

**NATIONAL HIGHWAYS & INFRASTRUCTURE DEVELOPMENT CORPORATION LTD.  
(Ministry of Road, Transport & Highways)  
Government of India**

**Schedule B & C**

**FOR**

**“Construction of two-Lane with hard shoulders of Changtongya - Longleng Road on EPC basis from existing Km 16.592 to Km 29.530 [Design Km. 18+779 to Km. 33+489] (Design Length - 14+710 Km) in the state of Nagaland under SARDP-NE Phase A”**

**Engineering, Procurement & Construction (EPC) Mode**

**BID DOCUMENT**

**January 2018**



**National Highways & Infrastructure Development Corporation Ltd  
(A Government of India Undertaking)**

**“Construction of two-Lane with hard shoulders of Changtongya - Longleng Road on EPC basis from existing Km 16.592 to Km 29.530 [Design Km.18.779 to Km. 33.489] (Design Length - 14.710 Km) in the state of Nagaland under SARDP-NE Phase A”**

**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 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.

## Annex I (Schedule-B)

### Description of Two Laning

The particulars specified in this Schedule - B are listed below as per the requirements of the Manual of Specifications and Standards for Two Laning of Highways (IRC SP:73-2015); referred to as the Manual. If any standards, specifications or details are not given in the Manual, the minimum design/construction requirements are specified in this Schedule or Schedule D.

Refer remarks column of table under Para 1.1 of Annex I of Schedule - A, construction carried out by previous contractor has been indicated. The contractor has to satisfy himself about the site conditions, quantity and quality of work done. He will be accordingly fully responsible for further requirement of design and construction of 2 Lane with hard shoulder.

#### 1.0 SCOPE OF THE PROJECT

##### 1.1 GENERAL

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 here in 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, 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 Authority Engineer)
- 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.

## **2.0 GEOMETRIC DESIGN AND GENERAL FEATURES**

### **2.1.1 General**

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

### **2.1.2 WIDENING OF THE EXISTING HIGHWAY**

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 [plain/rolling] terrain to the extent land is available.

### 2.1.3 Improvement of the existing road geometries

[Refer to paragraph 2.1 (v) of the Manual 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 **Schedule-D**.

The improvement shall be done in consultation with the Authority Engineer / 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:

#### Improvement due to Realignment:

Sl. No.	Existing Chainage (km)		Length (m)	Design Chainage (km)		Length (m)
	From	To		From	To	
1	16+650	16+710	60	18+909	18+959	50
2	16+890	16+950	60	19+119	19+164	45
3	17+150	17+200	50	19+379	19+419	40
4	17+245	17+300	55	19+464	19+504	40
5	17+740	17+800	60	19+959	20+009	50
6	17+870	17+930	60	20+079	20+129	50
7	20+380	20+440	60	22+559	22+609	50

Sl. No.	Existing Chainage (km)		Length (m)	Design Chainage (km)		Length (m)
	From	To		From	To	
8	20+915	20+980	65	23+074	23+119	45
9	21+035	21+095	60	23+174	23+224	50
10	21+270	21+330	60	23+409	23+459	50
15	21+630	21+700	70	23+759	23+809	50
16	22+000	22+065	65	24+109	24+159	50
17	22+690	22+750	60	24+759	24+799	40
18	23+040	23+080	40	25+089	25+124	35
19	24+620	26+800	2180	26+649	31+109	4460
20	26+980	27+050	70	31+274	31+329	55
21	27+400	27+500	100	31+659	31+759	100
22	27+650	27+730	80	31+889	31+388	80
23	28+130	28+300	170	32+359	32+469	110

**Probable location of Sharp Curves having radius less than 40 m:**

Sl No.	Design Chainage(m)		Side	Remarks
	From	To		
1	23082.1	23119.27	Right	Radius<40
2	23177.54	23237.39	Left	Radius<40
3	23237.39	23326.6	Right	Radius<40
4	23628.3	23672.06	Left	Radius<40
5	25571.95	25620.77	Right	Radius<40
6	25985.84	26056.53	Left	Radius<40
7	26664.89	26739.45	Left	Radius<40
8	27418.05	27489.86	Left	Radius<40
9	27850.92	27940.45	Left	Radius<40
10	28202.81	28262.99	Right	Radius<40
11	28731.71	28807.13	Right	Radius<40
12	29971.16	30007.26	Left	Radius<40
13	30465.61	30504.64	Right	Radius<40

Sl No.	Design Chainage(m)		Side	Remarks
	From	To		
14	31086.49	31111.13	Right	Radius<40
15	31177.56	31260.89	Left	Radius<40

## 2.2 Design speed

The design speed shall be as per IRC 73: 2015 however in exceptional cases the minimum design speed of [30 km per hour for hilly and mountainous terrain and 20 km per hour for hair pin bend locations]. The Location of Hair Pin Bends have been shown in Plan & Profile Drawings.

## 2.3 Proposed Right of Way

[Refer to paragraph 2.3 of the Manual]. Details of the Right of way are given in Annex-II of Schedule A.

Contractor has to design and construct the road, if required by provision of retaining walls and/or breast walls/slope stabilization/protection measures within the Right of Way given above and provision of the same shall not constitute a change of scope.

## 2.4 Type of Shoulders

(a) In built-up sections, footpaths/fully paved shoulders shall be provided in accordance with Clause 1.2.1 above.

(b) In open country, Hard Shoulder with GSB having thickness of 200mm, total 3 metre wide including both sides shall be provided and balance 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 and 5.11 of the Manual

## 2.5 Width of Carriageway/Roadway width

2.5.1 Two-Laning with hard shoulders shall be undertaken. The carriageway shall be [7(seven) m] wide and hard shoulder in accordance with the typical cross sections drawings in the Manual.

