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 fulfill 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 fulfill 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 improvement and up-gradation of the Project Highway to fulfill 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 16+00 to Km 32+50 .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 .

1.2.1 Except as otherwise provided in this Agreement, the width of the paved carriageway and cross-sectional features shall conform to paragraph 2.1 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	19927.906	19946.48	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
2	19988.388	19997.74	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
3	24930.577	24936.42	20	Hair pin bend curve	Adopted Design Speed of 20 Kmph
4	24976.351	24988.08	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 Hillside 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						

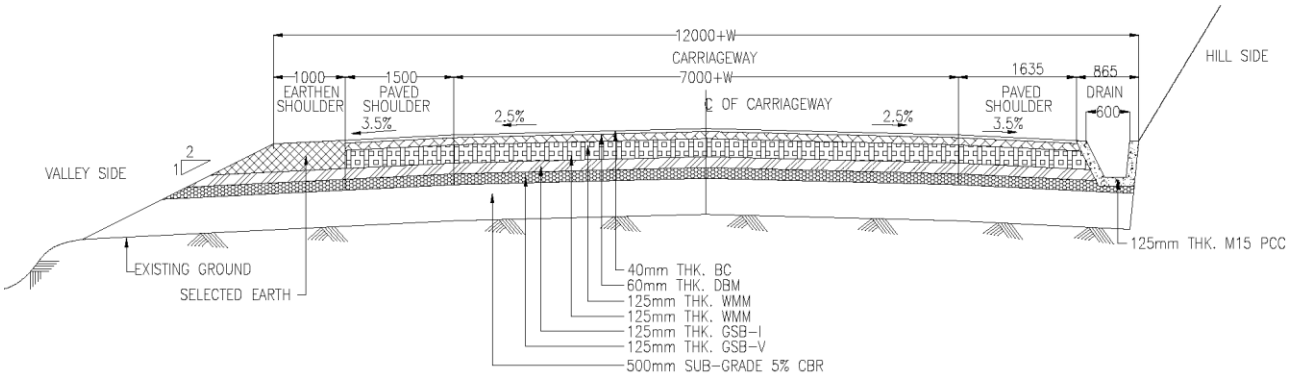
2.10 Cattle and pedestrian underpass /overpass

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		

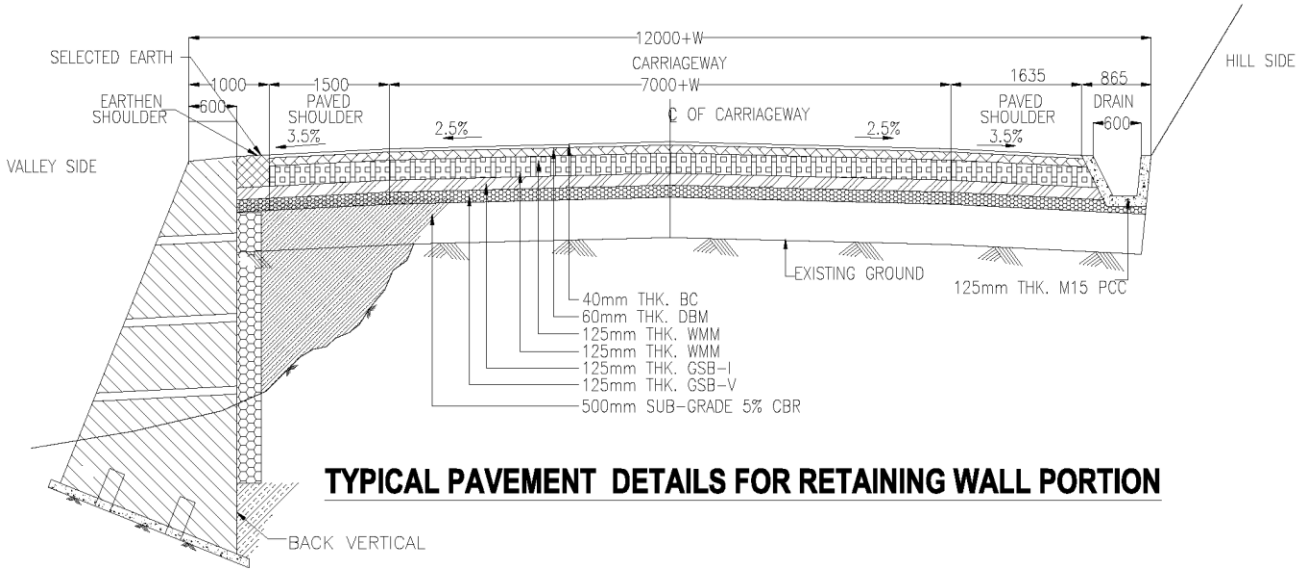
2.11 Typical cross-sections of the Project Highway

