TCS-2
47	63+560	63+580	20.00	TCS-1
48	63+580	63+620	40.00	TCS-2
49	63+620	63+640	20.00	TCS-1
50	63+640	63+730	90.00	TCS-4
51	63+730	63+760	30.00	TCS-2A
52	63+760	63+800	40.00	TCS-1A
53	63+800	63+840	40.00	TCS-2A
54	63+840	63+930	90.00	TCS-1A
55	63+930	63+980	50.00	TCS-3A
56	63+980	64+000	20.00	TCS-2A
57	64+000	64+040	40.00	TCS-4A
58	64+040	64+060	20.00	TCS-1A
59	64+060	64+100	40.00	TCS-2A
60	64+100	64+140	40.00	TCS-4A
61	64+140	64+180	40.00	TCS-2A
62	64+180	64+220	40.00	TCS-1A
63	64+220	64+240	20.00	TCS-3A
64	64+240	64+300	60.00	TCS-4A
65	64+300	64+340	40.00	TCS-2A
66	64+340	64+400	60.00	TCS-4A
67	64+400	64+420	20.00	TCS-1A
68	64+420	64+560	140.00	TCS-2A
69	64+560	64+580	20.00	TCS-1A
70	64+580	64+600	20.00	TCS-2A
71	64+600	64+640	40.00	TCS-4A
72	64+640	64+660	20.00	TCS-2A

S.No.	Design Chainage		Length (m)	Type of TCS
	From km	To km		
73	64+660	64+700	40.00	TCS-1A
74	64+700	64+720	20.00	TCS-2A
75	64+720	64+760	40.00	TCS-4A
76	64+760	64+780	20.00	TCS-2A
77	64+780	64+800	20.00	TCS-3A
78	64+800	64+820	20.00	TCS-2A
79	64+820	64+840	20.00	TCS-4A
80	64+840	64+860	20.00	TCS-1A
81	64+860	64+940	80.00	TCS-4A
82	64+940	65+080	140.00	TCS-4A
83	65+080	65+120	40.00	TCS-1A
84	65+120	65+140	20.00	TCS-2A
85	65+140	65+180	40.00	TCS-1A
86	65+180	65+540	360.00	TCS-4A
87	65+540	65+570	30.00	TCS-4
88	65+570	65+640	70.00	TCS-1
89	65+640	65+720	80.00	TCS-4
90	65+720	65+740	20.00	TCS-1
91	65+740	65+880	140.00	TCS-2A
92	65+880	65+940	60.00	TCS-4A
93	65+940	65+960	20.00	TCS-3A
94	65+960	66+100	140.00	TCS-2
95	66+100	66+120	20.00	TCS-3
96	66+120	66+140	20.00	TCS-1
97	66+140	66+160	20.00	TCS-3
98	66+160	66+180	20.00	TCS-4
99	66+180	66+240	60.00	TCS-1
100	66+240	66+360	120.00	TCS-2A
101	66+360	66+440	80.00	TCS-1A
102	66+440	66+460	20.00	TCS-2A
103	66+460	66+520	60.00	TCS-1A
104	66+520	66+600	80.00	TCS-4A
105	66+600	66+620	20.00	TCS-3A
106	66+620	66+720	100.00	TCS-4A
107	66+720	66+740	20.00	TCS-1A
108	66+740	66+760	20.00	TCS-2A
109	66+760	66+940	180.00	TCS-4A
110	66+940	66+980	40.00	TCS-1A
111	66+980	67+040	60.00	TCS-4A
112	67+040	67+080	40.00	TCS-1A
113	67+080	67+160	80.00	TCS-4A
114	67+160	67+180	20.00	TCS-1A
115	67+180	67+320	140.00	TCS-6
116	67+320	67+340	20.00	TCS-4A
117	67+340	67+360	20.00	TCS-1A
118	67+360	67+420	60.00	TCS-4A
119	67+420	67+460	40.00	TCS-1A
120	67+460	67+500	40.00	TCS-2A
121	67+500	67+540	40.00	TCS-1A
122	67+540	67+580	40.00	TCS-2A
123	67+580	67+600	20.00	TCS-3A
124	67+600	67+620	20.00	TCS-4A
125	67+620	67+680	60.00	TCS-3A

S.No.	Design Chainage		Length (m)	Type of TCS
	From km	To km		
126	67+680	67+740	60.00	TCS-4A
127	67+740	67+760	20.00	TCS-1A
128	67+760	67+780	20.00	TCS-2A
129	67+780	67+840	60.00	TCS-4A
130	67+840	67+860	20.00	TCS-1A
131	67+860	67+880	20.00	TCS-2A
132	67+880	67+900	20.00	TCS-1A
133	67+900	67+980	80.00	TCS-4A
134	67+980	68+000	20.00	TCS-1A
135	68+000	68+040	40.00	TCS-2A
136	68+040	68+080	40.00	TCS-4A
137	68+080	68+100	20.00	TCS-1A
138	68+100	68+120	20.00	TCS-2A
139	68+120	68+140	20.00	TCS-1A
140	68+140	68+160	20.00	TCS-2A
141	68+160	68+220	60.00	TCS-4A
142	68+220	68+240	20.00	TCS-3A
143	68+240	68+260	20.00	TCS-1A
144	68+260	68+300	40.00	TCS-2A
145	68+300	68+340	40.00	TCS-4A
146	68+340	68+420	80.00	TCS-2A
147	68+420	68+440	20.00	TCS-1A
148	68+440	68+510	70.00	TCS-4A
149	68+510	68+540	30.00	TCS-3A
150	68+540	68+720	180.00	TCS-2A
151	68+720	68+760	40.00	TCS-4A
152	68+760	68+900	140.00	TCS-1A
153	68+900	68+920	20.00	TCS-4A
154	68+920	68+940	20.00	TCS-1A
155	68+940	69+000	60.00	TCS-2A
156	69+000	69+080	80.00	TCS-1A
157	69+080	69+120	40.00	TCS-4A
158	69+120	69+160	40.00	TCS-3A
159	69+160	69+200	40.00	TCS-2A
160	69+200	69+240	40.00	TCS-3A
161	69+240	69+260	20.00	TCS-4A
162	69+260	69+340	80.00	TCS-3A
163	69+340	69+420	80.00	TCS-4A
164	69+420	69+440	20.00	TCS-3A
165	69+440	69+460	20.00	TCS-4A
166	69+460	69+500	40.00	TCS-2A
167	69+500	69+620	120.00	TCS-4A
168	69+620	69+640	20.00	TCS-1A
169	69+640	69+720	80.00	TCS-4A
170	69+720	69+740	20.00	TCS-2A
171	69+740	69+760	20.00	TCS-1A
172	69+760	69+850	90.00	TCS-4A
173	69+850	69+990	140.00	VIADUCT
174	69+990	70+020	30.00	TCS-2A
175	70+020	70+060	40.00	TCS-4A
176	70+060	70+120	60.00	TCS-3A
177	70+120	70+160	40.00	TCS-2A
178	70+160	70+300	140.00	TCS-4A

S.No.	Design Chainage		Length (m)	Type of TCS
	From km	To km		
179	70+300	70+320	20.00	TCS-2A
180	70+320	70+380	60.00	TCS-4A
181	70+380	70+420	40.00	TCS-2A
182	70+420	70+440	20.00	TCS-3A
183	70+440	70+470	30.00	TCS-2A
184	70+470	70+500	30.00	TCS-3A
185	70+500	70+520	20.00	TCS-2A
186	70+520	70+540	20.00	TCS-3A
187	70+540	70+640	100.00	TCS-4A
188	70+640	70+660	20.00	TCS-1A
189	70+660	70+800	140.00	TCS-4A
190	70+800	70+870	70.00	TCS-2A
191	70+870	70+900	30.00	TCS-4A
192	70+900	71+020	120.00	TCS-2A
193	71+020	71+040	20.00	TCS-3A
194	71+040	71+060	20.00	TCS-4A
195	71+060	71+080	20.00	TCS-1A
196	71+080	71+130	50.00	TCS-2A
197	71+130	71+140	10.00	TCS-4A
198	71+140	71+160	20.00	TCS-2A
199	71+160	71+260	100.00	TCS-4A
200	71+260	71+300	40.00	TCS-3A
201	71+300	71+320	20.00	TCS-4A
202	71+320	71+340	20.00	TCS-3A
203	71+340	71+540	200.00	TCS-4A
204	71+540	71+560	20.00	TCS-1A
205	71+560	71+580	20.00	TCS-4A
206	71+580	71+600	20.00	TCS-1A
207	71+600	71+620	20.00	TCS-2A
208	71+620	71+740	120.00	TCS-4A
209	71+740	71+780	40.00	TCS-3A
210	71+780	71+960	180.00	TCS-4A
211	71+960	71+980	20.00	TCS-3A
212	71+980	72+040	60.00	TCS-4A
213	72+040	72+060	20.00	TCS-3A
214	72+060	72+080	20.00	TCS-2A
215	72+080	72+260	180.00	TCS-4A
216	72+260	72+300	40.00	TCS-2A
217	72+300	72+320	20.00	TCS-4A
218	72+320	72+340	20.00	TCS-3A
219	72+340	72+360	20.00	TCS-4A
220	72+360	72+380	20.00	TCS-3A
221	72+380	72+420	40.00	TCS-4A
222	72+420	72+440	20.00	TCS-3A
223	72+440	72+460	20.00	TCS-2A
224	72+460	72+480	20.00	TCS-1A
225	72+480	72+500	20.00	TCS-4A
226	72+500	72+520	20.00	TCS-2A
227	72+520	72+560	40.00	TCS-1A
228	72+560	72+600	40.00	TCS-4A
229	72+600	72+640	40.00	TCS-1A
230	72+640	72+800	160.00	TCS-2
231	72+800	72+820	20.00	TCS-1

S.No.	Design Chainage		Length (m)	Type of TCS
	From km	To km		
232	72+820	72+920	100.00	TCS-2
233	72+920	72+970	50.00	TCS-1
234	72+970	73+000	30.00	TCS-4
235	73+000	73+020	20.00	TCS-2
236	73+020	73+040	20.00	TCS-3
237	73+040	73+100	60.00	TCS-1
238	73+100	73+160	60.00	TCS-2
239	73+160	73+220	60.00	TCS-1
240	73+220	73+320	100.00	TCS-2
241	73+320	73+380	60.00	TCS-1
242	73+380	73+420	40.00	TCS-2
243	73+420	73+480	60.00	TCS-1
244	73+480	73+560	80.00	TCS-2
245	73+560	73+580	20.00	TCS-3
246	73+580	73+760	180.00	TCS-2
247	73+760	73+780	20.00	TCS-1
248	73+780	73+840	60.00	TCS-2
249	73+840	73+900	60.00	TCS-1
250	73+900	73+940	40.00	TCS-2
251	73+940	74+080	140.00	TCS-1
252	74+080	74+120	40.00	TCS-2
253	74+120	74+140	20.00	TCS-1
254	74+140	74+240	100.00	TCS-2
255	74+240	74+260	20.00	TCS-4
256	74+260	74+280	20.00	TCS-3
257	74+280	74+300	20.00	TCS-1
258	74+300	74+480	180.00	TCS-2
259	74+480	74+500	20.00	TCS-1
260	74+500	74+520	20.00	TCS-2
261	74+520	74+540	20.00	TCS-1
262	74+540	74+560	20.00	TCS-2
263	74+560	74+580	20.00	TCS-1
264	74+580	74+600	20.00	TCS-2
265	74+600	74+620	20.00	TCS-1
266	74+620	74+780	160.00	TCS-2
267	74+780	74+800	20.00	TCS-1
268	74+800	74+850	50.00	TCS-4
269	74+850	74+880	30.00	TCS-1
270	74+880	75+020	140.00	TCS-2
271	75+020	75+060	40.00	TCS-1
272	75+060	75+300	240.00	TCS-2
273	75+300	75+320	20.00	TCS-3
274	75+320	75+380	60.00	TCS-2
275	75+380	75+420	40.00	TCS-3
276	75+420	75+630	210.00	TCS-2
277	75+630	75+640	10.00	TCS-1
278	75+640	75+750	110.00	TCS-4
279	75+750	76+310	560.00	VIADUCT
280	76+310	76+470	160.00	TCS-7
281	76+470	77+070	600.00	VIADUCT
282	77+070	77+160	90.00	TCS-7
283	77+160	77+200	40.00	TCS-2B
284	77+200	77+260	60.00	TCS-1B

S.No.	Design Chainage		Length (m)	Type of TCS
	From km	To km		
285	77+260	77+280	20.00	TCS-4B
286	77+280	77+300	20.00	TCS-5
287	77+300	77+340	40.00	TCS-4B
288	77+340	77+540	200.00	TCS-5
289	77+540	77+640	100.00	TCS-1B
290	77+640	77+780	140.00	TCS-5
291	77+780	77+800	20.00	TCS-4B
292	77+800	77+840	40.00	TCS-5
293	77+840	77+880	40.00	TCS-4B
294	77+880	78+260	380.00	TCS-5
295	78+260	78+380	120.00	TCS-1B
296	78+380	79+300	920.00	TCS-5
297	79+300	79+320	20.00	TCS-4C
298	79+320	79+340	20.00	TCS-1B
299	79+340	79+380	40.00	TCS-5
300	79+380	79+400	20.00	TCS-2
301	79+400	79+450	50.00	TCS-3
302	79+450	79+520	70.00	TCS-1
	Total		**18420**	

3. Intersections and Grade Separators:

All intersections and grade separators shall be as per the provision of relevant Manual.

Existing intersections which are deficient shall be improved to the prescribed standards.

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

(i) At-grade intersections

(a) Major Junctions

At grade major junctions shall be improved at intersecting roads with the Project highway is given below:

Sl.No	Location of intersection	Type of intersection	Other features
1	Km 61+100	Y-intersection	Intersecting road to be developed/Constructed for at least 120 m length.
2	Km 72+650	Y-intersection	
3	Km 75+700	Y-intersection	

(b) Minor Junctions

At grade minor junctions shall be improved at intersecting roads with the Project highway is given below:

Sl.No	Location of intersection	Type of intersection	Other features

1	65+550	T-intersection	Intersecting road to be developed/Constructed for at least 60 m length.
2	67+900	Y-intersection	
3	70+000	Y-intersection	
4	72+500	Y-intersection	
5	73+800	Y-intersection	
6	77+650	X-intersection	
7	79+250	X-intersection	
8	79+350	Y-intersection	
9	79+450	Y-intersection	
10	79+543	Y-intersection	

(ii) Grade Separated intersections with/ without ramps:

Sl. No.	Location	Salient features	Minimum Length of viaduct to be provided	Roads to be carried over/ under the structures
Nil				

4. ROAD EMBANKMENT AND CUT SECTION

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

(ii) **Raising of the existing road**: The existing road shall be raised as per given Plan & Profile.

5. PAVEMENT DESIGN

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

(ii) **Type of pavement:**

Flexible pavement shall be adopted with the minimum crust composition as mentioned below:

BC 40 mm

DBM 85 mm

WMM 250 mm

GSB 200 mm

(iii) Design requirements:

Design requirement for the flexible pavement shall be in accordance with section 5 of the IRC: SP-73-2018 and IRC:37-2018. The pavement shall be designed for an effective CBR of 11.54%.

(a) Design Period and Strategy

Flexible pavement shall be designed for a minimum design period of 20 years. Stage construction shall not be permitted.

(b) Design Traffic

Notwithstanding anything to the contrary contained in this Agreement or the Manual, the Contractor shall design the pavement for design traffic of 25 million standard axles.

(iv) Reconstruction of Stretches

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

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
1	61+100	61+180	80.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
2	61+180	61+240	60.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
3	61+240	61+340	100.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
4	61+340	61+360	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
5	61+360	61+420	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
6	61+420	61+440	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
7	61+440	61+520	80.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
8	61+520	61+540	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
9	61+540	61+620	80.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
10	61+620	61+640	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
11	61+640	61+780	140.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
12	61+780	61+800	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
13	61+800	61+840	40.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
14	61+840	61+880	40.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
15	61+880	61+940	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
16	61+940	61+960	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
17	61+960	61+980	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
18	61+980	62+040	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
19	62+040	62+080	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
20	62+080	62+120	40.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
21	62+120	62+140	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
22	62+140	62+160	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
23	62+160	62+240	80.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
24	62+240	62+280	40.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
25	62+280	62+300	20.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
26	62+300	62+330	30.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
27	62+330	62+360	30.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
28	62+360	62+380	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
29	62+380	62+420	40.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
30	62+420	62+460	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
31	62+460	62+520	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
32	62+520	62+560	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
33	62+560	62+620	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
34	62+620	62+760	140.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
35	62+760	62+780	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
36	62+780	62+900	120.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
37	62+900	62+930	30.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
38	62+930	63+040	110.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
39	63+040	63+080	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
40	63+080	63+100	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
41	63+100	63+300	200.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
42	63+300	63+320	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
43	63+320	63+400	80.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
44	63+400	63+460	60.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
45	63+460	63+550	90.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
46	63+550	63+560	10.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
47	63+560	63+580	20.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
48	63+580	63+620	40.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
49	63+620	63+640	20.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
50	63+640	63+730	90.00	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
51	63+730	63+760	30.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
52	63+760	63+800	40.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
53	63+800	63+840	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
54	63+840	63+930	90.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
55	63+930	63+980	50.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
56	63+980	64+000	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
57	64+000	64+040	40.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
58	64+040	64+060	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
59	64+060	64+100	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
60	64+100	64+140	40.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
61	64+140	64+180	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
62	64+180	64+220	40.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
63	64+220	64+240	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
64	64+240	64+300	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
65	64+300	64+340	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
66	64+340	64+400	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
67	64+400	64+420	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
68	64+420	64+560	140.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
69	64+560	64+580	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
70	64+580	64+600	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
71	64+600	64+640	40.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
72	64+640	64+660	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
73	64+660	64+700	40.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
74	64+700	64+720	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
75	64+720	64+760	40.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
76	64+760	64+780	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
77	64+780	64+800	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
78	64+800	64+820	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
79	64+820	64+840	20.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
80	64+840	64+860	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
81	64+860	64+940	80.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
82	64+940	65+080	140.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
83	65+080	65+120	40.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
84	65+120	65+140	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
85	65+140	65+180	40.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
86	65+180	65+540	360.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
87	65+540	65+570	30.00	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
88	65+570	65+640	70.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
89	65+640	65+720	80.00	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
90	65+720	65+740	20.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
91	65+740	65+880	140.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
92	65+880	65+940	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
93	65+940	65+960	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
94	65+960	66+100	140.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
95	66+100	66+120	20.00	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
96	66+120	66+140	20.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
97	66+140	66+160	20.00	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
98	66+160	66+180	20.00	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
99	66+180	66+240	60.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
100	66+240	66+360	120.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
101	66+360	66+440	80.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
102	66+440	66+460	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
103	66+460	66+520	60.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
104	66+520	66+600	80.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
105	66+600	66+620	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
106	66+620	66+720	100.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
107	66+720	66+740	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
108	66+740	66+760	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
109	66+760	66+940	180.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
110	66+940	66+980	40.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
111	66+980	67+040	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
112	67+040	67+080	40.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
113	67+080	67+160	80.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
114	67+160	67+180	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
115	67+180	67+320	140.00	TCS-6	Typical Cross Section -6, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope(RHS) (Sinking Zone)
116	67+320	67+340	20.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
117	67+340	67+360	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
118	67+360	67+420	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
119	67+420	67+460	40.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
120	67+460	67+500	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
121	67+500	67+540	40.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
122	67+540	67+580	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
123	67+580	67+600	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
124	67+600	67+620	20.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
125	67+620	67+680	60.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
126	67+680	67+740	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
127	67+740	67+760	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
128	67+760	67+780	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
129	67+780	67+840	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
130	67+840	67+860	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
131	67+860	67+880	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
132	67+880	67+900	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
133	67+900	67+980	80.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
134	67+980	68+000	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
135	68+000	68+040	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
136	68+040	68+080	40.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
137	68+080	68+100	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
138	68+100	68+120	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
139	68+120	68+140	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
140	68+140	68+160	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
141	68+160	68+220	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
142	68+220	68+240	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
143	68+240	68+260	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
144	68+260	68+300	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
145	68+300	68+340	40.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
146	68+340	68+420	80.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
147	68+420	68+440	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
148	68+440	68+510	70.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
149	68+510	68+540	30.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
150	68+540	68+720	180.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
151	68+720	68+760	40.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
152	68+760	68+900	140.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
153	68+900	68+920	20.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
154	68+920	68+940	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
155	68+940	69+000	60.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
156	69+000	69+080	80.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
157	69+080	69+120	40.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
158	69+120	69+160	40.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
159	69+160	69+200	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
160	69+200	69+240	40.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
161	69+240	69+260	20.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
162	69+260	69+340	80.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
163	69+340	69+420	80.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
164	69+420	69+440	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
165	69+440	69+460	20.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
166	69+460	69+500	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
167	69+500	69+620	120.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
168	69+620	69+640	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
169	69+640	69+720	80.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
170	69+720	69+740	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
171	69+740	69+760	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
172	69+760	69+850	90.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
173	69+990	70+020	30.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
174	70+020	70+060	40.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
175	70+060	70+120	60.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
176	70+120	70+160	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
177	70+160	70+300	140.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
178	70+300	70+320	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
179	70+320	70+380	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
180	70+380	70+420	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
181	70+420	70+440	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
182	70+440	70+470	30.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
183	70+470	70+500	30.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
184	70+500	70+520	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
185	70+520	70+540	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
186	70+540	70+640	100.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
187	70+640	70+660	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
188	70+660	70+800	140.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
189	70+800	70+870	70.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
190	70+870	70+900	30.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
191	70+900	71+020	120.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
192	71+020	71+040	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
193	71+040	71+060	20.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
194	71+060	71+080	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
195	71+080	71+130	50.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
196	71+130	71+140	10.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
197	71+140	71+160	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
198	71+160	71+260	100.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
199	71+260	71+300	40.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
200	71+300	71+320	20.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
201	71+320	71+340	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
202	71+340	71+540	200.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
203	71+540	71+560	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
204	71+560	71+580	20.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
205	71+580	71+600	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
206	71+600	71+620	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
207	71+620	71+740	120.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
208	71+740	71+780	40.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
209	71+780	71+960	180.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
210	71+960	71+980	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
211	71+980	72+040	60.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
212	72+040	72+060	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
213	72+060	72+080	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
214	72+080	72+260	180.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
215	72+260	72+300	40.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
216	72+300	72+320	20.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
217	72+320	72+340	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
218	72+340	72+360	20.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
219	72+360	72+380	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
220	72+380	72+420	40.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
221	72+420	72+440	20.00	TCS-3A	Typical Cross Section -3A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Breast Wall (RHS)
222	72+440	72+460	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
223	72+460	72+480	20.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
224	72+480	72+500	20.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
225	72+500	72+520	20.00	TCS-2A	Typical Cross Section -2A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Retaining Wall (LHS) And Hill Side Slope (RHS)
226	72+520	72+560	40.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
227	72+560	72+600	40.00	TCS-4A	Typical Cross Section -4A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Breast Wall (RHS)
228	72+600	72+640	40.00	TCS-1A	Typical Cross Section -1A, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Valley Side Slope (LHS) And Hill Side Slope (RHS)
229	72+640	72+800	160.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
230	72+800	72+820	20.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
231	72+820	72+920	100.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
232	72+920	72+970	50.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
233	72+970	73+000	30.00	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
234	73+000	73+020	20.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
235	73+020	73+040	20.00	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
236	73+040	73+100	60.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
237	73+100	73+160	60.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
238	73+160	73+220	60.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
239	73+220	73+320	100.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
240	73+320	73+380	60.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
241	73+380	73+420	40.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
242	73+420	73+480	60.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
243	73+480	73+560	80.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
244	73+560	73+580	20.00	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
245	73+580	73+760	180.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
246	73+760	73+780	20.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
247	73+780	73+840	60.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
248	73+840	73+900	60.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
249	73+900	73+940	40.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
250	73+940	74+080	140.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
251	74+080	74+120	40.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
252	74+120	74+140	20.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
253	74+140	74+240	100.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
254	74+240	74+260	20.00	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
255	74+260	74+280	20.00	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
256	74+280	74+300	20.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
257	74+300	74+480	180.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
258	74+480	74+500	20.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
259	74+500	74+520	20.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
260	74+520	74+540	20.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
261	74+540	74+560	20.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
262	74+560	74+580	20.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
263	74+580	74+600	20.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
264	74+600	74+620	20.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
265	74+620	74+780	160.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
266	74+780	74+800	20.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
267	74+800	74+850	50.00	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
268	74+850	74+880	30.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
269	74+880	75+020	140.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
270	75+020	75+060	40.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
271	75+060	75+300	240.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
272	75+300	75+320	20.00	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
273	75+320	75+380	60.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
274	75+380	75+420	40.00	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)

S.No	Design Chainage		Length(m)	Type of TCS	DESCRIPTION
	From	To			
275	75+420	75+630	210.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
276	75+630	75+640	10.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
277	75+640	75+750	110.00	TCS-4	Typical Cross Section -4, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Slope (RHS)
278	79+380	79+400	20.00	TCS-2	Typical Cross Section -2, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Retaining Wall (RHS)
279	79+400	79+450	50.00	TCS-3	Typical Cross Section -3, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Breast Wall (LHS) And Valley Side Retaining Wall (RHS)
280	79+450	79+520	70.00	TCS-1	Typical Cross Section -1, 2 Lane Highway (Open Country Mountainous/Steep Terrain) Hill Side Slope (LHS) And Valley Side Slope (RHS)
	Total		**14650**		

6. ROADSIDE DRAINAGE

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

Cement Concrete Lined Drain of trapezoidal shape as shown in the different typical cross sections in length to be constructed = 18860 m

7. DESIGN OF STRUCTURES

(i) General

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

b. Width of the carriageway of new bridges and structures shall be as follows:

Sl. No.	Viaduct at km	Width of carriageway and cross-sectional features
1	69+920	Total Deck Width = 13.60 m (7.0) MCW+ (2.8*2) PS + (0.5*2) CB (Typical Cross Section attached)
2	76+030	
3	76+770	

*MCW = Main Carriageway, PS = Paved Shoulders & CB = Crash Barrier

c. The following structures shall be provided with footpath, as per provisions of IRC:

Sl. No.	Location at km	Remarks
NIL		

d. All bridges shall be high-level bridges.

e. The following structures shall be designed to carry utility services as per site requirement.

Sr. No.	Bridge at km	Utility service to be carried	Remarks
Nil			

f. Cross-section of the new culverts and viaducts at deck level for the Project Highway shall conform to the typical cross-sections given.

(ii) <u>Culverts</u>

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

b. Reconstruction of existing culverts:

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

Sl.No.	Culvert location	Span/Opening (m)	Remarks
1	61+161	2 m	RCC BOX
2	61+255	2 m	RCC BOX
3	61+525	2 m	RCC BOX
4	61+850	2 m	RCC BOX

Sl.No.	Culvert location	Span/Opening (m)	Remarks
5	61+965	2 m	RCC BOX
6	62+055	2 m	RCC BOX
7	62+130	2 m	RCC BOX
8	62+206	2 m	RCC BOX
9	62+545	4 m	RCC BOX
10	62+750	2 m	RCC BOX
11	62+910	3 m	RCC BOX
12	63+310	2 m	RCC BOX
13	63+935	2 m	RCC BOX
14	64+140	2 m	RCC BOX
15	64+410	2 m	RCC BOX
16	64+585	3 m	RCC BOX
17	64+840	3 m	RCC BOX
18	64+967	2 m	RCC BOX
19	65+074	2 m	RCC BOX
20	65+199	2 m	RCC BOX
21	65+300	2 m	RCC BOX
22	65+543	2 m	RCC BOX
23	66+040	2 m	RCC BOX
24	66+253	2 m	RCC BOX
25	66+430	2 m	RCC BOX
26	66+570	2 m	RCC BOX
27	66+670	2 m	RCC BOX
28	66+880	2 m	RCC BOX
29	66+960	2 m	RCC BOX
30	67+105	2 m	RCC BOX
31	67+210	2 m	RCC BOX
32	67+295	2 m	RCC BOX
33	67+465	2 m	RCC BOX
34	67+550	4 m	RCC BOX
35	67+745	2 m	RCC BOX
36	68+010	3 m	RCC BOX
37	68+140	2 m	RCC BOX
38	68+285	2 m	RCC BOX
39	68+355	2 m	RCC BOX
40	68+664	2 m	RCC BOX
41	69+310	2 m	RCC BOX
42	69+620	2 m	RCC BOX
43	70+300	2 m	RCC BOX
44	70+635	2 m	RCC BOX
45	70+837	2 m	RCC BOX
46	70+980	2 m	RCC BOX
47	71+090	2 m	RCC BOX
48	71+277	2 m	RCC BOX
49	71+540	2 m	RCC BOX

Sl.No.	Culvert location	Span/Opening (m)	Remarks
50	71+927	2 m	RCC BOX
51	72+264	2 m	RCC BOX
52	73+000	3 m	RCC BOX
53	73+110	3 m	RCC BOX
54	73+410	3 m	RCC BOX
55	74+086	2 m	RCC BOX
56	74+200	2 m	RCC BOX
57	74+410	3 m	RCC BOX
58	74+708	3 m	RCC BOX
59	74+888	3 m	RCC BOX
60	75+027	3 m	RCC BOX
61	75+135	3 m	RCC BOX
62	75+620	2 m	RCC BOX
63	79+330	2 m	RCC BOX

c. Widening of Existing Culverts: All existing culverts which are not to be reconstructed shall be widened to the roadway width of the Project Highway as per details below. Repairs and strengthening of existing structures where required shall be carried out.

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

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

Sl. No	Culvert location	Span/Opening (m)
1	63+045	2 m
2	63+550	2 m
3	63+700	2 m
4	65+700	2 m
5	65+935	2 m
6	68+960	2 m
7	69+170	2 m
8	70+470	2 m
9	71+768	2 m
10	72+625	2 m
11	73+610	2 m

12	75+330	2 m
13	77+165	2 m
14	77+390	2 m
15	77+675	2 m
16	78+350	2 m
17	78+840	2 m
18	78+950	2 m

e. Repair/Replacement of railing/Parapets, flooring and protection works of the existing culverts shall be undertaken as follows:

Sr. No.	Location at km	Type of repair required
NIL		

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

(iii) Bridges

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

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

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

(ii) The following narrow bridges shall be widened:

Sr. No.	Location (Km)	Existing Width (m)	Extent of Widening (m)	Cross-section at deck level for widening
NIL				

(b) Additional New Viaduct

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

Sr. No.	Location	Total length (m)	Remarks
1	69+920	140	• Pile foundation to be adopted.

2	76+030	560	• Pile foundation to be adopted. • Poly Carbonate Sheet (View cutters) to be provided.
3	76+770	600	• Pile foundation to be adopted.

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

Sr. No.	Location (km)	Remarks
Nil		

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

Sr. No.	Location (km)	Remarks
Nil		

(e) Drainage System for Viaduct Decks: An effective drainage system for bridge decks shall be provided as specified in the provision of relevant Manual.

