

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. Upgradation to 4 lane highway

Upgradation shall include Four-Lanning of the Project Highway as described in Annex-I of this Schedule-B and in Schedule-C.

3. Specifications and Standards

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

Annex – I

(SCHEDULE-B)

Description of Four-Lanning

1. WIDENING OF THE EXISTING HIGHWAY

1.1 The Project Highway shall follow the existing alignment as 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 hilly terrain to the extent land is available.

1.2 WIDTH OF CARRIAGEWAY

1.2.1 Construction of Four-Lane pavement with paved shoulders shall be undertaken. The paved carriageway on both side of median shall be 7m wide with paved shoulders and 1.5 m wide median in accordance with the typical cross sections drawings as per four lane manual 2014

1.2.1 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.

2.2 Design speed

The design speed shall be the minimum design speed of 40 km/hr and ruling design speed of 60 km/hr for mountainous and steep terrain.

2.3 Improvement of the existing road geometrics

Improvement of the existing road geometrics shall be carried out as per section 2 of the Manual (IRC: 84-2014).

2.4 Right of Way

Details of the Right of Way are given below.

Design ch. (from)	Design ch. (to)	Design Length	PROW width (m)	EROW width (m)
152+490	166+700	14210	45	45

2.5 Type of shoulders

The shoulder shall be paved shoulder on hill and valley in open areas along with divided carriageway and 1.75m wide raised footpath in Built-up locations as per typical cross section of Four lane manual 2014.

2.5.1 In built-up sections. Raised footpaths shall be provided in the following stretches:

Sl. No.	Stretch (from Km to Km)	Raised footpaths	Reference to cross section
1	Length of 200m	2 X 1.75 m width Footpath	TCS-II

- (b) Shoulders of 1.5 m width shall be provided with selected earth wherever applicable as per TCS drawing.
- (c) Design and specifications of shoulders shall conform to the requirements specified in the relevant 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 requirements specified in the relevant Manual.

2.6.2 Lateral clearance: The width of the opening at the under passes shall be as follows:

Sl.No.	Location (Chainage) (from km to km)	Span/opening(m)	Remarks
1	NIL		

2.7 Lateral and vertical clearances at overpasses

2.7.1 Lateral and vertical clearances at overpasses shall be as per requirements specified in the relevant Manual.

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

Sl. No.	Location (Chainage) (from km to km)	Span/Opening (m)	Remarks
Nil			

2.8 Service roads

Service roads shall be constructed at the locations and for the lengths indicated below: [Refer requirements specified in the relevant Manual]

Sl. 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			

2.9 Grade separated structures

2.9.1 Grade separated structures shall be provided as per provision of the Manual. The requisite are given below:

[Refer to requirements specified in the relevant Manual]

Sl. No.	Location of Structure (VUP)	Length (m)	Number and length of spans	Approach gradient	Remarks. if any
Nil					

- (b) In the case of grade separated structures the type of structure and the level of the Project Highway and the crossroads shall be as follows:[Refer to provision of the

Manual and specify the type of vehicular underpass/ overpass structure and whether the cross road is to be carried at the existing Level. Raised or lowered]

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

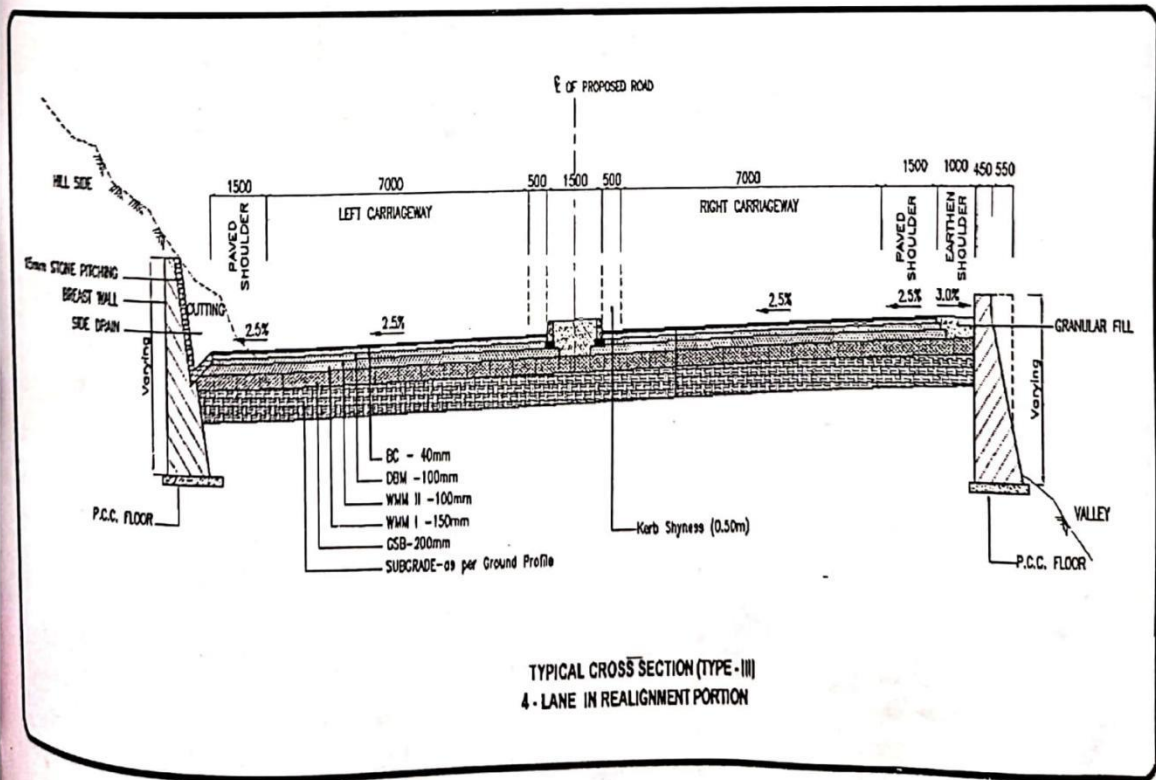
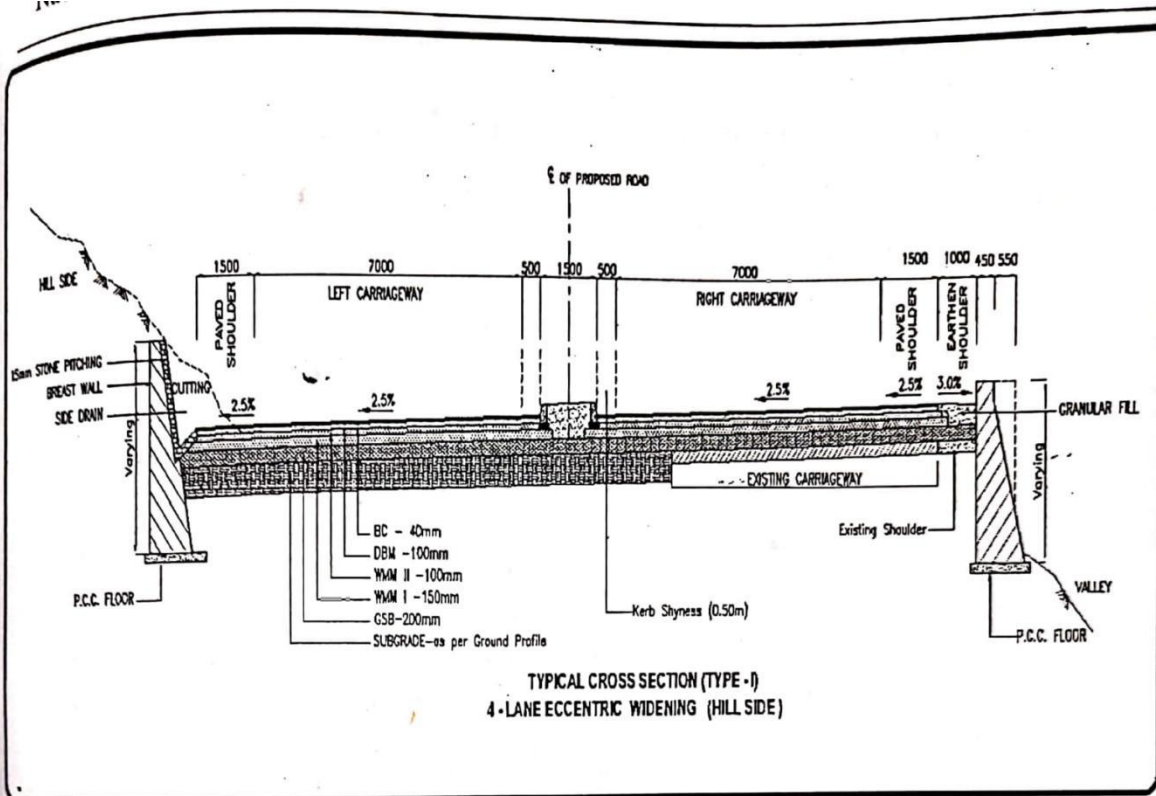
2.10 Cattle and pedestrian underpass /overpass