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



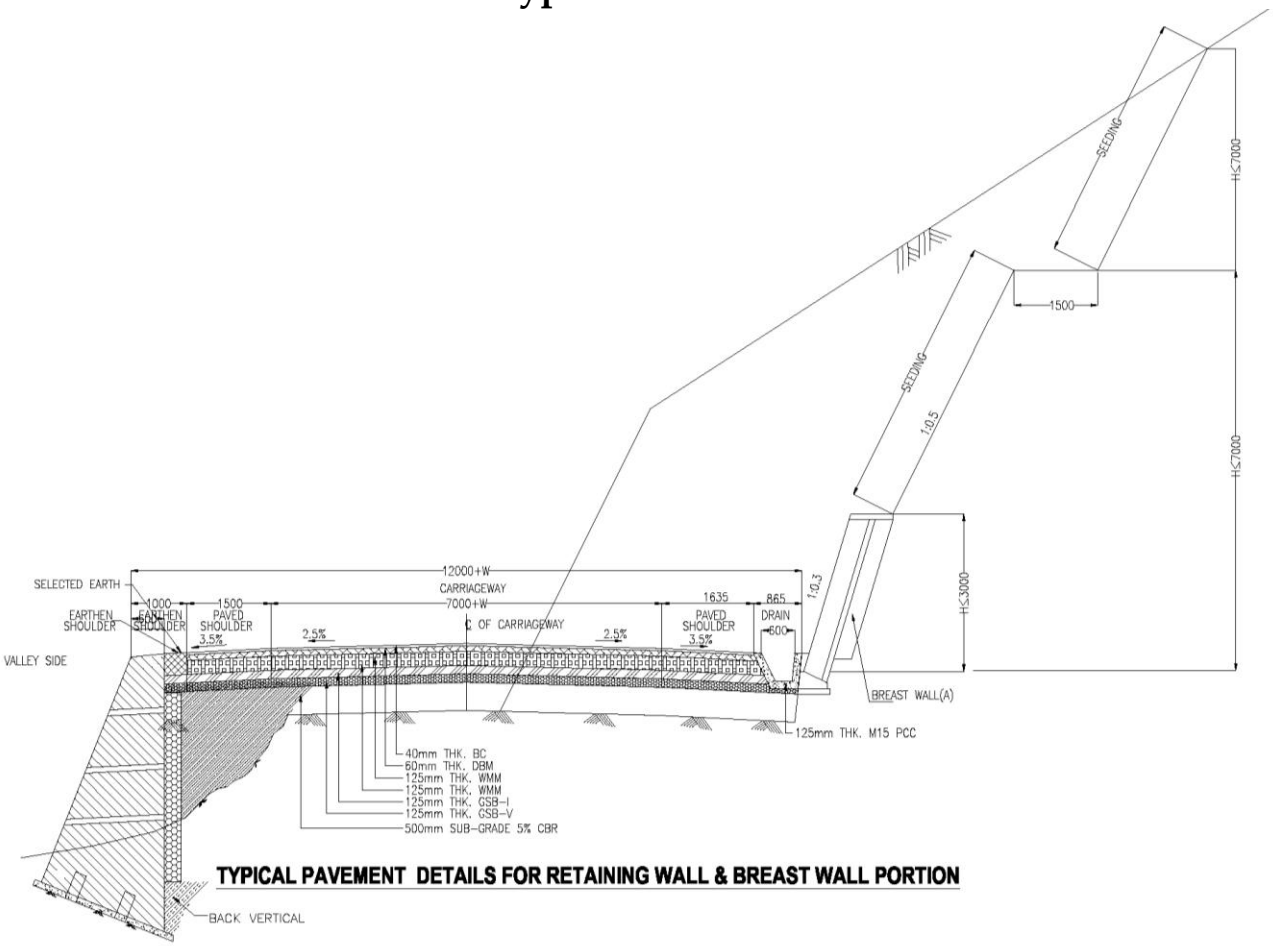
TYPICAL PAVEMENT DETAILS FOR MAIN ROAD

TCS 1- Typical Cross Section

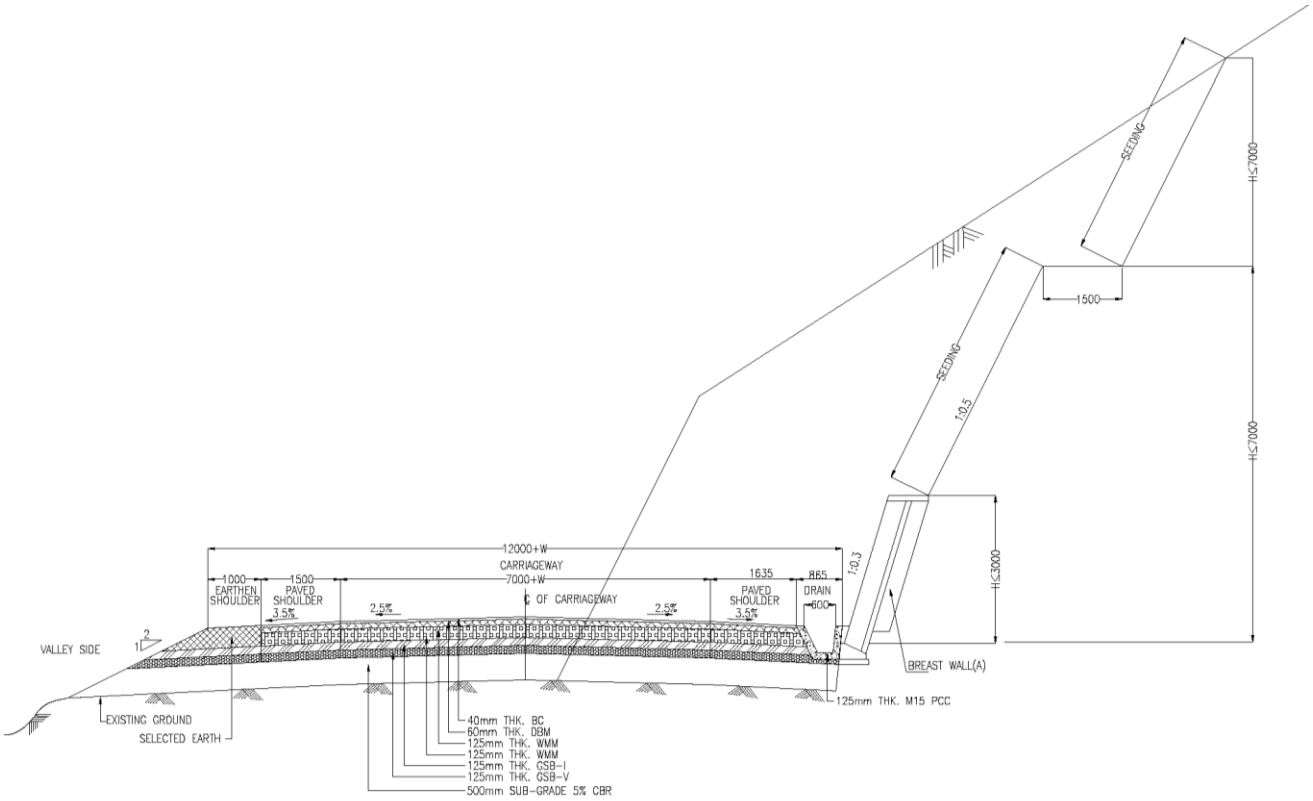


TYPICAL PAVEMENT DETAILS FOR RETAINING WALL PORTION

TCS 2- Typical Cross Section



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			Length in m	Village Name	District
Sr.No.	From	To			
1	15200	15800	600	Dentam	South
2	17120	18650	1530	Simkharka	South
3	19850	20160	310	Dodung	South
4	20700	20900	200	Bensimkharka	South
5	21450	21810	360	Ben Tthalabari	South
6	22420	22830	410	Ben Thaka	South
7	24950	25650	700	Cheerakh	South
8	26340	28700	2360	Rankey	South
9	29400	30650	1250	Ningaon	South
10	30950	31400	450	BhsiFatak	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	23310.00	LHS	Junction with Damthang Road	Y	Major

(d) Minor Intersections

Sr.No.	Design Chainage	Side	Remarks	Shape	Type
1	22175.00	RHS	Junction with Mangley Village Road	Y	Minor
2	22710.00	RHS	Junction with Nambrick Village Road	Y	Minor
3	32590.00	LHS	Army Camp Approach 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
16+00	32+50	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. 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	16+00	32+50	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	16000	17790	1790	Type-1	V shape Drain
2	17790	19285	1495	Type-2	Trapezoidal Drain
3	19285	20280	995	Type-1	V shape Drain
4	20280	20585	305	Type-2	Trapezoidal Drain
5	20585	21100	515	Type-1	V shape Drain