(f) Structures in Marine Environment: Nil

(iv) Rail-Road Bridges

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

(b) Road Over bridges

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

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

(c) Road under-bridges

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

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

(v) Grade Separated Structures

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

(vi) Repairs and strengthening of bridges and structures

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

(a) Bridges

Sl. No.	Location of Bridge (km)	Nature of extent of repairs/strengthening to be carried out
Nil		

(b) ROB/RUB

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

(c) Overpasses/Underpasses and other structures

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

(vii) List of Viaducts and Structures

The following is list of Viaducts and Structures

Sl. No.	Location (Design)
1	69+920

2	76+030
3	76+770

8. Traffic Control Devices and Road Safety Works

(i) Traffic control devices and road safety works shall be provided in accordance with the provisions of the relevant Manual.

(ii) Specifications of the reflective sheeting shall be Class C sheeting described in IRC:67 and type VIII/IX/XI as per ASTM D 4956-09 fixed over Aluminium or Aluminium Composite Material.

The minimum nos. of traffic sign boards are as hereunder-

Sl No.	Item	Total Nos
(i)	90 cm equilateral triangle	416
(ii)	60 cm circular	1178
(iii)	90 cm high octagon	304
(v)	Hazard Marker Sign Boards	168
(vi)	Village Name Boards of size 900x600	24
(vii)	Place Identification Boards of size 1200x900	4
(viii)	Advance Direction Sign Boards of 1800x1200	21
(ix)	Chevron boards of size 600x450	1104

(iii) **Road Marking:** The road markings with hot applied thermoplastic paint consisting of different lane markings, directional arrows, chevron marking, letterings, transverse bar marking (speed calming measure) etc. shall cover the entire Project Highway and at all junctions/intersections as per relevant code, manual and relevant MoRT&H circular.

(iv) **Road studs:** The Reflective Pavement Markers (RRPM) i.e. road studs of prismatic retroreflective type conforming to ASTM D 4280, Table 9.1 of Manual to be provided following placement details as per IRC:35. The colour pattern of road studs for edge line and centre line with respect traffic movement is to be adopted as per Manual and as per relevant MoRT&H Circular.

Minimum number of road studs of different colours: 4420 nos

(v) **Road Delineators:** Minimum 168 nos of road delineators to be provided as per Manual and relevant IRC code.

9. Roadside Furniture

(i) Roadside furniture shall be provided in accordance with the provisions of the relevant Manual.

(ii) Overhead Traffic Signs: Location and Size

The location & size of overhead traffic signs shall be as hereunder:

Location (Design)	Size	Remarks
Km 61+100	12.0 m x 2.0 m	Clear height of gantry = 6.0 m
Km 72+650		
Km 75+700		

10. Compulsory Afforestation: NIL

11. Hazardous Locations:

The safety barriers (Thrie Beam Crash Barriers along with reflectors) shall be provided at the following hazardous locations:

Sl.No.	Location stretch from (km) to (km)	LHS/RHS	Remarks
1	km 61+100 to km 69+850	At Valley side	Except at culverts & box cut locations.
2	km 69+990 to km 75+750		
3	km 76+310 to km 76+470		
4	Km 77+070 to km 79+520		

12. Special Requirement for Hill Roads

a) Retaining Wall:

The minimum requirement of Retaining wall is as follows. The Contractor is required to conduct detail investigation to assess the work based on site survey, investigations and assessment before commencement of work. Any increase in length within 10% of total scope mentioned herein shall not constitute a Change of Scope.

Retaining Walls Locations LHS:

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
1	61+100	61+120	20	RW 4m	plum
2	61+120	61+140	20	RW 4m	plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
3	61+140	61+160	20	RW 4m	plum
4	61+160	61+180	20	RW 4m	plum
5	61+180	61+200	20	RW 5m	plum
6	61+200	61+220	20	RW 6m	plum
7	61+220	61+240	20	RW 4m	plum
8	61+420	61+440	20	RW 4m	plum
9	61+620	61+640	20	RW 4m	plum
10	61+960	61+980	20	RW 4m	plum
11	62+040	62+060	20	RW 4m	plum
12	62+060	62+080	20	RW 4m	plum
13	62+140	62+160	20	RW 4m	plum
14	62+240	62+260	20	RW 4m	plum
15	62+260	62+280	20	RW 4m	plum
16	62+300	62+320	20	RW 4m	plum
17	62+420	62+440	20	RW 7m	plum
18	62+440	62+460	20	RW 5m	plum
19	62+520	62+540	20	RW 4m	plum
20	62+540	62+560	20	RW 4m	plum
21	62+620	62+640	20	RW 4m	plum
22	62+640	62+660	20	RW 4m	plum
23	62+660	62+680	20	8m RCC RW	RCC
24	62+680	62+700	20	8m RCC RW	RCC
25	62+700	62+720	20	RW 4m	plum
26	62+720	62+740	20	RW 4m	plum
27	62+740	62+760	20	RW 4m	plum
28	63+040	63+060	20	RW 4m	plum
29	63+060	63+080	20	RW 4m	plum
30	63+080	63+100	20	RW 4m	plum
31	63+800	63+820	20	RW 4m	plum
32	63+820	63+840	20	RW 4m	plum
33	63+940	63+960	20	RW 4m	plum
34	63+960	63+980	20	RW 4m	plum
35	63+980	64+000	20	RW 6m	plum
36	64+060	64+080	20	RW 5m	plum
37	64+080	64+100	20	RW 5m	plum
38	64+140	64+160	20	RW 5m	plum
39	64+160	64+180	20	10m RCC RW	RCC
40	64+220	64+240	20	RW 5m	plum
41	64+300	64+320	20	10m RCC RW	RCC
42	64+320	64+340	20	RW 5m	plum
43	64+420	64+440	20	8m RCC RW	RCC
44	64+480	64+500	20	RW 6m	plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
45	64+520	64+540	20	RW 5m	plum
46	64+540	64+560	20	RW 7m	plum
47	64+580	64+600	20	RW 6m	plum
48	64+640	64+660	20	RW 6m	plum
49	64+700	64+720	20	RW 5m	plum
50	64+760	64+780	20	RW 4m	plum
51	64+780	64+800	20	10m RCC RW	RCC
52	64+800	64+820	20	RW 4m	plum
53	64+940	64+960	20	RW 4m	plum
54	64+960	64+980	20	10m RCC RW	RCC
55	64+980	65+000	20	RW 5m	plum
56	65+120	65+140	20	RW 4m	plum
57	65+740	65+760	20	RW 5m	plum
58	65+760	65+780	20	10m RCC RW	RCC
59	65+780	65+800	20	10m RCC RW	RCC
60	65+800	65+820	20	8m RCC RW	RCC
61	65+820	65+840	20	RW 5m	plum
62	65+840	65+860	20	RW 4m	plum
63	65+860	65+880	20	RW 7m	plum
64	65+940	65+960	20	RW 4m	plum
65	65+960	65+980	20	RW 4m	plum
66	65+980	66+000	20	RW 4m	plum
67	66+000	66+020	20	RW 4m	plum
68	66+020	66+040	20	RW 4m	plum
69	66+040	66+060	20	RW 4m	plum
70	66+240	66+260	20	RW 4m	plum
71	66+260	66+280	20	10m RCC RW	RCC
72	66+280	66+300	20	10m RCC RW	RCC
73	66+300	66+320	20	RW 7m	plum
74	66+320	66+340	20	RW 5m	plum
75	66+340	66+360	20	RW 4m	plum
76	66+440	66+460	20	RW 4m	plum
77	66+600	66+620	20	RW 6m	plum
78	66+740	66+760	20	RW 4m	plum
79	67+180	67+200	20	RW 4m	plum
80	67+200	67+220	20	RW 4m	plum
81	67+220	67+240	20	RW 4m	plum
82	67+260	67+280	20	RW 4m	plum
83	67+280	67+300	20	RW 4m	plum
84	67+300	67+320	20	RW 4m	plum
85	67+460	67+480	20	RW 5m	plum
86	67+480	67+500	20	RW 4m	plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
87	67+540	67+560	20	RW 5m	plum
88	67+560	67+580	20	RW 4m	plum
89	67+580	67+600	20	RW 4m	plum
90	67+620	67+640	20	RW 4m	plum
91	67+640	67+660	20	RW 4m	plum
92	67+660	67+680	20	RW 4m	plum
93	67+760	67+780	20	RW 4m	plum
94	67+860	67+880	20	RW 4m	plum
95	68+000	68+020	20	8m RCC RW	RCC
96	68+020	68+040	20	RW 4m	plum
97	68+100	68+120	20	RW 5m	plum
98	68+140	68+160	20	RW 4m	plum
99	68+220	68+240	20	RW 4m	plum
100	68+260	68+280	20	RW 6m	plum
101	68+280	68+300	20	RW 6m	plum
102	68+300	68+320	20	RW 4m	plum
103	68+340	68+360	20	RW 4m	plum
104	68+360	68+380	20	RW 4m	plum
105	68+380	68+400	20	RW 7m	plum
106	68+400	68+420	20	8m RCC RW	RCC
107	68+560	68+580	20	RW 5m	plum
108	68+580	68+600	20	RW 4m	plum
109	68+600	68+620	20	RW 4m	plum
110	68+620	68+640	20	RW 4m	plum
111	68+640	68+660	20	RW 7m	plum
112	68+660	68+680	20	9m RCC RW	RCC
113	68+680	68+700	20	8m RCC RW	RCC
114	68+700	68+720	20	RW 4m	plum
115	68+940	68+960	20	RW 5m	plum
116	68+960	68+980	20	RW 4m	plum
117	68+980	69+000	20	RW 5m	plum
118	69+120	69+140	20	RW 4m	plum
119	69+140	69+160	20	RW 4m	plum
120	69+160	69+180	20	RW 4m	plum
121	69+180	69+200	20	8m RCC RW	RCC
122	69+200	69+220	20	RW 5m	plum
123	69+220	69+240	20	RW 4m	plum
124	69+260	69+280	20	RW 4m	plum
125	69+280	69+300	20	RW 4m	plum
126	69+300	69+320	20	RW 4m	plum
127	69+320	69+340	20	RW 4m	plum
128	69+420	69+440	20	RW 4m	plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
129	69+460	69+480	20	RW 4m	plum
130	69+480	69+500	20	RW 5m	plum
131	69+520	69+540	20	RW 4m	plum
132	69+720	69+740	20	RW 4m	plum
133	70+000	70+020	20	RW 4m	plum
134	70+060	70+080	20	RW 5m	plum
135	70+080	70+100	20	RW 4m	plum
136	70+100	70+120	20	RW 5m	plum
137	70+120	70+140	20	RW 4m	plum
138	70+140	70+160	20	RW 6m	plum
139	70+300	70+320	20	RW 6m	plum
140	70+380	70+400	20	RW 4m	plum
141	70+400	70+420	20	RW 4m	plum
142	70+420	70+440	20	RW 4m	plum
143	70+440	70+460	20	RW 4m	plum
144	70+460	70+480	20	RW 5m	plum
145	70+480	70+500	20	RW 4m	plum
146	70+500	70+520	20	RW 6m	plum
147	70+520	70+540	20	RW 4m	plum
148	70+800	70+820	20	RW 4m	plum
149	70+820	70+840	20	9m RCC RW	RCC
150	70+840	70+860	20	8m RCC RW	RCC
151	70+860	70+880	20	RW 4m	plum
152	70+900	70+920	20	RW 7m	plum
153	70+920	70+940	20	RW 7m	plum
154	70+940	70+960	20	RW 4m	plum
155	70+960	70+980	20	RW 6m	plum
156	70+980	71+000	20	RW 7m	plum
157	71+000	71+020	20	RW 4m	plum
158	71+020	71+040	20	RW 4m	plum
159	71+080	71+100	20	RW 5m	plum
160	71+100	71+120	20	RW 4m	plum
161	71+140	71+160	20	RW 5m	plum
162	71+260	71+280	20	RW 4m	plum
163	71+280	71+300	20	RW 4m	plum
164	71+320	71+340	20	RW 4m	plum
165	71+600	71+620	20	RW 4m	plum
166	71+740	71+760	20	RW 4m	plum
167	71+760	71+780	20	RW 4m	plum
168	71+960	71+980	20	RW 4m	plum
169	72+040	72+060	20	RW 5m	plum
170	72+060	72+080	20	RW 4m	plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
171	72+260	72+280	20	RW 4m	plum
172	72+280	72+300	20	RW 4m	plum
173	72+320	72+340	20	RW 4m	plum
174	72+360	72+380	20	RW 4m	plum
175	72+420	72+440	20	RW 4m	plum
176	72+440	72+460	20	RW 4m	plum
177	72+500	72+520	20	RW 4m	plum
178	72+600	72+620	20	RW 4m	plum
179	72+620	72+640	20	RW 4m	plum
180	72+640	72+660	20	RW 4m	plum
181	72+660	72+680	20	RW 6m	plum
182	73+240	73+260	20	RW 4m	plum
183	74+320	74+340	20	RW 5m	plum
184	74+680	74+700	20	RW 4m	plum
185	74+720	74+740	20	RW 4m	plum
186	74+900	74+920	20	RW 5m	plum
187	74+920	74+940	20	RW 5m	plum
188	74+940	74+960	20	RW 4m	plum
189	75+120	75+140	20	RW 4m	plum
190	75+140	75+160	20	RW 4m	plum
191	76+340	76+360	20	10m RCC RW	RCC (counter fort)
192	76+360	76+380	20	10m RCC RW	
193	76+380	76+400	20	10m RCC RW	
194	76+400	76+420	20	10m RCC RW	
195	76+420	76+440	20	10m RCC RW	
196	76+440	76+460	20	10m RCC RW	
197	76+460	76+480	20	10m RCC RW	
198	77+080	77+100	20	10m RCC RW	
199	77+100	77+120	20	10m RCC RW	
200	77+120	77+140	20	10m RCC RW	
201	77+140	77+160	20	RW 6m	plum
202	79+340	79+360	20	RW 5m	plum
203	79+360	79+380	20	RW 4m	plum
Total			**4060**		

Retaining Walls Locations RHS:

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
1	63+580	63+600	20	RW 4m	plum
2	63+600	63+620	20	RW 4m	plum
3	63+740	63+760	20	RW 4m	plum
4	64+140	64+160	20	RW 5m	plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
5	64+300	64+320	20	RW 5m	plum
6	64+480	64+500	20	RW 4m	plum
7	64+960	64+980	20	RW 4m	plum
8	65+760	65+780	20	RW 4m	plum
9	65+780	65+800	20	RW 4m	plum
10	65+800	65+820	20	RW 4m	plum
11	65+820	65+840	20	RW 5m	plum
12	65+980	66+000	20	RW 5m	plum
13	66+000	66+020	20	8m RCC RW	RCC
14	66+020	66+040	20	9m RCC RW	RCC
15	66+040	66+060	20	10m RCC RW	RCC
16	66+060	66+080	20	RW 7m	plum
17	66+080	66+100	20	RW 5m	plum
18	66+100	66+120	20	RW 4m	plum
19	66+140	66+160	20	RW 4m	plum
20	66+260	66+280	20	RW 4m	plum
21	66+280	66+300	20	8m RCC RW	RCC
22	67+460	67+480	20	RW 4m	plum
23	67+480	67+500	20	RW 4m	plum
24	68+000	68+020	20	RW 4m	plum
25	68+260	68+280	20	RW 4m	plum
26	68+280	68+300	20	RW 4m	plum
27	68+360	68+380	20	RW 4m	plum
28	68+380	68+400	20	RW 4m	plum
29	70+380	70+400	20	RW 4m	plum
30	70+860	70+880	20	RW 4m	plum
31	72+500	72+520	20	RW 5m	plum
32	72+640	72+660	20	RW 4m	plum
33	72+660	72+680	20	RW 6m	plum
34	72+680	72+700	20	9m RCC RW	RCC
35	72+700	72+720	20	RW 5m	plum
36	72+720	72+740	20	RW 4m	plum
37	72+740	72+760	20	RW 6m	plum
38	72+760	72+780	20	RW 5m	plum
39	72+780	72+800	20	RW 5m	plum
40	72+820	72+840	20	RW 4m	plum
41	72+840	72+860	20	RW 7m	plum
42	72+860	72+880	20	RW 6m	plum
43	72+880	72+900	20	RW 7m	plum
44	72+900	72+920	20	RW 4m	plum
45	73+000	73+020	20	RW 4m	plum
46	73+020	73+040	20	RW 4m	plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
47	73+100	73+120	20	RW 4m	plum
48	73+120	73+140	20	RW 4m	plum
49	73+140	73+160	20	RW 4m	plum
50	73+220	73+240	20	RW 5m	plum
51	73+240	73+260	20	10m RCC RW	RCC (counter fort)
52	73+260	73+280	20	RW 7m	plum
53	73+280	73+300	20	RW 4m	plum
54	73+300	73+320	20	RW 4m	plum
55	73+380	73+400	20	RW 5m	plum
56	73+400	73+420	20	RW 5m	plum
57	73+480	73+500	20	RW 4m	plum
58	73+500	73+520	20	RW 7m	plum
59	73+520	73+540	20	10m RCC RW	RCC (counter fort)
60	73+540	73+560	20	RW 7m	plum
61	73+560	73+580	20	RW 4m	plum
62	73+580	73+600	20	RW 5m	plum
63	73+600	73+620	20	RW 6m	plum
64	73+620	73+640	20	8m RCC RW	RCC
65	73+640	73+660	20	RW 6m	plum
66	73+660	73+680	20	RW 4m	plum
67	73+680	73+700	20	RW 4m	plum
68	73+700	73+720	20	RW 4m	plum
69	73+720	73+740	20	RW 5m	plum
70	73+740	73+760	20	RW 5m	plum
71	73+900	73+920	20	RW 4m	plum
72	73+920	73+940	20	RW 4m	plum
73	74+080	74+100	20	RW 4m	plum
74	74+100	74+120	20	RW 7m	plum
75	74+140	74+160	20	RW 6m	plum
76	74+160	74+180	20	RW 4m	plum
77	74+180	74+200	20	RW 7m	plum
78	74+200	74+220	20	10m RCC RW	RCC (counter fort)
79	74+220	74+240	20	RW 4m	plum
80	74+300	74+320	20	RW 5m	plum
81	74+320	74+340	20	8m RCC RW	RCC
82	74+340	74+360	20	RW 7m	plum
83	74+360	74+380	20	RW 6m	plum
84	74+380	74+400	20	RW 4m	plum
85	74+400	74+420	20	RW 4m	plum
86	74+420	74+440	20	RW 5m	plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
87	74+440	74+460	20	RW 4m	plum
88	74+460	74+480	20	RW 4m	plum
89	74+500	74+520	20	RW 5m	plum
90	74+540	74+560	20	RW 4m	plum
91	74+580	74+600	20	RW 4m	plum
92	74+620	74+640	20	RW 5m	plum
93	74+640	74+660	20	8m RCC RW	RCC
94	74+660	74+680	20	RW 6m	plum
95	74+680	74+700	20	RW 4m	plum
96	74+700	74+720	20	RW 4m	plum
97	74+720	74+740	20	RW 4m	plum
98	74+740	74+760	20	RW 4m	plum
99	74+760	74+780	20	RW 4m	plum
100	74+880	74+900	20	RW 4m	plum
101	74+900	74+920	20	RW 7m	plum
102	74+920	74+940	20	8m RCC RW	RCC
103	74+940	74+960	20	10m RCC RW	RCC (counter fort)
104	74+960	74+980	20	10m RCC RW	
105	74+980	75+000	20	10m RCC RW	
106	75+000	75+020	20	10m RCC RW	
107	75+060	75+080	20	RW 5m	plum
108	75+080	75+100	20	RW 4m	plum
109	75+100	75+120	20	RW 4m	plum
110	75+120	75+140	20	RW 5m	plum
111	75+140	75+160	20	RW 4m	plum
112	75+160	75+180	20	RW 4m	plum
113	75+180	75+200	20	RW 4m	plum
114	75+200	75+220	20	RW 4m	plum
115	75+220	75+240	20	RW 7m	plum
116	75+240	75+260	20	RW 7m	plum
117	75+260	75+280	20	RW 5m	plum
118	75+280	75+300	20	RW 4m	plum
119	75+300	75+320	20	RW 4m	plum
120	75+320	75+340	20	RW 5m	plum
121	75+340	75+360	20	RW 4m	plum
122	75+360	75+380	20	RW 5m	plum
123	75+380	75+400	20	RW 4m	plum
124	75+400	75+420	20	RW 4m	plum
125	75+420	75+440	20	RW 5m	plum
126	75+440	75+460	20	RW 4m	plum
127	75+460	75+480	20	RW 7m	plum
128	75+480	75+500	20	RW 6m	plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
129	75+500	75+520	20	RW 6m	plum
130	75+520	75+540	20	RW 5m	plum
131	75+540	75+560	20	RW 4m	plum
132	75+560	75+580	20	RW 4m	plum
133	75+580	75+600	20	RW 4m	plum
134	75+600	75+620	20	RW 5m	plum
135	75+740	75+760	20	RW 5m	plum
136	76+340	76+360	20	10m RCC RW	RCC (counter fort)
137	76+360	76+380	20	10m RCC RW	
138	76+380	76+400	20	10m RCC RW	
139	76+400	76+420	20	10m RCC RW	
140	76+420	76+440	20	10m RCC RW	
141	76+440	76+460	20	10m RCC RW	
142	76+460	76+480	20	10m RCC RW	
143	77+080	77+100	20	10m RCC RW	
144	77+100	77+120	20	10m RCC RW	
145	77+120	77+140	20	10m RCC RW	
146	77+140	77+160	20	10m RCC RW	
147	77+160	77+180	20	RW 7m	plum
148	77+180	77+200	20	RW 5m	plum
149	78+960	78+980	20	RW 4m	plum
150	78+980	79+000	20	RW 4m	plum
151	79+340	79+360	20	RW 6m	plum
152	79+360	79+380	20	RW 7m	plum
153	79+380	79+400	20	RW 5m	plum
154	79+400	79+420	20	RW 4m	plum
155	79+420	79+440	20	RW 4m	plum
Total			**3100**		

Total proposed minimum length of Retaining wall: 7160m

b) BREAST WALL

The minimum requirement of Breast wall is as follows. The Contractor is required to conduct detail investigation to assess the work based on site survey, investigations and assessment before commencement of work. Any increase in length within 10% of total scope mentioned herein shall not constitute a Change of Scope.

Breast Walls Locations LHS:

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
1	61+740	61+760	20	BW 3m	Plum
2	61+760	61+780	20	BW 4m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
3	61+780	61+800	20	BW 4m	Plum
4	62+000	62+020	20	BW 3m	Plum
5	62+880	62+900	20	BW 3m	Plum
6	63+400	63+420	20	BW 3m	Plum
7	63+480	63+500	20	BW 3m	Plum
8	63+500	63+520	20	BW 4m	Plum
9	63+520	63+540	20	BW 4m	Plum
10	63+640	63+660	20	BW 3m	Plum
11	63+660	63+680	20	BW 3m	Plum
12	63+680	63+700	20	BW 4m	Plum
13	63+700	63+720	20	BW 3m	Plum
14	63+720	63+740	20	BW 4m	Plum
15	64+260	64+280	20	BW 3m	Plum
16	64+880	64+900	20	BW 3m	Plum
17	64+900	64+920	20	BW 3m	Plum
18	65+240	65+260	20	BW 3m	Plum
19	65+260	65+280	20	BW 3m	Plum
20	65+280	65+300	20	BW 4m	Plum
21	65+300	65+320	20	BW 3m	Plum
22	65+320	65+340	20	BW 3m	Plum
23	65+340	65+360	20	BW 3m	Plum
24	65+360	65+380	20	BW 3m	Plum
25	65+380	65+400	20	BW 3m	Plum
26	65+400	65+420	20	BW 4m	Plum
27	65+420	65+440	20	BW 4m	Plum
28	65+440	65+460	20	BW 4m	Plum
29	65+460	65+480	20	BW 4m	Plum
30	65+480	65+500	20	BW 4m	Plum
31	65+500	65+520	20	BW 4m	Plum
32	65+520	65+540	20	BW 4m	Plum
33	65+540	65+560	20	BW 4m	Plum
34	65+560	65+580	20	BW 3m	Plum
35	65+640	65+660	20	BW 4m	Plum
36	65+660	65+680	20	BW 4m	Plum
37	65+680	65+700	20	BW 3m	Plum
38	65+700	65+720	20	BW 3m	Plum
39	66+100	66+120	20	BW 3m	Plum
40	66+140	66+160	20	BW 3m	Plum
41	66+160	66+180	20	BW 3m	Plum
42	66+920	66+940	20	BW 3m	Plum
43	66+940	66+960	20	BW 3m	Plum
44	66+960	66+980	20	BW 3m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
45	66+980	67+000	20	BW 3m	Plum
46	67+000	67+020	20	BW 3m	Plum
47	67+820	67+840	20	BW 3m	Plum
48	68+040	68+060	20	BW 3m	Plum
49	68+160	68+180	20	BW 3m	Plum
50	68+180	68+200	20	BW 3m	Plum
51	68+200	68+220	20	BW 3m	Plum
52	68+240	68+260	20	BW 4m	Plum
53	68+320	68+340	20	BW 4m	Plum
54	68+440	68+460	20	BW 3m	Plum
55	69+340	69+360	20	BW 3m	Plum
56	69+360	69+380	20	BW 3m	Plum
57	69+380	69+400	20	BW 3m	Plum
58	69+540	69+560	20	BW 4m	Plum
59	69+560	69+580	20	BW 3m	Plum
60	69+660	69+680	20	BW 4m	Plum
61	69+680	69+700	20	BW 4m	Plum
62	70+340	70+360	20	BW 4m	Plum
63	70+540	70+560	20	BW 4m	Plum
64	72+980	73+000	20	BW 4m	Plum
65	73+020	73+040	20	BW 3m	Plum
66	73+560	73+580	20	BW 4m	Plum
67	73+760	73+780	20	BW 4m	Plum
68	73+780	73+800	20	BW 4m	Plum
69	73+800	73+820	20	BW 4m	Plum
70	73+820	73+840	20	BW 4m	Plum
71	73+840	73+860	20	BW 4m	Plum
72	73+860	73+880	20	BW 3m	Plum
73	74+240	74+260	20	BW 3m	Plum
74	74+260	74+280	20	BW 4m	Plum
75	74+800	74+820	20	BW 3m	Plum
76	74+820	74+840	20	BW 3m	Plum
77	74+840	74+860	20	BW 3m	Plum
78	74+860	74+880	20	BW 4m	Plum
79	75+040	75+060	20	BW 4m	Plum
80	75+300	75+320	20	BW 4m	Plum
81	75+380	75+400	20	BW 4m	Plum
82	75+400	75+420	20	BW 4m	Plum
83	75+420	75+440	20	BW 3m	Plum
84	75+640	75+660	20	BW 3m	Plum
85	75+660	75+680	20	BW 4m	Plum
86	75+680	75+700	20	BW 4m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
87	75+700	75+720	20	BW 4m	Plum
88	75+720	75+740	20	BW 4m	Plum
89	75+740	75+760	20	BW 4m	Plum
90	77+260	77+280	20	BW 3m	Plum
91	77+280	77+300	20	BW 4m	Plum
92	77+300	77+320	20	BW 4m	Plum
93	77+320	77+340	20	BW 4m	Plum
94	77+340	77+360	20	BW 4m	Plum
95	77+360	77+380	20	BW 3m	Plum
96	77+380	77+400	20	BW 4m	Plum
97	77+400	77+420	20	BW 4m	Plum
98	77+420	77+440	20	BW 3m	Plum
99	77+440	77+460	20	BW 3m	Plum
100	77+460	77+480	20	BW 3m	Plum
101	77+480	77+500	20	BW 3m	Plum
102	77+500	77+520	20	BW 3m	Plum
103	77+520	77+540	20	BW 3m	Plum
104	77+640	77+660	20	BW 3m	Plum
105	77+660	77+680	20	BW 3m	Plum
106	77+680	77+700	20	BW 3m	Plum
107	77+700	77+720	20	BW 3m	Plum
108	77+720	77+740	20	BW 3m	Plum
109	77+740	77+760	20	BW 3m	Plum
110	77+760	77+780	20	BW 3m	Plum
111	77+780	77+800	20	BW 3m	Plum
112	77+800	77+820	20	BW 3m	Plum
113	77+820	77+840	20	BW 3m	Plum
114	77+840	77+860	20	BW 3m	Plum
115	77+860	77+880	20	BW 3m	Plum
116	77+880	77+900	20	BW 3m	Plum
117	77+900	77+920	20	BW 3m	Plum
118	77+920	77+940	20	BW 3m	Plum
119	77+940	77+960	20	BW 3m	Plum
120	77+960	77+980	20	BW 3m	Plum
121	77+980	78+000	20	BW 3m	Plum
122	78+000	78+020	20	BW 3m	Plum
123	78+020	78+040	20	BW 3m	Plum
124	78+040	78+060	20	BW 3m	Plum
125	78+060	78+080	20	BW 3m	Plum
126	78+080	78+100	20	BW 3m	Plum
127	78+100	78+120	20	BW 3m	Plum
128	78+120	78+140	20	BW 3m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
129	78+140	78+160	20	BW 3m	Plum
130	78+180	78+200	20	BW 3m	Plum
131	78+200	78+220	20	BW 3m	Plum
132	78+220	78+240	20	BW 3m	Plum
133	78+240	78+260	20	BW 3m	Plum
134	78+380	78+400	20	BW 3m	Plum
135	78+400	78+420	20	BW 3m	Plum
136	78+420	78+440	20	BW 3m	Plum
137	78+440	78+460	20	BW 3m	Plum
138	78+460	78+480	20	BW 3m	Plum
139	78+480	78+500	20	BW 3m	Plum
140	78+500	78+520	20	BW 3m	Plum
141	78+520	78+540	20	BW 3m	Plum
142	78+540	78+560	20	BW 3m	Plum
143	78+560	78+580	20	BW 3m	Plum
144	78+580	78+600	20	BW 3m	Plum
145	78+600	78+620	20	BW 3m	Plum
146	78+620	78+640	20	BW 3m	Plum
147	78+640	78+660	20	BW 3m	Plum
148	78+660	78+680	20	BW 4m	Plum
149	78+680	78+700	20	BW 4m	Plum
150	78+700	78+720	20	BW 3m	Plum
151	78+720	78+740	20	BW 4m	Plum
152	78+740	78+760	20	BW 3m	Plum
153	78+760	78+780	20	BW 3m	Plum
154	78+780	78+800	20	BW 3m	Plum
155	78+800	78+820	20	BW 3m	Plum
156	78+820	78+840	20	BW 3m	Plum
157	78+840	78+860	20	BW 3m	Plum
158	78+860	78+880	20	BW 3m	Plum
159	78+880	78+900	20	BW 3m	Plum
160	78+900	78+920	20	BW 4m	Plum
161	78+920	78+940	20	BW 4m	Plum
162	78+940	78+960	20	BW 3m	Plum
163	78+980	79+000	20	BW 4m	Plum
164	79+000	79+020	20	BW 3m	Plum
165	79+020	79+040	20	BW 3m	Plum
166	79+040	79+060	20	BW 3m	Plum
167	79+060	79+080	20	BW 3m	Plum
168	79+080	79+100	20	BW 3m	Plum
169	79+100	79+120	20	BW 3m	Plum
170	79+120	79+140	20	BW 3m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
171	79+140	79+160	20	BW 3m	Plum
172	79+160	79+180	20	BW 3m	Plum
173	79+180	79+200	20	BW 3m	Plum
174	79+200	79+220	20	BW 3m	Plum
175	79+220	79+240	20	BW 3m	Plum
176	79+240	79+260	20	BW 4m	Plum
177	79+260	79+280	20	BW 4m	Plum
178	79+280	79+300	20	BW 4m	Plum
179	79+400	79+420	20	BW 3m	Plum
180	79+420	79+440	20	BW 4m	Plum
181	79+440	79+460	20	BW 3m	Plum
TOTAL			**3620**		