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

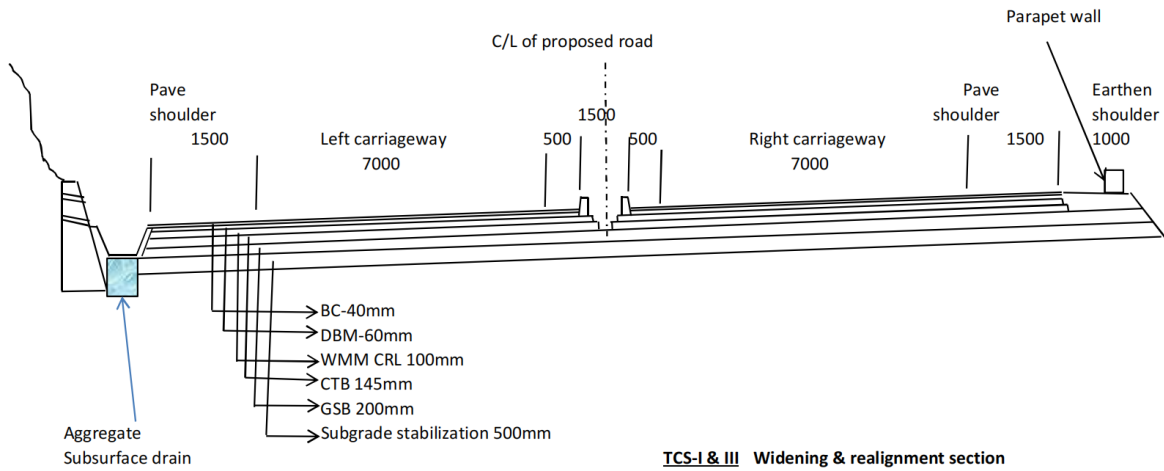
Sl.No.	Location	Type of crossing
Nil		

2.11 Typical cross-sections of the Project Highway

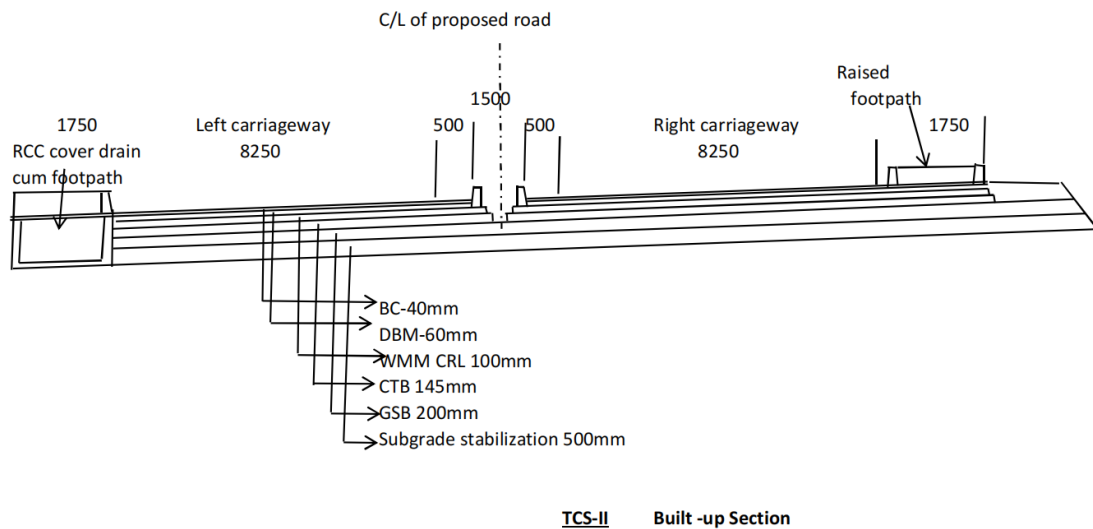
TCS TYPE	DESCRIPTION
TCS-II	In Built Up section
TCS-I	Widening on Hill side
TCS-III	Re-alignment section



TYPICAL CROSS SECTION OF FLEXIBLE PAVEMENT:



TYPICAL CROSS SECTION OF FLEXIBLE PAVEMENT:



The EPC Contractor shall modify the TCS according to the Pavement design mentioned in Clause 5.1.2& 5.1.3 of Schedule-B. In addition to that subsurface drainage system to be incorporated in this cross-section as per manual.