2.5.2 Except as otherwise provided in this Agreement, the width of the hard shoulder carriageway and cross-sectional features shall conform to Para 2.7 of the manual.

## 2.6 Lateral and vertical clearances at underpasses

2.6.1 Lateral and vertical clearances at underpasses and provision of guardrails/crash barriers shall be as per paragraph 2.11 of the Manual.

### 2.6.2 Lateral Clearance:

The width of the opening at the underpasses shall be as follows:

Sl. No.	Location [Chainage (km)]		Span/Opening (m)	Remarks
	From	To		
Nil				

## 2.7 Lateral and vertical clearances at overpasses

2.7.1 Lateral and vertical clearances at overpasses shall be as per paragraph 2.12 of the Manual.

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

Sl No.	Location [Chainage(km)]		Span/Opening (m)	Remarks
	From	To		
Nil				

## 2.8 Service roads

Service roads shall be constructed at the locations and for the lengths indicated below: [Refer to paragraph 2.13 of the Manual and provide details]

Sl. No.	Location of Service Road (km)		Right Hand Side (RHS) / Left Hand Side (LHS) / Both Sides	Length (km) of Service Road
	From	To		
Nil				

## 2.9 Grade Separated Structures

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

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

Sl. No.	Location of Structure	Length (m)	Number and Length of Spans (m)	Approach Gradient	Remarks, if any
Nil					

2.9.2 In the case of grade separated structures, the type of structure and the level of

“Construction of two-Lane with hard shoulders of Changtongya - Longleng Road on EPC basis from existing Km 16.592 to Km 29.530 [Design Km.18.779 to Km. 33.489] (Design Length - 14.710 Km) in the state of Nagaland under SARDP-NE Phase A”

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						

### 2.9.3 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.

Sl. No.	Location	Type of Crossing
Nil		

### 2.10 Typical cross-sections of the Project Highway

Typical cross-sections to be followed as per IRC: SP-73-2015 and in addition the proposed cross section for various situations are given in Fig.B-1 to B-6. These illustrate the cross sectional improvement proposals for the project highway. The Project Highway (length 14.33 km) shall be 2-lane carriageway with 1.5m wide Hard shoulders facility.

Following typical cross sections shall be provided for the Project Highway However to be designed as per manual.

- TCS I (a): Typical Cross Section for project road sections in Hill / Valley locations
- TCS I (b): Typical Cross Section for Project Road Sections requiring Fill on Valley Side
- TCS II: Typical Cross Section for project road section on ridge
- TCS III: Typical Cross Section for Project Road Sections through Box Cut Locations
- TCS IV: Typical Cross Section for Project Road Section through Town with Hill Valley Combination
- Type V: Typical Cross Section for Project Road Section through Town on Ridge

The cross section schedule shall be as follows:

Sl. No.	Chainage (km)		Length (m)	Type	Remarks
	From	To			
1	18+779	19+319	1870	I	

Sl. No.	Chainage (km)		Length (m)	Type	Remarks
	From	To			
2	19+319	19+359	40	II	
3	19+359	21+059	1700	I	
4	21+059	21+169	110	III	
5	21+169	25+609	4440	I	
6	25+609	25+629	20	II	
7	25+629	26+159	530	I	
8	26+159	26+229	70	II	
9	26+229	26+329	100	I	
10	26+329	26+609	280	III	
11	26+609	27+859	1250	I	
12	27+859	28+909	1050	III	
13	28+909	29+979	1970	I	
14	29+979	30+109	130	III	
15	30+109	30+459	350	I	
16	30+459	30+569	110	III	
17	30+569	30+979	390	I	
18	30+959	31+129	170	III	
19	31+129	31+209	80	I	
20	31+209	31+289	80	III	
21	31+289	31+909	620	I	
22	31+909	31+959	50	III	
23	31+959	33+489	1530	I	

Note: The extent of cross section type is indicative and shall be reviewed in consultation with the Authority Engineer at the time of construction as per the site condition. Type I Cross section consist of two variants as I (a) without retaining wall on valley side and 1(b) with retaining wall on valley side as detailed in figure B1 & B2 respectively. The locations please refer designed cross section @ 50 m interval detailed in Annexure III of Schedule A.

The alternative cross section of the Project Highway at the cross drainage structures shall follow the typical cross section in consultation with the Authority Engineer at the time of construction.

--

## 2.11 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.

## 2.12 Built-Up Areas

The alignment passes through Built up areas as tabulated below.

Sl. No.	Existing Chainage (km)		Design Chainage (km)		Name of Village/town
	From	To	From	To	
1	16+600	16+800	18+859	19+059	Yaongyimchen
2	16+800	17+400	19+059	19+619	Alayong
3	18+800	19+050	24+428	21+259	Yaong
4	26+800	28+000	31+104	32+222	Orangkong
5	28+000	29+400	32+219	33+489	Longleng

## 3.0 INTERSECTIONS AND GRADE SEPARATORS

All intersections shall be as per 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].

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

- i) Typical junction treatments as specified in Final Project Report shall be applied. Design types of intersections are as given below:

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

### (a) At-grade Intersections

#### (i) Major Intersections

Sl. No.	Location of Intersection	Intersection Towards	Existing Configurations				Type of Intersection	Figure No.	Other Features
			Location	Type	Width (m)	Surface			
NIL									

“Construction of two-Lane with hard shoulders of Changtongya - Longleng Road on EPC basis from existing Km 16.592 to Km 29.530 [Design Km.18.779 to Km. 33.489] (Design Length - 14.710 Km) in the state of Nagaland under SARDP-NE Phase A”

Details of junction improvement shall be as per IRC: SP:73-2015

(ii) **Minor Intersections**

Sl. No.	Location of Intersection (Design Chainage, km)	Type of Intersection	Side
1	19+359	T	Left
2	25+609	T	Left
3	31+464	Cross	Left/Right
4	Not in Scope	Cross	Left/Right

Details of junction improvements shall be as per IRC SP: 73-2015.

