EPC Schedules

"Road reconstruction & Slope protection work at 39.50 km near Mahanadi and Valley side restoration work at 37.00 km near Daragaon Devi Mandir of NH-55 (New NH-110) on EPC Mode in the State of West Bengal."

SCHEDULE - A

(See Clauses 2.1 and 8.1)

SITE OF THE PROJECT

1 The Site

(i) The Site of the Project Highway shall include the land and road works as described in Annex-I of this Schedule-A comprises the section of National Highway 110 (old NH55) commencing from KM 39+480 TO Km 39+540 (approx.) at MAHANADI & from Km 36+990 to 37+035 (approx.) at DARAGAON in the state of West Bengal.

(ii) The dates of handing over the Right of Way to the Contractor are specified in Annex-II of this Schedule-A.

(iii) 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 Authority Representative and the Contractor, and such inventory shall form part of the memorandum referred to in Clause 8.2 (i) of this Agreement.

(iv) 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 Annex-III based on site/design requirement.

(v) The status of the environment clearances obtained or awaited is given in Annex IV.

Annex - I
(Schedule-A)

Site

1. **Site**

(i) The Site of the Project Highway shall include the land and road works as described in Annex-I of this Schedule-A comprises the section of National Highway 110 (old 55) commencing from KM 39+480 TO Km 39+540 (approx.) at MAHANADI & from Km 36+990 to 37+035 (approx.) at DARAGAON in the state of West Bengal. The land, carriageway and structures comprising the site are described below.

2. **Land**
The site of the Project Highway Comprises the land described below:

S. No.	Chainage (km) From	Right of Way (m)	Remarks
1	39+480 to 39+540 approx.)	5.5 (Approx.)	
2	36+990 to 37+035 (approx.)	7.5 (Approx.)	

3. **Carriageway**
The present carriageway of the Project Highway is Single lane at 39.50 (approx.) & double lane at 37.00 (approx.). The type of the existing pavement is flexible.

4. **Culverts:**
The site has the following culverts:

Sl. No.	Chainage (Km)	Type of Culverts	Span/ Opening with span length (m)	Width (m)
	Nil			

5. **Road Side Drain:**
The details of the roadside drains are as follows:

Sl. No.	Location		Side of road	Type	
	From Km	To Km		Masonry/ CC (Pucca)	Earthen (Kutcha)
1.	39+480	39+540	LHS at Toe of Hill	PCC	
2.	36+990	37+035	LHS at Toe of Hill	PCC	

6. Railway Lines:

Sl. No.	Location		Side of Road
	From Km	To Km	
1	Complete stretch		LHS at Toe of Hill Slope

7. **Major Bridges**
The Site includes the following Major Bridges:

Chainage	Local name	Length (in M)	Carriageway (in M)
Nil	Nil	Nil	Nil

5. Road over-bridges (ROB)/ Road under-bridges (RUB)
The Site includes the following ROB (road over railway line) / RUB (road under railway line):

S. No.	Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)	ROB/ RUB
		Foundation	Superstructure			
Nil	Nil	Nil	Nil	Nil	Nil	Nil

6. Grade separators

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	Nil	Nil	Nil	Nil	Nil

7. Minor bridges - NIL

The Site includes the following minor bridges:

Chainage	Local name	Length (in M)	Carriageway (in M)
-	-	-	-

8. Railway level crossings

The Site includes the following railway level crossings:

S. No.	Location (km)	Remarks
Nil	Nil	Nil

9. 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)
Nil	Nil	Nil	Nil	Nil

10. Bus bays

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

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

11. Truck Lay byes

The details of truck lay byes are as follows:

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

12. Junctions

The details of major junctions are as follows: Nil

(NH: National Highway, SH: State Highway, MDR: Major District Road)

13. Deleted

14. 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)
Nil			

15. Build-up Area

The site includes the following build-up area:

S. No.	Build up stretches (km)	Name of Township
Nil		

Annex – II

(Schedule-A)