6	21100	21195	95	Type-2	Trapezoidal Drain
7	21195	21840	645	Type-1	V shape Drain
8	21840	22230	390	Type-2	Trapezoidal Drain
9	22230	22795	565	Type-1	V shape Drain
10	22795	23195	400	Type-2	Trapezoidal Drain
11	23195	25190	1995	Type-1	V shape Drain
12	25190	25835	645	Type-2	Trapezoidal Drain
13	25835	26470	635	Type-1	V shape Drain
14	26470	28610	2140	Type-2	Trapezoidal Drain
15	28610	29295	685	Type-1	V shape Drain
16	29295	30500	1205	Type-2	Trapezoidal Drain
17	30500	30800	300	Type-1	V shape Drain

Sr.No.	Chainage in m		Length	Type	Remarks
	From	To			
18	30800	31245	445	Type-2	Trapezoidal Drain
19	31245	32500	1255	Type-1	V shape 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	17384.00	1.85	20	Type-1
2	17630.00	1.85	20	Type-1
3	17881.00	1.85	20	Type-1
4	17910.00	3.2	20	Type-3
5	18087.00	1.85	20	Type-1
6	18525.00	2.70	20	Type-2
7	20197.00	1.85	20	Type-1
8	20623.00	2.70	20	Type-2
9	21081.00	1.85	20	Type-1
10	26130.00	3.2	20	Type-3
11	26280.00	1.85	20	Type-1
12	26385.00	1.85	20	Type-1
13	27025.00	2.70	20	Type-2
14	27555.00	1.85	20	Type-1
15	27798.00	1.85	20	Type-1
16	27947.00	2.70	20	Type-2
17	28005.00	1.85	20	Type-1

Sr.No.	Chainage	Clear Width of Chute	Length of Chute	Remarks
18	28163.00	1.85	20	Type-1
19	28465.00	3.2	20	Type-3
20	28624.00	1.85	20	Type-1
21	28746.00	1.85	20	Type-1
22	29031.00	3.2	20	Type-3
23	31253.00	1.85	20	Type-1
24	31303.00	1.85	20	Type-1
25	31405.00	3.2	20	Type-3
26	31696.00	1.85	20	Type-1
27	32311.00	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 – 1400 m V shaped drain.

