



National Highways & Infrastructure Development Corporation Limited

**REHABILITATION AND UPGRADATION OF SECTION FROM KM
206.000 TO 239.425 (NIMBUTALA TO AUSTIN CREEK) OF NH-
223 TO 2-LANE WITH HARD SHOULDER IN THE UNION
TERRITORY OF ANDAMAN & NICOBAR ISLANDS (PACKAGE NO. 4)**

EXECUTIVE SUMMARY (Package-4)

November-2017



C E C Projects Pvt. Ltd.

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Executive Summary

0.1 Introduction

The Andaman Trunk Road (ATR) has been designated as NH-223 vide GOI MoRT&H Notification dated 25.08.2005 except the chainages between Km 61 to 104 and Km 142 to 155. Subsequently, the entire ATR situated within the UT of Andaman & Nicobar Islands was designated as NH-223 vide GOI MoRT&H Notification dated 07.07.2008. National Highways & Infrastructure Development Corporation Limited (NHIDCL) has been entrusted with the development of NH-223 (New no. NH-4) to 2-lane/ 2 lane with hard shoulder configuration. It was decided during meetings that the work shall be divided into packages based on the availability of Land. Accordingly the section from Nimbutala at Km 206 to Austin Creek at Km 239.425 has been selected as the fourth package for bidding. To avoid CRZ clearance, this package has been ended at a distance of more than 500m before Austin Creek (i.e. at Km 239.425). This report is being prepared for the 4th package i.e. Nimbutala at Km 206.0 to Austin Creek at km 239.425 section of NH-223.

Sr. No.	NH No.	Section	Existing Chainage	Design Chainage	Design Length (Km)
1	223	Nimbutala to Austin Creek	Km 206.000 to 239.425	Ch. 205.895 to 239.300	33.405

0.1.1 Project Road

Project corridor is selected from Nimbutala to Austin Creek on NH-223 in Union Territory of Andaman & Nicobar Island. The project road in the section of NH-223 passes through 1 districts namely Middle Andaman. The settlements located on the stretch are Swadesh nagar, Haripur, Joypur, Basantipur, Deopur, Webi, Pahalgaon.

This executive summary is for package-4. Summary of the existing details/ features for package-4 has been given in Table-0.1 below.

Table 0.1: Project Summary

S.No	Particulars	Stretch (Km 206-239.425)
1	Start Point	Km 206.000
2	End Point	Km 239.425
3	Design Length	33.405 Km
4	Districts	Middle Andaman
5	Terrain	Rolling /Hilly
6	Right of Way(m)	Varies from 10-40m
7	Carriage way	Single lane/Intermediate lane/two lane/dual

S.No	Particulars	Stretch (Km 206-239.425)
		two lane divided carriageway
8	Major Bridge	Nil
9	Minor Bridge	9 Nos.
10	Pipe Culverts	91 Nos.
11	Slab / Box Culverts	23 Nos.
12	Railway Crossings	Nil
13	Major Junctions	1 No.
14	Minor Junctions	27 Nos.

0.1.2 Climate:

The climate of Andaman & Nicobar Island is tropical. It is hot and humid because of its proximity to the Equator and has no winter season. Summer in Andaman & Nicobar Island is from January to April and temperatures can reach 28°C. The monsoon season is May to December. Mid November to April is a good time to visit Andaman. Andaman & Nicobar Islands is always warm, with pleasant sea-breeze. Here is no extreme climate except rains and tropical storms in late summer. The weather is calm only from January to April and to some extent in October. It is quite hot in the months of March to May in the Andamans.

0.2 Engineering Survey, Investigation & Analysis

Engineering surveys have been carried out to assess the existing condition of the road and to facilitate the selection of suitable measures for its improvements. These engineering surveys have been carried out as per the guidelines given in the relevant MoRT&H/IRC/BIS Specifications/Codes to generate adequate database for preparing the most appropriate proposal for the rehabilitation and upgrading of existing 2-lane highway.

Various engineering surveys and investigations carried out are listed below:

- Road Inventory Survey
- Pavement Condition Survey
- Topographic surveys
- Axle Load Surveys
- Existing Pavement Investigations
- Inventory and condition survey of bridges and culverts

0.2.1 Terrain

The terrain in the complete project stretch is rolling/hilly with frequent rise and falls .

0.2.2 Carriageway

The existing carriageway of the road section under Package-4 is Single

Lane/Intermediate lane/two lane/dual two lane divided carriageway flexible pavement having varying carriageway varying as tabulated below in Table 0.2.

Table 0.2: Existing Carriageway

S.No	From	To	C/w Width
1	206.000	207.000	3.66
2	207.000	209.985	5.5
3	209.985	210.360	2 x 7.50
4	210.360	211.900	3.66
5	211.900	215.730	5.5
6	215.730	215.980	2x5.5
7	215.980	218.000	3.66
8	218.000	220.000	5.5
9	220.000	220.500	3.66
10	220.500	221.700	5.5
11	221.700	222.300	3.66
12	222.300	226.600	5.5
13	226.600	227.700	3.66
14	227.700	230.000	5.5
15	230.000	236.000	3.66
16	236.000	237.000	5.5
17	237.000	239.425	3.66

0.2.3 Land Use & EROW

The road section is traversing through forest land and revenue land. Revenue land is from Km 206.00 to km 208.800 (Swadesh nagar), Km 208.800 to 212.200(Haripur), Km 212.200 to Km 215.400(Joypur), Km 215.400 to 215.800(Pareshnagar), Km 215.800 to 217.800 (Govindpur), Km 217.800 to 221.400(Basantipur) Km 232.200 to Km 236.500(Pahalgaoon), Km 236.500 to 236.700(Webi), Km 236.700 to Km 238.700(Deopur), Km 238.700 to Km 239.400 (Lataw), km 239.400 to km 240.00 (Lucknow). Existing ROW of the road is varying between 10m to 40m. Existing ROW details at every 100 m is tabulated below from Km 206.000 to Km 239.425 in Table 0.3:

Table 0.3: Land Details

S.No.	Chainage(km)	Existing ROW (in M)			Remarks
		Right side	Left side	Total	
1	206.000	15	10	25	Swadesh Nagar
2	206.100	13	12	25	

S.No.	Chainage(km)	Existing ROW (in M)			Remarks
		Right side	Left side	Total	
3	206.200	12	13	25	
4	206.300	13	12	25	
5	206.400	13	12	25	
6	206.500	15	15	30	
7	206.600	15	15	30	
8	206.700	15	15	30	
9	206.800	12	9	21	
10	206.900	11	10	21	
11	207.000	11	10	21	
12	207.100	11	10	21	
13	207.200	12	10	22	
14	207.300	10	15	25	
15	207.400	9	9	18	
16	207.500	9	9	18	
17	207.600	10	10	20	
18	207.700	15	15	30	
19	207.800	15	15	30	
20	207.900	15	15	30	
21	208.000	15	15	30	
22	208.100	15	15	30	
23	208.200	15	15	30	
24	208.300	10	10	20	
25	208.400	13	12	25	
26	208.500	15	15	30	
27	208.600	15	15	30	
28	208.700	15	15	30	
29	208.800	15	15	30	Haripur
30	208.900	15	15	30	
31	209.000	15	15	30	
32	209.100	15	15	30	
33	209.200	15	15	30	
34	209.300	15	15	30	
35	209.400	15	15	30	
36	209.500	15	15	30	
37	209.600	15	15	30	
38	209.700	15	15	30	
39	209.800	15	15	30	

S.No.	Chainage(km)	Existing ROW (in M)			Remarks
		Right side	Left side	Total	
40	209.900	15	15	30	
41	210.000	15	15	30	
42	210.100	15	15	30	
43	210.200	15	15	30	
44	210.300	15	15	30	
45	210.400	15	15	30	
46	210.500	15	15	30	
47	210.600	15	15	30	
48	210.700	15	15	30	
49	210.800	15	15	30	
50	210.900	15	15	30	
51	211.000	15	15	30	
52	211.100	15	15	30	
53	211.200	10	20	30	
54	211.300	15	15	30	
55	211.400	15	15	30	
56	211.500	15	15	30	
57	211.600	15	15	30	
58	211.700	15	15	30	
59	211.800	15	15	30	
60	211.900	15	15	30	
61	212.000	15	15	30	
62	212.100	15	15	30	
63	212.200	15	15	30	Joypur
64	212.300	15	15	30	
65	212.400	15	15	30	
66	212.500	15	15	30	
67	212.600	15	15	30	
68	212.700	15	15	30	
69	212.800	15	15	30	
70	212.900	15	15	30	
71	213.000	15	15	30	
72	213.100	15	15	30	
73	213.200	15	15	30	
74	213.300	15	15	30	
75	213.400	12	13	25	
76	213.500	11	14	25	