(b) **Grade Separated Intersections with/without Ramps**

Sl No.	Location (km)	Salient Features	Minimum Length of Viaduct to be Provided (m)	Road to be Carried Over/Under the Structures
Nil				

**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 section 4 of the Manual and the specified cross sectional details. Deficiencies in the plan and profile of the existing road shall be corrected.
- 4.2 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					

**5.0 PAVEMENT DESIGN**

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

**5.2 Type of pavement**

“Construction of two-Lane with hard shoulders of Changtongya - Longleng Road on EPC basis from existing Km 16.592 to Km 29.530 [Design Km.18.779 to Km. 33.489] (Design Length - 14.710 Km) in the state of Nagaland under SARDP-NE Phase A”

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

### 5.3 Design requirements

The granular layers (base and sub base) shall be designed for minimum 20 msa. The bituminous courses (Dense Bituminous Macadam and Bituminous Concrete) shall be designed for minimum 5 msa. Bituminous Concrete shall be minimum 40 mm thick.

Bituminous Grade VG 40 shall be used for BC.

### 5.4 Reconstruction of stretches/ Realignment/ Bypass of Sections

5.4.1 [Refer to paragraph 5.9.7 of the manual and specify the stretches, if any, to be reconstructed.]

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

Sl. No.	Existing Section (km)		Remarks
	From	To	
1	16+592	29+530	Poor condition of existing pavement and or Realignment Section

#### 5.4.3 Rigid Pavement

No rigid pavement has been considered for the Project Highway.

## 6.0 ROAD SIDE 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 Drainage Measures

Following measures shall be adopted:

- i) Covered RCC Drain on Hill Side

- ii) Open, side, V shaped PCC drains at the hill side for widening at hill sides.
- iii) Open, side, V shaped PCC drains at both sides in realignment stretches by hill cut.

Open side V shaped 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. RCC 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.

#### Details of Drains

Sl. No.	Chainage (km)		Length (m)	Remarks
	From	To		
1	18+779	19+359	40	V shaped PCC Drain on Both Sides
2	19+359	21+059	1700	V- shaped PCC Drain on Hill Side
3	21+059	21+169	110	V - shaped PCC Drain on Both Sides
4	21+169	25+609	4440	V - shaped PCC Drain on Hill Side
5	25+609	25+629	20	V - shaped PCC Drain on Both Sides
6	25+629	26+159	530	V - shaped PCC Drain on Hill Side
7	26+159	26+229	70	V - shaped PCC Drain on Both Sides
8	26+229	26+329	100	V - shaped PCC Drain on Hill Side
9	26+329	26+609	280	V - shaped PCC Drain on Both Sides
10	26+609	27+859	1250	V - shaped PCC Drain on Hill Side
11	27+859	28+909	1050	V - shaped PCC Drain on Both Sides
12	28+909	29+979	1970	V - shaped PCC Drain on Hill Side
13	29+979	30+109	130	V - shaped PCC Drain on Both Sides
14	30+109	30+459	350	V - shaped PCC Drain on Hill Side
15	30+459	30+569	110	V - shaped PCC Drain on Both Sides
16	30+569	30+959	390	V - shaped PCC Drain on Hill Side
17	30+959	31+129	170	V - shaped PCC Drain on Both Sides
18	31+129	31+209	80	V - shaped PCC Drain on Hill Side
19	31+209	31+289	80	V - shaped PCC Drain on Both Sides
20	31+289	31+909	620	V - shaped PCC Drain on Hill Side
21	31+909	31+959	50	V - shaped PCC Drain on Both Sides
22	31+959	33+489	1530	RCC Drain on Hill Side

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

V - shaped section for the drain/ditch has been proposed as it is more economical and efficient as compared to rectangular cross section V-Shaped. These road side drains have been designed of adequate capacity to carry 100% surface runoff of the drainage area of highway ROW and the adjoining land. The side slopes have been kept as 1H: 1V in case of unlined drain/ditches. However, successful bidder may adopt any type of PCC drain as per IRC & accordingly they may carry out their own diligence to arrive at project cost before submitting the bid.

## 7.0 DESIGN OF STRUCTURES

### 7.1 General

7.1.1 The Project road from Changtongya to Longleng from Km. 18.779 to Km.33.489 (design chainages), includes provision of **71 box culverts**. All culverts and other 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. New culverts shall be constructed wide enough to accommodate the adjacent road cross section as given in this Schedule-B. The details of existing culverts are given in Schedule-A.

7.1.2 Width of the carriageway of new bridges and Structures shall be as per Clause 7.3 of the Manual.

7.1.3 All bridges shall be high-level bridges.  
[Refer to paragraph 7.1(iii) of the Manual and state if there is any exception]

7.1.4 The following structures shall be designed to carry utility services specified in the table below:  
[Refer to paragraph 7.1 (viii) of the Manual and provide details]

Sl. No.	Bridge at Km	Utility service to be carried	Remarks
NIL			

7.1.5 Cross-section of the new culverts and bridges at deck level for the Project Highway shall conform to the typical cross sections given in the section 7 of the Manual.

### 7.2 Culverts

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

#### 7.2.2 Reconstruction of existing culverts

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

[Refer to paragraph 8.2.3 (i) of the Manual and provide details]. These are

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

\* Specify modifications, if any, required in the road level etc.