Dates for providing Right of Way

The dates on which the Authority shall provide Right of Way to the Contractor on different stretches of the Site are stated below:

Sl. No	Chainage (km)	Length(m)	Available Width (m)	Proposed Width	Date of providing Right of Way*
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
(i)	33+480 to 39+540 (approx)	60 m	Variable	Min 7 m	On Appointed date
(ii)	36+990 to 37+035 (approx)	45 m		10m Approx	

Annex - III
(Schedule-A)

Alignment Plans

The existing alignment of the Project Highway shall be modified in the following sections as per the alignment plan indicated below:

Not required. Existing alignment shall be followed.

Annex - IV

(Schedule-A)

Environment Clearances

The following environment clearances have been obtained:

Not Required

The following environment clearances are awaited:

Not Required

–

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 **"Road reconstruction & Slope protection work at 39.50 km near Mahanadi and Valley side restoration work at 37.00 km near Daragaon Devi Mandir of NH-55 (New NH-110) on EPC Mode in the State of West Bengal"**

3 **Specifications and Standards**

The Project Highway shall be designed and constructed in conformity with the Specifications and Standards specified in Annex-I of Schedule-D.

Annex – I

(Schedule-B)

Description of [Two-Laning]

[Note: Description of the Project Highway shall be given by the Authority in detail together with explanatory drawings (where necessary) to explain the Authority's requirements precisely in order to avoid subsequent changes in the Scope of the Project. The particulars that must be specified in this Schedule-B are listed below as per the requirements of the Manual of Specifications and Standards for [Two Laning of Highways (IRC:SP:73)], referred to as the Manual. If any standards, specifications or details are not given in the Manual, the minimum design/construction requirements shall be specified in this Schedule. In addition to these particulars, all other essential project specific details, as required, should be provided in order to define the Scope of the Project clearly and precisely.]

The Site of the Slope protection and Landslide Mitigation at Locations from KM 39+480 to Km 39+540 (approx.) at MAHANADI & from Km 36+990 to 37+035 (approx.) at DARAGOAN of NH-110 (old NH-55) in the state of West Bengal on EPC mode.

.

1. Widening of the Existing Highway

(i) The Project Highway shall follow the existing alignment unless otherwise specified by the Authority and shown in the alignment plans specified in Annex-III of Schedule-A.

(ii) Width of Carriageway

(a) The paved main carriageway width shall be in accordance with the typical cross-sections as given in of Annex-I of Schedule-B

Sl. No.	Stretch (from km to km)	Width of carriageway	Remarks
1	KM 39+480 to 39+540	10 m Approx.	-
2	KM 36+990 to 37+035	10 m Approx.	

Provided that in the built-up areas the width of the carriageway shall be as specified in the following table:

Sl. No.	Built-up stretch (Township)	Location	Width (m)	Typical Cross Section (Refer to Manual)	Remarks
Nil					

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

2. Geometric Design and General Features

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

i. Improvement of the existing road geometrics

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.

In the above 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 existing right of way and proper road signs and safety Measures shall be provided.

ii. Right of Way-

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

iii. Type of shoulders

(a) Inbuilt-up sections. footpaths/fully paved shoulders shall be provided in the following stretches:

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

(b) Design and specifications of paved shoulders/Footpath/Drain and granular material shall conform to the requirements specified in the Manual.

iv. Lateral and vertical clearances at underpasses

(a) Lateral and vertical clearances at underpasses and provision of guardrails/crash barriers shall be as per requirements specified in the relevant Manual.

(b) Lateral clearance: The width of the opening at the underpasses shall be as follows:

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

Lateral and vertical clearances at overpasses

(a) Lateral and vertical clearances at overpasses shall be as per requirements specified in the relevant Manual.

