SCHEDULE - B

(See Clause 2.1)

Development of the Project Highway

1 Development of the Project Highway

Development of the Project Stretch from Km. 0+000 to Km. 10+500 of Kohima Bypass includes design and construction of the Project Highway as described in this Schedule-B and in Schedule-C.

2 Rehabilitation and Augmentation

NA.

3 Specifications and Standards

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

Annex - I
(Schedule-B)

Description of Four Lane with Paved Shoulder

[Note: Description of the Project Highway shall be given by the Authority in detail together with explanatory drawings (where necessary) to explain the Authority's requirements precisely in order to avoid subsequent changes in the Scope of the Project. The particulars that must be specified in this Schedule-B are listed below as per the requirements of the Manual of Specifications and Standards for Two Laning with paved shoulder of Highways (IRC: SP: 73-2018), referred to as the Manual. If any standards, specifications or details are not given in the Manual, the minimum design/construction requirements shall be specified in this Schedule. In addition to these particulars, all other essential project specific details, as required, should be provided in order to define the Scope of the Project clearly and precisely.]

1 CONSTRUCTION OF THE HIGHWAY

i) WIDTH OF CARRIAGEWAY

a) Two Lanning with paved shoulder shall be undertaken. The paved carriageway including paved shoulders shall be in accordance with the typical cross sections drawings provided in para 14 of Annexure-I Schedule-B

Note: The length of road in built-up section is tentative, and it may vary as per site condition. In case of increase of length, no positive change of scope will be payable.

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

2. GEOMETRIC DESIGN AND GENERAL FEATURES

i) General

Geometric design and general features of the Project Highway shall be in accordance with Section 2 of the IRC: SP: 73-2018

ii) Design speed

The design speed shall be as per IRC 73: 2018.

iii) Improvement of the existing road geometrics

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

Sr. No.	Stretch (from Km to Km)	Type of deficiency	Remarks

NIL

iv) Right of Way

Details of the Right of Way have been given in Annex II of Schedule A.

v) Type of shoulders

a) Type of shoulders have been given in TCS mentioned in para 14, Annexure I of Schedule B.

b) Design and specifications of the paved shoulders and granular material shall be conforming to the requirements specified in paragraph 5.10 of the IRC: SP: 73-2018.

vi) Lateral and vertical clearances at underpasses

a) Lateral and vertical clearances at underpasses and provision of guardrails/crash barriers shall be as per para 2.10 of the IRC: SP: 73-2018

b) Lateral clearance: The width of the opening at the Vehicular under Passes (VUP) shall be as follows:

Sr. No.	Location (Design Chainage) Km	Span / Opening (m)	Vertical Clearances (m)
Nil			

vii) Lateral and vertical clearances at overpasses

a) Lateral and vertical clearances at overpasses shall be as per para 2.11 of the Manual, however no overpass has been proposed.

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

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

viii) Service roads/Slip road

Service roads/Slip road shall be constructed at the locations and for the lengths indicated below [Refer to paragraph 2.12 of IRC: SP: 73-2018]:

(a) Details of service road

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			

(b) Details of Slip Road

Sr. No.	Existing Chainage		Design Chainage		Right Hand side (RHS) or Left-Hand side (LHS) or Both side	Length (m) of Slip Road	Remarks
	From	To	From	To			
Nil							

ix) Grade separated structures

a) Grade separated structures shall be provided as per paragraph 2.13 of the IRC: SP: 73-2018. 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						

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

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

x) Cattle and pedestrian underpass /overpass

Cattle and pedestrian underpass/overpass shall be constructed as follows: (as per IRC SP: 73:2018)

Sr. No.	Location (Chainage) (From Km to Km)	Type of Crossing
NIL		

xi) Typical cross-sections of the Project Highway

Indicative typical cross section of the Project highway has been provided as per para 14 of Annexure-I (Schedule B).

Sr. No.	Details	TCS	Length (m)
1.	Open country-Mountainous Terrain, Without Retaining wall on New Alignment	TCS-I	350
2.	Open country-Mountainous Terrain, With Retaining wall on New Alignment	TCS-II	9300
3.	Built-up section-Mountainous Terrain	TCS-III	0
4.	Open country-Mountainous Terrain, Without Retaining wall on Existing Road	TCS-IV	0
5.	Open country-Mountainous Terrain, With Retaining wall on Existing Road	TCS-V	0
6.	Open country-Mountainous Terrain, Box cutting With both side breast wall on new alignment	TCS-VI	850
	Total Length		10500

3 INTERSECTIONS AND GRADE SEPARATORS

All intersections shall be as per Section3 of the Manual. Existing intersections which are deficient shall be improved to the prescribed standards.