Breast Walls Locations RHS:

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
1	61+100	61+120	20	BW 4m	Plum
2	61+120	61+140	20	BW 4m	Plum
3	61+140	61+160	20	BW 4m	Plum
4	61+160	61+180	20	BW 4m	Plum
5	61+240	61+260	20	BW 3m	Plum
6	61+260	61+280	20	BW 4m	Plum
7	61+280	61+300	20	BW 3m	Plum
8	61+300	61+320	20	BW 3m	Plum
9	61+320	61+340	20	BW 3m	Plum
10	61+360	61+380	20	BW 3m	Plum
11	61+380	61+400	20	BW 3m	Plum
12	61+400	61+420	20	BW 4m	Plum
13	61+440	61+460	20	BW 4m	Plum
14	61+460	61+480	20	BW 4m	Plum
15	61+480	61+500	20	BW 4m	Plum
16	61+500	61+520	20	BW 4m	Plum
17	61+540	61+560	20	BW 4m	Plum
18	61+560	61+580	20	BW 4m	Plum
19	61+580	61+600	20	BW 4m	Plum
20	61+600	61+620	20	BW 4m	Plum
21	61+640	61+660	20	BW 4m	Plum
22	61+660	61+680	20	BW 3m	Plum
23	61+680	61+700	20	BW 3m	Plum
24	61+700	61+720	20	BW 3m	Plum
25	61+720	61+740	20	BW 4m	Plum
26	61+740	61+760	20	BW 4m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
27	61+760	61+780	20	BW 4m	Plum
28	61+800	61+820	20	BW 4m	Plum
29	61+820	61+840	20	BW 3m	Plum
30	61+880	61+900	20	BW 3m	Plum
31	61+900	61+920	20	BW 4m	Plum
32	61+920	61+940	20	BW 3m	Plum
33	61+980	62+000	20	BW 4m	Plum
34	62+000	62+020	20	BW 3m	Plum
35	62+020	62+040	20	BW 3m	Plum
36	62+080	62+100	20	BW 4m	Plum
37	62+100	62+120	20	BW 3m	Plum
38	62+160	62+180	20	BW 4m	Plum
39	62+180	62+200	20	BW 4m	Plum
40	62+200	62+220	20	BW 4m	Plum
41	62+220	62+240	20	BW 4m	Plum
42	62+240	62+260	20	BW 3m	Plum
43	62+260	62+280	20	BW 3m	Plum
44	62+280	62+300	20	BW 3m	Plum
45	62+300	62+320	20	BW 3m	Plum
46	62+320	62+340	20	BW 4m	Plum
47	62+340	62+360	20	BW 4m	Plum
48	62+380	62+400	20	BW 3m	Plum
49	62+400	62+420	20	BW 3m	Plum
50	62+460	62+480	20	BW 4m	Plum
51	62+480	62+500	20	BW 3m	Plum
52	62+500	62+520	20	BW 4m	Plum
53	62+560	62+580	20	BW 4m	Plum
54	62+580	62+600	20	BW 4m	Plum
55	62+600	62+620	20	BW 4m	Plum
56	62+780	62+800	20	BW 3m	Plum
57	62+800	62+820	20	BW 4m	Plum
58	62+820	62+840	20	BW 4m	Plum
59	62+840	62+860	20	BW 4m	Plum
60	62+860	62+880	20	BW 3m	Plum
61	62+880	62+900	20	BW 3m	Plum
62	62+940	62+960	20	BW 4m	Plum
63	62+960	62+980	20	BW 4m	Plum
64	62+980	63+000	20	BW 3m	Plum
65	63+000	63+020	20	BW 4m	Plum
66	63+020	63+040	20	BW 4m	Plum
67	63+080	63+100	20	BW 3m	Plum
68	63+100	63+120	20	BW 3m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
69	63+120	63+140	20	BW 4m	Plum
70	63+140	63+160	20	BW 4m	Plum
71	63+160	63+180	20	BW 3m	Plum
72	63+180	63+200	20	BW 3m	Plum
73	63+200	63+220	20	BW 3m	Plum
74	63+220	63+240	20	BW 3m	Plum
75	63+240	63+260	20	BW 3m	Plum
76	63+260	63+280	20	BW 4m	Plum
77	63+280	63+300	20	BW 4m	Plum
78	63+320	63+340	20	BW 3m	Plum
79	63+340	63+360	20	BW 4m	Plum
80	63+360	63+380	20	BW 4m	Plum
81	63+380	63+400	20	BW 4m	Plum
82	63+460	63+480	20	BW 3m	Plum
83	63+480	63+500	20	BW 3m	Plum
84	63+500	63+520	20	BW 3m	Plum
85	63+520	63+540	20	BW 4m	Plum
86	63+540	63+560	20	BW 3m	Plum
87	63+940	63+960	20	BW 4m	Plum
88	63+960	63+980	20	BW 4m	Plum
89	64+000	64+020	20	BW 3m	Plum
90	64+020	64+040	20	BW 4m	Plum
91	64+100	64+120	20	BW 4m	Plum
92	64+120	64+140	20	BW 3m	Plum
93	64+220	64+240	20	BW 3m	Plum
94	64+240	64+260	20	BW 4m	Plum
95	64+260	64+280	20	BW 3m	Plum
96	64+280	64+300	20	BW 4m	Plum
97	64+340	64+360	20	BW 3m	Plum
98	64+360	64+380	20	BW 3m	Plum
99	64+380	64+400	20	BW 3m	Plum
100	64+600	64+620	20	BW 3m	Plum
101	64+620	64+640	20	BW 3m	Plum
102	64+720	64+740	20	BW 4m	Plum
103	64+740	64+760	20	BW 4m	Plum
104	64+780	64+800	20	BW 4m	Plum
105	64+820	64+840	20	BW 4m	Plum
106	64+860	64+880	20	BW 3m	Plum
107	64+880	64+900	20	BW 3m	Plum
108	64+900	64+920	20	BW 3m	Plum
109	64+920	64+940	20	BW 3m	Plum
110	65+000	65+020	20	BW 4m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
111	65+020	65+040	20	BW 4m	Plum
112	65+040	65+060	20	BW 4m	Plum
113	65+060	65+080	20	BW 3m	Plum
114	65+180	65+200	20	BW 3m	Plum
115	65+200	65+220	20	BW 3m	Plum
116	65+220	65+240	20	BW 3m	Plum
117	65+240	65+260	20	BW 4m	Plum
118	65+260	65+280	20	BW 4m	Plum
119	65+280	65+300	20	BW 4m	Plum
120	65+300	65+320	20	BW 4m	Plum
121	65+320	65+340	20	BW 4m	Plum
122	65+340	65+360	20	BW 3m	Plum
123	65+360	65+380	20	BW 3m	Plum
124	65+380	65+400	20	BW 3m	Plum
125	65+400	65+420	20	BW 4m	Plum
126	65+420	65+440	20	BW 4m	Plum
127	65+440	65+460	20	BW 4m	Plum
128	65+460	65+480	20	BW 4m	Plum
129	65+480	65+500	20	BW 3m	Plum
130	65+500	65+520	20	BW 3m	Plum
131	65+520	65+540	20	BW 3m	Plum
132	65+540	65+560	20	BW 4m	Plum
133	65+560	65+580	20	BW 3m	Plum
134	65+880	65+900	20	BW 3m	Plum
135	65+900	65+920	20	BW 3m	Plum
136	65+920	65+940	20	BW 4m	Plum
137	66+520	66+540	20	BW 4m	Plum
138	66+540	66+560	20	BW 3m	Plum
139	66+560	66+580	20	BW 3m	Plum
140	66+620	66+640	20	BW 3m	Plum
141	66+640	66+660	20	BW 3m	Plum
142	66+660	66+680	20	BW 4m	Plum
143	66+680	66+700	20	BW 4m	Plum
144	66+700	66+720	20	BW 3m	Plum
145	66+760	66+780	20	BW 3m	Plum
146	66+780	66+800	20	BW 4m	Plum
147	66+800	66+820	20	BW 4m	Plum
148	66+820	66+840	20	BW 4m	Plum
149	66+840	66+860	20	BW 4m	Plum
150	66+860	66+880	20	BW 4m	Plum
151	66+880	66+900	20	BW 3m	Plum
152	66+900	66+920	20	BW 3m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
153	66+920	66+940	20	BW 3m	Plum
154	66+940	66+960	20	BW 3m	Plum
155	66+960	66+980	20	BW 3m	Plum
156	66+980	67+000	20	BW 3m	Plum
157	67+000	67+020	20	BW 3m	Plum
158	67+020	67+040	20	BW 3m	Plum
159	67+080	67+100	20	BW 3m	Plum
160	67+100	67+120	20	BW 3m	Plum
161	67+120	67+140	20	BW 3m	Plum
162	67+140	67+160	20	BW 4m	Plum
163	67+320	67+340	20	BW 3m	Plum
164	67+360	67+380	20	BW 3m	Plum
165	67+380	67+400	20	BW 4m	Plum
166	67+400	67+420	20	BW 3m	Plum
167	67+580	67+600	20	BW 3m	Plum
168	67+600	67+620	20	BW 4m	Plum
169	67+620	67+640	20	BW 4m	Plum
170	67+640	67+660	20	BW 4m	Plum
171	67+660	67+680	20	BW 4m	Plum
172	67+680	67+700	20	BW 4m	Plum
173	67+700	67+720	20	BW 4m	Plum
174	67+720	67+740	20	BW 4m	Plum
175	67+780	67+800	20	BW 4m	Plum
176	67+800	67+820	20	BW 3m	Plum
177	67+820	67+840	20	BW 3m	Plum
178	67+900	67+920	20	BW 4m	Plum
179	67+920	67+940	20	BW 3m	Plum
180	67+940	67+960	20	BW 3m	Plum
181	67+960	67+980	20	BW 3m	Plum
182	68+040	68+060	20	BW 3m	Plum
183	68+060	68+080	20	BW 3m	Plum
184	68+160	68+180	20	BW 3m	Plum
185	68+180	68+200	20	BW 3m	Plum
186	68+200	68+220	20	BW 3m	Plum
187	68+220	68+240	20	BW 4m	Plum
188	68+300	68+320	20	BW 4m	Plum
189	68+320	68+340	20	BW 3m	Plum
190	68+440	68+460	20	BW 3m	Plum
191	68+460	68+480	20	BW 3m	Plum
192	68+480	68+500	20	BW 3m	Plum
193	68+500	68+520	20	BW 3m	Plum
194	68+520	68+540	20	BW 3m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
195	68+540	68+560	20	BW 4m	Plum
196	68+720	68+740	20	BW 3m	Plum
197	68+740	68+760	20	BW 4m	Plum
198	68+900	68+920	20	BW 4m	Plum
199	69+080	69+100	20	BW 4m	Plum
200	69+100	69+120	20	BW 3m	Plum
201	69+120	69+140	20	BW 3m	Plum
202	69+140	69+160	20	BW 4m	Plum
203	69+200	69+220	20	BW 3m	Plum
204	69+220	69+240	20	BW 3m	Plum
205	69+240	69+260	20	BW 3m	Plum
206	69+260	69+280	20	BW 4m	Plum
207	69+280	69+300	20	BW 4m	Plum
208	69+300	69+320	20	BW 4m	Plum
209	69+320	69+340	20	BW 4m	Plum
210	69+340	69+360	20	BW 3m	Plum
211	69+360	69+380	20	BW 3m	Plum
212	69+380	69+400	20	BW 3m	Plum
213	69+400	69+420	20	BW 3m	Plum
214	69+420	69+440	20	BW 4m	Plum
215	69+440	69+460	20	BW 3m	Plum
216	69+500	69+520	20	BW 4m	Plum
217	69+520	69+540	20	BW 3m	Plum
218	69+540	69+560	20	BW 3m	Plum
219	69+560	69+580	20	BW 3m	Plum
220	69+580	69+600	20	BW 3m	Plum
221	69+600	69+620	20	BW 4m	Plum
222	69+640	69+660	20	BW 3m	Plum
223	69+660	69+680	20	BW 3m	Plum
224	69+680	69+700	20	BW 3m	Plum
225	69+700	69+720	20	BW 4m	Plum
226	69+760	69+780	20	BW 4m	Plum
227	69+780	69+800	20	BW 3m	Plum
228	69+800	69+820	20	BW 3m	Plum
229	69+820	69+840	20	BW 4m	Plum
230	69+840	69+860	20	BW 3m	Plum
231	70+020	70+040	20	BW 3m	Plum
232	70+040	70+060	20	BW 4m	Plum
233	70+060	70+080	20	BW 4m	Plum
234	70+080	70+100	20	BW 4m	Plum
235	70+100	70+120	20	BW 4m	Plum
236	70+160	70+180	20	BW 4m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
237	70+180	70+200	20	BW 4m	Plum
238	70+200	70+220	20	BW 3m	Plum
239	70+220	70+240	20	BW 4m	Plum
240	70+240	70+260	20	BW 4m	Plum
241	70+260	70+280	20	BW 4m	Plum
242	70+280	70+300	20	BW 3m	Plum
243	70+320	70+340	20	BW 3m	Plum
244	70+340	70+360	20	BW 3m	Plum
245	70+360	70+380	20	BW 3m	Plum
246	70+420	70+440	20	BW 3m	Plum
247	70+480	70+500	20	BW 3m	Plum
248	70+520	70+540	20	BW 4m	Plum
249	70+540	70+560	20	BW 3m	Plum
250	70+560	70+580	20	BW 3m	Plum
251	70+580	70+600	20	BW 3m	Plum
252	70+600	70+620	20	BW 3m	Plum
253	70+620	70+640	20	BW 3m	Plum
254	70+660	70+680	20	BW 3m	Plum
255	70+680	70+700	20	BW 3m	Plum
256	70+700	70+720	20	BW 4m	Plum
257	70+720	70+740	20	BW 4m	Plum
258	70+740	70+760	20	BW 3m	Plum
259	70+760	70+780	20	BW 4m	Plum
260	70+780	70+800	20	BW 4m	Plum
261	70+880	70+900	20	BW 4m	Plum
262	71+020	71+040	20	BW 3m	Plum
263	71+040	71+060	20	BW 3m	Plum
264	71+120	71+140	20	BW 4m	Plum
265	71+160	71+180	20	BW 3m	Plum
266	71+180	71+200	20	BW 4m	Plum
267	71+200	71+220	20	BW 3m	Plum
268	71+220	71+240	20	BW 3m	Plum
269	71+240	71+260	20	BW 3m	Plum
270	71+260	71+280	20	BW 4m	Plum
271	71+280	71+300	20	BW 4m	Plum
272	71+300	71+320	20	BW 3m	Plum
273	71+320	71+340	20	BW 3m	Plum
274	71+340	71+360	20	BW 3m	Plum
275	71+360	71+380	20	BW 3m	Plum
276	71+380	71+400	20	BW 3m	Plum
277	71+400	71+420	20	BW 3m	Plum
278	71+420	71+440	20	BW 3m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
279	71+440	71+460	20	BW 3m	Plum
280	71+460	71+480	20	BW 3m	Plum
281	71+480	71+500	20	BW 3m	Plum
282	71+500	71+520	20	BW 4m	Plum
283	71+520	71+540	20	BW 4m	Plum
284	71+560	71+580	20	BW 4m	Plum
285	71+620	71+640	20	BW 4m	Plum
286	71+640	71+660	20	BW 3m	Plum
287	71+660	71+680	20	BW 4m	Plum
288	71+680	71+700	20	BW 3m	Plum
289	71+700	71+720	20	BW 3m	Plum
290	71+720	71+740	20	BW 3m	Plum
291	71+740	71+760	20	BW 3m	Plum
292	71+760	71+780	20	BW 3m	Plum
293	71+780	71+800	20	BW 4m	Plum
294	71+800	71+820	20	BW 4m	Plum
295	71+820	71+840	20	BW 4m	Plum
296	71+840	71+860	20	BW 3m	Plum
297	71+860	71+880	20	BW 4m	Plum
298	71+880	71+900	20	BW 3m	Plum
299	71+900	71+920	20	BW 3m	Plum
300	71+920	71+940	20	BW 4m	Plum
301	71+940	71+960	20	BW 4m	Plum
302	71+960	71+980	20	BW 4m	Plum
303	71+980	72+000	20	BW 3m	Plum
304	72+000	72+020	20	BW 3m	Plum
305	72+020	72+040	20	BW 3m	Plum
306	72+040	72+060	20	BW 4m	Plum
307	72+080	72+100	20	BW 3m	Plum
308	72+100	72+120	20	BW 4m	Plum
309	72+120	72+140	20	BW 4m	Plum
310	72+140	72+160	20	BW 4m	Plum
311	72+160	72+180	20	BW 3m	Plum
312	72+180	72+200	20	BW 4m	Plum
313	72+200	72+220	20	BW 4m	Plum
314	72+220	72+240	20	BW 4m	Plum
315	72+240	72+260	20	BW 4m	Plum
316	72+300	72+320	20	BW 3m	Plum
317	72+320	72+340	20	BW 4m	Plum
318	72+340	72+360	20	BW 3m	Plum
319	72+360	72+380	20	BW 3m	Plum
320	72+380	72+400	20	BW 4m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
321	72+400	72+420	20	BW 3m	Plum
322	72+420	72+440	20	BW 3m	Plum
323	72+480	72+500	20	BW 4m	Plum
324	72+560	72+580	20	BW 3m	Plum
325	72+580	72+600	20	BW 4m	Plum
326	73+780	73+800	20	BW 4m	Plum
327	73+800	73+820	20	BW 4m	Plum
328	73+820	73+840	20	BW 4m	Plum
329	74+260	74+280	20	BW 3m	Plum
330	74+800	74+820	20	BW 3m	Plum
331	74+820	74+840	20	BW 3m	Plum
332	77+280	77+300	20	BW 3m	Plum
333	77+340	77+360	20	BW 4m	Plum
334	77+360	77+380	20	BW 4m	Plum
335	77+380	77+400	20	BW 4m	Plum
336	77+400	77+420	20	BW 3m	Plum
337	77+420	77+440	20	BW 4m	Plum
338	77+440	77+460	20	BW 3m	Plum
339	77+460	77+480	20	BW 3m	Plum
340	77+480	77+500	20	BW 3m	Plum
341	77+500	77+520	20	BW 3m	Plum
342	77+520	77+540	20	BW 3m	Plum
343	77+640	77+660	20	BW 3m	Plum
344	77+660	77+680	20	BW 3m	Plum
345	77+680	77+700	20	BW 3m	Plum
346	77+700	77+720	20	BW 3m	Plum
347	77+720	77+740	20	BW 3m	Plum
348	77+740	77+760	20	BW 3m	Plum
349	77+760	77+780	20	BW 4m	Plum
350	77+800	77+820	20	BW 3m	Plum
351	77+820	77+840	20	BW 3m	Plum
352	77+880	77+900	20	BW 4m	Plum
353	77+900	77+920	20	BW 4m	Plum
354	77+920	77+940	20	BW 4m	Plum
355	77+940	77+960	20	BW 4m	Plum
356	77+960	77+980	20	BW 3m	Plum
357	77+980	78+000	20	BW 3m	Plum
358	78+000	78+020	20	BW 4m	Plum
359	78+020	78+040	20	BW 3m	Plum
360	78+040	78+060	20	BW 3m	Plum
361	78+060	78+080	20	BW 3m	Plum
362	78+080	78+100	20	BW 4m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
363	78+100	78+120	20	BW 4m	Plum
364	78+120	78+140	20	BW 4m	Plum
365	78+140	78+160	20	BW 4m	Plum
366	78+180	78+200	20	BW 4m	Plum
367	78+200	78+220	20	BW 3m	Plum
368	78+220	78+240	20	BW 3m	Plum
369	78+240	78+260	20	BW 3m	Plum
370	78+380	78+400	20	BW 3m	Plum
371	78+400	78+420	20	BW 3m	Plum
372	78+420	78+440	20	BW 3m	Plum
373	78+440	78+460	20	BW 3m	Plum
374	78+460	78+480	20	BW 3m	Plum
375	78+480	78+500	20	BW 3m	Plum
376	78+500	78+520	20	BW 3m	Plum
377	78+520	78+540	20	BW 3m	Plum
378	78+540	78+560	20	BW 3m	Plum
379	78+560	78+580	20	BW 3m	Plum
380	78+580	78+600	20	BW 3m	Plum
381	78+600	78+620	20	BW 3m	Plum
382	78+620	78+640	20	BW 3m	Plum
383	78+640	78+660	20	BW 3m	Plum
384	78+660	78+680	20	BW 3m	Plum
385	78+680	78+700	20	BW 3m	Plum
386	78+700	78+720	20	BW 4m	Plum
387	78+720	78+740	20	BW 3m	Plum
388	78+740	78+760	20	BW 3m	Plum
389	78+760	78+780	20	BW 3m	Plum
390	78+780	78+800	20	BW 3m	Plum
391	78+800	78+820	20	BW 3m	Plum
392	78+820	78+840	20	BW 3m	Plum
393	78+840	78+860	20	BW 3m	Plum
394	78+860	78+880	20	BW 3m	Plum
395	78+880	78+900	20	BW 3m	Plum
396	78+900	78+920	20	BW 4m	Plum
397	79+020	79+040	20	BW 4m	Plum
398	79+040	79+060	20	BW 3m	Plum
399	79+060	79+080	20	BW 3m	Plum
400	79+080	79+100	20	BW 3m	Plum
401	79+100	79+120	20	BW 3m	Plum
402	79+120	79+140	20	BW 3m	Plum
403	79+140	79+160	20	BW 3m	Plum
404	79+160	79+180	20	BW 3m	Plum

Sr. No	Chainage From	Chainage To	Length(m)	Minimum Height(m)	Type
405	79+180	79+200	20	BW 3m	Plum
406	79+200	79+220	20	BW 3m	Plum
407	79+220	79+240	20	BW 3m	Plum
408	79+240	79+260	20	BW 3m	Plum
409	79+260	79+280	20	BW 4m	Plum
410	79+280	79+300	20	BW 4m	Plum
411	79+300	79+320	20	BW 4m	Plum
TOTAL			**8220**		

Total proposed minimum length of Breast wall: 11840m.

c) Special Slope Protection

The minimum requirement for Special Slope Protection work is as follows. The Contractor is required to conduct detail investigation to assess the work based on site survey, investigations and assessment before commencement of work. Any increase in area within 10% of total scope mentioned herein shall not constitute a Change of Scope.

The Special Slope protection works shall comprise of the following:

(i) Excavation in rock in accordance with the requirements of lines, grades and cross sections

(ii) Supply and Installation of Self Drilling hollow soil/rock anchor of different diameter (horizontal and vertical) in soil /overburden /rock suitable for, drilling placing and cement grouting. Installtions with all accessories.

(iii) Providing & installing Gabion box for retaining structure with Mechanically Woven Double Twisted Hexagonal Shaped Wire mesh Gabion Boxes

(iv) Supply and fixing of Double Twisted Mesh over the geo-jute layer.

(v) Coir mat (450GSM) applied on slope surface for erosion control.

(vi) Structural steel work, fixed with or without connecting plate, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete

(vii) Details of specification and standard has been specified in Schedule-D

Slope protection in LHS side

Sr. No	Chainage From	Chainage To	Length(m)
1	62+000	62+020	20
2	62+880	62+900	20
3	63+660	63+680	20

Sr. No	Chainage From	Chainage To	Length(m)
4	63+700	63+720	20
5	65+240	65+280	40
6	65+680	65+720	40
7	66+920	67+020	100
8	68+180	68+220	40
9	69+360	69+400	40
10	74+240	74+260	20
11	74+800	74+860	60
12	77+360	77+380	20
13	77+420	77+540	120
14	77+640	78+160	520
15	78+180	78+260	80
16	78+380	78+660	280
17	78+740	78+900	160
18	79+000	79+240	240
		Total Length(m)	**1840**
		Total area (sqm)	**13,800**

Slope protection work RHS Side

Sr. No	Chainage From	Chainage To	Length(m)
1	61+280	61+320	40
2	61+360	61+400	40
3	61+660	61+720	60
4	61+880	61+900	20
5	62+000	62+040	40
6	62+100	62+120	20
7	62+240	62+320	80
8	62+380	62+420	40
9	62+480	62+500	20
10	62+780	62+800	20
11	62+860	62+900	40
12	62+980	63+000	20
13	63+100	63+120	20
14	63+160	63+220	60
15	63+460	63+520	60
16	63+540	63+560	20
17	64+120	64+140	20
18	64+260	64+280	20
19	64+340	64+400	60

20	64+620	64+640	20
21	64+860	64+940	80
22	65+220	65+240	20
23	65+340	65+400	60
24	65+480	66+580	100
25	66+620	66+660	40
26	66+700	66+720	20
27	66+760	66+780	20
28	66+880	67+040	160
29	67+080	67+140	60
30	67+400	67+420	20
31	67+800	67+840	40
32	67+920	67+980	60
33	68+040	68+080	40
34	68+160	68+220	60
35	68+320	68+340	20
36	68+440	68+540	100
37	69+100	69+140	40
38	69+220	69+260	40
39	69+340	69+420	80
40	69+520	69+600	80
41	69+640	69+700	60
42	69+780	69+820	40
43	69+840	69+860	20
44	70+320	70+380	60
45	70+420	70+440	20
46	70+540	70+640	100
47	70+660	70+700	40
48	70+740	70+760	20
49	71+240	71+260	20
50	71+300	71+500	200
51	71+640	71+660	20
52	71+680	71+780	100
53	71+880	71+920	40
54	71+980	72+040	60
55	72+160	72+180	20
56	72+340	72+360	20
57	72+400	72+440	40
58	72+560	72+580	20
59	77+440	77+540	100

60	77+640	77+760	120
61	78+020	78+080	60
62	78+200	78+260	60
63	78+380	78+700	320
64	78+720	78+900	180
65	79+040	79+260	220
		Total Length(m)	**3820**
		Total area (sqm)	**28,650**

Note : The minimum area of special slope protection work is **42,450 sqm**. The height of special protection work should be assessed and approved by the Authority's Engineer, as per site requirement.

13. CHANGE OF SCOPE

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

14. UTILITY SHIFTING :

Details are given in Sheet-II (Annex-I to Schedule-B)

Sheet-II (Annex-I to Schedule-B)

Utility Shifting

Shifting of obstructing existing utilities as indicated in Schedule A to an appropriate location in accordance with the standards and specifications of concerned Utility Owing Department is part of the scope of work of the Contractor. The bidders may visit the site and assess the quantum of shifting of utilities for the project before submission of their bid. Copy of utility relocation plan is enclosed. The specifications 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 Owing Department and it is to be agreed solely between the Contractor and the Utility Owing 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 crossings to underground as per requirement of Utility Owing Department and/or/construction of project highway. The Contractor shall carry out joint inspection with Utility Owing Department and get the estimates from Utility Owing Department. The assistance of the Authority is limited to giving forwarding letter on the proposal of Contractor to Utility Owing Department whenever asked by the Contractor. The decision/approval of Utility Owing Department shall be binding on the Contractor.

b) The supervision charges at the rates/charges applicable of the Utility Owing Department shall be paid directly by the Authority to the Utility Owing Department as and when Contractor* furnishes demand of Utility Owning Department along with a copy of estimated cost given by the latter.

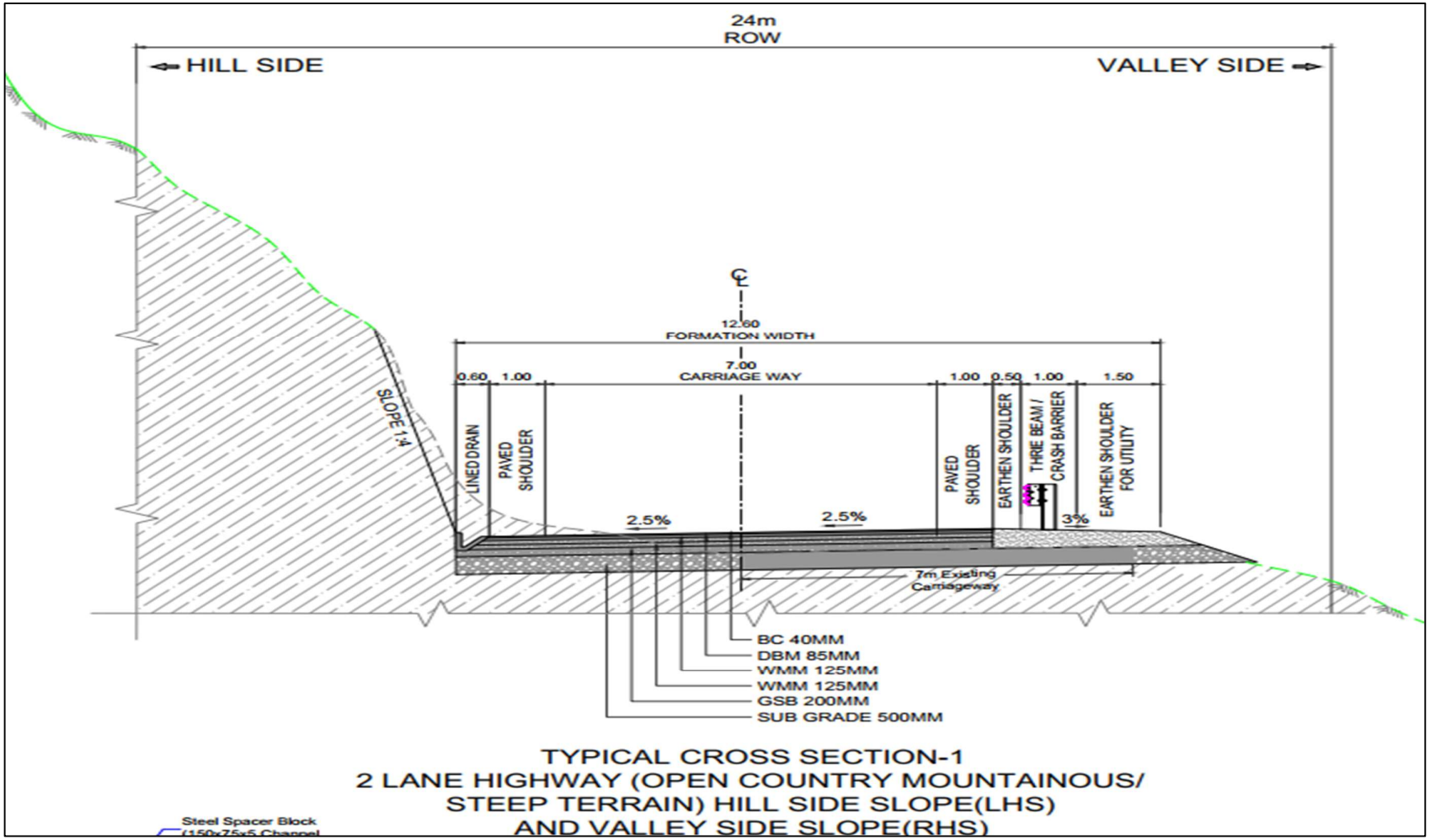
c) The dismantled materials/scrap of existing Utility to be shifted/dismantled shall belong to the Contractor who would be free to dispose-off the dismantled material as deemed fit by them unless the Contractor* is required to deposit the dismantled material to Utility Owing Department as per the norms and practice and, in that case the amount of credit for dismantled material may be availed by the Contractor as per the estimate agreed between them.