S.No.	Chainage(km)	Existing ROW (in M)			Remarks
		Right side	Left side	Total	
77	213.600	15	15	30	
78	213.700	15	15	30	
79	213.800	15	15	30	
80	213.900	15	15	30	
81	214.000	15	15	30	
82	214.100	15	15	30	
83	214.200	15	15	30	
84	214.300	15	15	30	
85	214.400	15	15	30	
86	214.500	15	15	30	
87	214.600	15	15	30	
88	214.700	15	15	30	
89	214.800	15	15	30	
90	214.900	15	15	30	
91	215.000	15	15	30	
92	215.100	15	15	30	
93	215.200	15	15	30	
94	215.300	15	15	30	
95	215.400	15	15	30	Pareshnagar
96	215.500	15	15	30	
97	215.600	15	15	30	
98	215.700	15	15	30	
99	215.800	15	15	30	Govindpur
100	215.900	15	15	30	
101	216.000	15	15	30	
102	216.100	15	15	30	
103	216.200	15	15	30	
104	216.300	15	15	30	
105	216.400	15	15	30	
106	216.500	15	15	30	
107	216.600	15	15	30	
108	216.700	15	15	30	
109	216.800	15	15	30	
110	216.900	15	15	30	
111	217.000	15	15	30	
112	217.100	15	15	30	
113	217.200	15	15	30	

S.No.	Chainage(km)	Existing ROW (in M)			Remarks
		Right side	Left side	Total	
114	217.300	15	15	30	
115	217.400	15	15	30	
116	217.500	15	15	30	
117	217.600	15	15	30	
118	217.700	15	15	30	
119	217.800	15	15	30	Basantipur
120	217.900	15	15	30	
121	218.000	15	15	30	
122	218.100	15	15	30	
123	218.200	15	15	30	
124	218.300	15	15	30	
125	218.400	15	15	30	
126	218.500	15	15	30	
127	218.600	15	15	30	
128	218.700	15	15	30	
129	218.800	15	15	30	
130	218.900	15	15	30	
131	219.000	15	15	30	
132	219.100	15	15	30	
133	219.200	15	15	30	
134	219.300	15	15	30	
135	219.400	15	15	30	
136	219.500	15	15	30	
137	219.600	15	15	30	
138	219.700	15	15	30	
139	219.800	15	15	30	
140	219.900	15	15	30	
141	220.000	15	15	30	
142	220.100	15	15	30	
143	220.200	15	15	30	
144	220.300	15	15	30	
145	220.400	15	15	30	
146	220.500	15	15	30	
147	220.600	15	15	30	
148	220.700	15	15	30	
149	220.800	15	15	30	
150	220.900	15	15	30	

S.No.	Chainage(km)	Existing ROW (in M)			Remarks
		Right side	Left side	Total	
151	221.000	15	15	30	
152	221.100	15	15	30	
153	221.200	15	15	30	
154	221.300	15	15	30	
155	221.400	15	15	30	Forest
156	221.500	15	15	30	
157	221.600	15	15	30	
158	221.700	15	15	30	
159	221.800	15	15	30	
160	221.900	15	15	30	
161	222.000	15	15	30	
162	222.100	15	15	30	
163	222.200	15	15	30	
164	222.300	15	15	30	
165	222.400	15	15	30	
166	222.500	15	15	30	
167	222.600	15	15	30	
168	222.700	15	15	30	
169	222.800	15	15	30	
170	222.900	15	15	30	
171	223.000	15	15	30	
172	223.100	15	15	30	
173	223.200	15	15	30	
174	223.300	15	15	30	
175	223.400	15	15	30	
176	223.500	15	15	30	
177	223.600	15	15	30	
178	223.700	15	15	30	
179	223.800	15	15	30	
180	223.900	15	15	30	
181	224.000	15	15	30	
182	224.100	15	15	30	
183	224.200	15	15	30	
184	224.300	15	15	30	
185	224.400	15	15	30	
186	224.500	15	15	30	
187	224.600	15	15	30	

S.No.	Chainage(km)	Existing ROW (in M)			Remarks
		Right side	Left side	Total	
188	224.700	15	15	30	
189	224.800	15	15	30	
190	224.900	15	15	30	
191	225.000	15	15	30	
192	225.100	15	15	30	
193	225.200	15	15	30	
194	225.300	15	15	30	
195	225.400	15	15	30	
196	225.500	15	15	30	
197	225.600	15	15	30	
198	225.700	15	15	30	
199	225.800	15	15	30	
200	225.900	15	15	30	
201	226.000	15	15	30	
202	226.100	15	15	30	
203	226.200	15	15	30	
204	226.300	15	15	30	
205	226.400	15	15	30	
206	226.500	15	15	30	
207	226.600	15	15	30	
210	226.700	15	15	30	
211	226.800	15	15	30	
212	226.900	15	15	30	
213	227.000	15	15	30	
214	227.100	15	15	30	
215	227.200	15	15	30	
216	227.300	15	15	30	
217	227.400	15	15	30	
218	227.500	15	15	30	
219	227.600	15	15	30	
220	227.700	15	15	30	
221	227.800	15	15	30	
222	227.900	15	15	30	
223	228.000	15	15	30	
224	228.100	15	15	30	
225	228.200	15	15	30	
226	228.300	15	15	30	

S.No.	Chainage(km)	Existing ROW (in M)			Remarks
		Right side	Left side	Total	
227	228.400	15	15	30	
228	228.500	15	15	30	
229	228.600	15	15	30	
230	228.700	15	15	30	
231	228.800	15	15	30	
232	228.900	15	15	30	
233	229.000	15	15	30	
234	229.100	15	15	30	
235	229.200	15	15	30	
236	229.300	15	15	30	
237	229.400	15	15	30	
238	229.500	15	15	30	
239	229.600	15	15	30	
240	229.700	15	15	30	
241	229.800	15	15	30	
242	229.900	15	15	30	
243	230.000	15	15	30	
244	230.100	15	15	30	
245	230.200	15	15	30	
246	230.300	15	15	30	
247	230.400	15	15	30	
248	230.500	15	15	30	
249	230.600	15	15	30	
250	230.700	15	15	30	
251	230.800	15	15	30	
252	230.900	15	15	30	
253	231.000	15	15	30	
254	231.100	15	15	30	
255	231.200	15	15	30	
256	231.300	15	15	30	
257	231.400	15	15	30	
258	231.500	15	15	30	
259	231.600	15	15	30	
260	231.700	15	15	30	
261	231.800	15	15	30	
262	231.900	15	15	30	
263	232.000	15	15	30	

S.No.	Chainage(km)	Existing ROW (in M)			Remarks
		Right side	Left side	Total	
264	232.100	15	15	30	
265	232.200	7	10	17	Pahalgaon
266	232.300	7	8	15	
267	232.400	4	8	12	
268	232.500	3	9	12	
269	232.600	4	8	12	
270	232.700	4	8	12	
271	232.800	5	5	10	
272	232.900	4	6	10	
273	233.000	5	10	15	
274	233.100	5	9	14	
275	233.200	5	7	12	
276	233.300	7	7	14	
277	233.400	5	8	13	
278	233.500	9	9	18	
279	233.600	5	14	19	
280	233.700	5	6	11	
281	233.800	6	7	13	
282	233.900	6	7	13	
283	234.000	4	10	14	
284	234.100	4	8	12	
285	234.200	5	6	11	
286	234.300	5	6	11	
287	234.400	5	6	11	
288	234.500	7	5	12	
289	234.600	20	20	40	
290	234.700	10	13	23	
291	234.800	13	14	27	
292	234.900	7	13	20	
293	235.000	18	15	33	
294	235.100	12	11	23	
295	235.200	10	14	24	
296	235.300	16	10	26	
297	235.400	12	13	25	
298	235.500	11	8	19	
299	235.600	12	12	24	
300	235.700	10	15	25	

