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 2Lane with Paved shoulder Project Highway as described in this Schedule-B and in Schedule-C.

2 Rehabilitation and augmentation

Rehabilitation and augmentation shall include Two Laning with Paved Shoulder and strengthening 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.

4 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.

Annexure – I
(Schedule – B)

Project is construction/ improvement of the existing single lane road to two lane with paved shoulder in accordance with IRC-SP: 73:2015, IRC-SP: 48:1998 and other relevant codes including standard good practice of the road construction.

The following sections of this schedule briefly highlight the scope of the work of the 'Project'. The descriptions of the requirements for the various elements of the Project Highway given herein under are the bare minimum requirements for the 'Project'.
In the planning, design and execution of the works and other works in connection with the repair, maintenance or improvement of the Project Highway and functions associated with the construction of the Project Highway and roadside facilities, the Construction Contractor shall take all such actions and do all such things (including, but not limiting to, organizing itself, adopting measures and standards, executing procedures, including inspection procedures and highway patrol's, and engaging and managing agents and employees) as will;

a. enable the NHIDCL to provide an acceptably safe highway in respect of its condition (structural safety) and use (road safety);
b. enable the NHIDCL to fulfil its statutory and common law obligations;
c. enable the NHIDCL to provide a congestion free uninterrupted flow of traffic on the Project Highway;
d. enable the NHIDCL to provide a level of highway service to the public not inferior to that provided on the trunk road during construction or improvement works;
e. enable the police, local authorities, and others with statutory duties or functions in relation to the Project Highway or adjoining roads to fulfil those duties and functions;
f. minimize the occurrence and adverse effects of accidents and ensure that all accidents and emergencies are responded to as quickly as possible;
g. minimize the risk of damage, destruction or disturbance to third party property;
h. ensure that members of the public are treated with all due courtesy and consideration;
i. provide a safe, clear and informative system of road signs;
j. comply with any specified programme requirements, including for the completion of the new road;
k. enable standards of reliability, durability, accessibility, maintainability, quality control and assurance, and fitness for purpose appropriate to a highway of the character of the Project Highway to be achieved throughout the Contract Period;
l. ensure adequate off-street parking facilities for both passenger and goods vehicles;

m. provide adequate bus bays for stopping of buses and bus shelters for commuters to wait under protection;

n. achieve a high standard in the appearance and aesthetic quality of the Project Highway and achieve integration of the Project Highway with the character of the surrounding landscape through both sensitive design and sensitive management of all visible elements including those on the existing road;

o. Undertake proper safety audit through an appropriate consultant (i.e. apart from the Independent Consultant) before C.O.D.;

p. Carry out accident recording and reporting (to NHIDCL) by type on regular basis; and

q. Ensure adequate safety of the Project Workers on the work site.

1. WIDENING OF THE EXISTING HIGHWAY

1.1 Notwithstanding the basic alignment plans enclosed with this document the Construction Contractor shall himself carryout and be responsible for engineering surveys, investigation and detailed engineering designs and prepare the working drawings for all the components relevant for the construction and up-gradation of the Project Highway to fulfil the scope of the project as envisaged herein under. These shall comply with design specifications and standards given in **Schedule–D.** The designs for different project facilities shall follow the locations and indicative designs given in **Schedule–C** and shall comply with design specifications and standards outlined in **Schedule–D.** All the designs and drawings shall be reviewed by the Authority Engineer prior to execution.

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

1.2 Width of Carriageway

1.2.1 The proposed 2-Lane Carriageway starts from Km 0+000 to Km 16+00 .The paved carriageway shall be 7.0m + 1.5m paved shoulder valley side +1.635m paved shoulder on hill side + 1.0 m Earthen shoulder /Parapet on Valley side +0.865 m road side on Hill side .

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 the relevant Sections of the Manuals for two laning

2.2 Design speed

The design speed shall be the minimum design speed of [30 km per hr for hilly and mountainous/steep terrain].

2.3 Improvement of the existing road geometrics

[Refer to paragraph 2.1 (v) of the IRC-SP: 73:2015 and provide details]

The hilly gradients shall be corrected in such a way so as to attain a limiting gradient of 6% in order to achieve longitudinal drainage. Also vertical curves shall be improved / introduced so that the vertical curves meet IRC: SP-73 - 2015 standards.

The horizontal alignment of the Project Highway shall be improved as per the standards set out in IRC-SP: 48:1998**.**

The improvement shall be done in consultation with the Independent consultant / Project Company ensuring that the proposed improvements are accommodated within the land width available as far as practical otherwise action to acquire more land shall be resorted to through NHIDCL.

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:

S. No.	From	To	Radius	Type of Deficiency	Remarks
1	6040.00	6068.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
2	6116.00	6131.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
3	6291.00	6315.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
4	6316.00	6350.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
5	6588.00	6598.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
6	6599.00	6640.00	20	Hair pin bend curve	Adopted Design Speed

S. No.	From	To	Radius	Type of Deficiency	Remarks
					of 20 Kmph
7	7176.00	7203.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
8	7203.00	7230.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
9	7998.00	8016.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
10	8016.00	8052.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
11	8092.00	8106.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
12	10569.00	10593.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
13	10593.00	10625.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
14	12933.00	12958.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
15	12958.00	12984.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
16	13354.00	13390.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
17	15165.00	15184.00	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph

The proposed horizontal and vertical alignment is available in digital format and this is for information and authority shall not be held responsible for any implications of the contract. EPC contractor shall carry out his own survey and investigations and due diligence both during bidding and during design and construction.

2.4 Right of Way

Details of Proposed ROW

As described in Annex-II of Schedule-A.

2.5 Type of shoulders

Paved shoulders of 1.5 m width on Valley side & 1.635 m width on Hill side shall be provided and balance 1.0m width on hill side earthen shoulder shall be covered with 150mm thick compacted layer of granular material.

2.6 Lateral and vertical clearances at Underpasses

Lateral and vertical clearances at underpasses and provision of guardrails/crash barriers shall be as per paragraph 2.11 of the IRC SP 73 2015.

2.7 Lateral and vertical clearances at Overpasses

Lateral and vertical clearances at overpasses shall be as per paragraph 2.12 of the IRC SP 73.. 2015

2.8 Service roads - Nil

2.9 Grade separated structures

2.9.1 Grade separated structures shall be provided as per paragraph 2.14 of the IRC SP 73 2015. The requisite particulars are given below:

[Refer to paragraphs 2.14.1 of the Manual and provide details]

S. No.	Design Chainage (Km)	Name of Intersecting Roads	Proposed Span Arrangement (m)	Remarks
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: [Refer to paragraphs 2.14.2 of the Manual and specify the type of vehicular under pass/ overpass structure and whether the cross road is to be carried at the existing level, raised or lowered].

Sl No.	Location	Type of Structure/Length (m)	Cross Road at			Remarks, if any
			Existing Level	Raised Level	Lowered Level	
Nil						

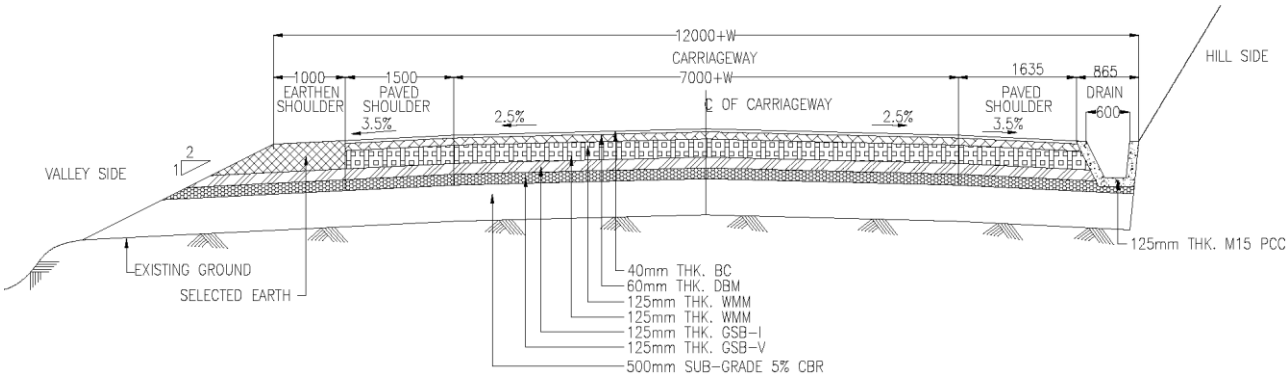
2.10 Cattle and pedestrian underpass /overpass

Cattle and pedestrian underpass/overpass shall be constructed as follows: [Refer to paragraph 2.14.3 of the Manual and specify the requirements of cattle and pedestrian underpass/overpass.

