

# **SCHEDULES**

**SCHEDULE – A**  
(See Clause 8.1)

**SITE OF THE PROJECT**

**1 The Site**

1.1 The Project road from Nepal Border to India border corridor connecting Kakarvitta – Panitanki is part of AH 02 project. Access to the start point of site from Siliguri is via the bituminous road NH31 C (approximately 30km), a journey of about 60 minutes. Project can also be accessed by air through Bagdogra airport. Siliguri is also connected to various parts of north eastern states and other parts of India by well established rail network.

The topography falls under the plain terrain of IRC classification and traverse generally through semi urban area. The first 0.6 Km of this road from Kakarvitta in Nepal to start of bridge in Nepal border is a state highway and then the project road joins NH 31C at Panitanki in India.

There exists 1 major bridge on the d/s of the proposed new Mechi bridge.

Majority of the land use along the project road is for agriculture in rural areas and commercial, residential etc in built-up sections.

There is 1 major junction at the start the project road.

Traffic on this stretch of project road is of mixed type. Large number of commercial vehicles & passenger vehicles are plying on this road.

Number of utilities viz. electricity, telephone, HT lines, Water pipe lines and OFC are present. Site of the Project Highway shall include the land, buildings, structures and road works as described in Annex-I of this Schedule-A.

- 1.2 The dates of handing over the Right of Way to the Contractor are specified in **Annex-II** of this **Schedule-A**.
- 1.3 An inventory of the Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Executing Agency Representative and the EPC Contractor, and such inventory shall form part of the memorandum referred to in Clause 8.2.1 of the Agreement.
- 1.4 The alignment plans of the Project Highway are specified in Annex-III. In the case of sections where no modification in the existing alignment of the Project Highway is contemplated, the alignment plan has not been provided. Alignment plans have only been given for sections where the existing alignment is proposed to be upgraded. The proposed profile of the Project Highways shall be followed by the contractor with minimum FRL as indicated in the alignment plan. The contractor, however, improve/upgrade the Road Profile as indicated in Annexure-III based on site/design requirement
- 1.5 The status of the environment clearances obtained or awaited is given in Annex IV.

Annex - I  
(Schedule-A)

**Site**

Note: Through suitable drawings and description in words, the land, buildings, structures and road works comprising the Site shall be specified briefly but precisely in this Annex-I. All the chainages/location referred to in Annex-I to Schedule-A shall be existing chainages.

**1.0 Site**

The Project road from Nepal Border to India border corridor connecting Kakarvitta – Panitanki is part of AH 02 project. Access to the start point of site from Siliguri is via the bituminous road NH31 C (approximately 30km), a journey of about 60 minutes. Project can also be accessed by air through Bagdogra airport. Siliguri is also connected to various parts of north eastern states and other parts of India by well established rail network.

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Majority of the land use along the project road is for agriculture in rural areas and commercial, residential etc in built-up sections.

There is 1 major junction at the start the project road.

Traffic on this stretch of project road is of mixed type. Large number of commercial vehicles & passenger vehicles are plying on this road.

Number of utilities viz. electricity, telephone, HT lines, Water pipe lines and OFC are present.

**2. Land**

The Site of the Project Highway comprises the land (sum total of land already in possession and land to be possessed) as described below:

Design Chainage (Km)		Existing ROW Width Varies (m)	
From	To	From	To
0+000	0+547	48.0	49.0
1+270	1+500	45.0	45.0

**2.0 Carriageway**

The present carriageway width varies from 7.00 to 8.0 m with footpath on both sides

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except the urban location where it is 13 to 14 m. The type of the existing pavement is flexible.

### 3.0 Major Bridges

There is an existing bridge immediately on the d/s of the proposed new bridge with following details:

S. No	Name of Bridge	Type	Existing Chainage (km)	Width (m)	Span Arrangement (m)	Type of Structure		
						Foundation	Substructure	Superstructure
1	Mechi Bridge	Major	-	8.0	28.3 + 18 x 29.3 + 28.3	Well	RCC / Wall	PSC Girder

### 5.0 Railway Over-Bridges (ROB) / Railway Under-Bridges (RUB)

The site includes the following ROB/ RUB..

S No	ROB / RUB	Existing Chainage (Km)	Width (m)	Span Arrangement (m)	Type of Structure		
					Foundation	Substructure	Superstructure
Nil							

### 6.0 Grade separator

The Site includes the following grade separators:

S. No.	Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)
		Foundation	Superstructure		
NIL					

## 7.0 Minor Bridges

The site includes the following Minor Bridges

S. No	Name of Bridge	Type	Existing Chainage (km)	Width (m)	Span Arrangement	Type of Structure		
						Foundati on	Sub-structure	Super-structure
Nil								

## 8.0 Railway level crossings/Railway Track

The Site includes the following railway level crossings:

Sl. No.	Road Segment	Existing Chainage (km)	Remarks
NIL			

## 9.0 Underpasses (Vehicular, Non Vehicular)

The Site includes the following underpasses:

S. No.	Chainage (km)	Type of Structure	No. of Spans with span length (m)	Width (m)

## 10.0 Culverts

S. No.	Chainage (km)	Type of Culvert	Span /Opening with span length (m)	Width (m)

### 11.0 Bus Bays

The details of bus stops on the Site are as follows:

S. No.	Chainage (km)	Length (m)	Left Hand Side	Right Hand Side

### 12.0 Truck Lay byes

The details of truck lay byes are as follows:

S. No.	Chainage (km)	Length (m)	Left Hand Side	Right Hand Side

### 13.0 Road side drains

The details of the roadside drains are as follows:

S. No.	Location		Type	
	From km	to km	Masonry/cc (Pucca)	Earthen (Kutchha)

### 14.0 Major Junctions

The details of major junctions are as follows:

S. No	Existing Chainage (km)	Design Chainage (km)	Type of Junction	Type of cross road
1	100.970	0+000	At Grade	Starting Point of Project in Nepal
2	101+120	0+150	At Grade	To the LCS on Nepal side (including pedestrian crossing)
3		1+270	At Grade	Intersection of Project Road with village road and Panitanki bypass on India side (including pedestrian

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				crossing)
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## 15.0 Minor Junctions

The details of minor junctions are as follows:

S. No	Existing Chainage (km)	Design Chainage (km)	Side	Type of Junction	Type of cross road
Access to built up areas on LHS on Nepal side					

## 16.0 Bypasses

The details of the existing road sections proposed to be bypassed are as follows:

S. No.	Name of bypass (town)	Chainage (km) From km to km	Length (in Km)

## 17.0 Other Structures/Details

Total number of structures on the Site is noted below:

a)	Total No. of Major Bridges	-	Nil
b)	Total No. of Railway Over/Under Bridges	-	Nil
c)	Total No. of Minor Bridges	-	Nil
d)	Total No. of Pipe Culverts	-	Nil
e)	Total No. of Slab Culverts	-	Nil
f)	Total No. of Box Culverts	-	Nil
h)	Level Crossings	-	Nil

### i) Built Up Locations

The following are the Built-up locations on the Project Road.

Existing Chainage		Length (m)	Village
From	To		
100.970	101.517	547	Kakarvitta

### j) GTS BM Details :

The GTS Bench mark value on cement plaster of bed plate of South Abutment of Railway Bridge No. 2 over Mahananda River is MSL 117.716m. The bench mark is near

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telegraph post No.01/11 and is about 1.6m below the level of rails of Siliguri Junction.

ID	Easting	Northing	MSL (Meter)	Remarks
	(Meter)	(Meter)		
GPS1	616084.404	2947418.897	129.695	India Side
P118	616160.414	2947378.970	128.944	India Side
TBM1	615512.259	2947679.391	130.982	Nepal Side

- The coordinates given in the table are based on the orientation of the our survey co-ordinates to match with the already constructed Panitanki Bypass of AH02.

#### **k) Referencing System**

Kilometer stones are existing in some of the locations of the project highway. It is called the “Existing Chainage”. During topographical survey with Total Station, observations made are referred to “Design Chainage”. The relationship between the “Existing Chainage” and the “Design Chainage” as per field surveys of the location of existing Km stones using the total station for the “Project Highway” is given below:

#### **Design Chainage corresponding to Existing Chainage**

Design Chainage (Km)		Existing Chainage (Km)		Remarks
From	To	From	To	
0.000	0.547	100.970	101.517	Kakarvitta (NH-327B) in Nepal
0.547	1.222	-	-	New Mechi Bridge (Partly in India & partly in Nepal)
1.222	1.500	-	-	Joining the Panitanki bypass in India



**(Schedule-A)****Dates for providing Right of Way**

The dates on which the Authority shall provide Right of Way (ROW) to the Contractor on Different stretches of the Site are stated below:

:

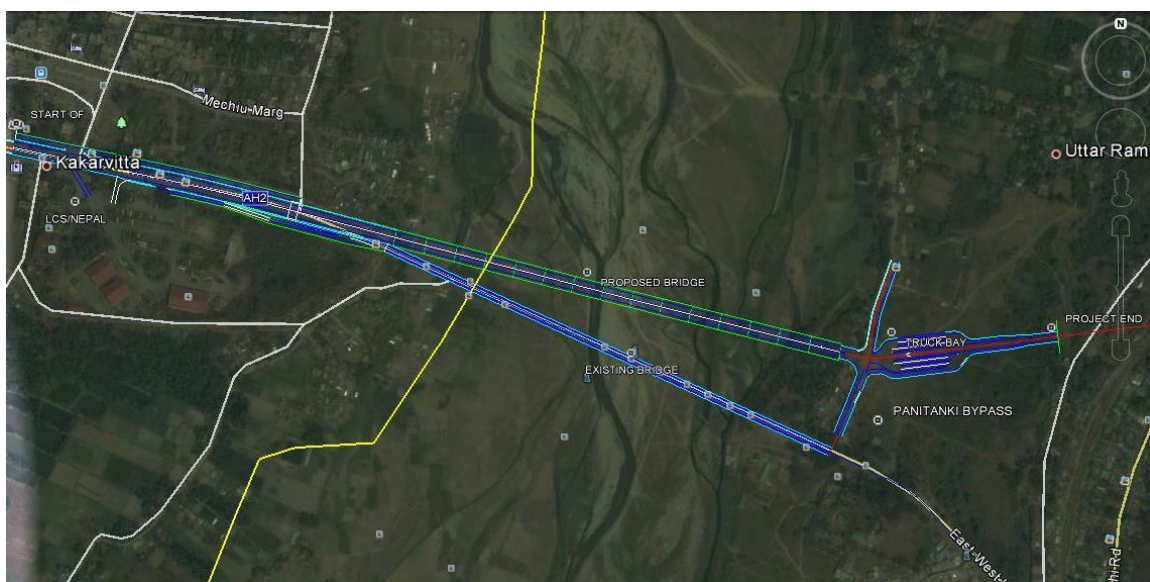
Sl. No	From Km to Km	Length (Km)	Side	Date of Providing ROW*
1	2	3	4	5
(i) Full Right of Way (Full Width)				
(a) Mechi Bridge & Stretch	0+547 to 1+222 1+270 To 1+500	0.675 0.230	Both sides	Appointed Date
(ii) Balance Right of Way (Full Width)				
(b) Stretch	0+000 to 0+547 1+222 to 1+270	0.547 0.048	Both sides	6 months

\* The dates specified herein shall in no case be beyond 150 (one hundred and fifty) days after the Appointed Date.

**Annex - III**  
**(Schedule-A)**

**Alignment Plans**

The existing alignment of the Project Highway shall be modified as per the enclosed alignment plan. ENCLOSED



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*(Schedule-A)*

**Environment Clearances**

The project highway does not require environment clearance as per MoEF circular dated **22.08.2013**

From Environmental considerations the stretch from km 0+000 to 1+500 (New Mechi Bridge and its approach on Nepal and India border) can be handed over as there is no existence of Wild Life corridor and Reserved /Protected Forest Areas. The tree cutting permission will not deter contractor to work in areas free of trees. In the tree areas he can work only when tree are cut and tree felling permission is available.

## **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 Four-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.

**Annex – I**  
**(Schedule – B)**  
**DESCRIPTION OF FOUR LANING**

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'.

**1 WIDENING OF EXISTING HIGHWAY**

**1.1** 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.

**1.2 Width of Carriageway**

**1.2.1** The paved carriageway shall be 10.0m (7m + 2 x1.5m paved shoulder) for two lane and 22.0 (2 x 11.0m matching with bridge cross section with RE wall) for four lane with service road in accordance with the typical cross section drawings, except in the areas mentioned in the table below.

S No	Built-Up Stretch (Township)	Location (Km)		Carriageway Width (m)	Typical Cross Section
		From	To		
1	Kakarvitta	0+000	0+150	2 x 11.0 + 1 x 5.5 (Service Road)	1
2	Kakarvitta	0+150	0+400	2 x 11.0 + 1 x 5.5 + 1 x 3.75 (Service Roads)	2
3	Kakarvitta	0+400	0+547	2 x 11.0 + 1 x 5.5 + 1 x 3.75 + 1 x 3.75 (Service Roads)	3

**1.2.2** Except as otherwise provided in this Agreement, the width of the paved carriageway and cross-sectional features shall conform to paragraph 1.1 above.

S No	Stretch	Carriageway Width (m)	Typical Cross Section
1	4-Lane Rural	2 x 11.0 + 2 x 2.0	4

## **2. GEOMETRIC DESIGN AND GENERAL FEATURES**

### **2.1 General**

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

### **2.2 Design speed**

The design speed shall be the minimum design speed of 40 kmph for plain terrain.

### **2.3 Improvement of the existing road geometrics**

[Refer to paragraph 2.1 (v) of the Manual and provide details]

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:

Sl. No	Stretch(km)		Type Of Deficiency	Remarks
	From	To		
Nil				

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**

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

#### **Details of Proposed ROW**

S. No.	Design Chainage (m)		Length (KM)	Width (m)
	From	To		
1	0+000	0+547	547	55
2	1+222	1+500	278	45 – 60

### **2.5 Type of shoulders**

[Refer to paragraph 2.5.2 of the Manual and specify]

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

S No	Built-up Stretch (Township)	Location (Km)		Fully Paved Shoulder / Footpath	Typical Cross Section
		From	To		
1	Kakarvitta	0+000	0+150	Footpath	TCS-1
2	Kakarvitta	0+150	0+400	Footpath	TCS-2
3	Kakarvitta	0+400	0+547	Footpath	TCS-3

- (b) In open country, [paved shoulders of 1.5 m width shall be provided and balance 1.0m 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 5.9.9 and 5.9.10 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:

S. No	Location	Existing Chainage (Km)	Design Chainage (Km)	Name of Intersecting Roads	Width of Opening	Vertical Clearance (m)
1	-	101.380	0+410	-	12.0	5.5

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

## 2.7 Lateral and vertical clearances at overpasses

2.7.1 Lateral and vertical clearances at overpasses shall be as per paragraph 2.11 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]

S. No.	Location of service road (Km)		Right hand side (RHS) / Left hand side (LHS) / or Both sides	Length of service road (Km)
	From	To		
1	0+000	0+150	LHS Side	0.150
2	0+150	0+400	Both Sides	0.250
3	0+400	0+547	Both Sides	0.147

## 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:

S. No	Existing Chainage	Design Chainage	Name of Intersecting Roads	Proposed Structural Configuration	Proposed Structure Type	Proposed Number and length of Spans (m)	Approach Gradient (%)	Total Width of Structure
Nil								

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

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	

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## 2.10 Cattle and pedestrian underpass /overpass

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

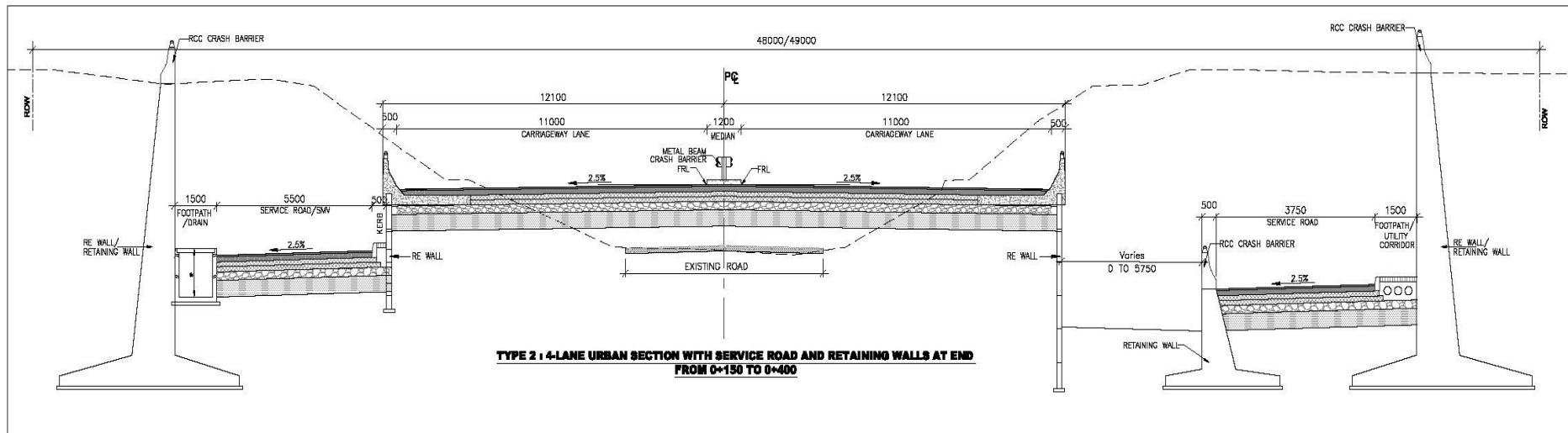
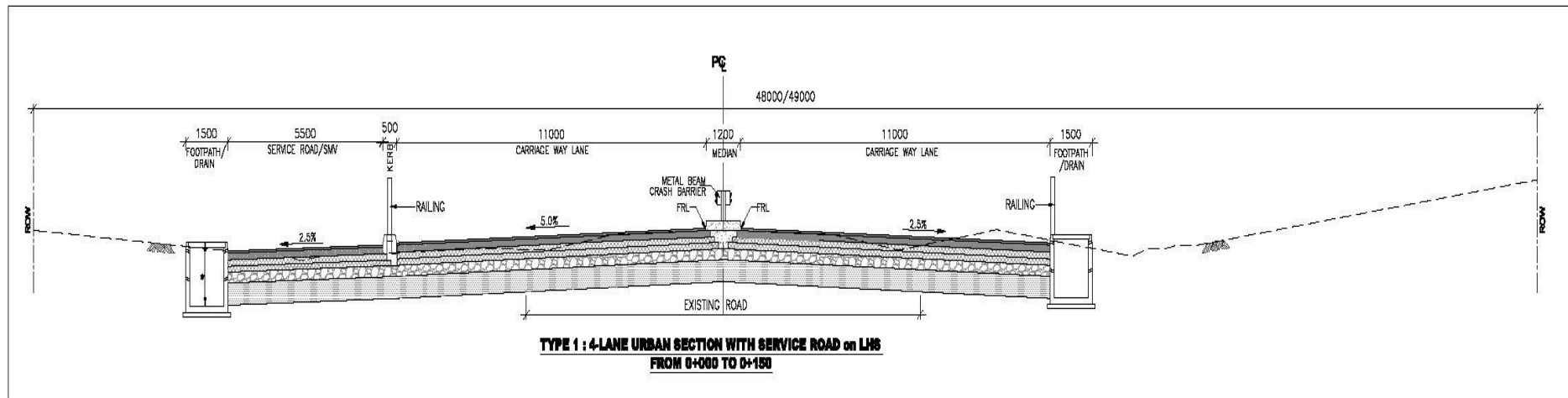
S. No.	Location	Type of crossing
Nil		