Sl. No.	Existing Chainage (km)	Design Chainage (km)	Proposed Span (m)	Proposal
1	16.580	18.824	1.5	RCC Box
2	22.461	24.472	1.5	RCC Box
3	23.200	25.179	2.0	RCC Box
4	24.402	26.348	1.5	RCC Box
5	24.545	26.481	1.5	RCC Box
6	24.650	26.557	1.5	RCC Box
7	26.955	31.094	1.5	RCC Box
8	27.365	31.469	1.5	RCC Box
9	27.700	31.779	1.5	RCC Box
10	27.925	31.964	1.5	RCC Box
11	29.004	32.965	1.5	RCC Box
12	29.292	33.257	1.5	RCC Box
13	29.500	33.465	1.5	RCC Box

\* All box culverts (excluding the box culverts in cushion) shall be provided with approach slabs on both sides. Moreover upstream and downstream protection works, including chute drains connecting stream with the culvert, catch pits; baffle piers/blocks etc. shall be provided which must be ascertained as per the site conditions and details given in drawings of culvert.

7.2.3 Additional new culverts shall be constructed as per particulars given in the table below:

#### BOX CULVERT DETAILS

Sl.No	Existing Chainage (km)	Design Chainage (km)	Proposed Span (m)	Proposal
.				

Sl.No	Existing Chainage (km)	Design Chainage (km)	Proposed Span (m)	Proposal
1	16.755	18.989	1.5	RCC Box
2	17.150	19.179	1.5	RCC Box
3	17.800	19.959	1.5	RCC Box
4	17.875	20.044	1.5	RCC Box
5	18.082	20.204	1.5	RCC Box
6	18.263	20.509	1.5	RCC Box
7	18.381	20.609	1.5	RCC Box
8	18.567	20.774	1.5	RCC Box
9	18.684	20.891	1.5	RCC Box
10	18.774	20.959	1.5	RCC Box
11	-	21.249	1.5	RCC Box
12	19.400	21.459	1.5	RCC Box
13	19.628	21.639	1.5	RCC Box
14	19.761	21.927	1.5	RCC Box
15	19.913	22.157	1.5	RCC Box
16	20.276	22.394	2.0	RCC Box
17	20.555	22.456	1.5	RCC Box
18	20.678	22.739	1.5	RCC Box
19	20.760	22.829	1.5	RCC Box
20	21.025	23.043	2.0	RCC Box
21	21.235	23.289	3.0	RCC Box
22	21.500	23.534	1.5	RCC Box
23	21.802	23.845	1.5	RCC Box

“Construction of two-Lane with hard shoulders of Changtongya - Longleng Road on EPC basis from existing Km 16.592 to Km 29.530 [Design Km.18.779 to Km. 33.489] (Design Length - 14.710 Km) in the state of Nagaland under SARDP-NE Phase A”

Sl.No	Existing Chainage (km)	Design Chainage (km)	Proposed Span (m)	Proposal
24	21.983	24.014	3.0	RCC Box
25	22.038	24.069	1.5	RCC Box
26	22.157	24.171	1.5	RCC Box
27	22.335	24.364	1.5	RCC Box
28	22.677	24.669	2.0	RCC Box
29	22.900	24.909	1.5	RCC Box
30	23.045	24.999	1.5	RCC Box
31	23.175	25.144	3.0	RCC Box
32	23.298	25.339	1.5	RCC Box
33	23.475	25.449	1.5	RCC Box
34	23.595	25.609	1.5	RCC Box
35	23.710	25.672	1.5	RCC Box
36	-	25.742	1.5	RCC Box
37	-	25.822	1.5	RCC Box
38	23.940	25.904	1.5	RCC Box
39	24.000	26.009	1.5	RCC Box
40	24.225	26.104	1.5	RCC Box
41	24.275	26.169	1.5	RCC Box
42	-	26.884	1.5	RCC Box
43	-	27.003	3.0	RCC Box
44	-	27.174	1.5	RCC Box
45	-	27.247	1.5	RCC Box
46	-	27.709	1.5	RCC Box

“Construction of two-Lane with hard shoulders of Changtongya - Longleng Road on EPC basis from existing Km 16.592 to Km 29.530 [Design Km.18.779 to Km. 33.489] (Design Length - 14.710 Km) in the state of Nagaland under SARDP-NE Phase A”

Sl.No	Existing Chainage (km)	Design Chainage (km)	Proposed Span (m)	Proposal
47	-	27.829	3.0	RCC Box
48	-	28.089	3.0	RCC Box
49	-	28.459	1.5	RCC Box
50	-	28.636	3.0	RCC Box
51	-	29.144	1.5	RCC Box
52	-	29.594	1.5	RCC Box
53	-	29.649	3.0	RCC Box
54	-	29.789	3.0	RCC Box
55	-	29.844	3.0	RCC Box
56	-	30.134	1.5	RCC Box
57	-	32.419	3.0	RCC Box
58	28.603	32.586	1.5	RCC Box

\* Existing chainages of proposed culverts along the realignment section have been left blank.