S.No.	Chainage(km)	Existing ROW (in M)			Remarks
		Right side	Left side	Total	
301	235.800	9	14	23	
302	235.900	11	11	22	
303	236.000	13	13	26	
304	236.100	7	13	20	
305	236.200	7	13	20	
306	236.300	7	13	20	
307	236.400	8	10	18	
308	236.500	9	8	17	Webi
309	236.600	9	10	19	
310	236.700	10	12	22	Deopur
311	236.800	6	6	12	
312	236.900	12	13	25	
313	237.000	11	11	22	
314	237.100	11	7	18	
315	237.200	11	10	21	
316	237.300	16	16	32	
317	237.400	12	7	19	
318	237.500	12	10	22	
319	237.600	14	11	25	
320	237.700	10	7	17	
321	237.800	10	10	20	
322	237.900	13	14	27	
323	238.000	7	10	17	
324	238.100	9	6	15	
325	238.200	8	8	16	
326	238.300	10	12	22	
327	238.400	11	9	20	
328	238.500	10	10	20	
329	238.600	10	10	20	
330	238.700	13	7	20	Lataw
331	238.800	6	6	12	
332	238.900	6	6	12	
333	239.000	10	6	16	
334	239.100	10	5	15	
335	239.200	11	10	21	
336	239.300	20	7	27	
337	239.400	15	15	30	Lucknow

S.No.	Chainage(km)	Existing ROW (in M)			Remarks
		Right side	Left side	Total	
338	239.500	15	15	30	
339	239.600	15	15	30	
340	239.700	15	15	30	
341	239.800	15	15	30	
342	239.900	15	15	30	
343	240.000	15	15	30	

0.2.4 Pavement Condition:

Pavement condition of road stretch under package-4 is generally found to be in fair condition.

Existing pavement composition of the project road (Pkg-4) forms important information, in formulating the rehabilitation designs. The summary of the thickness and composition of the pavement crust in both directions is provided below in Table-0.4

Table-0.4 Pavement Composition

Chainage	Position of Pit (side)	Pavement Composition			Total (mm)
		Bitumen Layer (mm)	Base Course (mm)	Sub base Course (mm)	
210.000	L.H.S	40	-	130	170
215.000	L.H.S	40	120	150	310
220.000	L.H.S	40	120	130	390
225.000	R.H.S	40	115	140	295
230.000	R.H.S	50	290	-	340
235.000	L.H.S	60	100	160	320

0.2.5 Road Junctions:

The road stretch in package-4 comprises of 1 major junction and 27 minor junctions. The major and minor road junctions are listed below in Table-0.5 & 0.6. The minor junctions are basically feeder roads connecting to villages along the project road.

Table 0.5: List of Major Junction

S.No	Existing Chainage (km)	At Grade	Grade Separated	Category of Cross Road+			
				NH	SH	MDR	Others
1	239.153	At Grade	-			Y	

Table 0.6: List of Minor Junction

S.No	Existing Chainage (km)	At Grade	Grade Separated	Category of Cross Road+			
				NH	SH	MDR	Others
1	206.479	At Grade	-				T-type

S.No	Existing Chainage (km)	At Grade	Grade Separated	Category of Cross Road+			
				NH	SH	MDR	Others
2	206.993	At Grade	-				T-type
3	207.103	At Grade	-				T-type
4	208.532	At Grade	-				T-type
5	208.729	At Grade	-				T-type
6	208.977	At Grade	-				T-type
7	210.027	At Grade	-				T-type
8	210.083	At Grade	-				T-type
9	210.493	At Grade	-				Y-type
10	211.378	At Grade	-				T-type
11	211.853	At Grade	-				Y-type
12	212.085	At Grade	-				Y-type
13	212.556	At Grade	-				Y-type
14	213.911	At Grade	-				T-type
15	215.891	At Grade	-				Y-type
16	215.917	At Grade	-				T-type
17	216.025	At Grade	-				Y-type
18	216.69	At Grade	-				Y-type
19	217.825	At Grade	-				Y-type
20	217.888	At Grade	-				Y-type
21	218.484	At Grade	-				Y-type
22	220.543	At Grade	-				T-type
23	232.317	At Grade	-				Y-type
24	233.73	At Grade	-				Y-type
25	233.95	At Grade	-				Y-type
26	237.55	At Grade	-				T-type
27	238.038	At Grade	-				Y-type

0.2.6 Structure

The road stretch in package-4 comprises 9 minor bridges and 119 culverts. Details of minor bridges are tabulated in Table-0.7 & summary of culverts in Table-0.8

Table 0.7: Details of Minor Bridges

S. No.	Existing Chainage (km)	Type of Structure			No. of Spans with span length (c/c of exp gap)	Total Width (m)
		Foundation	Sub-Structure	Super-Structure		
1	206.029	Belly Bridge			53.5	4.25
2	208.625	Open	RC WALL	RC SOLID SLAB	49.0	10.50

S. No.	Existing Chainage (km)	Type of Structure			No. of Spans with span length (c/c of exp gap)	Total Width (m)
		Foundation	Sub-Structure	Super-Structure		
3	212.200	Open	RC WALL	RC SOLID SLAB	3 x 6.2 + 6 x 6.0	5.3
4	217.543	Open	RC WALL	RC SOLID SLAB	1 x 6.7	8.2
5	219.090	Open	RC WALL	RC SOLID SLAB	2 x 5.7 + 2 x 6.1	7.6
6	219.639	Open	RC WALL	RC SOLID SLAB	4 x 6.0	7.7
7	232.278	Open	RC WALL	RC SOLID SLAB	1 x 7.9	5.5
8	236.720	Open	RC WALL	RC SOLID SLAB	2 x 10.9	7.5
9	239.061	Open	RC WALL	RC SOLID SLAB	1x6.0	8.4

Table 0.8: Summary of Culverts

Sl. No.	Type of Structure	No. of Structures
1	Slab Culverts	23
2	Pipe Culverts	91
3	Blocked	5
Grand Total		119

0.3 Improvement Proposals

Design Standards given in relevant IRC codes, guidelines and special publications, and MORT&H circulars as applicable to the National Highways have been followed. The consultant's approach towards the project is in accordance to the TOR in lines with the project objectives.

0.3.1 Design Standards

The design standards adopted for the study is as per the latest IRC: SP: 73-2015 "Manual of Specifications & Standards for Two Laning of Highways with Paved Shoulder". Design speed considered for the project section is as mentioned below in Table 0.9.

Table 0.9: Design Speed

Sl. No.	Terrain Type	Design Speed (Km/h)		Horizontal Radius (M)	
		Ruling	Minimum	Desirable Minimum	Absolute Minimum
I	Plain & Rolling	100	80	400	250
II	Mountainous & Hilly	60	40	150	75

0.3.2 Curve Improvement

The horizontal design made use of the data collected from the surveys and investigations carried out for the study. Geometric design of the project section has been done as per the provisions of IRC:SP:73-2015. However, the improvement of the existing road geometrics to the prescribed standards is not possible everywhere, 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. List of deficient curves having radius less than 75m have been listed below in Table 0.10.

Table 0.10: Curve Improvement

S.No	Design Chainage (km)
1	207.881
2	208.205
3	208.377
4	208.619
5	211.884
6	211.996
7	212.126
8	218.892
9	222.065
10	222.820
11	222.905
12	223.042
13	225.376
15	227.108
16	227.542
17	227.660
18	228.421
19	229.364
20	229.466
21	229.546
22	229.701
23	230.145
24	230.242
25	230.350
26	230.436
27	230.598
28	230.874
29	233.660
30	234.353
31	234.411
32	234.804
33	235.508
34	237.762
35	238.010

S.No	Design Chainage (km)
36	238.196
37	239.037

0.3.3 Widening Scheme

Widening of existing road have been decided as per the availability of land and type of land. 7 types of typical cross sections have been proposed. Chainage wise TCS schedule have been given separately in Table 0.12 below. TCS wise length of the alignment is tabulated in Table 0.11. Typical Cross Section drawings have been given in subsequent pages.