2.12 Realignment chainages of the Project Highway are tabulated below:

Design Chainage (m) as per Plan & Profile		
From	To	Length (m)
152490	152560	70
152620	152700	80
152800	152860	60
152975	153425	450
153680	153780	100

Design Chainage (m) as per Plan & Profile		
From	To	Length (m)
153820	153870	50
154155	154235	80
155040	155120	80
155580	155650	70
155710	156220	510
156300	156980	680
157130	157480	350
158300	158470	170
158680	158760	80
158830	159450	620
159590	159660	70
159730	159760	30
159800	159830	30
159880	159930	50
160060	160150	90
160620	160810	190
160910	160970	60
161530	161690	160
161790	162030	240
162100	162165	65
162210	162275	65
162600	162710	110
162745	162790	45
162840	162900	60
162960	163040	80
163080	163290	210
163380	163440	60
163570	163850	280
163920	164010	90
164220	164270	50
164100	164150	50
164800	164860	60
164910	164990	80
165740	165800	60
165870	165920	50
165980	166140	160
166235	166495	260
166640	166670	30
Total		6235

In above realignment chainages some stretches particularly landslide portion Plan & Profile may be modified as per site condition.

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.

[Refer to provision of the relevant Manual and specify the requirements. Explain where necessary with drawings/sketches/general arrangement]

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

(a) At-grade intersections

Sl. No.	Design chainage(Km)	Side	Type of Junction	Remarks
1	156550	RHS	Minor	To Village

(5) Grade separated intersection with/without ramps

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

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 The existing road including realignment portion shall be modified as per FRL mentioned in Plan & Profile as attached in Annex III of Schedule A.

The existing road shall be raised in the following sections:

Sl. No.	Section (from km to km)	Length (km)	Extent of raising [Top of finished road level]
Nil			

5. PAVEMENT DESIGN

Pavement design shall be carried out in accordance with provision of the relevant manual.

5.1 Type of pavement

5.1.1 Flexible pavement design i.e. Granular base and sub base with DBM & BC as per IRC 37-2012, plate for 8 CBR and 30 msa, was considered in previous completed stretch as tabulated below-

Sl. No.	Section (Design Km)	Design Length (km)	BC (mm)	DBM (mm)	WMM (mm)	GSB (mm)	Total Crust (mm)
1	Km 152+490 to Km 166+700	Details of completed work (Ref. as per Sch.-A)	40	100	250	200	590

5.1.2As per latest code IRC:37-2018 **Flexible pavement** design as per Clause 2.2 Cementitious Base and Sub bases with a Crack Relief layer of aggregate interlayer below the bituminous surfacing, as per Plate 39& Effective CBR 12% and 40 msa is considered as tabulated below.

Sl. No.	Section (Design Km)	Design Length (km)	BC (mm)	DBM (mm)	WMM (mm) as CRL	Cementitious Base (mm)	GSB (mm)	Total Crust (mm)
1	Km 152+490 to Km 166+700	Balance length (Ref. sl. no. 6 of Sch.-B)	40	60	100	145	200	545

Since, the successful bidder under EPC mode can use various types of flexible pavements mentioned in IRC:37-2018, they may carry out their own due diligence to arrive at project cost before submitting bids and also use of New/ alternative material and Technology in Construction of Highways may be adopted as per MoRTH Circular no. RW/NH-33044/18/2020-S&R (P&B) dated 14.12.2020.

Bituminous Grade VG 30 / VG 40 shall be used for DBM & BC.

5.1.3 Box Cell Viaduct:

As per site condition Box cell Viaduct including road works is proposed under separate EPC Contract due to this the following chainages has been separated from this contract:

Sl no.	Chainage	Length (m) in 4 lane
1	153+150 to 153+350 BHS	200
2	155+850 to 156+300 BHS	450
3	157+200 to 157+500 BHS	300
	Total	950m

5.2 Design requirements

5.2.1 Design Period and Strategy

Flexible pavement for new pavement or for widening and strengthening of the existing pavement shall be designed for a minimum design period of 20 years. Stage construction shall not be permitted.

5.2.2 Design Traffic

Notwithstanding anything to the contrary contained in this Agreement or the Manual. The Contractor shall design the pavement for design traffic of 40 msa & minimum Effective CBR of 12%.

6. Balance work of 4 laning: layer wise and side wise

6.1 Earthwork upto Subgrade Top:

SL. NO.	CHAINAGE		Side	LENGTH IN Mtrs
	From	To		
1	154+960	155+190	LHS	230
2	155+300	155+650	LHS	350
3	155+650	155+710	LHS	60
4	155+710	155+850	LHS	140
5	157+500	157+650	LHS	150
6	166+600	166+640	LHS	40
7	166+670	166+700	LHS	30
8	154+960	155+190	RHS	230
9	155+300	155+650	RHS	350
10	155+650	155+710	RHS	60
11	155+710	155+850	RHS	140
12	157+500	157+750	RHS	250
13	162+930	162+960	RHS	30
14	165+130	165+180	RHS	50
15	165+750	165+850	RHS	100
16	166+600	166+700	RHS	100
	Total Length (2 Lane)			2310
	Total Length (4 Lane)			1155

6.2 Preparation of subgrade with cement stabilization / chemical stabilization for improving subgrade layer of 500 mm :

SL. NO.	CHAINAGE		Side	LENGTH IN Mtrs
	From	To		
1	152+780	152+900	LHS	120
2	153+350	153+400	LHS	50
3	154+200	154+380	LHS	180
4	154+540	155+850	LHS	1310
5	156+300	156+400	LHS	100
6	157+500	157+800	LHS	300
7	159+140	159+400	LHS	260
8	166+600	166+700	LHS	100
9	153+350	153+400	RHS	50
10	154+880	155+850	RHS	970
11	156+300	156+418	RHS	118
12	157+000	157+200	RHS	200
13	157+500	158+200	RHS	700
14	159+140	159+370	RHS	230
15	161+200	161+400	RHS	200
16	162+930	162+960	RHS	30
17	165+130	165+230	RHS	100
18	165+250	165+450	RHS	200
19	165+450	165+630	RHS	180