S. No.	Location	Type of crossing
Nil		

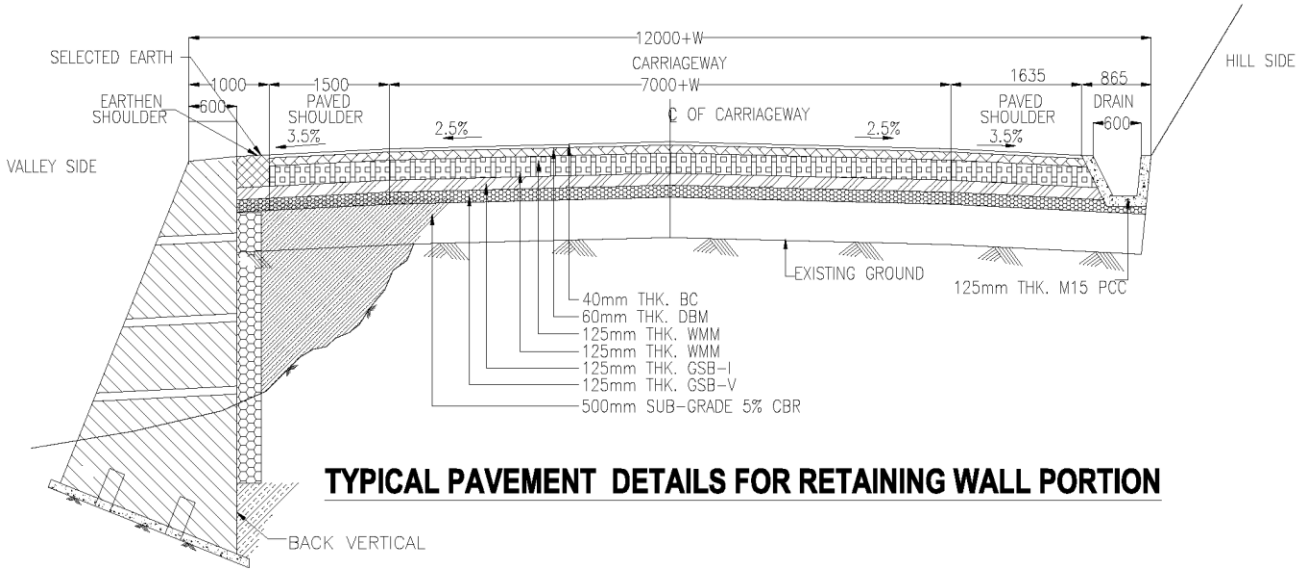
2.11 Typical cross-sections of the Project Highway

Approximate cross section type (tentative) suitable at various chainages of project highway is as shown below:



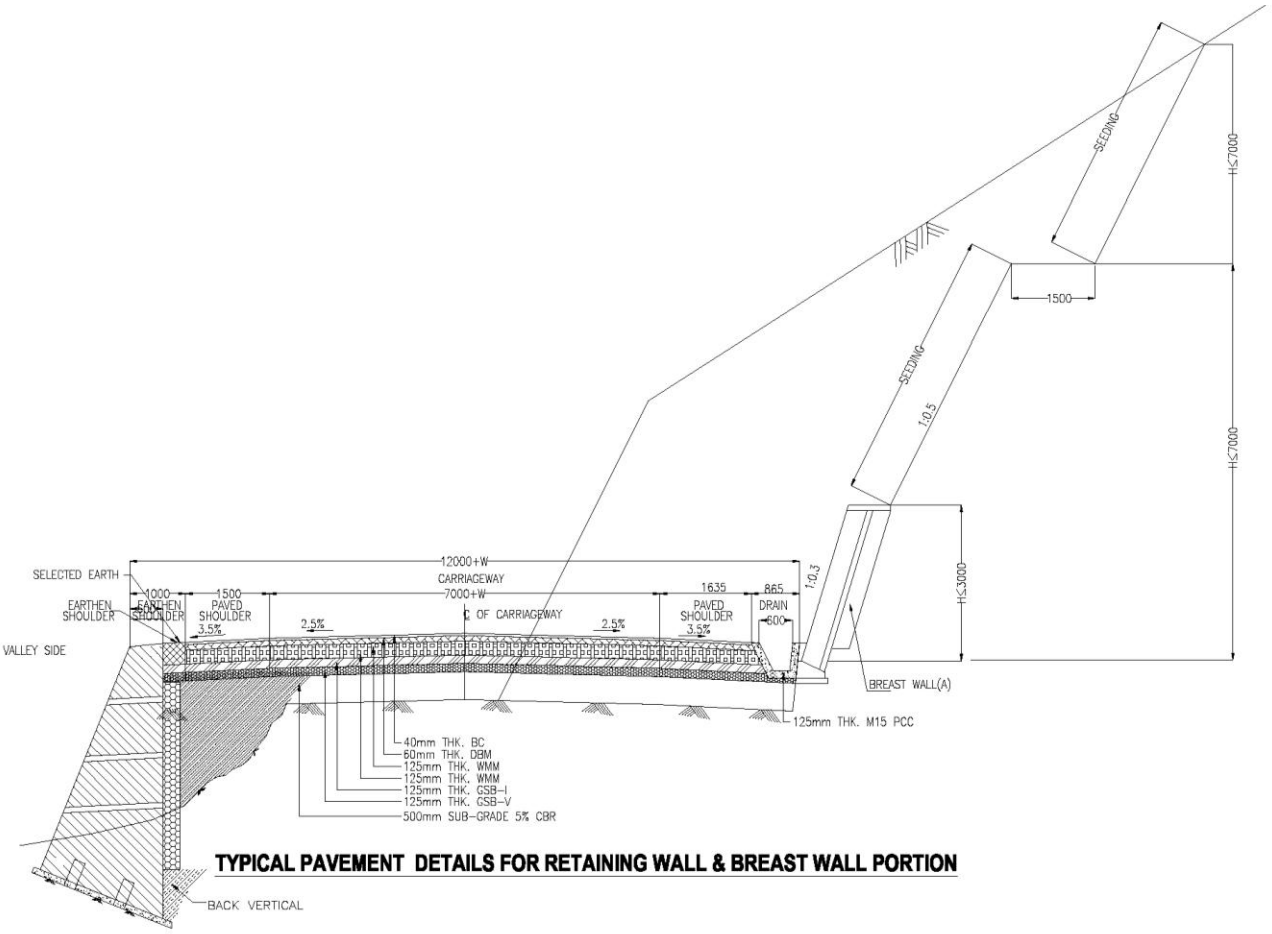
TYPICAL PAVEMENT DETAILS FOR MAIN ROAD

TCS 1- Typical Cross Section



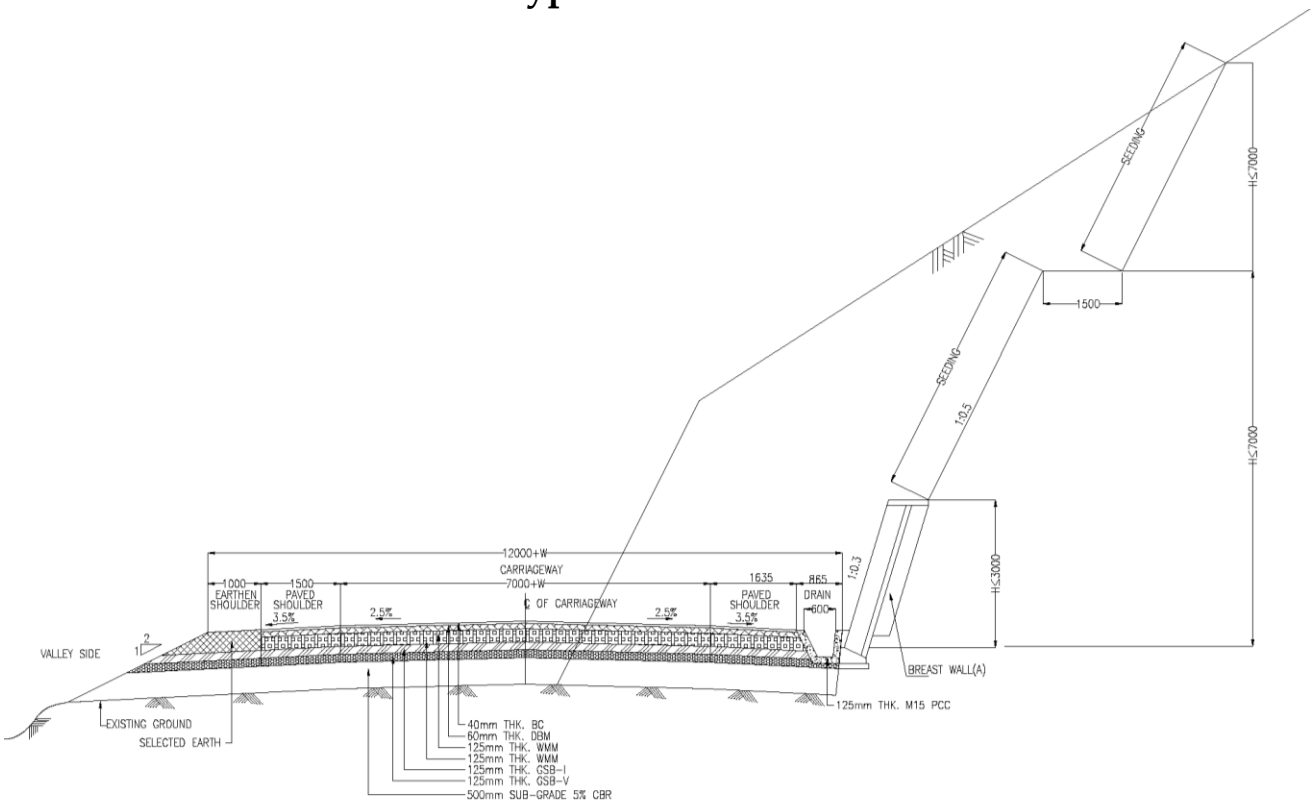
TYPICAL PAVEMENT DETAILS FOR RETAINING WALL PORTION

TCS 2- Typical Cross Section



TYPICAL PAVEMENT DETAILS FOR RETAINING WALL & BREAST WALL PORTION

TCS 3- Typical Cross Section



TYPICAL PAVEMENT DETAILS FOR BREAST WALL PORTION

TCS 4- Typical Cross Section

Sr. No.	Typical section	TCS No.	Remarks
1	Typical Cross section -1	TCS-1	General typical section of pavement
2	Typical Cross section -2	TCS-2	Ref clause No -8.1 & 8.2
3	Typical Cross section -3	TCS-3	Ref clause No -8.1 , 8.2 , 8.5 & 8.6
4	Typical Cross section -4	TCS-4	Ref clause No -8.5 & 8.6

2.12 Longitudinal Section

As a minimum, the Construction Contractor shall achieve the proposed finished road level as indicated in the plan and profile drawings for this purpose in FFSR. However, the final finished road levels (FRL) will be finalized as per site conditions in consultation with NHIDCL. The proposed profile of the Project Highway shall be followed by the contractor with minimum FRL as indicated in the alignment plan.

2.13 Built-Up Areas

Existing Chainage			Village Name	Design Chainage		District
Sr.No.	From	To		From	To	
1	Diversion	Diversion	Manpari	750	2400	East
2	2080	2820	Lower Dalep	3120	3850	South
3	3450	4550	Amalay Dara	4475	5525	South
4	6400	7900	Lower Tanak	7335	8740	South
5	8900	10840	Nepal Gaon	9720	11630	South
6	10840	10920	Upper Tanak	11630	11710	South
7	11600	13350	Khadi	12375	14050	South
8	13550	14520	Tarku	14275	15225	South
9	15200	15800	Dentam	15895	16490	South

3 INTERSECTIONS AND GRADE SEPARATORS

All intersections and grade separators shall be as per relevant Section 3 of the Manual. Existing intersections which are deficient shall be improved to the prescribed standards.

[Refer to paragraphs 3.1.1, 3.1.2 and 3.3 of the 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 Major intersections

S. No	Existing Chainage (Km)	Design Chainage (Km)	Location	Proposed Structure	Remarks
Nil					

(b) Grade separated intersection with/without ramps

S. No.	Design Chainage (Km)	Road Leads To	Junction Type	Proposed Improvements
Nil				

(c) Major Intersections

Sr.No.	Design Chainage	Side	Remarks	Shape	Type
1	0.00		Junction with NH-10 at Take off point	Y	Major
2	6300.00	RHS	Junction with Yanyang Road	Y	Major
3	15160.00	LHS	Junction with NH-710	Y	Major

(d) Minor Intersections

Sr.No.	Design Chainage	Side	Remarks	Shape	Type
1	3110.00	RHS	Merging with Existing Road	Y	Minor
2	3835.00	LHS	Junction with Bermoik Road	Y	Minor
3	12955.00	LHS	Junction with Timi Road	Y	Minor

4.0 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 relevant sections of the Manuals 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 [Refer to paragraph 4.2.2 of the Manual and specify sections to be raised].
The existing road shall be raised in the following sections:

Sl No.	Section (km)		Length (km)	Extent of Raising*	Remarks
	From	To			
Nil					

* Difference between levels at proposed c/l and existing road/ground below proposed c/l

5.0 PAVEMENT DESIGN

5.1 Pavement design shall be carried out in accordance with relevant Sections of the Manuals.

5.2 Type of pavement

Flexible Pavement with Granular Sub-base (GSB) and Wet Mix Macadam (GSB) shall be designed as per IRC-37:2012.

5.3 Design requirements

5.3.1 Design Period and strategy

Flexible pavement shall be designed for a minimum design period of 15 years as per IRC-37:2012. 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 as given below:

From (Km)	To (Km)	Minimum Design Loading in terms of Million Standard Axles
0+0	16+00	10 MSA

5.3.3 Design Parameters

The flexible pavement for the main carriageway is a 2-lane carriageway having 1.5 m wide paved shoulder and 1.0 m wide earthen shoulder in some stretches. This shall be designed using the IRC 37: 2012 Method for the projected traffic levels and the following indicative design input parameters:

Indicative Design Parameters

(i)	Performance Period	15 years + Construction Period of 36 months
(ii)	Traffic on Design Lane	Minimum 10 MSA as per IRC-SP-73 2015. Design should take care of the maximum wheel load derived from the axle load survey on the design lane
(iii)	Design serviceability Loss	2.0
(iv)	Reliability	90%
(v)	Overall Standard Deviation	0.49
(vi)	Effective Road block Soil Resilient Modulus	Corresponding to 4-day soaked CBR value of 5.0% to 8.0%
(vii)	Layer Coefficients	As per the IRC 37 : 2012 procedures
(viii)	Drainage quality of Pavement	Good

5.3.4 The Project highway will be a light-trafficked section connecting the major arterial network of the country. The design exercise should therefore duly take into account the importance of the road, the performance level and the maintenance requirements during the performance period. The provision of Wet Mix Macadam (granular base)/cement-treated base/ sub-base (crushed stone only)/ sub grade layer(s) and the use of 60/70 Bitumen in bituminous base layers and polymer modified bitumen (PMB 40) in wearing course shall be considered while deciding about the composition of the pavement structure. The design should also accompany the Quality Assurance Plan (QAP) along with its implementation scheme for the construction of the pavement structure.

5.3.5 However, in case of a change in the pavement design at the detailed engineering stage, the same shall not be considered as a change in scope of work nor shall qualify for a variation order.

5.3.6 Paved shoulders of 1.5 m width shall have same thickness of the pavement as that of the main carriageway with same composition as that of main carriageway for monolithic construction.

5.3.7 Contractor shall design the pavement for design traffic of 10 million standard axles (MSA corresponding sub grade CBR.

5.3.8 Rigid Pavement

No rigid pavement has been considered for the Project Highway.

5.4 Reconstruction of stretches

Refer to paragraph 5.9.7 of the Manual and specify the sections, if any, to be reconstructed.]
The following sections of the existing road shall be reconstructed. These shall be designed as new pavement.

Sl No.	Section (km)		Remarks
	From	To	
1	0+000	16+00	Poor condition of existing pavement

6 ROADSIDE DRAINAGE

Drainage system including surface and subsurface drains for the Project Highway shall be provided as per section 6 of the Manual.

