

SCHEDULE - B  
(See Clause 2.1)

**Development of the Project Highway**

**1      *Development of the Project Highway***

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

**2      *Two Lane with Paved shoulder***

Two lane with paved shoulder shall strengthening of the existing two lane along with construction of paved shoulders as described in Annex-I & Annex-II of this Schedule-B and Annex-I of 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.

As per Government of Sikkim Gazette Notification, **Blasting** is not allowed for road formation widening work. In case of any special situation, controlled blasting can be resorted with the prior permission of the concerned District Administration after taking all necessary safety measures.

Annex - I  
(Schedule-B)

**Description of Two Lane with Paved Shoulder**

The Site of the Two-Lane Project Highway comprises the section of National Highway - 717A commencing from km 0+000 to km 26+706 i.e. the Rehnok to Pakyong section (existing length 27+185 km) in the State of Sikkim. The land, carriageway and structures comprising the Site are described below.

**1 WIDENING OF THE EXISTING HIGHWAY**

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

**1.2 WIDTH OF CARRIAGEWAY**

1.2.1 Two Lanning with paved shoulder shall be undertaken. The paved carriageway including paved shoulders shall be 10.5 m wide in accordance with the typical cross sections drawings in the Manual.

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

Sr. No.	Built-up Stretch (Township)	Location/Design Chainage (Km)		Width (m)	Typical Cross Section
		From	To		
1	Rorathrang	8+200	8+700	10.5	Typical Cross Section in built-up area Clause 2.14, IRC:SP:73-2015

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

**2. GEOMETRIC DESIGN AND GENERAL FEATURES**

**2.1 General**

*Geometric design and general features of the Project Highway shall be in accordance with Section 2 of the Manual. The Indicative Chainages with applicable typical Cross section is given below:*

### TYPICAL CROSS SECTION

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
1	0+000	0+800	0.8	Raised Portion	TCS-01
2	0+800	0+869	0.069	New Alignment	TCS-02
3	0+869	1+200	0.331	Raised Portion	TCS-01
4	1+200	1+435	0.235	New Alignment	TCS-02
5	1+435	1+500	0.065	Raised Portion	TCS-01
6	1+500	1+725	0.225	New Alignment	TCS-02
7	1+725	1+871	0.146	Raised Portion	TCS-01
8	1+871	2+000	0.129	New Alignment	TCS-02
9	2+000	2+400	0.4	Raised Portion	TCS-01
10	2+400	2+800	0.4	New Alignment	TCS-02
11	2+800	3+050	0.25	Raised Portion	TCS-01
12	3+050	3+150	0.1	New Alignment	TCS-02
13	3+150	3+285	0.135	Raised Portion	TCS-01
14	3+285	3+430	0.145	New Alignment	TCS-02
15	3+430	3+762	0.332	Raised Portion	TCS-01
16	3+762	3+950	0.188	New Alignment	TCS-02
17	3+950	4+400	0.45	Raised Portion	TCS-01
18	4+400	4+751	0.351	New Alignment	TCS-02
19	4+751	4+818	0.067	Raised Portion	TCS-01
20	4+818	4+900	0.082	New Alignment	TCS-02
21	4+900	4+982	0.082	Raised Portion	TCS-01
22	4+982	5+060	0.078	New Alignment	TCS-02
23	5+060	5+110	0.05	Raised Portion	TCS-01

### TYPICAL CROSS SECTION

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
24	5+110	5+154	0.044	New Alignment	TCS-02
25	5+154	5+200	0.046	Raised Portion	TCS-01
26	5+200	5+418	0.218	New Alignment	TCS-02
27	5+418	5+710	0.292	Raised Portion	TCS-01
28	5+710	6+078	0.368	New Alignment	TCS-02
29	6+078	6+152	0.074	Raised Portion	TCS-01
30	6+152	6+383	0.231	New Alignment	TCS-02
31	6+383	6+758	0.375	Raised Portion	TCS-01
32	6+758	6+812	0.054	New Alignment	TCS-02
33	6+812	6+900	0.088	Raised Portion	TCS-01
34	6+900	7+016	0.116	New Alignment	TCS-02
35	7+016	7+455	0.439	Raised Portion	TCS-01
36	7+455	7+592	0.137	New Alignment	TCS-02
37	7+592	7+950	0.358	Raised Portion	TCS-01
38	7+950	8+110	0.16	<b>Bridge Portion</b>	
39	8+110	8+200	0.09	Raised Portion	TCS-01
40	8+200	8+700	0.5	<b>Built-up Section</b>	TCS-03
41	8+700	8+800	0.1	New Alignment	TCS-02
42	8+800	8+995	0.195	Raised Portion	TCS-01
43	8+995	9+062	0.067	New Alignment	TCS-02
44	9+062	9+446	0.384	Raised Portion	TCS-01
45	9+446	9+520	0.074	New Alignment	TCS-02
46	9+520	9+770	0.25	Raised Portion	TCS-01

### TYPICAL CROSS SECTION

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
47	9+770	9+821	0.051	New Alignment	TCS-02
48	9+821	9+900	0.079	Raised Portion	TCS-01
49	9+900	10+373	0.473	New Alignment	TCS-02
50	10+373	10+450	0.077	Raised Portion	TCS-01
51	10+450	10+537	0.087	New Alignment	TCS-02
52	10+537	10+700	0.163	Raised Portion	TCS-01
53	10+700	10+800	0.1	New Alignment	TCS-02
54	10+800	11+182	0.382	Raised Portion	TCS-01
55	11+182	11+418	0.236	New Alignment	TCS-02
56	11+418	11+521	0.103	Raised Portion	TCS-01
57	11+521	11+738	0.217	New Alignment	TCS-02
58	11+738	11+777	0.039	Raised Portion	TCS-01
59	11+777	12+070	0.293	New Alignment	TCS-02
60	12+070	12+452	0.382	Raised Portion	TCS-01
61	12+452	12+549	0.097	New Alignment	TCS-02
62	12+549	13+100	0.551	Raised Portion	TCS-01
63	13+100	13+150	0.05	New Alignment	TCS-02
64	13+150	14+138	0.988	Raised Portion	TCS-01
65	14+138	14+211	0.073	New Alignment	TCS-02
66	14+211	14+500	0.289	Raised Portion	TCS-01
67	14+500	14+585	0.085	New Alignment	TCS-02
68	14+585	14+800	0.215	Raised Portion	TCS-01
69	14+800	14+900	0.1	New Alignment	TCS-02

### TYPICAL CROSS SECTION

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
70	14+900	14+954	0.054	Raised Portion	TCS-01
71	14+954	15+049	0.095	New Alignment	TCS-02
72	15+049	15+223	0.174	Raised Portion	TCS-01
73	15+223	15+300	0.077	New Alignment	TCS-02
74	15+300	15+390	0.09	Raised Portion	TCS-01
75	15+390	15+450	0.06	New Alignment	TCS-02
76	15+450	16+085	0.635	Raised Portion	TCS-01
77	16+085	16+168	0.083	New Alignment	TCS-02
78	16+168	16+600	0.432	Raised Portion	TCS-01
79	16+600	16+630	0.03	New Alignment	TCS-02
80	16+630	17+075	0.445	Raised Portion	TCS-01
81	17+075	17+300	0.225	New Alignment	TCS-02
82	17+300	18+250	0.95	Raised Portion	TCS-01
83	18+250	18+323	0.073	New Alignment	TCS-02
84	18+323	18+420	0.097	Raised Portion	TCS-01
85	18+420	18+539	0.119	New Alignment	TCS-02
86	18+539	19+620	1.081	Raised Portion	TCS-01
87	19+620	20+138	0.518	New Alignment	TCS-02
88	20+138	20+260	0.122	Raised Portion	TCS-01
89	20+260	20+385	0.125	New Alignment	TCS-02
90	20+385	20+536	0.151	Raised Portion	TCS-01
91	20+536	20+625	0.089	New Alignment	TCS-02
92	20+625	20+950	0.325	Raised Portion	TCS-01