## 2.11 Typical cross-sections of the Project Highway

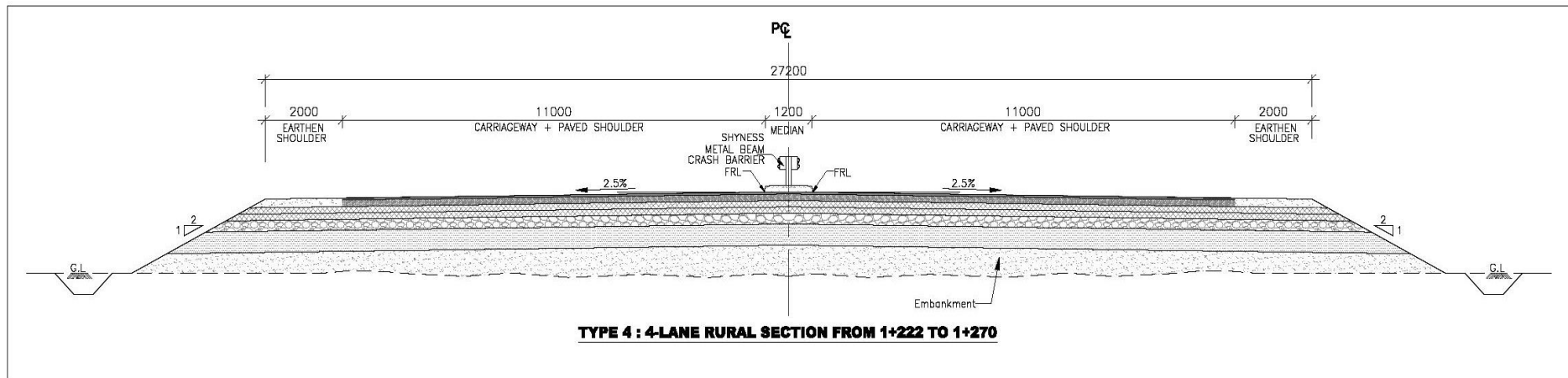
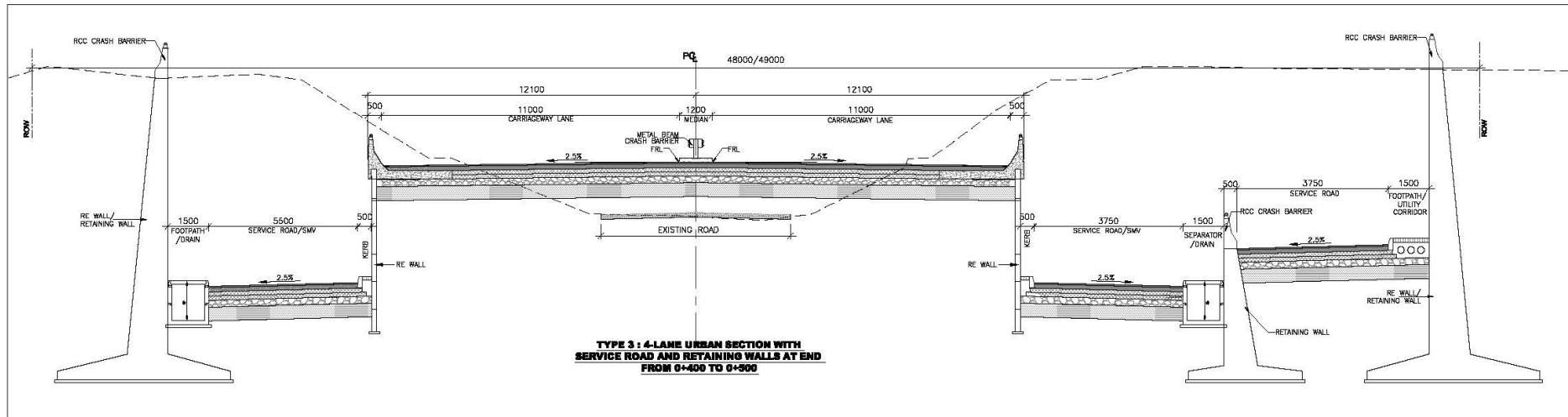
Approximate cross section type (tentative) suitable at various chainages of project highway is as shown below:

### Typical Cross Sections

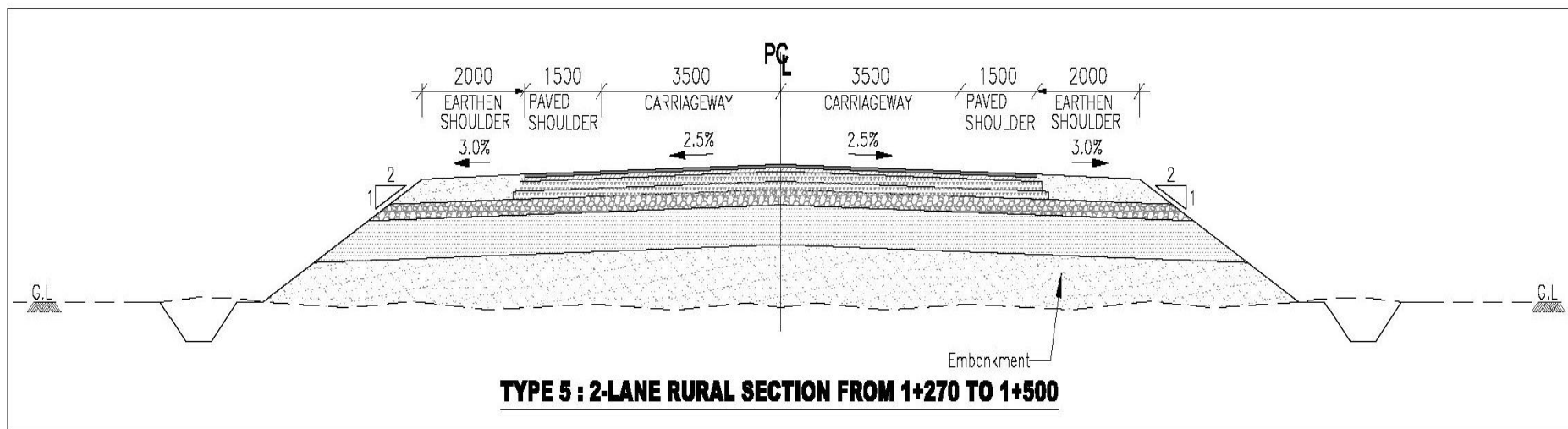
- a) Type-1 : 4 Lane Urban Section with Service Road on LHS
- b) Type-2 : 4 Lane Urban Section with Service Road on LHS & RHS and Retaining Wall at end
- c) Type-3 : 4 Lane Urban Section with Service Road on LHS & RHS and Retaining Wall at end
- d) Type-4 : 4 Lane Rural Section
- e) Type-5 : 2 Lane Rural Section



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## 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 FDPR. However, the final finished road levels (FRL) will be finalized as per site conditions in consultation with NHIDCL

## 2.13 Built-Up Areas

The alignment passes through Built up areas as tabulated below.

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Sl.no	Existing Chainage		Design Chainage		Name of Village/town etc
	From ( Km)	To (Km)	From (km)	To (km)	
As per Annexure-I of Schedule-A					

## 2.14 Cross Section Type along the Project Corridor

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

Design Chainage (km)		Length (Km)	Cross-Section Type
From	To		
0+000	0+150	0.150	Type-1
0.+150	0+400	0.250	Type-2
0+400	0+547	0.147	Type-3
0+547	1+222	0.675	Major Bridge
1+222	1+270	0.048	Type-4
1+270	1+500	0.230	Type-5*

\* The truck-lay byes shall be provided as per the drawing in this section.

## 3 INTERSECTIONS AND GRADE SEPARATORS

### 3.1 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:

## At-grade intersections

### (a) Major Intersections

S. No	Existing Chainage (Km)	Design Chainage (Km)	Location	Proposed Structure	Remarks
1	100.970	0+000	Kakarvitta	At Grade	-
2	-	0+150	Kakarvitta	At Grade	To the LCS (including pedestrian crossing)
2	-	1+270	Panitanki Bypass	At Grade	Intersection of Project Road with Village Road and Panitanki bypass on India side

### (b) Grade separated intersection with/without ramps

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

## 4.0 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:

S. No	Section (from Km to Km)	Length(m)	Extent of raising
1	0+000 to 0+547 1+270 to 1+500	777	As per Drawing

## 5.0 PAVEMENT DESIGN

5.1 Pavement design shall be carried out in accordance with section 5 of the Manual. The detailed pavement design including overlay and pavement characteristics requirements of the Project Highway shall be done in accordance with Schedule D.

## 5.2 Type of pavement

[Refer to paragraph 5.1 of the Manual and state specific requirement, if any, of providing cement concrete pavement.]

The contractor is to adopt flexible pavement for the project highway as per manual.

## 5.3 Design requirements

[Refer to paragraph 5.4, 5.9 and 5.10 of the Manual and specify design requirements and strategy]

### 5.3.1 Design Period and strategy

Flexible pavement for new pavement or for widening and strengthening of the existing pavement shall be designed for a minimum design period of 15 years. 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 a design traffic of 30 million standard axles.

S. No	Design Chainage		Adopted Design for 15 Years MSA
	From	To	
1	0+000	0+547	30
2	1+222	1+500	30

## 5.4 Design Period and strategy for Rigid pavement.

The Rigid pavement shall be designed in accordance IR-58 -2011 for a design period of 30 years using the following traffic and axle load spectrum. The existing flexible pavement shall be removed/milled up to bottom of bituminous layers in case of existing road locations. The usage/disposal of milled/dismantled pavement shall be in accordance EMAP requirements.

## 5.5 Design Traffic

Notwithstanding anything to the contrary contained in this Agreement or the Manual, the Contractor shall design the pavement for design traffic of 30 million standard axles.

## 5.6 Reconstruction of stretches

The stretches of the existing road as shown in the plan and profile shall be reconstructed. These shall be designed as 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.

Drainage system including surface and subsurface drains for the Project Highway shall be provided as per Section 6 of the Manual. RCC covered drain shall be provided at the following stretches of built up areas including connecting to river for discharge of storm water (including storm water collected at the underpass located at Km. 0+410)

S. No	Name of Township	Design Chainage (Km)		Length (Km)	Side
		From	To		
1	Kakarvitta	0+000	0+150	0.150	LHS
2	Kakarvitta	0+150	0+547	0.397	Both

## 7.0 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 as given in the table and culverts 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.

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

[Refer to paragraph 7.1 (ii) of the Manual and specify the width of carriageway of new bridges and structures of more than 60 metre length, if the carriageway width is different from 7.5 metres in the table below.]

S. No	Bridges at km	Width of carriageway and cross sectional features
1	0.885	24.2 m (0.5+11.0+1.2+11.0+0.5)

7.1.3 The following structures shall be provided with footpaths:

[Refer to paragraph 7.1 (iii) of the Manual and provide details of new Structures with footpath.]

S. No	Location at Km	Remarks
Nil		

7.1.4 All bridges shall be high-level bridges.

[Refer to paragraph 7.1 (iv) of the Manual and state if there is any exception]



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

[Refer to paragraph 7.1 (viii) of the Manual and provide details]

S. No	Bridge at km	Utility service to be carried	Remarks
Nil			

7.1.6 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.

## 7.2 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 7.3 (i) of the Manual and provide details]

S. No	Culvert location	Span/Opening (m)	Remarks, if any*
Nil			

### 7.2.3 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.	Culvert location	Type, span, height and width of existing culvert (m)	Repairs to be carried out [specify]

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

Sl No.	Culvert location	Span/Opening (m)

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

[Refer to paragraph 7.23 of the Manual and provide details]

S. No	Location	Type of Repair required
As mentioned in the notes of 7.2.3		

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

### 7.3 Bridges

7.3.1 Existing bridges to be re- constructed/widened

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

[Refer to paragraph 7.3.2 of the Manual and provide details]

S. No	Bridge location (km)	Salient details of existing bridge	Adequacy or otherwise of the existing waterway, vertical clearance, etc*	Remarks
Nil				

- (ii) The following narrow bridges shall be widened:

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

7.3.2 *Additional new bridges*

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

S. No.	Location (Km)	Total Length (m)	Remarks, if any
1	0+885	675 (5 units of 3 x 45m)	The superstructure shall be 3 Span Continuous PSC Box Girder having Fishbelley shape (5 units of 3 x 45m) using Precast PSC Segments with Circular Pier resting on Pile Foundation

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

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

Sl. No.	Location at km	Remarks

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

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

S. No.	Location at Km	Remarks
As mentioned in Table below 7.6		

- 7.3.5 *Drainage system for bridge decks*

An effective drainage system for bridge decks shall be provided as specified in the Manuals.

- 7.3.6 *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]

NIL

## 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 7.19 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 (Chainage 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.

##### 7.5.1 Vehicular Underpass

The vehicular underpass structure shall be provided at the locations as specified in paragraphs 2.6 of this Annex-I.

S. No	Location	Existing Chainage (Km)	Design Chainage (Km)	Name of Intersecting Roads	Proposed Structural Configuration	Proposed Structure Type	Proposed Span Arrangement (m)	Total Width of Structure (m)
1	-	101.380	0+410	-	New 2 Lane	RCC Box	12.0 (Sq) x 5.5	24.2

#### 7.6 Repairs and strengthening of bridges and structures

[Refer to paragraph 7.23 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. Details of Existing Major Bridges to be Widened, Repaired and Rehabilitated**

S. No	Name of Existing Bridge	Existing Chainage (km)	Design Chainage (km)	Width (m)	Span Arrangement (m)	Type of Structure			Details of Rehabilitation	Width of Widening(m)
						Foundati on	Sub-structure	Super-structure		
1	Mechi Bridge	-	-	8.0	28.3 + 18x29.3 + 28.3	Well	Wall Type	PSC Girder	<ul style="list-style-type: none"> <li>Wearing coat shall be replaced.</li> <li>Damaged expansion joint shall be replaced.</li> <li>Floor protection works for piers and Abutment</li> </ul>	-

**B Details of Existing Minor Bridges to be Widened, Deck Replacement, Repair and Rehabilitated**

S. No	Name of Existing Bridge	Existing Chainage (Km)	Design Chainage (km)	Width (m)	Span Arrangement (m)	Type of Structure			Details of Rehabilitation	Width of Widening (m)
						Foundati on	Sub-structure	Super-structure		
Nil										

**Note: Repair and Rehabilitation Measures to be carried out for bridges:**

A schedule for repair and rehabilitation of bridges to be prepared based on detailed inspection and to be approved from Engineer before taking up this work subjected to a minimum rehabilitation measures mentioned in the table.

Widening of the bridge shall include widening of deck slab, abutment, return / retaining wall, approach slab (dismantling of existing return or wing wall if necessary) along with associated works including quadrant embankment slopes with stone pitching.

**c. ROB / RUB**

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

**d. Overpasses/Underpasses and other structures**

S. No	Location of Overpass / Underpass (Km)	Nature and extent of repairs /strengthening to be carried out
Nil		

**7.7 List of Major Bridges and Structures**

The following is the list of the Major Bridges (MJB) and Structures

S. No	Location
1	0+885 (MJB)

**8. TRAFFIC CONTROL DEVICES AND ROAD SAFETY WORKS**

**8.1 General**

Traffic control devices, Road safety devices and Road side furniture shall comprise of road signs, road markings, object markers, hazard markers, studs, delineators, attenuators, safety barriers, pedestrian guard rails, boundary stones, Km stones, etc. shall be provided in accordance with Section 9 of the Manual

- 8.2** Specifications of the reflective sheeting. Type VIII/Type IX Micro-prismatic Retro-reflective sheeting conforming to ASTM-D-4956.

**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]

## 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.]

Total of 116 trees are identified to be affected in the proposed ROW. As per guideline, 1:3 new tree to be planted by the Contractor.

Location	LHS	RHS	Remarks
km.0+000 to 0+547	43	33	Nepal Side
Km. 1+222 to 1+500	13	27	India Side
Total	116		

## 11 HAZARDOUS LOCATIONS

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

Design Chainage in km (LHS)			Design Chainage in km (RHS)		
From	to	Length (m)	From	to	Length (m)
1+270	1+500	230	1+270	1+500	230

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

(ii) Pedestrian Railing Details

S. No	Chainage (Km)		Length (m)	Remarks
	From	To		
1	0+000	0+150	150	As per TCS

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

(iii) W-Metal Beam Crash Barrier Details

S. No	Chainage (Km)		Length (m)	Remarks
	From	To		
1	0+000	0+547	547	In median as per TCS
2	1+222	1+500	278	As per TCS

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

## 12 SPECIAL REQUIREMENTS 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.

**The minimum quantity of protection works may be taken as below**

### Details of RE Wall/ Retaining Wall Locations

The following are the RE wall / Retaining Wall locations::

S. No	Design Chainage (Km)		Length (m)	Side
	From	To		
1	0+150	0+547	397	Both Sides as per TCS

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

Note: The wall length is indicative and shall be estimated by the EPC contractor. However, the Contractor shall be responsible for accurate assessment of the actual requirement as per site situation & prepare designs for slope protection & stabilization as per the specifications & standards stipulated in schedule 'D' and submit the same to AE for review through the proof consultant and implement it accordingly thereafter.

**Any increase in quantity over and above the tentative quantity as mentioned in above tables or through change in specifications will not be considered for payment as change of scope.** Therefore Contractor shall make through investigation of the site and assess the requirement of slope protection and slide prone zones and other safety features on his own before submission of bid.

## 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 - C  
(See Clause 2.1)

## PROJECT FACILITIES

### 1 Project Facilities

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

- (a) Toll plazas;
- (b) Roadside furniture;
- (c) Street lighting;
- (d) Pedestrian facilities;
- (e) Landscaping and tree plantation;
- (f) Truck lay-byes;
- (g) Bus-bays and bus shelters;
- (h) Traffic aid posts;
- (i) Medical aid posts;
- (j) Vehicle rescue posts; and
- (k) Others

### 2 Description of Project Facilities

Each of the Project Facilities is briefly described below:

#### (a) Toll Plazas

Nil

#### (b) Road side Furniture

Road side furniture shall be provided in accordance with Section 9.0 of the Manual of Standards and Specifications.

#### (c) Street Lighting:

Street lighting and lighting system shall be provided in accordance with Clause 13.3 of the Manual of Standards and Specifications.

Lighting shall be provided at the following locations as per IRC SP 84:2014:

- (aa) Lighting shall be provided at Truck lay byes and Bus stops as per Schedule D
- (ab) High Mast Lighting shall be provided at all Major Junctions, Truck lay byes and Grade Separation structures.

S. No	Chainage (km)		Length (m)
	From	To	
1	0+000	1+500	1500

**(d) Pedestrian Facilities**

Pedestrian crossing Facilities shall be provided in accordance with Section 12.2 of the Manual of Standards and Specifications and Typical Cross Section Details provided in Appendix BI

**(e) Landscaping and Tree Plantation**

Highway landscaping and tree plantation shall be provided in accordance with Section 11 of the Manual of Standards and Specifications.