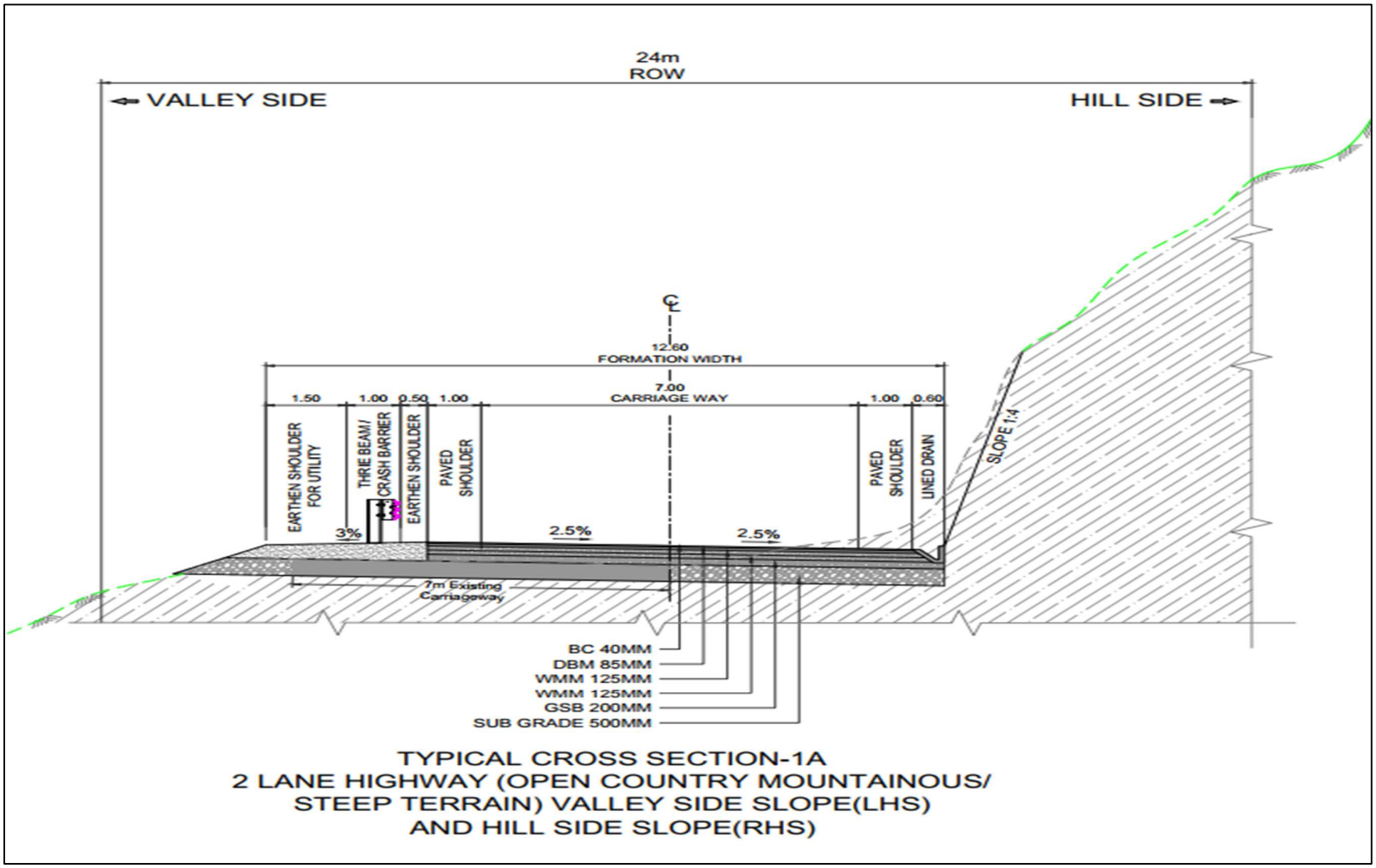
d) The utilities shall be handed over after shifting work is completed to Utility Owning Department up to their entire satisfaction. The maintenance

liability shall rest with the Utility Owning Department after handing over process is complete as far as utility shifting works are concerned.

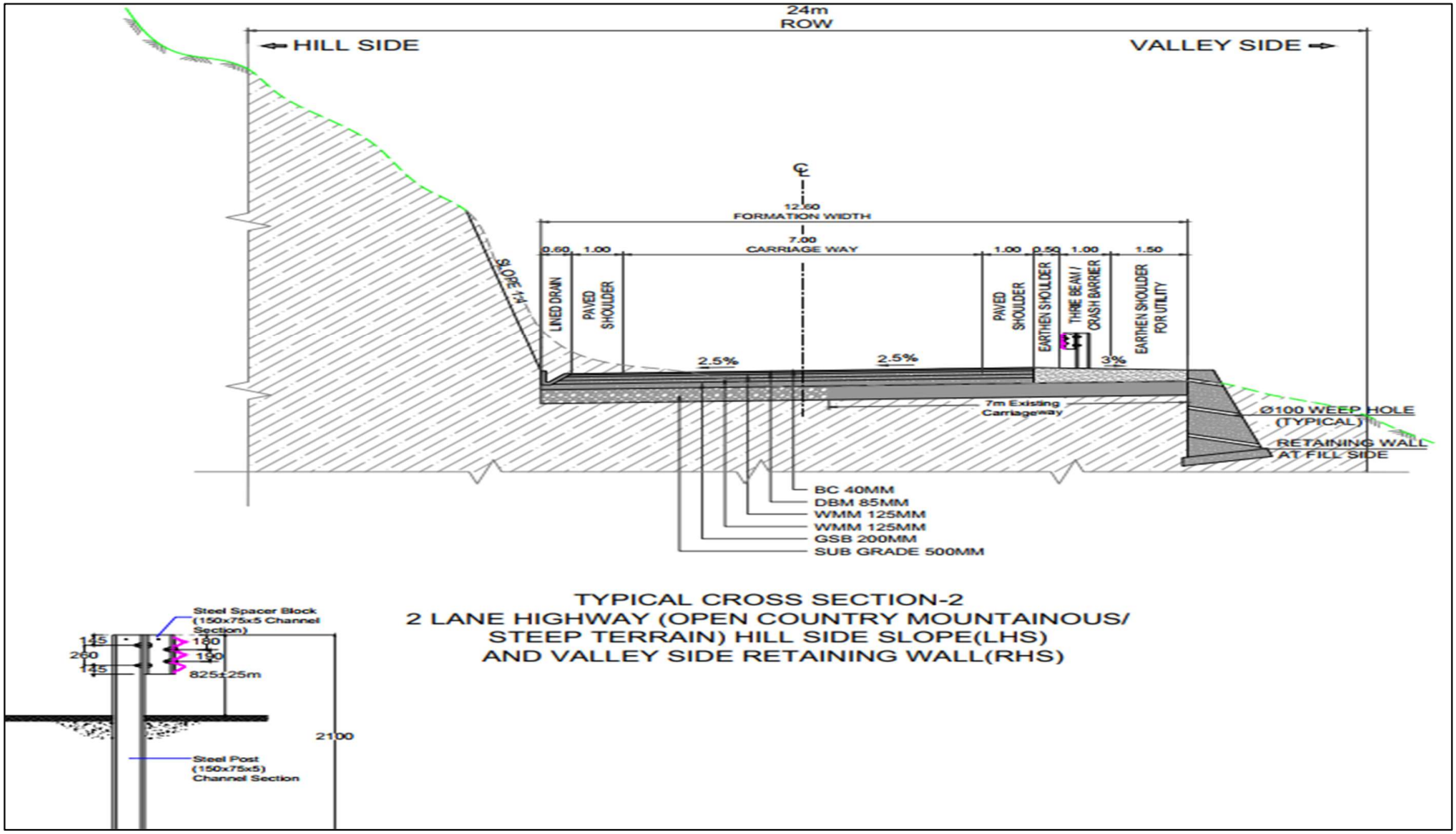
Note -II Copy of utility shifting plans enclosed as Annexure-II to Schedule B1.

Typical Cross Section

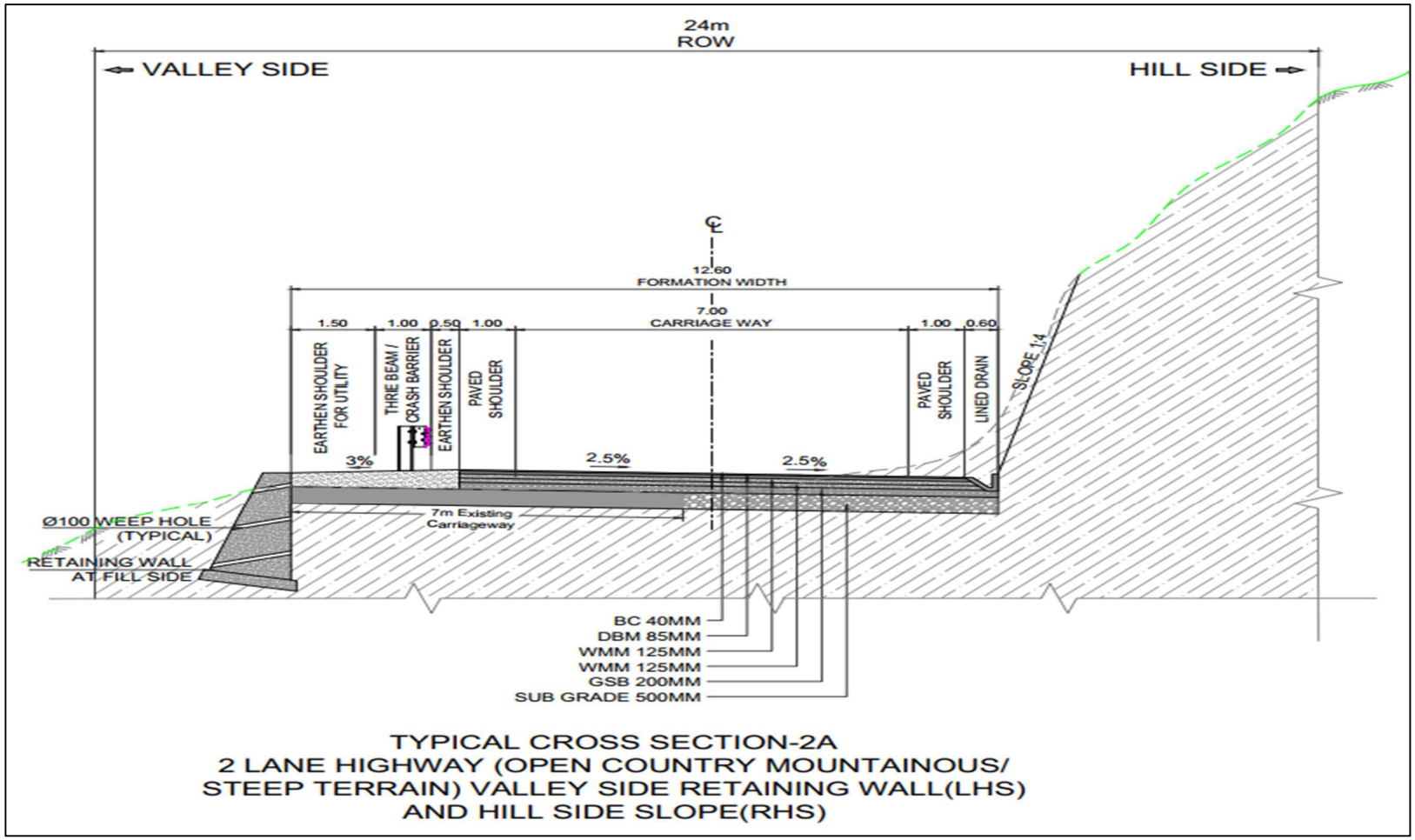




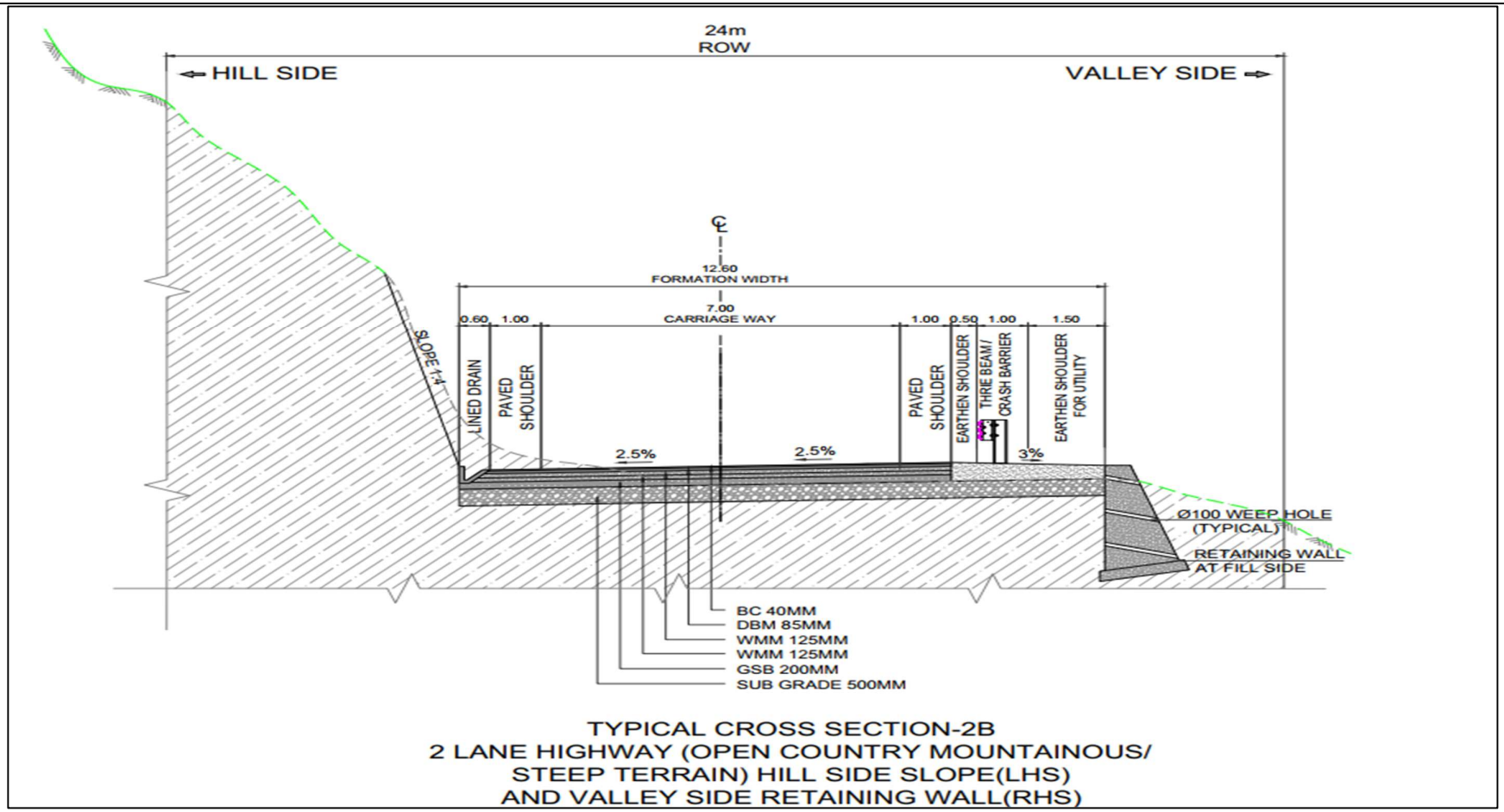
TYPICAL CROSS SECTION-1A
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/ STEEP TERRAIN) VALLEY SIDE SLOPE(LHS) AND HILL SIDE SLOPE(RHS)



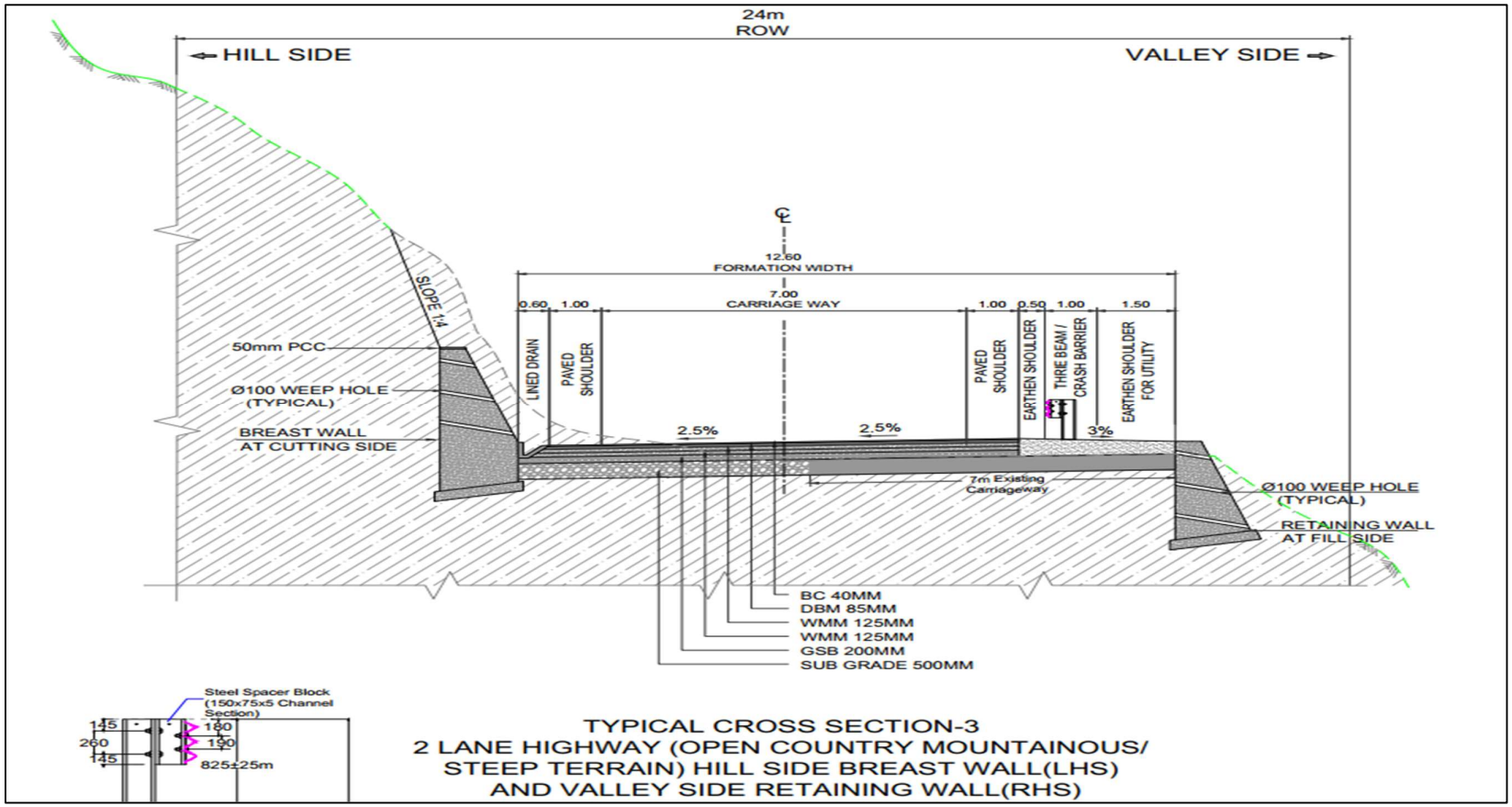
TYPICAL CROSS SECTION-2
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/ STEEP TERRAIN) HILL SIDE SLOPE(LHS) AND VALLEY SIDE RETAINING WALL(RHS)

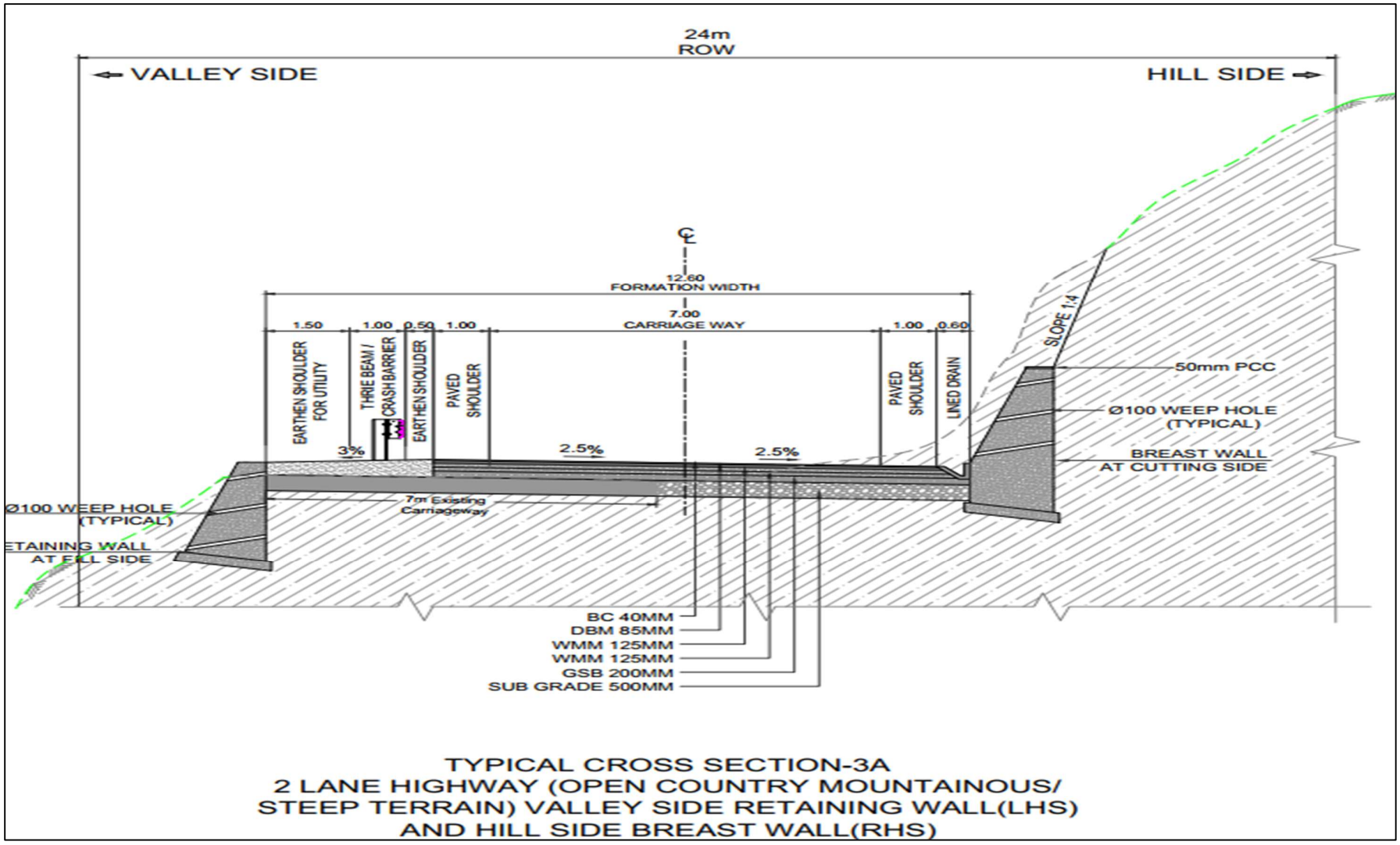


TYPICAL CROSS SECTION-2A
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/ STEEP TERRAIN) VALLEY SIDE RETAINING WALL(LHS) AND HILL SIDE SLOPE(RHS)

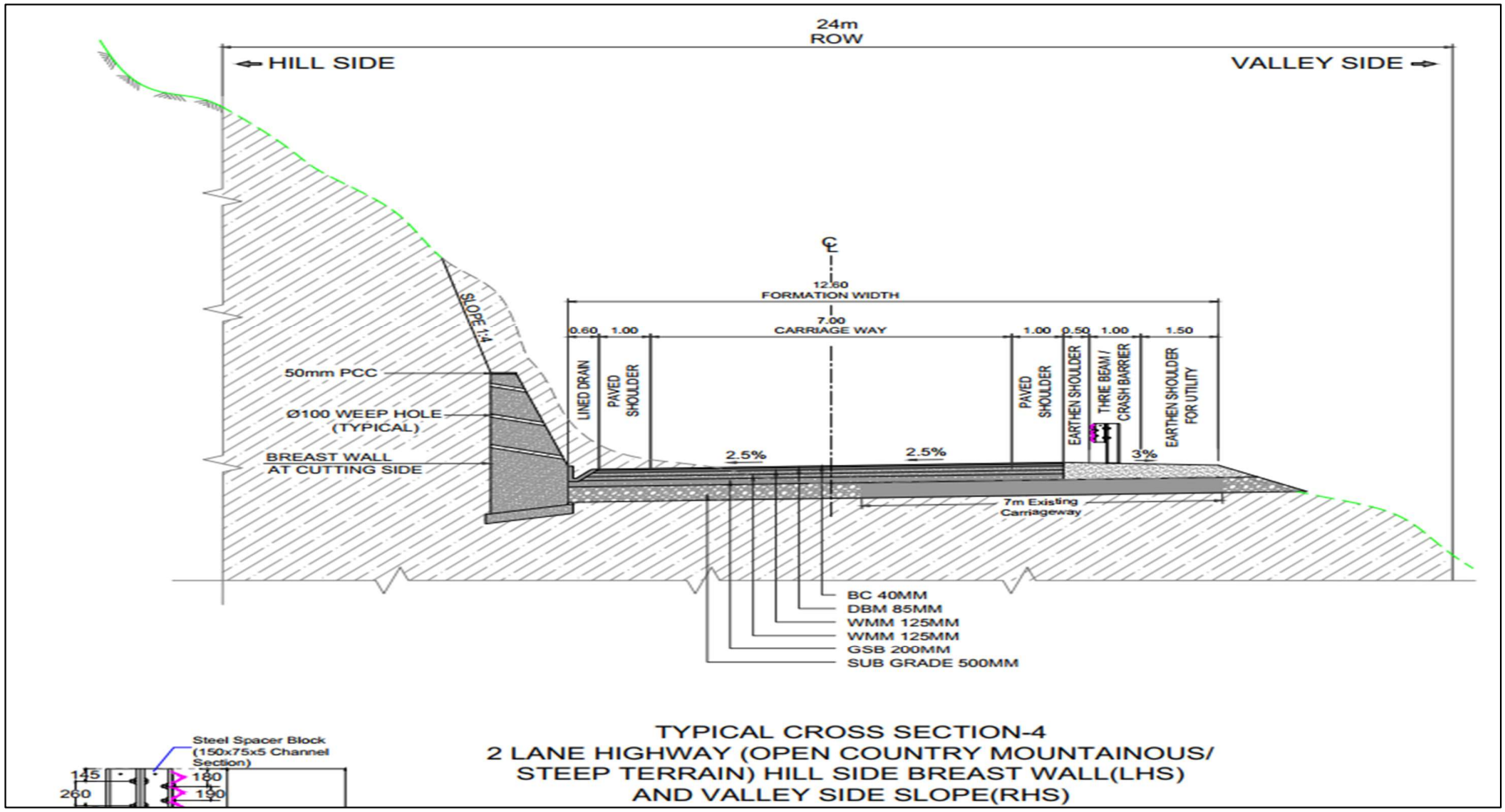


TYPICAL CROSS SECTION-2B
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/ STEEP TERRAIN) HILL SIDE SLOPE(LHS) AND VALLEY SIDE RETAINING WALL(RHS)

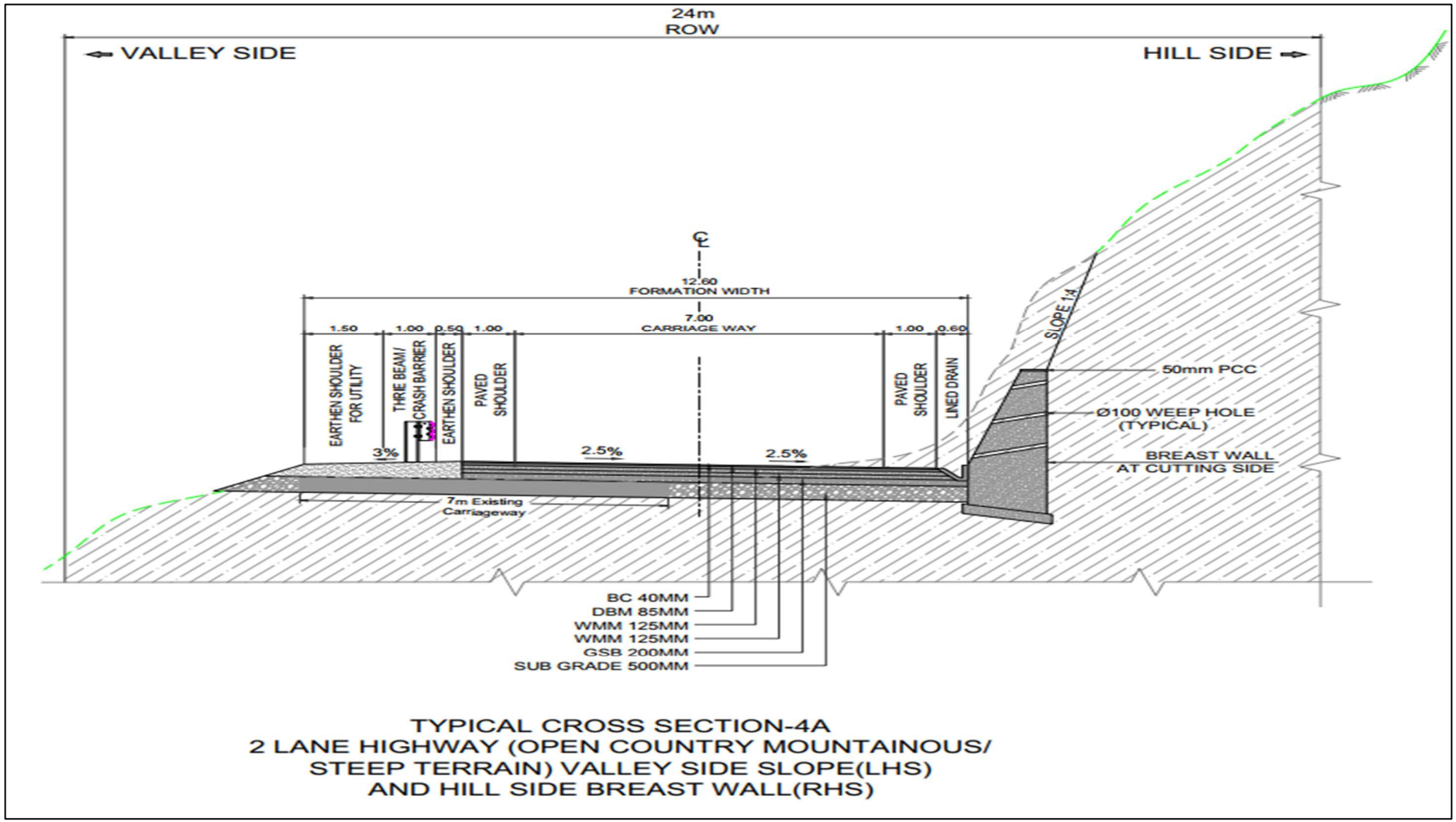

24m
ROW
HILL SIDE
VALLEY SIDE
12.60
FORMATION WIDTH
7.00
CARRIAGE WAY
0.60
1.00
1.00
0.50
1.00
1.50
SLOPE 1:4
50mm PCC
Ø100 WEEP HOLE
(TYPICAL)
BREAST WALL
AT CUTTING SIDE
LINED DRAIN
PAVED SHOULDER
PAVED SHOULDER
EARTHEN SHOULDER
THRIE BEAM / CRASH BARRIER
EARTHEN SHOULDER FOR UTILITY
2.5%
2.5%
3%
7m Existing Carriageway
Ø100 WEEP HOLE
(TYPICAL)
RETAINING WALL
AT FILL SIDE
BC 40MM
DBM 85MM
WMM 125MM
WMM 125MM
GSB 200MM
SUB GRADE 500MM
Steel Spacer Block
(150x75x5 Channel
Section)
145
260
145
150
150
825±25m
TYPICAL CROSS SECTION-3
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/
STEEP TERRAIN) HILL SIDE BREAST WALL(LHS)
AND VALLEY SIDE RETAINING WALL(RHS)