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

[Refer to paragraph 8.2.3 of the Manual and provide details]

Sl. No.	Existing Chainage (km)	Design Chainage (km)	Proposal	Proposed Span
NIL				

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

### 7.3 Bridges

7.3.1 The existing bridges to be reconstructed/widened

“Construction of two-Lane with hard shoulders of Changtongya - Longleng Road on EPC basis from existing Km 16.592 to Km 29.530 [Design Km.18.779 to Km. 33.489] (Design Length - 14.710 Km) in the state of Nagaland under SARDP-NE Phase A”



- (i) The existing bridges at the following locations shall be reconstructed as new structures (Minor Bridge)

Sl No.	Existing Chainage (KM)	Design Chainage (KM)	Proposed Span(m)	Proposed Width(m)	Remarks
NIL					

Sl. No	Bridge Location (km)	Salient Details of Existing Bridges					Adequacy or Otherwise of the Existing Waterway, Vertical Clearance etc.	Remarks
		Span Arrangement (m)	Carriageway Width (m)	Total Width (m)	Type of Superstructure	Type of Foundation		
NIL								

7.3.2 The following structures shall be provided with footpaths:

Sl. No.	Location (km)	Remarks
NIL		

### 7.3.3 Additional New Minor Bridges

New minor bridges at the following locations on the project highways shall be constructed in Package as per manual

Sr. No.	Designed Chainage (km)	River/ Nallah Name	Proposed Span Arrangement (m)
NIL			

### 7.3.4 Additional new Major bridges

[Specify additional new bridges if required, and attach GAD]

Sl. No.	Location Designed (km)	Total Length (m)	Remarks
NIL			

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

[Refer to paragraph 7.18 (iv) of the Manual and provide details]

Sl. No.	Location (km)	Remarks
Nil		

7.3.6 Repairs/replacements of railings/parapets of the existing bridges shall be undertaken as follows:

[Refer to paragraph 7.18 (v) of the Manual and provide details]

Sl. No.	Location (km)	Remarks
Nil		

7.3.7 Drainage system for bridge decks

An effective drainage system for bridge decks shall be provided as specified in paragraph 8.21 of the Manual

7.3.8 Structures in marine environment

[Refer to paragraph 7.22 of the Manual and specify the necessary measures / treatments for protecting structures in marine environment, where applicable]

## 7.4 Rail-road Bridges

7.4.1 Design, construction and detailing of ROB/RUB shall be as specified in section 7 of the Manual. [Refer to paragraph 8.19 of the Manual and specify modification, if any]

7.4.2 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 (km)	Length of Bridge (m)
Nil		

### 7.4.3 Road under-bridges

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

Sl No.	Location of Level Crossing (km)	Number and Length of Span (m)
Nil		

### 7.5 Grade Separated Structures

[Refer to paragraph 7.20 of the Manual]

The grade separated structures shall be provided at the locations and of the type and length specified in paragraphs 2.9 and 3 of this Annex-I.

### 7.6 Underpasses/Overpasses

There is no Underpass/Overpass proposed on the Project Highway.

### 7.7 Repairs and strengthening of bridges and structures

[Refer to paragraph 8.23 of the Manual and provide details]

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 Bridge (km)	Nature and Extent of Repairs/Strengthening to be Carried out
Nil		

#### C. Overpasses / Underpasses and Other Structures

Sl No.	Location of Bridge (km)	Nature and Extent of Repairs/Strengthening to be Carried out
Nil		

**7.8 List of Major Bridges and Structures**

The following is the list of Major Bridges on Package

Sl No.	Location Design (km)	Total Length (m)	Remarks
NIL			

**8.0 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]

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

Traffic Signage's, Road Marking and other appurtenances	Unit	Quantity
Road Marking on Centre line & Edge	sqm	4,929
Direction & Place Identification up to 0.9 sqm	sqm	18
Direction & Place Identification more than 0.9 sqm	sqm	2
60 cm Equilateral Triangle	Number	142
60 cm Circular	Number	40
60 cm High Octagon	Number	14
60 cm X 45 cm Rectangular	Number	20
60 cm X 50 cm Chevron Sign	Number	388
Hectometer Stone	Number	154
Km stone	Number	32
5 <sup>th</sup> km stone	Number	7
Boundary Stone (as per clause 13 herein under)	Number	384
Road Delineators	Number	1734
Road Marker/ Road Stud	Number	19,250
W Metal Crash Barrier	Number	906
RCC Crash Barrier	Rm	15,609

**9.0 ROAD SIDE FURNITURE**

9.1 Roadside furniture shall be provided in accordance with the provisions of Section 11 of the Manual IRC: SP: 73-2015.

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 installation 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. The minimum number of overhead signs shall be 03 (01 No. of gantry and 02 No. of Cantilever) as per this manual.

## 10.0 COMPULSORY AFFORESTATION

[Refer to paragraph 11.1 of the Manual and specify the number of trees which are required to be planted by the Contractor as compensatory afforestation.]

Minimum 1471 nos. trees are required to be planted.

## 11.0 HAZARDOUS LOCATIONS

- i) Metal Beam crash barrier length of minimum 8998 (single runner, heavy duty and W-shape) shall be provided at the locations of bridge approaches and high embankments (3.0m and more), at sharp curves on both sides. 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.

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

Sl No.	Design Chainage(m)		Length (m)	Remarks
	From	To		
1	23084.07	23121.24	38	Radius<40
2	23179.51	23239.36	60	Radius<40
3	23239.36	23328.57	90	Radius<40
4	23630.27	23674.03	44	Radius<40
5	25573.92	25622.74	49	Radius<40
6	25987.81	26058.5	71	Radius<40
7	26666.86	26741.42	74.564	Radius<40
8	27420.02	27491.83	71.81	Radius<40

Sl No.	Design Chainage(m)		Length (m)	Remarks
	From	To		
9	27852.89	27942.42	89.535	Radius<40
10	28204.78	28264.96	60.18	Radius<40
11	28733.68	28809.1	75.42	Radius<40
12	29973.13	30009.23	36.096	Radius<40
13	30467.58	30506.61	39.028	Radius<40
14	31088.46	31113.1	24.642	Radius<40
15	31179.53	31262.86	83.332	Radius<40
			906.607	

The safety barriers, protective works shall also be provided at the hazardous location/lengths.