There are no intersections with cross roads having bituminous surfacing. The cross roads fall into the category of VRs. The Contractor has to construct the following:

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

i. At-Grade intersections:

Sr. No.	Location of Intersection	Type of intersection	Other feature
1	0+000	Y	At Grade (Start of Project road)
2	10+000	T	Junction with Village road

ii. Grade Separated intersection with/without ramps

S. 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

i) Widening and improvement of the existing road embankment/cuttings and construction of new road embankment/ cuttings shall conform to the Specifications and Standards given in section 4 of IRC: SP: 73-2018 and the specified cross-sectional details. Deficiencies in the plan and profile of the existing road shall be corrected.

ii) Raising of the existing road:

The existing road shall be raised in the following sections:

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

5 PAVEMENT DESIGN

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

5.2 Type of pavement

Flexible pavement shall be adopted for Project Highway. Notwithstanding anything contrary contained in this Agreement or the Manual, the pavement shall be designed as given below.

5.3 Design requirements

Notwithstanding anything to the contrary contained in this agreement or the manual, the contractor shall design the pavement of main carriageway for design traffic of 50 MSA with a minimum design period of 20 years. CBR value as obtained at site shall be taken for design if less than 10%. Maximum value of CBR to be taken for design shall not exceed 10%.

Bituminous Grade VG 30 or VG 40 shall be used for BC.

5.4Reconstruction of stretches/ Realignment/ Bypass of Sections

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

Sl. No.	Existing Section (km)		Remarks
	From	To	
NIL			

5.4.2 Rigid Pavement

No rigid pavement has been considered for the Project Highway.

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 (IRC: SP: 73-2018).
Lined drain of following length shall be provided:

Sr. No.	Length (except CD structures) (m)	Side of construction Hill side/Both
1	9208	Hill side
2	850	Both side

The length of side drains given above are minimum and it may vary as per site condition. In case of increase of length, no positive change of scope will be payable.

7. DESIGN OF STRUCTURES

i. General

a) All bridges, culverts and structures shall be designed and constructed in accordance with section 7 of IRC: SP: 73-2018 and referred other codes therein and shall conform to the cross- sectional features and other details specified therein

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

Sr. No.	Bridge (km)	Length of Bridge (m)	Width of carriageway and Cross - Sectional feature
1	1+600	240	As per section 7.3 (ii) of the manual.
2	3+000	80	

c) Following structures shall be provided with footpaths:

Sr. No.	Bridge (km)	Length of Bridge (m)	Remark
1	1+600	240	Footpath on both sides as per section 7 of the manual.
2	3+000	80	

d) All bridges shall be high-level bridges.

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

Sr. No.	Bridge (km)	utility service to be carried out on both side
1	1+600	OFC and telephone cables
2	3+000	

f) Cross-section of the new culverts and bridges at deck level for the Project Highway shall conform to the typical cross-sections of IRC: SP: 73-2018.

ii. Culverts

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

b) Reconstruction of Existing Culverts:

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

S. No.	Existing chainage (km)	Design Chainage (km)	Proposal Details		
			Span/Opening (m)	Type of Culvert	Remarks, if any
NIL					

c) Widening and Repairing of existing culverts

S. No.	Existing chainage (km)	Design Chainage (km)	Proposal Details			TCS type
			Width (m)	Type of Culvert	Repairs to be carried out	
Nil						

d) New culverts shall be constructed as per tentative chainage given in the table below. Final chainage to be decided as per the site condition by the AE.

Sr. No.	Tentative Design Chainage (Km)	Span/Opening (m)	Type of Culvert
1	0+150	1X2	BOX/ SLAB
2	0+300	1X2	BOX/ SLAB
3	0+450	1X2	BOX/ SLAB
4	0+600	1X2	BOX/ SLAB
5	0+750	1X2	BOX/ SLAB
6	0+900	1X2	BOX/ SLAB
7	1+050	1X2	BOX/ SLAB