Table 0.11: Summary of TCS Type Proposed

TCS No.	Proposed TCS type	Length (Km)
I	Widening in Rural Section (Rolling)	14.58
II-A	Widening in Urban Section (Rolling)	8.231
II-B	Widening in Urban Section (Rolling) (varying 10-13m)	1.346
II-C	Widening in Urban Section with divided carriageway (Rolling)	0.622
III	Widening in Rural section in Hilly area	1.442
IV	New Construction in Rural section (Cutting)	3.554
V	New Construction in Rural section (Filling)	3.63

Table 0.12: TCS Schedule

S.No	Existing Chainage		Design Chainage		Widening Proposal	Length (m)	TCS Proposed
	From	To	From	To			
1	206.000	206.295	205.895	206.190	Widening-Urban	295	TCS II-B
2	206.295	209.986	206.190	209.851	Widening-Urban	3661	TCS II-A
3	209.986	210.359	209.851	210.225	Widening-Urban	374	TCS II-C
4	210.359	211.629	210.225	211.468	Widening-Urban	1243	TCS II-A
5	211.629	212.232	211.468	212.089	Widening	621	TCS I
6	212.232	212.440	212.089	212.310	Widening-Urban	221	TCS II-A
7	212.440	215.225	212.310	215.095	Widening	2785	TCS I
8	215.225	215.731	215.095	215.600	Widening-Urban	505	TCS II-A
9	215.731	215.980	215.600	215.848	Widening-Urban	248	TCS II-C
10	215.980	217.051	215.848	216.909	Widening-Urban	1061	TCS II-A
11	217.051	217.795	216.909	217.650	Widening	741	TCS I
12	217.795	217.875	217.650	217.730	New Const.-Filling	80	TCS V***
13	217.875	218.175	217.730	218.026	Widening-Urban	296	TCS II-A

S.No	Existing Chainage		Design Chainage		Widening Proposal	Length (m)	TCS Proposed
	From	To	From	To			
14	218.175	220.3095	218.026	220.15	Widening	2124	TCS I
15	220.310	221.934	220.150	221.750	New Const.-Filling	1600	TCS V***
16	221.934	222.214	221.750	222.025	New Const.-Cutting	275	TCS IV**
17	222.214	222.364	222.025	222.150	Widening	125	TCS I
18	222.364	222.515	222.150	222.300	New Const.-Cutting	150	TCS IV**
19	222.515	222.665	222.300	222.450	New Const.-Filling	150	TCS V***
20	222.665	222.840	222.450	222.625	New Const.-Cutting	175	TCS IV**
21	222.840	223.032	222.625	222.825	New Const.-Filling	200	TCS V***
22	223.032	225.121	222.825	224.900	Widening	2075	TCS I
23	225.121	225.378	224.900	225.150	New Const.-Cutting	250	TCS IV**
24	225.378	225.504	225.150	225.275	New Const.-Filling	125	TCS V***
25	225.504	225.852	225.275	225.625	New Const.-Cutting	350	TCS IV**
26	225.852	225.955	225.625	225.725	Widening	100	TCS III*
27	225.955	226.510	225.725	226.275	Widening	550	TCS I
28	226.510	226.586	226.275	226.350	New Const.-Cutting	75	TCS IV**
29	226.586	226.735	226.350	226.500	Widening	150	TCS I
30	226.735	227.007	226.500	226.760	New Const.-Cutting	260	TCS IV**
31	227.007	227.225	226.760	226.975	New Const.-Filling	215	TCS V***
32	227.225	227.859	226.975	227.590	Widening	615	TCS I
33	227.859	227.927	227.590	227.675	New Const.-Filling	85	TCS V***
34	227.927	228.047	227.675	227.800	New Const.-Cutting	125	TCS IV**
35	228.047	229.029	227.800	228.775	Widening	975	TCS I
36	229.029	229.128	228.775	228.875	New Const.-Filling	100	TCS V***
37	229.128	229.278	228.875	229.025	Widening	150	TCS I
38	229.278	229.353	229.025	229.100	New Const.-Filling	75	TCS V***
39	229.353	229.478	229.100	229.250	Widening	150	TCS I
40	229.478	229.960	229.250	229.700	New Const.-Cutting	450	TCS IV**
41	229.960	230.184	229.700	229.925	Widening	225	TCS I
42	230.184	230.523	229.925	230.250	New Const.-Filling	325	TCS V***
43	230.523	230.724	230.250	230.450	Widening	200	TCS III*
44	230.724	230.927	230.450	230.650	New Const.-Cutting	200	TCS IV**
45	230.927	231.103	230.650	230.825	Widening	175	TCS I
46	231.103	231.199	230.825	230.925	New Const.-Cutting	100	TCS IV**

S.No	Existing Chainage		Design Chainage		Widening Proposal	Length (m)	TCS Proposed
	From	To	From	To			
47	231.199	232.199	230.925	231.924	Widening	999	TCS I
48	232.199	232.899	231.924	232.624	Widening-Urban	700	TCS II-B
49	232.899	233.075	232.624	232.800	Widening	176	TCS I
50	233.075	233.225	232.800	232.950	New Const.-Cutting	150	TCS IV**
51	233.225	233.425	232.950	233.150	Widening	200	TCS I
52	233.425	233.700	233.150	233.425	Widening	275	TCS III*
53	233.700	234.050	233.425	233.776	Widening-Urban	351	TCS II-B
54	234.050	234.449	233.776	234.175	Widening	399	TCS III*
55	234.449	234.625	234.175	234.350	New Const.-Filling	175	TCS V***
56	234.625	234.778	234.350	234.500	Widening	150	TCS I
57	234.778	235.000	234.500	234.725	New Const.-Cutting	225	TCS IV**
58	235.000	235.505	234.725	235.225	New Const.-Filling	500	TCS V***
59	235.505	235.682	235.225	235.400	Widening	175	TCS I
60	235.682	235.823	235.400	235.525	New Const.-Cutting	125	TCS IV**
61	235.823	236.009	235.525	235.725	Widening	200	TCS I
62	236.009	236.084	235.725	235.800	New Const.-Cutting	75	TCS IV**
63	236.084	236.436	235.800	236.150	Widening	350	TCS I
64	236.436	236.837	236.150	236.550	Widening	400	TCS III*
65	236.837	237.300	236.550	237.013	Widening	463	TCS I
66	237.300	238.200	237.013	237.932	Widening-Urban	919	TCS II-A
67	238.200	238.282	237.932	238.000	Widening	68	TCS III*
68	238.282	238.675	238.000	238.406	Widening	406	TCS I
69	238.675	238.998	238.406	238.731	Widening-Urban	325	TCS II-A
70	238.998	239.425	238.731	239.300	New Const.-Cutting	569	TCS IV**

* Retaining wall and Breast wall shown in TCS III drawing is typical. Location of these components should be applied as per site condition.

** TCS IV is proposed for cutting in rural section and drawing shown for the same is typical. Wherever required the breast wall must be provided, if there is cutting in hill.

*** TCS V is proposed for filling in rural section and drawing shown for the same is typical. Wherever required the retaining wall must be provided, to confine the toe wall within ROW.

0.3.4 PAVEMENT DESIGN

The scope of pavement improvement envisaged for the project includes:

- Rehabilitation & upgradation of the project stretch to 2-lane with hard shoulder ;

Based on the field studies and analysis of data, the improvement, rehabilitation and upgrading requirements for the Project Road have been identified. Since the project road involves strengthening of existing flexible pavement, flexible pavement is proposed for widening. However, due to shortage of good quality of aggregate in nearby quarry i.e. Panchvati & high haulage cost of aggregate from Brookshabad, it is decided to provide new pavement composition as Cemented Base and Cemented Subbase with SAMI layer at the interface of Cemented Base and the Bituminous layer.

Using CT Subbase and CT Base, cost of pavement is reduced by approximately 50 percent as compared to granular base and granular subbase pavement composition. In addition to this, cost is also reduced due to use of aggregates obtained after dismantling of existing road.

- **Design CBR value**

The design CBR of Subgrade is 3%. (Ref Plate-13 of IRC 37:2012)

- **Computation of Design Traffic**

The consultant has conducted traffic volume count in 2011 at one location and calculated the MSA based on the traffic with 5 percent growth rate. Considering 15 years as design period for flexible pavement and 24 months as the construction period, MSA has been calculated for the pavement design and given below in Table 0.13. MSA calculated for 15 years is 0.56 & MSA calculated for 10 years is 0.34.

However, given the fact that project highway is lifeline of Andaman Islands, the highway is proposed to be strengthen for minimum 20 MSA to accommodate further growth expected on the road after completion of major bridge on Middle & Humphrey Strait. Hence, design traffic of 20 MSA has been considered for design of flexible pavement as per the procedure given in IRC:37-2012.