As per plan & Profile drawing

6.4 Catch water drain - 1800 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 13.0m 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:

Sr. No.	Chainage (m)	Curve/ Straight	Radius	Type	Span X Depth	Remarks
1	16194	S	1000	BOX-TYPE-1	2 X 2	Proposed
2	16484	C	60	BOX-TYPE-2	3 X 3	Proposed
3	18900	S	272	BOX-TYPE-1	2 X 2	Proposed
4	19209	S	INFINITY	BOX-TYPE-1	2 X 2	Proposed
5	19718	S	-326	BOX-TYPE-1	2 X 2	Proposed
6	21447	S	-397	BOX-TYPE-3	4 X 4	Proposed
7	21739	C	-55	BOX-TYPE-1	2 X 2	Proposed
8	22147	C	-104	HPC-TYPE-2	1.2 X D NP4	Proposed
9	22927	S	INFINITY	BOX-TYPE-1	2 X 2	Proposed
10	23220	C	45	HPC-TYPE-2	1.2 X D NP4	Proposed

Sr. No.	Chainage (m)	Curve/ Straight	Radius	Type	Span X Depth	Remarks
11	23327	C	58	BOX-TYPE-1	2 X 2	Proposed
12	23882	S	INFINITY	BOX-TYPE-2	3 X 3	Proposed
13	24521	S	30	HPC-TYPE-1	1.2 X D NP4	Proposed
14	25071	C	45	BOX-TYPE-1	2 X 2	Proposed
15	25315	S	1205	HPC-TYPE-1	1.2 X D NP4	Proposed
16	25577	C	31	HPC-TYPE-2	1.2 X D NP4	Proposed
17	25921	C	45	HPC-TYPE-2	1.2 X D NP4	Proposed
18	27180	S	1542	HPC-TYPE-1	1.2 X D NP4	Proposed
19	29386	C	112	BOX-TYPE-1	2 X 2	Proposed
20	29678	C	50	BOX-TYPE-1	2 X 2	Proposed
21	29882	S	-60	BOX-TYPE-1	2 X 2	Proposed
22	30162	S	INFINITY	BOX-TYPE-1	2 X 2	Proposed
23	31056	S	INFINITY	BOX-TYPE-1	2 X 2	Proposed
24	31696	S	65	BOX-TYPE-1	2 X 2	Proposed
25	32911	S	126	HPC-TYPE-1	1.2 X D NP4	Proposed

Reconstruction of culvert

Sr. No.	Chainage (m)	Curve/ Straight	Radius	Type	Span X Depth	Remarks
1	16733	C	144	BOX-TYPE-1	2 X 2	Re-construction
2	16785	S	INFINITY	HPC-TYPE-1	1.2 X D NP4	Re-construction
3	17014	S	65	HPC-TYPE-1	1.2 X D NP4	Re-construction
4	17044	S	INFINITY	HPC-TYPE-1	1.2 X D NP4	Re-construction
5	17277	S	30	HPC-TYPE-1	1.2 X D NP4	Re-construction
6	17384	C	80	BOX-TYPE-2	3 X 3	Re-construction
7	17630	C	60	BOX-TYPE-4	6 X 4	Re-construction
8	17881	C	66	BOX-TYPE-1	2 X 2	Re-construction
9	17910	C	64	BOX-TYPE-1	2 X 2	Re-construction
10	18087	C	70	BOX-TYPE-2	3 X 3	Re-construction
11	18189	S	45	HPC-TYPE-1	1.2 X D NP4	Re-construction
12	18525	S	30	BOX-TYPE-3	4 X 4	Re-construction
13	20197	S	36	BOX-TYPE-4	6 X 4	Re-construction
14	20288	C	-60	HPC-TYPE-2	1.2 X D NP4	Re-construction
15	20505	C	-45	HPC-TYPE-2	1.2 X D NP4	Re-construction

Sr. No.	Chainage (m)	Curve/ Straight	Radius	Type	Span X Depth	Remarks
16	20623	S	45	BOX-TYPE-3	4 X 4	Re-construction
17	21081	S	INFINITY	BOX-TYPE-1	2 X 2	Re-construction
18	21391	C	40	HPC-TYPE-2	1.2 X D NP4	Re-construction
19	22434	C	70	HPC-TYPE-2	1.2 X D NP4	Re-construction
20	22581	S	76	HPC-TYPE-1	1.2 X D NP4	Re-construction
21	23364	S	526	HPC-TYPE-1	1.2 X D NP4	Re-construction
22	23423	S	INFINITY	HPC-TYPE-1	1.2 X D NP4	Re-construction
23	23553	C	216	HPC-TYPE-2	1.2 X D NP4	Re-construction
24	23721	C	60	HPC-TYPE-2	1.2 X D NP4	Re-construction
25	24131	S	2454	HPC-TYPE-1	1.2 X D NP4	Re-construction
26	24411	S	30	HPC-TYPE-1	1.2 X D NP4	Re-construction
27	24627	S	63	HPC-TYPE-1	1.2 X D NP4	Re-construction
28	24682	S	30	HPC-TYPE-1	1.2 X D NP4	Re-construction
29	26130	C	30	BOX-TYPE-3	4 X 4	Re-construction
30	26280	C	30	BOX-TYPE-2	3 X 3	Re-construction
31	26385	S	30	BOX-TYPE-2	3 X 3	Re-construction
32	26437	S	INFINITY	HPC-TYPE-1	1.2 X D NP4	Re-construction
33	26705	S	INFINITY	HPC-TYPE-1	1.2 X D NP4	Re-construction
34	26797	C	65	HPC-TYPE-2	1.2 X D NP4	Re-construction
35	27025	C	30	BOX-TYPE-3	4 X 4	Re-construction
36	27555	C	30	BOX-TYPE-2	3 X 3	Re-construction
37	27798	C	30	BOX-TYPE-3	4 X 4	Re-construction
38	27947	C	47	BOX-TYPE-1	2 X 2	Re-construction
39	28005	S	45	BOX-TYPE-2	3 X 3	Re-construction
40	28163	C	35	BOX-TYPE-3	4 X 4	Re-construction
41	28465	C	30	BOX-TYPE-2	3 X 3	Re-construction
42	28624	C	59	BOX-TYPE-2	3 X 3	Re-construction
43	28746	C	30	BOX-TYPE-2	3 X 3	Re-construction
44	28871	C	30	HPC-TYPE-2	1.2 X D NP4	Re-construction
45	29031	S	217	BOX-TYPE-1	2 X 2	Re-construction
46	30298	S	INFINITY	HPC-TYPE-1	1.2 X D NP4	Re-construction
47	30518	S	211	HPC-TYPE-1	1.2 X D NP4	Re-construction
48	30714	S	340	HPC-TYPE-1	1.2 X D NP4	Re-construction
49	31253	S	INFINITY	BOX-TYPE-1	2 X 2	Re-construction
50	31303	C	45	BOX-TYPE-1	2 X 2	Re-construction
51	31405	S	65	BOX-TYPE-1	2 X 2	Re-construction
52	31488	S	309	BOX-TYPE-1	2 X 2	Re-construction
53	31668	S	503	HPC-TYPE-1	1.2 X D NP4	Re-construction
54	32046	C	60	HPC-TYPE-2	1.2 X D NP4	Re-construction
55	32091	S	INFINITY	HPC-TYPE-1	1.2 X D NP4	Re-construction
56	32212	C	93	HPC-TYPE-2	1.2 X D NP4	Re-construction
57	32311	S	INFINITY	BOX-TYPE-1	2 X 2	Re-construction
58	32669	S	75	HPC-TYPE-1	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	19565	PSC	Open	Nala	1x10+1X40+1X20	Existing bridge
2	19965	PSC	Open	Nala	1X20+1X35	
3	24970	PSC	Open	Nala	1X25+1X50+1X25	