### TYPICAL CROSS SECTION

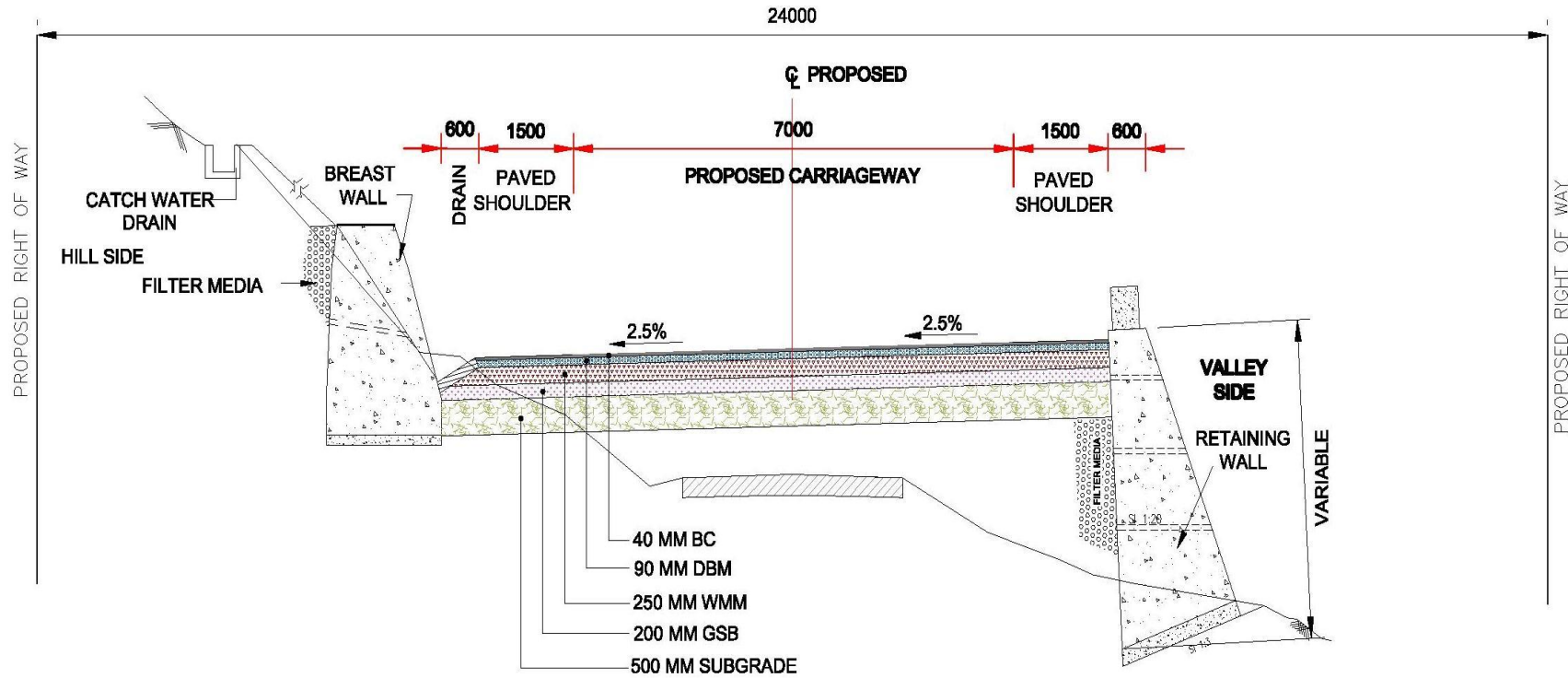
Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
93	20+950	21+020	0.07	New Alignment	TCS-02
94	21+020	21+450	0.43	Raised Portion	TCS-01
95	21+450	21+600	0.15	New Alignment	TCS-02
96	21+600	21+800	0.2	Raised Portion	TCS-01
97	21+800	21+960	0.16	New Alignment	TCS-02
98	21+960	22+000	0.04	Raised Portion	TCS-01
99	22+000	22+332	0.332	New Alignment	TCS-02
100	22+332	22+700	0.368	Raised Portion	TCS-01
101	22+700	22+800	0.1	New Alignment	TCS-02
102	22+800	22+850	0.05	Raised Portion	TCS-01
103	22+850	22+920	0.07	New Alignment	TCS-02
104	22+920	23+000	0.08	Raised Portion	TCS-01
105	23+000	23+100	0.1	New Alignment	TCS-02
106	23+100	23+625	0.525	Raised Portion	TCS-01
107	23+625	23+713	0.088	New Alignment	TCS-02
108	23+713	23+865	0.152	Raised Portion	TCS-01
109	23+865	24+010	0.145	New Alignment	TCS-02
110	24+010	24+376	0.366	Raised Portion	TCS-01
111	24+376	24+410	0.034	New Alignment	TCS-02
112	24+410	24+650	0.24	Raised Portion	TCS-01
113	24+650	24+700	0.05	New Alignment	TCS-02
114	24+700	25+475	0.775	Raised Portion	TCS-01
115	25+475	25+725	0.25	New Alignment	TCS-02

### TYPICAL CROSS SECTION

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
116	25+725	25+832	0.107	Raised Portion	TCS-01
117	25+832	26+027	0.195	New Alignment	TCS-02
118	26+027	26+160	0.133	Raised Portion	TCS-01
119	26+160	26+218	0.058	New Alignment	TCS-02
120	26+218	26+706	0.488	Raised Portion	TCS-01