Table 0.13 Summary of MSA

Year	Category of Commercial Vehicle					Total Commercial Vehicles (Volume)	Cumulative MSA
	2-Axle Truck	3-Axle Truck	4-6 Axle	LCV	Standard Bus		
2011	31	1	0	35	35	833	Years of construction
2012	33	2	0	37	37	879	
2013	35	3	0	39	39	926	
2014	37	4	0	41	41	975	
2015	39	5	0	44	44	1028	
2016	41	6	0	47	47	1084	
2017	44	7	0	50	50	1143	
2018	47	8	0	53	53	1204	

Year	Category of Commercial Vehicle					Total Commercial Vehicles (Volume)	Cumulative MSA
	2-Axle Truck	3-Axle Truck	4-6 Axle	LCV	Standard Bus		
2019	50	9	0	56	56	1267	
2020	53	10	0	59	59	1333	0.02
2021	56	11	0	62	62	1402	0.05
2022	59	12	0	66	66	1476	0.07
2023	62	13	0	70	70	1553	0.10
2024	66	14	0	74	74	1635	0.13
2025	70	15	0	78	78	1720	0.16
2026	74	16	0	82	82	1808	0.19
2027	78	17	0	87	87	1901	0.23
2028	82	18	0	92	92	1999	0.26
2029	87	19	0	97	97	2101	0.30
2030	92	20	0	102	102	2208	0.34
2031	97	21	0	108	108	2322	0.38
2032	102	23	0	114	114	2442	0.42
2033	108	25	0	120	120	2568	0.47
2034	114	27	0	126	126	2699	0.51
2035	120	29	0	133	133	2838	0.56
2036	126	31	0	140	140	2983	0.61
2037	133	33	0	147	147	3134	0.67
2038	140	35	0	155	155	3294	0.73
2039	147	37	0	163	163	3461	0.79
2040	155	39	0	172	172	3638	0.85
2041	163	41	0	181	181	3822	0.92

- **Design Lane Traffic**

Project road is being improved as 2-lane carriageway with hard shoulder facility. Therefore, design lane traffic is determined by application of distribution of commercial vehicles in both directions. As per IRC: 37-2012 for 2-lane carriageway 50 percent of the total number of commercial vehicles is considered.

- **Pavement Composition**

IRC:37–2012 (Plate-13) is followed for the design of flexible pavement. The result of the IRC design for new pavement construction is presented in below.

Table 0.14 Pavement Composition for New Pavement

Pavement Composition	Pavement Thickness (in mm)
1. Wearing Course	
(a) Bituminous Concrete (BC)	50 mm
2. CT Base	180 mm
3. CT Sub-base	250mm
Total	480 mm

0.3.5 Improvement Proposal for Bridges

9 nos. of minor bridges are existing on the alignment. Out of 9 minor bridges, 1 bridge is to be reconstructed as RCC T-beam, 2 bridges are to be widened and 6 bridges are to be retained with minor repair. Details of existing bridge cum improvement proposal has been given in Table 0.15 below.

Table 0.15: Bridge Improvement proposal

Sl. No.	Existing Chainage (Km)	Design Chainage	Details of Existing Bridge							Proposed Bridge		
			Type	Span Arrangement (C/C of Exp. Gap)	C/W Width (m)	Total Width (m)	Skew Angle (°)	Condition	Improvement Proposal	Structure Type	Span Arrangement	Width (m)
1	206.029	205+923	Belly Bridge	53.5	3.25	4.25	0	Fair	Reconstruction	RCC T-beam	3x18.85	8.5
2	208.625	208+512	Superstr.: RCC Slab Substr.: RCC Wall Foundation: Open	49.0	7.5	10.50	0	Good	Retained	-	-	-
3	212.200	212+064	Superstr.: RCC Slab Substr.: RCC Wall Foundation: Open	3 x 6.2 + 6 x 6.0	4.3	5.3	0	Good	Widening (right side)	RCC Slab	-	8.5
4	217.543	217+400	Superstr.: RCC Slab Substr.: RCC Wall Foundation: Open	1 x 6.7	7.5	8.2	0	Good	Retained	-	-	-
5	219.090	218+932	Superstr.: RCC Slab Substr.: RCC Wall Foundation: Open	2 x 5.7 + 2 x 6.1	6.7	7.6	0	Good	Retained	-	-	-
6	219.639	219+477	Superstr.: RCC Slab Substr.: RCC Wall Foundation: Open	4 x 6.0	6.8	7.7	0	Good	Retained	-	-	-
7	232.278	232+000	Superstr.: RCC Slab Substr.: RCC Wall Foundation: Open	1 x 7.9	4.7	5.5	45.5	Good	Widening(both side)	RCC SLAB	-	8.5
8	236.720	236+434	Superstr.: RCC Slab Substr.: RCC Wall Foundation: Open	2 x 10.9	6.6	7.5	0	Good	Retained	-	-	-
9	239.061	238+792	Superstr.: RCC Slab Substr.: RCC Wall Foundation: Open	1x6.00	7.45	8.4	0	Good	Retained	-	-	-

0.3.6 Improvement of Culverts

Summary of the improvement proposal of 120 nos. of existing culverts along the road section in package-4 is given below in Table 0.16 below.

Table 0.16: Summary of Culvert Improvement proposal

Improvement proposed	Type of Structure			
	Pipe Culvert	Slab/Cut Stone Slab	Box	Blocked
Widening	-	3	-	-
Retained	-	2	-	-
Reconstruction as HP Culvert	8	-	-	-
Reconstruction as Box Culvert	83	18	-	5
New Construction	-	-	1	-
Redundant	-	-	-	-
Total	91	23	1	5

0.3.7 Traffic Control and Safety Measures

- **Bus Shelters**

Bus Shelter shall be provided at following locations in accordance with the Manual of Specifications and Standards as referred in Schedule-D.

Table 0.17: List of Bus Shelter

S. No.	Existing Chainage	Design Chainage	Side
1	217.095	216+952	Left
2	217.292	217+150	Right
3	231.998	231+620	Right

- **Breast Wall/ Retaining Wall**

Breast Wall have been proposed along the roadway edge on the hilly side of the section of project road where cutting is required or cutting is more than available ROW. In hilly sections, breast wall of Random Rubble Masonary (1:6) has been proposed. It shall be provided at following locations in accordance with the Manual of Specifications and Standards as referred in Schedule-D.

Retaining wall shall be proposed to be installed in sections of the project road having toe of the filling section is beyond available ROW to confine it within ROW.

Breast Wall & Retaining Wall is proposed in cutting and filling sections as per the list presented below:

Table 0.18: Breast Wall locations

S.No	Design Chainage		Side	Length (m)
	From	To		
1	221.750	221.800	Left	50
2	221.875	221.950	Left	75
3	232.850	232.950	Right	100
4	233.250	233.275	Left	25
5	234.075	234.100	Right	25
6	234.500	234.725	Both	450
7	235.420	235.485	Left	65
8	235.780	235.800	Right	20
9	236.280	236.310	Left	30
10	238.950	239.075	Both	250
Total length (m)				1090