SL. NO.	CHAINAGE		Side	LENGTH IN Mtrs
	From	To		
20	166+090	166+290	RHS	200
21	166+290	166+400	RHS	110
22	166+400	166+700	RHS	300
Total Length (2 Lane)				6008
Total Length (4 Lane)				3004

6.3 Granular Works (Sub –Base)

SL. NO.	CHAINAGE		Side	LENGTH IN Mtrs
	From	To		
1	152+780	152+900	LHS	120
2	153+350	153+400	LHS	50
3	153+900	155+850	LHS	1950
4	156+300	156+420	LHS	120
5	157+130	157+200	LHS	70
6	157+500	157+800	LHS	300
7	159+140	159+400	LHS	260
8	166+600	166+700	LHS	100
9	153+350	153+400	RHS	50
10	154+810	155+850	RHS	1040
11	156+300	156+418	RHS	118
12	156+850	157+200	RHS	350
13	157+500	158+200	RHS	700
14	159+100	159+370	RHS	270
15	161+200	161+460	RHS	260
16	162+930	162+960	RHS	30
17	165+050	165+230	RHS	180
18	165+230	165+630	RHS	400
19	166+090	166+700	RHS	610
Total Length (2 Lane)				6978
Total Length (4 Lane)				3489

6.4 Granular Works (Base, Shoulders)

SL. NO.	CHAINAGE		Side	LENGTH IN Mtrs
	From	To		
1	152+780	152+900	LHS	120
2	153+090	153+150	LHS	60
3	153+350	153+400	LHS	50
4	153+900	155+850	LHS	1950
5	156+300	156+420	LHS	120
6	157+130	157+200	LHS	70
7	157+500	157+800	LHS	300

SL. NO.	CHAINAGE		Side	LENGTH IN Mtrs
	From	To		
8	159+140	159+400	LHS	260
9	166+600	166+700	LHS	100
10	153+100	153+150	RHS	50
11	153+350	153+450	RHS	100
12	154+810	155+850	RHS	1040
13	156+300	156+500	RHS	200
14	156+850	157+200	RHS	350
15	157+500	158+200	RHS	700
16	158+660	158+900	RHS	240
17	159+100	159+380	RHS	280
18	160+690	160+815	RHS	125
19	161+200	161+550	RHS	350
20	162+930	162+960	RHS	30
21	165+050	165+620	RHS	570
22	166+060	166+700	RHS	640
	Total Length (2 Lane)			7705
	Total Length (4 Lane)			3852.5

6.5 DBM with Prime coat & Tack Coat

SL NO	CHAINAGE		Side	LENGTH IN Mtrs
	From	To		
1	152+780	152+900	LHS	120
2	153+090	153+150	LHS	60
3	153+350	155+850	LHS	2500
4	156+300	156+420	LHS	120
5	157+130	157+200	LHS	70
6	157+500	157+800	LHS	300
7	159+140	159+400	LHS	260
8	159+400	159+490	LHS	90
9	166+550	166+700	LHS	150
10	152+800	152+900	RHS	100
11	153+070	153+150	RHS	80
12	153+350	153+450	RHS	100
13	154+810	155+850	RHS	1040
14	156+300	156+610	RHS	310
15	156+830	157+200	RHS	370
16	157+500	159+430	RHS	1930
17	159+860	159+910	RHS	50
18	160+665	160+820	RHS	155
19	161+190	161+560	RHS	370
20	162+490	164+620	RHS	2130
21	164+860	165+650	RHS	790
22	166+060	166+700	RHS	640

SL NO	CHAINAGE		Side	LENGTH IN Mtrs
	From	To		
	Total Length (2 Lane)			11735
	Total Length (4 Lane)			5867.5

6.6 BC with Tack Coat : From Km 152+490 to Km 166+700= 13.080 Km (4 lane)

7 Reconstruction of Damaged stretch :

Bidders are requested to visit the site/stretch to understand the requirement of reconstruction as per their own assessment. The locations and length given in Schedule-A are tentative.

7.1 DBM stretch :

SL. NO.	CHAINAGE		Side	Length
	From	To		
1	165+650	166+090	RHS	440
	Total Length (2 Lane)			440
	Total Length (4 Lane)			220

7.2 WMM Stretch:

Sl. No.	Chainage		Side	Length
	From	To		
1	156+500	156+610	RHS	110
2	156+830	156+850	RHS	20
3	158+900	159+100	RHS	200
4	159+380	159+400	RHS	20
5	166+020	166+060	RHS	40
	Total Length(2 Lane)			390
	Total Length(4 Lane)			195

7.3 GSB Stretch:

Sl. No.	Chainage		Side	Length
	From	To		
1	159+370	159+400	RHS	30
2	161+460	161+490	RHS	30
	Total Length(2 Lane)			60
	Total Length(4 Lane)			30

7.4 The distressed locations should be identified with their exact chainages. The distressed portion should then be marked up. Then the entire DBM layer must be scrapped off thoroughly. After scrapping of DBM layer, the top WMM surface must be thoroughly checked with respect to degree of compaction and plasticity (within the grid) randomly by doing the test pits at few locations. Further it should be extended for GSB and subgrade layer with extraction of layer material to observe CBR value. If result does not comply in any of the layers then in that grid all the material including subgrade should be excavated and reconstructed freshly.

If subgrade soil is complying with the physical properties while GSB does not, then excavation should be made upto GSB layer and reconstruction should be done from GSB layer. The same should be done for WMM also.

8. ROADSIDEDRAINAGE

Drainage system including surface and subsurface drains for the Project Highway has been provided as per Section 6 of the Manual. However balance drains shall be provided in the table given below:

RCC Covered Drain (U Shaped) in built up area & valley side for connecting culvert outlet and other section of hill side PCC Drain (Trapezoidal shaped) and Sub surface drain at balance portion of Subgrade length. All connecting village road box drain with iron grating shall be provided.