## 12.0 SPECIAL REQUIREMENT FOR HILL ROADS

In accordance with section 13 of the manual (from IRC: SP: 73-2015), IRC: SP-1998 and Recommended practices for 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 existing hill slopes, it is imperative that slopes are stabilized for ensuring longevity of the slope 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.

(i) The **minimum quantity** of protection work may be taken as below:

Type of Protection Work		
Protection Work	Unit	Quantity
Parapet Wall	Rm	-
Breast wall with PCC	Rm	7,314
Gabion Retaining Wall (with application of Geo - synthetic)	cum	1,70,414
RE Wall with Geo - synthetic	sqm	4,099
Geo Synthetic Mat for Erosion Control, Soil Nailing & Fencing lengths	m	2395
Seeding and Mulching with Polymer Net	sqm	54,457

Type of Protection Work		
Protection Work	Unit	Quantity
Hydroseeding	sqm	1,55,811
Catch Water Drain (Unlined)	Rm	39,650
Chute for Culvert		At Every Culvert Location

**Note-** *The Contractor shall be responsible for accurate assessment of the actual requirement as per site situation & prepare designs for slope protection & stabilization as per the specifications & standards stipulated in schedule 'D' and submit the same to the AE for review through the proof consultant and implement it accordingly thereafter.*

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

## 12.2 Rip rap Protection:

The minimum quantity of riprap protection or similar work to be provided at valley side shoulder in the following locations as special safety feature on valley side on curves locations detailed in para 11.0

## 12.3 ROAD LAND BOUNDARY (Clause 12.2 IRC SP: 73 : 2015)

Road land (ROW) boundary shall be demarcated by putting RCC boundary pillars of size 60cm x 15cm x 15 cm embedded in concrete (as per IRC:25) along the Project Highway at 200 m interval on both sides. All the components used in delineating road land boundary shall be aesthetically pleasing, sturdy and vandal proof. The road land boundary shall be demarcated in consultation with NHIDCL.

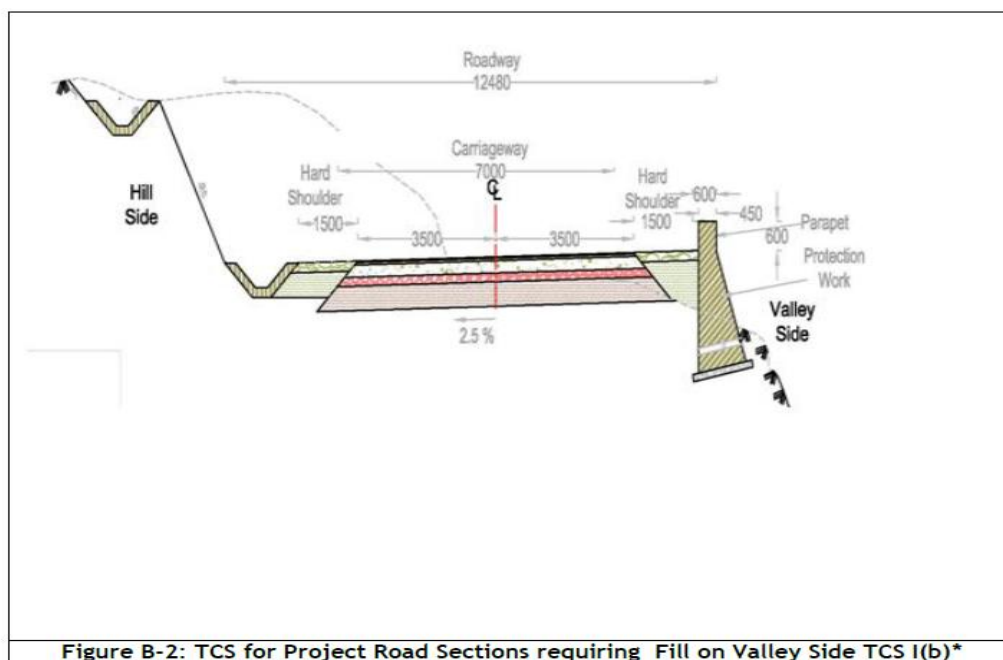
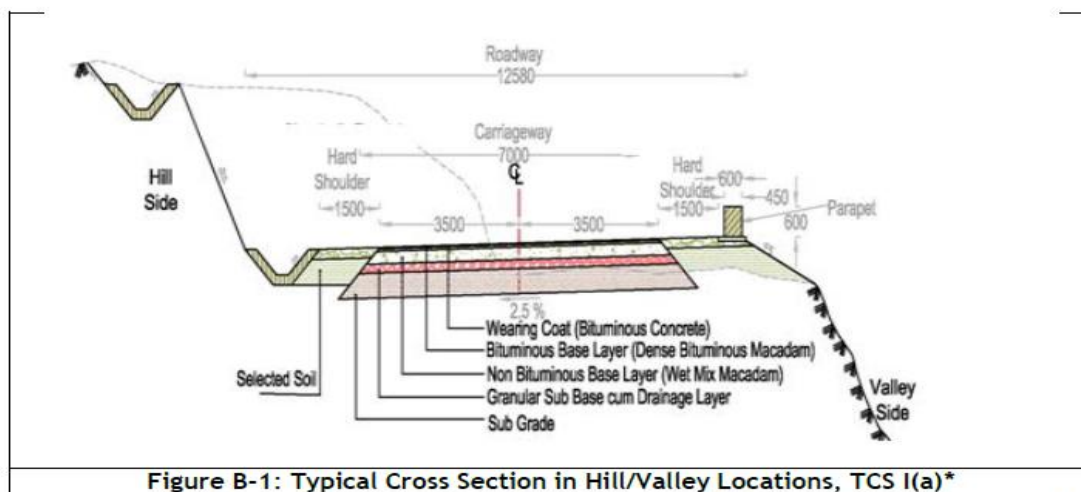
## 12.4 Disposal of Debris: - As per Manual

## 13.0 CHANGE OF SCOPE

The size of Structures, bridges, culverts and slope protection works whatsoever in terms of retaining wall, breast wall, gabion wall, RE wall, chute drain, catch pit, baffle piers/blocks etc. under special requirement of hill slope specified hereinabove shall be treated as an approximate assessment. The actual lengths, heights and widths 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, heights and widths and specifications in this Schedule-B shall not constitute a Change of Scope, save and except any variations in the length, height and width arising out of a Change of Scope expressly undertaken in accordance with the provisions of Article 13.