**(f) Truck Lay-byes**

Truck Lay-byes shall be provided as per enclosed drawings and as decided by Engineer-in-Charge in the following locations:

S. No	Design Chainage (km)	Side
1	1+350	Both

**(g) Bus-bays and Bus Shelter**

Bus-bays and shelters shall be provided in accordance with Clause 13.5 of the Manual of Standards and Specifications at following locations.

S. No	Design Chainage (km)	Side	S. No	Design Chainage (km)	Side
Nil					

**(h) Traffic Aid Posts**

Nil

**(i) Medical Aid Posts**

**(a)** Nil

**(b) Ambulances**

Nil

**(j) Vehicle rescue posts**

**(a)** Nil.

**(b) Cranes**

Nil

**(k) Others**

**(1) Highway Lighting**

Lighting shall be provided at the following locations:

(i) Lighting shall be provided at approach to bridges, Built up areas and as per Schedule D (IRC: SP: 84-2014).

(ii) High Mast Lighting shall be provided at all Major Junctions

**(2) Highway Patrol**

Nil

## **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 & Specification for Four Laning of Highways (IRC: SP-84-2014) referred to herein as the Manual]

[Note: Specify the relevant Manual, Specifications and Standards]

Annex - I  
(Schedule-D)  
**Specifications and Standards for Construction**

**1 Specifications and Standards**

- (a) All Materials, works and construction operations shall conform to the Manual of Standards and Specifications for Four Laning of Highways (IRC: SP: 84-2014) referred to as the Manual
- (b) MORTH Specifications for Road and Bridge Works.(Fifth revision, April 2013) referred to as Part I and additional technical Specifications comprising of additions to the "specifications for road and bridge works" referred to in Part - I above as Additional Specifications for particular item of works not already covered in PART-I.

Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Executing Agency

- (c) Any improvement measures in Subgrade/Sub base shall be allowed in line with the specification requirements with available latest technologies to the satisfaction of the Executing Agency.
- (d) Utilisation of milled material as RAP/WMM/GSB (non drainage layer) as per the specification requirements.

**2 Deviations from the Specifications and Standards**

- 2.1 The terms “Concessionaire”, “Independent Engineer” and “Concession Agreement” used in the Manuals shall be deemed to be substituted by the terms “EPC Contractor”, “Authority’s Engineer” and “Agreement” respectively.
- 2.2 notwithstanding anything to the contrary contained in Paragraph 1 above, the following Specifications and Standards shall apply to the Project Highway, and for purposes of this Agreement, the aforesaid Specifications and Standards shall be deemed to be amended to the extent set forth below:

S. No.	Clause referred in the Manual	Provision as per Manual	Amended Provision
1	7.3	Width of superstructure	Total Width of Superstructure shall be as given in Section 7 & Drawings
2	2.2	Ruling design speed shall be adopted	Speed restricted locations are given in the table

## TECHNICAL SPECIFICATIONS

### 1. PREAMBLE

1.1 The Technical Specifications contained herein as Volume V shall be read in conjunction with the other Documents.

#### 1.1.1 General

The Technical specifications covering the materials and the workmanship aspects as well as method of measurements and payments are included in this section. These specifications cover the items of civil and non-civil works coming under scope of this document. All work shall be carried out in conformity with the same. These specifications are not intended to cover the minute details. The works shall be executed in accordance with good practices followed for achieving high standards of workmanship, thus ensuring safety and durability of the construction. All codes and standards referred to in these specifications shall be the latest thereof unless otherwise stated.

#### 1.1.2 Inclusive Documents

The provisions of special conditions of contract, those specified elsewhere in the tender document, as well as execution drawings and notes, or other specifications issued in writing by the Engineer shall form part of the technical specifications of this project.

1.1.3 The attention of the contractor is drawn to those clauses of codes which require supporting specification either by the Engineer or by 'Mutual agreement between the supplier and purchaser'. In such cases, it is the responsibility of the tenderer /contractor to seek clarification on any uncertainty and obtain prior approval of the Engineer before taking up the supply/construction. In absence of such prior clarification, the Engineer's choice/design will be final and binding on the contractor without involving separately any additional payment.

#### 1.1.4 Measurement and Payment

The methods of measurement and payment shall be as described under various items and in the Bill of Quantities. Where specific definitions are not given the methods described in CPWD, IRC IS and B.I.S. Code will be followed. Should there be any detail of construction or materials which has not been referred to in the specification or in the Bill of Quantities and Drawings but the necessity for which may be implied or inferred there from, or which is usual or essential to the completion of the work in the trades, the same shall be deemed to be included in the rate and prices quoted by the contractor in the Bill of Quantities.

#### 1.1.5 Defective Works

All defective works are liable to be demolished, rebuilt and defective materials replaced by the contractor at his own cost. In the event of such works being accepted by carrying out repairs etc, as specified by the Engineer the cost of repairs will be borne by the contractor.

### 1.2 SITE INFORMATION

1.2.1 The information given hereunder and provided elsewhere in these documents is given in good faith by the Employer but the Contractor shall satisfy himself regarding all aspects of site conditions and no claim will be entertained on the plea that the information supplied by the Employer is erroneous or insufficient.

1.2.2 The area, in which the works are located in the Nepal and Indian border falls under the plain terrain as per IRC classification. The Project road consists of Construction of New Mechi Bridge and its Approaches in Nepal (Kakarvitta) & India (Panitank) with a total length of 1.5 Km.

### **1.2.3 General Climatic Conditions**

The region has a dry summer and bracing cold winter. The cold season is from December to February and is followed by hot summers from March to the last week of June. The south west Monsoon season follows, from June last to mid-September. The period from mid-September to about the end of November constitute the post monsoon season.

### **1.2.4 Seismic Zone**

The works are located in Seismic Zone IV.

## **2. GENERAL REQUIREMENTS**

The Technical Specifications in accordance with which the entire work described hereinafter to be constructed and completed by the Contractor shall comprise of the following:

### **2.1 PART-I: General Technical Specifications**

The General Technical Specifications shall be the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (Fifth Revision April 2013)", issued by the Ministry of Surface Transport & Highways, Government of India and published by the Indian Roads Congress.

### **2.2 PART-II: Additional Technical Specifications**

The Additional Technical Specifications shall comprise of Additions to the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS" referred to in PART - I above as Additional Specifications for particular item of works not already covered in PART-I.

#### **Additional Specifications**

The following Appendices have been added to the "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS" (Fifth Revision April 2013).

1. Appendix A-1 Providing PVC Rigid Pipes as Utility Duct
3. Appendix A-2 Curing using Liquid Membrane Forming Compound
4. Appendix A-3 Specification for PVC rigid pipes
5. Appendix A-4 Guard Post
8. Appendix A-5 Painting on Structures with Synthetic Enamel Paint for Numbering & Span Details of Bridges / Culverts and Water Proof Cement Paint for Parapet, Railing, Kerb and Crash Barrier
9. Appendix A-6 Reflective Pavement Markers (Road Studs)
10. Appendix A-7 Seismic Restrainers
11. Appendix A-8 Environmental Management Plan
12. Appendix A-9 Plantation of Flowering Plants and Shrubs
13. Appendix A-10 Involuntary Resettlement Safeguard Principles for the Project

In the absence of any definite provisions on any particular issue in the aforesaid Specifications, reference may be made to the latest codes and specifications of IRC, BIS, BS, ASTM, AASHTO and CAN/CSA in that order. Where even these are silent, the construction and completion of the works shall conform to sound engineering practice as approved by the

Engineer.

**2.3 PART III Specifications for Building, Subways and miscellaneous Works.**

Technical Specifications for Building, Subways, etc. and Miscellaneous works shall be the latest "CPWD Specifications-2009 volume 1 & 2 for Civil Works and General Specifications for Electrical Works Part I – Internal 2005, Part II – External 2007, as published by the Central Public Works Department (CPWD), Govt. of India and deemed to be bound into this document.

**2.4** The latest edition till 28 days before the final date of submission of the bid of all specifications / standard shall be applicable.



## **PART II**

### **ADDITIONAL TECHNICAL SPECIFICATION**

#### **DEFINITIONS**

The following abbreviations shall be added

"MORT&H"	:	Ministry of Road Transport & Highways (Previously known as 'MOST', Ministry of Surface Transport)
"NHIDCL"	:	National Highways Infrastructure Development Corporation Limited
"BIS"	:	Bureau of Indian Standards
"WBM"	:	Water Bound Macadam
"WMM"	:	Wet Mix Macadam
"CPCB"	:	Central Pollution Control Board
"QA"	:	Quality Assurance
"BOQ"	:	Bill of Quantities
"CECRI"	:	Central Electro Chemical Research Institute

## ADDITIONAL TECHNICAL SPECIFICATIONS

### *Appendix A-1*

#### PROVIDING PVC RIGID PIPES AS UTILITY DUCT

**1. Scope**

The work shall be consisting of laying and jointing of PVC rigid pipes for utility ducts in accordance with requirements of these specifications.

**2. Material**

PVC rigid pipes shall conform to IS: 4985-1988 suitable to sustain a working pressure of 4.0 kgf/cm<sup>2</sup>.

**3. Laying of Pipes**

Pipes shall be laid inside the crash barrier / safety barrier of deck slab of culverts, bridges, flyovers, etc. The pipes shall be fixed in position as per drawing and tied firmly with the reinforcement. The pipes shall be fitted and matched so that when laid in work they shall have a smooth uniform invert.

**4. Jointing**

The pipes shall be joined by collar or otherwise as approved by the Engineer.

**5. Closing of Ends**

The ends of pipes shall be closed with plastic covers to prevent ingress of foreign materials.

**6. Measurement for Payments**

The utility ducts shall be measured from end to end in linear metres.

**7. Rate**

The contract unit rate for the pipes shall include cost of pipes including cost of collars or other jointing material, transportation, handling, storing, laying in position and jointing complete and all incidental costs to complete the work as per specification.

## CURING USING LIQUID MEMBRANE FORMING COMPOUND

### 1. General

Liquid membrane forming compound are sometimes permitted to be used by the engineer for curing concrete for part or whole of the total curing period as specified in sections dealing with concrete construction. These membranes reduce the loss of water from concrete during early hardening period and some type of compounds also help in reducing the temperature-rise of concrete exposed to the radiation from the sun. These specifications cover the type and use of such compounds. However, the use of the same will need specific permission from the engineer, who may require a number of tests to be carried out for establishing the conformity of the product to these specifications and to establish that the curing compound and its method of use does not have any unacceptable effect on the quality of concrete. The cost of the initial acceptance testing and the quality control testing will be borne by the owner, if the method has been specified as a requirement by the engineer. If on the other hand, it is suggested by the contractor as an alternative to wet-curing, the full cost of testing will be borne by him and deemed to be included in his rates for concreting. The cost of curing in any case will be deemed to be part of the concrete rates and will not be paid extra.

All equipment, material etc., needed for curing and protection of concrete shall be at hand and ready for installing before actual concreting begins. Detailed plans, methods and procedures shall be firmly established, shall be settled and got approved in writing from the Engineer-in-charge sufficiently in advance of the actual concreting.

The equipment and method proposed to be utilised shall provide for adequate control and avoid interruption or damage to the work of other agencies.

Only wax-based white pigmented curing compound with water retention of 90 percent shall be used to cure the dry lean concrete. The curing compound shall conform to BS 7542. The curing compound shall be applied uniformly with a mechanical sprayer and with a hood to protect the spray from the wind. The curing compound shall be applied over the entire exposed surface of the DLC, including sides and edges, at the rate of 0.2 liters/ square meter.

The first application, referred to as the curing application, shall be applied immediately after the final rolling of the DLC is completed. As soon as the curing compound has lost its tackiness, the surface shall be covered with wet Hessian for three days. The second application, referred to as the debonding application, shall be applied 24 to 48 hours prior to the PQC placement. The application shall be made on the DLC surface free of debris and damaged surface. If the DLC is damaged, it shall be corrected prior to application of the second application of the curing compound. No construction traffic except that used for placing the PQC shall be allowed on the DLC surface after the second application of the curing compound. The curing compound shall not be tacky at the time of the PQC placement.

## **2. Curing Compound**

The curing compound shall be conforming to ASTM-C-309-81, Type-2, white pigmented compound. The solids dissolved in vehicle shall be either A (no restrictions) or Class B (resin as defined in ASTM D-883) as approved by the engineer.

White pigmented compound (Type-2) shall consist of finely divided white pigments and vehicle solids, ready mixed for immediate use without alteration.

The compound shall present a uniform white appearance when applied uniformly to a fresh concrete surface at a specified rate of application. It shall be of such consistency that it can be readily applied by spraying to provide uniform coating at temperatures above 4°C. If two coats are to be applied then it should be applied at an interval of approximately one hour. They shall adhere to freshly placed concrete that has stiffened or sufficient resist marking during the application and to damp hardened concrete and shall form a continuous film when applied at a rate of 5 m<sup>2</sup>/litre. When dry, the covering shall be continuous flexible and without visible breaks or pin holes and shall remain as unbroken film at least 28 days after application. It shall not react deleteriously with the concrete.

The compound shall meet with the requirement of water retention test as per ASTM designation C-156-80. The loss of water in this test shall be restricted to not more than 0.55 kg/m<sup>2</sup> of exposed surface in 72 hours.

The white pigmented compound (Type 2) when tested as specified in accordance with method E-79 of ASTM shall exhibit a day light reflectance of not less than 60% of that of magnesium oxide.

It shall fulfill the requirement of drying time when tested in accordance with ASTM-C-309-81. The compound applied shall be dry to touch in not more than 4 hours. After 12 hours it shall not be tacky or tack off (peel off) concrete when walked upon nor it shall impart a slippery surface.

The liquid compound should be of a sprayable consistency.

## **3. Supply and Testing**

### **3.1 Acceptance Testing**

Prior to the approval of the brand/trade name of compound and the source of supply and manufacturer acceptance testing shall be carried out to demonstrate the conformance of the compound to Clause 2 above. In addition, testing shall be performed to demonstrate that no adverse/undesirable change in quality of concrete or concrete surface takes place as a result/by-product of use of the compound. These tests should be designed to check properties such as loss of strength at 28 days of surface layer, or of concrete cube, change in surface texture, change in adhesion to subsequently applied layers like plaster, flooring, tiling etc. The type and number of tests are to be as specified by the engineer.

### **3.2 Routine Testing**

- a) The liquid membrane forming curing compound should be brought in the manufacturer's original clear containers. Each container shall be legibly marked with the name of the manufacture, the trade name of the compound, the type of compound and class of vehicle/solids, the nominal percentage of volatile material and batch or lot number. The lot

numbers will be assigned to the quantity of compound mixed, sampled and tested as single product. The manufacturer shall exercise the care in filling the container so that all are equally representative of the compound produced.

- b) Curing compound to be used on site shall be got tested at least 14 days in advance so that the result of water retention tests, reflectance test, drying etc, are available before it can be permitted for use. All of the filled containers represented by the approved sample shall then be sealed to prevent leakage, substitution or dilution. The engineer-in-charge or authorised representative should mark each container represented by the samples with a suitable identification mark for later identification and correlation and shall be kept in store with double lock arrangements. One key shall be kept with the Contractor and the other with Engineer. Random samples shall be collected from every batch of the compound. Frequency of random sampling shall be done as directed by the Engineer. The contractor shall provide samples and labour for collecting samples free of cost. Testing shall be carried out by agency approved by the engineer and in presence of his representative.

#### **4. Method of Application**

The compound shall be sprayed using mechanical sprayer of approved design to ensure uniform and continuous membrane on the concrete surface. The coverage shall be at the rate specified by the manufacturer or at the rate of 4m<sup>2</sup> per litre or as specified by the manufacturer and approved by the engineer. Field trials shall be conducted to decide effective coverage rate, which depends upon surface finish. The engineer after verification of the field and based on the actual experience shall order the rate of application as needed for achieving the proper curing. With a view to ensure thorough and complete coverage, approximately one half of the compound for a given area should be applied by moving the spray gun back and forth in one direction and the remaining half at right angles to this direction. In case the application is still not found uniform, the contractor shall have to apply the second coat as and when directed by the Engineer. If a second coat is to be applied, it should be applied approximately after an interval of one hour. The curing compound shall generally be applied as soon as the bleeding water or shine disappears, leaving dull appearance.

If surface treatment by roughing, hand brushing etc., is required (e.g. as in case of road pavements) the curing compound should be applied immediately after the same. Equipment for spraying curing compound shall be of pressure tank type (5 to 7 kg/cm<sup>2</sup>) with provision of continuous agitation. A curing jumbo with multiple travelling spray fans shall be provided for effective spray. Spraying on concrete lining shall be done in such a way that the green concrete is not disturbed or damaged or any foot impression left. Necessary schemes or spraying by mechanised means shall be got approved by the Engineer-in-charge. However, in emergency for very small areas/ patches) it can be applied with wire or bristled brush.

**SPECIFICATION FOR PVC RIGID PIPES**

**1. Scope**

The item includes supplying of PVC pipes with fittings of specified diameter including laying, fixing, cutting, jointing, etc., for service duct or drain water pipe line.

**2. Materials**

The pipes and fittings shall conform to series IV of IS 4985-1978. PVC pipes and fittings shall be free from cracks, flows and defects.

**3. Construction Methodology**

Before laying pipe line, it shall be first examined for damages and cracks. No cracked or damaged pipe and fittings shall be used in the work and they shall be removed from the site by the contractor at his own cost.

All the pipes and fittings shall be thoroughly cleaned with brush and washed if necessary to removed any accumulated stone, soil or dirt inside and outside surface.

The pipes shall be carefully laid straight to the correct alignment as indicated in the drawing. All pipes shall be used in standard length as far as possible. Cut length may be used only where it is necessary to make up exact length.

The pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer.

The joining of pipes and fittings generally shall be done with approved make of cement solvent including making surface rough. The pipe shall be cut to desired length. Care shall be taken that profile or cut surfaces shall not be changed and the fibrous material shall be removed with scraper or knife.

**6. Measurement and Rate**

The payment shall be made on running meter basis of pipe fixed in position. Unit rates includes,

- i. Supplying of PVC pipes and fittings of specified diameter
- ii. Laying and cutting the pipe wherever necessary and wastage
- iii. Fixing the pipe line with GI clamps not less than 2mm thick and GI nails length not less than 40mm or with PVC clamps, screws, wooden gutties etc.
- iv. Making the solution joint
- v. All necessary materials, labour and use of tools required to complete the job

The measurement shall be taken along the longitudinal axis center to center which includes fittings, making joint etc.

## **SPECIFICATION FOR GUARD POST**

### **1. General**

The work covers the construction, supply, priming, painting & fixing of guard posts at locations as directed by the Engineer.

Guard posts shall generally be located at all horizontal curves (<1000m radius) where metal beam crash barrier has not been provided.

- 1.1** The posts shall be of concrete grade M25 and shall conform to IS 10262-1982. Guidelines for concrete mix design. The precast member shall be properly checked against spalling, bruises, cracks etc. after 28 days curing to the satisfaction of the Engineer.

The posts shall be fixed at-places as decided by the Engineer with the bottom 470 mm below proposed hard shoulder finished surface. The fixation shall be such that it shall not get tilted or dislocated under normal condition.

After erection, guard posts shall be painted with one coat-primer and two coats of colour paint (white & black). All colours shall be of ready mix oil bound and shall be approved by the Engineer. There shall be three white and three black bands alternately placed.