SL. NO.	DESIGN CHAINAGE (Km)		Length (M)	Remarks
	FROM	TO		
1	As per TCS II Schedule	In Built up section	200m	As per Four lane manual 2014 & IRC : SP-48
2	As per TCS I Schedule	Widening on Hill Side	6235m	
3	As per TCS III Schedule	Re-alignment section	5480m	
4	From Ch 166+200 to Ch 166+400 for connecting outlet of two culverts on valley side	Valley side	200m	

9. DESIGN OF STRUCTURES

9.1 General

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

9.1.2 Width of the carriageway of new bridges and structures shall be as per figure 7.2 A and figure 7.3 of the Four lane manual (IRC SP: 84-2014)

9.1.3 Cross section of two lane new bridge with existing two lane shall be as per figure 7.4 A & 7.4 B of four lane Manual (IRC: 84-2014)

9.1.4 The following structures shall be provided with footpaths:

Sl. No.	Design (Km)	Type of Structure			Span Length (m)	Footpath Width (m)	Remarks
		Foundation	Sub-structure	Superstructure			
1	165+130	RCC / Steel T-Beam Girder			1 x 24.75	1.5	Dzuza (RHS)

9.1.5 All bridges shall be high-level bridges.

9.1.6 The following structures shall be designed to carry utility services specified in Table below:

Sl. No.	Bridge at km	Utility service to be carried	Scope
1	165+130	Water Pipe	New

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

10.1 Culverts

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

10.1.2 Widening of Proposed culverts:

The culverts at the following locations shall be constructed as widening / new culverts:

Sl. No.	Design Ch.	Span Arrangement	Type of Culvert	Completed	Balance to be constructed
1	152+515	(1X1.5X1.5)	Box culvert	1.00	0.0
2	152+577	(1X1.5X1.5)	Box culvert	1.00	0.0
3	152+826	(1X1.5X1.5)	Box culvert	1.00	0.0
4	152+858	(1X1.5X1.5)	Box culvert	1.00	0.0
5	152+900	(1X1.5X1.5)	Box culvert	1.00	0.0
6	152+965	(1X1.5X1.5)	Box culvert	1.00	0.0
7	153+104	(1X1.5X1.5)	Box culvert	1.00	0.0
8	153+422	(1X1.5X1.5)	Box culvert	1.00	0.0
9	153+450	(1X1.5X1.5)	Box culvert	1.00	0.0
10	153+610	(1X1.5X1.5)	Box culvert	1.00	0.0
11	153+652	(1X1.5X1.5)	Box culvert	1.00	0.0
12	153+820	(1X1.5X1.5)	Box culvert	1.00	0.0
13	153+881	(1X1.5X1.5)	Box culvert	1.00	0.0
14	153+980	(1X1.5X1.5)	Box culvert	1.00	0.0
15	154+022	(1X1.5X1.5)	Box culvert	1.00	0.0
16	154+133	(1X1.5X1.5)	Box culvert	1.00	0.0
17	154+243	(1X1.5X1.5)	Box culvert	1.00	0.0
18	154+340	(1X1.5X1.5)	Box culvert	1.00	0.0
19	154+388	(1X1.5X1.5)	Box culvert	1.00	0.0
20	154+450	(1X1.5X1.5)	Box culvert	1.00	0.0
21	154+495	(1X1.5X1.5)	Box culvert	1.00	0.0

Sl. No.	Design Ch.	Span Arrangement	Type of Culvert	Completed	Balance to be constructed
22	154+612	(1X1.5X1.5)	Box culvert	1.00	0.0
23	154+808	(1X1.5X1.5)	Box culvert	1.00	0.0
24	154+834	(1X1.5X1.5)	Box culvert	1.00	0.0
25	154+908	(1X1.5X1.5)	Box culvert	0.50	0.5
26	154+989	(1X1.5X1.5)	Box culvert	0.00	1.0
27	155+039	(1X1.5X1.5)	Box culvert	0.00	1.0
28	155+130	(1X1.5X1.5)	Box culvert	0.00	1.0
29	155+445	(1X1.5X1.5)	Box culvert	0.00	1.0
30	155+555	(1X1.5X1.5)	Box culvert	0.00	1.0
31	155+680	(1X1.5X1.5)	Box culvert	0.00	1.0
32	155+707	(1X1.5X1.5)	Box culvert	0.50	0.5
33	155+820	(1X1.5X1.5)	Box culvert	1.00	0.0
34	155+867	(1X1.5X1.5)	Box culvert	0.50	0.5
35	156+087	(1X1.5X1.5)	Box culvert	0.00	1.0
36	156+230	(1X1.5X1.5)	Box culvert	1.00	0.0
37	156+418	(1X1.5X1.5)	Box culvert	1.00	0.0
38	156+485	(1X1.5X1.5)	Box culvert	1.00	0.0
39	156+543	(1x4.0X3.0)	Box culvert	1.00	0.0
40	156+595	(1X1.5X1.5)	Box culvert	1.00	0.0
41	156+786	(1X1.5X1.5)	Box culvert	1.00	0.0
42	156+847	(1X1.5X1.5)	Box culvert	1.00	0.0
43	157+003	(1X1.5X1.5)	Box culvert	1.00	0.0
44	157+074	(1x3.0x3.0)	Box culvert	1.00	0.0
45	157+750	(1X1.5X1.5)	Box culvert	1.00	0.0
46	157+800	(1X1.5X1.5)	Box culvert	1.00	0.0
47	157+475	(1X4.0X3.0)	Box culvert	0.00	1.0
48	158+045	(1x3.0x3.0)	Box culvert	0.00	1.0
49	158+140	(1X1.5X1.5)	Box culvert	1.00	0.0
50	158+254	(1X1.5X1.5)	Box culvert	1.00	0.0
51	158+296	(1X1.5X1.5)	Box culvert	1.00	0.0
52	158+754	(1X1.5X1.5)	Box culvert	1.00	0.0
53	158+896	(1X1.5X1.5)	Box culvert	1.00	0.0
54	159+445	(1X1.5X1.5)	Box culvert	1.00	0.0
55	159+567	(1X1.5X1.5)	Box culvert	1.00	0.0
56	159+656	(1X1.5X1.5)	Box culvert	1.00	0.0
57	159+701	(1X1.5X1.5)	Box culvert	1.00	0.0
58	159+860	(1X1.5X1.5)	Box culvert	1.00	0.0
59	159+891	(1X1.5X1.5)	Box culvert	1.00	0.0
60	159+978	(1X1.5X1.5)	Box culvert	1.00	0.0
61	160+037	(1X1.5X1.5)	Box culvert	1.00	0.0
62	160+279	(1X1.5X1.5)	Box culvert	1.00	0.0
63	160+385	(1X1.5X1.5)	Box culvert	1.00	0.0
64	160+541	(1X1.5X1.5)	Box culvert	1.00	0.0
65	160+640	(1x3.0x3.0)	Box culvert	1.00	0.0
66	160+822	(1X1.5X1.5)	Box culvert	1.00	0.0