**Applicable Typical Cross Section:**

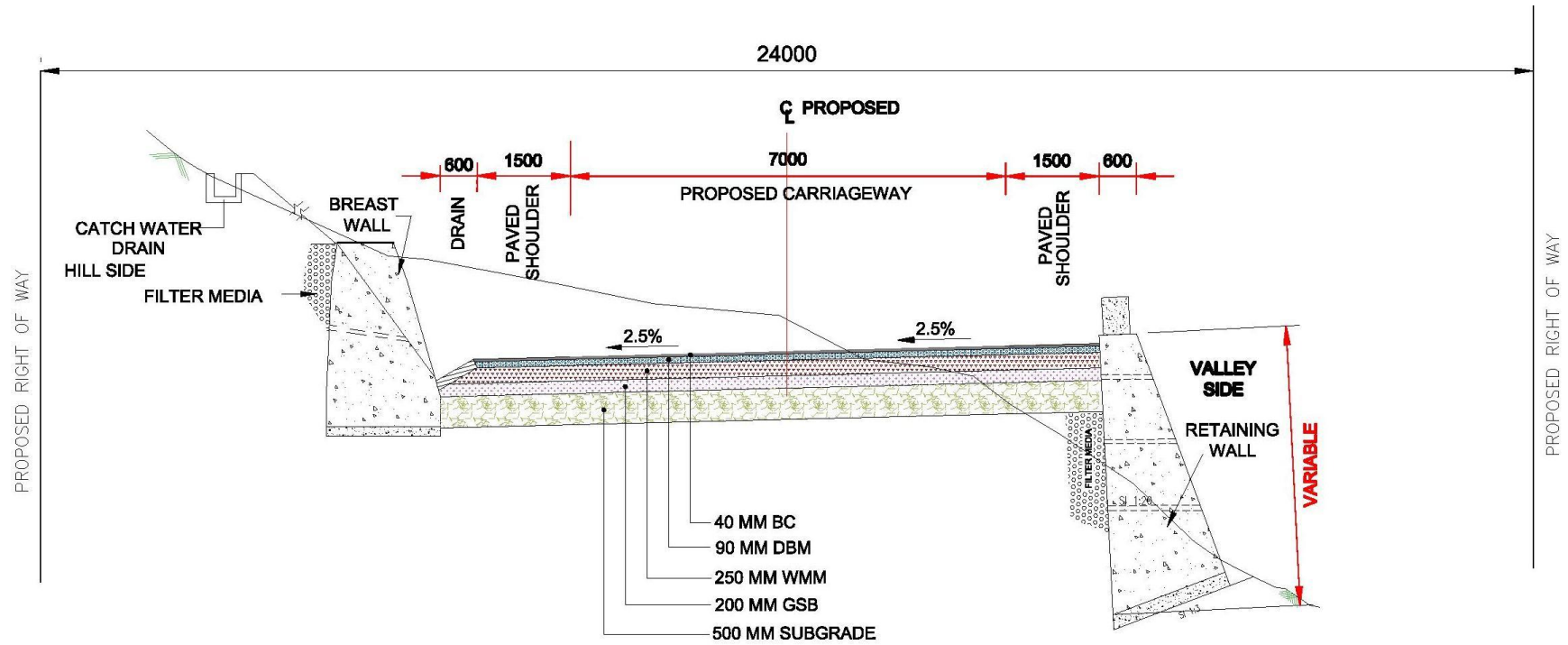
**TCS-I**



**TCS 1**

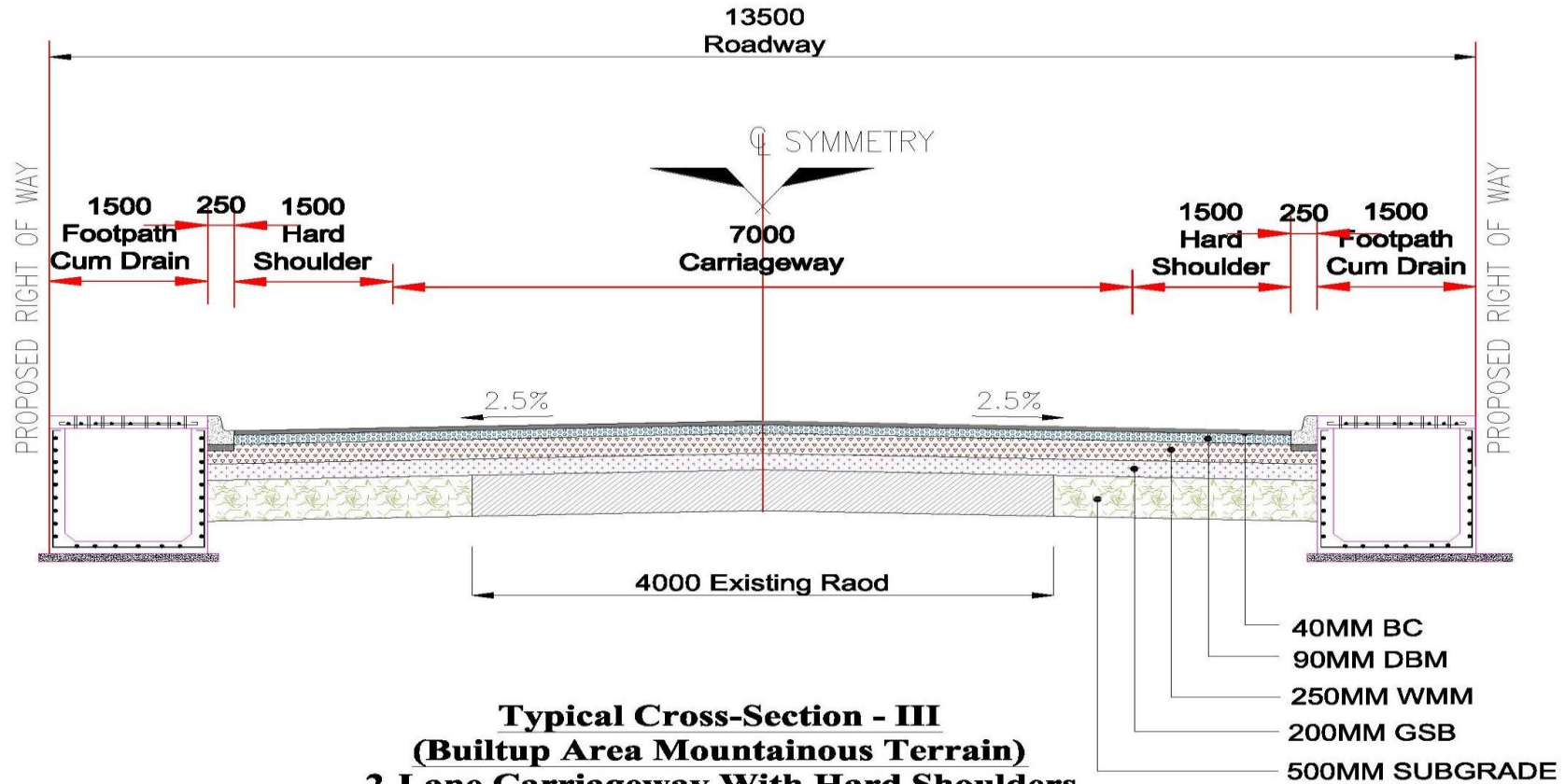
**Two Lane With Paved Shoulder Raised Portion(Hill Section)**

**TCS-II**



**TCS 2**  
**Two Lane With Paved Shoulder Raised Portion(Hill Section)**  
**(New Alignment)**

**TCS-III**



**Typical Cross-Section - III  
(Builtup Area Mountainous Terrain)  
2-Lane Carriageway With Hard Shoulders  
Including Both Side Drains Cum Footpath**

## 2.2 Design speed

The design speed shall be minimum design speed of 40 km per hr for Mountainous and Steep terrain.

## 2.3 Improvement of the existing road geometrics

### 2.3.1 Details of Bypass

Sr. No.	Existing Chainage		Length (m)	Design Chainage		Length (m)	TCS TYPE	Remarks
	From	To		From	To			
Nil								

#### Realignment:

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
1	0+800	0+869	0.069	New Alignment	TCS-02
2	1+200	1+435	0.235	New Alignment	TCS-02
3	1+500	1+725	0.225	New Alignment	TCS-02
4	1+871	2+000	0.129	New Alignment	TCS-02
5	2+400	2+800	0.4	New Alignment	TCS-02
6	3+050	3+150	0.1	New Alignment	TCS-02
7	3+285	3+430	0.145	New Alignment	TCS-02
8	3+762	3+950	0.188	New Alignment	TCS-02
9	4+400	4+751	0.351	New Alignment	TCS-02
10	4+818	4+900	0.082	New Alignment	TCS-02
11	4+982	5+060	0.078	New Alignment	TCS-02
12	5+110	5+154	0.044	New Alignment	TCS-02
13	5+200	5+418	0.218	New Alignment	TCS-02

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
14	5+710	6+078	0.368	New Alignment	TCS-02
15	6+152	6+383	0.231	New Alignment	TCS-02
16	6+758	6+812	0.054	New Alignment	TCS-02
17	6+900	7+016	0.116	New Alignment	TCS-02
18	7+455	7+592	0.137	New Alignment	TCS-02
19	8+700	8+800	0.1	New Alignment	TCS-02
20	8+995	9+062	0.067	New Alignment	TCS-02
21	9+446	9+520	0.074	New Alignment	TCS-02
22	9+770	9+821	0.051	New Alignment	TCS-02
23	9+900	10+373	0.473	New Alignment	TCS-02
24	10+450	10+537	0.087	New Alignment	TCS-02
25	10+700	10+800	0.1	New Alignment	TCS-02
26	11+182	11+418	0.236	New Alignment	TCS-02
27	11+521	11+738	0.217	New Alignment	TCS-02
28	11+777	12+070	0.293	New Alignment	TCS-02
29	12+452	12+549	0.097	New Alignment	TCS-02
30	13+100	13+150	0.05	New Alignment	TCS-02
31	14+138	14+211	0.073	New Alignment	TCS-02
32	14+500	14+585	0.085	New Alignment	TCS-02
33	14+800	14+900	0.1	New Alignment	TCS-02
34	14+954	15+049	0.095	New Alignment	TCS-02
35	15+223	15+300	0.077	New Alignment	TCS-02
36	15+390	15+450	0.06	New Alignment	TCS-02