Sr. No.	Tentative Design Chainage (Km)	Span/Opening (m)	Type of Culvert
8	1+200	1X2	BOX/ SLAB
9	1+350	1X2	BOX/ SLAB
10	1+800	1X2	BOX/ SLAB
11	2+000	1X2	BOX/ SLAB
12	2+150	1X2	BOX/ SLAB
13	2+300	1X2	BOX/ SLAB
14	2+450	1X2	BOX/ SLAB
15	2+600	1X2	BOX/ SLAB
16	2+800	1X2	BOX/ SLAB
17	3+150	1X2	BOX/ SLAB
18	3+300	1X2	BOX/ SLAB
19	3+450	1X2	BOX/ SLAB
20	3+600	1X2	BOX/ SLAB
21	3+800	1X2	BOX/ SLAB
22	3+950	1X2	BOX/ SLAB
23	4+100	1X2	BOX/ SLAB
24	4+250	1X2	BOX/ SLAB
25	4+400	1X2	BOX/ SLAB
26	4+600	1X2	BOX/ SLAB
27	4+800	1X2	BOX/ SLAB
28	4+950	1X2	BOX/ SLAB
29	5+100	1X2	BOX/ SLAB
30	5+250	1X2	BOX/ SLAB
31	5+400	1X2	BOX/ SLAB
32	5+600	1X2	BOX/ SLAB
33	5+800	1X2	BOX/ SLAB
34	5+950	1X2	BOX/ SLAB
35	6+100	1X2	BOX/ SLAB
36	6+450	1X2	BOX/ SLAB
37	6+600	1X2	BOX/ SLAB
38	6+700	1X2	BOX/ SLAB
39	6+950	1X2	BOX/ SLAB
40	7+100	1X2	BOX/ SLAB
41	7+250	1X2	BOX/ SLAB
42	7+400	1X2	BOX/ SLAB
43	7+550	1X2	BOX/ SLAB
44	7+700	1X2	BOX/ SLAB
45	7+950	1X2	BOX/ SLAB
46	8+100	1X2	BOX/ SLAB
47	8+250	1X2	BOX/ SLAB
48	8+400	1X2	BOX/ SLAB
49	8+550	1X2	BOX/ SLAB
50	8+700	1X2	BOX/ SLAB
51	8+850	1X2	BOX/ SLAB
52	9+000	1X2	BOX/ SLAB
53	9+150	1X2	BOX/ SLAB

Sr. No.	Tentative Design Chainage (Km)	Span/Opening (m)	Type of Culvert
54	9+300	1X2	BOX/ SLAB
55	9+450	1X2	BOX/ SLAB
56	9+600	1X2	BOX/ SLAB
57	9+800	1X2	BOX/ SLAB
58	9+950	1X2	BOX/ SLAB
59	10+100	1X2	BOX/ SLAB
60	10+250	1X2	BOX/ SLAB
61	10+400	1X2	BOX/ SLAB

The numbers of culvert above are minimum, to be provided and it may increase as per site condition. In case of increase in numbers of culvert, no positive change of scope will be payable

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

Sr. No.	Location (km)	Type of Repair required
NIL		

f) Floor Protection works of culverts shall be as specified in the relevant IRC codes and Technical Specifications.

iii. Bridges

a) Existing Bridges to be re-constructed / widened

i. The existing bridges at the following locations shall be re-constructed as new structures

Major Bridges:

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Design No. of Spans with span length (m)	Remarks
NIL				

Minor Bridges:

Sl. No.	Chainage		Silent Details of Existing Bridges	Adequacy or otherwise of the existing waterway, vertical clearance	Remarks
	Existing	Design			
Nil					

(ii) The following narrow bridges shall be widened:

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

b) Additional New 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:

Major Bridge:

Sr. No.	Location (Km)		Total length (m)	Remarks
	Existing	Design		
1	-	1+600	240	2 Lane New Bridge as per section 7 of IRC SP 73:2018
2	-	3+000	80	

Minor Bridge:

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

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

Sr. No.	Location (km)	Remarks
Nil		

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

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)	Existing no. of Spans with span length (m)	Remarks
Nil				

e) Drainage system for bridge decks

An effective drainage system for bridge decks shall be provided as specified in section 7.20 of IRC: SP: 73-2018.

f) Structures in marine environment

NA

iv. Rail - Road Bridges

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

b) 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 (Design Chainage km)	Length of bridge (m)
Nil		

c) Road under-Bridges

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

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

v. Grade separated structures

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

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

vi. 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 / Strengthening to be carried out

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			

vii. List of Major bridges and structures

The following is the list the list of major bridges and structures

Sr. No.	Location (In km)
1	1+600 (Major Bridge)
2	3+000 (Major Bridge)

8. TRAFFIC CONTROL DEVICES AND ROAD SAFETY WORKS

i. Traffic control devices and road safety works shall be provided in accordance with Section 9 of IRC: SP:73-2018.