(b) Lateral clearance: The width of the opening at the overpasses shall be as follows:

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

v. Service roads

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

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

vi. Grade separated structures

(a) Grade separated structures shall be provided as per provision of the Manual. The requisite is given below:

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

(c) In the case of grade separated structures the type of structure and the level of the Project Highway and the cross roads shall be as follows:

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

vii. Cattle and pedestrian underpass /overpass

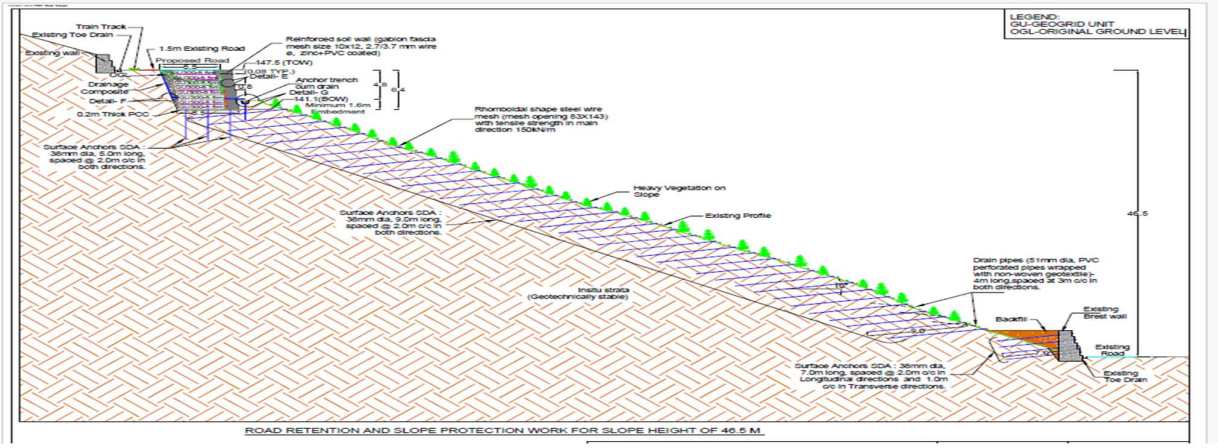
Cattle and pedestrian underpass/overpass shall be constructed as follows:

Sl. No.	Location	Type of crossing

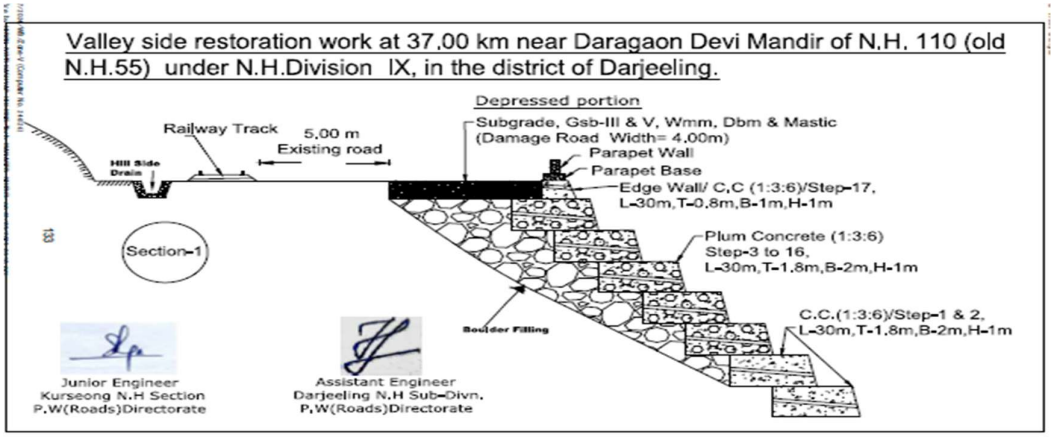
Nil

viii. Typical cross-sections of the Project Highway:

(A) For Km 39.5 Approx.



(B) For Km37 Approx.



