

Schedule - B

(See Clause 2.1)

Development of the Project Highway

1. Development of the Project Highway

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

2. Rehabilitation and augmentation

Rehabilitation and augmentation shall include Two-Laning with Earthen 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.

Annex -I

(Schedule -B)

Construction of 48m Bridge over Chuba Khola from Km 75+300 to Km 75+800 on NH-10 in the State of Sikkim on EPC basis.

1. Widening of the Existing Highway

- (i) 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.
- (ii) Width of Carriageway
- (a) Two-Laning with earthen shoulders shall be undertaken. The paved carriageway shall be 7 (seven) m wide alongwith paved shoulders in accordance with the typical cross sections drawings in the Manual.

In the built-up areas also, the width of the carriageway shall be as specified in the following table:

Sl. No.	Built-up stretch (Township)	Location in m		Carriage Way Width (m)	Paved Shoulder Width (m)
		From	To		
NIL					

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

2. Geometric Design and General Features

(i) General

Geometric design and general features of the Project Highway shall be in accordance with Section 2 of the Manual.

(ii) Design speed

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

(iii) Improvement of the existing road geometrics

The hilly gradients shall be corrected in such a way so as to attain a limiting gradient of 7% 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	75300.0	75500.0	20	Vertical gradient	6.67 %
2	75550.0	75800.0	20	Vertical gradient	7.30%

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.

(iv) Right of Way

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

(v) Type of shoulders

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

Sl.No.	Stretch (from km to km)	Fully paved shoulders/ footpaths	Reference to cross section
Nil			

(b) In open country, earthen shoulders of 2.5 m width shall be covered with 150 mm thick compacted layer of granular material.

(c) Design and specifications of paved shoulders and granular material shall conform to the requirements specified in paragraphs 5.10 of the Manual.

(vi) Lateral and vertical clearances at underpasses

- (a) Lateral and vertical clearances at underpasses and provision of guardrails/crash barriers shall be as per paragraph 2.11 of the Manual.
- (b) Lateral clearance: The width of the opening at the underpasses shall be as follows:

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

(vii) Lateral and vertical clearances at overpasses

- (a) Lateral and vertical clearances at overpasses shall be as per paragraph 2.11 of the Manual.
- (b) Lateral clearance: The width of the opening at the overpasses shall be as follows:

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

(viii) Service roads

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

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

(ix) Grade separated structures

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

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

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

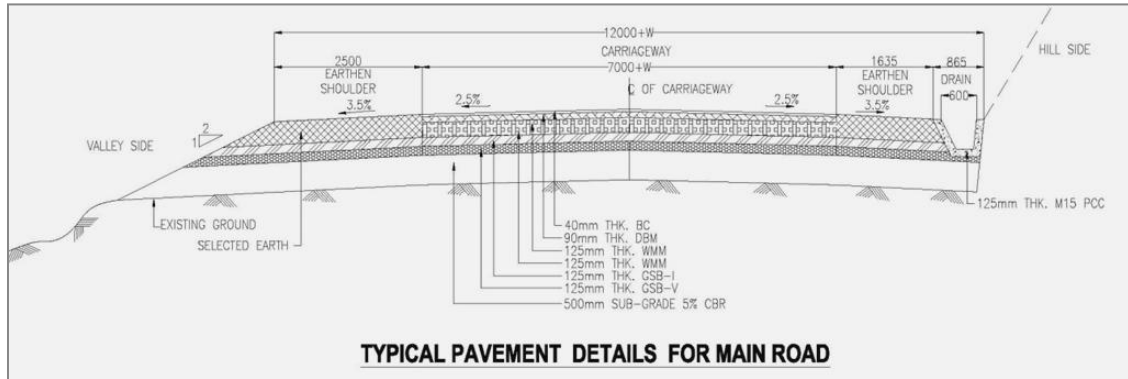
Sl. No.	Location	Type of structure Length (m)	Cross road at			Remarks, if any
			Existing Level	Raised Level	Lowered Level	
Nil						

- (x) Cattle and pedestrian underpass /overpass

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

Sl. No.	Location	Type of crossing
Nil		

- (xi) Typical cross-sections of the Project Highway



3. Intersections and Grade Separators

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

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

- (i) At-grade intersections

Sl. No.	Location of intersection	Type of intersection	Other features
Nil			

- (ii) Grade separated intersection with/without ramps

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

4. Road Embankment and Cut Section

- (i) Widening and improvement of the existing road embankment/cuttings and construction of new road embankment/cuttings shall conform to the Specifications and Standards given in Section 4 of the Manual and the specified

cross sectional details. Deficiencies in the plan and profile of the existing road shall be corrected.