(a) Traffic Signs: Traffic signs include roadside signs, overhead signs and curb mounted signs along the entire Project Highway shall be provided conforming to IRC 67 and section 800 of MoRTH specification.

(b) Pavement Marking: Pavement markings shall cover road marking for the entire Project Highway and shall be provided conforming to IRC 35-2015.

(c) Safety Barrier: W-beam crash barrier along the project highway at all locations shall be provided as specified in section 9 of IRC: SP: 73-2018.

ii. 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 conforming to section 800 of MoRTH specification.

9. ROADSIDE FURNITURE (SECTION 9 of IRC: SP: 73-2018)

i. Roadside furniture shall be provided in accordance with the provisions of IRC: SP:73-2018.

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

(b) Pedestrian: 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.

ii. Overhead traffic signs: Location and Size

(a) Full width Overhead signs: Full width Overhead signs shall be provided as below:

Sl. No.	Design Chainage	Remarks
1	0.050	
2	10.500	

(b) Cantilever Overhead signs: Overhead signs shall be provided as below:

Sl. No.	Design Chainage	Remarks
1	2.500	
2	6.500	

(c) Delineators: Delineators for the entire Project Highway at the locations as per section 9.4 of IRC SP 73:2018.

10. COMPENSATORY AFFORESTATION

Minimum 1050 nos. trees are required to be planted as compensatory afforestation.

11. HAZARDOUS LOCATIONS

Metal Beam crash barrier of minimum length of 2362m (single runner, heavy duty and W-shape) shall be provided at the locations of bridge approaches and high embankments (3.0m and more), at sharp curves on both sides on the project by the Contractor at the locations finalized in consultation with AE. Typical details of metal crash barrier are given in as per manual. Increase in length if any as per site requirement will not constitute change of scope.

12. SPECIAL REQUIREMENTS FOR HILL ROADS

Refer to section 13 of IRC: SP: 73-2018.

The following minimum length of protection works have been made for tabulated below:

Sr. No.	Items	Length (m)
1	Breast wall (3 m height)	5120
2	Retaining wall (average 5 m high)	900

3	Hydroseeding and Seeding & mulching	31530 sqm

Note- (i) *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.*

(ii) Any increase in quantity over and above the minimum qty. ***as mentioned in above table or through change in specifications will not be considered as change of scope.*** *Therefore contractor shall make thorough investigation at site and assess the requirement of slope protection and slide prone zone and other safety features at his own before submission of bid.*

(iii) The length of Retaining Wall shown above is minimum, to be constructed at site for proper geometrics and will not be converted to Breast Wall. Any reduction in the total length of Retaining Wall constructed at site shall constitute of negative change of scope.