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
Nil						

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		

7.3.4Repairs/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	30
3	60 cm circular	each	33
4	80 mm x 60 mm rectangular	each	22
5	60 cm x 45 cm rectangular	each	28
6	60 cm x 60 cm square	each	30
7	Direction and Place Identification signs upto 0.9 sqm size board.	Sqm	7.5

Sr.No.	Traffic Signages, Road Marking and other appurtenances	unit	Quantity
8	Road Marking with Hot Applied Thermoplastic Compound with Reflectorising Glass	Sqm	4125
9	5th kilometre stone (precast)	each	
10	Ordinary Kilometer stone (Precast)	each	3
11	Hectometer stone (Precast)	each	13
12	Road Delineators	each	65
13	Boundary pillar	each	15
14	Street Furniture	each	180

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	17885.00	17895.00	10	3	RHS
2	17895.00	17905.00	10	3	RHS
3	19745.00	19755.00	10	3	RHS
4	19755.00	19765.00	10	3	RHS
5	19765.00	19775.00	10	4	RHS
6	19775.00	19785.00	10	3	RHS
7	19785.00	19795.00	10	4	RHS
8	19795.00	19805.00	10	4	RHS
9	19805.00	19815.00	10	5	RHS
10	19815.00	19825.00	10	6	RHS
11	19825.00	19835.00	10	6	RHS
12	19835.00	19845.00	10	5	RHS
13	19845.00	19855.00	10	5	RHS
14	19855.00	19865.00	10	6	RHS
15	19875.00	19885.00	10	3	LHS

Sr.No.	Chainage		Length in m	Height in m	Remarks
	From	To			
16	19885.00	19895.00	10	3	LHS
17	19895.00	19905.00	10	3	LHS
18	19895.00	19905.00	10	6	RHS
19	19905.00	19915.00	10	3	LHS
20	19905.00	19915.00	10	6	RHS
21	19915.00	19925.00	10	6	RHS
22	19925.00	19935.00	10	6	RHS
23	19995.00	20005.00	10	3	RHS
24	20505.00	20515.00	10	3	RHS
25	20515.00	20525.00	10	3	RHS
26	20615.00	20625.00	10	3	RHS
27	20625.00	20635.00	10	3	RHS
28	20935.00	20945.00	10	4	RHS
29	20945.00	20955.00	10	3	RHS
30	21645.00	21655.00	10	3	RHS
31	21655.00	21665.00	10	3	RHS
32	21665.00	21675.00	10	3	RHS
33	21675.00	21685.00	10	3	RHS
34	21705.00	21715.00	10	3	RHS
35	22675.00	22685.00	10	3	RHS
36	23155.00	23165.00	10	3	RHS
37	23165.00	23175.00	10	4	RHS
38	23215.00	23225.00	10	3	RHS
39	23225.00	23235.00	10	3	RHS
40	25125.00	25135.00	10	5	RHS
41	25135.00	25145.00	10	5	RHS
42	25185.00	25195.00	10	4	RHS
43	25195.00	25205.00	10	4	RHS
44	25255.00	25265.00	10	3	RHS
45	25265.00	25275.00	10	4	RHS
46	25355.00	25365.00	10	3	RHS
47	25365.00	25375.00	10	3	RHS
48	26025.00	26035.00	10	3	RHS
49	26115.00	26125.00	10	5	RHS
50	26135.00	26145.00	10	5	RHS
51	26365.00	26375.00	10	4	RHS
52	26375.00	26385.00	10	4	RHS
53	27515.00	27525.00	10	3	RHS
54	27545.00	27555.00	10	5	RHS
55	27555.00	27565.00	10	3	RHS
56	27755.00	27765.00	10	3	RHS
57	27765.00	27775.00	10	6	RHS
58	27785.00	27795.00	10	4	LHS