### **1.2 Measurement for payment of posts**

The measurement shall be in number.

### **1.3 Rate**

The contract unit rate for guard posts shall be paid in full compensation for furnishing of all labour, materials, tools, equipment for construction, fixing, painting at site and all other incidental costs necessary to complete the work to these specifications.

**PAINTING OF STRUCTURES WITH SYNTHETIC ENAMEL PAINT FOR NUMBERING & SPAN DETAILS OF BRIGES / CULVERTS AND WATER PROOF CEMENT PAINT FOR PARAPET, RAILING, KERB AND CRASH BARRIER**

**1. Painting with Synthetic Enamel Paint**

**Materials**

Synthetic enamel paint confirming to IS : 2932 of approved brand and manufacture and of the required colour shall be used for the top coat and an undercoat of ordinary paint of shade to match the top coat as recommended by the same manufacturer as far as top coat shall be used.

**Painting on New Surface**

**Preparation of surface.**

The surface shall be thoroughly cleaned and dusted off. All dirt, mortar droppings and grease shall be thoroughly removed before painting is started. The prepared surface shall have received the approval of the Engineer after inspection, before painting is commenced.

**Application:** The number of coats including the undercoat shall be as stipulated in the item.

- (a) **Under coat:** One coat of the specified ordinary paint of shade suited to the shade of the top coat, shall be applied and allowed to dry overnight. It shall be rubbed next day with the finest grade of wet abrasive paper to ensure a smooth and even surface, free from brush marks and all loose particles dusted off.
- (b) **Top Coat:** Two top coats of synthetic enamel paint of desired shade shall be applied after the undercoat is thoroughly dry. Additional finishing coats shall be applied if found necessary to ensure properly uniform glossy surface.

**Lettering and Numbering on New Surface:**

The letters and numbers for bridges/culverts span and number shall be as per IRC-7-1971. The size of area for painting shall be varied depends upon the numbers and letters. The background area and letters/numbers shall be painted with one prime coat (under coat) and two coats (top coat) of synthetic enamel paint.

**Measurement for payment:**

The painting of culverts /Bridges numbering and span arrangement shall be measured in number of each side facing traffic.

**Rate:**

Rate shall include the cost of materials, labour and other operation described above to complete set of letters and numbers required in each side facing traffic.

**2. Water Proof Cement Painting**

**Material:**

The water proof cement paint shall be (conforming to IS: 5410) of approved brand and



manufacture.

The water cement paint shall be brought to the site of work by the contractor in its original container in sealed condition. The material shall be brought in at a time in adequate to suffice for the whole work or at least a fortnight's work, the material be kept in the joint custody of the Contractor and the Engineer-in-Charge. The empties shall not be removed from the site of work till the relevant item of the work has been completed and permission obtained from the Engineer-in-Charge.

**Preparation of Surface:**

For New work, the surface shall be thoroughly cleaned of all mortar dropping, dirt, dust, algae, grease and other foreign matter by brushing and washing. Pitting in plaster shall be made good and a coat of waterproof cement paint shall be applied over patches after wetting them thoroughly.

**Preparation of mix:**

Cement paint shall be mixed in such quantities as can be used up within an hour of its mixing as otherwise the mixture will set and thicken, affecting flow and finish, Cement paint shall be mixed with water in two stages. The first stage shall comprise of 2 parts of cement paint and one part of water stirred thoroughly and allowed to stand for 5 minutes. Care shall be taken to add the cement paint gradually to the water and not vice versa. The second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain a liquid of workable and uniform consistency. In all cases the manufacturer's instructions shall be followed meticulously.

The lids of cement paint drums shall be kept tightly closed when not in use, as by exposure to atmosphere the cement paint rapidly becomes air set due to its hygroscopic qualities.

In case of cement paint brought in gunny bags, once the bag is opened, the contents should be consumed in full on the day of its opening. If the same is not likely to be consumed in full, the balance quantity should be transferred and preserved in an airtight container to avoid its exposure to atmosphere.

**Application:**

The solution shall be applied on the clean and wetted surface with brushes or spraying machine. The solution shall be kept well stirred during the period of application. It shall be applied on the surface which is on the shady side of the building so that the direct heat of the sun on the surface is avoided. The method of application of cement paint shall be as per manufacturer's specification. The completed surface shall be watered after the day's work.

The second coat shall be applied after the first coat has been set for at least 24 hours. Before application of the second or subsequent coats, the surface of the previous coat shall not be wetted.

For the work, the surface shall be treated with three or more coat of waterproof cement paint as found necessary to get a uniform shade.

For old work, the treatment shall be with one or more coats as found necessary to get a uniform shade.

**Precaution:**

Water proof cement paint shall not be applied on surfaces already treated with white wash, colour wash, distemper dry or oil bound, varnishes, paints, etc. It shall not be applied on gypsums, wood and metal surfaces.

If water proof cement paint is required to be applied on existing surfaces previously treated with white wash, colour wash, etc., the surface shall be thoroughly cleaned by scrapping off all the white wash, colour was etc., completely. Thereafter, a coat of cement primer shall be applied followed by two or more coats of water proof cement paint.

**Measurement for Payment:**

The painting shall be measured in square metre of surface area treated.

**Rate:**

Rate shall include one prime coat and two coats of the paint over the prime coat including cost of all labour and materials involved in all operations described above.

**REFLECTIVE PAVEMENT MARKERS (ROAD STUDS)****1 General**

Reflective pavement marker (RPM) or road stud is a device, which is bonded to or anchored within the road surface for lane marking & delineation for nighttime visibility. It reflects incident light in directions close to the direction from which it came.

**2 Definition**

Description of terms specific to this standard.

Coefficient of luminous intensity (CIL) or specific intensity-

The ratio of luminous intensity of the retro reflector in the direction of observation to illuminance at the retro reflector on a plane perpendicular to the direction of the incident light expressed in terms of millicandelas per incident lux (mcd/ lx).

Horizontal entrance angle-

The angle in the horizontal plane between the direction of incident light & the normal to the leading edge of the marker.

Observation angle-

The angle at the reflector between the illumination axis & the observation axis.

Retro-reflection-

Reflection in which the radiation is returned in direction close to the direction from which it came, this property being maintained over wide variations of the direction of incident radiation.

Head-

That part of the road stud, which is above the road surface when the road stud is fixed in position in the road.

Upper Surface-

That part of the external surface of the road stud, which is visible when the road stud is fixed in position in the road.

Anchorage-

That part of a road stud, which is below the road surface when the road stud is fixed in position in the road.

**3 Material**

Plastic body of RPM/road stud shall be moulded from ASA (Acrylic Strene Acrylonitrile) or HIPS (High- Impact Polystyrene) or ABS or any other suitable material approved by the Engineer in charge. The marker shall support a load of 13635 kg tested in accordance with ASTM D4280.

Reflective panels shall consist of number of lenses containing single or dual prismatic cube capable of providing total internal reflection of the light entering the lens face. Lenses shall be

moulded of methyl methacrylate conforming to ASTM D788 or equivalent.

#### 4 Design

The slope or retro reflecting surface shall preferably be  $35 \pm 5$  degree to base.

The area of each retro reflecting surface shall not be less than 13.0 sqcm.

#### 5 Optical performance

##### 5.1 Unidirectional

Each reflector or combination of reflectors on each face of the stud shall have a CIL not less than that given in table below.

Minimum CIL value for stud		
Entrance angle	Observation angle	CIL in mcd/ lx
		White
0° U 5° L&R	0.3°	220
0°U 10° L&R	0.5°	120

**Note:** The entrance angle of 0o U corresponds to the normal aspects of the reflectors when the reflecting road stud is installed in horizontal road surface.

##### 5.2 Tests

Co-efficient of luminance intensity can be measured by procedure described in ASTM E809 "Practice For Measuring Photometric Characteristics" or as recommended in BS: 873 Part IV – 1973.

Under test conditions, a stud shall not considered to fail the photometric requirements if the measured CIL at any one position of measurement is less than the values specified in table provided that

- (i) The value is not less than 80% of the specified minimum
- (ii) The average of the left & right measurements for the specific angle is greater than the specified minimum

#### 6 Fixing of reflective markers

##### 6.1 Requirements

The enveloping profile of the head of the stud shall be smooth & the studs shall not present any sharp edges to traffic.

The reflecting portions of the stud shall be free from crevices or ledges where dirt might accumulate.

All road studs shall be legibly marked with the name, trademark or other means of identification & shall not be less than 100mm.

Marker height shall not exceed 20mm.

Marker width shall not exceed 130mm & shall not be less than 100mm

The base of the marker shall be flat within 1.3mm. If the bottom of the marker is configured, the outer most faces of the configuration shall not deviate more than 1.3mm from a flat surface.

## **6.2 Placement**

The reflective marker shall be fixed to the road surface using the adhesives & the procedures recommended by the manufacturer. No nails shall be used to affix the marker, as nails are hazardous for the roads.

Regardless of the type of adhesive used, the markers shall not be fixed if the pavement is not surface dry & on new asphalt concrete surfacing until the surfacing has been open to traffic for a period of not less than 14 days.

The portions of the highway surface, to which the marker is to be bonded by the adhesive, shall be free of dirt, curing compound, grease, oil, moisture, loose or unsound layers, paint & any other material which would adversely affect the bond of adhesives.

Use a wire brush, if necessary to loosen & remove dirt, then brush or blow clean.

The adhesive shall be placed uniformly on the cleaned pavement surface or on the bottom of the marker in a quantity sufficient to result in complete coverage of the area of contact of the marker with no voids present and a slight excess after the marker has been lightly pressed in place.

For epoxy installations, excess adhesive around the edge of the marker excess adhesive on the pavement and adhesive on the exposed surfaces of the markers shall be immediately removed. Soft rags moistened with mineral spirits or kerosene may be used if necessary to remove adhesive from exposed faces of pavement markers.

## **7 Warranty & Durability**

The contractor shall obtain from the manufacturer a two-year in-field test/ evaluation report for performance as per the table mentioned above and submit to the Engineer. In addition, a two-year warranty for satisfactory in-field performance of the finished road marker shall also be given by the contractor who carries out the work of fixing of reflective road markers. In case the markers are displaced, damaged, get worn out or lose their reflectivity compared to stipulated standards, the contractor would be required to replace all such markers within 15 days off the intimation from the Engineer at his own cost and with no extra remuneration to be paid for such work.

## **8 Measurement for payment**

The measurement of reflective road markers shall be in numbers of markers supplied and fixed.

## **9 Rate**

The contract unit rate for reflective road markers shall be payment in full compensation for furnishing all labour, material, tools, equipment including all incidental costs necessary for

carrying out the work at site conforming to the specifications complete as per approved drawings or as directed by the Engineer.

**SEISMIC TRANSMIT UNITS****Fabrication**

Seismic Transmission Unit is a proprietary item of the manufacturer who will design, manufacture and install the same at site as per the requirement of design loads given by the consultant. This will be fixed to the side of pier cap in longitudinal direction and to the bottom of the Precast PSC segment. The design, drawings and specification for this item shall be based on the AASTHO code of practice.

**Measurement for Payment**

Seismic Transmission Units assemblies shall be measured in numbers according to their capacities.

**Rate**

The contract unit rate for a Seismic Transmission Unit (STU) assembly shall include cost of design, supplying and fixing including all necessary assembly. all complete as specified on the drawings or as directed by the Engineer. The rate shall include cost of all tests prescribed in the specifications and shown on the approved drawings.

## Environmental Management Plan

### 1.1.1 INTRODUCTION

Environmental Management Plan (EMP) is the key to ensure that the environmental quality of the zone under impact does not deteriorate beyond the expected level due to the construction and operation of the project road. The EMP comprises a set of measures to be taken in different stages like the design, construction and operation to eliminate, offset or reduce adverse environmental impacts to acceptable levels. Elimination/prevention is possible through elimination of impacts or by avoiding the action. This can also be achieved by reducing the scale of action. Remediation is repairing or restoring particular features of the environment adversely affected by the activity. Offsetting actions mean compensating for impacts by providing additions to or substitutes for the affected environment. Mitigation plans generally evolve around remediation and offsetting.

### 1.1.2 ENVIRONMENT MANAGEMENT PLAN MATRIX

The Environmental Management Plan is meant for mitigation/management /avoidance of the negative impacts and the enhancement of the various environmental components along the project road. For each mitigation measure to be taken its location, timeframe, implementation and overseeing/supervising responsibilities are listed in the EMP matrix. The measure adopted and /or to be adopted during the different stages of the project have been detailed in **Table 1** for pre construction, construction and operation phases respectively.

### 1.2.1 Implementation Arrangements

The project will be implemented by the Project Implementation Unit of the Executing Agency. The PIU will be formed headed by the Project director. The Project Director is a Superintending Engineer Level Officer. The PD will have one Executive Engineer for to look into day to day activities of project implementation. This executive Engineer will be supported by Assistant Engineers. The PIU will have one Environmental Expert. The responsibility of implementing the mitigation measures lies with the PIU being an Executing Agency (EA). All construction activities being taken up by the contractors under the Authority Engineer will be scrutinised by the PIU. The Authority Engineer will have a qualified environmental expert in their team to supervise EMP implementation along with construction works. The contractor will have one designate Environmental Expert in their team. For Safe guarding the environmental aspects, Implementation Support Consultant will be put in place.

### 1.2.2 Environmental Monitoring

#### *Introduction*

The environmental monitoring programme provides such information on which management decision may be taken during construction and operational phases. It provides basis for evaluating the efficiency of mitigation and enhancement measures and suggest further actions that need to be taken to achieve the desired effect.



The monitoring includes:

- (i) Visual observations;
- (ii) Selection of environmental parameters at specific locations;
- (iii) Sampling and regular testing of these parameters.

### ***Objectives***

The objectives of the environmental monitoring programme are:

- Evaluation of the efficiency of mitigation and enhancement measures;
- Updating of the actions and impacts of baseline data;
- Adoption of additional mitigation measures if the present measures are insufficient;
- Generating the data, which may be incorporated in environmental management plan in future projects.

### ***Methodology***

Monitoring methodology covers the following key aspects:

- Components to be monitored;
- Parameters for monitoring of the above components;
- Monitoring frequency;
- Monitoring standards;
- Responsibilities for monitoring;
- Direct responsibility,
- Overall responsibility;
- Monitoring costs.

**Table 1: Environmental Management Plan Matrix for New Mechi Major Bridge and its Approaches in Nepal and Indian Border**

Environmental Issues/Impacts	Enhancement/ Mitigation Measures	Reference to Contract Documents	Management Action	Implementation Responsibilities
<b>PRE-CONSTRUCTION PHASE (removal of trees and encroachments; site clearances, establishments of construction camps)</b>				
Uncertainties concerning land and other assets acquisition	Refer Resettlement Plan for Details			
Inadequate compensation and other grievances	Refer Resettlement Plan for Details			
Tree clearance (116 )	Compensatory plantation & additional plantation in available clear space	Indian Forest Act (1980)/ Nepal Forest Regulations	Only marked trees to be felled. Compensatory plantation of 1160 trees (@ 10 saplings for each tree felled). Removal of trees only within Col after joint verification with forest department.	Forest Department ( India ) for India portion and Forest Department ( Nepal) for Nepal portion and Contractor
Grubbing & levelling at Bridge and approach construction site	Removal of remains of trees to facilitate construction and carting away of remains	Project Requirement	Contractor will carry out the clearing of stumps and levelling Carting away will be done by the NHAI in India portion and DoR for Nepal portion after the stumps are removed from the ground.	PIU India/PIU Nepal, CSC and Contractor
Siting of construction Camp	<ul style="list-style-type: none"> <li>Siting will be finalised after approval of CSC who will look into the site and planning of the contractor.</li> </ul>	Project Requirement	Contractor will prepare a site plan. The contractor will avoid camp site near Mechi River Bank and river flood plains Machinery and equipment area will be protected. Vehicle refuelling sites will be avoided in the flood plains of Mechi River	CSC and Contractor
<b>CONSTRUCTION PHASE (Earthworks; Construction works related bridge and approaches; camp site operation; procurement of material from quarries, crushers and borrow areas; traffic management during construction)</b>				
Borrow pit exploitation causing loss of productive land ( Borrow area development	Indemnity by contractors to NHAI PIU India/PIU Nepal against third party claims.	Contract requirement	Contractor will verify that enough quantity of borrow materials is available at identified 2 borrow pits	Contractor and CSC

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Environmental Issues/Impacts	Enhancement/ Mitigation Measures	Reference to Contract Documents	Management Action	Implementation Responsibilities
	Equitable agreements for borrow pit development will be reached between land owners and contractors including measures for post-restoration.	Contract Requirement	CSC will check restoration and post-restoration use.	CSC and contractor
	Contractors will submit plans to CSC and PIU India/PIU Nepal for borrow pit exploitation and post-use restoration before commencement of work and implementation of approved plans.	Contract Requirement	Inclusion of appropriate clauses in construction contracts, monitoring of compliance during construction and proper administration of contracts will be ensured.	CSC and Contractor
Erosion/damage to embankments	Embankment portion at approaches in Nepal and India	Contract requirement	Inclusion of appropriate items in specification for retaining wall or slope stabilisation measures, monitoring of compliance during construction of retaining wall and appropriate administration of contracts will be ensured.	CSC and contractor
Safe site for construction workers' camp	Site will be located at least at 500 m downwind from Panitanki, Kakarbhitta, and Mechi River and at least 1 km away from Khoribari Reserved forest at Panitanki	Contract Requirement	CSC and PIU INDIA/PIU NEPAL will approve the site chosen by the contractors Conditions will be put in contract document for location of site at above specified distances.	PIU INDIA/PIU NEPAL/CSC /Contractor
Sanitation and disposal facilities at construction workers' camp	Proper availability of drinking water and sanitation facilities at workers' camp	Contract Requirement	Contractor will install temporary toilets with septic tank/soak pits. Contractor will provide suitable collection and disposal system for domestic refuse. For collection of domestic refuse dustbins will be provided. The collected waste may be disposed off at the nearest municipal land fill site.	PIU INDIA/PIU NEPAL, CSC and Contractor
Cooking fuel at workers' camp	Workers' should not depend for cooking on fuel wood.	Contract Requirement	Contractor will ensure availability of kerosene oil/LPG. Inclusion of the	PIU INDIA/PIU NEPAL, CSC and Contractor

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Environmental Issues/Impacts	Enhancement/ Mitigation Measures	Reference to Contract Documents	Management Action	Implementation Responsibilities
			above conditions in contract document will be ensured.	
Health facilities at workers' camp	Availability of first aid and health facilities	Contract Requirement	The contractor will ensure first aid boxes in adequate numbers and make shift dispensary at camp. The above condition will be put in contract document.	PIU INDIA/PIU NEPAL, CSC and Contractor
HIV/ AIDs awareness campaign at workers' camp	Workers to be made aware of HIV/AIDs and protection measures.	Contract Requirement	To organise awareness programme every month	PIU INDIA/PIU NEPAL, CSC and Contractor
Damage to services running parallel or across the alignment of Mechi Bridge and approaches during construction leading to interruption in supply	Relocation of any potentially affected services prior to commencement of any construction works	Contract Requirement	Potentially affected services will be identified in design stage.	PIU INDIA/PIU NEPAL, CSC and Contractor
	Contractors will be responsible for identifying and safeguarding services adjacent to works and for compensating statutory undertakers for any accidental damage to such services.	Contract Requirement	Service undertakers will be notified for relocation and necessary programming to avoid construction delays (incl. payments).	PIU INDIA/PIU NEPAL, CSC and Contractor
			Relocation works to be completed by statutory undertakers before construction works start in accordance with an agreed programme.	PIU INDIA/PIU NEPAL, CSC and Contractor
			• Inclusion of appropriate clauses in construction contracts; monitoring of compliance during construction and proper administration of contracts will be ensured.	PIU INDIA/PIU NEPAL
Fire Prevention	Adopt safe work practice and have adequate fire fighting facilities	Contract Requirement	Provision of adequate fire fighting equipment will be made.	Contractor
Presence of contractor's	Contractor will provide own suitably equipped	Contract Requirement	Inclusion of appropriate clauses in construction	CSC and PIU INDIA/PIU