The improvements in the drainage and the slope erosion shall be made as per the following norms:

6.1 Road side Drainage Measures

Following measures shall be adopted:

i) Open side V shape drains at the hill side for widening at hill sides and both sides in realignment stretches by hill cut.

Open side V shape cross section drain shall be provided on hill sides of the project highway in order to intercept surface water from the carriageway, shoulders and hill slopes. Trapezoidal Lined drains have slopes also been proposed in urban/semi urban/intersection stretches. The concrete drains shall be covered in reaches along commercial establishments and intersections. The drains outfall into the natural water courses i.e. either in culverts or bridges. Table below gives the location of lined drains.

These are guidelines for minimum provisions. However, contractor has to design as per requirement of road in accordance with manual.

Sr.No.	Chainage in m		Length	Type	Remarks
	From	To			

1	0	750	750.0	Type-1	V shape Drain
2	750	2400	1650.0	Type-2	Trapezoidal Drain
3	2400	3120	720.0	Type-1	V shape Drain
4	3120	3850	730.0	Type-2	Trapezoidal Drain
5	3850	4475	625.0	Type-1	V shape Drain
6	4475	5525	1050.0	Type-2	Trapezoidal Drain
7	5525	7335	1810.0	Type-1	V shape Drain
8	7335	8740	1405.0	Type-2	Trapezoidal Drain
9	8740	9720	980.0	Type-1	V shape Drain
10	9720	11630	1910.0	Type-2	Trapezoidal Drain
11	11630	11710	80.0	Type-2	Trapezoidal Drain
12	11710	12375	665.0	Type-1	V shape Drain
13	12375	14050	1675.0	Type-2	Trapezoidal Drain
14	14050	14275	225.0	Type-1	V shape Drain
15	14275	15225	950.0	Type-2	Trapezoidal Drain
16	15225	15895	670.0	Type-1	V shape Drain
17	15895	16000	105.0	Type-2	Trapezoidal Drain

Note: (The above locations shall be reviewed in consultation with the Independent Consultant at the time of construction as per the site condition).

6.2 Chutes

Surface run off on a hill slope flows down in the form of natural gulleys / chutes. The water entrapped in the catch water drains is also brought down by connecting them with existing natural gulleys. It is therefore desired to provide lined chutes to lead the discharge to the catch pit of culvert or to a natural drainage channel.

Sr.No.	Chainage	Clear Width of Chute	Length of Chute	Remarks
1	422.00	1.85	20	Type-1
2	738.00	2.70	20	Type-2
3	1160.00	1.85	20	Type-1
4	2040.00	2.70	20	Type-2
5	2243.00	1.85	20	Type-1
6	2542.00	1.85	20	Type-1
7	2758.00	2.70	20	Type-2
8	3204.00	3.2	20	Type-3
9	3235.00	1.85	20	Type-1
10	4151.00	1.85	20	Type-1
11	4188.00	1.85	20	Type-1
12	4278.00	3.2	20	Type-3
13	4444.00	1.85	20	Type-1
14	5855.00	3.2	20	Type-3
15	5987.00	3.2	20	Type-3
16	9264.00	1.85	20	Type-1
17	11513.00	1.85	20	Type-1
18	11816.00	1.85	20	Type-1
19	11915.00	3.2	20	Type-3
20	12252.00	1.85	20	Type-1
21	13862.00	2.70	20	Type-2
22	14064.00	1.85	20	Type-1

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

6.3 Drain on valley side at Box Cutting portion – 2400 m V shaped drain.

As per plan & Profile drawing

6.4 Catch water drain - 1200 m V shaped drain

Location will be finalized during construction stage as per site conditions in consultation with NHIDCL / AE

7 DESIGN OF STRUCTURES

7.1 General

7.1.1 All bridges 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 in MoRTH circular No: RW/NH/33044/2/88-S&R dated 24.03.2009 (for 2 lane structures as 12.9m without) and shall conform to the cross sectional features and other details specified in IRC: SP: 84-2014. The culverts shall be designed and constructed in accordance with section 7 of the Manuals.

The following guidelines shall be followed:

i) All the cross drainage structures for the new carriageway shall be designed in such a way so that the outer most face of railing/parapet shall be in line with the out most edge of shoulder.

ii) The existing culverts shall be extended to match the new road cross sections.

iii) The adequacy of the vent size for all culverts/bridges shall be ascertained through detailed hydrological surveys and finalized in consultation with the IC/Project Company. The highest flood level/maximum supply level shall be properly assessed after collecting flood histories form local authorities/interviews with locals/irrigation authorities.

iv) For drainage purpose the new/to be reconstructed box culverts of minimum span 2.0 m shall be provided.

v) Suitable river training works, bank protection and embankment protection works ensuring safety of bridge structure and its approaches against damage by flood water / rain water shall be provided.
The cross drainage plan of the highway shall be finalized in consultation with IC/Project Company and if required additional culverts shall be provided.
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.

7.1.2 All bridges shall be high-level bridges.

7.1.3 All bridges shall be designed to carry utility services

7.2 Culverts

7.2.1 Overall width of all culverts shall be equal to the roadway width of the approaches as per TCS at that particular location.

Proposed Culvert:

S/N	Chainage (m)	Curve /Straight	Radius	Type	Span X Depth	Remarks
1	422	S	-300	BOX-TYPE-1	2 X 2	Proposed
2	738	S	-319	BOX-TYPE-1	2 X 2	Proposed
3	1160	S	INFINITY	BOX-TYPE-4	6 X 4	Proposed
4	1990	S	INFINITY	BOX-TYPE-1	2 X 2	Proposed
5	2243	S	-600	BOX-TYPE-1	2 X 2	Proposed
6	2542	S	450	BOX-TYPE-1	2 X 2	Proposed
7	2758	S	INFINITY	BOX-TYPE-1	2 X 2	Proposed
8	3355	C	125	BOX-TYPE-2	3 X 3	Proposed
9	3681	S	-70	BOX-TYPE-1	2 X 2	Proposed
10	3852	C	-56	BOX-TYPE-2	3 X 3	Proposed
11	4760	C	70	HPC-TYPE-2	1.2 X D NP4	Proposed
12	5078	S	-60	HPC-TYPE-1	1.2 X D NP4	Proposed
13	5460	C	77	BOX-TYPE-1	2 X 2	Proposed
14	5684	C	72	BOX-TYPE-1	2 X 2	Proposed
15	6193	C	30	BOX-TYPE-1	2 X 2	Proposed
16	6432	S	INFINITY	BOX-TYPE-1	2 X 2	Proposed
17	6784	S	-75	BOX-TYPE-1	2 X 2	Proposed
18	7066	S	INFINITY	HPC-TYPE-1	1.2 X D NP4	Proposed
19	7351	S	105	HPC-TYPE-1	1.2 X D NP4	Proposed
20	7587	C	113	BOX-TYPE-1	2 X 2	Proposed
21	7869	C	-45	BOX-TYPE-1	2 X 2	Proposed
22	8149	C	60	BOX-TYPE-1	2 X 2	Proposed
23	8631	C	100	BOX-TYPE-1	2 X 2	Proposed
24	9925	S	45	HPC-TYPE-1	1.2 X D NP4	Proposed
25	10155	S	INFINITY	BOX-TYPE-1	2 X 2	Proposed
26	10486	C	-159	BOX-TYPE-1	2 X 2	Proposed
27	10707	C	67	BOX-TYPE-1	2 X 2	Proposed
28	11000	C	45	BOX-TYPE-1	2 X 2	Proposed
29	13589	C	45	HPC-TYPE-2	1.2 X D NP4	Proposed
30	14743	S	INFINITY	BOX-TYPE-1	2 X 2	Proposed

S/N	Chainage (m)	Curve /Straight	Radius	Type	Span X Depth	Remarks
31	14983	S	INFINITY	BOX-TYPE-1	2 X 2	Proposed
32	15372	C	-77	BOX-TYPE-1	2 X 2	Proposed
33	15611	C	60	BOX-TYPE-1	2 X 2	Proposed
34	15914	S	INFINITY	BOX-TYPE-1	2 X 2	Proposed