Sr.No.	Chainage		Length in m	Height in m	Remarks
	From	To			
59	27795.00	27805.00	10	5	LHS
60	27805.00	27815.00	10	3	LHS
61	27815.00	27825.00	10	3	LHS
62	27815.00	27825.00	10	4	RHS
63	27825.00	27835.00	10	4	RHS
64	27835.00	27845.00	10	4	RHS
65	27845.00	27855.00	10	5	RHS
66	27855.00	27865.00	10	5	RHS
67	27865.00	27875.00	10	5	RHS
68	27875.00	27885.00	10	5	RHS
69	27895.00	27905.00	10	4	RHS
70	27905.00	27915.00	10	3	RHS
71	27935.00	27945.00	10	3	LHS
72	27975.00	27985.00	10	3	LHS
73	27995.00	28005.00	10	5	LHS
74	28005.00	28015.00	10	5	LHS
75	28025.00	28035.00	10	4	RHS
76	28035.00	28045.00	10	4	RHS
77	28045.00	28055.00	10	4	RHS
78	28055.00	28065.00	10	4	RHS
79	28065.00	28075.00	10	4	RHS
80	28075.00	28085.00	10	3	RHS
81	28085.00	28095.00	10	3	RHS
82	28095.00	28105.00	10	5	RHS
83	28105.00	28115.00	10	4	RHS
84	28115.00	28125.00	10	3	RHS
85	28125.00	28135.00	10	3	RHS
86	28135.00	28145.00	10	3	RHS
87	28145.00	28155.00	10	4	RHS
88	28155.00	28165.00	10	3	LHS
89	28165.00	28175.00	10	3	LHS
90	28725.00	28735.00	10	3	RHS
91	28745.00	28755.00	10	4	RHS
92	29375.00	29385.00	10	4	RHS
93	29395.00	29405.00	10	3	RHS
94	29425.00	29435.00	10	3	RHS
95	29435.00	29445.00	10	3	RHS
96	29765.00	29775.00	10	3	RHS
97	29775.00	29785.00	10	3	RHS
98	29885.00	29895.00	10	3	RHS
99	30055.00	30065.00	10	3	RHS
100	30285.00	30295.00	10	3	RHS
101	30295.00	30305.00	10	3	RHS

Sr.No.	Chainage		Length in m	Height in m	Remarks
	From	To			
102	30305.00	30315.00	10	3	RHS
103	30315.00	30325.00	10	3	RHS
104	30355.00	30365.00	10	3	RHS
105	30365.00	30375.00	10	3	RHS
106	30385.00	30395.00	10	3	RHS
107	30395.00	30405.00	10	3	RHS
108	32045.00	32055.00	10	3	RHS
109	32325.00	32335.00	10	3	RHS
110	32505.00	32515.00	10	3	RHS
111	32515.00	32525.00	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	16245.00	16255.00	10	12	RHS
2	17975.00	17985.00	10	12	RHS
3	19865.00	19875.00	10	8	RHS
4	19875.00	19885.00	10	12	RHS
5	19885.00	19895.00	10	12	RHS
6	20505.00	20515.00	10	10	LHS
7	26125.00	26135.00	10	8	RHS
8	27775.00	27785.00	10	6	RHS
9	27785.00	27795.00	10	10	RHS
10	27795.00	27805.00	10	10	RHS
11	27805.00	27815.00	10	6	RHS
12	27885.00	27895.00	10	6	RHS
13	27925.00	27935.00	10	6	RHS
14	27935.00	27945.00	10	6	RHS
15	27945.00	27955.00	10	6	LHS
16	27945.00	27955.00	10	10	RHS
17	27955.00	27965.00	10	12	RHS
18	27965.00	27975.00	10	10	RHS
19	27975.00	27985.00	10	10	RHS
20	27985.00	27995.00	10	10	RHS
21	27995.00	28005.00	10	8	RHS
22	28005.00	28015.00	10	10	RHS
23	28015.00	28025.00	10	8	RHS
24	28155.00	28165.00	10	8	RHS
25	28165.00	28175.00	10	6	RHS
26	28455.00	28465.00	10	8	RHS
27	28465.00	28475.00	10	8	RHS

Sr.No.	Chainage		Length in m	Height in m	Remarks
	From	To			
28	28735.00	28745.00	10	6	RHS
29	31625.00	31635.00	10	10	RHS
30	32315.00	32325.00	10	10	RHS

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	16245.00	16255.00	10	3	RHS
2	16245.00	16255.00	10	2	RHS
3	17395.00	17405.00	10	2	RHS
4	17405.00	17415.00	10	2	RHS
5	17415.00	17425.00	10	3	RHS
6	17425.00	17435.00	10	2	RHS
7	17435.00	17445.00	10	2	RHS
8	17695.00	17705.00	10	2	LHS
9	17795.00	17805.00	10	2	RHS
10	17805.00	17815.00	10	2	RHS
11	17875.00	17885.00	10	2	RHS
12	17905.00	17915.00	10	3	RHS
13	17965.00	17975.00	10	2	RHS
14	17975.00	17985.00	10	3	RHS
15	17975.00	17985.00	10	2	RHS
16	18005.00	18015.00	10	2	RHS
17	18085.00	18095.00	10	3	RHS
18	18985.00	18995.00	10	2	RHS
19	19265.00	19275.00	10	2	RHS
20	19395.00	19405.00	10	2	RHS
21	19455.00	19465.00	10	3	RHS
22	19725.00	19735.00	10	2	RHS
23	19735.00	19745.00	10	2	RHS
24	19875.00	19885.00	10	3	RHS
25	19885.00	19895.00	10	3	RHS
26	19885.00	19895.00	10	2	RHS
27	19925.00	19935.00	10	2	LHS