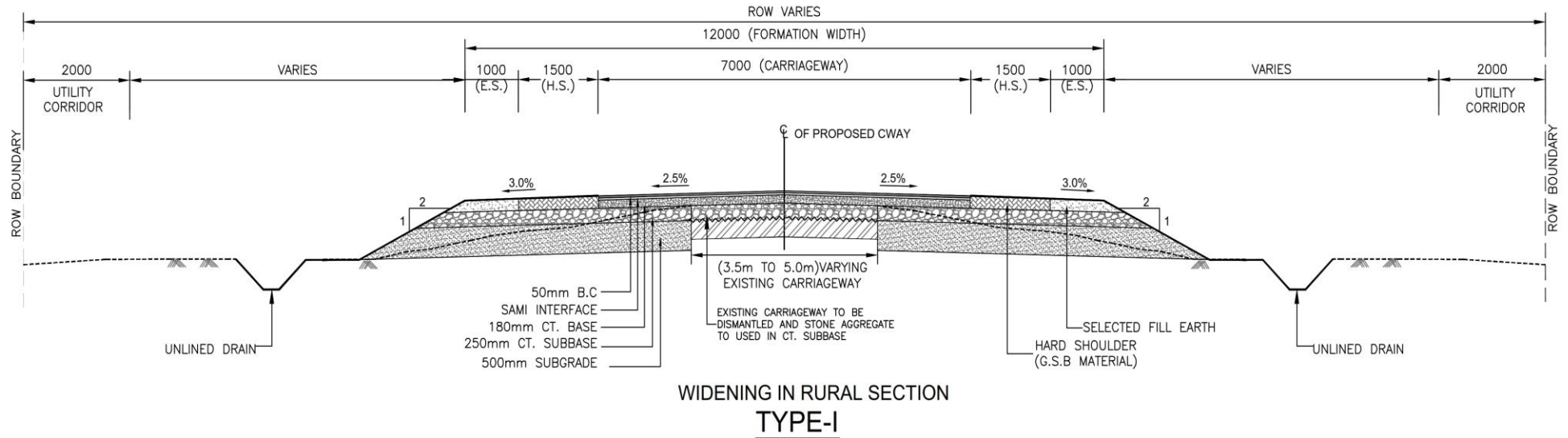
Table 0.19: Retaining Wall locations

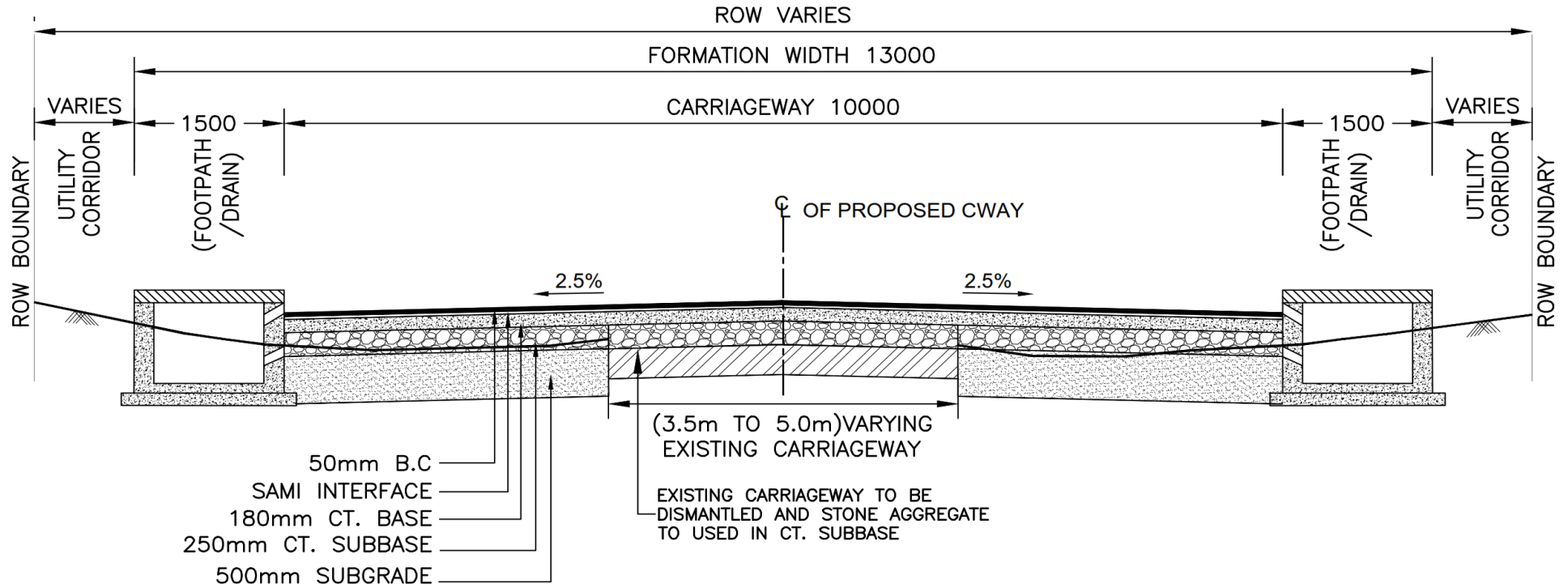
S.No	Design Chainage		Side	Length (m)
	From	To		
1	217.700	217.725	Right	25
2	221.025	221.180	Right	155
3	221.175	221.250	Left	75
4	221.630	221.700	Left	70
5	221.725	221.750	Right	25
6	225.625	225.675	Left	50
7	229.065	229.085	Right	20
8	229.920	229.950	Left	30
9	229.950	230.000	Right	50
10	230.125	230.175	Right	50
11	233.160	233.225	Left	65
12	233.375	233.425	Left	50
13	233.800	234.100	Both	600
14	234.175	234.300	Both	250
15	234.325	234.350	Both	50
16	234.775	234.825	Right	50
17	234.875	234.925	Both	100

S.No	Design Chainage		Side	Length (m)
	From	To		
18	234.975	235.050	Right	75
19	235.200	235.225	Right	25
20	236.180	236.220	Right	40
21	236.400	236.440	Left	40
22	236.440	236.550	Both	220
23	237.932	237.950	Right	18
24	237.950	238.000	Left	50
Total length (m)				2183

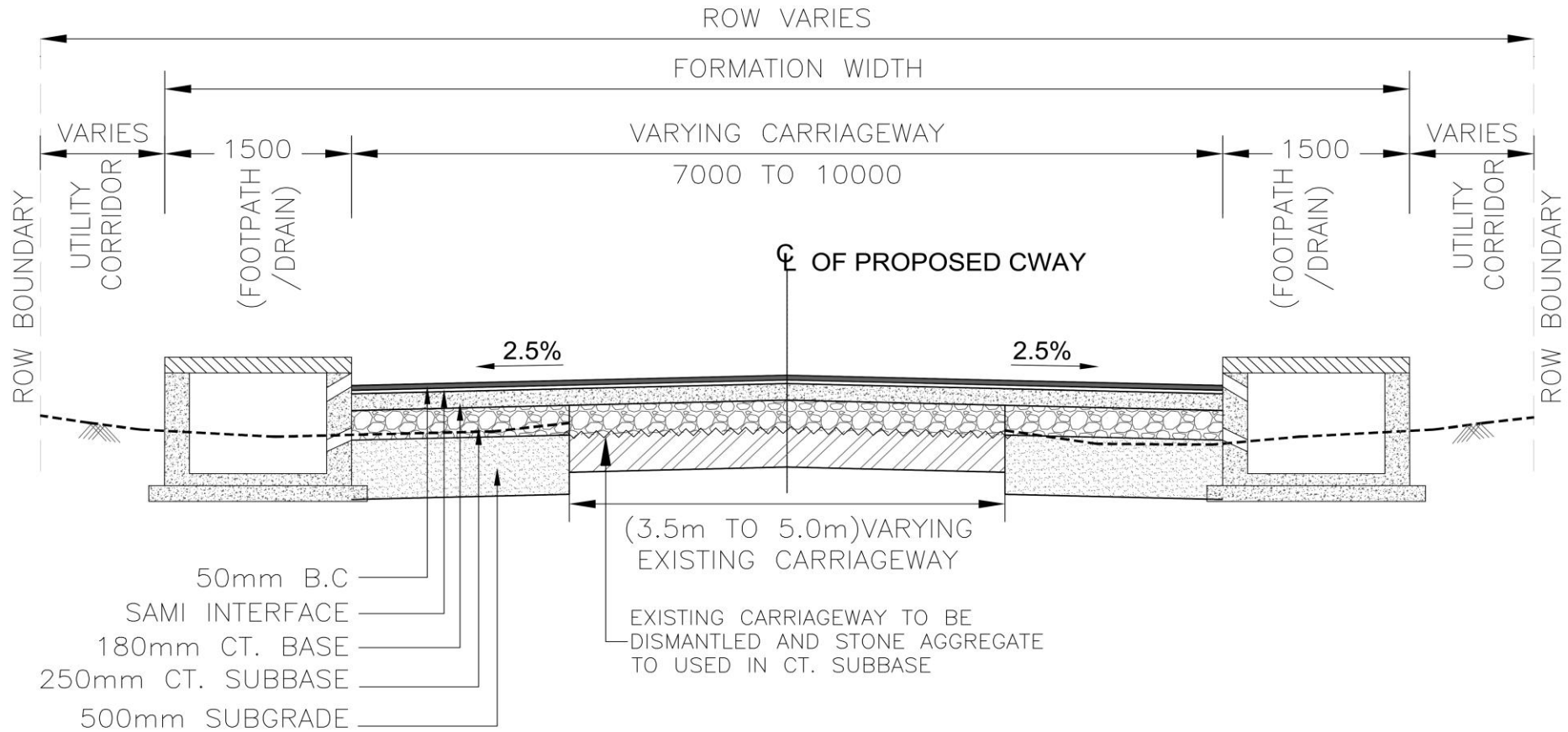
**Rehabilitation and up-gradation of section from Km 206.000 to 239.425
(NImbutala to Austin Creek) of NH-223 to 2-Lane with hard shoulder in the
Union Territory of Andaman & Nicobar Islands (Package-4)**