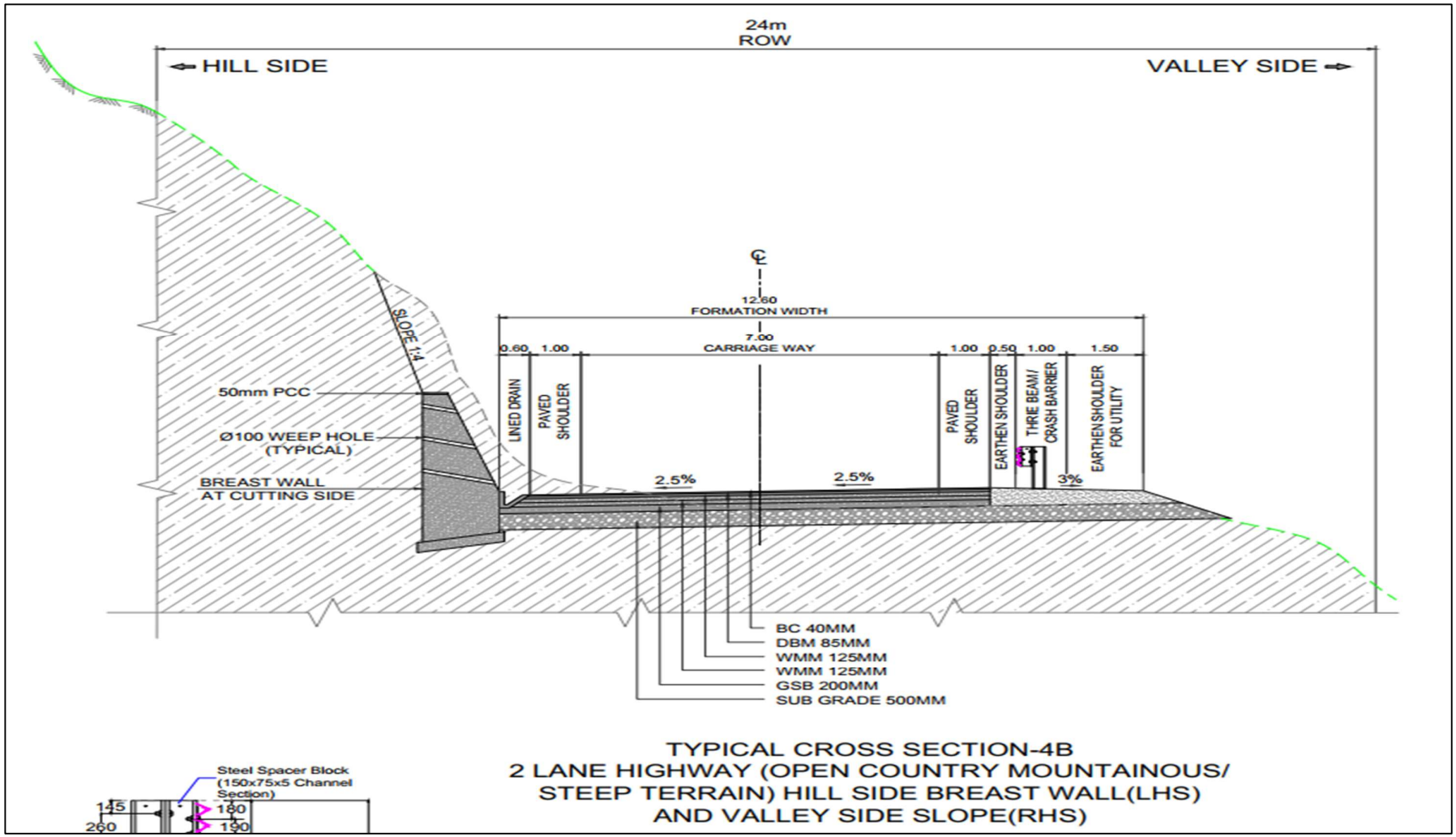
TYPICAL CROSS SECTION-3A
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/ STEEP TERRAIN) VALLEY SIDE RETAINING WALL(LHS) AND HILL SIDE BREAST WALL(RHS)

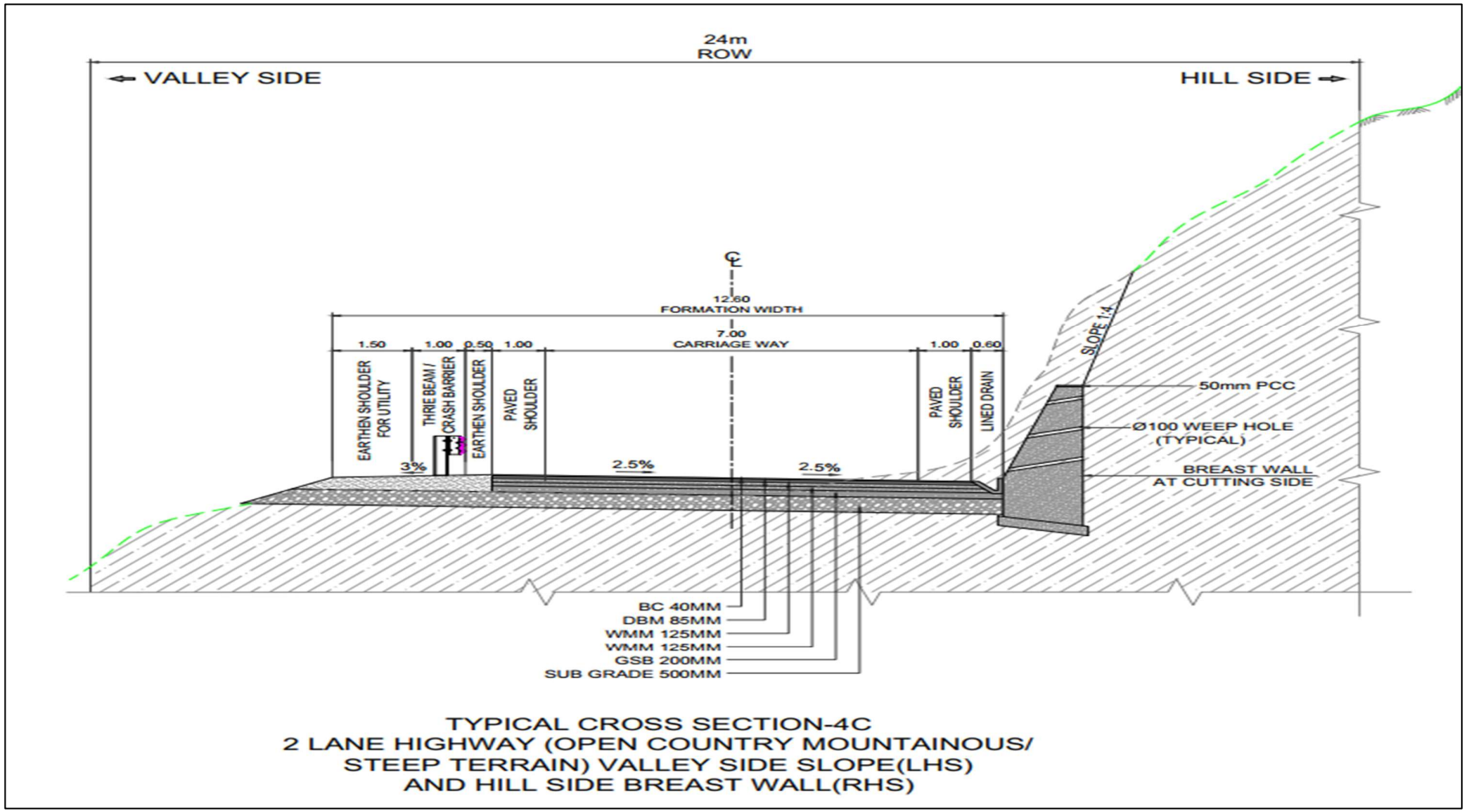


TYPICAL CROSS SECTION-4
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/ STEEP TERRAIN) HILL SIDE BREAST WALL(LHS) AND VALLEY SIDE SLOPE(RHS)

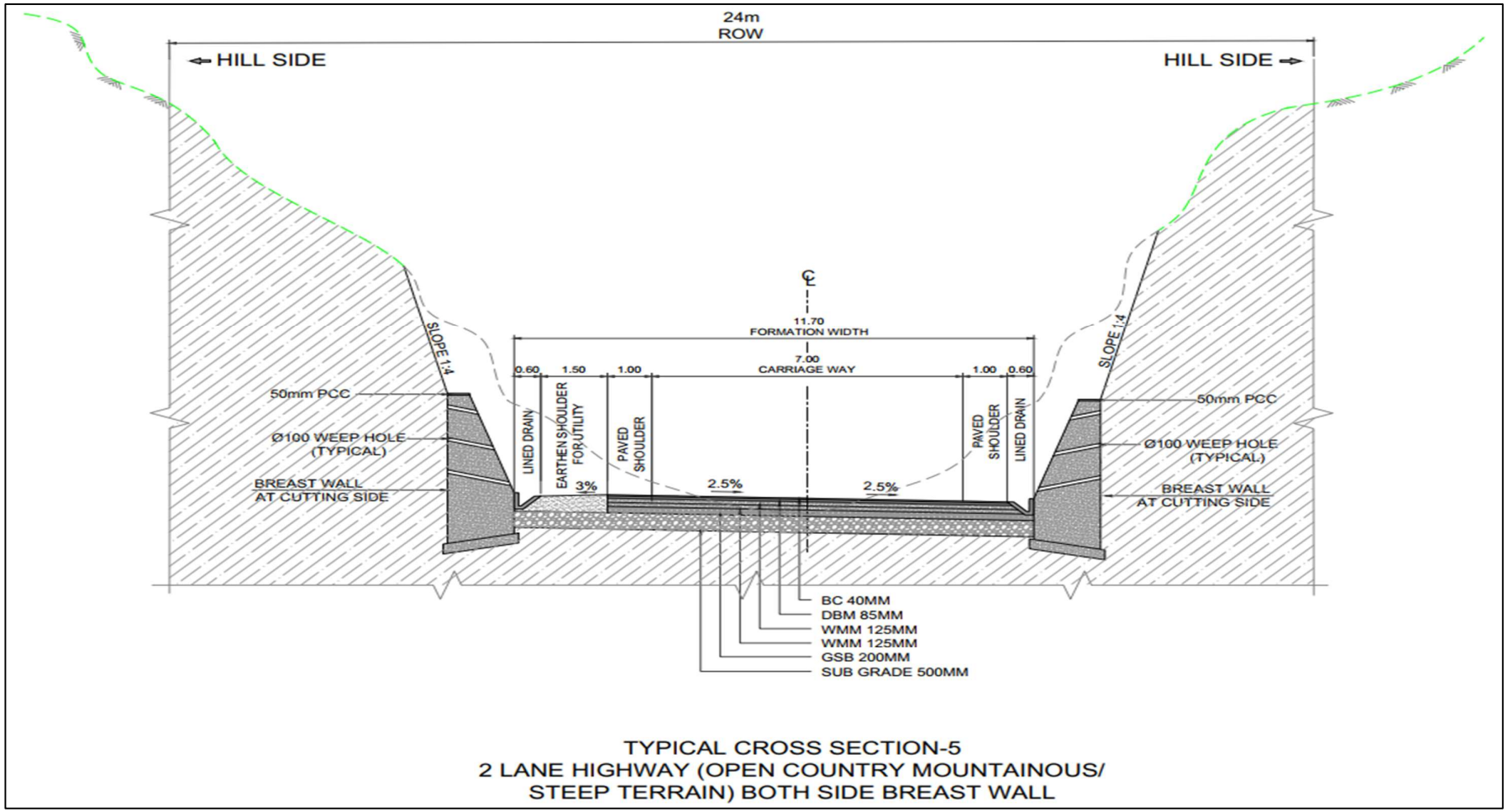


TYPICAL CROSS SECTION-4A
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/ STEEP TERRAIN) VALLEY SIDE SLOPE(LHS) AND HILL SIDE BREAST WALL(RHS)

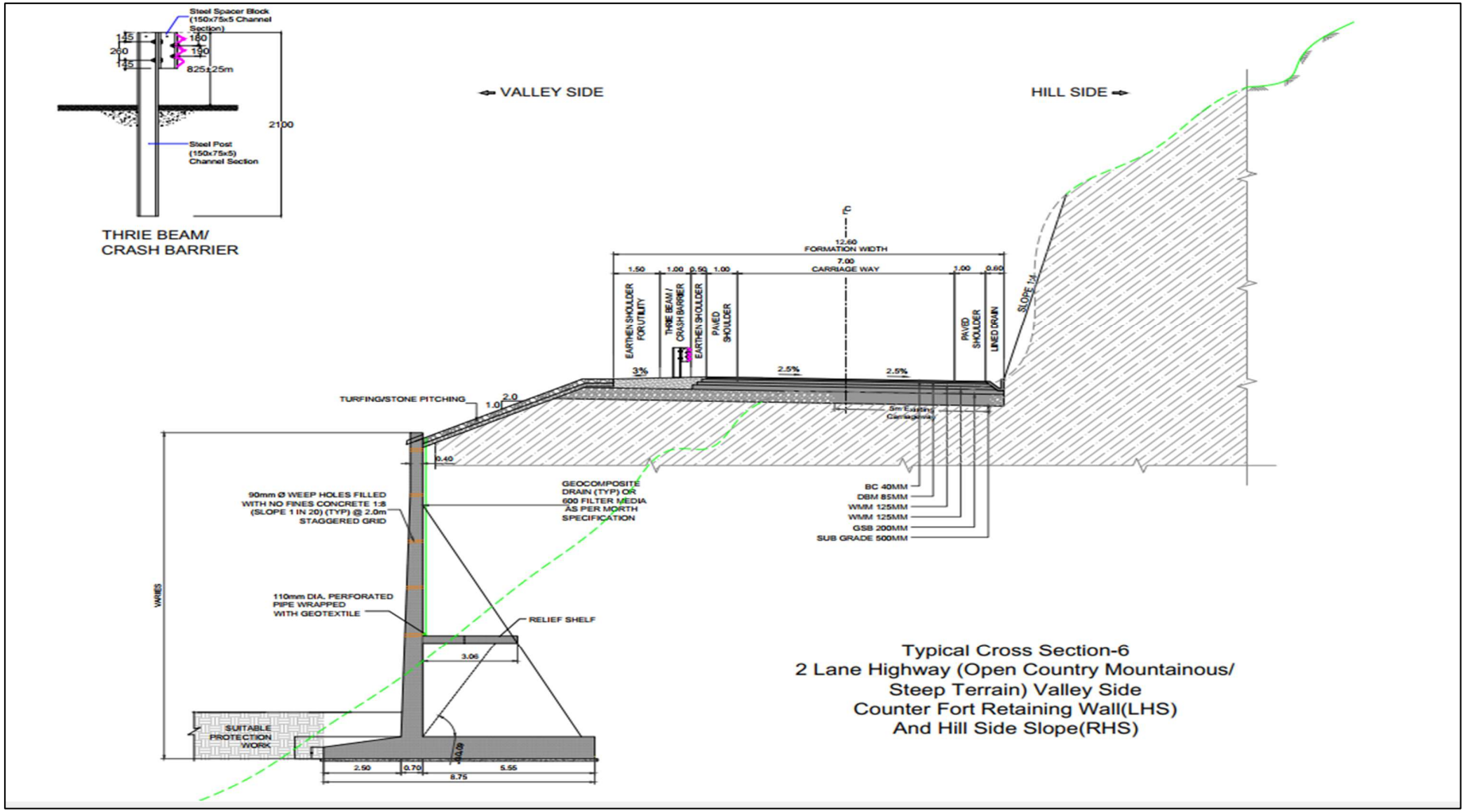

24m
ROW
HILL SIDE
VALLEY SIDE
SLOPE 1:4
50mm PCC
Ø100 WEEP HOLE
(TYPICAL)
BREAST WALL
AT CUTTING SIDE
12.60
FORMATION WIDTH
7.00
CARRIAGE WAY
0.60
1.00
1.00
0.50
1.00
1.50
LINED DRAIN
PAVED SHOULDER
PAVED SHOULDER
EARTHEN SHOULDER
THRIE BEAM/ CRASH BARRIER
EARTHEN SHOULDER FOR UTILITY
2.5%
2.5%
3%
BC 40MM
DBM 85MM
WMM 125MM
WMM 125MM
GSB 200MM
SUB GRADE 500MM
Steel Spacer Block
(150x75x5 Channel
Section)
145
260
180
190
TYPICAL CROSS SECTION-4B
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/
STEEP TERRAIN) HILL SIDE BREAST WALL(LHS)
AND VALLEY SIDE SLOPE(RHS)

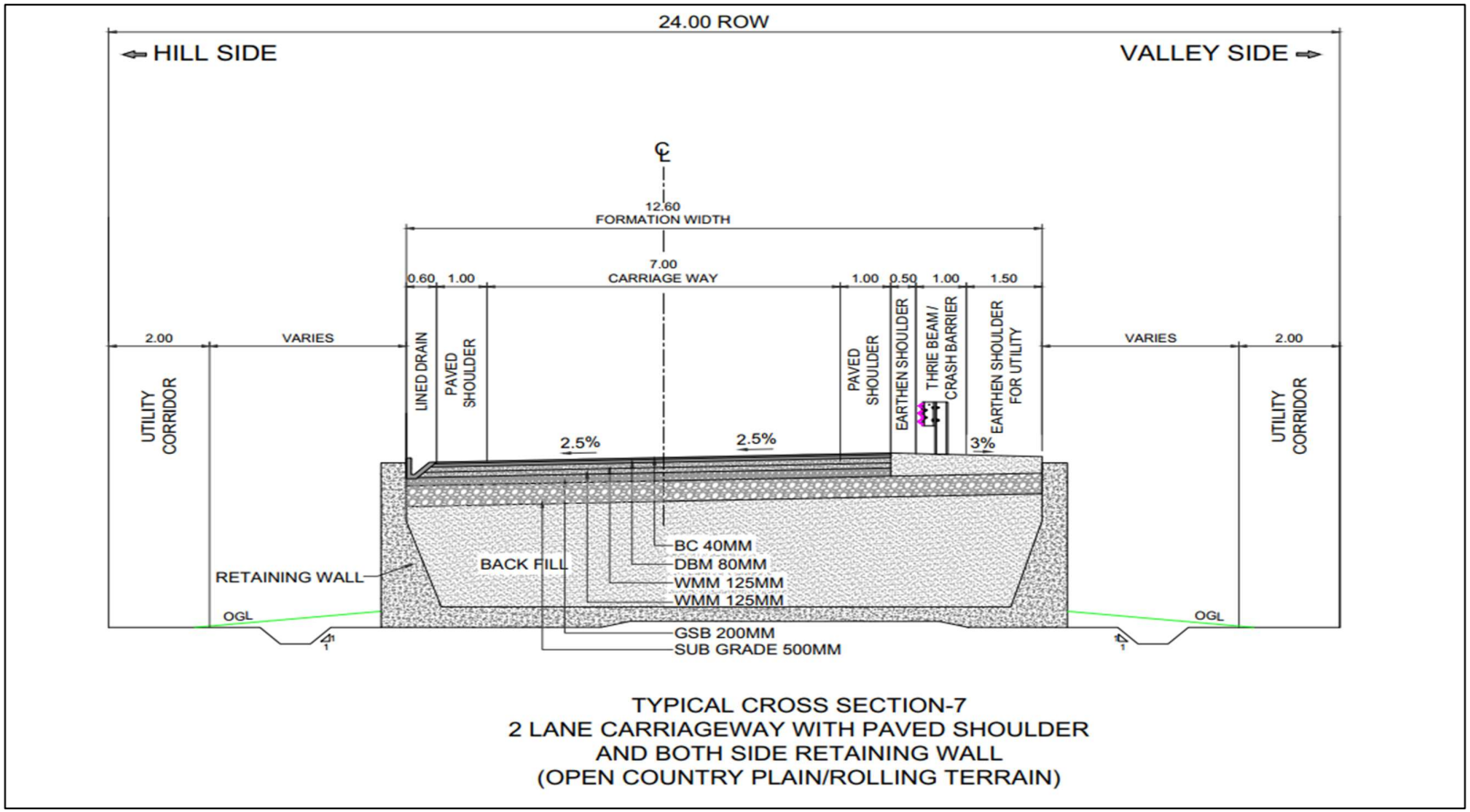


TYPICAL CROSS SECTION-4C
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/ STEEP TERRAIN) VALLEY SIDE SLOPE(LHS) AND HILL SIDE BREAST WALL(RHS)

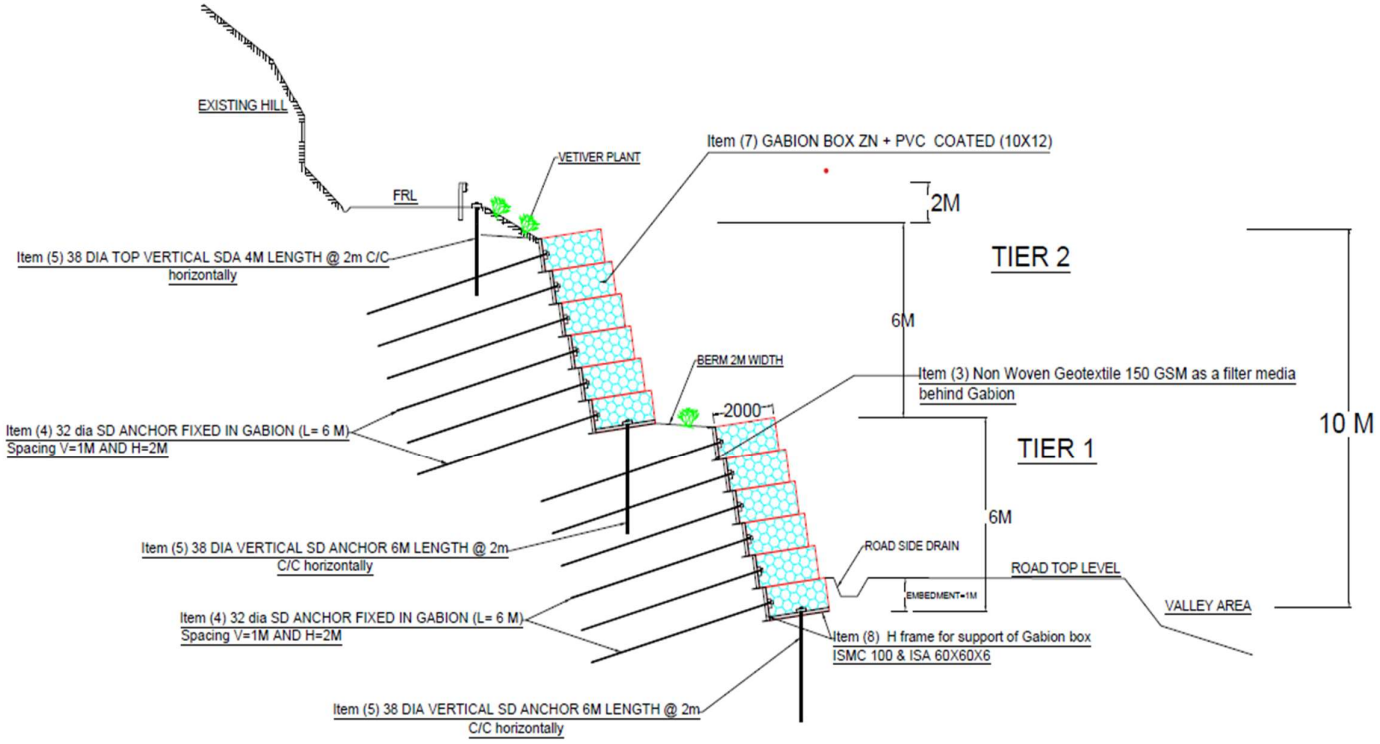


TYPICAL CROSS SECTION-5
2 LANE HIGHWAY (OPEN COUNTRY MOUNTAINOUS/
STEEP TERRAIN) BOTH SIDE BREAST WALL


Steel Spacer Block (150x75x5 Channel Section)
145
180
260
190
145
825±25m
2100
Steel Post (150x75x5) Channel Section
THRIE BEAM/ CRASH BARRIER
VALLEY SIDE
HILL SIDE
12.60 FORMATION WIDTH
7.00 CARRIAGE WAY
1.50
1.00
0.50
1.00
1.00
0.60
EARTHEN SHOULDER FOR UTILITY
THRIE BEAM / CRASH BARRIER
EARTHEN SHOULDER
PAVED SHOULDER
PAVED SHOULDER
LINED DRAIN
SLOPE 1:1
3%
2.5%
2.5%
TURFING/STONE PITCHING
1.0
2.0
0.40
5m Existing Carriageway
GEOCOMPOSITE DRAIN (TYP) OR 600 FILTER MEDIA AS PER MORTH SPECIFICATION
90mm Ø WEEP HOLES FILLED WITH NO FINES CONCRETE 1:8 (SLOPE 1 IN 20) (TYP) @ 2.0m STAGGERED GRID
110mm DIA. PERFORATED PIPE WRAPPED WITH GEOTEXTILE
RELIEF SHELF
3.06
VARIES
SUITABLE PROTECTION WORK
2.50
0.70
5.55
8.75
BC 40MM
DBM 85MM
WMM 125MM
WMM 125MM
GSB 200MM
SUB GRADE 500MM
Typical Cross Section-6
2 Lane Highway (Open Country Mountainous/ Steep Terrain) Valley Side
Counter Fort Retaining Wall(LHS)
And Hill Side Slope(RHS)


24.00 ROW
HILL SIDE
VALLEY SIDE
12.60
FORMATION WIDTH
7.00
CARRIAGE WAY
0.60
1.00
1.00
0.50
1.00
1.50
2.00
VARIES
VARIES
2.00
UTILITY CORRIDOR
LINED DRAIN
PAVED SHOULDER
PAVED SHOULDER
EARTHEN SHOULDER
THRIE BEAM / CRASH BARRIER
EARTHEN SHOULDER FOR UTILITY
UTILITY CORRIDOR
2.5%
2.5%
3%
BC 40MM
DBM 80MM
WMM 125MM
WMM 125MM
BACK FILL
RETAINING WALL
OGL
OGL
GSB 200MM
SUB GRADE 500MM
TYPICAL CROSS SECTION-7
2 LANE CARRIAGEWAY WITH PAVED SHOULDER
AND BOTH SIDE RETAINING WALL
(OPEN COUNTRY PLAIN/ROLLING TERRAIN)

Slope protection work at Lava-Pedong Section (West Bengal)



SECTION 'A-A'

PROTECTION LENGTH=70M

SPECIFICATIONS:

1). Needle Punched and mechanically bonded non-woven Geotextile indigenously manufactured from high quality fibers on the prepared subgrade for Seperation 150 gsm

2). Self Drilling hollow soil/rock anchor of outer dia of 32 mm and inner dia of 18.5mm, yield load carrying capacity of minimum 230 kN in soil /overburden /rock suitable for, drilling placing and cement grouting

3). Gabion box for retaining structure with Mechanically Woven Double Twisted Hexagonal Shaped Wire mesh Gabion Boxes as per IS 16014:2012,MORTH Clause 2500, of required size, MeshType 10x12 (D=100 mm with tolerance of ± 2%) Zinc + PVC coated, DT Mesh wire diameter 2.7/3.7 mm, mechanically edged/selvedged with partitions at every 1m interval and shall have minimum 10 numbers of openings per meter of mesh perpendicular to twist, tying with lacing wire of diameter 2.2mm, supplied @ 3% by weight of Gabion boxes, filled with boulders with least dimension of 200 mm

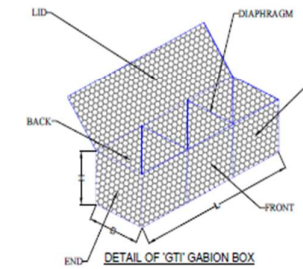
4). Self drilling Hollow soil / rock anchor of outer dia of 38 mm and Inner dia of 19 mm, Yield Load Carrying Capacity of Minimum 400 KN in soil / overburden /rock suitable for drilling placing and cement grouting. Installation with all accesses such as 76 mm dia drill bit, couplers, 8mm thick base plate and nut and bolt complete in all. respect.

5). Structural steel work in single section, fixed with or without connecting plate, including cutting, hoisting, fixing in position and applyinga priming coat of approved steel primer all complete.

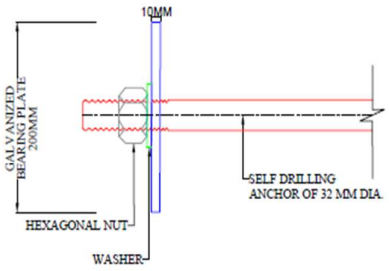
*Note :

1). As per site observations; the most critical section is 20m from OGL & **Average Inclination of slope = 700**

2). The given proposal in on site observations basis as suggested by an expert.