Sr.No.	Chainage		Length in m	Height in m	Remarks
	From	To			
28	19995.00	20005.00	10	3	LHS
29	20005.00	20015.00	10	3	RHS
30	20495.00	20505.00	10	3	RHS
31	20575.00	20585.00	10	2	RHS
32	20975.00	20985.00	10	2	RHS
33	21145.00	21155.00	10	2	RHS
34	21255.00	21265.00	10	2	RHS
35	21625.00	21635.00	10	2	RHS
36	21635.00	21645.00	10	2	RHS
37	21685.00	21695.00	10	3	RHS
38	21695.00	21705.00	10	2	RHS
39	21715.00	21725.00	10	2	RHS
40	21725.00	21735.00	10	3	RHS
41	21745.00	21755.00	10	2	RHS
42	21755.00	21765.00	10	2	RHS
43	21785.00	21795.00	10	2	RHS
44	21795.00	21805.00	10	2	RHS
45	21835.00	21845.00	10	2	RHS
46	21895.00	21905.00	10	2	RHS
47	22425.00	22435.00	10	2	RHS
48	22575.00	22585.00	10	3	RHS
49	22655.00	22665.00	10	2	RHS
50	22665.00	22675.00	10	2	RHS
51	22775.00	22785.00	10	3	RHS
52	22785.00	22795.00	10	2	RHS
53	22795.00	22805.00	10	2	RHS
54	22805.00	22815.00	10	3	RHS
55	22885.00	22895.00	10	2	RHS
56	22945.00	22955.00	10	3	RHS
57	22955.00	22965.00	10	2	RHS
58	22965.00	22975.00	10	2	RHS
59	22975.00	22985.00	10	3	RHS
60	22985.00	22995.00	10	2	RHS
61	23145.00	23155.00	10	2	RHS
62	23175.00	23185.00	10	2	RHS
63	23185.00	23195.00	10	2	RHS
64	23195.00	23205.00	10	2	RHS
65	23205.00	23215.00	10	2	RHS
66	23235.00	23245.00	10	3	RHS
67	23255.00	23265.00	10	3	RHS
68	23265.00	23275.00	10	2	RHS
69	23275.00	23285.00	10	2	RHS
70	23285.00	23295.00	10	2	RHS

Sr.No.	Chainage		Length in m	Height in m	Remarks
	From	To			
71	23295.00	23305.00	10	2	RHS
72	23305.00	23315.00	10	2	RHS
73	23315.00	23325.00	10	2	RHS
74	23325.00	23335.00	10	2	RHS
75	23345.00	23355.00	10	2	RHS
76	23355.00	23365.00	10	3	RHS
77	23365.00	23375.00	10	2	RHS
78	23515.00	23525.00	10	2	RHS
79	24925.00	24935.00	10	3	RHS
80	25005.00	25015.00	10	3	RHS
81	25015.00	25025.00	10	2	RHS
82	25025.00	25035.00	10	2	RHS
83	25055.00	25065.00	10	2	RHS
84	25065.00	25075.00	10	2	RHS
85	25075.00	25085.00	10	2	RHS
86	25145.00	25155.00	10	3	RHS
87	25175.00	25185.00	10	3	RHS
88	25205.00	25215.00	10	3	RHS
89	25215.00	25225.00	10	2	RHS
90	25225.00	25235.00	10	2	RHS
91	25235.00	25245.00	10	3	RHS
92	25245.00	25255.00	10	2	RHS
93	25345.00	25355.00	10	3	RHS
94	25375.00	25385.00	10	2	RHS
95	25385.00	25395.00	10	3	RHS
96	25395.00	25405.00	10	3	RHS
97	25405.00	25415.00	10	2	RHS
98	25465.00	25475.00	10	2	RHS
99	26085.00	26095.00	10	2	RHS
100	26095.00	26105.00	10	2	RHS
101	26105.00	26115.00	10	2	RHS
102	26145.00	26155.00	10	3	RHS
103	26155.00	26165.00	10	2	RHS
104	26355.00	26365.00	10	2	RHS
105	26385.00	26395.00	10	2	RHS
106	27505.00	27515.00	10	3	RHS
107	27525.00	27535.00	10	2	RHS
108	27915.00	27925.00	10	2	RHS
109	27955.00	27965.00	10	3	RHS
110	27955.00	27965.00	10	2	RHS
111	27985.00	27995.00	10	2	LHS
112	28015.00	28025.00	10	2	LHS
113	28185.00	28195.00	10	2	RHS