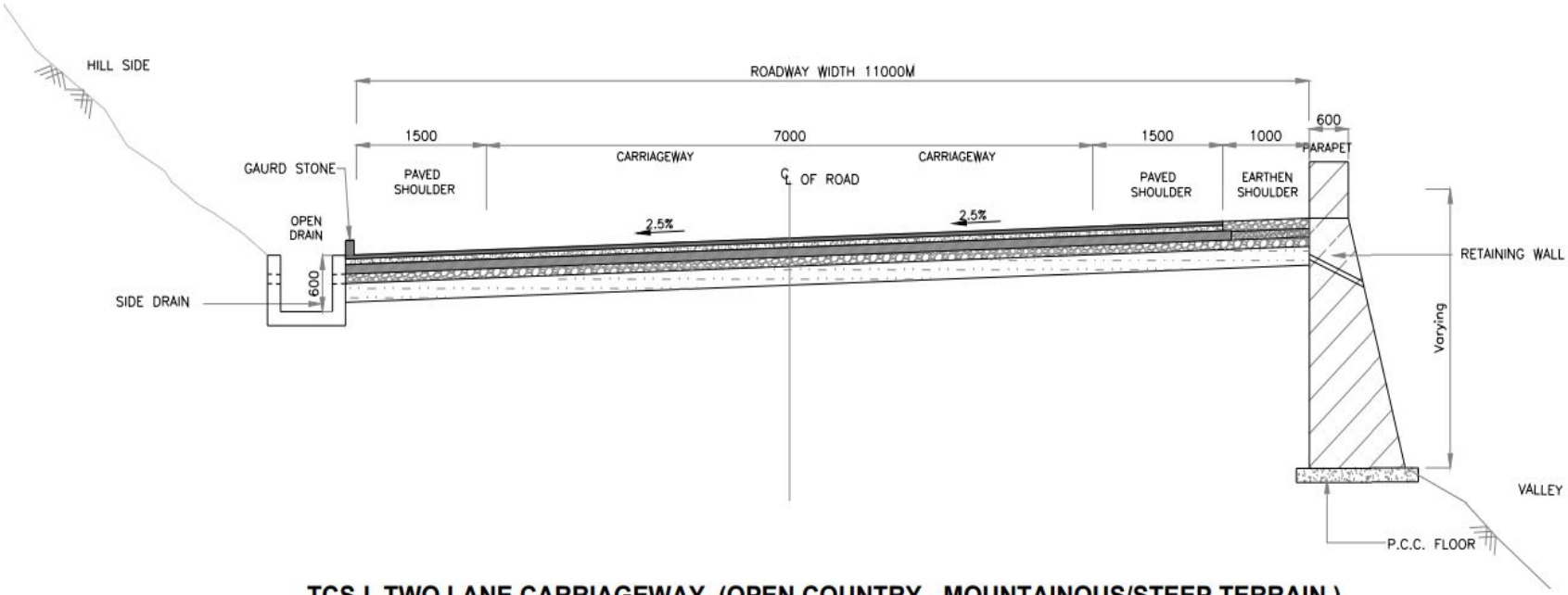
13. CHANGE OF SCOPE

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 increase in the lengths specified in this Schedule-B shall not constitute a Change of Scope, save and except any variations in the length arising out of a Change of Scope expressly undertaken in accordance with the provisions of Article 13.

14. INDICATIVE CHAINAGES WITH APPLICABLE TYPICAL CROSS SECTION:

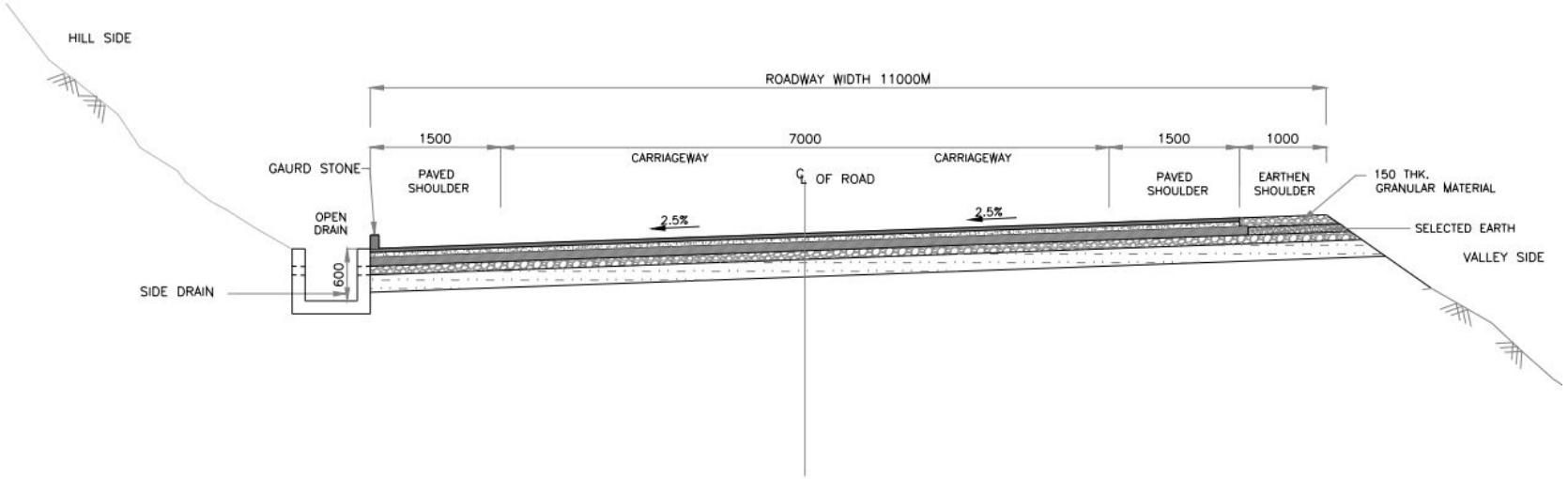
S.No	Design Chainage		Length	Type of TCS
	From	To		
1	0+000	0+850	850	TCS-II
2	0+850	1+050	200	TCS-I
3	1+050	1+800	750	TCS-II
4	1+800	1+850	50	TCS-VI
5	1+850	1+900	50	TCS-II
6	1+900	1+950	50	TCS-I
7	1+950	2+150	200	TCS-II
8	2+150	2+200	50	TCS-VI
9	2+200	3+550	1350	TCS-II
10	3+550	3+650	100	TCS-VI
11	3+650	4+500	850	TCS-II
12	4+500	4+650	150	TCS-VI
13	4+650	4+850	200	TCS-II
14	4+850	5+100	250	TCS-VI
15	5+100	5+650	550	TCS-II
16	5+650	5+750	100	TCS-I
17	5+750	9+900	4150	TCS-II
18	9+900	10+150	250	TCS-VI
19	10+150	10+500	350	TCS-II