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
37	16+085	16+168	0.083	New Alignment	TCS-02
38	16+600	16+630	0.03	New Alignment	TCS-02
39	17+075	17+300	0.225	New Alignment	TCS-02
40	18+250	18+323	0.073	New Alignment	TCS-02
41	18+420	18+539	0.119	New Alignment	TCS-02
42	19+620	20+138	0.518	New Alignment	TCS-02
43	20+260	20+385	0.125	New Alignment	TCS-02
44	20+536	20+625	0.089	New Alignment	TCS-02
45	20+950	21+020	0.07	New Alignment	TCS-02
46	21+450	21+600	0.15	New Alignment	TCS-02
47	21+800	21+960	0.16	New Alignment	TCS-02
48	22+000	22+332	0.332	New Alignment	TCS-02
49	22+700	22+800	0.1	New Alignment	TCS-02
50	22+850	22+920	0.07	New Alignment	TCS-02
51	23+000	23+100	0.1	New Alignment	TCS-02
52	23+625	23+713	0.088	New Alignment	TCS-02
53	23+865	24+010	0.145	New Alignment	TCS-02
54	24+376	24+410	0.034	New Alignment	TCS-02
55	24+650	24+700	0.05	New Alignment	TCS-02
56	25+475	25+725	0.25	New Alignment	TCS-02
57	25+832	26+027	0.195	New Alignment	TCS-02
58	26+160	26+218	0.058	New Alignment	TCS-02

#### ***2.4 Right of Way***

NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LIMITED

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

## 2.5 Type of shoulders

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

Sr. No.	Stretch				Fully Paved Shoulder /Footpath	Reference to Cross Section
	Existing Chainage(m)		Design Chainage(m)			
	From	To	From	To		
1	7+850	8+350	8+200	8+700	Footpath	3

- (a) In open country, (Paved shoulders of 1.5 m width shall be provided and balance 1.0 m width earthen shoulder shall be covered with 150 mm thick compacted layer of granular material).
- (b) Design and specifications of paved shoulders and granular material shall conform to the requirements specified in paragraphs 5.10 and 5.11 of the Manual.

## 2.6 Lateral and vertical clearances at underpasses

2.6.1 Lateral and vertical clearances at underpasses and provision of guardrails/crash barriers shall be as per paragraph 2.10 of 2-lanning Manual.

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

Sr. No.	Location Chainage From km to km)	Span / Opening (m)	Remarks
Nil			

Vertical clearance: Vertical Clearance at underpasses/Flyovers shall not be less than 5.5 m and for Cattle underpass shall not be less than 4.5 m.

## 2.7 Lateral and vertical clearances at overpasses

2.7.1 Lateral and vertical clearances at overpasses shall be as per paragraph 2.11 of the 2-lanning Manual.

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

Sr. No.	Design Chainage km)	Span / Opening (m)	Remarks
Nil			

**2.7.3** Vertical clearance: A minimum 5.5 m vertical clearance shall be provided at all points of the carriageway of the project highway.

**2.8 Service roads**

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

Sr. No.	Location of Service road (from km to km)	Right hand side (RHS)/Left hand side (LHS)/ or Both sides	Length (km) of Service road
Nil			

**Details of Slip Road**

Sr. No.	Existing Chainage		Design Chainage		Right Hand side(RHS ) or Left Hand side (LHS) or Both side	Length Km of Service Road
	From	To	From	To		
NIL						

**2.9 Grade separated structures**

2.9.1 Grade separated structures shall be provided as per paragraph 2.13 of the 2-lanning Manual. The requisite particulars are given below:

Sr. No.	Location of structure (Existing)	Location of structure (Design)	Length (m)	Number and length of Spans(m)	Approach Gradient	Remarks, if any
NIL						

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

Sr. No.	Location (Design Chainage)	Location (Design Chainage)	Type of Structure Length	Cross road at		
				Existing level	Raised Level	Lowered Level

NIL

### **2.10 Cattle and pedestrian underpass /overpass**

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

[Refer to paragraphs 2.13.3 of the Manual and specify the requirements of Cattle and pedestrian underpass/ overpass]

Cattle and pedestrian underpass/ overpass shall be constructed

### **2.11 Typical cross-sections of the Project Highway**

Indicative typical cross section of the Project highway shall be Fig. 2.11 to 2.12 for existing road section and Bypasses & Realignment, Fig. 2.13 for built-up section of the manual (IRC: SP: 73-2015).

<b>Sr. No.</b>	<b>Detail</b>	<b>TCS</b>	<b>Length (m)</b>	<b>Length (Km)</b>
1	Two Lane with Paved Shoulder Raised Portion (Hill Section)	I	17477	17.477
2	Two Lane with Paved Shoulder Raised Portion (Hill Section) in new alignment	II	8569	8.569
3	Two Lane with Paved Shoulder including both side drains cum footpath ( Built-up area Mountainous Terrain)	III	500	0.5

## **3. INTERSECTIONS AND GRADE SEPARATORS**

All intersections and grade separators shall be as per Section 3 of the Manual. Existing intersections which are deficient shall be improved to the prescribed standards. Properly designed intersections shall be provided at the locations and of the types and features given in the tables below:

(a) **At-Grade Intersections:**

<b>Sr. No.</b>	<b>Location(Existing Chainage) of Intersection (km)</b>	<b>Location(Design Chainage) of Intersection (km)</b>	<b>Type of Intersection</b>	<b>Other features</b>
NIL				

**1. Major intersections**

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

<b>Sr. No.</b>	<b>Location (Existing Chainage) (km)</b>	<b>Location (Design Chainage) (km)</b>	<b>Salient Feature</b>	<b>Minimum Length of Viaduct</b>	<b>Road to be carried Under structure</b>
NIL					

**2. Minor Intersections**

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

	<b>Existing Chainage</b>	<b>Design Chainage</b>	<b>Type</b>	<b>Direction</b>	<b>Remarks</b>
1	0+560	0+560	Y	RHS	C C Road
2	0+737	0+735	Y	RHS	C C Road
3	1+020	1+010	Y	RHS	C C Road
4	1+615	1+605	T	RHS	To Home
5	1+860	1+860	T	LHS	Shalgari Village (B T Road)
6	6+607	6+592	Y	RHS	To Golden Cross (B T Road)

	<b>Existing Chainage</b>	<b>Design Chainage</b>	<b>Type</b>	<b>Direction</b>	<b>Remarks</b>
7	8+184	8+120	T	LHS	To Rangpo
8	8+578	8+500	Y	RHS	To Taja ( B T Road)
9	17+088	17+080	Y	RHS	Pichierkhani
10	17+216	17+490	Y	RHS	To Taja
11	18+390	18+250	Y	LHS	To Rangpo ( B T Road)
12	19+154	19+009	Y	LHS	C C Road
13	21+341	20+960	T	RHS	B T Road (To Temple)
14	21+800	21+439	T	RHS	B T Road (To Chetri)
15	24+158	23+720	T	RHS	To Chalamthan
16	24+300	23+862	T	RHS	To Home
17	25+680	25+200	Y	LHS	C C Road
18	26+890	26+380	T	LHS	B T Road (Airport)

#### **4. ROAD EMBANKMENT AND CUT SECTION**

4.1 Widening and improvement of the existing road embankment/cuttings and construction of new road embankment/ cuttings shall conform to the 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.