3. Intersections and Grade Separators

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

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

(i) At-grade intersections

Major Intersections

Sl. No.	Location of intersection (Km)	Type of intersection	Other features	Remarks

Nil

Minor Intersections

Sl. No.	Location of intersection (Km)	Type of intersection	Other features
Nil			

(ii) Grade separated intersection with/without ramps

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

4. Road Embankment and Cut Section

i. Widening and improvement of the existing road embankment/cuttings and construction of new road embankment/cuttings shall conform to the Specifications and Standards given in Section 4 of the Manual and the specified cross-sectional details. Deficiencies in the plan and profile of the existing road shall be corrected.

ii. Raising of the existing road

The existing road shall be raised in the following sections:

Sl. No.	**Section (from km to km)**	**Length (km)**	**Extent of raising [Top of finished road level]**
NIL			

5. Pavement Design

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

ii. Type of pavement

The existing road shall be widened and strengthened as flexible pavement.

iii. Design requirements

As per Manual and specify design requirements and strategy

(a) Design Period and strategy

Flexible pavement for new pavement shall be designed for a minimum design period of 20 years. Stage construction shall not be permitted.

(b) Design Traffic

Notwithstanding anything to the contrary contained in this Agreement or the Manual. The

Contractor shall design the pavement for design traffic not less than 30 million standard axles.

Minimum compliant design Crust shall be as below:

(i) Widening /Reconstruction: -

For Km 39.5 Mahanadi		
Sl. No.	**Pavement Composition**	**Min. Thickness (in mm)**
1	Bituminous Macadam	25
2	Bituminous Base/Binder Course/DBM	50
3	Non-Bituminous Base Course/Wet Mix Macadam	250
4	GSB	200
5	Subgrade	500
	Total	**1025**

For Km 37 near Daragaon		
Sl. No.	**Pavement Composition**	**Min. Thickness (in mm)**
1	Bituminous Macadam	25
2	Bituminous Base/Binder Course/DBM	50
3	Non-Bituminous Base Course/Wet Mix Macadam	250
4	GSB	200
5	Subgrade	500
	Total	**1025**

(ii) Overlay over Subsurface drains: -

iv. Reconstruction of stretches

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

Sl. No.	Stretch	Remarks
1.	KM 39.480 to 39.540 (approx.)	60m in length (approx.)
2.	KM 36.990 to 37.035 (approx.)	45 m in length (approx.)

Note 1 - The above length/quantity mentioned in the table is tentative and minimum. The contractor must execute the length/ Quantity required as per the actual site condition in consultation with the Authority's Engineer/Authority and shall not constitute the Change of Scope.

Note 2: The Contractor shall adopt such work methodology ensuring that there shall be no damages to structures located outside ROW (either private or Govt. structures such as permanent or temporary building structures, sheds, utilities, trees, or other immovable structures) on account of construction and maintenance of the project highway. To avoid the above issues, it is clarified that the cost of the repair/damaged structures, failing outside the ROW, should be borne by the Contractor, wherever damages are on account of the Contractor. Further, it is Contractor's responsibility to retain video graphic and photographic records of structures at vulnerable areas.

6. Roadside Drainage

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

7. Design of Structures

i. General

(a) All bridges culverts and structures shall be designed and constructed in accordance with provision of the relevant Manual and shall conform the cross- sectional features another detail specified therein.

(b) The following structure shall be provided with footpaths:

Sl. No.	Bridge/Structure at km	Width of carriageway and cross-sectional features
Nil		

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

Provision of the Manual of Specifications and Standards for Two Lanning of Highways with Paved Shoulder IRC: SP: 73-2018 shall be followed.