Reconstruction of culvert

S/N	Chainage (m)	Curve /Straight	Radius	Type	Span X Depth	Remarks
1	3204	S	-75	BOX-TYPE-2	3 X 3	Re-construction
2	3235	S	INFINITY	BOX-TYPE-1	2 X 2	Re-construction
3	4074	C	60	HPC-TYPE-2	1.2 X D NP4	Re-construction
4	4151	C	85	BOX-TYPE-2	3 X 3	Re-construction
5	4188	S	586	BOX-TYPE-2	3 X 3	Re-construction
6	4278	S	75	BOX-TYPE-2	3 X 3	Re-construction
7	4444	C	75	BOX-TYPE-3	4 X 4	Re-construction
8	5855	C	60	BOX-TYPE-2	3 X 3	Re-construction
9	5987	C	-182	BOX-TYPE-2	3 X 3	Re-construction
10	7802	C	-60	HPC-TYPE-2	1.2 X D NP4	Re-construction
11	8462	S	310	HPC-TYPE-1	1.2 X D NP4	Re-construction
12	8989	S	-150	HPC-TYPE-1	1.2 X D NP4	Re-construction
13	9264	C	55	BOX-TYPE-2	3 X 3	Re-construction
14	9446	C	55	HPC-TYPE-2	1.2 X D NP4	Re-construction
15	9600	S	75	HPC-TYPE-1	1.2 X D NP4	Re-construction
16	9757	C	-151	HPC-TYPE-2	1.2 X D NP4	Re-construction
17	9814	C	-275	HPC-TYPE-2	1.2 X D NP4	Re-construction
18	11187	S	INFINITY	HPC-TYPE-1	1.2 X D NP4	Re-construction
19	11513	C	-65	BOX-TYPE-3	4 X 4	Re-construction
20	11728	S	-300	HPC-TYPE-1	1.2 X D NP4	Re-construction
21	11746	S	-505	HPC-TYPE-1	1.2 X D NP4	Re-construction
22	11816	S	INFINITY	BOX-TYPE-1	2 X 2	Re-construction
23	11915	S	-400	BOX-TYPE-2	3 X 3	Re-construction
24	11998	S	INFINITY	HPC-TYPE-1	1.2 X D NP4	Re-construction
25	12140	C	-38	HPC-TYPE-2	1.2 X D NP4	Re-construction
26	12252	S	-1610	BOX-TYPE-2	3 X 3	Re-construction
27	12658	S	-300	HPC-TYPE-1	1.2 X D NP4	Re-construction
28	12875	S	INFINITY	HPC-TYPE-1	1.2 X D NP4	Re-construction

S/N	Chainage (m)	Curve /Straight	Radius	Type	Span X Depth	Remarks
29	13043	C	-130	HPC-TYPE-2	1.2 X D NP4	Re-construction
30	13271	C	-117	HPC-TYPE-2	1.2 X D NP4	Re-construction
31	13452	S	INFINITY	HPC-TYPE-1	1.2 X D NP4	Re-construction
32	13862	S	35	BOX-TYPE-1	2 X 2	Re-construction
33	14064	S	34	BOX-TYPE-3	4 X 4	Re-construction
34	14275	C	178	HPC-TYPE-2	1.2 X D NP4	Re-construction
35	14324	C	58	HPC-TYPE-2	1.2 X D NP4	Re-construction
36	14430	C	144	HPC-TYPE-2	1.2 X D NP4	Re-construction

7.2.3 Widening of existing culverts - Nil

7.2.4 Repairs/replacements of railing/parapets, flooring and protection works of the existing culverts - Nil

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

7.3 Bridges (Major & Minor)

7.3.1 Existing bridges to be Re-constructed

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

S/N	Location in m	Super structure	Foundation	Remarks	Span Arrangement	Remarks	
1	6090	PSC	Open	Nala	1X48	Existing	Ex. Road

Note: Extra widening shall be provided over structures falling on curves with radius less than 300m.

7.3.2 Additional new bridges

New bridges at the following locations on the Project Highway shall be constructed.

S/N	Location in m	Super structure	Foundation	Remarks	Span Arrangement	Remarks	
1	70	PSC	Pile	Teesta River	1X20+1X65+2X20	Proposed	Alignment
2	1590	PSC	Open	Nala	1X25+1X48+1X25	Proposed	Alignment
3	2860	PSC	Open	Nala	1X40	Proposed	Alignment
4	2975	PSC	Open	Nala	1X48+1X20	Proposed	Alignment

Note: Extra widening shall be provided over structures falling on curves with radius less than 300m.

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

S. No.	Location at Km	Remarks
Nil		

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

S. No.	Location at Km	Remarks
Nil		

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 - Nil

7.4. Rail-road bridges – Nil

7.4.1 Design, construction and detailing of ROB/RUB shall be as specified in section 7 of the Manual. [Refer to paragraph 7.19 of the Manual and specify modification, if any]

7.4.2 Road over-bridges- Nil

7.4.3 Road under-bridges:-Nil

7.5 Grade separated structures- Nil

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.

8.2 Specifications of the reflective sheeting [Refer to paragraph 9.3 of the Manual and specify]

Traffic signs and pavements markings shall include roadside signs, overhead signs, curve amounted signs and road marking along the Project Highway. The design and marking for the project Highway shall be as per design standards

indicated in **Schedule–D** and the location for various treatments shall be finalized in consultation with the Independent Consultant and Project Company.

The road markings shall be applied to lane lines, road center lines, edge lines, continuity line, stop lines, give way lines, directional arrows, diagonal/chevron markings, and Zebra crossings at parking areas.

PCC kerbs (duly painted) approximately 460 RM (minimum) shall be provided by EPC Contractor in busbays and Islands.

8.3 Traffic Signs

(i) A complete range of permanent retro-reflective traffic signs as per the requirements defined in but not limited to the FPR, for the safe and efficient movement of traffic. These sign are to be of regulatory, warning and informatory types and placed on the roadside except at the start and end of the project road and start and end of two bypasses where overhead directional and lane designation signs shall be mounted on the steels portals.

(ii) Temporary traffic and construction signs are to be provided during construction and maintenance operations for traffic diversion and pedestrian safety.

8.4 Pavement Marking

I. Retro-reflective thermoplastic paint is proposed for use.
The road markings shall be applied to lane lines, road center lines, edge lines, continuity line, stop lines, give way lines, diagonal/chevron markings, Zebra crossings and at parking areas.

II. Delineators bollards and other safety devices shall be provided on entire project Highway and other locations as directed by NHIDCL.

III. All signs shall be the reflectorized type with high intensity retro-reflective sheeting conforming to ASTM D 4956-01, type VIII and /or type IX of micro prismatic type. All sign boards of size more than 1.2 m and less than 0.9 m shall be provided at the locations finalized in consultation with NHIDCL.

IV. Cautionary sign boards (900mm Equilateral Triangle), stop sign (900mm Octagonal) mandatory sign boards(600mm dia), Village name boards (600X900mm), Hazard Plate (300X900mm), chevron signboard (600X750mm), Facility information sign (600X800mm), Advance direction sign (1800X1200mm), Place identification sign (1200X900mm) shall be provided by the Construction Contractor with suitable interval in consultation with NHIDCL.

The minimum quantity of Traffic signages and pavement marking are tabulated here

Sr.No.	Traffic Signages, Road Marking and other appurtenances	unit	Quantity
1	90 cm equilateral triangle	each	12
2	60 cm equilateral triangle	each	25
3	60 cm circular	each	32
4	80 mm x 60 mm rectangular	each	28
5	60 cm x 45 cm rectangular	each	22
6	60 cm x 60 cm square	each	30
7	Direction and Place Identification signs upto 0.9 sqm size board.	Sqm	7.5
8	Road Marking with Hot Applied Thermoplastic Compound with Reflectorising Glass	Sqm	4000
9	5th kilometre stone (precast)	each	3
10	Ordinary Kilometer stone (Precast)	each	13
11	Hectometer stone (Precast)	each	65
12	Road Delineators	each	14
13	Boundary pillar	each	150
14	Street Furniture	each	1050

9 ROADSIDE FURNITURE

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

9.2 *Overhead traffic signs: location and size*
[Refer to paragraph 11.5 of the Manual and provide details]

The overhead signs shall be the reflectorized type with high intensity retro-reflective sheeting conforming to ASTM D 4956-01, type VIII and /or type IX of

micro prismatic type. The retro reflected sheets of Engineering Grade and high intensity grade (ordinary) shall not be used. The height, lateral clearance, location and instillation shall be as per relevant clauses of MoRTH specifications. Overhead sign shall be installed ahead of major intersections and urban areas as per detailed design requirements.