#### **4.2 Raising of the existing road:**

The existing road shall be raised in the following sections:

<b>Sr. No.</b>	<b>Proposed Chainage</b>		<b>Length in (Km)</b>	<b>Type of Cross Section</b>	<b>Remarks</b>
	<b>From (Km)</b>	<b>To (Km)</b>			
1	0+000	0+800	0.8	Raised Portion	TCS-01
2	0+869	1+200	0.331	Raised Portion	TCS-01
3	1+435	1+500	0.065	Raised Portion	TCS-01
4	1+725	1+871	0.146	Raised Portion	TCS-01
5	2+000	2+400	0.4	Raised Portion	TCS-01

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
6	2+800	3+050	0.25	Raised Portion	TCS-01
7	3+150	3+285	0.135	Raised Portion	TCS-01
8	3+430	3+762	0.332	Raised Portion	TCS-01
9	3+950	4+400	0.45	Raised Portion	TCS-01
10	4+751	4+818	0.067	Raised Portion	TCS-01
11	4+900	4+982	0.082	Raised Portion	TCS-01
12	5+060	5+110	0.05	Raised Portion	TCS-01
13	5+154	5+200	0.046	Raised Portion	TCS-01
14	5+418	5+710	0.292	Raised Portion	TCS-01
15	6+078	6+152	0.074	Raised Portion	TCS-01
16	6+383	6+758	0.375	Raised Portion	TCS-01
17	6+812	6+900	0.088	Raised Portion	TCS-01
18	7+016	7+455	0.439	Raised Portion	TCS-01
19	7+592	7+950	0.358	Raised Portion	TCS-01
20	8+110	8+200	0.09	Raised Portion	TCS-01
21	8+800	8+995	0.195	Raised Portion	TCS-01
22	9+062	9+446	0.384	Raised Portion	TCS-01
23	9+520	9+770	0.25	Raised Portion	TCS-01
24	9+821	9+900	0.079	Raised Portion	TCS-01
25	10+373	10+450	0.077	Raised Portion	TCS-01
26	10+537	10+700	0.163	Raised Portion	TCS-01
27	10+800	11+182	0.382	Raised Portion	TCS-01
28	11+418	11+521	0.103	Raised Portion	TCS-01
29	11+738	11+777	0.039	Raised Portion	TCS-01

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
30	12+070	12+452	0.382	Raised Portion	TCS-01
31	12+549	13+100	0.551	Raised Portion	TCS-01
32	13+150	14+138	0.988	Raised Portion	TCS-01
33	14+211	14+500	0.289	Raised Portion	TCS-01
34	14+585	14+800	0.215	Raised Portion	TCS-01
35	14+900	14+954	0.054	Raised Portion	TCS-01
36	15+049	15+223	0.174	Raised Portion	TCS-01
37	15+300	15+390	0.09	Raised Portion	TCS-01
38	15+450	16+085	0.635	Raised Portion	TCS-01
39	16+168	16+600	0.432	Raised Portion	TCS-01
40	16+630	17+075	0.445	Raised Portion	TCS-01
41	17+300	18+250	0.95	Raised Portion	TCS-01
42	18+323	18+420	0.097	Raised Portion	TCS-01
43	18+539	19+620	1.081	Raised Portion	TCS-01
44	20+138	20+260	0.122	Raised Portion	TCS-01
45	20+385	20+536	0.151	Raised Portion	TCS-01
46	20+625	20+950	0.325	Raised Portion	TCS-01
47	21+020	21+450	0.43	Raised Portion	TCS-01
48	21+600	21+800	0.2	Raised Portion	TCS-01
49	21+960	22+000	0.04	Raised Portion	TCS-01
50	22+332	22+700	0.368	Raised Portion	TCS-01
51	22+800	22+850	0.05	Raised Portion	TCS-01
52	22+920	23+000	0.08	Raised Portion	TCS-01
53	23+100	23+625	0.525	Raised Portion	TCS-01

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
54	23+713	23+865	0.152	Raised Portion	TCS-01
55	24+010	24+376	0.366	Raised Portion	TCS-01
56	24+410	24+650	0.24	Raised Portion	TCS-01
57	24+700	25+475	0.775	Raised Portion	TCS-01
58	25+725	25+832	0.107	Raised Portion	TCS-01
59	26+027	26+160	0.133	Raised Portion	TCS-01
60	26+218	26+706	0.488	Raised Portion	TCS-01

## 5 PAVEMENT DESIGN

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

### 5.2 Type of pavement

### 5.3 Design requirements

#### 5.3.1 Design Period and strategy

Flexible Pavement shall be designed for a minimum design period of 15 years Stage construction shall not be permitted.

#### 5.3.2 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.

#### 5.4 Reconstruction of stretches

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

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
1	0+000	0+800	0.8	Raised Portion	TCS-01
2	0+869	1+200	0.331	Raised Portion	TCS-01
3	1+435	1+500	0.065	Raised Portion	TCS-01
4	1+725	1+871	0.146	Raised Portion	TCS-01
5	2+000	2+400	0.4	Raised Portion	TCS-01
6	2+800	3+050	0.25	Raised Portion	TCS-01
7	3+150	3+285	0.135	Raised Portion	TCS-01
8	3+430	3+762	0.332	Raised Portion	TCS-01
9	3+950	4+400	0.45	Raised Portion	TCS-01
10	4+751	4+818	0.067	Raised Portion	TCS-01
11	4+900	4+982	0.082	Raised Portion	TCS-01
12	5+060	5+110	0.05	Raised Portion	TCS-01
13	5+154	5+200	0.046	Raised Portion	TCS-01
14	5+418	5+710	0.292	Raised Portion	TCS-01
15	6+078	6+152	0.074	Raised Portion	TCS-01
16	6+383	6+758	0.375	Raised Portion	TCS-01
17	6+812	6+900	0.088	Raised Portion	TCS-01
18	7+016	7+455	0.439	Raised Portion	TCS-01
19	7+592	7+950	0.358	Raised Portion	TCS-01
20	8+110	8+200	0.09	Raised Portion	TCS-01
21	8+800	8+995	0.195	Raised Portion	TCS-01
22	9+062	9+446	0.384	Raised Portion	TCS-01
23	9+520	9+770	0.25	Raised Portion	TCS-01
24	9+821	9+900	0.079	Raised Portion	TCS-01

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
25	10+373	10+450	0.077	Raised Portion	TCS-01
26	10+537	10+700	0.163	Raised Portion	TCS-01
27	10+800	11+182	0.382	Raised Portion	TCS-01
28	11+418	11+521	0.103	Raised Portion	TCS-01
29	11+738	11+777	0.039	Raised Portion	TCS-01
30	12+070	12+452	0.382	Raised Portion	TCS-01
31	12+549	13+100	0.551	Raised Portion	TCS-01
32	13+150	14+138	0.988	Raised Portion	TCS-01
33	14+211	14+500	0.289	Raised Portion	TCS-01
34	14+585	14+800	0.215	Raised Portion	TCS-01
35	14+900	14+954	0.054	Raised Portion	TCS-01
36	15+049	15+223	0.174	Raised Portion	TCS-01
37	15+300	15+390	0.09	Raised Portion	TCS-01
38	15+450	16+085	0.635	Raised Portion	TCS-01
39	16+168	16+600	0.432	Raised Portion	TCS-01
40	16+630	17+075	0.445	Raised Portion	TCS-01
41	17+300	18+250	0.95	Raised Portion	TCS-01
42	18+323	18+420	0.097	Raised Portion	TCS-01
43	18+539	19+620	1.081	Raised Portion	TCS-01
44	20+138	20+260	0.122	Raised Portion	TCS-01
45	20+385	20+536	0.151	Raised Portion	TCS-01
46	20+625	20+950	0.325	Raised Portion	TCS-01
47	21+020	21+450	0.43	Raised Portion	TCS-01
48	21+600	21+800	0.2	Raised Portion	TCS-01

Sr. No.	Proposed Chainage		Length in (Km)	Type of Cross Section	Remarks
	From (Km)	To (Km)			
49	21+960	22+000	0.04	Raised Portion	TCS-01
50	22+332	22+700	0.368	Raised Portion	TCS-01
51	22+800	22+850	0.05	Raised Portion	TCS-01
52	22+920	23+000	0.08	Raised Portion	TCS-01
53	23+100	23+625	0.525	Raised Portion	TCS-01
54	23+713	23+865	0.152	Raised Portion	TCS-01
55	24+010	24+376	0.366	Raised Portion	TCS-01
56	24+410	24+650	0.24	Raised Portion	TCS-01
57	24+700	25+475	0.775	Raised Portion	TCS-01
58	25+725	25+832	0.107	Raised Portion	TCS-01
59	26+027	26+160	0.133	Raised Portion	TCS-01
60	26+218	26+706	0.488	Raised Portion	TCS-01

## 6 ROAD SIDE DRAINAGE

Drainage system including surface and subsurface drains for the Project Highway shall be provided as per Section 6 of the Manual. Lined drain is provided in following stretches.