(e) The following structures shall be designed to carry utility services specified in- NIL

(f) Cross-section of the new culverts and bridges at deck level for the Project Highway shall conform to the typical cross-sections given in provision of the relevant Manual.

ii. Culverts

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

Sl No.	Culvert Location	Span /Opening (m)	Remarks*
Nil			

(a) 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 provision of the relevant 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]
Nil			

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

Sl. No.	Culvert location	Size	Type of Culvert
	Nil		

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

Sl. No.	Location at km	Type of repair required
Nil		

(f) Floor protection works shall be Provided with Proper Drop and Guide as specified in the relevant IRC Codes and Specifications.

iii. Bridges

Existing bridges to be re-constructed/widened

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

Sl. No.	Bridge location	Salient details of existing bridge		Adequacy or otherwise of the existing waterway, vertical clearance etc.*	Remarks
	(km)	Type of Structures	Span Arrangement and Total Vent way (No. x Length) (m)		
Nil					

(ii) The following narrow bridges shall be widened:

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

(a) Additional new bridges

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

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

Sl. No.	Location at km	Remarks
Nil		

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

Sl. No.	Location at km	Remarks
Nil		

(d) Drainage system for bridge decks

An effective drainage system for bridge decks shall be provided as per section 7.20 of the Manual.

(e) Structures in marine environment

Nil

(i) Rail-road bridges

(a) Design construction and detailing of ROB/RUB shall be as specified in provision of the relevant Manual **Nil**

(b) Road over-bridges

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

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

(c) Road under-bridges

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

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

(ii) Grade separated structures

Refer provision of the relevant Manual

The grade separated structures shall be provided at the locations and of the type and length specified in paragraphs 2(ix) and3 of this Annex-I.

(iii) Repairs and strengthening of bridges and structures

The existing bridges and structures to be repaired/ strengthened and the nature and extent of repairs

/strengthening required are given below:

(a) Bridges

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

(b) ROB / RUB

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

(c) Overpasses/Underpasses and other structures

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

(vii) List of Major Bridges and Structures

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

Sl. No.	Location (Km)
Nil	

8. Traffic Control Devices and Road Safety Works

(i) Traffic control devices and road safety works shall be provided in accordance with provisions of relevant Manual.

(ii) Specifications of the reflective sheeting shall be as per Manual.

9. Retaining wall.

Sl no	Chainage	Length (in m) approx	Approximate Height (in m and minimum)	Remarks
1	KM 39.480 to 39.540 (approx.)	60	As per design/TCS	
2	KM 36.990 to 37.035 (approx.)	45	As per design/TCS	

Note: -

(a) The above length/Height/quantity mentioned in the table is tentative and minimum. The contractor must execute the length/Height/Quantity required as per the actual site condition in consultation with the Authority's Engineer/Authority and shall not constitute the Change of Scope.

10.1 Roadside Furniture

(i) Road side furniture shall be provided in accordance with article 8(i) of this schedule. -as per Manual.

11. Compulsory Afforestation

As per manual.

12. Hazardous Locations

As per site if any.

13. Scope of work:

The work shall be executed as per MoRT&H Specifications for Road and Bridge works (Fifth Revision) and other relevant updated IRC codes/ manuals. The details of the work proposed in this estimate for the entire project length are as follows.

Location Km 39.5 (approx.)

Stretch Length 60.0 m

Item Number	Description of Item					Quantity		Unit
	Member	Number	Length	Breadth	Height			
	Excavation							
1	Excavation in soil in hilly area by mechanical means including cutting and trimming of side slopes and disposing of excavated earth with all lifts and lead upto 1000 metres.							
					Total	**567.60**	Cum	Cum
	Structural fill							
2	Providing & Backfilling behind reinforced soil wall with available backfill material including all leads and lifts, including segregation, complete as per drawing and technical specification (Reference to MoRT&H's specification Clause 3100 and IRC:78 caluse 710.1.4) & 2200. (Backfill)							
					Total	**1773.75**	Cum	***Cum***
	Gabion							
3	Providing & making of Gabion structure of size (2x0.8x1)m with Mechanically Woven Double Twisted Hexagonal Shaped Wire meshGabion Boxes as per IS 16014:2012, MoRT&H's 5 th revision clause2500, of required size, Mesh Type 10x12(D=100 mm with tolerance of±2%), Zinc coated, Mesh wire diameter 2.7/3.7mm (ID/OD),mechanically edged/selvedged with partitions at every 1m intervaland shall have minimum 10 numbers of openings per meter of mesh perpendicular to twist, tying with lacing wire of diameter2.2/3.2mm(ID/OD), supplied @3% by weight of Gabion boxes, filled with boulders with least dimension of 200 mm, as per drawing, all complete as per directions of Engineer-in-charge.							
					Total	**403.20**	Cum	Cum