(ii) Raising of the existing road

The existing road shall be raised in the following sections:

Sl. No.	Section (from km to km)	Length	Extent of raising [Top of finished road level]
1	75+350 to 75+500	150	Average height 1.2 m

5. Pavement Design

(i) Pavement design shall be carried out in accordance with Section 5 of the Manual.

(ii) Type of pavement

Flexible Pavement

(iii) Design requirements

(a) Design Period and strategy

As per clause 5.4.1, 5.9 & 5.10 of IRC : SP: 73- 2015

(b) Design Traffic

As per clause 5.4.1, 5.9 & 5.10 of IRC : SP: 73- 2015

(iv) Reconstruction of stretches

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

Sr. No.	Stretch in Km		Remarks
	From	To	
1	75+300	75+800	Construction of new 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:

Open side trapezoidal lined 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. 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	Remarks
	From	To		
1	75300.00	75800.00	440.0	Trapezoidal Drain line drain excluding bridge portion

7. Design of Structures

(i) General

(a) All bridges, culverts and structures shall be designed and constructed in accordance with Section 7 of the Manual and shall conform to the cross-sectional features and other details specified therein.

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

Sr.No.	Bridge at Km	Width of carriageway and cross-sectional features*
1	75+300 To 75+800	Carriageway width 11.0 m + Safety Kerbs 1.0(2x0.5) m+ Crash barrier 1.0 (2x.50) m

(c) The following structures shall be provided with footpaths:

Sr.No.	Location at Km	Remarks
Nil		

(d) All bridges shall be high-level bridges.

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

Sr.No.	Bridge at Km	Utility services to be carried	Remarks
Nil			

(f) 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.

(ii) Culverts

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

(b) Reconstruction of existing culverts:

The existing culverts at the following locations shall be re-constructed as new culverts:

S/N	Chainage (m)	Curve /Straight	Radius	Type	Span X Depth
NIL					

(c) Widening of existing culverts:

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

Sl. No	Chainages	Description
NIL		

Note- The work done of above culverts is incomplete by earlier EPC contractor and need to widen/repair as per Technical standards. Repair works like Catch pit, Head wall, Outfall, Parapet wall etc.

(d) Additional new culverts shall be constructed as per particulars given in the table below:

S/N	Chainage (m)	Curve /Straight	Radius	Type	Span X Depth
NIL					

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

(e) Repairs/replacements of railing/parapets, flooring and protection works of the existing culverts shall be undertaken as follows:

Sl.No.	Location at Km	Type of repair required
NIL		

(f) Floor protection works shall be as specified in the relevant IRC Codes and Specifications

(iii) Bridges

(a) Existing bridges to be re- constructed/widened

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

S/N	Location in m	Super structure	Foundation	Remarks	Span Arrangement
1	75+530	Steel truss with single lane carriageway	Adequate vertical clearance & water way	Weak bridge at very sharp curve	1
*Attach GAD					

(ii) The following narrow bridges shall be widened:

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

(b) Additional new bridges

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

S/N	Location in m	Super structure	Foundation	Remarks	Span Arrangement	Remarks
1	75530	PSC	Open	Nala	1x48	Alignment

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

Sl.No.	Location at Km	Remarks, if any
Nil		

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

Sl.No.	Location at Km	Remarks, if any
Nil		

(e) Drainage system for bridge decks

An effective drainage system for bridge decks shall be provided as specified in paragraph 7.20 of the Manual

(f) Structures in marine environment-**Nil**

(iv) Rail-road bridges

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

(b) Road over-bridges

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

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

(c) Road under-bridges

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

Sl. No.	Location of Level crossing (Chainage Km)	Number and length of span (m)
Nil		

(v) Grade separated structures

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

(vi) Repairs and strengthening of bridges and structures

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

(a) Bridges

Sl. No.	Location of bridge (km)	Nature and extent of repairs /strengthening to be carried out
Nil		

(b) ROB/RUB

Sl. No.	Location of ROB/RUB (km)	Nature and extent of repairs /strengthening to be carried out
Nil		

(c) Overpasses/Underpasses and other structures

Sl. No.	Location of structure (km)	Nature and extent of repairs /strengthening to be carried out
Nil		

(vii) List of Major Bridges and Structures

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

Sl.No.	Location	Span arrangement	Remarks
1	75530	1 x 48	New alignment

8. Traffic Control Devices and Road Safety Works

(i) Traffic control devices and road safety works shall be provided in accordance with Section 9 of the Manual.