RCC covered drain shall be constructed at given below locations:

Sr. No.	Existing Chainage		Design Chainage		Length	Remarks
	From	To	From	To		
1	7-850	8+350	8+200	8+700	500	Rorathang

## 7 DESIGN OF STRUCTURES

### 7.1 General

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

**7.1.2** Width of the carriageway of new bridges and structures shall be as follows:

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[Refer to paragraph 7.3 (ii) of the Manual and specify the width of carriageway of new bridges and structures of more than 60 metre length, if the carriageway width is different from 11 metre including kerb shyness in the table below.]

Sr. No.	Bridge (km)	Width of carriageway and Cross - Sectional feature
Nil		

**7.1.3** The following structures shall be provided with footpaths:

[The Manual and provide details of new Structures with footpath.]

Sr. No.	Location at km		Remarks
	(Existing Chainage)	(Design Chainage)	
1	5+220	5+500	Minor Bridge

**7.1.4** All bridges shall be high-level bridges.

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

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

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

## **7.2 Culverts**

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

### **7.2.2 Reconstruction of Existing Culverts:**

The existing culverts at the following locations shall be reconstructed as new culverts:

Sr. No.	Design Chainage	Design Size	Type of Structure	Proposal
1	0+059	1X3	RCC Slab	Replaced
2	0+220	1X3	RCC Slab	Replaced

<b>Sr. No.</b>	<b>Design Chainage</b>	<b>Design Size</b>	<b>Type of Structure</b>	<b>Proposal</b>
3	0+287	1X3	RCC Slab	Replaced
4	1+002	1X3	RCC Slab	Replaced
5	1+504	1X3	RCC Slab	Replaced
6	1+709	1X3	RCC Slab	Replaced
7	2+047	1X3	RCC Slab	Replaced
8	2+085	1X3	RCC Slab	Replaced
9	2+143	1X3	RCC Slab	Replaced
10	2+323	1X3	RCC Slab	Replaced
11	2+380.21	1X3	RCC Slab	Replaced
12	2+748.59	1X3	RCC Slab	Replaced
13	2+782.43	1X3	RCC Slab	Replaced
14	2+951.88	1X3	RCC Slab	Replaced
15	2+982.60	1X3	RCC Slab	Replaced
16	3+279.38	1X3	RCC Slab	Replaced
17	3+417.53	1X3	RCC Slab	Replaced
18	3+436.76	1X3	RCC Slab	Replaced
19	3+488	1X3	RCC Slab	Replaced
20	4+167	1X3	RCC Slab	Replaced
21	4+218	1X3	RCC Slab	Replaced
22	4+247	1X3	RCC Slab	Replaced
23	4+757	1X3	RCC Slab	Replaced
24	5+067	1X3	RCC Slab	Replaced
25	5+706	1X3	RCC Slab	Replaced
26	6+040	1X3	RCC Slab	Replaced

<b>Sr. No.</b>	<b>Design Chainage</b>	<b>Design Size</b>	<b>Type of Structure</b>	<b>Proposal</b>
27	6+309	1x3	RCC Slab	Replaced
28	6+613	1x3	RCC Slab	Replaced
29	6+779	1x3	RCC Slab	Replaced
30	7+024	1x3	RCC Slab	Replaced
31	7+118.30	1x3	RCC Slab	Replaced
32	7+187.14	1x3	RCC Slab	Replaced
33	7+309.00	1x3	RCC Slab	Replaced
34	7+412.93	1x3	RCC Slab	Replaced
35	7+543.74	1X3	RCC Slab	Replaced
36	8+151.38	1X3	RCC Slab	Replaced
37	9+075.42	1X3	RCC Slab	Replaced
38	10+593.20	1X3	RCC Slab	Replaced
39	11+106.49	1X3	RCC Slab	Replaced
40	11+197.52	1X3	RCC Slab	Replaced
41	11+308.81	1X3	RCC Slab	Replaced
42	11+478.12	1X3	RCC Slab	Replaced
43	11+975.20	1X3	RCC Slab	Replaced
44	12+108.92	1X3	RCC Slab	Replaced
45	12+298.99	1X3	RCC Slab	Replaced
46	12+423.10	1X3	RCC Slab	Replaced
47	12+649.18	1X3	RCC Slab	Replaced
48	12+838	1X3	RCC Slab	Replaced
49	13+101	1X3	RCC Slab	Replaced
50	13+190	1X3	RCC Slab	Replaced

<b>Sr. No.</b>	<b>Design Chainage</b>	<b>Design Size</b>	<b>Type of Structure</b>	<b>Proposal</b>
51	13+303	1X3	RCC Slab	Replaced
52	13+423	1X3	RCC Slab	Replaced
53	13+622	1X3	RCC Slab	Replaced
54	13+886	1X3	RCC Slab	Replaced
55	14+011	1X3	RCC Slab	Replaced
56	14+300	1X3	RCC Slab	Replaced
57	14+324	1X3	RCC Slab	Replaced
58	15+695	1X3	RCC Slab	Replaced
59	16+515	1X3	RCC Slab	Replaced
60	17+380	1X3	RCC Slab	Replaced
61	17+612	1X3	RCC Slab	Replaced
62	17+706	1X3	RCC Slab	Replaced
63	18+045	1X3	RCC Slab	Replaced
64	18+506	1X3	RCC Slab	Replaced
65	18+887	1X3	RCC Slab	Replaced
66	18+950	1X3	RCC Slab	Replaced
67	19+645	1X3	RCC Slab	Replaced
68	19+663	1X3	RCC Slab	Replaced
69	20+175	1X3	RCC Slab	Replaced
70	20+295	1X3	RCC Slab	Replaced
71	20+600	1X3	RCC Slab	Replaced
72	20+780	1X3	RCC Slab	Replaced
73	20+818	1X3	RCC Slab	Replaced
74	21+142	1X3	RCC Slab	Replaced

<b>Sr. No.</b>	<b>Design Chainage</b>	<b>Design Size</b>	<b>Type of Structure</b>	<b>Proposal</b>
75	21+275	1X3	RCC Slab	Replaced
76	21+645	1X3	RCC Slab	Replaced
77	22+041	1X3	RCC Slab	Replaced
78	22+113	1X3	RCC Slab	Replaced
79	22+156	1X3	RCC Slab	Replaced
80	22+360	1X3	RCC Slab	Replaced
81	22+470	1X3	RCC Slab	Replaced
82	22+622	1X3	RCC Slab	Replaced
83	22+706	1X3	RCC Slab	Replaced
84	22+800	1X3	RCC Slab	Replaced
85	22+940	1X3	RCC Slab	Replaced
86	23+047	1X3	RCC Slab	Replaced
87	23+108	1X3	RCC Slab	Replaced
88	23+213	1X3	RCC Slab	Replaced
89	23+285	1X3	RCC Slab	Replaced
90	23+357	1X3	RCC Slab	Replaced
91	23+495	1X3	RCC Slab	Replaced
92	23+562	1X3	RCC Slab	Replaced
93	23+935	1X3	RCC Slab	Replaced
94	24+098	1X3	RCC Slab	Replaced
95	24+141	1X3	RCC Slab	Replaced
96	24+180	1X3	RCC Slab	Replaced
97	24+250	1X3	RCC Slab	Replaced
98	24+395	1X3	RCC Slab	Replaced

<b>Sr. No.</b>	<b>Design Chainage</b>	<b>Design Size</b>	<b>Type of Structure</b>	<b>Proposal</b>
99	24+810	1X3	RCC Slab	Replaced
100	25+014	1X3	RCC Slab	Replaced
101	25+152	1X3	RCC Slab	Replaced
102	25+217	1X3	RCC Slab	Replaced
103	25+627	1X3	RCC Slab	Replaced
104	25+669	1X3	RCC Slab	Replaced
105	25+924	1X3	RCC Slab	Replaced
106	26+307	1X3	RCC Slab	Replaced

### 7.2.3 Widening and Repairing of existing culverts

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

<b>S. No.</b>	<b>Culvert Location (Km)</b>	<b>Type , Span, Height and width of existing culvert</b>	<b>Type of Repair Required</b>
Nil			