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Environmental Issues/Impacts	Enhancement/ Mitigation Measures	Reference to Contract Documents	Management Action	Implementation Responsibilities
workforce increasing pressure on already strained local facilities including health & medical facilities	and staffed site emergency medical facilities.		contracts; monitoring of compliance during construction and proper administration of contracts will be ensured.	NEPAL
Incomplete post-use clearance and reinstatement of construction camps leading to loss of land productivity or additional costs for land owners to reinstate land	Contractor will prepare site restoration plans for approval of CSC and PIU to implement these plans fully prior to demobilization. All temporary works sites to be notified by the contractor prior to use	Contract Requirement	Inclusion of appropriate clauses in construction contracts; monitoring of compliance during construction and proper administration of contracts will be ensured. All sites will be photographed to record pre-use state. BOQ's will include nominated lump sum for reinstatement of temporary sites to peruse status.	CSC and PIU INDIA/PIU NEPAL and Contractors
Pollution of land, ground water and surface water arising from sanitary and other wastes and spillages	During construction it will be ensured that contractor does not dispose off debris in Mechi River	Contract Requirement	Monitoring of compliance during construction and strict administration of contracts will be ensured.	CSC, PIU INDIA/PIU NEPAL, Contractor and Statutory Undertakers
	Vehicle maintenance and refuelling will be confined to areas under construction yard to trap discarded lubricant and fuel spills.	Contract Requirement	Condition will be included in contract document	CSC, PIU INDIA/PIU NEPAL Contractor and Statutory Undertakers
	Sanitation waste from workers' camp will not be diverted to Mechi River. The waste water will be diverted to septic tank.	Contract Requirement	Separate septic tanks shall be used for disposal of sanitary waste.	CSC, PIU INDIA/PIU NEPAL Contractors and Statutory Undertakers
	Contractor to prepare, for PIU's approval detailed public health utilities plan for the workers camps and other works sites, which make adequate provision for safe disposal of all wastes and prevention of spillages, leakage of	Contract Requirement	Monitoring of compliance during construction and strict administration of contracts will be ensured.	CSC, PIU INDIA/PIU NEPAL, Contractor and Statutory Undertakers

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Environmental Issues/Impacts	Enhancement/ Mitigation Measures	Reference to Contract Documents	Management Action	Implementation Responsibilities
	polluting materials, etc.			
	Contractor will be required to pay all costs associated with cleaning up any pollution caused by their activities and to pay full compensation to those affected	Contract Requirement	Monitoring of compliance during construction and strict administration of contracts will be ensured.	CSC, PIU INDIA/PIU NEPAL, Contractor and Statutory Undertakers
Contractor's water abstraction resulting in depletion of scarce water resources with local users and pollution of surface water bodies ( Mechi River and other streams) from construction activities	Contractor will make suitable arrangements for own supply and protection of water bodies from pollution Silt fencing will be provided all around the base of the stockpile of materials wherever material is stockpiled near water bodies.	Contract Requirement	Monitoring of compliance during construction and strict administration of contracts will be ensured.	CSC, PIU INDIA/PIU NEPAL
Construction traffic causing pavement and structure damage to roads due to overloading, increasing congestion and increased road safety hazards	Contractor will use appropriate vehicles and to comply with legal gross vehicle and axle load limits	Contract Requirement	Monitoring of compliance during construction and strict administration of contracts will be ensured.	CSC, PIU INDIA/PIU NEPAL
	Contractors will repair damage to any road at own expense	Contract Requirement	The CSC will ensure preparation and enforcement of traffic management plans.	CSC, PIU INDIA/PIU NEPAL
	Contractor will minimise road safety hazards and inconvenience to other road users by taking appropriate measures such as proper diversions, signages, etc.	Contract Requirements	Monitoring of compliance during construction and strict administration of contracts will be ensured.	CSC, PIU INDIA/PIU NEPAL
Road safety hazards associated with temporary traffic diversions	Contractor will take all reasonable measures to minimise interference with traffic flow at Kakarbhitta and Panitanki and to provide safe transit at	Contract Requirement	Monitoring of compliance during construction and strict administration of contracts will be ensured.	CSC and PIU INDIA/PIU NEPAL

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Environmental Issues/Impacts	Enhancement/ Mitigation Measures	Reference to Contract Documents	Management Action	Implementation Responsibilities
	diversions. The contractor will maintain two way traffic at diversions and will inform the local traffic police about the traffic diversion			
Air pollution from Hot Mix Plant, concrete batching plant, construction yard and due to movement and operation of construction vehicles and machinery	Construction camps will be located in open areas and away from residential complexes	Contract Requirement	Monitoring of air pollution and timely action to decrease the pollutant concentration by appropriate measures will be taken up.	PIU INDIA/PIU NEPAL, CSC and Contractor
	Trucks carrying construction material will be covered with tarpaulin sheet to avoid spilling.	Contract Requirement	The CSC will enforce the mitigation measures suggested through efficient monitoring.	PIU INDIA/PIU NEPAL, CSC and Contractor
	Water sprinkling will be carried out in mornings and evenings on haul roads and compact surface.	Contract Requirement	The CSC will enforce the mitigation measures suggested through efficient monitoring.	PIU INDIA/PIU NEPAL, CSC and Contractor
	Vehicles and construction machinery will be maintained to conform emission standards specified by West Bengal Pollution Control Board	Contract Requirement	The CSC will enforce the mitigation measures suggested through efficient monitoring.	PIU INDIA/PIU NEPAL, CSC and Contractor
	Stock piled sand and stone will be wetted before loading. Construction debris shall be disposed only at designated sites.	Contract Requirement	The CSC will enforce the mitigation measures suggested through efficient monitoring.	PIU INDIA/PIU NEPAL, CSC and Contractor
Noise Levels	Construction camp will be located in open areas as far as possible from residential areas	Contract Requirements	Condition will be included in contract document	PIU INDIA/PIU NEPAL, CSC and Contractor
	All equipment will be maintained in good working order, properly designed engine enclosures and inbuilt silencers.	Contract Requirements	Condition will be included in contract document	PIU INDIA/PIU NEPAL, CSC and Contractor
	Construction work will	Contract	Condition will be included	PIU INDIA/PIU

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Environmental Issues/Impacts	Enhancement/ Mitigation Measures	Reference to Contract Documents	Management Action	Implementation Responsibilities
	be prohibited between 10.0 PM – 6.00 A.M. near residential areas.	Requirement	in contract document	NEPAL, CSC and Contractor
Relocation of common property resources	01 Hand Pumps, 3 temples, 2 check posts, and one entrance gate are falling in the proposed RoW. These need to be relocated/rebuild in case of Public assets or the owners need to be compensated in case of private asset	Contract requirements	Condition will be included in contract document	PIU INDIA/PIU NEPAL, CSC and Contractor
Accidents Hazards and Safety	The contractor will prepare a safety manual for all activities of construction as well as activities at construction camps. This manual will have safety measures to be adopted. The safety procedure for transportation of construction materials will also be detailed.	Design Requirement	Condition will be included in the contract document	PIU INDIA/PIU NEPAL, CSC and Contractor
Negative Impact on Flora due to Cutting of Trees and removal of vegetation	To compensate for 116 (40 in India and 76 in Nepal) numbers of trees to be cut, 1160 (400 in India and 760 in Nepal) numbers of trees will be planted.	Design Requirement	The project authorities will deposit necessary funds to the State forest department West Bengal and Forest Department, Government of Nepal as part of tree cutting permission for the compensatory afforestation.	PIU INDIA/PIU NEPAL, CSC, contractor, Forest Departments( India and Nepal)
Negative Impact on Fauna	The compensatory plantation will provide nesting ground to avifauna as this will be done in available space on either side of road. Construction workers shall be trained about safe handling of animals if found by chance. Cost of training built into training component cost. Construction workers will be trained not to	Design Requirement	Necessary training to workers not hunt the animals and birds	PIU INDIA/PIU NEPAL, CSC and Contractor



Environmental Issues/Impacts	Enhancement/ Mitigation Measures	Reference to Contract Documents	Management Action	Implementation Responsibilities
	go for fishing in water bodies			
Occupational Safety and Health	Construction workers will be provided with personal protective equipment (PPE) such as earplugs, helmets, safety shoes, gloves, etc.	Contract Requirement	The contractor will ensure adequacy and availability of PPEs.	PIU INDIA/PIU NEPAL, CSC and Contractor
Siltation into Mechi River	The siltation will be avoided by not storing the construction material, construction waste, excavated earth, etc. near the banks of Mechi River and in Flood Plains of Mechi River	Contract Requirement	Conditions will be included in contract document.	PIU INDIA/PIU NEPAL, CSC and Contractor
Contamination of water from construction wastes	All measures will be taken to prevent the waste water produce in construction from entering directly into Mechi River as directed by CSC Construction works near surface water sources shall be avoided during monsoon The discharge standards promulgated under the Environmental Protection Act, 1986 shall be strictly adhered to.	Contract Requirement	<ul style="list-style-type: none"> <li>Conditions will be included in contract document.</li> </ul>	PIU INDIA/PIU NEPAL, CSC and Contractor
Environmental monitoring during Construction Phase	Ambient air quality to be measured once in a season (except monsoon) at location specified in monitoring plan along project bridge	Contract Requirement	Records will be maintained for reporting and for future reference.	PIU INDIA/PIU NEPAL, CSC and Contractor
	Water quality (ground and surface) to be monitored once in a season except monsoon at locations specified in monitoring plan	Contract Requirement	Records will be maintained for reporting and for future reference.	PIU INDIA/PIU NEPAL, CSC and Contractor

Environmental Issues/Impacts	Enhancement/ Mitigation Measures	Reference to Contract Documents	Management Action	Implementation Responsibilities
	Noise levels to be monitored once in a season at locations specified in monitoring plan	Contract Requirement	Records will be maintained for reporting and for future reference.	PIU INDIA/PIU NEPAL, CSC and Contractor
	Soil quality in agriculture field along RoW of Bridge and approaches to be monitored once in a season except monsoon.	Contract Requirement	Records will be maintained for reporting and for future reference.	PIU INDIA/PIU NEPAL, CSC and Contractor
	Monitoring of construction sites for arrangements made for protection measures at storage areas, drainage arrangement, and sanitation at construction camp. Inspection of construction camps for sanitation	Contact requirement	Records will be maintained for reporting and for future reference.	PIU INDIA/PIU NEPAL, CSC and Contractor
<b>OPERATIONAL PHASE</b>				
Increased Air Pollution	Ambient air quality monitoring at locations specified in monitoring plan	Project Requirement	Monitoring frequency is thrice a year for initial period of 2 years	PIU INDIA/PIU NEPAL through NABL approved monitoring agency
Noise Pollution	Noise pollution monitoring at locations specified in monitoring plan	Project Requirement	Monitoring frequency is thrice a year for a period of 2 years.	PIU INDIA/PIU NEPAL through NABL approved monitoring agency
Water Pollution	Monitoring of surface and ground water quality at locations specified in monitoring plan	Project Requirement	Monitoring frequency is once in a season for a period of 2 years	PIU INDIA/PIU NEPAL through NABL approved monitoring agency
Soil Characteristics	Monitoring of soil quality of agricultural field close to RoW	Project Requirement	Monitoring frequency is once in season except monsoon for 2 years	PIU INDIA/PIU NEPAL through NABL approved monitoring agency

## **PLANTATION OF FLOWERING PLANTS AND SHRUBS**

### **1 Scope**

The work shall consist of:

- i) Planting of flowering saplings at designated locations.

### **2 Materials**

#### **2.1 Dump Manure**

Dump manure shall be of well decayed (at least six months) organic or vegetable matter, obtained in the dry state from the municipal dump or other similar sources approved by the Engineer. The manure shall be free from earth, stone, brickbats or other extraneous matter.

#### **2.2 Farmyard Manure**

Farmyard Manure shall be well decayed (should be at least 6 months covered in dump), free from grits and any other unwanted materials.

#### **2.3 Good Earth**

The soil shall be agricultural soil of sandy-loam texture, free from kankar, moorum, shingle, stone, brickbats, building rubbish and any other foreign matter. The earth shall be free from clods or lumps of sizes bigger than 75mm in any direction. It shall have pH value ranging between 6.0 to 8.5.

#### **2.4 Oil Cake (Neem/Castor/Groundnut)**

The cake shall be free from dust, grit and any other foreign matter.

#### **2.5 Sapling of flowering Plants**

The sapling shall be of height, as approved by the Engineer leafy type and draught resistant variety native to the area and be of good quality of up to 1m height or caliper dia of 25mm as directed by the Engineer.

#### **2.6 Sapling of Shrubs**

The saplings shall be of draught resistant variety normally grown for hedges in the area, approved by the Engineer.

### **3. Construction Operations**

#### **3.1 Planting Flowering Plants and Refilling Earth after Mixing with Oil Cake, Manure and Watering**

Holes of circular shape of 100mm dia and 150mm in depth in ordinary soil shall be excavated and the excavated soil, broken to clods of sizes not exceeding 75mm in any direction, shall be stacked outside the hole. Stones, brickbats, unsuitable earth and other rubbish, all roots, and weeds etc. other undesirable growth met with during excavation shall be separated out and unserviceable material removed from the site as directed. Useful material, if any, shall be stacked properly and separately. Good earth in quantities required to replace such discarded stuff shall be brought and stacked at site by the Contractor, depth not more than 50cm from ground level. The pit shall be treated for termite by raking

the soil up to 50mm and treated with 5% Aldrin or Chloradang dust in soil.

The plants hole shall be manured with powdered neem/caster oil cake along with farm yard manure/dump manure screened through 16mm sieve and these shall be uniformly mixed with the excavated top soil after the manure has been broken down to powder (size of particles not to exceed 6mm in any direction) in equal proportion. A sapling of plant shall be placed at the centre of the hole and then the mixture shall be filled into the hole upto the level of adjoining ground and then profusely watered to enable the soil to subside. The refilled soil shall then be dressed evenly with its surface about 50 to 75mm below the adjoining ground level or as directed by the Engineer.

The planting shall be completed soon after completion of the flyover.

### **3.2 Turfing, with Fine Grassing**

The work shall include the work of ploughing, dressing including breaking of clods, removal of rubbish, dressing and supplying of doob roots at 10cm apart, including supplying and spreading of farm yard manure at the rate of 0.60 cum per 100 sqm.

The work shall cover the maintenance of turfing as per para 4.

### **3.3 Planting of Shrubs**

The Shrubs saplings shall be planted in rows. Bed for the saplings shall be prepared with necessary manuring, and the live saplings shall be planted in lines parallel to the median edge to the directions of the Engineer. Spacing between saplings in a row shall be such that a thick hedge can be grown, and this shall generally be not farther away than 300mm.

The planting shall be completed soon after completion of the flyover.

### **3.4 Grassing of Median Area**

The included area of the flyover between the shrubs shall be seeded and mulched to develop grass cover in accordance with Clause 308.

## **4 Maintenance**

The saplings of flowering plants and shrubs planted shall be watered and maintained by the Contractor till issue of final taking over certificate. Maintenance shall also include watering, weeding out of undesirable plants and replacement of dead plant, manuring and trimming of the hedges.

## **5 Measurement for Payment**

The area to be provided with plants and shrubs will be measured in sq.m.

The area for turfing shall also be measured in sqm.

## **6 Rates**

The contract unit rate for planting of flowering plants and shrubs and turfing shall include the cost of all labour and material involved in all the operations described above including cost of saplings and maintenance as mentioned above, the cost of supplying and stacking the requisite quantity of manure and oil cake and other incidentals.

### **Involuntary Resettlement Safeguard Principles for the Project**

Based on the analysis of government provisions and ADB policy, the following resettlement principles are adopted for this Project:

#### ***Commencement of Civil works***

Wherever private land is involved, compensation for land should be paid to the land owner or into court deposit, in case of ownership/apportionment issues exist, prior to commencement of civil works. In stretches where there is no land acquisition and all improvements are proposed with the right-of-way, all assistances should be paid to the DP prior to giving clearance for civil works.

However, any long term rehabilitation measures like training for skill development and pension for life will continue for a longer period and such rehabilitation measures will not be a bar to commence civil works.

#### **Impact to crop, structure and use of private land during civil works**

During civil works, wherever the Contractor causes impact to crop or structure that is beyond the proposed right-of-way, the contractor shall compensate for the loss within a week and wherever land is used temporarily, the contractor shall pay land rental value during the duration of temporary use and restore the land to its original condition after civil works in that stretch is completed.

SCHEDULE - E  
(See Clauses 2.1 and 14.2)

**MAINTENANCE REQUIREMENTS**

**1 Maintenance Requirements**

- 1.1 The Contractor shall, at all times maintain the Project Highway in accordance with the provisions of this Agreement, Applicable Laws and Applicable Permits.
- 1.2 The Contractor shall repair or rectify any Defect or deficiency set forth in Paragraph 2 of this Schedule-E within the time limit specified therein and any failure in this behalf shall constitute non-fulfillment of the Maintenance obligations by the Contractor. Upon occurrence of any breach hereunder, the Authority shall be entitled to effect reduction in monthly lump sum payment as set forth in Clause 14.6 of this Agreement, without prejudice to the rights of the Authority under this Agreement, including Termination thereof.
- 1.3 All Materials, works and construction operations shall conform to the MORTH Specifications for Road and Bridge Works, and the relevant IRC publications. Where the specifications for a work are not given, Good Industry Practice shall be adopted.

[Specify all the relevant documents]

**2 Repair/rectification of Defects and deficiencies**

The obligations of the Contractor in respect of Maintenance Requirements shall include repair and rectification of the Defects and deficiencies specified in Annex - I of this Schedule-E within the time limit set forth therein.

**3 Other Defects and deficiencies**

In respect of any Defect or deficiency not specified in Annex - I of this Schedule-E, the Authority's Engineer may, in conformity with Good Industry Practice, specify the permissible limit of deviation or deterioration with reference to the Specifications and Standards, and any deviation or deterioration beyond the permissible limit shall be repaired or rectified by the Contractor within the time limit specified by the Authority's Engineer.

**4 Extension of time limit**

Notwithstanding anything to the contrary specified in this Schedule-E, if the nature and extent of any Defect or deficiency justifies more time for its repair or rectification than the time specified herein, the Contractor shall be entitled to additional time in conformity with Good Industry Practice. Such additional time shall be determined by the Authority's Engineer and conveyed to the Contractor and the Authority with reasons thereof.

**5 Emergency repairs/restoration**

Notwithstanding anything to the contrary contained in this Schedule-E, if any Defect,

deficiency or deterioration in the Project Highway poses a hazard to safety or risk of damage to property, the Contractor shall promptly take all reasonable measures for eliminating or minimizing such danger.