Sl. No.	Design Ch.	Span Arrangement	Type of Culvert	Completed	Balance to be constructed
67	160+876	(1X1.5X1.5)	Box culvert	1.00	0.0
68	160+990	(1X1.5X1.5)	Box culvert	1.00	0.0
69	161+057	(1X1.5X1.5)	Box culvert	1.00	0.0
70	161+205	(1X1.5X1.5)	Box culvert	1.00	0.0
71	161+300	(1X1.5X1.5)	Box culvert	1.00	0.0
72	161+556	(1X1.5X1.5)	Box culvert	1.00	0.0
73	161+640	(1X1.5X1.5)	Box culvert	1.00	0.0
74	161+715	(1X1.5X1.5)	Box culvert	1.00	0.0
75	161+758	(1X1.5X1.5)	Box culvert	1.00	0.0
76	161+820	(1x6.0x3.0)	Box culvert	1.00	0.0
77	161+918	(1X1.5X1.5)	Box culvert	1.00	0.0
78	162+030	(1X1.5X1.5)	Box culvert	1.00	0.0
79	162+085	(1X1.5X1.5)	Box culvert	1.00	0.0
80	162+175	(1X1.5X1.5)	Box culvert	1.00	0.0
81	162+222	(1X1.5X1.5)	Box culvert	1.00	0.0
82	162+299	(1X1.5X1.5)	Box culvert	1.00	0.0
83	162+326	(1X1.5X1.5)	Box culvert	1.00	0.0
84	162+364	(1X1.5X1.5)	Box culvert	1.00	0.0
85	162+392	(1X1.5X1.5)	Box culvert	1.00	0.0
86	162+428	(1X1.5X1.5)	Box culvert	1.00	0.0
87	162+457	(1X1.5X1.5)	Box culvert	1.00	0.0
88	162+497	(1X1.5X1.5)	Box culvert	1.00	0.0
89	162+551	(1X1.5X1.5)	Box culvert	1.00	0.0
90	162+730	(1X1.5X1.5)	Box culvert	1.00	0.0
91	162+820	(1X1.5X1.5)	Box culvert	0.50	0.5
92	162+980	(1X1.5X1.5)	Box culvert	1.00	0.0
93	163+065	(1X1.5X1.5)	Box culvert	1.00	0.0
94	163+138	(1X1.5X1.5)	Box culvert	1.00	0.0
95	163+177	(1X1.5X1.5)	Box culvert	1.00	0.0
96	163+280	(1X1.5X1.5)	Box culvert	1.00	0.0
97	163+309	(1x2.0X2.0)	Box culvert	1.00	0.0
98	163+380	(1X1.5X1.5)	Box culvert	1.00	0.0
99	163+514	(1X1.5X1.5)	Box culvert	1.00	0.0
100	163+579	(1X1.5X1.5)	Box culvert	1.00	0.0
101	163+694	(1X1.5X1.5)	Box culvert	1.00	0.0
102	163+892	(1X1.5X1.5)	Box culvert	1.00	0.0
103	164+018	(1x2.0X2.0)	Box culvert	1.00	0.0
104	164+123	(1X1.5X1.5)	Box culvert	1.00	0.0
105	164+314	(1X1.5X1.5)	Box culvert	1.00	0.0
106	164+431	(1X1.5X1.5)	Box culvert	1.00	0.0
107	164+507	(1X1.5X1.5)	Box culvert	1.00	0.0
108	164+596	(1X1.5X1.5)	Box culvert	1.00	0.0
109	164+667	(1X1.5X1.5)	Box culvert	1.00	0.0
110	164+782	(1x2.0X2.0)	Box culvert	1.00	0.0
111	164+907	(1X1.5X1.5)	Box culvert	1.00	0.0

Sl. No.	Design Ch.	Span Arrangement	Type of Culvert	Completed	Balance to be constructed
112	165+014	(1X1.5X1.5)	Box culvert	1.00	0.0
113	165+290	(1X1.5X1.5)	Box culvert	1.00	0.0
114	165+390	(1X1.5X1.5)	Box culvert	1.00	0.0
115	165+418	(1X1.5X1.5)	Box culvert	1.00	0.0
116	165+691	(1X1.5X1.5)	Box culvert	1.00	0.0
117	166+247	(1X1.5X1.5)	Box culvert	0.50	0.5
118	165+762	(1X1.5X1.5)	Box culvert	1.00	0.0
119	165+837	(1X1.5X1.5)	Box culvert	1.00	0.0
120	165+974	(1X1.5X1.5)	Box culvert	1.00	0.0
121	166+092	(1X1.5X1.5)	Box culvert	1.00	0.0
122	166+191	(1X1.5X1.5)	Box culvert	1.00	0.0
123	166+210	(1X1.5X1.5)	Box culvert	1.00	0.0
124	166+340	(1X1.5X1.5)	Box culvert	1.00	0.0
125	166+450	(1X1.5X1.5)	Box culvert	1.00	0.0

Note: Yellow colour culvert to be constructed by separate Agency.

11 Repairs/replacements of parapets, flooring and protection works of the existing culverts shall be undertaken as follows:

[Refer provision of the relevant Manual and provide details]

As per site requirement / Authority's Engineer guidance.

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

12 Bridges

12.1 Existing bridges to be re-constructed/widened

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

[Refer provision of the relevant Manual and provide details]

Sl. No.	Bridge location	Salient details of existing bridge		Adequacy or otherwise of the existing waterway, vertical clearance etc.*	Scope
	(km)	Type of Structures	Span Arrangement and Total Vent way (No. x Length) (m)		
1					Nil

(ii) The following narrow bridges shall be widened:

Sl. No.	Location (km)	Existing width(m)	Extent of widening(m)	Cross-section at deck level for widening@
				Nil

12.2 Additional New bridges (Minor)

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

Sl. No.	Location (km)	Total Length (m)	Scope
1	158+817	9.8	All Balance work like approach slab, wearing course, stone pitching, filter media, painting, other misc. works etc.(BHS).
2	161+255	14.75	All Balance work like approach slab, wearing course, expansion joint, stone pitching, filter media, painting, other misc. works etc.(RHS).
3	165+130	24.75	2 lane new bridge (RHS).
4	165+530	9.8	All Balance work like return wall, approach slab, wearing course, stone pitching, filter media, painting, other misc. works etc.(BHS)

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

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

Sl. No.	Location at km	Scope
1	161+225	To be done
2	165+130	To be done

12.2.2 Drainage system for bridge decks

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

12.4 Rail-road bridges

12.4.1 Design construction and detailing of ROB/RUB shall be as specified in provision of the relevant Manual

Nil

12.4.2 Road over-bridges

Road over-bridges (road over rail) shall be provided at the following level crossings.