7.2.4 Additional New culverts shall be constructed as per Particulars given in the table below:

<b>Sr. No.</b>	<b>Design Chainage</b>	<b>Design Size</b>	<b>Type of Structure</b>	<b>Proposal</b>
1	10+145	1X3	RCC Slab	New
2	10+187	1X3	RCC Slab	New
3	10+229	1X3	RCC Slab	New
4	10+302	1X3	RCC Slab	New

7.2.5 Repairs/ Replacement of Railing/Parapets, flooring and protection works of the existing culverts shall be undertaken as follows:

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Sr. No.	Existing Chainage (km)	Design Chainage (km)	Type of Culvert	Span (m)	Type of Repair
NIL					
<b>1= Replacement of Wearing coat, 2= Repair of parapet wall, 3= Repair of Substructure, 4=Repair of superstructure</b>					

**7.2.6** Floor Protection works shall be as specified in the relevant IRC codes and specifications.

### **7.3 Bridges**

#### **7.3.1 Existing Bridges to be retained**

(i) The existing bridges at the following locations shall be retained:

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Existing no. of Spans with span length (m)	Remarks
1	8+000	8+032	1x24.4+1x45.9+1x45.7+1x43	Retained

(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				

#### **7.3.2 Additional New Bridges**

New bridges at the following locations on the project highway shall be constructed. GADs for the new bridges are attached in the drawings folder:

Sr. No.	Location		Span Arrangement	Total length (m)	Remarks
	Existing Chainage (Km)	Design Chainage (Km)			

1	-----	5+500	2x20	40	New Minor Bridge
2	-----	26+448	1x20	20	New Minor Bridge

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

Sr. No.	Location (km)	Remarks
Nil		

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

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Existing no. of Spans with span length (m)	Remarks
1	7+600	8+032	1x24.4+1x45.9+1x45.7+1x43	As per site condition

### **7.3.5 Drainage system for bridge decks**

An effective drainage system for bridge decks shall be provided as specified in paragraph 7.21 of the Manual.

### **7.3.6 Structures in marine environment**

The Manual and specify the necessary measures / treatments for protecting structures in marine environment, where applicable.

## **7.4 Rail - Road Bridges**

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

### **7.4.2 Road Over-Bridges**

Road over-bridges (road over railway line) shall be provided at the following level crossings, as per manual:

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

#### 7.4.3 Road under-Bridges

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

Sl. No.	Location of Level crossings(km)	Number and length of Span (m)
Nil		

#### 7.5 Grade separated structures

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

Sr. No.	Location		Span Arrangement	Total length (m)	Remarks
	Existing Chainage (Km)	Design Chainage (Km)			
Nil					

#### 7.6 Repairs and strengthening of bridges and structures

All 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 / Design Chainage (In km)/Span	Side (LHS/RHS)	Nature and Extent of Repairs /
Nil			

##### B. ROB / RUB

Sl. No.	Location / Design Chainage (In km)	Side (LHS/RHS)	Nature and Extent of Repairs / Strengthening to be carried out
Nil			

### C. Overpass / Underpass and Other structures

Sr. No.	Location / Design Chainage (In km)	Side (LHS/RHS)	Nature and Extent of Repairs/ Strengthening to be carried out
Nil			

### 7.7 List of Major Bridges and Structures

The following is the list of the Major Bridges and Structures:

Sl. No.	Location
1	8+032 (1x24.4+1x 45.9+1x45.7+1x43=159 m)

## 8. TRAFFIC CONTROL DEVICES AND ROAD SAFETY WORKS

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

- (a) Traffic Signs: Traffic signs include roadside signs, overhead signs and curb mounted signs along the entire Project Highway.
- (b) Pavement Marking: Pavement markings shall cover road marking for the entire Project Highway.
- (c) Safety Barrier: Provide W-beam crash barrier along the project highway at all locations as specified in manual recommended in Schedule D.

### 8.2 Specifications of the reflecting sheeting.

Retro reflective sheeting should be of high intensity grade with encapsulated lens or with micro prismatic retro reflective element in accordance with ASTM Standard D 4956-04 shall be provided.

## 9. ROADSIDE FURNITURE

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

- (a) Road Boundary Stone: For the entire Project Highway.

- (b) Pedestrian Guard Rail: The pedestrian facilities shall include the provision of the;
  - (i) Pedestrian guardrail: Provide pedestrian guardrail at each bus stop location.
  - (ii) Pedestrian Crossings: Provide pedestrian crossing facilities on Junctions.
- (c) Overhead traffic signs: Location and Size
  - (i) Full width Overhead signs: Full width Overhead signs shall be provided as suggested in manual recommended in Schedule D.
  - (ii) Cantilever Overhead signs: Overhead signs shall be provided as suggested in manual recommended in Schedule D.
  - (iii) Delineators: Delineators for the entire Project Highway at the locations as suggested in manual recommended in Schedule D

**10. COMPULSORY AFFORESTATION**

The number of Trees which are required to be planted by the contractor as compensatory afforestation should be as per Forest Conservation Act, twice the number of trees to be cut.

**11. HAZARDOUS LOCATIONS**

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

Sl. No.	Design Chainage			Remarks
	From	To	Length (m)	
Nil				

**12. Special Requirement for Hill Roads**

In accordance with section 13 of the manual ( from IRC SP 73 : 2015 ), IRC : SP 48:1998 and Recommended Practices for the Treatment of Embankment and Roadside slopes for Erosion control(First Revision) IRC: 56 :2011 and relevant IRC codes

**12.1 SLOPE PROTECTION MEASURES**

As the project involves cutting of the hill slopes, it's imperative that slopes are stabilised for ensuring longevity of the slopes and the road. Slope stability, erosion control and landslide correction shall be accomplished in accordance with IRC: SP 48:1998. Reference may be drawn from IRC: 56-2011.

The minimum quantity of protection works may be taken as below

**12.2 Reinforced Soil Slope Structure** conforming to MORTH specification for road and bridge works and relevant BS codes shall be used as a retaining structure for proposed widening of the Valley Side in those locations wherever requisite design width is sufficiently available to lay the soil reinforcing element of the Reinforced Soil Slope Structure with minimal excavation and disturbance to the existing valley slope and the traffic running on top of it. Equivalent / Higher Protection system will be Technically Evaluated by Approving Authority. The Final Type of product to be used shall be decided upon approval of final design / drawing as per IRC & BS specification.

The minimum requirement of Reinforced Slope Structure / Reinforced earth composite system are suggested as following which may vary as per final drawings and design approved by competent authority. The Contractor is required to conduct detail investigation to assess the work based on site survey, investigations and assessment before commencement of work

Reinforced soil structure: Reinforced soil structure shall be Provide to arrest damage cause to the valley side and the road, by under cutting by stream or other water course. Such structures shall be provided at the following locations of the Project highways:

**Details of Reinforced soil slope structure:**

Sl. No.	Chainage		Stretch Length (in Mtr)	Proposed Carriageway width from the edge of existing road in Valley side (in Mtr)	Height of Reinforced Soil slope Wall (in Mtr)
	From	To			
1	0+800	0+850	50	5.6	3.5
2	0+850	0+900	50	12.7	4
3	1+000	1+010	10	6	10
4	1+100	1+200	100	5	4
5	1+320	1+330	10	7	11
6	1+600	1+725	125	14	6
7	1+900	1+910	10	14	6

**Details of Reinforced soil slope structure:**

Sl. No.	Chainage		Stretch Length (in Mtr)	Proposed Carriageway width from the edge of existing road in Valley side (in Mtr)	Height of Reinforced Soil slope Wall (in Mtr)
	From	To			
8	1+910	1+990	80	6	5
9	2+150	2+170	20	6	4
10	2+200	2+230	30	7.5	10
11	2+230	2+250	20	8	10
12	2+250	2+300	50	7.5	10
13	2+570	2+620	50	12	8
14	3+850	3+960	110	10	12
15	3+970	3+980	10	4.5	8
16	4+100	4+200	100	3	7
17	4+375	4+400	25	3	7
18	4+460	4+480	20	7	8
19	5+350	5+550	200	7	6
20	5+600	5+680	80	6	8
21	8+600	8+680	80	9	15
22	8+820	8+900	80	9	15
23	9+100	9+110	10	7	6
24	9+780	9+820	40	14	9
25	9+900	10+000	100	11	11
26	10+650	10+660	10	11	7
27	12+450	12+600	150	19	9

**Details of Reinforced soil slope structure:**

Sl. No.	Chainage		Stretch Length (in Mtr)	Proposed Carriageway width from the edge of existing road in Valley side (in Mtr)	Height of Reinforced Soil slope Wall (in Mtr)
	From	To			
28	12+600	12+750	150	24	13
29	13+420	13+470	50	8	10
30	14+300	14+400	100	8	10
31	14+930	14+980	80	11	11
32	19+760	19+860	100	14	15
33	23+000	23+080	80	13	12

Note: The wall length is indicative and shall be estimated by the EPC contractor.