DETAIL OF 'GTI' GABION BOX



Detail of Item-(4)

Schedule - C

Schedule - C
(See Clause2.1)

PROJECT FACILITIES

1. Project Facilities

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

~~(a) toll plaza;~~

(b) road side furniture;

~~(c) pedestrian facilities;~~

~~(d) tree plantation;~~

(e) truck lay-byes;

(f) bus bays and bus shelters;

~~(g) rest areas;~~

(h) Others to be specified: street lighting

2. Description of Project Facilities

Each of the project facilities is described below:

2.1 Toll Plaza

Toll plaza shall be designed as per the guidelines of manual and it is provided at following locations:

Sl.No.	Toll Plaza Location (Design Chainage in Km)
NIL	

2.2 **Road side furniture:** As described in Annex-I of Schedule-B, including the below mentioned facility:

2.2.1 Identification & boundary stones:

S.N	Project facility	Location	Design requirements	Other essential details
1	5th Kilometer stones	Km 61+100 to 79+520	As per Manual and relevant IRC code.	-
2	Kilometer stones			
3	Hectometer stones			
4	Boundary stones			

2.3 **Pedestrian facilities** : Nil

2.4 **Tree plantation** : Nil

2.5 **Truck lay-byes** :

S.N	Location	Design requirements	Other essential details
1	km 62+100 (LHS)	As per Manual and relevant IRC code.	-
2	km 74+840 (RHS)		

2.6 **Bus bays and bus shelters**:

S.N	Location	Design requirements	Other essential details
1	km 65+250 (LHS)	As per Manual and relevant IRC code.	-
2	km 66+600 (RHS)		
3	km 74+940 (LHS)		
4	km 75+290 (RHS)		

2.7 **Rest areas** : NIL

2.8 **Others** :

2.8.1 Street lighting:

S.N	Location	Design requirements	Other essential details
1	At Junctions/Intersections, Viaducts and it's approaches, Bus Bay and Bus shelters, Truck Lay byes etc.	As per Manual and relevant IRC code.	Minimum 156 nos.

Schedule- D

Schedule - D

(See Clause2.1)

Specifications and Standards

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

2. **Design Standards:**

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

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

IRC-37: 2018 Guidelines for the design of flexible pavements

Code for Practice of Road Signs IRC- 67: 2022.

The Hill Road Manual IRC SP:48: 2023 should be referred.

The NGT Order dated 01.11.2018 should be followed for disposal of muck.

3. As regards, the work of utility shifting, the relevant specification, relevant rules, regulations and acts of Utility Owning Department/ Agencies shall be applicable.

Annex – I

(Schedule-D)

Annex-I Specifications and Standards for Construction

1. Specifications and Standards

All Materials, works and construction operations shall conform to the Manual of Specifications and Standards for Two-Lanning of Highways (IRC: SP:73), referred to as the Manual and MORTH Specifications for Road and Bridge Works. In addition, provisions of relevant Codes, Standards, Specifications, Guidelines etc. of IRC, MoRT&H, AASHTO, ASTM, Euro Codes and British Codes shall also be referred. Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Authority's Engineer.

1.1 Design Standards for Specialized Slope Protection Works

(i) Hill Road Manual IRC SP:48: 2023

(ii) MoRT&H OM no. RW/NH-33044/55/2021-S&R (P&B)pt./Hill Clope Monitoring (Computer No. 219394), dated 28.11.2024

(iii) IRC- HRB- Special Report-23 -State of the Art: Design and Construction of Rock fall Mitigation systems.

(iv) IRC: SP: 42 – 2014, Guidelines of Road Drainage.

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

(vi) BS 8006-1:2010+A1:2016–Code of Practice for Strengthened /Reinforced Soil& other fills.

(vii) BS 8081:2015+A2:2018 – Code of Practice for Grouted Anchors.

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

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

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

(xi) IS 14268: 2017 - Uncoated Stress Relieved Low Relaxation Seven-Wire (Ply) Strand for Prestressed Concrete— Specification.

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

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

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

(xv) Other Indian / International Standards applicable as per Good Industry Practice.

2. Deviations from the Specifications and Standards

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

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

Clause Referred in Manual	Item	Provision as per Manual	Modified Provision	Remarks
2.2.1	Minimum design speed in hilly terrain.	40 kmph	At some locations listed below, where the horizontal curve radius is not meeting the criteria as per manual	Speed is restricted for Curve having radius less 50m.
2.6.1	Width of shoulders in mountainous and steep terrain (Hilly Area)	Paved shoulder (open country) = 1.50 m (each side) Earthen shoulder (open country) = 1.00 m (valley side)	As defined in clause 2 (vii) (b) of Annex-I of Sch-B	

The following Policy circulars of MoRTH shall be also complied:

Sl. No.	Policy circular No.	Dated	Subject
1	Efile No. RW/NH-33044/55/2021-S&R(P&B)Pt./ Hill slope monitoring (Computer No. 219394)	28th November 2024	Expert Committee Report on Cost Effective Long Term Remedial Measures for landslide prone areas in hilly regions.
2	Efile No. RW/NH-34066/09/2017/S&R(B) (Computer no. 185417)	12th February 2021	Reinforcing Steel Bars (Clause 1000.9.3.1 of Ministry's specification for Roads and Bridge Works).
3	E-file No. RW/NH-33044/22/2020-S&R (P&B) (Computer No. 186381)	4th June 2024	Width of shoulder (Paved earthen) for National Highways
4	Efile no. RW/NH-35072/05/2018-S&R(P&B) (Computer No. 165688)	19th April 2024	Recommended Bitumen type & grade for different climate &traffic loading for National Highway and Expressway works in India
5	Efile No. RW/NH-35072/05/2018-S&R(P&B) (E165688)	23rd August 2023	Use of Bitumen: Demand Supply, Type & grade, specifications, source of procurement and quality in construction of National Highway Projects
6	Efile No. RW/NH-36098/25/2022-S&R (P&)/Pt.	16th March 2023	Safety in road construction zone in National Highway Projects – effective and adequate measures to be taken
7	Efile No. RW/NH-36098/17/2022/S&R(B)	2nd January 2023	Provisions of crash barriers in existing bridge.

3. CURVE *DETAILS:*

Curve details where speed limit is restricted to 20km/hr. are given in the table below:

Sl. N	HIP Chainage	Radius	Transition Length	SPEED (V) in KMPH	Super elevation e (%)	Remark
1	61436.056	30	25	25	9.259	
2	61741.148	30	25	25	9.259	
3	61842.67	30	25	25	9.259	
4	61910.742	40	25	30	10.000	
5	61967.245	30	15	20	5.926	
6	62370.466	40	25	30	10.000	
7	62541.421	40	25	30	10.000	
8	62620.532	40	25	30	10.000	

Sl. N	HIP Chainage	Radius	Transition Length	SPEED (V) in KMPH	Super elevation e (%)	Remark
9	62732.528	40	25	30	10.000	
10	62824.222	40	25	30	10.000	
11	62951.046	45	20	30	8.889	
12	63532.485	20	15	20	10.000	Hair Pin Bends
13	63559.352	20	0	20	10.000	
14	63713.157	20	15	20	10.000	Hair Pin Bends
15	63740.74	20	0	20	10.000	
16	63917.99	40	15	20	4.444	
17	64012.685	40	25	30	10.000	
18	64231.76	40	25	30	10.000	
19	64742.88	35	15	20	5.079	
20	64824.865	30	20	20	5.926	
21	64963.224	35	15	20	5.079	
22	65527.71	20	15	20	10.000	Hair Pin Bends
23	65554.765	20	0	20	10.000	
24	65713.935	20	15	20	10.000	Hair Pin Bends
25	65739.054	20	0	20	10.000	
26	65950.367	20	15	20	10.000	Hair Pin Bends
27	65977.709	20	0	20	10.000	
28	66213.36	20	15	20	10.000	Hair Pin Bends
29	66240.325	20	0	20	10.000	
30	66368.026	40	15	20	4.444	
31	68454.646	45	15	25	6.173	
32	68553.542	30	15	20	5.926	
33	68801.524	20	15	20	10.000	Hair Pin Bends
34	68829.61	20	0	20	10.000	
35	68963.643	40	25	30	10.000	
36	70226.926	40	15	20	4.444	
37	71616.21	35	15	20	5.079	
38	78373.394	35	25	30	10.000	
39	78422.54	35	0	20	5.079	
40	78861.18	30	15	20	5.926	
41	78907.482	30	0	20	5.926	
42	79154.876	45	15	25	6.173	
43	79342.657	38	15	25	7.310	

4. *Technical Specification:*

- ***Counter-fort Retaining wall***

  - **Design Standards**

I. **Codes and Standards:** Design should comply with relevant codes like ACI 318 (for concrete), BS 8110, Eurocode 2, or IS 456 for design and construction.

II. **Load Considerations:** Consider lateral earth pressure, surcharge loads, seismic forces, and other environmental factors.

III. **Safety Factors:** Apply appropriate safety factors as per the design code.

- **Materials**

I. **Concrete Grade:** Minimum M25 or C30 for reinforced concrete.

II. **Reinforcement Steel:** High-yield strength deformed bars conforming to ASTM A615, IS 1786, or equivalent.

III. **Cement:** OPC 43/53 grade or equivalent.

IV. **Aggregate:** Clean, well-graded aggregate conforming to IS 383 or equivalent.

- **Structural Details**

I. **Reinforcement:**

Vertical bars: Main reinforcement to resist bending moments.
Horizontal and inclined bars: Ties and distribution steel to control shrinkage and temperature effects.
Adequate anchorage and lap lengths as per design standards.

II. **Concrete Cover:** Minimum 40 mm for reinforcement to protect against corrosion.

III. **Footing Design**: Base slab must be designed to distribute loads from the counterforts uniformly to the foundation soil.

- **Construction Considerations**

I. **Formwork:** Ensure smooth, properly aligned formwork to achieve desired dimensions and prevent honeycombing.

II. **Curing:** Proper curing for a minimum of 7-14 days to achieve adequate strength.

III. **Construction Joints:** Located at points of minimum shear, with shear keys or dowels for continuity.

IV. **Quality Control:** Test concrete and steel samples for strength and quality compliance.

- **Drainage and Waterproofing**

I. Provide weep holes or drainage pipes at regular intervals to prevent hydrostatic pressure buildup behind the wall.

II. Use waterproofing membranes or coatings to protect the wall from seepage.

- **Maintenance**

I. Regular inspections for cracks, spalling, and water seepage.

II. Apply protective coatings periodically to reduce corrosion risks.

- ***Slope protection (Self Drilling Anchoring Work):***

ISO certified SDA shall be arranged as specified in the drawings in order to stabilize in-situ strata. The grout shall be made of OPC grade 53 with suitable admixtures. The SDA, nuts, bearing plates and couplers shall be epoxy coated. In-house testing facility of the manufacturer shall have NABL, GAI-LAP certifications.

Drilling shall be carried out by suitable equipment. Diameter of SDA shall be 32 (inner dia-18.5mm) & 38 mm (inner dia-19.0mm) as specified. The SDA shall be made of tensile strength of min. 400 kN. The SDA rod shall be continuously threaded. For convenience of installation, appropriate arrangement (coupler) shall be made to connect two smaller lengths of SDA to achieve the required length.

Installation guideline

a. **Scaling works**: All the loose debris & unwanted materials are to be properly removed from the surface of slope and in the location of SDA applications.

b. The SDA is driven in the required position with help of sacrificial drill bit at the bottom of the anchor bar which facilitates in drilling the hole. The minimum diameter, minimum length and minimum spacing of SDA shall be as specified or site requirement. Additional length and/or spacing of anchoring/nailing shall be carried out as per site condition and as directed by Authority/Authority's Engineer.

c. The grout is pumped through the hollow bar during the drilling process. Grouting shall be done by using OPC grade 53 along with addition of suitable admixture. Mixing shall be done along with potable water so as to form the cementitious paste.

d. The base plates of size 200mm x 200mm x 10 mm shall be placed at interface for tightening the nuts.

e. The fascia (if applicable) shall be installed in front and connected to the steel rods with base plate and nuts.

Following equipment deployed on site
1) Grout agitator
2) Compressor – 450 to 600CFM
3) Drilling equipment percussion/rotary type
4) Any other required equipment.

Expansive plasticizing agent for cement grouts shall be used, typical brand name DR. FIXIT PIDICRETE AM is a shrinkage compensating grout admixture for pressure grouting or similar brand with same properties.

Technical Specification of Mechanically Woven Double Twisted Hexagonal Shaped Wire Mesh netting roll, Mesh Type 10x12, Zn + PVC coated Mesh Wire dia. 2.7/3.7mm (ID/OD), end of roll mechanically edged / selvedged, with galvanization as per IS 16014:2012 and MoRTH (Fifth Revision) 2013, Clause 2500.

Scope:
This specification covers the use of mechanically woven hexagonal shaped double twisted (DT) wire mesh rock fall netting for surface rock fall protection including the scope of furnishing and installation as per the special provisions mentioned in the specifications, instructions from the manufacturer/supplier of the rock fall protection system and as directed by the Engineer- In-Charge.

General Requirements:

The DT wire mesh rock fall netting shall meet the minimum requirements of mechanically woven DT hexagonal shaped zinc and PVC coated wire mesh mainly mesh wire diameter, mesh type, zinc coating, PVC coating, wire tensile strength and mesh panel tensile strength as specified in this document.

System Technology:
The DT wire mesh rock fall netting shall be made up of mechanically woven hexagonal DT wire mesh. The steel wire shall be heavily zinc coated soft temper steel. PVC coating shall be applied for added protection, to use in corrosive environment. Nominal PVC thickness of 0.50mm shall be applied. The hexagonal shape of the mesh provides a better distribution of the working tensions along the wires that form the mesh.

Zn + PVC Coated
Hexagonal wire mesh

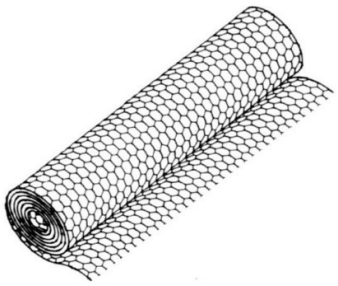


Figure 1 Typical Wire Mesh Rock fall Netting

Material Specifications:
Mechanically Woven Double Twisted Hexagonal shaped Zn + PVC coated wire mesh:
All steel wires used in the manufacturing of wire mesh rock fall netting shall conform to IS 16014:2012. The wire used for the manufacture of mesh shall have a tensile strength between 350-550N/mm2 and elongation shall not be less than 10%. Test shall be carried out on a sample of at least 20 cm length. All tests on the mesh wire, selvedging wire & lacing wire shall be performed prior to manufacturing the mesh. The DT wire mesh shall have peak tensile strength of 40 kN/m tested as per procedure outlined in clause 6 of this specification.
Selvedge wire: The diameter of the selvedging shall be bigger than the wires in the mesh. The diameter of selvedge wire shall be 3.4mm and shall have same characteristics as the mesh wire.

Lacing wire: The diameter of the lacing wire shall be 2.2 mm and shall have same characteristics as the mesh wire and shall have same characteristics as the mesh wire.

Zinc coating

Zinc coating: Minimum quantities of Zinc shown at Table 1 shall meet the requirements of IS 4826:1979.

Adhesion of zinc coating: The adhesion of the zinc coating to the wire shall be such that, when the wire is wrapped ten turns around a mandrel having four times the diameter of the wire, it does not flake or crack when rubbing it with the bare fingers in accordance with IS 4826:1979.

PVC (Polyvinyl Chloride) coating

a. PVC coating thickness: Nominal – 0.5 mm, Minimum – 0.4 mm;
b. Specific weight: 1.3 kg/dm3 – 1.35 kg/dm3 in accordance with IS 13360, Part3, section 1.
c. Hardness: between 50 and 60 Shore D, according to IS 13360, Part5, section 11
d. Tensile strength: Higher than 20.6 MPa, according to IS 13360, Part5, section 1
e. Elongation at break: not less than 200% in accordance with IS 13360, Part5, section 1.5.
f. Color: Grey - RAL 7037.

Wire diameter, tolerances, zinc coating shall conform to values indicated in Table 1:

Table 1 Characteristics of Mesh wire, Selvedge wire and Lacing wire

Characteristics of 10x12 mesh	Mesh wire	Selvedge wire	Lacing wire
Mesh Wire Dia mm	2.7	3.4	2.2
Tolerance (+/-) mm	0.07	0.09	0.06
Zn Coating Min (gm/sq.m)	260	270	240

The wire mesh shall have nominal opening of 100mm as shown in Figure 2. The mesh opening tolerances are indicated in Table 2.

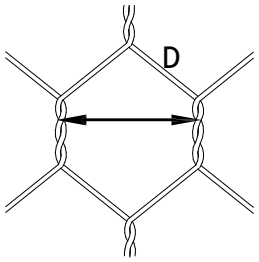


Figure 2 Mesh Details

Tolerances in Mesh Opening size: - 2% to +2%

DT mesh shall have minimum 10 numbers of mesh openings per meter of mesh perpendicular to twist of mesh.

Procedure for verification of mesh opening.

Rockfall netting shall be unfolded on the plain ground.

Any shrink in the unfolded netting shall be removed, by stretching the Mesh panel. Marking on the ground shall be made from the Centre of the twist of one mesh and the second.
Marking shall be done at 1 m distance.
The number of mesh Openings in the 1 m shall be counted & verified.
Table 2 Standard Mesh

Mesh type	"D" (mm)	Tolerance	Mesh Panel Strength (parallel to twist)	Zinc +PVC coated		
				Diameter of wire (Inner / Outer wire)		
				Mesh wire(mm)	Selvedge (mm)	Lacing wire(mm)
10X12	100mm	- 2% to +2%	40kN /m	2.7/3.7	3.4/4.4	2.2/3.2

Dimensions of DT wire mesh

DT wire mesh shall be manufactured in a standard width of 4m and length of 25 or 50m with tolerance of ±5% .Table 3 indicates standard sizes of DT wire mesh rock fall netting Other roll sizes may be required as per site conditions subject to the Engineer's approval. For non-standard roll lengths there may be some variation outside the tolerance limit from the nominal size shown in the contract drawings.
Table 3 Standard sizes of DT wire mesh rock fall netting

Type	Length (m)	Width (m)
DT wire mesh (Mesh 10x12)	25	4
	50	4
	100	4

Installation:
Vegetation, debris and loose soils and other deleterious matter shall be cleared to the satisfaction of Authority Engineer. Reference benchmarks, line and levels shall be marked at site. The materials, tools and tackles shall be shifted to site without damaging system.

The rolls of DT wire mesh rock fall netting should be rolled down the surface from top anchoring system as per the contract drawings. New roll shall be placed in the same manner directly overlapping the adjacent roll such that longitudinal ropes of both the rolls can be laced together by hand. Lacing shall commence by twisting end of the lacing wire tightly to the wire mesh. It shall then pass round the two edges being joined using alternate single and double loops at approximately 100mm intervals. The lacing wire shall be securely tied off at the bottom of the roll. The bottom anchoring shall be done as per the drawings.

Manufacturer's installation guideline shall be referred for details.

Testing and Acceptance criteria:
Testing shall be done on raw material as per codes specified in Table 4. Approval for the material shall be obtained in the writing from the Engineer before actual start of supply. The manufacturer of the DT wire mesh rock fall netting shall provide manufacturers test certificate for the material with every lot/shipment. The

manufacturers test certificate for DT wire mesh rock fall netting shall be provided for certifying that rock fall protection system conforms to all the technical and special requirements.

The punch strength test results shall be 19kN in accordance with MoRTH section 2500 and test specified therein.

DT wire mesh tensile strength test procedure

A tensile test on DT wire mesh sample shall be carried out in order to estimate tensile strength parallel to twist. The test shall be carried out as per procedure outlined below. The DT wire mesh tensile strength shall be minimum 40 kN/m.

a. Take a DT wire mesh of approximately 1.0 m width. The sample shall have edge wire on both the sides.

b. The height of the sample shall be such that after selvedging on both the sides, effective height of the sample shall be more than 300 mm. Sample shall be loaded on the UTM in a direction parallel to twist, with the samples being gripped as shown in the figure 3.

c. The effective height of sample (gauge length) shall be the distance measured between the two rows of inner gripping pins on two grips.

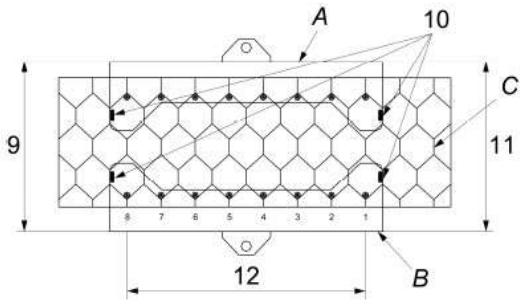
d. Distance between the two end gripping points (pins) along the width of the sample shall be recorded as the unit width under test. The width shall be at least 700 mm.

e. The load shall be applied gradually to the sample and the test be continued till the break point.

f. The peak load and the % elongation shall be recorded.

g. The strength of the DT wire mesh shall be (peak load/unit width under test) expressed in kN/m.

NB. If the sample slips at any of the gripping point during the test, such a test shall be discarded and a new sample shall be taken.



Key

1 to 8	Steel hooks	12	Effective width
9	Left reading	*A*	Upper steel plate
10	Lateral hooks	*B*	Underneath steel plate
11	Right reading	*C*	Mesh sample

Figure 4 Tensile strength of mesh panel

PVC coating thickness test procedure:

The thickness of the PVC coating shall be determined on a randomly chosen individual piece of wire removed from the coil at 3 places 1 metre apart.

Measure with a micrometer the diameter of the galvanized steel wire with PVC coating. Determine the thickness of the PVC coating by stripping the PVC coating from the wire and measure the reduced diameter with a micrometer. The thickness of the coating is the difference between the diameter of the galvanized steel wire with PVC coating and the measured diameter of the galvanized steel wire divided by two. The thickness values should be as per clause 3.e. While removing the PVC coating by stripping, take care not to remove any of the metallic surfaces.

Table 4 Testing Plan

Sr. No	Test	Reference	Frequency of Testing	Sample size	Remarks
	MESH WIRE				
1	Tensile strength & Elongation%	IS 16014:2012	Once	Three	
2	Mass of Zinc & adhesion	IS 4826:1979	Once	Three	
3	DT wire mesh panel strength	Clause 1.6	Once	Three	
4	Physical dimension of Wire mesh rock fall netting	TDS, Visual checking			
5	PVC coating thickness	Clause 1.3.5	Once	Three	
Note:	Testing of wire shall be done on samples from raw material				

Schedule - E

(See Clauses 2.1 and 14.2)

Maintenance Requirements

1. Maintenance Requirements

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

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

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

2. Repair/rectification of Defects and deficiencies

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

3. Other Defects and deficiencies

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

4. Extension of time limit

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

5. Emergency repairs/restoration

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

6. Daily inspection by the Contractor

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

7. Pre-monsoon inspection / Post-monsoon inspection

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

8. Repairs on account of natural calamities

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

Annex – I

(Schedule-E)

Annex-Repair/rectification of Defects and deficiencies

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

Table -1: Maintenance Criteria for Pavements:

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/Repair	Maintenance Specifications
		Desirable	Acceptable					
Flexible Pavement (Pavement of MCW, Service Road, approaches of Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	Potholes	Nil	< 0.1 % of area and subject to limit of 10 mm in depth	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC 82: 2015 and Distress Identification Manual for Long Term Pavement Performance Program, FHWA 2003 (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 Scale, Tape, odometer etc.		2-7 days	IRC:82-2015
	Bleeding	Nil	< 1 % of area	Daily			3-7 days	MORT&H Specification 3004.4
	Ravelling/ Stripping	Nil	< 1 % of area	Daily			7-15 days	IRC:82-2015 read with IRC SP 81
	Edge Deformation / Breaking	Nil	< 1 m for any 100 m section and width < 0.1 m at any location, restricted to 30 cm from the edge	Daily			7- 15 days	IRC:82-2015
	Roughness BI	2000 mm/km	2400 mm/km	Bi-Annually	Class I Profilometer SCRIM	Class I Profilometer : ASTM E950 (98) :2004 –Standard Test Method for measuring Longitudinal Profile of Travelled	180 days	IRC:82-2015
	Skid Number	60SN	50SN	Bi-Annually			180 days	BS: 7941-1: 2006

<table>
<tr><th rowspan="2">Asset Type</th><th rowspan="2">Performance Parameter</th><th colspan="2">Level of Service (LOS)</th><th>Frequency of Inspection</th><th>Tools/Equipment</th><th>Standards and References for Inspection and Data Analysis</th><th>Time limit for Rectification/Repair</th><th>Maintenance Specifications</th></tr>
<tr><th>Desirable</th><th>Acceptable</th><th></th><th></th><th></th><th></th><th></th></tr>
<tr><td rowspan="3"></td><td>Pavement Condition Index</td><td>3</td><td>2.1</td><td>Bi-Annually</td><td rowspan="2">(Sideway-force Coefficient Routine Investigation Machine or equivalent)</td><td rowspan="2">Surfaces with Accelerometer Established Inertial Profiling Reference
ASTM E1656 -94: 2000- Standard Guide for Classification of Automatic Pavement Condition Survey Equipment</td><td>180 days</td><td>IRC:82-2015</td></tr>
<tr><td>Other Pavement Distresses</td><td></td><td></td><td>Bi-Annually</td><td>2-7 days</td><td>IRC:82-2015</td></tr>
<tr><td>Deflection/ Remaining Life</td><td></td><td></td><td>Annually</td><td>Falling Weight Deflecto meter</td><td>IRC 115: 2014</td><td>180 days</td><td>IRC:115-2014</td></tr>
<tr><td rowspan="2">Rigid Pavement (Pavement of MCW, Service Road, Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)</td><td>Roughness BI</td><td>2200mm/km</td><td>2400mm/km</td><td>Bi-Annually</td><td>Class I Profilometer</td><td>ASTM E950 (98) :2004 and ASTM E1656 -94: 2000</td><td>180 days</td><td>IRC:SP:83-2008</td></tr>
<tr><td>Skid</td><td colspan="2">Skid Resistance no. at different speed of vehicles
<table><tr><th>Minimum SN</th><th>Traffic Speed (Km/h)</th></tr><tr><td>36</td><td>50</td></tr><tr><td>33</td><td>65</td></tr><tr><td>32</td><td>80</td></tr><tr><td>31</td><td>95</td></tr><tr><td>31</td><td>110</td></tr></table></td><td>Bi-Annually</td><td>SCRIM (Sideway-force Coefficient Routine Investigation Machine or equivalent)</td><td>IRC:SP:83-2008</td><td>180 days</td><td>IRC:SP:83-2008</td></tr>
<tr><td rowspan="3">Embankment/ Slope</td><td>Edge drop at shoulders</td><td>Nil</td><td>40mm</td><td>Daily</td><td rowspan="3">Length Measurement Unit like Scale, Tape, odometer etc.</td><td rowspan="3">IRC SP:73-2018, IRC 36-2010 & IRC 56-2011</td><td>7-15 days</td><td>MORT&H Specification 408.4</td></tr>
<tr><td>Slope of camber/cross fall</td><td>Nil</td><td><2% variation in prescribed slope of camber /cross fall</td><td>Daily</td><td>7-15 days</td><td>MORT&H Specification 408.4</td></tr>
<tr><td>Embankment Slopes</td><td>Nil</td><td><15 % variation in prescribe side slope</td><td>Daily</td><td>7-15 days</td><td>MORT&H Specification 408.4</td></tr>
</table>

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/Repair	Maintenance Specifications
		Desirable	Acceptable					
	Embankment Protection	Nil	Nil	Daily	NA		7-15 days	MORT&H Specification
	Rain Cuts/ Gullies in slope	Nil	Nil	Daily Specially During Rainy Season	NA		7-15 days	MORT&H Specification

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

Table -2: **Maintenance Criteria for Rigid Pavements:**

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
CRACKING						
1	**Single Discrete Cracks Not intersecting with any joint**	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	Not applicable
			1	w < 0.2 mm. hair cracks		
			2	w = 0.2 - 0.5 mm, discernible from slow-moving car	Seal without delay	Seal, and stitch if L > lm. Within 7days
			3	w = 0.5 - 1.5 mm, discernible from fast-moving car		
			4	w = 1.5 - 3.0 mm	Seal, and stitch if L > l m. Within 7 days	Staple or Dowel Bar Retrofit, FDR for affected portion. Within 15days
			5	w > 3 mm.		
2	**Single Transverse (or Diagonal) Crack intersecting with one or more joints**	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.2 mm, hair cracks	Route and seal with epoxy. Within 7 days	Staple or Dowel Bar Retrofit. Within 15days
			2	w = 0.2 - 0.5 mm, discernible from slow vehicle		
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route, seal and stitch, if L > 1 m. Within 7 days	
			4	w = 3.0 - 6.0 mm	Dowel Bar Retrofit. Within 15 days	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
			5	w > 6 mm, usually associated with spalling, and/or slab rocking under traffic	Not Applicable, as it may be full depth	Full Depth Repair Dismantle and reconstruct affected. Portion with norms and specifications - See Para 5.5 & 9.2 Within 15days
3	**Single Longitudinal Crack intersecting with one or more joints**	w = width of crack L = length of crack d = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.5 mm, discernable from slow moving vehicle	Seal with epoxy, if L > 1 m. Within 7 days	Staple or dowel bar retrofit. Within 15days
			2	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route seal and stitch, if L > l m. Within 15 days	-
			3	w = 3.0 - 6.0 mm	Staple, if L > 1 m. Within 15 days	Partial Depth Repair with stapling. Within 15 days
			4	w = 6.0 - 12.0 mm, usually associated with spalling	Not Applicable, as it may be full depth	
			5	w > 12 mm, usually associated with spalling, and/or slab rocking under traffic		Full Depth Repair Dismantle and reconstruct affected portion as per norms and specifications - See Para 5.6.4 Within 15 days
4	**Multiple Cracks intersecting with one or more joints**	**w = width of crack**	0	Nil, not discernible	No Action	-
			1	w < 0.2 mm, hair cracks	Seal, and stitch if L > l m. Within 15 days	
			2	w = 0.2 - 0.5 mm. discernible from slow vehicle		
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Full depth repair within 15 days	Dismantle, Reinstate subbase, Reconstruct whole slab as per specifications within 30 days
			4	w = 3.0 - 6.0 mm panel broken into 2 or 3 pieces		
			5	w > 6 mm and/or panel broken into more than 4 pieces		

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
5	**Corner Break**	w = width of crack L = length of crack	0	Nil, not discernible	No Action	-
			1	w < 0.5 mm; only 1 corner broken	Seal with low viscosity epoxy to secure broken parts Within 7 days	Seal with epoxy seal with epoxy Within 7days
			2	w < 1.5 mm; L < 0.6 m, only one corner broken		
			3	w < 1.5 mm; L < 0.6 m, two corners broken	Partial Depth (Refer Figure 8.3 of IRC:SP: 83-2008) Within 15 days	Full depth repair
			4	w > 1.5 mm; L > 0.6 m or three corners broken		
			5	three or four corners broken		Reinstate sub-base, and reconstruct the slab as per norms and specifications within 30days
6	**Punch-out (Applicable to Continuous Reinforced Concrete Pavement (CRCP) only)**	w = width of crack L = length (m/m2)	0	Nil, not discernible		No Action
			1	w < 0.5 mm; L < 3 m/m^2	Not Applicable, as it may be full depth	Seal with low viscosity epoxy to secure broken parts. Within 15days
			2	either w > 0.5 mm or L < 3 m/m^2		
			3	w > 1.5 mm and L < 3 m/m^2		
			4	w > 3 mm, L < 3 m/m^2 and deformation		Full depth repair - Cut out and replace damaged area taking care not to damage reinforcement. Within 30days
			5	w > 3 mm, L > 3 m/m^2 and deformation		
Surface Defects						
7	Ravelling or Honeycomb type surface	r = area damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	**Short Term**	**Long Term**
					No action.	Not Applicable
			1	r < 2 %	Local repair of areas damaged and liable to be damaged. Within 15 days	
			2	r = 2 - 10 %		
			3	r = 10-25%	Bonded Inlay, 2 or 3 slabs if Affecting. Within 30 days	
			4	r = 25 - 50 %		

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
			5	r > 50% and h > 25 mm	Reconstruct slabs, 4 or more slabs if affecting. Within 30 days	
8	**Scaling**	r = damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	**Short Term** No action.	**Long Term** Not Applicable
			1	r < **2 %**	Local repair of areas damaged and liable to be damaged. Within 7days	
			2	r = 2 - 10 %		
			3	r = 10 - 20%	Bonded Inlay within 15 days	
			4	r = 20 - 30 %		
			5	r > 30 % and h > 25 mm	Reconstruct slab within 30 days	
9	**Polished Surface/Glazing**	t = texture depth, sand patch test	0		No action.	Not Applicable
			1	t > 1 mm		
			2 '	t = 1 - 0.6 mm	Monitor rate of deterioration	
			3	t = 0.6 - 0.3 mm		
			4	t = 0.3 - 0.1 mm		
			5	t < 0.1 mm	Diamond Grinding if affecting 50% or more slabs in a continuous stretch of minimum 5 km. Within 30 days	
10	**Pop out (Small Hole), Pothole Refer Para 8.4**	n = number/m^2 d = diameter h = maximum depth	0	d < 50 mm; h < 25 mm; n < 1 per 5 m^2	No action.	Not Applicable
			1	d = 50 - 100 mm; h < 50 mm; n < 1 per 5 m^2	Partial depth repair 65 mm deep. Within 15 days	
			2	d = 50 - 100 mm; h > 50 mm; n < 1 per 5 m^2		
			3	d = 100 - 300 mm; h < 100 mm n < 1 per 5 m^2	Partial depth repair 110mm i.e.10 mm more than the depth of the hole. Within 30 days	
			4	d = 100 - 300 mm; h > 100 mm; n < 1 per 5 m^2		
			5	d > 300 mm; h > 100 mm: n > 1 per 5 m^2	Full depth repair.	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
					Within 30 days	

Joint Defects						
11	**Joint Seal Defects**	loss or damage L = Length as % total joint length	0	Difficult to discern.	**Short Term** No action.	**Long Term** Not Applicable
			1	Discernible, L< 25% but of little immediate consequence with regard to ingress of water or trapping incompressible material.	Clean joint, inspect later.	
			3	Notable. L > 25% insufficient protection against ingress of water and trapping incompressible material.	Clean and reapply sealant in Selected locations. Within 7 days	
			5	Severe; w > 3 mm negligible protection against ingress of water and trapping incompressible material.	Clean, widen and reseal the joint. Within 7 days	
12	**Spalling of Joints**	w = width on either side of the joint L = length of spalled portion (as % joint length)	0	Nil, not discernible	No action.	Not Applicable
			1	w < 10 mm	Apply low viscosity epoxy resin/ mortar in cracked portion. Within 7 days	
			2	w = 10 - 20 mm, L < 25%		
			3	w = 20 - 40 mm, L > 25%	Partial Depth Repair.	