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

12.4.3 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 crossing (Chainage km)	Number and length of span (m)
1	Nil	

12.5 Grade separated structures

Nil

12.6 Repairs and strengthening of bridges and structures

12.6.1 Bridges

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

Sl. No.	Location of bridge (km)	Scope
1	161+255	Construction of RCC Crash barrier, drainage spout, Wearing course, approach slab, repair & rehabilitation of bridge deck, girder, bearing, abutment and other misc. work etc. (LHS).
2	165+130	Construction of RCC Crash barrier, drainage spout, Wearing course, approach slab, repair & rehabilitation of bridge deck, girder, bearing, abutment and other misc. work etc. (LHS).
3	155+254	Construction of drainage spout, Wearing course, approach slab repair & rehabilitation of bridge deck, Steel truss, bearing, abutment and other misc. work etc. (LHS).

12.7 List of Major Bridges and Structures

The following is the list of the Major Bridges and Structures: Work to be executed by separate Agency

Location (Km)	Proposed span (in m)	Proposed width	Scope
155+254	1 x 81	New Two Lane	All Balance work like Superstructure and other misc. works(RHS).

13. TRAFFIC CONTROL DEVICES AND ROAD SAFETY WORKS

- (a) Traffic control devices and road safety works shall be provided in accordance with Section 9 of the Manual IRC: SP: 84-2014.
- (b) Specifications of the reflective sheeting. As per the Clause 9.3 of the Manual IRC: SP: 84-2014 of Specifications and Standards

14. ROADSIDE FURNITURE

- (c) Road side furniture shall be provided in accordance with the provisions of Section 12 of the Manual IRC: SP: 84-2014.
- (a) The Overhead traffic signs: location and size

Sl. No.	Location (Km)	Remarks
1	Full width overhead signs (2 nos.),	Location to be identified in consultation with Authority's Engineer

Sl. No.	Location (Km)	Remarks
2	Cantilever over head signs (6 nos.)	Location to be identified in consultation with Authority's Engineer

15. COMPULSORY AFFORESTATION

The number of shrubs/plants which are required to be planted by the contractor as compulsory afforestation shall be as per Forest Conservation Act and as per the section 11 of four lane Manual IRC: SP: 84-2014

16. HAZARDOUS LOCATION / SAFETY PRECAUTIONS / PROTECTION WORKS

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

16.1 Gabion Breast Wall :- The provision of Gabion Breast wall including slope protection measures are:

Sl. no.	Chainage		Length(m)
	From km.	To Km.	
1	155+140	155+165	25
		Total	25

16.2 The tentative locations and proposed type of Breast walls reinforced cement concrete with micro piling are as following:

Sl. No.	Chainage		Side	Length (M)	Proposed Provision	Remarks
	From	To				
1	152965	152975	RHS	10	RCC Breast wall with micro piling	
2	153820	153860	RHS	40	RCC Breast wall with micro piling	
3	154880	154910	RHS	30	RCC Breast wall with micro piling	
4	155050	155200	RHS	150	RCC Breast wall with micro piling	
5	155680	155700	RHS	20	RCC Breast wall with micro piling	
6	155750	155850	RHS	100	RCC Breast wall with micro piling	
7	156300	156400	RHS	100	RCC Breast wall with micro piling	
8	156850	156905	RHS	55	RCC Breast wall with micro piling	
9	157150	157200	RHS	50	RCC Breast wall with micro piling	
10	157500	157700	RHS	200	RCC Breast wall with micro piling	
11	157830	157965	RHS	135	RCC Breast wall with micro piling	
12	158000	158065	RHS	65	RCC Breast wall with micro piling	
13	158065	158095	RHS	30	RCC Breast wall with micro piling	
14	158095	158100	RHS	5	RCC Breast wall with micro piling	
15	158100	158137	RHS	37	RCC Breast wall with micro piling	
16	158137	158144	RHS	7	RCC Breast wall with micro piling	
17	158144	158154	RHS	10	RCC Breast wall with micro piling	
18	158840	158850	RHS	10	RCC Breast wall with micro piling	
19	158860	158900	RHS	40	RCC Breast wall with micro piling	
20	158690	158780	RHS	90	RCC Breast wall with micro piling	
21	159010	159040	RHS	30	RCC Breast wall with micro piling	
22	159050	159070	RHS	20	RCC Breast wall with micro piling	
23	159070	159082	RHS	12	RCC Breast wall with micro piling	
24	159082	159102	RHS	20	RCC Breast wall with micro piling	