**12.3 Reinforced Soil Composite System** (including soil nailing ) or equivalent system conforming to MORTH specification for road and bridge works and relevant BS codes shall be used as a retaining structure for proposed widening of the Valley Side for those locations wherever requisite design width is not available to lay the soil reinforcing element of the Reinforced Slope Structure. This includes reinforce and strengthen the unstable valley slopes with soil nailing while doing the excavation in a top-down manner by incorporating inclusions into the excavated slope surface based on the detail soil investigation and slope stability analysis. Reinforced soil Composite System shall consist of reinforced slope directly attached with stabilized slope mass.

The minimum requirement of Reinforced Slope Structure / Reinforced earth composite system are suggested as following which may vary as per final drawings and design approved by competent authority. The Contractor is required to conduct detail investigation to assess the work based on site survey, investigations and assessment before commencement of work

**Reinforced Soil Composite or equivalent Structure location**

Sr. No.	Sinking & Sliding Zone	Chainage		Tentative Stretch Length (in Mtr)	Proposed Carriageway width from the edge of existing road in Valley side (in Mtr)	Tentative Height of Retaining Structure in Valley side (in Mtr)
		From	To			
1	g	3+680	3+690	10	5.5	25
2		4+400	4+420	20	10	30
3	&	4+420	4+460	40	11	30
4	S	6+900	6+960	60	11	24
5	I	9+300	9+350	50	12	22

Note: The wall length is indicative and shall be estimated by the EPC contractor.

**Sliding Zone at Km 14 :** The alignment is passing through sinking and sliding zone at few locations which need to be treated with specialized techniques, special measures to be taken for these areas. The reinforced soil composite system or equivalent system conforming to conforming to MORTH specification for road and bridge works and relevant BS codes shall be used as a retaining structure for proposed widening of the Valley Side. This includes reinforce and strengthen the unstable valley slopes with soil nailing while doing the excavation in a top-down manner by incorporating inclusions into the excavated slope surface based on the detail soil investigation and slope stability analysis. Reinforced Earth Composite System shall consist of reinforced slope directly attached with stabilized slope mass. In addition to above High steel wire mesh to be provided to avoid sliding of rock mass in sliding zones identified based on geological study of the area.

The minimum requirement of Reinforced Slope Structure / Reinforced earth composite system to treat Sliding & Sinking Zone are suggested as following which may vary as per final drawings and design approved by competent authority. The Contractor is required to

conduct detail investigation to assess the work based on site survey, investigations and assessment before commencement of work.

Sr. No.	Tentative Chainage		Tentative Stretch Length (in Mtr)
	From	To	
<b>1</b>			
1	14+050	14+400	350

**12.4 Retaining Wall :** The minimum requirement of Retaining wall are suggested as following which may vary as per final drawings and design approved by competent authority. The Contractor is required to conduct detail investigation to assess the work based on site survey, investigations and assessment before commencement of work.

**Retaining Walls Locations:**

Sl. No.	From	To	Length	Avg. Height
1	1700	1800	100	2.5
2	2+300	2+380	80	2.5
3	5+550	5+700	150	3.6
4	5+800	5+920	120	3.5
5	7+800	7+880	80	2.5
6	9+340	9+440	100	3.3
7	10+060	10+720	660	4
8	11+660	11+780	120	6
9	12+960	13+060	100	2.64
10	13+540	14+760	1220	4.35
11	17+040	17+080	40	2.3
12	17+380	17+560	180	2.6

13	20+040	20+360	320	6
14	22+360	22+620	260	5.5
15	24+000	24+100	100	3.6
16	25+140	25+500	360	6
17	26+000	26+140	140	3

Note: The wall length is indicative and shall be estimated by the EPC contractor.

**12.5 Breast Wall :** The minimum requirement of Breast wall are suggested as following which may vary as per final drawings and design approved by competent authority. The Contractor is required to conduct detail investigation to assess the work based on site survey, investigations and assessment before commencement of work.

In addition to breast wall Landslide zones to be treated with Soil nailing & High Strength Wire Mesh having of minimum diameter 3 mm twisted or Straight of high tensile steel wire as per IRC & BS specifications. The System should be tailor made according to the site conditions and requirements with accessories like Connection Clips / Press Claws / Shackles/ Boundary Ropes / Wire Rope Anchors etc. Equivalent / Higher Protection system will be Technically Evaluated by Approving Authority. The Final Type of product to be used shall be decided upon approval of final design / drawing as per IRC & BS specification.

**Breast Wall Location:**

Sl. No.	From	To	Length	Avg. Height
1	1220	1260	40	2.5
2	1+520	1+600	80	5
3	2+460	2+500	40	6
4	4+520	4+880	360	6.48
5	5+260	5+300	40	6.8
6	5+720	5+800	80	5.5

<b>Sl. No.</b>	<b>From</b>	<b>To</b>	<b>Length</b>	<b>Avg. Height</b>
7	6+820	7+000	180	2.5
8	8+720	8+760	40	5.5
9	9+020	9+100	80	6
10	11+360	11+560	200	3.7
11	11+980	12+160	180	6.5
12	12+660	12+720	60	2.5
13	14+300	14+340	40	8.5
14	14+420	14+460	40	15
15	14+780	15+100	320	4
16	15+940	16+040	100	3
17	16+000	16+680	680	5.6
18	17+660	17+720	60	4.68
19	20+600	20+660	60	4.75
20	23+240	23+460	220	4
21	24+420	24+500	80	2.6
22	26+960	26+980	20	6

Note: The wall length is indicative and shall be estimated by the EPC contractor.

However, the Contractor shall be responsible for accurate assessment of the actual requirement as per site situation & prepare designs for slope protection & stabilization as per the specifications & standards stipulated in schedule 'D' and submit the same to AE for review through the proof consultant and implement it accordingly thereafter.

**Any increase in Quality over and above the tentative quantity as mentioned in above table or through change in specifications will not be considered for payment as change of scope.** Therefore Contractor shall make through investigation of the site and assess the requirement of slope protection and slide prone zones and other safety features on his own before submission of bid.

**13. CHANGE OF SCOPE**

The length of Structures, bridges and slope protection works whatsoever in terms of retaining wall, breast wall and gabion wall or under special requirement of hill slope specified herein 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 specification and standards. Any variations in the lengths and specifications given in the schedule-B shall not constitute a change of Scope.

SCHEDULE - D  
(See Clause 2.1)

**SPECIFICATIONS AND STANDARDS**

**1      *Construction***

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

**2      *Design Standards***

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

Manual of Specifications and Standards for Two Lanning of Highways (IRC: SP: 73-2015), referred to herein as the Manual

Annex - I  
(Schedule-D)

**Specifications and Standards for Construction**

**1 Specifications and Standards**

All Materials, works and construction operations shall conform to the Two lane Manual(IRC:SP:73-2015) of Specifications and Standards for Two-Laning (IRC:SP:73-2015) and MORTH Specifications for Road and Bridge Works(Fifth Revision) and IRC 56-2011 Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Authority's Engineer.

**2 Deviation from the Specifications and Standards.**

**1.1** The terms "Concessionaire", "Independent Engineer" and "Concession Agreement" used in the Two lane Manual(IRC:SP:73-2015) shall be deemed to be substituted by the terms "Contractor", "Authority's Engineer" and "Agreement" respectively.