Joint Defects						
					Within 15 days	
			4	w = 40 - 80 mm, L > 25%	30 - 50 mm deep, h = w + 20% of w, within 30 days	
			5	w > 80 mm, and L > 25%	50 - 100 mm deep repair. H = w + 20% of w. Within 30 days	
13	**Faulting (or Stepping) in Cracks or Joints**	f = difference of level	0	not discernible, < 1 mm	No action.	No action.
			1	f < 3 mm		
			2	f = 3 - 6 mm	Determine cause and observe, take action for diamond grinding	Replace the slab as appropriate. Within 30days
			3	f = 6 - 12 mm	Diamond Grinding	
			4	f= 12 - 18 mm	Raise sunken slab.	Replace the slab as appropriate. Within 30days
			5	f> 18 mm	Strengthen subgrade and sub-base by grouting and raising sunken slab	
14	**Blow-up or Buckling**	h = vertical displacement from normal profile	0	Nil, not discernible	**Short Term**	**Long Term**
			1	h < 6 mm	No Action	
			2	h = 6 - 12 mm	Install Signs to Warn Traffic within 7 days	
			3	h = 12 - 25 mm		
			4	h > 25 mm	Full Depth Repair.	

Joint Defects						
					Within 30 days	
			5	shattered slabs, ie 4 or more pieces	Replace broken slabs. Within 30 days	
15	**Depression**	h = negative vertical displacement from normal profile L =length	0	Not discernible, h < 5 mm	No action.	Not Applicable
			1	h = 5 - 15 mm		
			2	h = 15-30 mm, Nos <20% joints	Install Signs to Warn Traffic within 7 days	
			3	h = 30 - 50 mm		
			4	h > 50 mm or > 20% joints	Strengthen subgrade. Reinstate pavement at normal level if L < 20 m. Within 30 days	
			5	h > 100 mm		
16	**Heave**	h = positive vertical displacement from normal profile. L = length	0	Not discernible. h < 5 mm	**Short Term** No action.	**Long Term** Scrabble
			1	h = 5 - 15 mm	Follow up.	
			2	h = 15 - 30 mm, Nos <20% joints	Install Signs to Warn Traffic within 7 days	
			3	h = 30 - 50 mm		
			4	h > 50 mm or > 20% joints	Stabilise subgrade. Reinstate pavement at normal level if length < 20 m. Within 30 days	
			5	h > 100 mm		
17	**Bump**		0	h < 4 mm	No action	

Joint Defects						
		h = vertical displacement from normal profile	1	h = 4 - 7 mm	Grind, in case of new construction within 7 days	Construction Limit for New Construction.
			3	h = 7 - 15 mm	Grind, in case of ongoing Maintenance within 15 days	Replace in case of new construction. Within 30days
			5	h > 15 mm	Full Depth Repair. Within 30 days	Full Depth Repair. Within 30days
18	**Lane to Shoulder Drop-off**	f = difference of level	0	Nil, not discernible < 3mm	**Short Term** No action.	**Long Term**
			1	f = 3 - 10 mm	Spot repair of shoulder within 7 days	
			2	f = 10 - 25 mm		
			3	f = 25 - 50 mm	Fill up shoulder within 7 dayss	
			4	f = 50 - 75 mm		For any 100 m stretch Reconstruct shoulder, if affecting 25% or more of stretch. Within 30days
			5	f > 75 mm		
Drainage						
19	**Pumping**	quantity of fines and water expelled	0	not discernible	No Action	
			1 to 2	slight/ occasional Nos < 10%	Repair cracks and joints Without delay.	Inspect and repair sub-drainage at

Joint Defects						
		through open joints and cracks Nos	3 to 4	appreciable/ Frequent 10 - 25%	Lift or jack slab within 30 days.	distressed sections and upstream.
		Nos/100 m stretch	5	abundant, crack development > 25%	Repair distressed pavement sections. Strengthen subgrade and subbase. Replace slab. Within 30 days	
20	**Ponding**	Ponding on slabs due to blockage of drains	0-2	No discernible problem	No action.	
			3 to 4	Blockages observed in drains, but water flowing	Clean drains etc within 7 days, Follow up	Action required to stop water damaging foundation within 30 days.
			5	Ponding, accumulation of water observed	-do-	

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

<table>
<tr><th>Asset Type</th><th>Performance Parameter</th><th>Level of Service (LOS)</th><th>Frequency of Measurement</th><th>Testing Method</th><th>Recommended Remedial measures</th><th>Time limit for Rectification</th><th>Specifications and Standards</th></tr>
<tr><td>Highway</td><td>Availability of Safe Sight Distance</td><td>As per IRC: 52-2019, a minimum of safe stopping sight distance shall be available throughout.
<table><tr><th>Design Speed, kmph</th><th>Desirable Minimum Sight Distance (m)</th><th>Safe Stopping Sight Distance (m)</th></tr><tr><td>50</td><td>120</td><td>60</td></tr><tr><td>40</td><td>90</td><td>45</td></tr></table></td><td>Monthly</td><td>Manual Measurements with Odometer along with video/ image backup</td><td colspan="2">Removal of obstruction within 24 hours, in case of sight line affected by temporary objects such as trees, temporary encroachments.
In case of permanent structure or design deficiency:
Removal of obstruction/improvement of deficiency at the earliest
Speed Restriction boards and suitable traffic calming measures such as transverse bar marking, blinkers, etc. shall be applied during the period of rectification.</td><td>IRC : 52-2019</td></tr>
<tr><td rowspan="3">Pavement Marking</td><td>Wear</td><td><70% of marking remaining</td><td>Bi-Annually</td><td>Visual Assessment as per Annexure-F of IRC:35-2015</td><td>Re - painting</td><td>Cat-1 Defect – within 24 hours
Cat-2 Defect - within 2 months</td><td>IRC:35-2015</td></tr>
<tr><td>Day time Visibility</td><td>During expected life Service Time
Cement Road - 130mcd/m^2/lux
Bituminous Road - 100mcd/m^2/lux</td><td>Monthly</td><td>As per Annexure-D of IRC:35-2015</td><td>Re - painting</td><td>Cat-1 Defect – within 24 hours
Cat-2 Defect – within 2 months</td><td>IRC:35-2015</td></tr>
<tr><td>Night Time Visibility</td><td><u>Initial and Minimum Performance for Dry Retro reflectivity during night time:</u></td><td>Bi-Annually</td><td>As per Annexure-E of IRC:35-2015</td><td>Re - painting</td><td>Cat-1 Defect – within 24 hours
Cat-2 Defect – within 2 months</td><td>IRC:35-2015</td></tr>
</table>

<table>
<tr><th>Asset Type</th><th>Performance Parameter</th><th>Level of Service (LOS)</th><th>Frequency of Measurement</th><th>Testing Method</th><th>Recommended Remedial measures</th><th>Time limit for Rectification</th><th>Specifications and Standards</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>Design Speed</td><td colspan="2">(RL) Retro Reflectivity (mcd/m^2/lux)</td></tr>
<tr><td></td><td>Initial (7 days)</td><td>Minimum Threshold level (TL) & warranty period required up to 2 years</td></tr>
<tr><td>Up to 65</td><td>200</td><td>80</td></tr>
<tr><td>65 - 100</td><td>250</td><td>120</td></tr>
<tr><td>Above 100</td><td>350</td><td>150</td></tr>
</table>
<u>Initial and Minimum Performance for Night Visibility under wet condition (Retro reflectivity):</u>
Initial 7 days Retro reflectivity: 100 mcd/m^2/lux
Minimum Threshold Level: 50 mcd/m^2/lux</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>Skid Resistance</td><td>Initial and Minimum performance for Skid Resistance:
Initial (7days): 55BPN
Min. Threshold: 44BPN
*Note: shall be considered under urban/city traffic condition encompassing the locations like pedestrian crossings, bus bay, bus stop, cycle track intersection delineation, transverse bar markings etc</td><td>Bi-Annually</td><td>As per Annexure-G of IRC:35-2015</td><td></td><td>Within 24 hours</td><td>IRC:35-2015</td></tr>
<tr><td>Road Signs</td><td>Shape and Position</td><td>Shape and Position as per IRC:67-2022. Signboard should be clearly visible for the design speed of the section.</td><td>Daily</td><td>Visual with video/image backup</td><td>Improvement of shape, in case if shape is damaged.</td><td>48 hours in case of Mandatory Signs, Cautionary and Informatory Signs</td><td>IRC:67-2022</td></tr>
</table>

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
					Relocation as per requirement	(Single and Dual post signs) 15 Days in case of Gantry/Cantilever Sign boards	
	Retro reflectivity	As per specifications in IRC:67-2022	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:67-2022
Kerb	Kerb Height	As per IRC 86:1983 depending upon type of Kerb	Bi-Annually	Use of distance measuring tape	Raising Kerb Height	Within 1 Month	RC 86:1983
	Kerb Painting	Functionality: Functioning of Kerb painting as intended	Daily	Visual with video/image backup	Kerb Repainting	Within 7-days	RC 35:2015
Other Road Furniture	Reflective Pavement Markers (Road Studs)	Numbers and Functionality as per specifications in IRC:SP 73-2018 and IRC:35-2015, unless specified in Schedule-B.	Daily	Counting	New Installation	Within 2 months	IRC:SP:73-2018, IRC:35-2022
	Pedestrian Guardrail	Functionality: Functioning of guardrail as intended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:SP:73-2018,
	Traffic Safety Barriers	Functionality: Functioning of Safety Barriers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:73-2018, IRC:119-2015

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	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:73-2018, IRC:119-2015
	Attenuators	Functionality: Functioning of Attenuators as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP-2014, IRC:119-2015
	Guard Posts and Delineators	Functionality: Functioning of Guard Posts and Delineators as intended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC: 79 – 2019
	Overhead Sign Structure	Overhead sign structure shall be structurally adequate	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:67-2022
	Traffic Blinkers	Functionality: Functioning of Traffic Blinkers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:73-2018,
Highway Lighting System	Highway Lights	Illumination: Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC:SP:73-2018
		No major failure in the lighting system	Daily	-	Rectification of failure	24 hours	IRC:SP:73-2018,
		No minor failure in the lighting system	Monthly	-	Rectification of failure	8 hours	IRC:SP:73-2018,
	Toll Plaza Canopy Lights	Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC:SP:73-2018,
		No major/minor failure in the lighting system	Daily	-	Rectification of failure	8 hours	IRC:SP:73-2018,

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Trees and Plantation including median plantation	Obstruction in a minimum head-room of 5.5 m above carriageway or obstruction in visibility of road signs	No obstruction due to trees	Monthly	Visual with video/image backup	Removal of trees	Immediate	IRC:SP:73-2018,
	Deterioration in health of trees and bushes	Health of plantation shall be as per requirement of specifications & instructions issued by Authority from time to time	Daily	Visual with video/image backup	Timely watering and treatment. Or Replacement of Trees and Bushes.	Within 90 days	IRC:SP:73-2018,
	Vegetation affecting sight line and road structures	Sight line shall be free from obstruction by vegetation	Daily	Visual with video/image backup	Removal of Trees	Immediate	IRC:SP:73-2018,
Rest Areas	Cleaning of toilets	-	Daily	-	-	Every 4 hours	
	Defects in electrical, water and sanitary installations	-	Daily	-	Rectification	24 hours	
Other Project Facilities and Approach roads	Damage or deterioration in Approach Roads, pedestrian facilities, truck lay-bys, bus-bays, bus- shelters, cattle crossings, Traffic Aid Posts, Medical Aid Posts and other works		Daily	-	Rectification	15 days	IRC:SP:73-2018,

Table 4: Maintenance Criteria for Structures and Culverts:

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Pipe/box/slab culverts	Free waterway/unobstructed flow section	85% of culvert normal flow area to available.	2 times in a year (before and after rainy season)	Inspection by Bridge Engineer as per IRC SP: 35-1990 and recording of depth of silting and area of vegetation.	Cleaning silt up soils and debris in culvert barrel after rainy season, removal of bushes and vegetation, U/s of barrel, under barrel and D/s of barrel before rainy season.	15 days before onset of monsoon and within 30 days after end of rainy season.	IRC 5-2015, IRC SP:40-2019 and IRC SP:13-2004
	Leak-proof expansion joints if any	No leakage through expansion joints	Bi-Annually	Physical inspection of expansion joints as per IRC SP: 35-1990 if any, for leakage strains on walls at joints.	Fixing with sealant suitably	30 days or before onset of rains whichever comes earlier	IRC SP:40-2019 and IRC SP:69-2011
	Structurally sound	Spalling of concrete not more than 0.25 sqm Delamination of concrete not more than 0.25 Sqm. Cracks wider than 0.3 mm not more than 1m aggregate length	Bi-Annually	Detailed inspection of all components of culvert as per IRC SP:35-1990 and recording the defects	Repairs to spalling, cracking, delamination, rusting shall be followed as per IRC: SP:40-2019.	15 days	IRC SP 40-2019 and MORTH Specifications clause 2800
	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sqm, damage to solid apron	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 40-2019 and IRC: SP:13-2004.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		(concrete apron) not more than 1 sqm					
Bridges including ROBs Flyover etc. as applicable	Riding quality or user comfort	No pothole in wearing coat on bridge deck	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC or wearing coat	15 days	MORT&H Specification 2811
Bridge -Super Structure	Bumps	No bump at expansion joint	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC on either side of expansion joints, profile correction course on approach slab in case of settlement to approach embankment	15 days	MORT&H Specification 3004.2 & 2811.
	User safety (condition of crash barrier and guard rail)	No damaged or missing stretch of crash barrier or pedestrian hand railing	Daily	Visual inspection and detailed condition survey as per IRC SP: 35-1990.	Repairs and replacement of safety barriers as the case may be	3days	IRC: 5-2015, IRC SP: 73-2018 and IRC SP: 40-2019.
	Rusted reinforcement	Not more than 0.25 sq.m	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out the repairs to affected concrete portion with epoxy mortar / concrete.	15 days	IRC SP: 40-2019 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
	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: 40-2019 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: 51-2015.
	Vibrations in bridge deck due to moving trucks	Frequency of vibrations shall not be more than 5 Hz	Once in every 5 years for spans more than 30m and every 10 years for spans between 15 to 30 m	Laser displacement sensors or laser vibro-meters	Strengthening of super structure	4 months	AASHTO LRFD specifications
	Leakage in Expansion joints	No damage to elastomeric sealant compound in strip seal expansion joint, no leakage of rain water through	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: 40-2019.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
		expansion joint in case of buried and asphalt plug and copper strip joint.					
	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: 40-2019.
	Drainage spouts	No down take pipe missing/broken below soffit of the deck slab. No silt, debris, clogging of drainage spout collection chamber.	Monthly	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Cleaning of drainage spouts thoroughly. Replacement of missing/broken down take pipes with a minimum pipe extension of 500mm below soffit of slab. Providing sealant around the drainage spout if any leakages observed.	3 days	MORTH specification 2700.
Bridge-substructure	Cracks/spalling of concrete/ rusted steel	No cracks, spalling of concrete and rusted steel	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out repairs to substructure by grouting/guniting and micro concreting depending on type of defect noticed	30 days	IRC SP: 40-2019 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
	Bearings	Delamination of bearing reinforcement not more than 5%, cracking or tearing of rubber not more than 2 locations per side, no rupture of reinforcement or rubber	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	In case of failure of even one bearing on any pier/abutment, all the bearings on that pier/abutment shall be replaced, in order to get uniform load transfer on to bearings.	3 months	MORTH specification 2810, IRC 83 and IRC SP: 40-2019.
Bridge Foundation	Scouring around foundations	Scouring shall not be lower than maximum scour level for the bridge	Bi-Annually	Condition survey and visual inspection as per IRC SP:35-1990 using Mobile Bridge Inspection Unit. In case of doubt, use Underwater camera for inspection of deep wells in major Rivers.	Suitable protection works around pier/abutment	1 month	IRC SP: 40-2019, MORTH specification 2500
	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sq.m, damage to solid apron (concrete apron) not more than 1 sq.m	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching.	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier.	IRC: SP 40-2019 and IRC: SP:13-2022.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Slope Protection (Landslide & Sinking)	Movement & deformation in landslide & sinking zones	Movement & deformation beyond permissible limit should be made good to the design standard	14 Days	Once in month/ as when noticed	Standard method as approved by the Authority QA/QC plan of the contractor	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier	Refer the Schedule B and Schedule D
	Any material or defect development in workmanship used in protection work	The material and workmanship specification should be in accordance with Schedule B and Schedule D	14 Days	Once in month/ as when noticed	Standard method as approved by the Authority QA/QC plan of the contractor	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier.	Refer the Schedule B and Schedule D
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 5: Maintenance Criteria for Hill Roads

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

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

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

A. Flexible Pavement

	Nature of Defect or deficiency	Time limit for repair/ rectification
(b)	**Granular earth shoulders, side slopes, drains and culverts**	
(i)	Variation by more than 1 % in the prescribed slope of camber/cross fall (shall not be less than the camber on the main carriageway)	7 (seven) days
(ii)	Edge drop at shoulders exceeding 40 mm	7 (seven) days
(iii)	Variation by more than 15% in the prescribed side (embankment) slopes	30 (thirty) days
(iv)	Rain cuts/gullies in slope	7 (seven) days
(v)	Damage to or silting of culverts and side drains	7 (seven) days
(vi)	Desilting of drains in urban/semi- urban areas	24 (twenty four) hours
(vii)	Railing, parapets, crash barriers	7 (seven) days (Restore immediately if causing safety hazard)
(c)	**Road side furniture including road sign and pavement marking**	
(i)	Damage to shape or position, poor visibility or loss of retro- reflectivity	48 (forty eight) hours
(ii)	Painting of km stone, railing, parapets, crash barriers	As and when required/ Once every year
(iii)	Damaged/missing signs road requiring replacement	7 (seven) days
(iv)	Damage to road mark ups	7 (seven) days
(d)	**Road lighting**	
(i)	Any major failure of the system	24 (twenty four) hours
(ii)	Faults and minor failures	8 (eight) hours
(e)	**Trees and plantation**	
(i)	Obstruction in a minimum head- room of 5 m above carriageway or obstruction in visibility of road signs	24 (twenty four)hours
(ii)	Removal of fallen trees from carriageway	4 (four) hours
(iii)	Deterioration in health of trees and bushes	Timely watering and treatment
(iv)	Trees and bushes requiring replacement	30 (thirty) days

Nature of Defect or deficiency		Time limit for repair/ rectification
(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], Rain water harvesting/Artificial Recharge Unit 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**	

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

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

Schedule - F

(See Clause 4.1 (vii)(a))

Applicable Permits

1. Applicable Permits

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

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

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

c. Licence for use of explosives;

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

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

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

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

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

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

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

Schedule – G

(See Clauses 7.1 and 19.2)

Form of Bank Guarantee

Annex-I

(See Clause 7.1)

[Performance Security/Additional Performance Security]

To

The Managing Director,
National Highway & Highway Development Corporation Ltd.
1st Floor, Tower-A, World Trade Centre, Nauroji Nagar
New Delhi- 110029

WHEREAS_____[name and address of Contractor] (hereafter called the "Contractor") has undertaken, in pursuance of Letter of Acceptance (LOA) No. _____Dated_____ for construction of "**Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder from Lavamore to Start of Pedong Bypass along NH-717A from existing km 61.100 to km 79.520 in the State of West Bengal on EPC Mode"** (hereinafter called the "Contract").

AND WHEREAS the Contract requires the Contractor to furnish an {Performance Security/ Additional Performance Security} for due and faithful performance of its obligations, under and in accordance with the Contract, during the {Construction Period/ Defects Liability Period and Maintenance Period} in a sum of Rs….. cr. (Rupees ……..….. crore) (the "**Guarantee Amount**"[1]).

AND WHEREAS 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 Contract, 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.

[1] Guarantee Amount for Performance Security and Additional Performance Security shall be calculated as per Contract.

2. A letter from the Authority, under the hand of an officer not below the rank of [Superintending Engineer of Ministry of Road Transport & Highways], 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 Contract 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 Contract 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 Contract 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 Contract 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 Contract 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 Contract or for the fulfillment, compliance and/or performance of all or any of the obligations of the Contractor under the Contract.

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

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

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

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

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

12. This Guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

13. The guarantor/bank hereby confirms that it is on the SFMS (Structural Finance Messaging System) platform & shall invariably send an advice of this Bank Guarantee to the designated bank of NHIDCL, detail of which is as under:

S. No.	Particulars	Details
1.	Name of Beneficiary	National Highways & Infrastructure Development Corporation Ltd. (NHIDCL)
2.	Name of Bank	Canara Bank
3.	Account No.	8598201005819
4.	IFSC Code	CNRB0008598

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

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

(Designation)

(Code Number)

(Address)

(See Clauses 2.21)

Format of Insurance Surety Bond

[Performance Security/Additional Performance Security]

To

The Managing Director,
National Highway & Highway Development Corporation Ltd.
1st Floor, Tower-A, World Trade Centre, Nauroji Nagar
New Delhi- 110029

WHEREAS_____[name and address of Contractor] (hereafter called the "Contractor") has undertaken, in pursuance of Letter of Acceptance (LOA) No. _____Dated_____ for construction of "**Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder from Lavamore to Start of Pedong Bypass along NH-717A from existing km 61.100 to km 79.520 in the State of West Bengal on EPC Mode"** (hereinafter called the "Contract").

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

AND WHEREAS we, through our branch at …… (the "Surety Insurer") have agreed to furnish this Surety Bond by way of Performance security.

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

1. The Surety Insurer herby 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 Contract, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Surety Bond Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein

2. A letter from the Authority, under the hand of an officer not below the rank of [Superintending Engineer of Ministry of Road Transport Et Highways], 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 Contract shall be conclusive, final and binding on the Surety Insurer. The Surety Insurer further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Contract and its decision that the Contractor is in default shall be final and binding on the Surety Insurer, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

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

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

5. The Authority shall have the liberty, without affecting in any manner the liability of the Surety Insurer under this Surety Bond, to vary at any time, the terms and conditions of the Contract 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 Contract 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 Contract and/or the securities available to the Authority, and the Surety Insurer shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Surety Insurer from its liability and obligation under this Surety Bond and the Surety Insurer hereby waives all of its rights under any such law

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

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

8. The Surety Bond shall cease to be in force and effect on ****[$]. Unless3 a demand or claim under this Surety Bond is made in writing before expiry of the Surety Bond, the Surety Insurer shall be discharged from its liabilities hereunder.

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

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

10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Surety Insurer at its above referred branch, which shall be deemed to have been duly 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 in proving such notice, when given by post it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

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

12. This Guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

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)

Annex – II

(Schedule - G)
(See Clause 19.2)

Annex-IForm for Guarantee for Advance Payment

The Managing Director,
National Highways & Infrastructure Development Corporation Limited (NHIDCL)
New Delhi
WHEREAS:

(A) ……[name and address of contractor] (hereinafter called the "**Contractor**") has executed an agreement (hereinafter called the "**Agreement**") with the National Highways & Infrastructure Development Corporation, 1st & 2nd Floor, Tower A, World Trade Centre, Nauroji Nagar, New Delhi – 110029, (hereinafter called the **"Authority"**) have entered (hereinafter called the "**Authority**") for **Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration from Lavamore (Km 61.10) to Start of Pedong Bypass (Km 79.700) along NH-717A in state of West Bengal** basis, subject to and in accordance with the provisions of the Agreement

(B) In accordance with Clause 19.2 of the Agreement, the Authority shall make to the Contractor an interest bearing @*Bank Rate + 3%* advance payment (herein after called "**Advance Payment**") equal to 10% (ten per cent) of the Contract Price; and that the Advance Payment shall be made in two instalments 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 instalment to remain effective till the complete and full repayment of the instalment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of {first/second} instalment 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.

2. A letter from the Authority, under the hand of an officer not below the rank of General Manager in the NHIDCL, that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the instalment of the Advance Payment under and in accordance with the

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

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

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

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

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

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

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

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

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants

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

that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.

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

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

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

13. The guarantor/bank hereby confirms that it is on the SFMS (Structural Finance Messaging System) platform & shall invariably send an advice of this Bank Guarantee to the designated bank of MORT&H, details of which is as under:

S. No.	Particulars	Details
1.	Name of Beneficiary	National Highways & Infrastructure Development Corporation Limited (NHIDCL)
2.	Name of Bank	Canara Bank
3.	Account No.	8598201005819
4.	IFSC Code	CNRB0008598

Signed and sealed this ……. day of ……., 20…… at …….
SIGNED, SEALED AND DELIVERED

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

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

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

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

Schedule - H

(See Clauses10.1 (iv) and 19.3)

Contract Price Weightages

1.1 The Contract Price for this Agreement is Rs……

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	Stage for Payment	Percentage weightage
1	2	3	4
I. Road works including culverts, widening and repair of culverts.	**18.71%**	**B.1- Reconstruction/ New realignment/ bypass (Flexible pavement)**	
		(1) Earthwork up to top of subgrade	45.93%
		(3) Granular Sub-Base (GSB)	1.82%
		(4) Wet mix macadam (WMM)	1.80%
		(5) Dense Graded Bituminous Macadam (DBM)	26.14%
		(6) Bituminous Concrete	13.00%
		D- Re-Construction and New culverts on existing road, realignments, bypasses :	
		Culverts (length < 6 m)	11.31%
III. Major Bridge(length > 60 m.) works and ROB/RUB/ elevated sections/flyovers including viaducts, if any	**23.10%**	**C.2-New Elevated Section/Flyovers/ Grade Separators**	
		(1) Pile Foundation	**11.79%**
		(2) Sub-structure	**37.61%**
		(3) Super-structure (including bearings)	**43.55%**
		(4) Wearing Coat including expansion joints	**3.30%**
		(5) Miscellaneous Items like hand rails, crash barriers, road markings etc.)	**3.49%**
		(6) Wing walls/return walls	
		(7) Approaches (including Crash Barriers, Retaining walls/Reinforced Earth wall, stone pitching and protection works)	**0.26%**
IV. Other works	**54.58%**	**(i) Toll Plaza**	0.00%
		(ii) Road side drains	
		(a) CC Lined Drain	1.09%
		(b) Cover slab	0.00%

		(iii) Road signs, markings, km stones, safety devices etc.	1.57%
		(iv) Overhead gantry mounted signs	0.03%
		(v) Project facilities (a) Bus Bays (b) Truck lay-byes (c) Rest areas (d) others	5.39%
		(vi) Road side plantation	0.00%
		(vii) Protection works# other than approaches to	0.00%
		(a) Thrie Beam Crash Barrier	3.11%
		(b) Retaining Wall	26.93%
		(c) Breast Wall	18.24%
		(d) Special Slope Protection	37.38%
		(viii) Safety and traffic management during construction	0.00%
		(ix) Junction Development	6.26%
V. Utility shifting	**3.61%**	**Electrical utilities and Public Health Utilities (Water pipelines and sewage lines)**	
		(i) EHT line	0.00%
		(ii) EHT crossings	0.00%
		(iii) HT/LT line	33.00%
		(iv) HT/LT crossings	0.00%
		(v) Water pipeline	67.00%
		(vi) Water pipeline crossing	
		(vii) Sewage lines	0.00%
		(viiii) Sewage line crossings.	0.00%

1.3 Procedure of estimating the value of work done.

1.3.1 Road works.

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

Table 1.3.1

Stage of for Payment	**Percentage Weight in particular Item**	**Payment Procedure**
1	**2**	**3**
B.1- Reconstruction/ New realignment/ bypass (Flexible pavement)		
(1) Earthwork up to top of subgrade	**45.93%**	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent
(3) Granular Sub-Base (GSB)	**1.82%**	
(4) Wet mix macadam (WMM)	**1.80%**	
(5) Dense Graded Bituminous Macadam (DBM)	**26.14%**	

Stage of for Payment	Percentage Weight in particular Item	Payment Procedure
D- Re-Construction and New culverts on existing road, realignments, bypasses :		of the total length or 500 m, whichever is less.
Culverts (length < 6 m)	**11.31%**	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 atleast one culvert. 75% of the cost will be payable on completion of box/abutments and slab/pipe and head wall. Remaining 25% will become payable on completion of protection works including return/wing walls and any other work associated with culverts.