Executive Summary

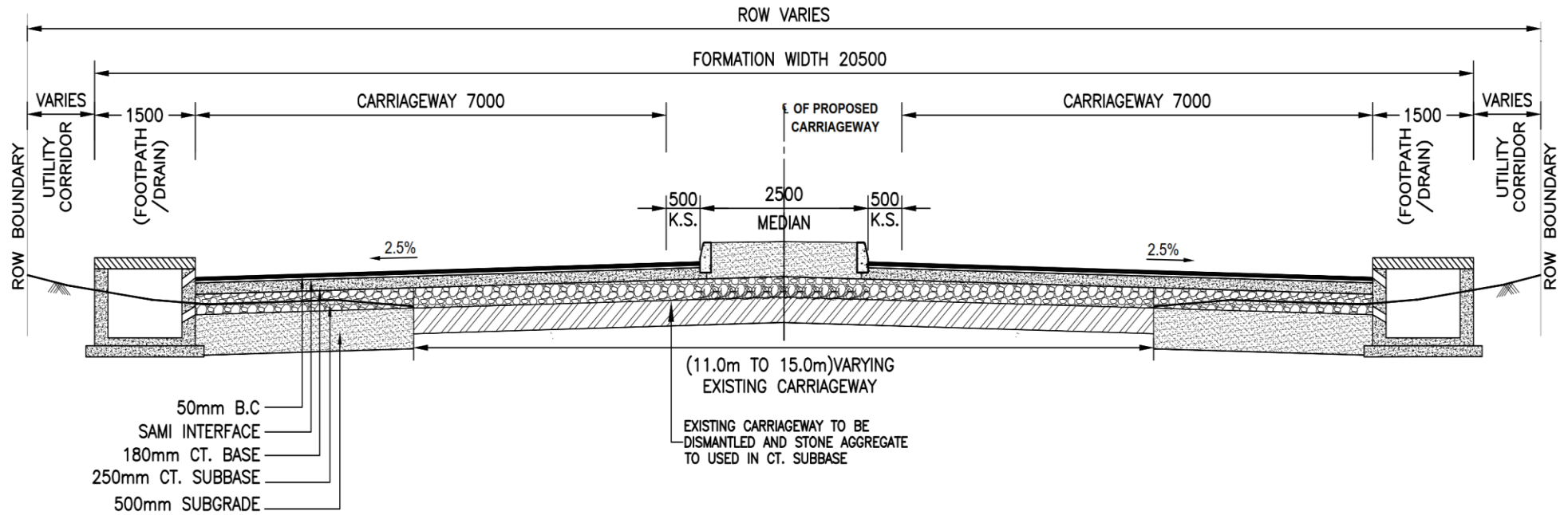




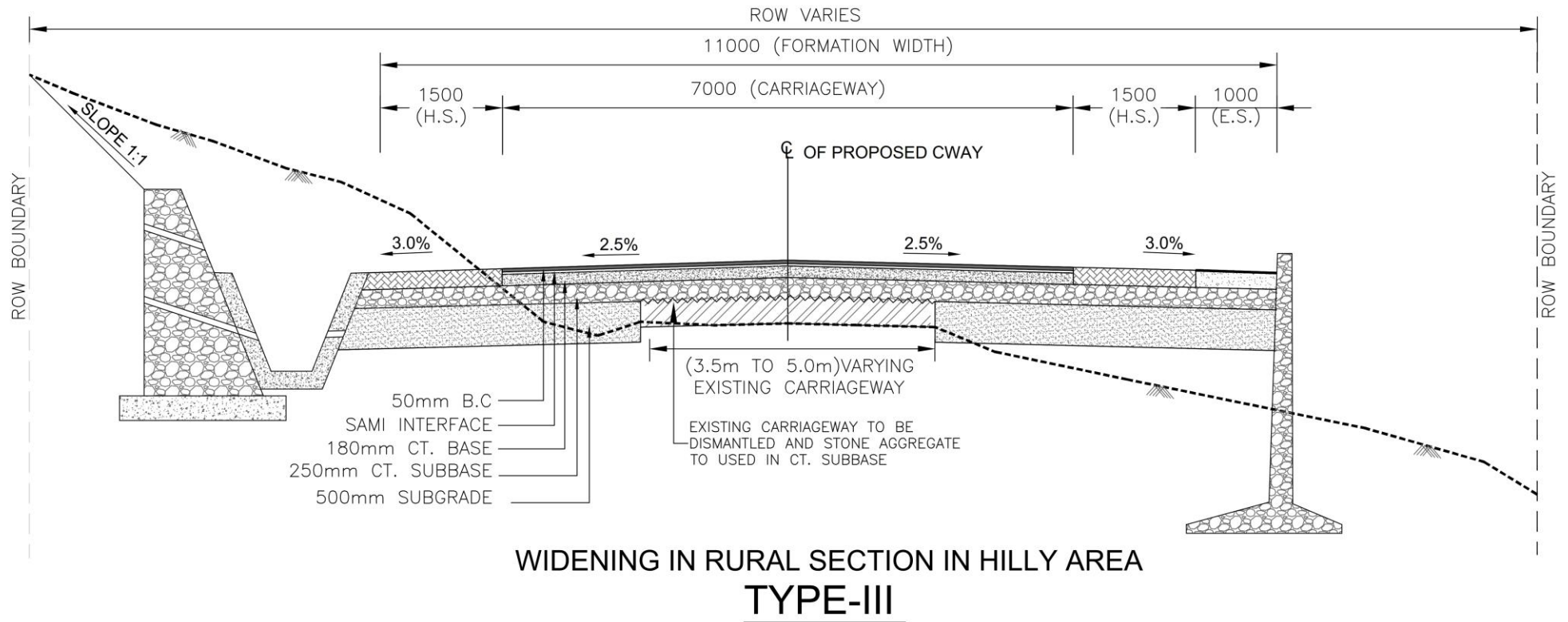
WIDENING IN URBAN SECTION
TYPE-II(A)



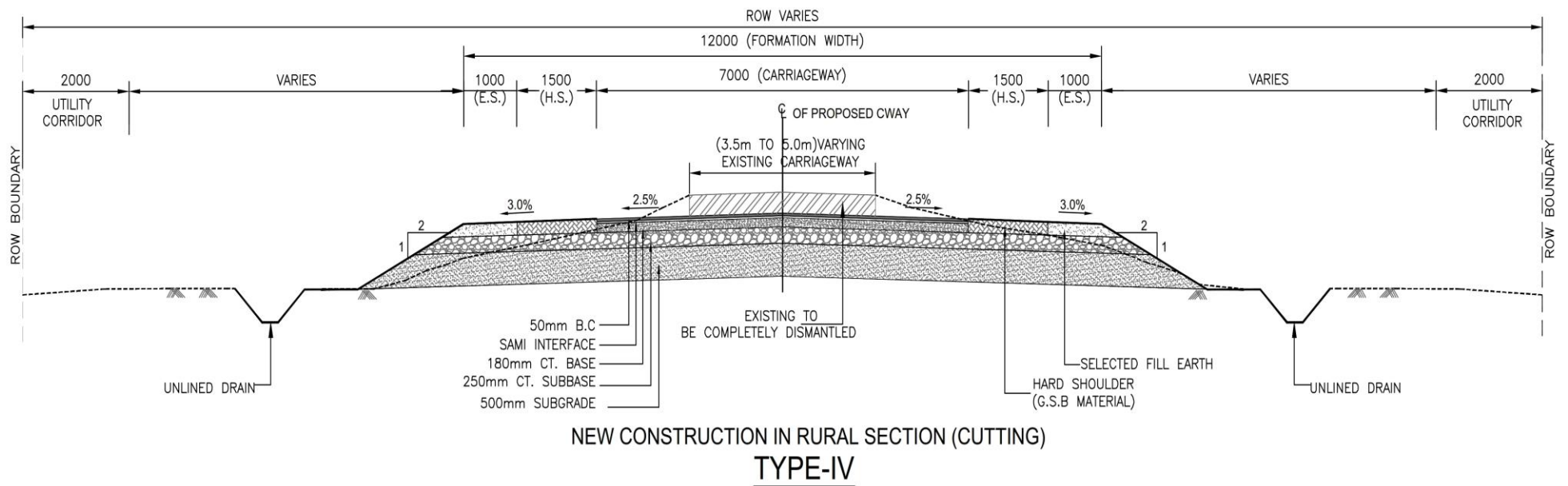
WIDENING IN URBAN SECTION TYPE-II(B)