Sl. No.	Chainage		Side	Length (M)	Proposed Provision	Remarks
	From	To				
25	159102	159165	RHS	63	RCC Breast wall with micro piling	
26	159165	159175	RHS	10	RCC Breast wall with micro piling	
27	159205	159235	RHS	30	RCC Breast wall with micro piling	
28	159285	159370	RHS	85	RCC Breast wall with micro piling	
29	159980	160040	RHS	60	RCC Breast wall with micro piling	
30	160070	160110	RHS	40	RCC Breast wall with micro piling	
31	161300	161325	RHS	25	RCC Breast wall with micro piling	
32	161347	161357	RHS	10	RCC Breast wall with micro piling	
33	161507	161550	RHS	43	RCC Breast wall with micro piling	
34	162550	162564	RHS	14	RCC Breast wall with micro piling	
35	162591	162625	RHS	34	RCC Breast wall with micro piling	
36	162705	162715	RHS	10	RCC Breast wall with micro piling	
37	162715	162725	RHS	10	RCC Breast wall with micro piling	
38	162725	162760	RHS	35	RCC Breast wall with micro piling	
39	162785	162790	RHS	5	RCC Breast wall with micro piling	
40	162795	162810	RHS	15	RCC Breast wall with micro piling	
41	162850	162980	RHS	130	RCC Breast wall with micro piling	
42	163360	163366	RHS	6	RCC Breast wall with micro piling	
43	163807	163840	RHS	33	RCC Breast wall with micro piling	
44	163492	163520	RHS	28	RCC Breast wall with micro piling	
45	163575	163585	RHS	10	RCC Breast wall with micro piling	
46	163694	163696	RHS	2	RCC Breast wall with micro piling	
47	164000	164240	RHS	240	RCC Breast wall with micro piling	
48	164310	164330	RHS	20	RCC Breast wall with micro piling	
49	164640	164650	RHS	10	RCC Breast wall with micro piling	
50	164740	164750	RHS	10	RCC Breast wall with micro piling	
51	164905	164910	RHS	5	RCC Breast wall with micro piling	
52	164950	165000	RHS	50	RCC Breast wall with micro piling	
53	165015	165020	RHS	5	RCC Breast wall with micro piling	
54	165180	165280	RHS	100	RCC Breast wall with micro piling	
55	165290	165295	RHS	5	RCC Breast wall with micro piling	
56	165305	165355	RHS	50	RCC Breast wall with micro piling	
57	165418	165420	RHS	2	RCC Breast wall with micro piling	
58	165435	165550	RHS	115	RCC Breast wall with micro piling	
59	165670	165840	RHS	170	RCC Breast wall with micro piling	
60	165910	166000	RHS	90	RCC Breast wall with micro piling	
61	166100	166250	RHS	150	RCC Breast wall with micro piling	
62	166250	166308	RHS	58	RCC Breast wall with micro piling	
63	166335	166345	RHS	10	RCC Breast wall with micro piling	
64	166445	166455	RHS	10	RCC Breast wall with micro piling	
65	166468	166477	RHS	9	RCC Breast wall with micro piling	
66	166551	166600	RHS	49	RCC Breast wall with micro piling	
67	166600	166700	RHS	100	RCC Breast wall with micro piling	
Total				3222		

Note: Construction to be made 2917m RCC Breast wall with micro piling.

16.2.1 Retaining Wall : The Provision of Retaining wall are:

Sl.No	CHAINAGE		Length (m)	Remarks
	From	To		
1	152780	152900	120	RCC Retaining wall with micro piling
2	155100	155140	40	Gabion wall
3	162740	162800	60	RCC Retaining wall with micro piling
4	162900	162950	50	RCC Retaining wall with micro piling
		Total	270	

17. Metal Beam Crash Barrier / Parapet wall with Cement Concrete block:

The parapet wall shall be provided on valley edge in complete length minus built up length, bridge span etc. Minimum length of parapet wall shall be 7362 m. The design of parapet wall shall be as per IRC SP48:1998. Typical details of metal beam crash barrier are given in as per manual. Increase in length if any as per site requirement will not constitute change of scope.

18. SPECIAL REQUIREMENT FOR HILL ROADS

All special features shall be provided as per Manual. The side slope shall be protected by using suitable slope protection measures all along the highway on Hill side and valley side as per site requirements.

18.1 Landslide Mitigation:

Landslide Mitigation has to be provided at the specified chainages mentioned below. The following are the Landslide Mitigation measures to be adopted with the technical specification mentioned below:

18.1.1 For Sinking Zone Area in the following

chainages :

1. Between Km 152.780 to Km 152.900
2. Between Km 157.400 to Km 157.500
3. Between Km 158.000 to Km 158.070
4. Between Km 162.010 to Km 162.100
5. Between Km 162.800 to Km 162.850

18.1.2 System for reinforcing the earth

It includes reinforcing and strengthening of the unstable slopes while doing the excavation in a top down manner by in-situ soil reinforcement of the excavated slope surface based on the detail soil investigation and slope stability analysis.

System for reinforcing the earth shall consist of reinforced earth wall structure as per the specification below and soil nailing/ ground anchors. The backfilled reinforced earth wall is to be mechanically connected with the soil nailed/ ground anchored stabilized slope.

- (i) **Fascia :** The fascia element shall be of prefabricated and hot deep galvanized mild steel bar steel mesh having minimum bar diameter of 8mm and minimum galvanization thickness in accordance with BS 729: 1971 (1994).
- (ii) **Soil Reinforcing Element:** High Adherence Geosynthetic Straps with grooves on both sides to generate high friction and having coating for better durability as soil reinforcing element. Any other similar material for Soil Reinforcement can be used after the approval from AE.
- (iii) **Connection between fascia and soil reinforcing element:** mechanical connection system shall be used, using rust/corrosion resistant steel meeting the long term strength criteria.
- (iv) **Fill material:** Backfill material shall be reasonably free from organic or other deleterious material conforming to MoRTH “Specification of Road and Bridges Works”, Fifth Revision or IRC: SP: 102-2014.
- (v) **Drainage:** Drainage gallery minimum 600mm wide having 20mm down aggregates as per MoRTH specification.
- (vi) **Soil Nailing:** To be done as per AS 4678:2002 or any other relevant code as per site condition with approval of AE.
- (vii) **Ground Anchors:** Depending on the soil strata, height of the structure and slope stability design, the excavated slope surface to be strengthened by Permanent Ground Anchors.
- (viii) **Connection System:** The connection between the reinforced soil slope and soil nail and/ or ground anchors shall be mechanical in nature for full load transfer mechanism. All steel components of the connection shall be hot-dip galvanized to BS 729:1971 requirements or IS 4759:1996.

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 the AE for review through the proof consultant and implement it accordingly thereafter. Further the Proof and Safety Consultancy for the above work will only be done through IIT/CBRI/CSIR.

18.2 Landslide stretch in the following chainages:

1. Between Km 153.104 to 153.350 = 246m
2. Between Km 155.700 to 156.350 = 650m
3. Between Km 157.200 to 157.500 = 300m
4. Between Km 157.500 to 157.750= 250m
5. Between Km 157.950 to 158.300=350m

6. Between Km 159.000 to 159.400= 400m
 7. Between Km 162.550 to 162.950=400m
 8. Between Km 164.000 to 164.300=300m
 9. Between Km 165.250 to 165.390=140m
 10. Between Km 165.420 to 165.520=100m
 11. Between Km 165.600 to 165.700=100m
 12. Between Km 166.100 to 166.250=150m
- Total= **3386m**

18.3 Hill Slope stabilization works to be taken up by separate Agency.

19. UTILITIES

Provision of accommodating utilities shall be made both over as well as underground wherever required.

20. Change of Scope

The length of Structures and Bridges 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 under taken in accordance with the provisions of Article 13.

(Schedule-B1)

1. The shifting of utilities and felling of trees shall be carried out by the concerned department.
The cost of the same shall be borne by the concerned department.