(ii) Specifications of the reflective sheeting.

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	2
2	Road Marking with Hot Applied Thermoplastic Compound with Reflectorising Glass	Sqm	150
3	Road Delineators	each	40
4	Street Furniture	each	40

9. Roadside Furniture

- (i) Roadside furniture shall be provided in accordance with the provisions of Section -9 of the Manual.
- (ii) Overhead traffic signs: location and size - Nil

10. Compulsory Afforestation

Nil

11. Hazardous Locations

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

Sl.No.	Location stretch from (Km) to (Km)	LHS/RHS
Nil		

12. Special Requirement for Hill Roads

As the project involves cutting of the hill slopes, it's imperative that slopes are stabilized 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

Sr.No	Description of Item	Unit	Quantity
1	Plum Concrete Retaining wall 3.00 m high	Rm	110.00
2	RCC Relief shelves Retaining Wall 5.00m high	Rm	40.00
3	RCC Relief shelves Retaining Wall 7.00m high	Rm	20.00
4	RCC Relief shelves Retaining Wall 12.00m high	Rm	5.00

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

13. Change of Scope

The length of Structures and bridges specified hereinabove shall be treated as an approximate assessment. The actual lengths as required on the basis of detailed investigations shall be determined by the Contractor in accordance with the Specifications and Standards. Any variations in the lengths specified in this Schedule-B shall not constitute a Change of Scope, save and except any variations in the length arising out of a Change of Scope expressly undertaken in accordance with the provisions of Article 13.

Schedule - D

(See Clause 2.1)

Specifications and Standards

1. Construction

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

2. Design Standards

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

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

Code for Practice of Road Signs IRC 67:2001.

The Hill Road Manual IRC SP 48 -1998 should be referred.

THE NATIONAL GREEN TRIBUNAL PRINCIPAL BENCH, NEW DELHI on 01th Nov, 2018

Following recommendations and suggestions have been made for dumping muck & dumping yard:-

- a. Before dumping muck at the dumping yard first of all retaining/ gabion walls of specified capacity and suitable design should be constructed.
- b. All the dumping sites should be properly designed with retaining wall/gabion structures and should be maintained regularly in order to check the spillage of the muck down the slope and into the rivers and other places.
- c. Wherever boulders are rolling down along with much, gabion structures/retaining wall should have sufficient foundation and bottom width should be 4-5 m. Length of one gabion structure should not be more than 6-8 m. Wherever more length of gabion structure is required one gabion structure should be bound with another
- d. If any new dumping sites are identified in future, then the retaining / gabion structures should be constructed at suitable vertical interval of 5-6 m so that entire disposed muck may not exert pressure only at one wall/ toe wall rather the load of muck should be distributed on different walls.
- e. Angle of repose of muck should be maintained between 30 to 45°. Long slopes should be intercepted to several short ones with the help of 1.5 to 2.0 m wide berms / terraces/ benches in between in order to maintain less

than critical velocity for runoff water and simultaneously mass erosion with be controlled.

- f. The capacity/ volume of muck disposal site should be more than volume of muck to be disposed.
 - g. Proper sign boards indicating the name, number, location, dumping capacity, etc. should be installed at all the dumping sites.
 - h. Dumping sites which are full of their capacity they should be rehabilitated with local grass or shrubs. Jute geo textile (JGT) may also be used for establishment of vegetation at vulnerable sites.
 - i. Gabion walls should be constructed above HFL of River. If slope is very high to construct a gabion wall then a RCC/stone masonry retaining wall should be given at bank of River after proper design including foundation. Height of this wall should be well above the HFL of River.
 - j. Proper protection measures should be taken along with river-side in order to stop spilling/falling of muck into the river.
 - k. All construction sites should follow and comply with the provisions of the Construction and Demolition Waste Management Rules, 2016".
3. The contractor shall ensure maintaining plan/profile/x-sections approved by Authority's Engineer and any slope protection required shall be considered incidental to the original work with no extra payment/change of scope on this account.

Annex -I
(Schedule-D)

Annex -I: Specifications and Standards for Construction

1. Specifications and Standards

All Materials, works and construction operations shall conform to the Manual of Specifications and Standards for Two-Laning of Highways (IRC:SP:73), referred to as the Manual, and MORTH Specifications for Road and Bridge Works. Where 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

- (i) The terms "Concessionaire", "Independent Engineer" and "Concession Agreement" used in the Manual shall be deemed to be substituted by the terms "Contractor", "Authority's Engineer" and "Agreement" respectively.