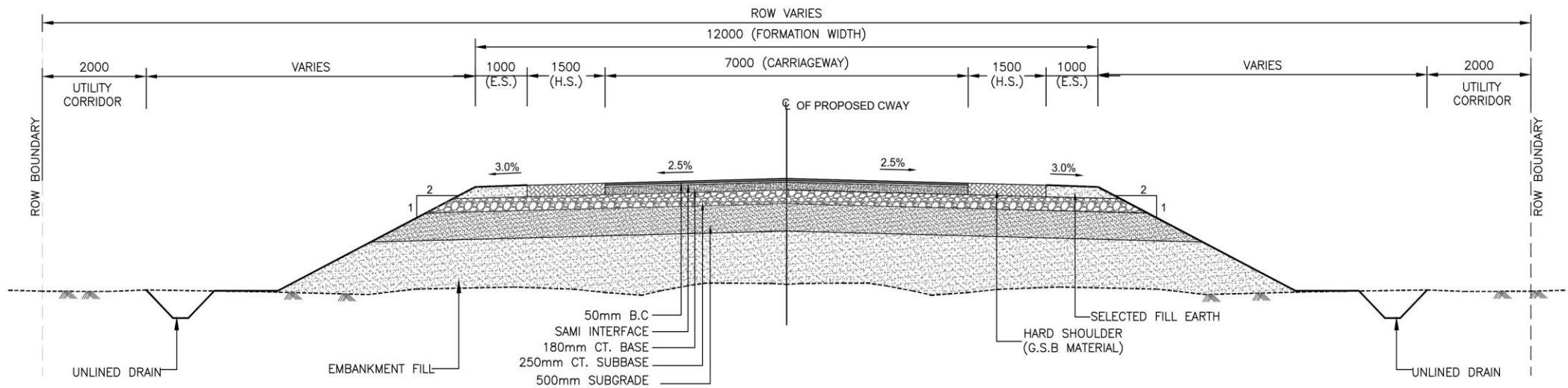
WIDENING TO FOUR LANE WITH RAISED MEDIAN IN URBAN SECTION
TYPE-II(C)



* Retaining wall and Breast wall shown in TCS drawing is typical. Location of these components should be applied as per site condition.



** TCS IV is proposed for cutting in rural section and drawing shown for the same is typical. Wherever required the breast wall must be provided, if there is cutting in hill.



NEW CONSTRUCTION IN RURAL SECTION (FILLING)
TYPE-V

*** TCS V is proposed for filling in rural section and drawing shown for the same is typical. Wherever required the retaining wall must be provided, to confine the toe wall within ROW.

0.4 Rate Analysis

All broad work items have been identified. Unit rates of different work items have been derived using M/oRT&H Standard Data Book for Rate Analysis. Basic rates of labour materials, & machinery have been taken from different sources as mentioned below

0.4.1 Labour

The basic rate of labour have been taken from Andaman PWD.

0.4.2 Machinery

Rates of Machinery for the year 2001-02 have been taken from SDB of MoRT&H. Same was used in the rate analysis after escalating it by 80%. The rates after the escalation is comparable to the current market rate.

0.4.3 Material

Cement is proposed to be transported from Portblair. Stone Aggregates for BC layer has been taken from Brookshabad quarry in Portblair. And stone aggregates for CT base & subbase, moorum, boulders is proposed to be taken from Panchvati quarry. Hence the current market rates of these materials have been taken.

Steel is proposed to be shipped from Kolkata. Basic rate of steel has been taken from the SAIL for Kolkata.

Bitumen shall be brought from Haldia through ships. Latest rate of bitumen at Haldia published by IOCL in its website has been taken.

0.4.4 Carriage of materials

For carriage of materials by ship from Mainland, unit rates for transportation was obtained from Indian Coastal Conference (ICC, the autonomous body for fixing rates and guidelines for shipping in India). After addition of bunker surcharge, dirty cargo charges, provision for freight increase, service tax etc. (as per guidelines laid down by ICC), final unit rate for transportation of materials by sea route have been worked out. Moreover, Octroi duty @ 3% was also added to the basic rate of materials at Port Blair for the materials transported from Mainland (as per guidelines laid down by Port Blair Municipal Council, PBMC).

0.5 Cost Estimate

The quantities of the following major items of work were considered for preliminary cost estimation:

1. Site Clearance
2. Earth Work

3. Sub-base and Base Courses
4. Bituminous Works
5. Culverts
6. Bridges
7. Road Junctions
8. Drainage & Protection Work
9. Traffic Signs, Markings & Road Appurtenances

Cost estimation has been done based on the broad concept widening and reconstruction scheme adopted for the existing pavement.

Given below is the abstract of cost estimate of package-4.

Table 0.19: Abstract of Cost Estimate

Bill No.	Items	Amount (Rs)
I	Widening of Existing Alignment	
	TCS (Type-I)	
	Site Clearance and Dismantling	3,602,839.25
	Earthworks	63,721,734.19
	Sub-base and Base Courses	269,793,737.93
	Pavement	
	Bituminous Pavement	80,315,249.49
	Traffic Sign, Marking and Other Appurtenances	25,840,976.23
	Total	443,274,537.08
	TCS (Type-IIA)	
	Site Clearance and Dismantling	2,033,948.55
	Earthworks	23,989,861.17
	Sub-base and Base Courses	128,758,207.94
	Pavement	
	Bituminous Pavement	64,773,154.87
	Traffic Sign, Marking and Other Appurtenances	14,588,276.77
	Total	234,143,449.30
	TCS (Type-IIB)	
	Site Clearance and Dismantling	332,607.79
	Earthworks	3,213,582.82
	Sub-base and Base Courses	17,897,250.12
	Pavement	
	Bituminous Pavement	9,044,181.50

Bill No.	Items	Amount (Rs)
	Traffic Sign,Marking and Other Appurtenances	2,385,593.55
	Total	32,873,215.79
	TCS (Type-II)	
	Site Clearance and Dismantling	153,701.37
	Earthworks	1,930,892.06
	Sub-base and Base Courses	17,027,494.76
	Pavement	
	Bituminous Pavement	8,521,882.83
	Traffic Sign,Marking and Other Appurtenances	1,102,406.53
	Total	28,736,377.54
	TCS (Type-III)	
	Site Clearance and Dismantling	356,330.19
	Earthworks	6,368,294.24
	Sub-base and Base Courses	24,188,427.26
	Pavement	
	Bituminous Pavement	7,943,387.50
	Traffic Sign,Marking and Other Appurtenances	2,555,739.90
	Total	41,412,179.09
	TCS (Type-IV)	
	Site Clearance and Dismantling	878,222.96
	Earthworks	23,035,485.79
	Sub-base and Base Courses	65,764,536.67
	Pavement	
	Bituminous Pavement	19,577,530.64
	Traffic Sign,Marking and Other Appurtenances	6,298,959.50
	Total	115,554,735.55
	TCS (Type-V)	
	Site Clearance and Dismantling	897,003.19
	Earthworks	28,645,506.35
	Sub-base and Base Courses	67,170,868.91
	Pavement	
	Bituminous Pavement	19,996,183.52
	Traffic Sign,Marking and Other Appurtenances	6,433,658.69
	Total	123,143,220.65
5	Culverts (Pipe/ Box)	
5A	Hume Pipe Culvert	6,511,265.47
5B	Box Culvert	

Bill No.	Items	Amount (Rs)
		463,789,858.89
5C	Pipe Culvert Widening @60000 Per Sqm	180,000.00
5D	Culvert (General Maintenance)	275,520.00
	Total	470,756,644.36
6	Bridges	
6A	Minor Bridge (Reconstruction)	23,232,952.08
6B	Minor Bridge (Widening)	22,862,700.00
6C	Bridge (Minor Repairs)	3,360,900.00
	Total	49,456,552.08
7	Drainage and Protection Works	
7A	Drainage	30,386,807.99
7B	Protection Works	144,211,601.94
	Total	74,598,409.93
III	OTHER ITEMS	
8A	Major Junction (1 Nos.)	
	Earthworks	2,903,709.60
	Sub-base and Base Courses	8,134,402.64
	Bituminous Pavement	4,092,095.80
	Traffic Sign,Marking and Other Appurtenances	1,704,298.95
	Total	16,834,506.99
8B	Minor Junction (27 Nos.)	
	Earthworks	10,929,816.00
	Sub-base and Base Courses	25,341,792.84
	Bituminous Pavement	2,748,452.30
	Traffic Sign,Marking and Other Appurtenances	2,880,795.98
	Total	1,900,857.12
8C	Bus Shelter	
	Earthworks	,399,449.13
	Sub-base and Base Courses	,895,941.54
	Bituminous Pavement	953,773.10
	Traffic Sign,Marking and Other Appurtenances	2,339,736.31
	Total	,588,900.07
A	Civil Construction Cost for the Year 2016-17	1,989,273,585.56
	In Rs. Cr	198.927
	Per Km Cost (in Cr)	5.955