## **6 Daily inspection by the Contractor**

The Contractor shall, through its engineer, undertake a daily visual inspection of the Project Highway and maintain a record thereof in a register to be kept in such form and manner as the Authority's Engineer may specify. Such record shall be kept in safe custody of the Contractor and shall be open to inspection by the Authority and the Authority's Engineer at any time during office hours.

## **7. Pre-monsoon inspection / Post-monsoon inspection**

The Contractor shall carry out a detailed pre-monsoon inspection of all bridges, culverts and drainage system before [1st June] every year in accordance with the guidelines contained in IRC: SP35. Report of this inspection together with details of proposed maintenance works as required on the basis of this inspection shall be sent to the Authority's Engineer before the [10th June] every year. The Contractor shall complete the required repairs before the onset of the monsoon and send to the Authority's Engineer a compliance report. Post monsoon inspection shall be done by the [30th September] and the inspection report together with details of any damages observed and proposed action to remedy the same shall be sent to the Authority's Engineer.

## **8. Repairs on account of natural calamities**

All damages occurring to the Project Highway on account of a Force Majeure Event or default or neglect of the Authority shall be undertaken by the Authority at its own cost. The Authority may instruct the Contractor to undertake the repairs at the rates agreed between the Parties.

Annex - I  
(Schedule-E)

### Repair/rectification of Defects and deficiencies

The Contractor shall repair and rectify the Defects and deficiencies specified in this Annex-I of Schedule-E within the time limit set forth in the table below.

Nature of Defect or deficiency		Time limit for repair/rectification
<b>ROADS</b>		
<b>(a)</b>	<b>Carriageway and paved shoulders</b>	
(i)	Breach or blockade	Temporary restoration of traffic within 24 hours; permanent restoration within 15 (fifteen) days
(ii)	Roughness value exceeding 2,200 mm in a stretch of 1 km (as measured by a calibrated bump integrator)	120 (one hundred and twenty) days
(iii)	Pot holes	24 hours
(iv)	Any cracks in road surface	15 (fifteen) days
(v)	Any depressions, rutting exceeding 10 mm in road surface	30 (thirty) days
(vi)	Bleeding/skidding	7 (seven) days
(vii)	Any other defect/distress on the road	15 (fifteen) days
(viii)	Damage to pavement edges	15 (fifteen) days
(ix)	Removal of debris, dead animals	6 hours
<b>(b)</b>	<b>Granular earth shoulders, side slopes, drains and culverts</b>	
(i)	Variation by more than 1 % in the prescribed slope of camber/cross fall (shall not be less than the camber on the main carriageway)	7 (seven) days
Nature of Defect or deficiency		Time limit for repair/rectification
(ii)	Edge drop at shoulders exceeding 40 mm	7 (seven) days



(iii)	Variation by more than 15% in the prescribed side (embankment) slopes	30 (thirty) days
(iv)	Rain cuts/gullies in slope	7 (seven) days
(v)	Damage to or silting of culverts and side drains	7 (seven) days
(vi)	Desilting of drains in urban/semi-urban areas	24 hours
(vii)	Railing, parapets, crash barriers	7 (seven) days (Restore immediately if causing safety hazard)
<b>(c)</b>	<b>Road side furniture including road sign and pavement marking</b>	
(i)	Damage to shape or position, poor visibility or loss of retro-reflectivity	48 hours
(ii)	Painting of km stone, railing, parapets, crash barriers	As and when required/Once every year
(iii)	Damaged/missing road signs requiring replacement	7 (seven) days
(iv)	Damage to road mark ups	7 (seven) days
<b>(d)</b>	<b>Road lighting</b>	
(i)	Any major failure of the system	24 hours
(ii)	Faults and minor failures	8 hours
<b>(e)</b>	<b>Trees and plantation</b>	
(i)	Obstruction in a minimum head-room of 5 m above carriageway or obstruction in visibility of road signs	24 hours
(ii)	Removal of fallen trees from carriageway	4 hours
(iii)	Deterioration in health of trees and bushes	Timely watering and treatment
<b>Nature of Defect or deficiency</b>		<b>Time limit for repair/rectification</b>
(iv)	Trees and bushes requiring replacement	30 (thirty) days
(v)	Removal of vegetation affecting sight line and road structures	15 (fifteen) days
<b>(f)</b>	<b>Rest area</b>	

(i)	Cleaning of toilets	Every 4 hours
(ii)	Defects in electrical, water and sanitary installations	24 hours
<b>(g)</b>	<b>[Toll Plaza]</b>	
<b>(h)</b>	<b>Other Project Facilities and Approach roads</b>	
(i)	Damage in approach roads, pedestrian facilities, truck lay-byes, bus-bays, bus-shelters, cattle crossings, [Traffic Aid Posts, Medical Aid Posts] and service roads	15 (fifteen) days
(ii)	Damaged vehicles or debris on the road	4 (four) hours
(iii)	Malfunctioning of the mobile crane	4 (four) hours
<b>Bridges</b>		
<b>(a)</b>	<b>Superstructure</b>	
(i)	Any damage, cracks, spalling/scaling  Temporary measures  Permanent measures	within 48 hours  within 15 (fifteen) days or as specified by the Authority's Engineer
<b>(b)</b>	<b>Foundations</b>	
(i)	Scouring and/or cavitation	15 (fifteen) days
<b>(c)</b>	<b>Piers, abutments, return walls and wing walls</b>	
(i)	Cracks and damages including settlement and tilting, spalling, scaling	30 (thirty) days
<b>Nature of Defect or deficiency</b>		<b>Time limit for repair/rectification</b>
<b>(d)</b>	<b>Bearings (metallic) of bridges</b>	
(i)	Deformation, damages, tilting or shifting of bearings	15 (fifteen) days Greasing of metallic bearings once in a year
<b>(e)</b>	<b>Joints</b>	
(i)	Malfunctioning of joints	15 (fifteen) days
<b>(f)</b>	<b>Other items</b>	
(i)	Deforming of pads in elastomeric	7 (seven) days

	bearings	
(ii)	Gathering of dirt in bearings and joints; or clogging of spouts, weep holes and vent-holes	3 (three) days
(iii)	Damage or deterioration in kerbs, parapets, handrails and crash barriers	3 (three) days (immediately within 24 hours if posing danger to safety)
(iv)	Rain-cuts or erosion of banks of the side slopes of approaches	7 (seven) days
(v)	Damage to wearing coat	15 (fifteen) days
(vi)	Damage or deterioration in approach slabs, pitching, apron, toes, floor or guide bunds	30 (thirty) days
(vii)	Growth of vegetation affecting the structure or obstructing the waterway	15 (fifteen) days
<b>(g)</b>	<b>Hill Roads</b>	
(i)	Damage to retaining wall/breast wall	7 (seven) days
(ii)	Landslides requiring clearance	12 (twelve) hours
(iii)	Snow requiring clearance	24 (twenty four) hours

Note: Where necessary, the Authority may modify the time limit for repair/rectification, or add to the nature of Defect or deficiency before issuing the bidding document, with the approval of the competent authority.

SCHEDULE - F  
(See Clause 3.1.7(a))

**APPLICABLE PERMITS**

**1 Applicable Permits**

- 1.1 The Contractor shall obtain, as required under the Applicable Laws, the following Applicable Permits:
- (a) Permission of the State Government for extraction of boulders from quarry;
  - (b) Permission of Village Panchayats and Pollution Control Board for installation of crushers;
  - (c) Licence for use of explosives;
  - (d) Permission of the State Government for drawing water from river/reservoir;
  - (e) Licence from inspector of factories or other competent Authority for setting up batching plant;
  - (f) Clearance of Pollution Control Board for setting up batching plant;
  - (g) Clearance of Village Panchayats and Pollution Control Board for setting up asphalt plant;
  - (h) Permission of Village Panchayats and State Government for borrow earth; and
  - (i) Any other permits or clearances required under Applicable Laws.
- 1.2 Applicable Permits, as required, relating to environmental protection and conservation shall have been procured by the Authority in accordance with the provisions of this Agreement.

SCHEDULE – G  
(See Clauses 7.1.1, 7.5.3 and 19.2)  
FORM OF BANK GUARANTEE  
Annex-I

(See Clause 7.1.1)

Annex-I : Performance Security/Additional Performance Security

The Managing Director,  
National Highways & Infrastructural Development Corporation Ltd.  
PTI Building, 3rd Floor,  
4, Parliament Street  
New Delhi - 110001

WHEREAS:

- (A) \_\_\_\_\_ [name and address of contractor] (hereinafter called the "Contractor") and [name and address of the authority], (hereinafter called the "Authority") have entered into an agreement (hereinafter called the "Agreement") for **"Construction of Mechi Bridge and Approaches on India-Nepal border linking Kakarvitta in Nepal and Panitnaki in India under Engineering Procurement and Construction (EPC) Mode"** subject to and in accordance with the provisions of the Agreement
- (B) The Agreement requires the Contractor to furnish a Performance Security for due and faithful performance of its obligations, under and in accordance with the Agreement, during the {Construction Period/ Defects Liability Period and Maintenance Period} (as defined in the Agreement) in a sum of Rs..... cr. (Rupees ..... crore) (the "Guarantee Amount").
- (C) We, ..... through our branch at ..... (the "Bank") have agreed to furnish this bank guarantee (hereinafter called the "Guarantee") by way of Performance Security.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor's obligations during the {Construction Period/ Defects Liability Period and Maintenance Period} under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of [General Manager in the National Highways Authority of India], that the Contractor has committed default in the due and faithful performance of all or any

of its obligations under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Agreement or to extend the time or period for the compliance with, fulfillment and/ or performance of all or any of the obligations of the Contractor contained in the Agreement or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Agreement or for the fulfillment, compliance and/or performance of all or any of the obligations of the Contractor under the Agreement.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect on \*\*\*\*\$. Unless a demand

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<sup>\$</sup> Insert date being 2 (two) years from the date of issuance of this Guarantee (in accordance with Clause 7.2 of the

or claim under this Guarantee is made in writing before expiry of the Guarantee, the Bank shall be discharged from its liabilities hereunder.

9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect for up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.
12. This guarantee shall also be operatable at our..... Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment there under claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.
13. Bank Guarantee has been sent to authority's bank through SFMS gateway as per the details below:-

Sl. No	Particulars	Details
1	Name of the Beneficiary	National Highways and Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Syndicate Bank, Transport Bhawan, 1st Parliament street, New Delhi-110001

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Agreement).

Signed and sealed this ..... day of ....., 20..... at .....

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.



Annex – II  
(Schedule - G)  
(See Clause 7.5.3)

Annex-II: Form for Guarantee for Withdrawal of Retention Money

The Managing Director,  
National Highways & Infrastructural Development Corporation Ltd.  
PTI Building, 3rd Floor,  
4, Parliament Street  
New Delhi - 110001

WHEREAS:

- (A) [name and address of contractor] (hereinafter called the "Contractor") has executed an agreement (hereinafter called the "Agreement") with the [name and address of the authority], (hereinafter called the "Authority") for **"Construction of Mechi Bridge and Approaches on India-Nepal border linking Kakarvitta in Nepal and Panitnaki in India under Engineering Procurement and Construction (EPC) Mode"**, subject to and in accordance with the provisions of the Agreement.
- (B) In accordance with Clause 7.5.3 of the Agreement, the Contractor may withdraw the retention money (hereinafter called the "Retention Money") after furnishing to the Authority a bank guarantee for an amount equal to the proposed withdrawal.
- (C) We, ..... through our branch at ..... (the "Bank") have agreed to furnish this bank guarantee (hereinafter called the "Guarantee") for the amount of Rs. ----- cr. (Rs.-----crore) (the "Guarantee Amount").

NOW, THEREFORE, the Bank hereby unconditionally and irrevocably guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to show grounds or reasons for its demand and/or for the sum specified therein.
2. A letter from the Authority, under the hand of an officer not below the rank of [General Manager in the National Highways Authority of India], that the Contractor has committed default in the due and faithful performance of all or any of its obligations for under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final, and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason

whatsoever.

3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Retention Money and any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Retention Money.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
8. The Guarantee shall cease to be in force and effect 90 (ninety) days after the date of the Completion Certificate specified in Clause 12.4 of the Agreement.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope

containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.
12. This guarantee shall also be operatable at our..... Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment there under claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.
13. Bank Guarantee has been sent to authority's bank through SFMS gateway as per the details below:-

Sl. No	Particulars	Details
1	Name of the Beneficiary	National Highways and Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Syndicate Bank, Transport Bhawan, 1st Parliament street, New Delhi-110001

Signed and sealed this ..... day of ....., 20..... at .....

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch

Annex – III

(Schedule - G)  
(See Clause 19.2)

Annex-III: Form for Guarantee for Advance Payment

The Managing Director,  
National Highways & Infrastructural Development Corporation Ltd.  
PTI Building, 3rd Floor,  
4, Parliament Street  
New Delhi - 110001

WHEREAS:

- (A) [name and address of contractor] (hereinafter called the “Contractor”) has executed an agreement (hereinafter called the “Agreement”) with the [name and address of the authority], (hereinafter called the “Authority”) for the **“Construction of Mechi Bridge and Approaches on India-Nepal border linking Kakarvitta in Nepal and Panitnaki in India under Engineering Procurement and Construction (EPC) Mode”**, subject to and in accordance with the provisions of the Agreement
- (B) In accordance with Clause 19.2 of the Agreement, the Authority shall make to the Contractor an interest bearing (@ Bank Rate) advance payment (herein after called “Advance Payment”) equal to 10% (ten per cent) of the Contract Price; and that the Advance Payment shall be made in two installments subject to the Contractor furnishing an irrevocable and unconditional guarantee by a scheduled bank for an amount equivalent to 110% (one hundred and ten percent) of such installment to remain effective till the complete and full repayment of the installment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of {first/second} installment of the Advance Payment is Rs. ----- cr. (Rupees ----- crore) and the amount of this Guarantee is Rs. ----- cr. (Rupees ----- crore) (the “Guarantee Amount”).
- (C) We, ..... through our branch at ..... (the “Bank”) have agreed to furnish this bank guarantee (hereinafter called the “Guarantee”) for the Guarantee Amount.

NOW, THEREFORE, the Bank hereby, unconditionally and irrevocably, guarantees and affirms as follows:

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful repayment on time of the aforesaid instalment of the Advance Payment under and in accordance with the Agreement, and agrees and undertakes to pay to the Authority, upon its mere first written demand, and without any demur, reservation, recourse, contest or protest, and without any reference to the Contractor, such sum or sums up to an aggregate sum of the Guarantee Amount as the Authority shall claim, without the Authority being required to prove or to

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<sup>\$</sup> The Guarantee Amount should be equivalent to 110% of the value of the applicable instalment.

show grounds or reasons for its demand and/or for the sum specified therein.

2. A letter from the Authority, under the hand of an officer not below the rank of [General Manager in the National Highways Authority of India], that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the instalment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.
3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Advance Payment or to extend the time or period of its repayment or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Advance Payment.
7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.

8. The Guarantee shall cease to be in force and effect on \*\*\*\*.\$ Unless a demand or claim under this Guarantee is made in writing on or before the aforesaid date, the Bank shall be discharged from its liabilities hereunder.
9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.
11. This Guarantee shall come into force with immediate effect and shall remain in force and effect up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.
12. This guarantee shall also be operatable at our..... Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment there under claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.
13. Bank Guarantee has been sent to authority's bank through SFMS gateway as per the details below:-

Sl. No	Particulars	Details
1	Name of the Beneficiary	National Highways and Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Syndicate Bank, Transport Bhawan, 1st Parliament street, New Delhi-110001

Signed and sealed this ..... day of ....., 20..... at .....

**SIGNED, SEALED AND DELIVERED**

For and on behalf of the Bank by:

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<sup>\$</sup> Insert a date being 90 (ninety) days after the end of one year from the date of payment of the Advance payment to the Contractor (in accordance with Clause 19.2 of the Agreement).

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

- (i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.
- (ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.



**SCHEDULE - H**  
(See Clauses 10.1.4 and 19.3)

**Contract Price Weightages**

- 1.1 The Contract Price for this Agreement is Rs. \*\*\*\*\*
- 1.2 Proportions of the Contract Price for different stages of Construction of the Project Highway shall be as specified below:

Item	Weightage in Percentage to the Contract Price	Stage for Payment	Percentage Weightage
1	2	3	4
Road works including Culverts, Minor Bridges, Underpasses, Overpasses, Approaches to ROB / RUB / Major Bridges/ Structures (but excluding service roads)	5.31	<b>A- Widening and strengthening of existing road</b> (1) Earthwork up to top of the sub-grade (2) Granular work (Sub base, Base, Shoulders) (3) Dense Bituminous Macadam (4) Bituminous Concrete (5) Widening and repair of culverts (6) Widening and repair of Minor bridges  <b>B- New 4-lane realignment / bypass</b> (1) Earthwork up to top of the sub-grade (2) Granular work (Sub base, Base, Shoulders) (3) Dense Bituminous Macadam (4) Bituminous Concrete (5) CC Pavement  <b>C- New Culverts, Minor Bridges, Underpasses, Overpasses on Existing Road, Realignments, Bypasses:</b>	5.52 21.21 23.85 10.77 0.00 0.00  7.37 4.81 3.03 1.37 0.00

		(1) Culverts	0.00
		(2) Minor bridges	0.00
		(3) Cattle Underpasses	0.00
		(4) Pedestrian Underpasses	0.00
		(5) Grade Separated Structures	
		(a) Underpasses	22.08
		(b) Overpasses	0.00
Major Bridge works and ROB / RUB	84.96	<b>A- Widening and repairs of Major Bridges</b>	
		(1) Foundation	0.00
		(2) Sub-structure	0.00
		(3) Super-structure (including crash barriers etc. complete)	0.46
		(4) Approaches (excluding Retaining Wall)	0.00
		(5) Retaining Wall	0.00
		<b>B- Widening and repair of</b>	
		(a) ROB & (b) RUB	
		(1) Foundation	0.00
		(2) Sub-structure	0.00
		(3) Super-structure (including crash barriers etc. complete)	0.00
		(4) Approaches (excluding Reinforced Earth Wall)	0.00
		(5) Reinforced Earth Wall	0.00
		<b>C- New Major Bridges</b>	
		(1) Foundation	24.23
		(2) Sub-structure	14.32
		(3) Super-structure (including crash barriers etc. complete)	60.98
		(4) Approaches (excluding Retaining Wall)	0.00
		(5) Retaining Wall	0.00
		<b>D- New rail-road bridges</b>	
		(a) ROB & (b) RUB	
		(1) Foundation	0.00
		(2) Sub-structure	0.00
		(3) Super-structure (including crash barriers etc. complete)	0.00
		(4) Approaches (excluding Reinforced Earth Wall)	0.00

		(5) Reinforced Earth Wall	0.00
Structures (Elevated Sections, Reinforced Earth)	1.49	(1) Foundation (2) Sub-structure (3) Super-structure (including crash barriers etc. complete) (4) Approaches (excluding Reinforced Earth Wall) (5) Reinforced Earth Wall	0.00 0.00 0.00 0.00 100.00
Other works	8.25	(i) Service roads (ii) Toll Plaza (iii) Road side drains (iv) Road signs, markings, km stones, safety devices, (v) Project facilities (vi) Repairs to bridges/structures a) Providing wearing coat b) Replacement of bearings, joints c) Providing crash barriers d) Other items (vii) Road side plantation (viii) Protection works (ix) Safety & traffic management during construction * (x) Retaining wall (xi) Miscellaneous	5.76 0.00 7.73 4.49 3.76 0.00 0.00 0.00 0.00 0.00 33.33 4.36 34.19 5.88

\* The above list is illustrative and may require modification as per the scope of the work.