Sr.No.	Chainage		Length in m	Height in m	Remarks
	From	To			
114	28255.00	28265.00	10	2	RHS
115	28265.00	28275.00	10	3	RHS
116	28275.00	28285.00	10	3	RHS
117	28285.00	28295.00	10	3	RHS
118	28295.00	28305.00	10	3	RHS
119	28305.00	28315.00	10	2	RHS
120	28445.00	28455.00	10	2	RHS
121	28475.00	28485.00	10	3	RHS
122	28625.00	28635.00	10	3	RHS
123	28635.00	28645.00	10	2	RHS
124	29055.00	29065.00	10	3	RHS
125	29185.00	29195.00	10	3	RHS
126	29195.00	29205.00	10	3	RHS
127	29225.00	29235.00	10	2	RHS
128	29385.00	29395.00	10	2	RHS
129	29415.00	29425.00	10	2	RHS
130	29445.00	29455.00	10	3	RHS
131	29475.00	29485.00	10	2	RHS
132	29485.00	29495.00	10	2	RHS
133	29495.00	29505.00	10	3	RHS
134	29505.00	29515.00	10	2	RHS
135	29515.00	29525.00	10	2	RHS
136	29705.00	29715.00	10	2	RHS
137	29785.00	29795.00	10	2	RHS
138	29795.00	29805.00	10	2	RHS
139	29805.00	29815.00	10	2	RHS
140	29815.00	29825.00	10	3	RHS
141	29895.00	29905.00	10	3	RHS
142	29945.00	29955.00	10	3	RHS
143	29955.00	29965.00	10	3	RHS
144	29965.00	29975.00	10	2	RHS
145	29975.00	29985.00	10	2	RHS
146	29985.00	29995.00	10	3	RHS
147	30005.00	30015.00	10	2	RHS
148	30015.00	30025.00	10	3	RHS
149	30025.00	30035.00	10	2	RHS
150	30035.00	30045.00	10	2	RHS
151	30045.00	30055.00	10	3	RHS
152	30065.00	30075.00	10	2	RHS
153	30075.00	30085.00	10	2	RHS
154	30085.00	30095.00	10	2	RHS
155	30135.00	30145.00	10	2	RHS
156	30145.00	30155.00	10	2	RHS

Sr.No.	Chainage		Length in m	Height in m	Remarks
	From	To			
157	30155.00	30165.00	10	2	RHS
158	30165.00	30175.00	10	2	RHS
159	30175.00	30185.00	10	2	RHS
160	30185.00	30195.00	10	2	RHS
161	30195.00	30205.00	10	2	RHS
162	30205.00	30215.00	10	2	RHS
163	30225.00	30235.00	10	2	RHS
164	30235.00	30245.00	10	2	RHS
165	30245.00	30255.00	10	2	RHS
166	30255.00	30265.00	10	3	RHS
167	30275.00	30285.00	10	2	RHS
168	30325.00	30335.00	10	2	RHS
169	30335.00	30345.00	10	2	RHS
170	30345.00	30355.00	10	3	RHS
171	30375.00	30385.00	10	3	RHS
172	30405.00	30415.00	10	3	RHS
173	30425.00	30435.00	10	2	RHS
174	30465.00	30475.00	10	2	RHS
175	31445.00	31455.00	10	2	RHS
176	31695.00	31705.00	10	2	RHS
177	32485.00	32495.00	10	3	RHS
178	32495.00	32505.00	10	3	RHS
179	32615.00	32625.00	10	3	RHS
180	32785.00	32795.00	10	3	RHS
181	32825.00	32835.00	10	2	RHS
182	32835.00	32845.00	10	2	RHS
183	32845.00	32855.00	10	3	RHS
184	32855.00	32865.00	10	2	RHS
185	32885.00	32895.00	10	2	RHS
			1850.000		

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	20645	20980	335	3	Disposal Yard on RHS
2	22215	22325	110	3	Sinking Portion
3	32210	32660	450	2	Disposal Yard on RHS
			895.000		

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	16000	16050	50.00	2.00	LHS	
2	17205	17240	35.00	2.00	LHS	
3	18775	18880	105.00	2.00	LHS	
4	18995	19015	20.00	2.00	LHS	
5	19305	19345	40.00	3.00	LHS	
6	19450	19525	75.00	3.00	LHS	
7	19600	19680	80.00	2.00	LHS	
8	19730	19975	245.00	3.00	LHS	
9	20690	20730	40.00	2.00	LHS	
10	21105	21140	35.00	3.00	LHS	
11	21280	21330	50.00	2.00	LHS	
12	22155	22195	40.00	2.00	RHS	Junction with Mangley Village Road
13	22690	22730	40.00	2.00	RHS	Junction with Nambrick Village Road
14	23290	23330	40.00	2.00	LHS	Junction with Damthang

Sr. No	Chainage		Length in m	Height in m	Side	Remarks
	From	To				
						Road
15	25585	25650	65.00	2.00	LHS	
16	32570	32610	40.00	3.00	LHS	Army Camp Approach road

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 – 7500 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 Specification

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	22215	22325	Sinking Portion	Bed Rock	110	60

12.5 Mitigation measure adopted in above location

Sr.No.	Description	Unit	Quantity
1	Seeding and Mulching (Soil Cut Slope)	sqm	40000.00
2	Vegetation Mat (Steep Slope)	sqm	1600.00
3	Crib Work (F300)	sqm	800.00
4	Crib Work (F500)	sqm	1910.00

Sr.No.	Description	Unit	Quantity
5	Groundwater Drainage Work	meter	5424.00
6	Anchor Work	Rm	1472.00
7	Rock-bolt Work	Rm	700.00
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 table or through change in specifications will not be considered for payment as change of scope. Therefore Contractor shall make through investigation of the site and assess the requirement of slope protection and slide prone zones and other safety features on his own before submission of bid

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 - 55 No.

Nos of retaining wall, breast wall & other protection structure - 482 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 - 15.00 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 disposal 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

1.1 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 Deviations from the Specifications and Standards

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