### Typical Cross Section drawing



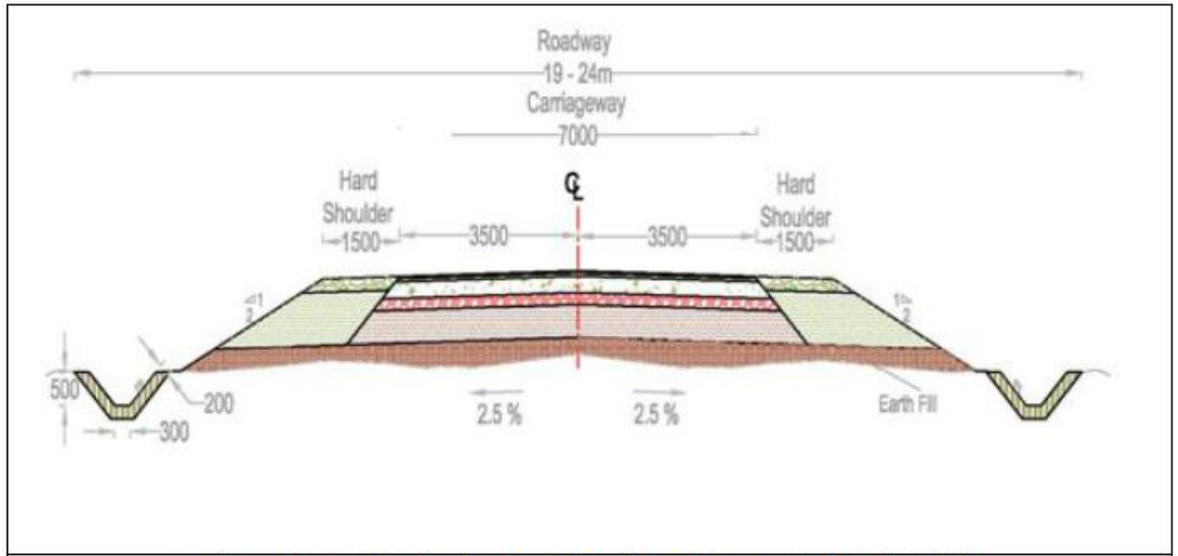


Figure B-3: TCS for Project Road Section on Ridge (TCS II)\*

39

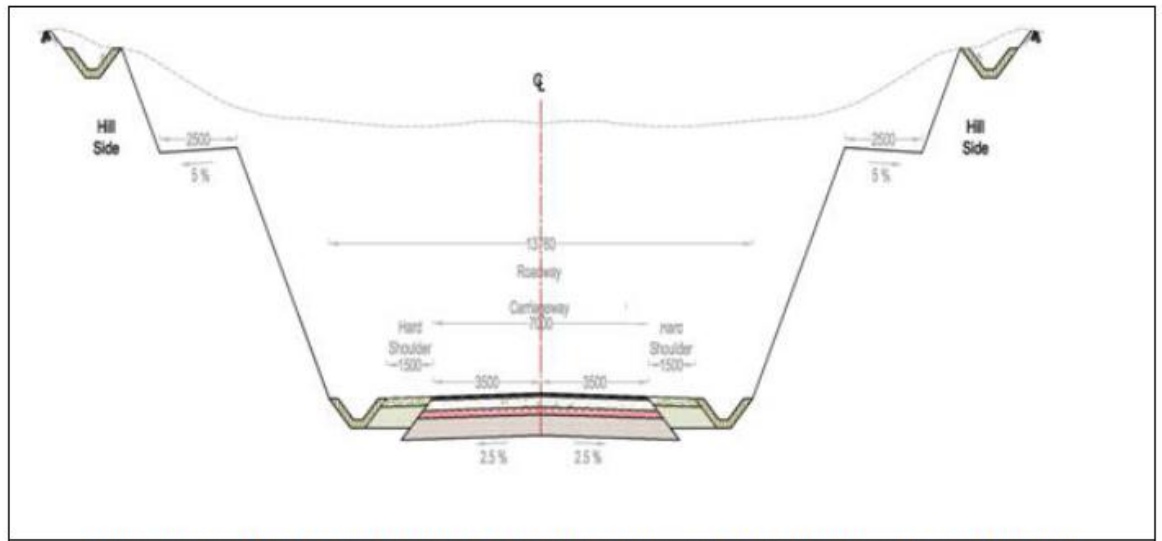
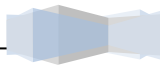
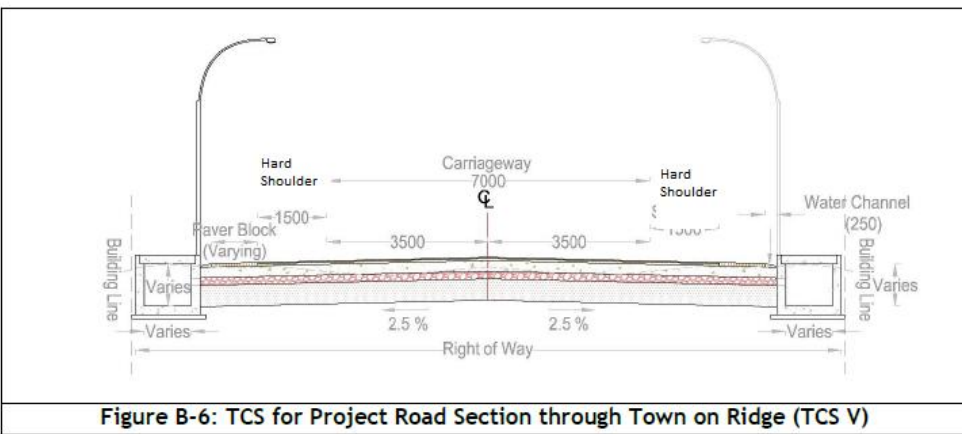
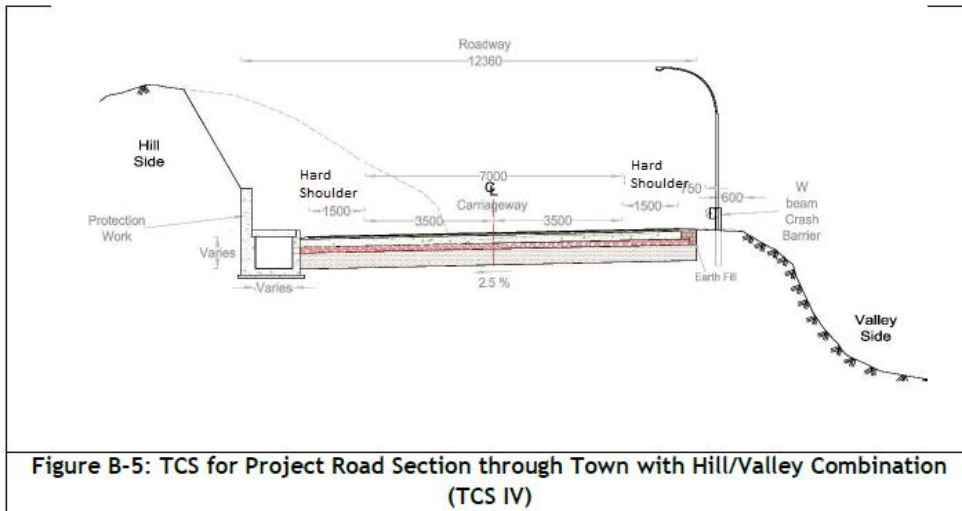