### 1.3 Procedure of estimating the value of work done

#### 1.3.1 Road works including approaches to minor bridges, Major Bridges and Structures (excluding service roads).

Procedure for estimating the value of road work done shall be as follows:

Table 1.3.1

Stage of Payment	Percentage Weightage	Payment Procedure
<b>A Widening &amp; Strengthening</b>		
(1) Earthwork up to top of the sub-grade	5.52	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10 (ten) percent of the total length. @
(2) Granular work (subbase, base, shoulders)	21.21	

(3) Dense Bituminous Macadam	23.85	
(4) Bituminous Concrete	10.77	
(5) Widening and repair of culverts	0.00	Cost of ten completed culverts shall be determined pro rata with respect to the total number of culverts. Payment shall be made on the completion of ten culverts.
(6) Widening and repair of minor bridges	0.00	Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length of the minor bridges. Payment shall be made on the completion of a minor bridge.
<b>B New 2-lane realignment, bypass</b>		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 5 (five) km length.
(1) Earthwork up to top of the sub-grade	7.37	
(2) Granular work (subbase, base, shoulders)	4.81	
(3) Dense Bituminous Macadam	3.03	
(4) Bituminous Concrete	1.37	
(5) CC Pavement	0.00	
<b>C New Culverts, Minor bridges on existing road, realignments, bypasses:</b>		
(1) Culverts	0.00	Cost of each culvert shall be determined on pro rata basis with respect to the total number of culverts. Payment shall be made on the completion of five culverts.
(2) Minor bridges	0.00	Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length of the minor bridges. Payment shall be made on the completion of a minor bridge
(3) Cattle / Pedestrian Underpasses	0.00	Cost of each Cattle / Pedestrian Underpass or Overpasses shall be determined on pro rata basis with

		respect to the total number of Cattle / Pedestrian Underpasses or Overpasses. Payment shall be made on the completion of the number of Cattle/Pedestrian Underpasses or Overpasses specified below: Total No: Stage for Payment: (i) 1 to 5 - on completion of all, (ii) 6 or more - on completion of five
(4) Pedestrian Overpasses	0.00	Same as for (3) above
(5) Grade Separated Structures		
(a) Underpasses	22.08	Same as for (3) above
(b) Overpasses	0.00	Same as for (3) above

@. For example, if the total length of bituminous work to be done is 100 km, the cost per km of bituminous work shall be determined as follows:

Cost per km = P x weightage for road work x weightage for bituminous work x (1/L)

Where P= Contract Price

L = Total length in km

Similarly, the rates per km for stages (1), (2) and (4) above shall be worked out.

### 1.3.2 Major Bridge works and ROB/RUB.

Procedure for estimating the value of Major Bridge works and of ROB/RUB shall be as stated in table 1.3.2:

Table 1.3.2

Stage of Payment	Weightage	Payment Procedure
<b>A Widening and repairs of Major Bridges</b>		
(1) Foundation: On completion of the foundation work including foundations for wing and return walls	0.00	Cost of each Major Bridge (Widening and repairs) shall be determined on pro-rata basis with respect to the total linear length (m) of the Major Bridges (widening and repairs). Payment shall be made on completion of each stage of a Major Bridge as per the weight age given in
(2) Sub-structure: On completion of abutments, piers up to the abutment/pier cap wing	0.00	

walls, return walls, guide bunds, if any.		this table.
(3) Super-structure: On completion of the super structure in all respects including hand rails/crash barriers, tests on completion etc., bridge complete in all respects and fit for use.	0.46	
(4) Approaches : On completion of approaches (excluding retaining wall if any), filter media etc., and complete in all respects & fit for use	0.00	
(5) Retaining Wall : On completion of retaining wall if any in the approaches in all respects	0.00	
<b>B Widening and repairs of</b>		
<b>(a) ROB &amp; (b) RUB</b>		
(1) Foundation: On completion of the foundation work including foundations for wing and return walls	0.00	Cost of each ROB/RUB (widening and repairs) shall be determined on pro rata basis with respect to the total linear length (m) of the ROB/RUB (widening and repairs). Payment shall be made on completion of each stage of ROB/RUB as per the weightage given in this table.
(2) Sub-structure: On completion of abutments, piers up to the abutment/pier cap wing walls, return walls, guide bunds, if any.	0.00	
(3) Super-structure: On completion of the super structure in all respects including hand rails/crash barriers, tests on completion etc., bridge complete in all respects and fit for use.	0.00	
(4) Approaches : On completion of approaches (excluding retaining wall if any), filter media etc., and complete in all respects & fit for use	0.00	

(5) Reinforced Earth Wall : On completion of Reinforced Earth Wall if any in the approaches in all respects	0.00	
<b>C New Major Bridges</b>		
(1) Foundation: On completion of the foundation work including foundations for wing and return walls	24.23	Cost of each Major Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridges. Payment shall be made on completion of each stage of a Major Bridge as per the weight age given in this table
(2) Sub-structure: On completion of abutments, piers up to the abutment/pier cap wing walls, return walls, guide bunds, if any.	14.32	
(3) Super-structure: On completion of the super structure in all respects including hand rails/crash barriers, tests on completion etc., bridge complete in all respects and fit for use.	60.98	
(4) Approaches : On completion of approaches (excluding retaining wall if any), filter media etc., and complete in all respects & fit for use	0.00	
(5) Retaining Wall : On completion of retaining wall if any in the approaches in all respects	0.00	
<b>D New Rail-road bridges</b>		
<b>(a) ROB &amp; (b) RUB</b>		
(1) Foundation: On completion of the foundation work including foundations for wing and return walls	0.00	Cost of each ROB/RUB shall be determined on pro-rata basis with respect to the total linear length (m) of the ROB/RUB. Payment shall be made on completion of each stage of ROB/RUB as per the weightage given in the table.
(2) Sub-structure: On completion of abutments, piers up to the abutment/pier cap wing walls, return walls, guide bunds, if any.	0.00	

(3) Super-structure: On completion of the super structure in all respects including hand rails/crash barriers, tests on completion etc., bridge complete in all respects and fit for use.	0.00	
(4) Approaches : On completion of approaches (excluding retaining wall if any), filter media etc., and complete in all respects & fit for use	0.00	
(5) Reinforced Earth Wall : On completion of Reinforced Earth Wall if any in the approaches in all respects	0.00	

### 1.3.3 Structures

Procedure for estimating the value of structure work shall be as stated in table 1.3.3:

Table 1.3.3

Stage of payment	Weightage	Payment procedure
(1) Foundation: On completion of the foundation works including foundations for wing and return walls	0.00	Cost of each structure shall be determined on pro rata basis in respect to the total linear length (m) of all the structures. Payment shall be made on completion of each stage of a structure as per the weight age given in this table.
(2) Sub-structure: On completion of abutments, piers up to the abutment/pier cap, wing walls & return walls if any.	0.00	
(3) Super-structure: On completion of the Structure along with super structure, including hand rails/crash barriers, tests on completion etc., elevated structure complete in all respects and fit for use.	0.00	
(4) Approaches: On completion of approaches (excluding Reinforced Earth Wall if any), filter media etc., complete in all respects and fit for use	0.00	



(5) Reinforced Earth work	100.00	Payment shall be made on pro rata basis on completion of 25 (twenty five) percent of total area.
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#### 1.3.4 Other works.

Procedure for estimating the value of other works done shall be as stated in table 1.3.4:

Table 1.3.4

Stage of Payment	Weightage	Payment Procedure
(i) Service roads	5.76	Unit of measurement is linear length in km. Cost per km shall be determined on pro rata basis with respect to the total length of the service roads. Payment shall be made for completed service road in a length of not less than 20 (twenty) percent of the total length of service roads.
(ii) Toll plaza	0.00	Unit of measurement is each completed toll plaza. Payment of each toll plaza shall be made on pro rata basis with respect to the total of all toll plazas.
(iii) Road side drains	7.73	Unit of measurement is linear length in km. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10 % (ten per cent) of the total length.
(iv) Road signs, markings, km stones, safety devices,	4.49	
(v) Project Facilities		Payment shall be made on pro rata basis for completed facilities.
a) Bus bays	0.00	
b) Truck lay-byes	3.76	
c) Rest areas	0.00	
d) Others	5.01	
(vi) Repairs to existing bridges/structures		Payment shall be made on pro rata basis for completed facilities.
a) Providing wearing coat	0.00	
b) Replacement of bearing, joints	0.00	
c) Providing crash barriers	0.00	
d) Other items	0.00	
(vii) Roadside plantation	0.00	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10% (ten per cent) of the total length.
(viii) Protection works	33.33	

(ix) Safety and traffic management during construction	4.36	Payment shall be made on pro-rata basis every six months
(x) Retaining wall	34.19	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10% (ten per cent) of the total length.
(xi) Miscellaneous	5.88	Payment shall be made on pro rata basis for completed facilities.

## **2. Procedure for payment for Maintenance**

- 2.1 The cost for maintenance shall be as stated in Clause 14.1.1.
- 2.2 Payment for Maintenance shall be made in quarterly installments in accordance with the provisions of Clause 19.7.

SCHEDULE - I  
(See Clause 10.2.4)

**DRAWINGS**

**1 Drawings**

In compliance of the obligations set forth in Clause 10.2 of this Agreement, the Contractor shall furnish to the Authority's Engineer, free of cost, all Drawings listed in Annex-I of this Schedule-I.

**2 Additional Drawings**

If the Authority's Engineer determines that for discharging its duties and functions under this Agreement, it requires any drawings other than those listed in Annex-I, it may by notice require the Contractor to prepare and furnish such drawings forthwith. Upon receiving a requisition to this effect, the Contractor shall promptly prepare and furnish such drawings to the Authority's Engineer, as if such drawings formed part of Annex-I of this Schedule-I.

Annex - I  
(Schedule - I)

**List of Drawings**

**Note: The Authority shall describe in this Annex-I, all the Drawings that the Contractor is required to furnish under Clause 10.2**

1. The Drawings that the EPC Contractor is required to furnish under Clause 10.2

Specifying the Drawings for Two/Four Laning with paved shoulders are as under:

- Horizontal and Vertical Alignment with details of reference pillars, Horizontal Intersection Points, Vertical Intersection Points, elements of curves, and sight distances.
- Cross-section at 50m interval along the alignment within ROW
- Typical cross-section with details of pavement structures
- Detailed drawings of individual Bridges and Structures
- Detailed drawings for individual culverts
- Detailed layout drawings for intersections
- Drawings for Road sign, Markings, Toll plazas, Bus stops, Parking areas, truck lay-bys.
- Detailed layout drawings for traffic circulation for service roads.
- Street lighting
- Landscaping & Tree plantation
- Vehicle rescue post
- Traffic management drawings for safety in construction zones
- Detailed drawings of road side furniture and safety structures
- Detailed drawing of guide bunds and protection works
- Detailed drawings of Drainage including RCC covered drains and Chute drains.

SCHEDULE – J  
(See Clause 10.3.2)

**PROJECT COMPLETION SCHEDULE**

**1 Project Completion Schedule**

During Construction period, the EPC Contractor shall comply with the requirements set forth in this Schedule-J for each of the Project Milestones and the **Scheduled Completion Date**. Within 15 (fifteen) days of the date of each Project Milestone, the EPC Contractor shall notify the Executing Agency of such compliance along with necessary particulars thereof.

**2 Project Milestone-I**

2.1 Project Milestone-I shall occur on the date falling on the 180th (one hundred and eightieth) day from the Appointed Date (the “Project Milestone-I”).

2.2 Prior to the occurrence of Project Milestone-I, the Contractor shall have commenced construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 10% (ten per cent) of the Contract Price.

**3 Project Milestone-II**

3.1 Project Milestone-II shall occur on the date falling on the 550th (Five hundred and fiftieth) day from the Appointed Date (the “Project Milestone-II”).

3.2 Prior to the occurrence of Project Milestone-II, the Contractor shall have continued with construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 40% (Forty per cent) of the Contract Price.

**4 Project Milestone-III**

4.1 Project Milestone-III shall occur on the date falling on the 915th (Nine hundred and fifteenth) day from the Appointed Date (the “Project Milestone- III”).

4.2 Prior to the occurrence of Project Milestone-III, the Contractor shall have continued with construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 80% (Eighty per cent) of the Contract Price.

**5 Scheduled Completion Date**

5.1 The Scheduled Completion Date shall occur on the 1095th (one thousand ninety five) day from the Appointed Date.

5.2 On or before the Scheduled Completion Date, the Contractor shall have completed construction in accordance with this Agreement.

## **6 Extension of time**

Upon extension of any or all of the aforesaid Project Milestones or the Scheduled Completion Date, as the case may be, under and in accordance with the provisions of this Agreement, the Project Completion Schedule shall be deemed to have been amended accordingly.

## SCHEDULE - K

*(See Clause 12.1.2)*

### **Tests on Completion**

#### **1 Schedule for Tests**

- 1.1 The Contractor shall, no later than 30 (thirty) days prior to the likely completion of construction, notify the Authority's Engineer and the Authority of its intent to subject the Project Highway to Tests, and no later than 10 (ten) days prior to the actual date of Tests, furnish to the Authority's Engineer and the Authority detailed inventory and particulars of all works and equipment forming part of Works.
- 1.2 The Contractor shall notify the Authority's Engineer of its readiness to subject the Project Highway to Tests at any time after 10 (ten) days from the date of such notice, and upon receipt of such notice, the Authority's Engineer shall, in consultation with the Contractor, determine the date and time for each Test and notify the same to the Authority who may designate its representative to witness the Tests. The Authority's Engineer shall thereupon conduct the Tests itself or cause any of the Tests to be conducted in accordance with Article 12 and this Schedule-K.

#### **2 Tests**

- 2.1 Visual and physical test: The Authority's Engineer shall conduct a visual and physical check of construction to determine that all works and equipment forming part thereof conform to the provisions of this Agreement. The physical tests shall include [\*\*\*].
- 2.2 Riding quality test: Riding quality of each lane of the carriageway shall be checked with the help of a calibrated bump integrator and the maximum permissible roughness for purposes of this Test shall be [2,000 (two thousand)] mm for each kilometre.
- 2.3 Tests for bridges: All major and minor bridges shall be subjected to the rebound hammer and ultrasonic pulse velocity tests, to be conducted in accordance with the procedure described in Special Report No. 17: 1996 of the IRC Highway Research Board on Nondestructive Testing Techniques, at two spots in every span, to be chosen at random by the Authority's Engineer. Bridges with a span of 15 (fifteen) metres or more shall also be subjected to load testing.
- 2.4 Other tests: The Authority's Engineer may require the Contractor to carry out or cause to be carried additional tests, in accordance with Good Industry Practice, for determining the compliance of the Project Highway with Specifications and Standards.
- 2.5 Environmental audit: The Authority's Engineer shall carry out a check to determine conformity of the Project Highway with the environmental requirements set forth in Applicable Laws and Applicable Permits.

- 2.6 Safety Audit: The Authority's Engineer shall carry out, or cause to be carried out, a safety audit to determine conformity of the Project Highway with the safety requirements and Good Industry Practice.

**3 Agency for conducting Tests**

All Tests set forth in this Schedule-K shall be conducted by the Authority's Engineer or such other agency or person as it may specify in consultation with the Authority.

**4 Completion Certificate**

Upon successful completion of Tests, the Authority's Engineer shall issue the Completion Certificate in accordance with the provisions of Article 12.



SCHEDULE - L  
(See Clause 12.2 and 12.4)

**PROVISIONAL CERTIFICATE**

- 1 I, ..... (Name of the Authority's Engineer), acting as the Authority's Engineer, under and in accordance with the Agreement dated ..... (the "Agreement"), for construction of the **"Construction of Mechi Bridge and Approaches on India-Nepal border linking Kakarvitta in Nepal and Panitnaki in India under Engineering Procurement and Construction (EPC) Mode"** (the **"Project Highway"**) on Engineering, Procurement and Construction (EPC) basis through ..... (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been undertaken to determine compliance of the Project Highway with the provisions of the Agreement.
- 2 Works that are incomplete on account of Time Extension have been specified in the Punch List appended hereto, and the Contractor has agreed and accepted that it shall complete all such works in the time and manner set forth in the Agreement. In addition, certain minor works are incomplete and these are not likely to cause material inconvenience to the Users of the Project Highway or affect their safety. The Contractor has agreed and accepted that as a condition of this Provisional Certificate, it shall complete such minor works within 30 (thirty) days hereof. These minor works have also been specified in the aforesaid Punch List.
- 3 In view of the foregoing, I am satisfied that the **"Construction of Mechi Bridge and Approaches on India-Nepal border linking Kakarvitta in Nepal and Panitnaki in India under Engineering Procurement and Construction (EPC) Mode"** can be safely and reliably placed in service of the Users thereof, and in terms of the Agreement, the Project Highway is hereby provisionally declared fit for entry into operation on this the ..... day of ..... 20.....

ACCEPTED, SIGNED, SEALED

SIGNED, SEALED AND

AND DELIVERED

DELIVERED

For and on behalf of

For and on behalf of

CONTRACTOR by:

AUTHORITY's ENGINEER by:

(Signature)

(Signature)

## COMPLETION CERTIFICATE

- 1 I, ..... (Name of the Authority's Engineer), acting as the Authority's Engineer, under and in accordance with the Agreement dated ..... (the **"Agreement"**), for the **"Construction of Mechi Bridge and Approaches on India-Nepal border linking Kakarvitta in Nepal and Panitnaki in India under Engineering Procurement and Construction (EPC) Mode"** (the **"Project Highway"**) on Engineering, Procurement and Construction (EPC) basis through ..... (Name of Contractor), hereby certify that the Tests in accordance with Article 12 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement, and I am satisfied that the Project Highway can be safely and reliably placed in service of the Users thereof.
- 2 It is certified that, in terms of the aforesaid Agreement, all works forming part of Project Highway have been completed, and the Project Highway is hereby declared fit for entry into operation on this the ..... day of ..... 20.....

SIGNED, SEALED AND DELIVERED

For and on behalf of

the Authority's Engineer by:

(Signature)

(Name)

(Designation)

(Address)

SCHEDULE - M  
(See Clauses 14.6, 15.2 and 19.7)

**PAYMENT REDUCTION FOR NON-COMPLIANCE**

**1. Payment reduction for non-compliance with the Maintenance Requirements**

- 1.1 Monthly lump sum payments for maintenance shall be reduced in the case of non-compliance with the Maintenance Requirements set forth in Schedule-E.
- 1.2 Any deduction made on account of non-compliance with the Maintenance Requirements shall not be paid even after compliance subsequently. The deductions shall continue to be made every month until compliance is done.
- 1.3 The Authority's Engineer shall calculate the amount of payment reduction on the basis of weightage in percentage assigned to non-conforming items as given in Paragraph 2.