Sl No.	Location (km)	Size	Remarks
NIL			

10 COMPULSORY AFFORESTATION

[Refer to paragraph 12.1 of the Manual and specify the number of trees which are required to be planted by the Contractor as compensatory afforestation.]

Minimum 2600 nos. trees are required to be planted.

11 HAZARDOUS LOCATIONS

Metal Beam crash barrier length of minimum 3000 m (single runner, heavy duty and W-shape) shall be provided at the locations of bridge approaches, steep valley side and at sharp curves on both sides. Heavy duty metal beam crash barriers shall be provided on this project by the Construction Contractor at the locations finalized in consultation with NHIDCL. Typical details of metal crash barrier are given in as per manual.

12 SPECIAL REQUIREMENTS 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

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

12.1.1 Retaining wall

Slope protection along valley side shall be RRM retaining wall height from 3 m to 6 m

Sr.No.	Chainage		Length in m	Height in m	Remarks
	From	To			
1	125	135	10	6	RHS
2	135	145	10	4	RHS
3	145	155	10	3	RHS
4	455	465	10	3	RHS
5	475	485	10	3	RHS
6	495	505	10	4	RHS
7	505	515	10	3	RHS
8	515	525	10	3	RHS
9	595	605	10	3	RHS
10	695	705	10	3	RHS
11	705	715	10	3	RHS
12	745	755	10	6	RHS
13	755	765	10	6	RHS
14	765	775	10	6	RHS
15	775	785	10	5	RHS
16	785	795	10	3	RHS
17	795	805	10	3	RHS
18	805	815	10	3	RHS
19	935	945	10	3	RHS
20	965	975	10	3	RHS
21	975	985	10	3	RHS
22	985	995	10	4	RHS
23	1015	1025	10	4	RHS
24	1025	1035	10	5	RHS
25	1035	1045	10	5	RHS
26	1045	1055	10	6	RHS
27	1055	1065	10	4	RHS
28	1065	1075	10	4	RHS
29	1075	1085	10	6	RHS
30	1095	1105	10	4	LHS
31	1105	1115	10	6	LHS
32	1155	1165	10	6	LHS
33	1165	1175	10	5	LHS

Sr.No.	Chainage		Length in m	Height in m	Remarks
	From	To			
34	1165	1175	10	6	RHS
35	1175	1185	10	3	RHS
36	1185	1195	10	3	RHS
37	1195	1205	10	3	RHS
38	1205	1215	10	3	RHS
39	1215	1225	10	3	RHS
40	1225	1235	10	3	RHS
41	1235	1245	10	3	RHS
42	1725	1735	10	6	RHS
43	1825	1835	10	3	RHS
44	2025	2035	10	3	RHS
45	2075	2085	10	4	RHS
46	2085	2095	10	3	RHS
47	2095	2105	10	3	RHS
48	2105	2115	10	3	RHS
49	2115	2125	10	4	RHS
50	2125	2135	10	3	RHS
51	2135	2145	10	4	RHS
52	2145	2155	10	4	RHS
53	2155	2165	10	4	RHS
54	2165	2175	10	3	RHS
55	2175	2185	10	3	RHS
56	2185	2195	10	3	RHS
57	2195	2205	10	3	RHS
58	2225	2235	10	3	RHS
59	2235	2245	10	3	RHS
60	2245	2255	10	4	RHS
61	2255	2265	10	4	RHS
62	2265	2275	10	4	RHS
63	2275	2285	10	6	RHS
64	2285	2295	10	6	RHS
65	2295	2305	10	6	RHS
66	2305	2315	10	6	RHS
67	2315	2325	10	6	RHS
68	2325	2335	10	6	RHS
69	2335	2345	10	3	RHS

Sr.No.	Chainage		Length in m	Height in m	Remarks
	From	To			
70	2375	2385	10	4	RHS
71	2385	2395	10	5	RHS
72	2925	2935	10	4	RHS
73	3705	3715	10	5	RHS
74	3715	3725	10	5	RHS
75	4175	4185	10	4	RHS
76	4355	4365	10	3	RHS
77	4415	4425	10	3	RHS
78	5195	5205	10	3	RHS
79	5255	5265	10	3	RHS
80	5265	5275	10	4	RHS
81	5275	5285	10	4	RHS
82	5345	5355	10	3	RHS
83	5355	5365	10	4	RHS
84	5365	5375	10	3	RHS
85	5375	5385	10	3	RHS
86	5535	5545	10	3	RHS
87	5855	5865	10	4	RHS
88	5945	5955	10	3	RHS
89	5955	5965	10	3	RHS
90	5985	5995	10	3	RHS
91	6265	6275	10	3	RHS
92	6275	6285	10	3	RHS
93	6285	6295	10	3	RHS
94	6385	6395	10	3	LHS
95	6565	6575	10	3	LHS
96	6575	6585	10	5	LHS
97	6915	6925	10	3	RHS
98	6925	6935	10	3	RHS
99	6975	6985	10	3	RHS
100	6985	6995	10	4	RHS
101	6995	7005	10	4	RHS
102	7005	7015	10	4	RHS
103	7015	7025	10	4	RHS
104	7025	7035	10	4	RHS
105	7035	7045	10	5	RHS

Sr.No.	Chainage		Length in m	Height in m	Remarks
	From	To			
106	7055	7065	10	4	RHS
107	7065	7075	10	5	RHS
108	7075	7085	10	5	RHS
109	7095	7105	10	5	RHS
110	7175	7185	10	4	RHS
111	7185	7195	10	3	RHS
112	7295	7305	10	3	LHS
113	7305	7315	10	3	LHS
114	7425	7435	10	3	LHS
115	9855	9865	10	3	RHS
116	9865	9875	10	5	RHS
117	9995	10005	10	5	RHS
118	10005	10015	10	5	RHS
119	10015	10025	10	5	RHS
120	10025	10035	10	4	RHS
121	10035	10045	10	3	RHS
122	10045	10055	10	3	RHS
123	10055	10065	10	3	RHS
124	10065	10075	10	5	RHS
125	10085	10095	10	4	RHS
126	10095	10105	10	3	RHS
127	10505	10515	10	3	RHS
128	10515	10525	10	5	RHS
129	10525	10535	10	4	RHS
130	10555	10565	10	5	RHS
131	10865	10875	10	3	LHS
132	11505	11515	10	4	LHS
133	11515	11525	10	3	LHS
134	12145	12155	10	3	LHS
135	12155	12165	10	3	LHS
136	12165	12175	10	4	LHS
137	12295	12305	10	3	LHS
138	12375	12385	10	3	LHS
139	12505	12515	10	4	LHS
140	12555	12565	10	3	LHS
141	13315	13325	10	3	RHS

Sr.No.	Chainage		Length in m	Height in m	Remarks
	From	To			
142	13325	13335	10	5	RHS
143	13335	13345	10	3	RHS
144	13345	13355	10	3	RHS
145	13395	13405	10	3	RHS
146	13415	13425	10	3	RHS
147	13965	13975	10	3	RHS
148	13975	13985	10	3	RHS
149	14515	14525	10	4	RHS
150	14575	14585	10	4	RHS
151	14585	14595	10	5	RHS
152	14605	14615	10	3	LHS
153	14645	14655	10	5	RHS
154	14655	14665	10	5	RHS
155	14665	14675	10	5	RHS
156	14675	14685	10	4	RHS
157	14685	14695	10	3	RHS
158	15175	15185	10	3	RHS
159	15185	15195	10	4	RHS
160	15195	15205	10	3	RHS
161	15435	15445	10	3	RHS
162	15695	15705	10	3	RHS
163	15705	15715	10	3	RHS
164	15715	15725	10	3	RHS
165	15725	15735	10	4	RHS
166	15735	15745	10	4	RHS
167	15745	15755	10	4	RHS
168	15755	15765	10	4	RHS
169	15765	15775	10	4	RHS
170	15775	15785	10	3	RHS
171	15785	15795	10	3	RHS