@. 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
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 including the length not handed over to the Contractor under clause 8.3 of this Contract Agreement due to which the Contractor is unable to execute the work, may be deducted from the total project length for payment 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 : NIL

1.3.3 Major Bridge works, ROB/RUB and Structures.

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

Table 1.3.3

Stage of for Payment	Percentage Weight in particular Item	Payment Procedure
1	2	3
C.2-New Elevated Section/Flyovers/ Grade Separators		
(1) Pile Foundation	**11.79%**	Cost of each structure shall be determined on pro rata basis with respect to the total linear length (m) of the structures. **Foundation:** Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one foundation of each of the structure as specified here in under: (a) Piling: Payment of 70% shall be made on completion of piling upto bottom of pile cap for each pile on pro-rata basis (b) Pile Cap: Payment of 30% shall be made on completion of pile cap. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(2) Sub-structure	**37.61%**	Payment against Sub- structure shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one sub-structure of abutments/piers upto abutment/pier cap level of each of the structure.
(3) Super-structure (including bearings)	**43.55%**	Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super- structure upto deck slab including bearings of at least one span as specified here in under: If pre-cast girders/ segments are used, interim payments shall be made at 75% of the cost of that element, as derived from MoRTH Data Book, applicable SOR of State PWD on Base Date with tender discount/premium applied thereon.
(4) Wearing Coat including expansion joints	**3.30%**	Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified for each of the structure.

Stage of for Payment	Percentage Weight in particular Item	Payment Procedure
(5) Miscellaneous Items like hand rails, crash barriers, road markings etc.	**3.49%**	Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified for each of the structure.
(6) Wing walls/return walls	**0.00%**	Payments shall be made on completion of all wing walls/return walls complete in all respects as specified for each of the structure.
(7) Approaches (including Crash Barriers, Retaining walls/Reinforced Earth wall, stone pitching and protection works)	**0.26%**	Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified here in under: If reinforced soil wall is used with facia panel/blocks, interim payment shall be made @75% of the Cost of that element as derived from MoRTH data Book. Applicable SOR of State PWD on Base Date with tender discount/premium applied thereon.

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 for Payment	Percentage Weight in particular Item	Payment Procedure
1	**2**	**3**
(i) Toll Plaza	0.00%	Unit of measurement is each completed toll plaza. Payment for each toll plaza shall be made on pro rata basis with respect to the total of all toll plazas as specified
(ii) Road side drains		
(a) CC Lined Drain	1.09%	Unit of measurement is linear length in metre. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 100 m on one side.
(b) Cover slab	0.00%	Unit of measurement is linear length in metre. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 100 m on one side.
(iii) Road signs, markings, km stones, safety devices etc.	1.57%	Unit of measurement is linear length in km. Payment shall be made on pro rata basis on completion of a stage in a length of not less than one Km on both sides.

Stage of for Payment	Percentage Weight in particular Item	Payment Procedure
(iv) Overhead gantry mounted signs	0.03%	Unit of measurement is each number. Payment shall be made on pro-rata basis on completion of each overhead gantry mounted sign.
(v) Project facilities (a) Bus Bays (b) Truck lay-byes (c) Rest areas (d) others	5.39%	Unit of measurement is each number. Payment shall be made on pro rata basis for completed facilities.
(vi) Road side plantation	0.00%	Unit of measurement is linear length in Km. Payment shall be made on pro rata basis on completion of one Km.
(vii) Protection works# other than approaches to		
(a) Thrie Beam Crash Barrier	3.11%	Unit of measurement is linear length. Payment against items (a), (b) & (c) shall be made on pro rata basis on completion of a stage in a length of not less than 10% (ten per cent) of the total length and 100 m whichever is less.
(b) Retaining Wall	26.93%	
(c) Breast Wall	18.24%	
(d) Special Slope Protection works	37.38%	Unit of measurement is area in sqm. Payment shall be made on pro rata basis on completion of each stage in an area of not less than 10% of the total area.
(viii) Safety and traffic management during construction	0.00%	Payment shall be made on prorata basis every six months.
(ix) Junction Development	6.26%	Unit of measurement is each number. Payment shall be made on pro rata basis on completion of development of each junction.
(x) Utility shifting : Electrical utilities and Public Health Utilities (Water pipelines and sewage lines)		
(a) 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 cable30%, (iii) OTR erection (if involved)-15% and (iv) Charging of line including dismantling and site clearance-35% (with OTR) and 50%without OTR)

Stage of for Payment	Percentage Weight in particular Item	Payment Procedure
(b) EHT crossings	0.00%	Cost of each crossing shall be determined on pro-rata basis with reference to total no. of crossings. Payment shall be made for not less than 25% of the (iii) HTI LT line [**] (including transformers if any) (iv) HTI LT crossings [**] (v) Water pipeline [**] (vi) water pipeline [**] crossings crossings subject to a minimum of 4 crossings
(c) HT/LT line	33.00%	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 LTI 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 cable30%, (iii) OTR erection (if involved)-10% and (iv) Charging of line including dismantling and site clearance-40% (with OTR) and 50%without OTR
(d) HT/LT crossings	0.00%	Cost of each crossing shall be determined on pro-rata basis with reference to total no. of crossings. Payment shall be made for not less than 25% of the crossings subject to a minimum of 10 crossings.
(e) Water pipeline	67.00%	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%)
(f) Water pipeline crossing		
(g) 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%)
(h) Sewage line crossings.	0.00%	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

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

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

Schedule - I

(See Clause 10.2 (iv))
Drawings

1. Drawings

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

2. Additional Drawings

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

Annex – I

(Schedule - I)

List of Drawings

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

a) Detailed Drawings of Plan & Profile with Horizontal intersection Point, Vertical Intersection Points, elements of curves, and sight distances.

b) Detailed Drawings of Cross-section at 50.0m interval along the alignment.

c) Typical Cross-section with details of pavement thickness.

d) Detailed Drawings of all Junctions/intersections.

e) Detailed drawing for culverts.

f) Detailed Drawings of road drainage measures and drainage Plan.

g) Detailed Drawings of slope protection measures like Secured Drapery in Hill Side and RCC and Plum concrete retaining wall in Valley Side.

h) Drawings of road furniture items including traffic signage, markings, safety barriers (Thrie beam) etc.

i) Detailed Utility Shifting Drawings (Electrical, HT/EHT Line and Water Supply line etc.)

j) Any other drawing relevant to the Project Highway as desired by Authority/Client.

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**

(iii) Project Milestone-I shall occur on the date falling on the **320th (Three Hundred twenty)** day from the Appointed Date (the "**Project Milestone-I**").

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

3. **Project Milestone-II**

(i) Project Milestone-II shall occur on the date falling on the **548th (Five Hundred and Forty eight)** day from the Appointed Date (the "**Project Milestone- II**").

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

4. **Project Milestone-III**

(i) Project Milestone-III shall occur on the date falling on the **776th (seven Hundred and seventy-six) day from the Appointed Date (the "Project Milestone- III").**

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

5. **Scheduled Completion Date**

(i) The Scheduled Completion Date shall occur on the **913th (Nine Hundred thirteen)** day from the Appointed Date.

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

6. Extension of time

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

Schedule - K

(See Clause 12.1 (ii))
Tests on Completion

1. Schedule for Tests

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

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

2. Tests

(i) Visual and physical test: The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include (to be decided in consultation with Authority's Engineer as per relevant IRC codes/manual).

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

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

(iv) Other tests: The Authority's Engineer may require the Contractor to carry out or cause to be carried additional tests, in accordance with Good

Industry Practice, for determining the compliance of the Project Highway with Specifications and Standards, except tests as specified in clause 5, but shall include measuring the reflectivity of road markings and road signs; and measuring the illumination level (lux) of lighting using requisite testing equipment.

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

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

3. Agency for conducting Tests

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

4. Completion Certificate

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

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

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

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

Schedule - L

(See Clause 12.2)

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 Rehabilitation and Upgradation to four lane configuration & strengthening of **Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration from Lavamore (Km 61.100) to Start of Pedong Bypass (Km 79.700) along NH-717A in state of West Bengal** on Engineering, Procurement and Construction (EPC) basis through …… (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement, and I am satisfied that the Project Highway can be safely and reliably placed in service of the Users thereof.

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

SIGNED, SEALED AND DELIVERED

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

(Signature)

(Name)

(Designation) (Address)

Schedule - M

(See Clauses 14.6, 15.2 and 19.7)

Payment Reduction for Non-Compliance

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

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

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

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

2. Percentage reductions in lump sum payments on monthly basis

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

S. No.	Item/Defect/Deficiency	Percentage
(a)	**Carriageway/Pavement**	
(i)	Potholes, cracks, other surface defects	15%
(ii)	Repairs of Edges, Rutting	5%
(b)	**Road, Embankment, Cuttings, Shoulders**	
(i)	Edge drop, inadequate cross fall, undulations, settlement, potholes, ponding, obstructions	10%
(ii)	Deficient slopes, raincuts, disturbed pitching, vegetation growth, pruning of trees	5%
(c)	**Bridges and Culverts**	
(i)	Desilting, cleaning. vegetation growth, damaged pitching, flooring, parapets, wearing course, footpaths, any damage to foundations	20%
(ii)	Any Defects in superstructures, bearings and sub-structures	10%

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

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

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

Where,

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

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

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

L1= non-complying length L = Total length of the road,

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

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

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

Schedule - N
(See Clause 18.1 (i))
Selection of Authority's Engineer

1. Selection of Authority's Engineer

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

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

2. Terms of Reference

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

3. Appointment of Government entity as Authority's Engineer

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

Annex – I

(Schedule - N)

Annex-I: Terms of Reference for Authority's Engineer

1. Scope

(i) These Terms of Reference (the "**TOR**") for the Authority's Engineer are being specified pursuant to the EPC Agreement dated ..... (the "**Agreement**), which has been entered into National Highways & Infrastructure Development Corporation, 1st Floor, Tower A, World Trade Centre, Nauroji Nagar, New Delhi – 110029 (the "**Authority**") and ..... (the "**Contractor**")[#] **Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration from Lavamore (Km 61.100) to Start of Pedong Bypass (Km 79.700) along NH-717A in state of West Bengal** on EPC mode, and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.

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

2. Definitions and interpretation

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

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

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

3. General

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

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

a). any Time Extension;

b). any additional cost to be paid by the Authority to the Contractor;

c). the Termination Payment; or

d). issuance of Completion Certificate or

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

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

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

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

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

4. Construction Period

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

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

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

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

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

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

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

(viii) The Authority's Engineer shall conduct the pre-construction review of manufacturer's test reports and standard samples of manufactured Materials, and such other Materials as the Authority's Engineer may require.

(ix) For determining that the Works conform to Specifications and Standards, the Authority's Engineer shall require the Contractor to carry out, or cause to be carried out, tests at such time and frequency and in such manner as specified in the Agreement and in accordance with Good Industry Practice for quality management. For purpose of this paragraph 4(ix), the tests specified in the MoRTH Specifications for Road and Bridge works and respective Indian Roads Congress Standards/ Guidelines/ Manuals, together with any other Indian/ International Standards mentioned therein including

any modifications/ substitutions thereof shall be deemed to be tests confirming to Good Industry Practice for quality management.

(x) The Authority's Engineer shall witness all the quality control tests carried out by the Contractor at its site laboratory/ main laboratory/ field/ plants. These include tests for all materials, mixes, products etc. Authority's Engineer shall also witness all tests of finished products like bearing in the manufacturer's laboratory as mandated in respective standards. Authority's Engineer will also conduct review of quality control documents in respect of factory manufactured materials/ finished products, etc. as per IRC:SP:112.

(xi) The timing of tests referred to in Paragraph 4 (ix), and the criteria for acceptance/ rejection of their results shall be determined by the Authority's Engineer in accordance with the MoRTH specifications for Road & Bridge works and respective Indian Roads Congress Standards/ Guidelines/ Manuals together with any other Indian/ International standards referred thereto. The tests shall be undertaken on a random sample basis and shall be in addition to, and independent of, the tests that may be carried out by the Contractor for its own quality assurance in accordance with Good Industry Practice.

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

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

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

(xv) The Authority's Engineer shall obtain from the Contractor a copy of all the Contractor's quality control records and documents before the Completion Certificate is issued pursuant to Clause 12.2.

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

(xvii) In the event that the Contractor carries out any remedial measures to secure the safety of suspended works and Users, and requires the Authority's Engineer to inspect such works, the Authority's Engineer shall inspect the suspended works within 3 (three) days of receiving such notice, and make a report to the Authority forthwith, recommending whether or not such suspension may be revoked by the Authority.

(xviii) The Authority's Engineer shall carry out, or cause to be carried out, all the Tests specified in Schedule-K and issue a Completion Certificate, as the case may be. For carrying out its functions under this Paragraph 4 (xviii) and all matters incidental thereto, the Authority's Engineer shall act under and in accordance with the provisions of Article 12 and Schedule-K.

5. Maintenance Period

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

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

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

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

the time limit for repair or rectification of any deviation or deterioration beyond the permissible limit.

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

6. Determination of costs and time

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

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

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

7. Payments

(i) The Authority's Engineer shall withhold payments for the affected works for which the Contractor fails to revise and resubmit the Drawings to the Authority's Engineer in accordance with the provisions of Clause 10.2 (iv) (d).

(ii) Authority's Engineer shall -

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

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

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

be paid to the Contractor in accordance with the provisions of the Agreement.

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

8. Other duties and functions

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

9. Miscellaneous

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

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

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

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

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

Schedule - O

(See Clauses 19.4 (i), 19.6 (i), and 19.8 (i))

Forms of Payment Statements

1. Stage Payment Statement for Works

The Stage Payment Statement for Works shall state:

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

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

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

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

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

f) Deductions:

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

ii. Any amount towards deduction of taxes; and

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

g) Net claim: (e) – (f) (iii);

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

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

v. For Change of Scope Orders, and

vi. Taxes deducted

2. Monthly Maintenance Payment Statement

The monthly Statement for Maintenance Payment shall state:

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

b) The deductions for maintenance work not done;

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

d) Amounts reflecting adjustments in price under Clause 19.12; and

e) Amount towards deduction of taxes

3. Contractor's claim for Damages

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

Schedule - P

(See Clause 20.1)

Insurance

1. Insurance during Construction Period

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

a). insurance of Works, Plant and Materials and an additional sum of 15 (fifteen) percent 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.

(ii) The insurance cover shall be not less than: Rs. 1,00,00,000/- (Rupees One Crore only)

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

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

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

4. Insurance to be in joint names

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

Schedule-Q
(See Clause 14.10)
Tests on Completion of Maintenance Period

1. Riding Quality test:

Riding quality test: Riding quality of each lane of the carriageway shall be checked with the help of a calibrated bump integrator and the maximum permissible roughness for purposes of this Test shall be 2,200 (two thousand and two hundred only) mm for each kilometre.

2. Visual and physical test:

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

Schedule-R

(See Clause 14.10)

Taking Over Certificate

I, …… (Name and designation of the Authority's Representative) under and in accordance with the Agreement dated…… (the "Agreement"), for **Widening and Up-gradation of existing carriageway into 2-lane with paved shoulder configuration from Lavamore (Km 61.100) to Start of Pedong Bypass (Km 79.700) along NH-717A in state of West Bengal** on 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)

SCHEDULE - S

Procedure for Dispute Resolution Board

The parties to the Contract Agreement mutually agree as follows:

1. The Board shall comprise of three Members having experience in the field of construction or have been involved in the Works related to construction and with the interpretation of contractual documents. One Member shall be selected by each of the Authority and the Contractor from the list maintained by NHIDCL hosted on its website website (https://nhidcl.com/). In the event the parties fail to select the member within 28 days of the date of the signing of Contract agreement, in that eventuality, upon the request of either or both parties such Member shall be selected by SAROD within 14 days. The third Member shall be selected by the other two members from the same list. If the two Members selected by or on behalf of the parties fail to select the third Member within 14 days after the later of their selections, then upon the request of either or both parties such third Member shall be selected by SAROD within 14 days. The third Member shall serve as DG (Road & Development) of the Board.

2. The Board shall be constituted when each of the three Board Members has signed a Board Member's declaration of Acceptance as required by the DRB's rules and procedures (which, along with the declaration of acceptance form, are attached as Annexure herewith).

3. In the event of death, disability, or resignation of any Member, such Member shall be replaced in the same manner as the Member being replaced was selected. If for any other reason, a Member fails or is unable to serve, the Managing Director, NHIDCL (or failing the action of the Managing Director then either of the other Members) shall inform the Parties and such non-serving Member shall be replaced in the same manner as the Member being replaced was selected. Any replacement made by the parties shall be completed within 28 days after the event giving rise to the vacancy on the Board, failing which the replacement shall be made by SAROD in the same manner as described above. Replacement shall be considered complete when the new Member signs the Board Member's Declaration of Acceptance. Throughout any replacement process, the Members not being replaced shall continue to serve and the Board shall continue to function and its activities shall have the same force and effect as if the vacancy had not occurred, provided, however that the Board shall not conduct a hearing nor issue a decision until the replacement is completed.

4. If either the Authority or the Contractor is dissatisfied with any decision of the Board, and/or if the Board fails to issue its decision within 56 days after receipt of all the pleadings (along with the supporting documents) of the parties by the DG (Road & Development) of the Board or any extension mutually agreed upon by the Authority and the Contractor, in such a case, either the Authority or the Contractor may, within 28 days after his receipt of the decision, or within 28 days after the expiry of the said period, as the case may be, give notice to the other party, with a copy for information to the Authority's Engineer, of his intention to refer the matter to the Conciliation Committee of Independent Experts (CCIE) of the Authority for Conciliation/amicable settlement.

5. It is mandatory to refer all the disputes to DRB before issuance of completion certificate and satisfactory completion of punch list items. No dispute shall be entertained after completion of aforementioned date.

6. If the Board has issued a decision to the Authority and the Contractor within the said 56 days or any extension mutually agreed upon by the Authority and the Contractor and no notice of intention to commence Conciliation by the Conciliation Committee of Independent Experts (CCIE) of the Authority for Conciliation/amicable settlement as to such dispute has been given by either the Authority or the Contractor within 28 days after the parties received such decision from the Board, the decision shall become final and binding upon the Authority and Contractor.

7. Whether or not it has become final and binding upon the Authority and the Contractor, a decision shall be admissible as evidence in any subsequent dispute resolution procedure, including any arbitration or litigation having any relation to the dispute to which the decision relates.

8. All decision of DRB which have become final and binding or till they have been reversed in subsequent conciliation/Arbitration process shall be implemented by the parties forthwith. Such implementation shall also include any relevant action of the Authority's Engineer.

9. If during the Contract Period, the Authority and the Contractor are of the opinion that the Disputes Resolution Board is not performing its functions properly, the Authority and the Contractor may together disband the Disputes Resolution Board and reconstitute it. In that case, a new board shall be selected in accordance with the provisions applying to the selection of the original Board as specified above, except that words "within 28 days after the signing of this Contract agreement" shall be replaced by the words "within 28 days after the date on which the notice disbanding the original Board became effective".
10. The Authority and the Contractor shall jointly signed a notice specifying that the Board shall stand disbanded with effect from the date specified in the notice. The notice shall be posted by the email to each member of the Board. A Member shall be deemed to have received the email even if he refuses to have received the same.
11. All other terms and conditions of the original Contract Agreement shall remain unaltered/unaffected and the parties shall remain bound by terms and conditions as contained therein.

Annexure to Schedule [S]

Disputes Resolution Board's Rules and Procedures

1. Except for providing the services required hereunder, the Board Members shall not give any advice to either party or to the Authority's Engineer concerning conduct of the Works. The Board Members:

   a. Shall have no financial interest in any party to the Contract, or the Authority's Engineer, or a financial interest in the contract, except for payment for services on the Board.

   b. Shall have had no previous employment by, or financial ties to, any party to the Contract Agreement, or the Authority's Engineer, except for fee based consulting services/advisers on other projects, and/or be Retired Government Officers (not connected in whole or part with the project), all of which must be disclosed in writing to both parties prior to appointment to the Board.

   c. Shall have disclosed in writing to both parties prior to appointment to the Board any and all recent or close professional or personal relationships with any director, officer, or employee of any party to the Contract, or the Authority's Engineer, and any and all prior involvement in the project to which the Contract relates:

   d. Shall not, while Board member, be employed whether as a consultant or adviser or otherwise by either party to the Contract, or the Authority's Engineer, except as a Board Member, without the prior consent of the parties and the other Board Members;

   e. Shall not, while a Board Member, engage in discussion or make any agreement with any party to the Contract, or with the Authority's Engineer, regarding employment whether as a consultant or otherwise whether after the Contract is completed or after service as a Board Member is completed.

   f. Shall remain and be impartial and independent of the parties and shall disclose in writing to the Authority, the Contractor and one another any fact or circumstance which might be such as to cause either the Authority or the Contractor to question the continued existence of the impartiality and independence required of Board Members, and

   g. Shall be fluent in the language of the Contract.

2. Except for its participation in the Board's activities as provided in the Contract Agreement and in this Agreement none of the Authority, the Contractor, and or the Authority's Engineer shall solicit advice or consultation from the Board or the Board Members on matters dealing with the conduct of the Works.

3. The Contractor shall:

a. Furnish to each Board member one copy of all documents which the Board may request including Contract Agreement, progress reports and other documents pertinent to the performance of the Contract Agreement.

b. In cooperation with the Authority, coordinate the site visits of the Board, including conference facilities, and secretarial and copying service.

4. The Board shall begin its activities following the signing of a Board Member's Declaration of Acceptance by all three Board Members, and it shall terminate these activities as set forth below:

   a. The Board shall terminate its regular activities when either (i) issuance of completion certificate and completion of punch list items or (ii) the parties have terminated the contract and when, in either case, the Board has communicated to the parties and the Authority's Engineer its decision on all disputes previously referred to it.

   b. Once the Board has terminated its regular activities as provided by the previous paragraph, the Board shall remain available to process any dispute referred to it by either party. In case of such a referral, Board Members shall receive payments as provided in paragraphs 7(a) (ii), (iii) and (iv).

5. Board Members shall not assign or subcontract any of their work under these Rules and Procedures.

6. The Board Members are Independent and not employees or agents of either the Authority or the Contractor.

7. Payments to the Board Members for their services shall be governed by the following provisions.

   a. Each Board Member will receive payments as follows:

      i. A retainer fee per calendar month as specified in the schedule of fee made part of this Schedule and its revision from time to time. This retainer fee shall be considered as payment in full for:

   A. Being available, on 7 days' notice, for all hearings, Site Visits, and other meetings of the Board.

   B. Being conversant with all project developments and maintaining relevant files.

   C. All offices and overhead expenses such as secretarial services, photocopying and office supplies (but not include telephone calls, faxes and telexes) incurred in connection with the duties as a Board Member.

ii. A daily fee as specified in the schedule of fee in respect of fee for site visit & meeting, fee for meeting/ hearing not at site and extra charges for days max. of 02 days for travel on each occasion) other than hearing / meeting days.

iii. Expenses, in addition to the above, all reasonable and necessary travel expenses (including economy class air fare, subsistence, and other direct travel expenses). Receipts for all expenses in excess of Rs. 2000/- (Rupees Two Thousand only) shall be provided.

iv. Reimbursement of any taxes that may be levied on payments made to the Board Member pursuant to this paragraph 7.

b. The retainer fee and other fees shall remain fixed for the period of each Board Member's term until revised by NHIDCL.

c. Phasing out of monthly retainer fee. Beginning with the next month after the completion certificate (or, if there are more than one, the one issued last) has been issued, the Board members shall receive only one-third of the monthly retainer fee till next one year. Beginning with the next month after the Board has terminated its regular activities pursuant to paragraph 4(a) above, the Board members shall no longer receive any monthly retainer fee.

d. Payments to the Board Members shall be shared equally by the Authority and the Contractor. The concerned Project Implementation Unit (PIU) of Authority shall pay members' invoices within 30 calendar days after receipt of such invoices and shall invoice the Contractor for one-half of the amounts of such invoices. The Contractor shall pay such invoices within 30 days' time period after receipt of such invoices.

8. Board Site Visits:

a. The Board shall visit the Site and meet the representatives of the Authority, the Contractor and the Authority's Engineer at regular intervals, at times of critical construction events, at the written request of either party, and in any case not less than 6 times in any period or 12 months. The timing of Site visits shall be as agreed among the Authority, the Contractor and the Board, but failing agreement shall be fixed by the Board.

b. Site visits shall include an informal discussion of the status of the construction of the Works. Site visits shall be attended by personnel from the Authority, the Contractor and the Authority's Engineer.

c. At the conclusion of each Site visit, the Board shall prepare a report covering its activities during the visit and shall send copies to the parties and to the Authority's Engineer.

9. Procedure for Dispute Referral to the Board

a. lf either party objects to any action or inaction of the other party or the Authority's Engineer, the objecting party may file a written Notice of Dispute to the other party with a copy to the Authority's Engineer stating that it is given pursuant to the Agreement and state clearly and in details the basis of the dispute.

b. The party receiving the Notice of Dispute will consider it and respond to it in writing within 14 days after receipt.

c. This response shall be final and conclusive on the subject, unless a written appeal to the response is filed with the responding party within 10 days after receiving the response and call upon Authority's Engineer to mediate and assist the parties in arriving an amicable settlement thereof. Both parties are encouraged to pursue the matter further to attempt to settle the dispute.

d. If the Authority's Engineer receiving the Notice of Dispute fails to provide a written response within 14 days after receipt of such Notice or failing mediation by Authority's Engineer, either party may require such dispute to be referred to the Board, either party may refer the dispute to the Board by written Request to the Board. The Request for decision shall state clearly and in full detail the specific issues of the dispute (s) to be considered by Board and shall be addressed to the DG (Road & Development) of the Board, with copies to the other Board Members, the other party, and the Authority Engineer, and it shall state that it is made pursuant to this Agreement.

e. When a dispute is referred to the Board, and the Board is satisfied that the dispute requires the Board's assistance, the Board decide when to conduct a hearing on the dispute. The Board may request that written documentation and arguments from both parties be submitted to each Board Member before the hearing begins. The parties shall submit insofar as possible agreed statements of the relevant facts.

f. During the hearing, the Contractor, the Authority, and the Authority's Engineer shall each have ample opportunity to be heard and to offer evidence. The Board's decision for resolution of the dispute will be given in writing to the Authority, the Contractor and the Authority's Engineer as soon as possible, and in any event not more than 56 days or any mutually extended period between the Authority and the Contractor. The time period of 56 days of issuance of DRB decision will reckon/start from the day of first hearing that begins after submission of complete pleadings (including supporting documents, if any) by the parties.

10. Conduct of Hearings:

a. Normally hearings will be conducted at the Site, but any location that would be more convenient and still provide all required facilities and access to necessary documentation may be utilized by the Board. Private session of the Board may be held at any cost-effective location convenient to the Board. Video recordings of all hearings shall invariably be made.

b. The Authority, the Authority's Engineer and the Contractor shall be given opportunity to have representatives at all hearings. Parties should restrain to bring any Advocate/Law Firm during DRB hearings.

c. During the hearings, no Board Member shall express any opinion concerning the merit of the respective arguments of the parties.

d. After the hearings are concluded, the Board shall meet privately to formulate its decision. The private meeting (s) of the Board shall not exceed 3 sittings. All Board deliberations shall be conducted in private, with all Members' individual views kept strictly confidential. The Board's decisions, together with an explanation of its reasoning shall be submitted in writing to both parties and to the Authority's Engineer. The decision shall be based on the pertinent contract provisions, applicable laws and regulations and the facts and circumstances involved in the dispute.

e. The Board shall make every effort to reach a unanimous decision. If this proves impossible the majority shall decide and the dissenting Member may prepare a

written minority report together with an explanation of its reasoning for submission to both parties and to the Authority's Engineer

11. In all procedural matters, including the furnishing of written documents and arguments relating to disputes, site visits and conduct of hearings, the Board shall have full and the final authority. If a unanimous decision on any such matter proves impossible, the majority shall prevail.
12. After having been selected and where necessary approved each Board Member shall sign two copies of the following declaration and make one copy available each to the Authority and to the Contractor.

BOARD MEMBER'S DECLARATION OF ACCEPTANCE

WHEREAS

a. A Contract Agreement (the Contract) for the_____ project [fill in the name of project] has been signed on _____ [fill in date] between_____ [name of Authority] and _____name of Contractor] (the Contractor).;

b. The provisions of Agreement and Dispute Resolution Board's rules and procedure provided for establishment and operation of Dispute Resolution Board (DRB).

c. The undersigned has been selected to serve as a Board Member on said Board;

NOW THEREFORE, the undersigned Board Member hereby declares as follows

1. I accept the selection as a Board Member and agree to serve on the Board and to be bound by the provisions of Contract Agreement and rules and procedure provided for establishment and operation of Dispute Resolution Board DRB).

2. With respect to paragraph 1 of Dispute Resolution Board's Rules and Procedure. said Annex A, I declare

   a. that I have no financial interest of the kind referred to in subparagraph (a):

   b. that I have had no previous employment nor financial ties of the kind referred to in subparagraph (b); and

   c. that I have made to both parties any disclosures that may be required by sub-paragraphs (b) and (c).

3. I declare that I have _____no. of Arbitrations (list enclosed) and _____ no. of DRBs (list enclosed) in progress and that I will give sufficient time for the current assignment.

BOARD MEMBER

_____

_____ [insert name of Board Member)
Date: _____

Schedule of expenses and fees payable to the Member(s) of Dispute Resolution Board (DRB)

The fee and other expenses payable to the Members of DRB shall be as under

S. No.	Particular	Amount Payable
1	Retainer-ship fee, secretarial assistance and incidental charges (telephone, fax, postage etc)	Rs. 50,000/- per month for one package and maximum of Rs. 75,000/- per month for 2 or more packages
2(i)	Fee for site visit or meetings at site	Rs. 25,000/- per day
(ii)	Fee for meetings/hearings not at site	Rs. 10,000/- per day
3	Traveling expenses	Economy class by air, AC first class by train and AC taxi by road
4	Lodging & Boarding	Rs. 15,000/- per day (Metro Cities): or Rs. 10,000/- per day (in other cities); or Rs. 5,000/- per day (own arrangement)
5	Extra charges for days other than hearing/meeting days (travel days maximum of 2 days on each occasion)	Rs. 5,000/-
6	Local conveyance	Rs. 2,000/-

Notes:

i. Lodging, boarding and travelling expenses will be allowed only for those members who are residing 100 kms away from the place of meeting.

ii. Delhi, Mumbai, Chennai, Kolkata, Bangalore and Hyderabad shall be considered as Metro Cites.

ii. The above schedule of fee and expenses shall be applicable on or after the date of issue of this circular.

iv. The expenses are to be shared equally by the parties i.e. Authority and Contractor.

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