Figure B-4: TCS for Project Road Sections through Box Cut Locations (TCS III)\*

“Construction of two-Lane with hard shoulders of Changtongya - Longleng Road on EPC basis from existing Km 16.592 to Km 29.530 [Design Km.18.779 to Km. 33.489] (Design Length - 14.710 Km) in the state of Nagaland under SARDP-NE Phase A”



“Construction of two-Lane with hard shoulders of Changtongya - Longleng Road on EPC basis from existing Km 16.592 to Km 29.530 [Design Km.18.779 to Km. 33.489] (Design Length - 14.710 Km) in the state of Nagaland under SARDP-NE Phase A”

**SCHEDULE - C**  
*(See Clause 2.1)*

**PROJECT FACILITIES**

**4 Project Facilities**

This schedule indicates the minimum spatial and functional requirements of the facilities to be provided on the **Project Highway (Total length of 14.710 km)** with an aim to cater to the envisaged demand till the end of the concession period.

The Contractor shall construct the Project Facilities in accordance with the provisions of this Agreement. Such Project Facilities for Package - II shall include:

- (a) Roadside furniture
- (b) Pedestrian facilities
- (c) Tree plantation
- (d) Bus shelters
- (e) Passing Places
- (f) Truck lay byes and
- (g) Others to be specified

**5 Description of Project Facilities**

**Toll Plaza**

NIL

**Bus Shelters**

To ensure orderly movement of the through traffic, bus shelters have been proposed outside the residential area, away from bridges, and high embankments and not too close to the road intersections. The bus stops have been proposed on one side of the road.

Bus shelters shall be provided on the Project Highway **at 8 locations** as mentioned herein under. Bus shelters shall be constructed as per Manual on both sides of the Project Highway. These bus shelters will also have passenger shelter.

### Details of Bus shelters

Sl. No.	Project Facility (in Pair)	Design Chainage (km)
1	Bus Shelter	18+909
2	Bus Shelter	19+409
3	Bus Shelter	21+109
4	Bus Shelter	30+489

### Pedestrian Facilities

Pedestrian facilities shall be provided at the locations of urban sections in order to ensure safety of pedestrians while crossing in consultation with NHIDCL. This should include (a) minimum Zebra Crossing with flashing Beacon or (b) Zebra Crossing with separate pedestrian phase or (c) any other provision as approved by NHIDCL.

### Landscaping

Landscape treatment of the Project Highway shall be undertaken through planting of trees and ground cover of appropriate varieties and landscaping on surplus land in the ROW. The Construction Contractor should plant **at least 1471nos. of trees** of minimum 6 ft. height with tree guard made up of MS sections.

Plantation scheme shall be prepared in consultation with the Forest Department of the Government of Arunachal Pradesh, and the Independent Consultant/ NHIDCL.

### Environment

The Project Highway during design, construction and maintenance during implementation period shall conform to the environmental rules and regulations in force. The Construction Contractor shall be responsible for the same.

---

“Construction of two-Lane with hard shoulders of Changtongya - Longleng Road on EPC basis from existing Km 16.592 to Km 29.530 [Design Km.18.779 to Km. 33.489] (Design Length - 14.710 Km) in the state of Nagaland under SARDP-NE Phase A”