**2. Percentage reductions in lump sum payments**

- 2.1 The following percentages shall govern the payment reduction:

S. No.	Item/Defect/Deficiency	Percentage
<b>(a)</b>	<b>Carriageway/Pavement</b>	
(i)	Potholes, cracks, other surface defects	15%
(ii)	Repairs of Edges, Rutting	5%
<b>(b)</b>	<b>Road, Embankment, Cuttings, Shoulders</b>	
(i)	Edge drop, inadequate crossfall, undulations, settlement, potholes, ponding, obstructions	10%
(ii)	Deficient slopes, raincuts, disturbed pitching, vegetation growth, pruning of trees	5%
<b>(c)</b>	<b>Bridges and Culverts</b>	
(i)	Desilting, cleaning, vegetation growth, damaged pitching, flooring, parapets, wearing course, footpaths, any damage to foundations	20%
<b>S. No.</b>	<b>Item/Defect/Deficiency</b>	<b>Percentage</b>

(ii)	Any Defects in superstructures, bearings and sub-structures	10%
(iii)	Painting, repairs/replacement kerbs, railings, parapets, guideposts/crash barriers	5%
<b>(d)</b>	<b>Roadside Drains</b>	
(i)	Cleaning and repair of drains	5%
<b>(e)</b>	<b>Road Furniture</b>	
(i)	Cleaning, painting, replacement of road signs, delineators, road markings, 200 m/km/5 <sup>th</sup> km stones	5%
<b>(f)</b>	<b>Miscellaneous Items</b>	
(i)	Removal of dead animals, broken down/accident vehicles, fallen trees, road blockades or malfunctioning of mobile crane	10%
(ii)	Any other Defects in accordance with paragraph 1.	5%
<b>(g)</b>	<b>Defects in Other Project Facilities</b>	5%

2.2 The amount to be deducted from monthly lump-sum payment for non compliance of particular item shall be calculated as under:

$$R = P/100 \times M \times L1/L$$

Where P = Percentage of particular item/Defect/deficiency for deduction

M = Monthly lump-sum payment in accordance with the Bid

L1 = Non-complying length

L = Total length of the road,

R = Reduction (the amount to be deducted for non compliance for a particular item/Defect/deficiency)

The total amount of reduction shall be arrived at by summation of reductions for such items/Defects/deficiency or non compliance.

For any Defect in a part of one kilometer, the non-conforming length shall be taken as one kilometer.

SCHEDULE - N  
(See Clause 18.1.1)

**SELECTION OF AUTHORITY'S ENGINEER**

**1 Selection of Authority's Engineer**

- 1.1 The provisions of the Model Request for Proposal for Selection of Technical Consultants, issued by the Ministry of Finance in May 2009, or any substitute thereof shall apply for selection of an experienced firm to discharge the functions and duties of an Authority's Engineer.
- 1.2 In the event of termination of the Technical Consultants appointed in accordance with the provisions of Paragraph 1.1, the Executing Agency shall appoint another firm of Technical Consultants forthwith and may engage a government-owned entity in accordance with the provisions of Paragraph 3 of this Schedule-N.

**2 Terms of Reference**

The Terms of Reference for the Authority's Engineer (the "TOR") shall substantially conform with Annex 1 to this Schedule N.

**3 Appointment of Government entity as Authority's Engineer**

Notwithstanding anything to the contrary contained in this Schedule, the Executing Agency may in its discretion appoint a government-owned entity as the Authority's Engineer; provided that such entity shall be a body corporate having as one of its primary functions the provision of consulting, advisory and supervisory services for engineering projects; provided further that a government-owned entity which is owned or controlled by the Executing Agency shall not be eligible for appointment as Authority's Engineer.

Annex – I  
(Schedule - N)

**TERMS OF REFERENCE FOR AUTHORITY’S ENGINEER**

**1 Scope**

- 1.1 These Terms of Reference (the “**TOR**”) for the Authority’s Engineer are being specified pursuant to the EPC Agreement dated ..... (the “**Agreement**”), which has been entered into between the MORTH, New Delhi through The Managing Director, National Highways Infrastructure Development Corporation Limited (the “Executing Agency”) and ..... (the “EPC Contractor”) for the “**Construction of Mechi Bridge and Approaches on India-Nepal border linking Kakarvitta in Nepal and Panitnaki in India under Engineering Procurement and Construction (EPC) Mode**”, and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.
- 1.2 The TOR shall apply to construction and maintenance of the Project Highway.

**2 Definitions and interpretation**

- 2.1 The words and expressions beginning with or in capital letters and not defined herein but defined in the Agreement shall have, unless repugnant to the context, the meaning respectively assigned to them in the Agreement.
- 2.2 References to Articles, Clauses and Schedules in this TOR shall, except where the context otherwise requires, be deemed to be references to the Articles, Clauses and Schedules of the Agreement, and references to Paragraphs shall be deemed to be references to Paragraphs of this TOR.
- 2.3 The rules of interpretation stated in Clauses 1.2, 1.3 and 1.4 of the Agreement shall apply, *mutatis mutandis*, to this TOR.

**3. General**

- 3.1 The Authority’s Engineer shall discharge its duties in a fair, impartial and efficient manner, consistent with the highest standards of professional integrity and Good Industry Practice.
- 3.2 The Authority’s Engineer shall perform the duties and exercise the authority in accordance with the provisions of this Agreement, but subject to obtaining prior written approval of the Authority before determining:
- (a) any Time Extension;
  - (b) any additional cost to be paid by the Authority to the Contractor;
  - (c) the Termination Payment; or

- (d) any other matter which is not specified in (a), (b) or (c) above and which creates an obligation or liability on either Party for a sum exceeding Rs. 5,000,000 (Rs. fifty lakh).
- 3.3 The Authority's Engineer shall submit regular periodic reports, at least once every month, to the Authority in respect of its duties and functions under this Agreement. Such reports shall be submitted by the Authority's Engineer within 10 (ten) days of the beginning of every month.
- 3.4 The Authority's Engineer shall inform the Contractor of any delegation of its duties and responsibilities to its suitably qualified and experienced personnel; provided, however, that it shall not delegate the authority to refer any matter for the Authority's prior approval in accordance with the provisions of Clause 18.2.
- 3.5 The Authority's Engineer shall aid and advise the Authority on any proposal for Change of Scope under Article 13.
- 3.6 In the event of any disagreement between the Parties regarding the meaning, scope and nature of Good Industry Practice, as set forth in any provision of the Agreement, the Authority's Engineer shall specify such meaning, scope and nature by issuing a reasoned written statement relying on good industry practice and authentic literature.

#### **4 Construction Period**

- 4.1 During the Construction Period, the Authority's Engineer shall review the Drawings furnished by the Contractor along with supporting data, including the geo-technical and hydrological investigations, characteristics of materials from borrow areas and quarry sites, topographical surveys, and the recommendations of the Safety Consultant in accordance with the provisions of Clause 10.1.6. The Authority's Engineer shall complete such review and send its observations to the Authority and the Contractor within 15 (fifteen) days of receipt of such Drawings; provided, however that in case of a Major Bridge or Structure, the aforesaid period of 15 (fifteen) days may be extended upto 30 (thirty) days. In particular, such comments shall specify the conformity or otherwise of such Drawings with the Scope of the Project and Specifications and Standards.
- 4.2 The Authority's Engineer shall review any revised Drawings sent to it by the Contractor and furnish its comments within 10 (ten) days of receiving such Drawings.
- 4.3 The Authority's Engineer shall review the Quality Assurance Plan submitted by the Contractor and shall convey its comments to the Contractor within a period of 21 (twenty-one) days stating the modifications, if any, required thereto.
- 4.4 The Authority's Engineer shall complete the review of the methodology proposed to be adopted by the Contractor for executing the Works, and convey its comments to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed methodology from the Contractor.
- 4.5 The Authority's Engineer shall grant written approval to the Contractor, where necessary,

for interruption and diversion of the flow of traffic in the existing lane(s) of the Project Highway for purposes of maintenance during the Construction Period in accordance with the provisions of Clause 10.4.

- 4.6 The Authority's Engineer shall review the monthly progress report furnished by the Contractor and send its comments thereon to the Authority and the Contractor within 7 (seven) days of receipt of such report.
- 4.7 The Authority's Engineer shall inspect the Construction Works and the Project Highway and shall submit a monthly Inspection Report bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. In particular, the Authority's Engineer shall include in its Inspection Report, the compliance of the recommendations made by the Safety Consultant.
- 4.8 The Authority's Engineer shall conduct the pre-construction review of manufacturer's test reports and standard samples of manufactured Materials, and such other Materials as the Authority's Engineer may require.
- 4.9 For determining that the Works conform to Specifications and Standards, the Authority's Engineer shall require the Contractor to carry out, or cause to be carried out, tests at such time and frequency and in such manner as specified in the Agreement and in accordance with Good Industry Practice for quality assurance. For purposes of this Paragraph 4.9, the tests specified in the IRC Special Publication-11 (Handbook of Quality Control for Construction of Roads and Runways) and the Specifications for Road and Bridge Works issued by MORTH (the "Quality Control Manuals") or any modification/substitution thereof shall be deemed to be tests conforming to Good Industry Practice for quality assurance.
- 4.10 The Authority's Engineer shall test check at least 20 (twenty) percent of the quantity or number of tests prescribed for each category or type of test for quality control by the Contractor.
- 4.11 The timing of tests referred to in Paragraph 4.9, and the criteria for acceptance/ rejection of their results shall be determined by the Authority's Engineer in accordance with the Quality Control Manuals. The tests shall be undertaken on a random sample basis and shall be in addition to, and independent of, the tests that may be carried out by the Contractor for its own quality assurance in accordance with Good Industry Practice.
- 4.12 In the event that results of any tests conducted under Clause 11.10 establish any Defects or deficiencies in the Works, the Authority's Engineer shall require the Contractor to carry out remedial measures.
- 4.13 The Authority's Engineer may instruct the Contractor to execute any work which is urgently required for the safety of the Project Highway, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work required on account of a Force Majeure Event, the provisions of Clause 21.6 shall apply.



- 4.14 In the event that the Contractor fails to achieve any of the Project Milestones, the Authority's Engineer shall undertake a review of the progress of construction and identify potential delays, if any. If the Authority's Engineer shall determine that completion of the Project Highway is not feasible within the time specified in the Agreement, it shall require the Contractor to indicate within 15 (fifteen) days the steps proposed to be taken to expedite progress, and the period within which the Project Completion Date shall be achieved. Upon receipt of a report from the Contractor, the Authority's Engineer shall review the same and send its comments to the Authority and the Contractor forthwith.
- 4.15 The Authority's Engineer shall obtain from the Contractor a copy of all the Contractor's quality control records and documents before the Completion Certificate is issued pursuant to Clause 12.4.
- 4.16 Authority's Engineer may recommend to the Authority suspension of the whole or part of the Works if the work threatens the safety of the Users and pedestrians. After the Contractor has carried out remedial measure, the Authority's Engineer shall inspect such remedial measures forthwith and make a report to the Authority recommending whether or not the suspension hereunder may be revoked.
- 4.17 In the event that the Contractor carries out any remedial measures to secure the safety of suspended works and Users, and requires the Authority's Engineer to inspect such works, the Authority's Engineer shall inspect the suspended works within 3 (three) days of receiving such notice, and make a report to the Authority forthwith, recommending whether or not such suspension may be revoked by the Authority.
- 4.18 The Authority's Engineer shall carry out, or cause to be carried out, all the Tests specified in Schedule-K and issue a Completion Certificate or Provisional Certificate, as the case may be. For carrying out its functions under this Paragraph 4.18 and all matters incidental thereto, the Authority's Engineer shall act under and in accordance with the provisions of Article 12 and Schedule-K.

## **5. Maintenance Period**

- 5.1 The Authority's Engineer shall aid and advise the Contractor in the preparation of its monthly Maintenance Programme and for this purpose carry out a joint monthly inspection with the Contractor.
- 5.2 The Authority's Engineer shall undertake regular inspections, at least once every month, to evaluate compliance with the Maintenance Requirements and submit a Maintenance Inspection Report to the Authority and the Contractor.
- 5.3 The Authority's Engineer shall specify the tests, if any, that the Contractor shall carry out, or cause to be carried out, for the purpose of determining that the Project Highway is in conformity with the Maintenance Requirements. It shall monitor and review the results of such tests and the remedial measures, if any, taken by the Contractor in this behalf.
- 5.4 In respect of any defect or deficiency referred to in Paragraph 3 of Schedule-E, the Authority's Engineer shall, in conformity with Good Industry Practice, specify the

permissible limit of deviation or deterioration with reference to the Specifications and Standards and shall also specify the time limit for repair or rectification of any deviation or deterioration beyond the permissible limit.

- 5.5 The Authority's Engineer shall examine the request of the Contractor for closure of any lane(s) of the Project Highway for undertaking maintenance/repair thereof, and shall grant permission with such modifications, as it may deem necessary, within 5 (five) days of receiving a request from the Contractor. Upon expiry of the permitted period of closure, the Authority's Engineer shall monitor the reopening of such lane(s), and in case of delay, determine the Damages payable by the Contractor to the Authority under Clause 14.5.

## **6 Determination of costs and time**

- 6.1 The Authority's Engineer shall determine the costs, and/or their reasonableness, that are required to be determined by it under the Agreement.
- 6.2 The Authority's Engineer shall determine the period of Time Extension that is required to be determined by it under the Agreement.
- 6.3 The Authority's Engineer shall consult each Party in every case of determination in accordance with the provisions of Clause 18.5.

## **7. Payments**

- 7.1 The Authority's Engineer shall withhold payments for the affected works for which the Contractor fails to revise and resubmit the Drawings to the Authority's Engineer in accordance with the provisions of Clause 10.2.4 (d).
- 7.2 Authority's Engineer shall -
- (a) within 10 (ten) days of receipt of the Stage Payment Statement from the Contractor pursuant to Clause 19.4, determine the amount due to the Contractor and recommend the release of 90 (ninety) percent of the amount so determined as part payment, pending issue of the Interim Payment Certificate; and
  - (b) within 15 (fifteen) days of the receipt of the Stage Payment Statement referred to in Clause 19.4, deliver to the Authority and the Contractor an Interim Payment Certificate certifying the amount due and payable to the Contractor, after adjustments in accordance with the provisions of Clause 19.10.
- 7.3 The Authority's Engineer shall, within 15 (fifteen) days of receipt of the Monthly Maintenance Statement from the Contractor pursuant to Clause 19.6, verify the Contractor's monthly statement and certify the amount to be paid to the Contractor in accordance with the provisions of the Agreement.
- 7.4 The Authority's Engineer shall certify final payment within 30 (thirty) days of the receipt

of the final payment statement of Maintenance in accordance with the provisions of Clause 19.16.

## **8. Other duties and functions**

The Authority's Engineer shall perform all other duties and functions as specified in the Agreement.

## **9 Miscellaneous**

- 9.1 A copy of all communications, comments, instructions, Drawings or Documents sent by the Authority's Engineer to the Contractor pursuant to this TOR, and a copy of all the test results with comments of the Authority's Engineer thereon, shall be furnished by the Authority's Engineer to the Authority forthwith.
- 9.2 The Authority's Engineer shall retain at least one copy each of all Drawings and Documents received by it, including 'as-built' Drawings, and keep them in its safe custody.
- 9.3 Within 90 (ninety) days of the Project Completion Date, the Authority's Engineer shall obtain a complete set of as-built Drawings, in 2 (two) hard copies and in micro film form or in such other medium as may be acceptable to the Authority, reflecting the Project Highway as actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Project Highway and setback lines, if any, of the buildings and structures forming part of Project Facilities; and shall hand them over to the Authority against receipt thereof.
- 9.4 The Authority's Engineer, if called upon by the Authority or the Contractor or both, shall mediate and assist the Parties in arriving at an amicable settlement of any Dispute between the Parties.
- 9.5 The Authority's Engineer shall inform the Authority and the Contractor of any event of Contractor's Default within one week of its occurrence.

## SCHEDULE - O

*(See Clauses 19.4.1, 19.6.1, and 19.8.1)*

### **Forms of Payment Statements**

#### **1. Stage Payment Statement for Works**

The Stage Payment Statement for Works shall state:

- (a) the estimated amount for the Works executed in accordance with Clause 19.3.1 subsequent to the last claim;
- (b) amounts reflecting adjustments in price for the aforesaid claim;
- (c) the estimated amount of each Change of Scope Order executed subsequent to the last claim;
- (d) amounts reflecting adjustment in price, if any, for (c) above in accordance with the provisions of Clause 13.2.3 (a);
- (e) total of (a), (b), (c) and (d) above;
- (f) Deductions:
  - (i) Any amount to be deducted in accordance with the provisions of the Agreement except taxes;
  - (ii) Any amount towards deduction of taxes; and
  - (i) Total of (i) and (ii) above.
- (g) Net claim: (e) – (f) (iii);
- (h) The amounts received by the Contractor upto the last claim:
  - (i) For the Works executed (excluding Change of Scope orders);
  - (ii) For Change of Scope Orders, and
  - (iii) Taxes deducted

#### **2. Monthly Maintenance Payment Statement**

The monthly Statement for Maintenance Payment shall state:

- (a) the monthly payment admissible in accordance with the provisions of the Agreement;
- (b) the deductions for maintenance work not done;
- (c) net payment for maintenance due, (a) minus (b);
- (d) amounts reflecting adjustments in price under Clause 19.12; and
- (e) amount towards deduction of taxes

### **3. Contractor's claim for Damages**

**Note:** The Contractor shall submit its claims in a form acceptable to the Authority.

## SCHEDULE - P

*(See Clause 20.1)*

### INSURANCE

#### 1. Insurance during Construction Period

- 1.1 The Contractor shall effect and maintain at its own cost, from the Appointed Date till the date of issue of the Completion Certificate, the following insurances for any loss or damage occurring on account of Non Political Event of Force Majeure, malicious act, accidental damage, explosion, fire and terrorism:
- (a) insurance of Works, Plant and Materials and an additional sum of [15 (fifteen)] per cent of such replacement cost to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature; and
  - (b) insurance for the Contractor's equipment and Documents brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.
- 1.2 The insurance under paragraph 1.1 (a) and (b) above shall cover the Authority and the Contractor against all loss or damage from any cause arising under paragraph 1.1 other than risks which are not insurable at commercial terms.

#### 2. Insurance for Contractor's Defects Liability

The Contractor shall effect and maintain insurance cover for the Works from the date of issue of the Completion Certificate until the end of the Defects Liability Period for any loss or damage for which the Contractor is liable and which arises from a cause occurring prior to the issue of the Completion Certificate. The Contractor shall also maintain other insurances for maximum sums as may be required under the Applicable Laws and in accordance with Good Industry Practice.

#### 3. Insurance against injury to persons and damage to property

- 3.1 The Contractor shall insure against its liability for any loss, damage, death or bodily injury, or damage to any property (except things insured under Paragraphs 1 and 2 of this Schedule or to any person (except persons insured under Clause 20.9), which may arise out of the Contractor's performance of this Agreement. This insurance shall be for a limit per occurrence of not less than the amount stated below with no limit on the number of occurrences.

The insurance cover shall be not less than the Contract Price

- 3.2 The insurance shall be extended to cover liability for all loss and damage to the Authority's property arising out of the Contractor's performance of this Agreement excluding:
- (a) the Authority's right to have the construction works executed on, over, under, in or through any land, and to occupy this land for the Works; and

- (b) damage which is an unavoidable result of the Contractor's obligations to execute the Works.

4. **Insurance to be in joint names**

The insurance under paragraphs 1 to 3 above shall be in the joint names of the Contractor and the Authority.

**End of the Document**