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

12.1.2 Details of Mechanically Stabilized earth locations:

Sr.No.	Chainage		Length in m	Height in m	Remarks
	From	To			
1	1085.00	1095.00	10	8	RHS
2	1095.00	1105.00	10	10	RHS
3	1105.00	1115.00	10	10	RHS
4	1115.00	1125.00	10	8	LHS
5	1115.00	1125.00	10	12	RHS
6	1125.00	1135.00	10	8	LHS
7	1125.00	1135.00	10	12	RHS
8	1135.00	1145.00	10	8	LHS
9	1135.00	1145.00	10	12	RHS
10	1145.00	1155.00	10	8	LHS
11	1145.00	1155.00	10	12	RHS
12	1155.00	1165.00	10	10	RHS
13	2395.00	2405.00	10	6	RHS
14	4365.00	4375.00	10	6	RHS
15	5965.00	5975.00	10	10	RHS
16	5975.00	5985.00	10	6	RHS
17	7045.00	7055.00	10	6	RHS
18	7085.00	7095.00	10	6	RHS
19	7105.00	7115.00	10	6	RHS
20	7115.00	7125.00	10	6	RHS
21	7125.00	7135.00	10	8	RHS
22	7135.00	7145.00	10	8	RHS
23	7145.00	7155.00	10	12	RHS
24	7155.00	7165.00	10	12	RHS
25	7165.00	7175.00	10	8	RHS
26	7355.00	7365.00	10	8	RHS
27	10075.00	10085.00	10	6	RHS
28	10535.00	10545.00	10	6	RHS
29	10545.00	10555.00	10	6	RHS
30	14525.00	14535.00	10	12	RHS
31	14535.00	14545.00	10	10	RHS
32	14595.00	14605.00	10	6	RHS
33	14605.00	14615.00	10	6	RHS
34	14615.00	14625.00	10	6	RHS
35	14625.00	14635.00	10	6	RHS
36	14635.00	14645.00	10	6	RHS
37	15005.00	15015.00	10	10	LHS
38	15505.00	15515.00	10	12	LHS

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

12.1.3 Toe wall

The requirement of the Toe walls is generated only when the road has been in use and problems of the slope line have been identified. These are proposed at locations having hill with steep slope & height of filling are more and retaining wall height more than 6.0 m along with valley side toe protection.

Sr. No.	Chainage		Length in m	Height in m	Remarks
	From	To			
1	155.00	165.00	10	2	RHS
2	165.00	175.00	10	2	RHS
3	175.00	185.00	10	3	RHS
4	195.00	205.00	10	2	RHS
5	435.00	445.00	10	2	RHS
6	465.00	475.00	10	3	RHS
7	485.00	495.00	10	3	RHS
8	525.00	535.00	10	2	RHS
9	575.00	585.00	10	2	RHS
10	605.00	615.00	10	2	RHS
11	635.00	645.00	10	2	RHS
12	685.00	695.00	10	2	RHS
13	915.00	925.00	10	2	RHS
14	945.00	955.00	10	3	RHS
15	995.00	1005.00	10	2	RHS
16	1005.00	1015.00	10	2	RHS
17	1115.00	1125.00	10	3	RHS
18	1125.00	1135.00	10	3	RHS
19	1125.00	1135.00	10	2	RHS
20	1135.00	1145.00	10	3	RHS
21	1175.00	1185.00	10	3	LHS
22	1245.00	1255.00	10	3	RHS
23	1255.00	1265.00	10	2	RHS
24	1505.00	1515.00	10	2	RHS
25	1735.00	1745.00	10	2	RHS
26	1815.00	1825.00	10	3	RHS
27	2035.00	2045.00	10	2	RHS
28	2205.00	2215.00	10	2	RHS
29	2215.00	2225.00	10	3	RHS
30	2285.00	2295.00	10	2	LHS
31	2295.00	2305.00	10	3	LHS
32	3205.00	3215.00	10	2	RHS
33	3325.00	3335.00	10	3	RHS
34	3335.00	3345.00	10	3	RHS
35	3345.00	3355.00	10	3	RHS
36	3355.00	3365.00	10	3	RHS
37	3725.00	3735.00	10	2	RHS

Sr. No.	Chainage		Length in m	Height in m	Remarks
	From	To			
38	3995.00	4005.00	10	3	RHS
39	4185.00	4195.00	10	3	RHS
40	4435.00	4445.00	10	2	RHS
41	4495.00	4505.00	10	2	RHS
42	4575.00	4585.00	10	2	RHS
43	4635.00	4645.00	10	2	RHS
44	4875.00	4885.00	10	3	RHS
45	4925.00	4935.00	10	3	RHS
46	4935.00	4945.00	10	2	RHS
47	5085.00	5095.00	10	2	RHS
48	5245.00	5255.00	10	2	RHS
49	5545.00	5555.00	10	2	RHS
50	5845.00	5855.00	10	3	RHS
51	5865.00	5875.00	10	3	RHS
52	5925.00	5935.00	10	2	RHS
53	5935.00	5945.00	10	3	RHS
54	5995.00	6005.00	10	2	RHS
55	5995.00	6005.00	10	3	LHS
56	6255.00	6265.00	10	3	RHS
57	6585.00	6595.00	10	3	RHS
58	6835.00	6845.00	10	3	RHS
59	6905.00	6915.00	10	3	RHS
60	6935.00	6945.00	10	2	RHS
61	6945.00	6955.00	10	3	RHS
62	7155.00	7165.00	10	3	LHS
63	7165.00	7175.00	10	2	LHS
64	7205.00	7215.00	10	2	LHS
65	7285.00	7295.00	10	2	LHS
66	7315.00	7325.00	10	2	LHS
67	7355.00	7365.00	10	2	LHS
68	7385.00	7395.00	10	2	LHS
69	7865.00	7875.00	10	2	LHS
70	8085.00	8095.00	10	2	RHS
71	9665.00	9675.00	10	2	RHS
72	9675.00	9685.00	10	3	RHS
73	9685.00	9695.00	10	2	RHS
74	9845.00	9855.00	10	2	RHS
75	9915.00	9925.00	10	3	RHS
76	9925.00	9935.00	10	2	RHS
77	9985.00	9995.00	10	2	RHS
78	10005.00	10015.00	10	2	LHS
79	10135.00	10145.00	10	2	RHS
80	10145.00	10155.00	10	3	RHS

Sr. No.	Chainage		Length in m	Height in m	Remarks
	From	To			
81	10155.00	10165.00	10	2	RHS
82	10165.00	10175.00	10	2	RHS
83	10335.00	10345.00	10	2	RHS
84	10475.00	10485.00	10	2	RHS
85	10485.00	10495.00	10	2	RHS
86	10495.00	10505.00	10	2	RHS
87	10855.00	10865.00	10	2	LHS
88	10875.00	10885.00	10	2	LHS
89	11075.00	11085.00	10	3	LHS
90	11085.00	11095.00	10	3	LHS
91	11505.00	11515.00	10	2	RHS
92	12175.00	12185.00	10	2	LHS
93	12285.00	12295.00	10	2	LHS
94	12305.00	12315.00	10	2	LHS
95	12325.00	12335.00	10	2	LHS
96	12335.00	12345.00	10	2	LHS
97	12345.00	12355.00	10	2	LHS
98	12365.00	12375.00	10	2	LHS
99	12495.00	12505.00	10	2	LHS
100	12545.00	12555.00	10	2	LHS
101	12685.00	12695.00	10	2	LHS
102	12695.00	12705.00	10	2	LHS
103	12705.00	12715.00	10	2	LHS
104	12715.00	12725.00	10	2	LHS
105	12735.00	12745.00	10	2	LHS
106	12745.00	12755.00	10	2	LHS
107	13065.00	13075.00	10	2	RHS
108	13285.00	13295.00	10	2	RHS
109	13305.00	13315.00	10	2	RHS
110	13385.00	13395.00	10	3	RHS
111	13405.00	13415.00	10	2	RHS
112	13915.00	13925.00	10	3	RHS
113	13925.00	13935.00	10	3	RHS
114	13935.00	13945.00	10	3	RHS
115	13945.00	13955.00	10	2	RHS
116	13955.00	13965.00	10	3	RHS
117	14525.00	14535.00	10	3	RHS
118	14525.00	14535.00	10	2	RHS
119	14565.00	14575.00	10	3	RHS
120	14695.00	14705.00	10	3	RHS
121	14705.00	14715.00	10	2	RHS
122	14735.00	14745.00	10	2	RHS
123	14905.00	14915.00	10	3	RHS

Sr. No.	Chainage		Length in m	Height in m	Remarks
	From	To			
124	15205.00	15215.00	10	3	RHS
125	15345.00	15355.00	10	2	RHS
126	15355.00	15365.00	10	3	RHS
127	15405.00	15415.00	10	2	RHS
128	15415.00	15425.00	10	2	RHS
129	15505.00	15515.00	10	3	LHS
130	15505.00	15515.00	10	2	LHS
131	15795.00	15805.00	10	3	RHS
132	15855.00	15865.00	10	2	RHS
133	15875.00	15885.00	10	3	RHS
134	15915.00	15925.00	10	2	RHS
			1340.000		

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

12.1.4 Gabion Wall:

The requirement of the Gabion wall is generated only where the road is aligned along a saddle portion, Near bus stand & river bank or a nallah (stream) slope failure and erosion of toe has also to be prevented and valley side slope made stable These are proposed at locations having hill with steep slope, having soil matrix Soil Mixed with Boulders and sharp curve portion. It is also proposed where the road side excavated spoils dumping area and embankment toe.