Typical Cross Section (TCS):



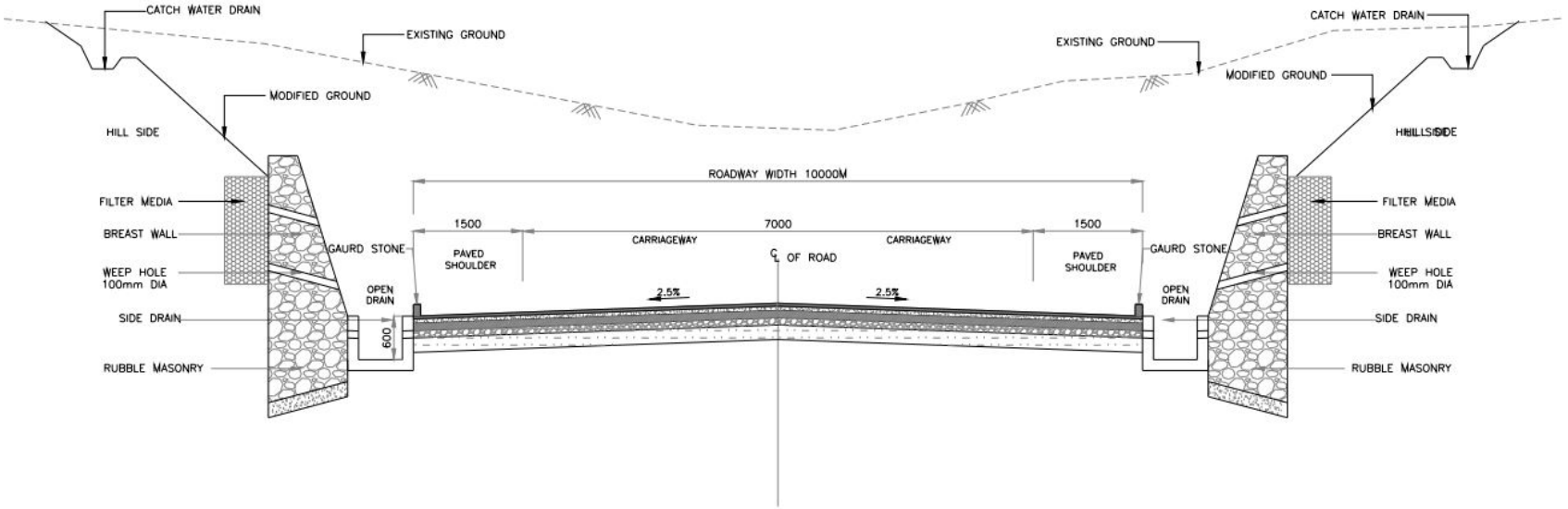
TCS-I TWO LANE CARRIAGEWAY, (OPEN COUNTRY - MOUNTAINOUS/STEEP TERRAIN) WITH RETAINING WALL AND PARAPET ON NEW ALIGNMENT

(Fig. 2.8 As per Two Lane Manual 2018)



TCS-II TWO LANE CARRIAGEWAY, (OPEN COUNTRY - MOUNTAINOUS/STEEP TERRAIN) WITHOUT RETAINING WALL ON NEW ALIGNMENT

(Fig. 2.9 As per Two Lane Manual 2018)



TCS-VI TWO LANE CARRIAGEWAY, (OPEN COUNTRY - MOUNTAINOUS/STEEP TERRAIN)
BOX CUTTING WITH BOTH SIDE BREAST WALL ON NEW ALIGNMENT