SR. NO.	CHAINAGE		LENGTH in m	HEIGHT in m	REMARKS
	FROM	TO			
1	2320	2370	50	2	Sliding Portion
2	3100	3600	500	3	Disposal Yard on RHS
3	3195	3465	270	2	Sinking Portion
4	3540	3695	155	3	Sinking Portion
5	4085	4145	60	2	Sliding Portion
6	4285	4370	85	2	Sinking Portion
7	4390	4390	0	2	Sinking Portion
8	4520	4545	25	3	Sinking Portion
9	4660	4735	75	3	Sinking Portion
10	5200	5285	85	2	Sinking Portion
11	5455	5575	120	2	Sinking Portion
12	6905	6970	65	2	Sinking Portion
13	12060	12135	75	2	Truck Lay
14	14595	14705	110	2	Sinking Portion
			1675.000		

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

12.1.5 Breast Wall:

The requirement of the breast walls is generated only when the road has been in use and problems of the slope line have been identified. These are proposed at locations having hill with steep slope, having soil matrix Soil Mixed with Boulders and sharp curve portion. It is also proposed where the rain water spills all around causing mud flow.

Sr. No.	Chainage		Length in m	Height in m	Side	Remarks
	From	To				
1	3090	3130	40.00	3.00	LHS	Merging with Existing Road
2	3290	3375	85.00	3.00	LHS	
3	3695	3720	25.00	2.00	LHS	
4	3815	3855	40.00	2.00	LHS	Junction with Bermick Road
5	4285	4315	30.00	2.00	LHS	
6	5775	5830	55.00	2.00	LHS	
7	6000	6055	55.00	2.00	LHS	
8	6125	6185	60.00	2.00	LHS	
9	6200	6260	60.00	2.00	LHS	
10	6280	6320	40.00	3.00	RHS	Junction with Yanyang Road
11	6320	6390	70.00	2.00	RHS	
12	7070	7135	65.00	2.00	LHS	
13	8040	8130	90.00	2.00	LHS	
14	8165	8260	95.00	2.00	LHS	
15	8455	8530	75.00	3.00	LHS	
16	9325	9555	230.00	3.00	LHS	
17	9615	9690	75.00	3.00	LHS	
18	9740	9790	50.00	3.00	LHS	
19	10070	10100	30.00	3.00	LHS	
20	10110	10200	90.00	3.00	LHS	
21	10360	10460	100.00	2.00	LHS	
22	10460	10540	80.00	2.00	LHS	
23	10865	10915	50.00	2.00	RHS	
24	11530	11555	25.00	2.00	RHS	
25	11555	11670	115.00	2.00	RHS	
26	11685	11725	40.00	2.00	RHS	
27	11765	11825	60.00	2.00	RHS	

Sr. No.	Chainage		Length in m	Height in m	Side	Remarks
	From	To				
28	11875	11910	35.00	2.00	RHS	
29	11920	11985	65.00	2.00	RHS	
30	12360	12430	70.00	2.00	RHS	
31	12450	12560	110.00	2.00	RHS	
32	12820	12895	75.00	2.00	RHS	
33	12935	12975	40.00	2.00	LHS	Junction with Timi Road
34	13070	13170	100.00	2.00	LHS	
35	13225	13505	280.00	2.00	LHS	
36	13595	13630	35.00	3.00	LHS	
37	13870	13935	65.00	2.00	LHS	
38	13955	14035	80.00	3.00	LHS	
39	14070	14170	100.00	3.00	LHS	
40	14250	14320	70.00	2.00	LHS	
41	14350	14405	55.00	3.00	LHS	
42	14450	14500	50.00	2.00	LHS	
43	14855	14890	35.00	3.00	LHS	
44	14975	15295	320.00	3.00	LHS	
45	15140	15180	40.00	3.00	LHS	Junction with NH-310
46	15360	15505	145.00	2.00	LHS	
47	15985	16000	15.00	2.00	LHS	
			3615.00			

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

12.1.6 Cut Slope wall :

Slope protection along hill side to protect the public properties and soil exposed face on hill side Height of wall varies from 3m to 5.0 m and shall be constructed with M 15 PCC .Length of wall – 6500 m

Location will be finalized during construction stage as per site conditions in consultation with NHIDCL / AE

12.2 Vetiver Plantation, Hydro Seeding and Hydro Mulching etc or similar works is to be done for slope protection and site mitigation measure upto a height of 12-15 m all along the slopes in each cutting locations except hard rock location which needs to be protected with appropriate applicable technologies, if required. Turfing with Sods on hill side slope shall be as per MoRTH Specifications

12.3 Spreading & Compaction of Roadway cutting and excavation from drain and foundation of other structures surplus material in layers not exceeding

300mm thickness at selected disposal location by Dozer at least four passes including construction of approach road to dumping site.

12.4 Land Slide Clearance in soil: Clearance of landslides in soil , ordinary rock and rock disposal of the same on the valley side/selected disposal side.

Sr. No.	Landslide Location		Disaster Type	Soil/Rock Condition	Landslide Size	
	Start	End			Length	Width
1	2320	2370	Sliding/Sliding	Bed Rock	50	50
2	3195	3465	Sliding/Sliding	Very Soft	270	50
3	3540	3695	Sliding/Sliding	Soft	155	30
4	4085	4145	Sliding/Sliding	Soft	60	80
5	4285	4370	Sliding/Sliding	Soft	85	180
6	4390	4490	Sliding/Sliding	Bed Rock	100	
7	4520	4545	Sliding/Sliding	Bed Rock	25	30
8	4660	4735	Sliding/Sliding	Bed Rock	75	
9	5200	5285	Sliding/Sliding	Soft	85	60
10	5455	5575	Sliding/Sliding	Bed Rock	120	40
11	6905	6970	Sliding/Sliding	Soft	65	
12	14595	14705	Sliding/Sliding	Bed Rock	110	50

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

12.5 Mitigation measure adopted in above location

Sr.No.	Description	Unit	Quantity
1	Seeding and Mulching (Soil Cut Slope)	sqm	30000
2	Vegetation Mat (Steep Slope)	sqm	1400
3	Crib Work (F300)	sqm	900

Sr.No.	Description	Unit	Quantity
4	Crib Work (F500)	sqm	1600
5	Groundwater Drainage Work	meter	4500
6	Anchor Work	Rm	1600
7	Rock-bolt Work	Rm	800
8	Turfing with Sods	sqm	25000

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 quantity over and above the tentative quantity as mentioned in above tables 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.

12.6 Dismantling of Structures

Dismantling of existing structures like culverts, bridges, retaining walls and other structure comprising of masonry, cement concrete, wood work, steel work, including T&P and scaffolding wherever necessary, sorting the dismantled material, disposal of unserviceable material and stacking the serviceable material with all lifts and lead of 1000 metres

No of culvert & other cross drainage structure - 65 No.

Nos of retaining wall, breast wall & other protection structure - 460 Nos

12.7 Dismantling of Flexible Pavements

Dismantling of flexible pavements and disposal of dismantled materials up to a lead of 1000 metres, stacking serviceable and unserviceable materials separately

Length of existing pavement - 13.00 Km

12.8 Removal of landslide

Clearance of landslides in soil and ordinary rock and disposal of the same on the valley side.

12.9 Disposal of cut material

Disposal of cut material at designed disposal area . Spreading & Compaction of Roadway cutting and excavation from drain and foundation of other structures surplus material in layers not exceeding 300mm thickness at selected displosal location by Dozer at least four passes including construction of approach road to dumping site.

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 EPC 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 Standards and Specifications for Two Laning of Highways (IRC: SP: 73-2015)

Annexure - 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 56-2011Where 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.

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.