	Non-Woven Geotextile				
4	Providing and laying CE Marked Needle Punched and Mechanically Bonded Non-Woven Geotextile indigenously manufactured from high quality polypropylene staple fibres (continous filament will not be accepted) for separation, drainge and filtration application with necessary overlaps as per the specifications with prior approval of concerned Superitending Engineer and as directed by Engineer-in-Charge.				
		Total	**855.53**	sqm.	sqm.
	Geogrid Unit				
5	Supplying and laying of CE marked Knitted and proprietary coated Polyester Uniaxial TechGrid for Soil Reinforcement indigenously manufactured from selected high tenacity polyester yarn with high molecular weight (> 25000 g/mol), and low carboxyl end group (<30mmol/kg) (extruded PP geogrids & Polyester strips & Geo strips, Steel Strips not allowed & not accepted). Requirement of geogrid strength in both direction and granular fill. (Specification: IRC:SP:59-2002 & MORTH Section-700) with necessary overlaps as per the specifications with prior approval of concerned Superintending Engineer and as directed by Engineer-in-Charge				
	Tech Geogrid 500-Ultimate Tensile Strength- 500kN/m				
		Total	**2904.00**	Sqm	Sqm
	12.7 mm LRPC Strand				
6	Supplying, binding, fixing etc. including initial straightening, cutting to requisite length, hooking and bending to correct shape, placing in proper position of uncoated HYSD reinforcement bar in super-structure complete as per drawing and technical specifications (Reference to MORT&H's specification 1600) .				
		Total	**426.14**	Kg	Kg
7					

	Drainage Composite			
	Supplying & laying of CE marked drainage composite for use behind walls/ slopes, between two different fills, alongside drains of road, below concrete lining of canals etc. having thermo bonding a draining core - HDPE geonet stabilized by carbon black comprises of two sets of parallel overayed ribs integrally connected to have a rhomboidal shape with nonwoven geotextile that will be working as separation or protecting layer, geocomposite having in plane flow capacity of 0.55 L / (m.s) at hydraulic gradient of 1.0 & 100 kPa pressure and tensile strength of 16 kN/m , with mass per unit area of 710 gsm, at easily accessible location including top and bottom, with all leads and lifts, manpower and machinery, materials, labour etc. complete and as directed by Engineer - In - Charge.			
		Total	**330.00** Sqm	Sqm
	Techslope mesh (65/3.0)			
8	Supply and installation of high tensile wire mesh consisting wire dia 3 mm having minimum tensile strength of 160 KN/m and bearing resistance for puncturing/ bursting strength should be 100 KN and shouldn't pass a stone size of 75 mm dia through mesh opening. The tensile strength of wire should be 1770 N/ sqmm having with Zn Coating Class A or 95% Zn + 5% Al Class-B Coating as per ISO 7959-2 for treatment of slopes, including all cost of material (net, boundary rope & rope anchor etc. comprising the complete system), labour, special labour and T&P required to complete the work in all respect in accordance with drawings, Technical Specifications and as per the direction of Engineer-In-Charge. Product Manufacturer shall have in-house test facility for conducting longitudinal tensile strength and puncturing resistance test and shall be responsible for carrying out both test (Longitudinal tensile strength and puncturing resistance) during PDI per lot in presence of representative/s of E-I-C on his own expenses.			
		Total	**4692.00** Sqm	Sqm
9				

	Supply and installation of Self driven rock anchor made of 40CR material with outer dia of 38 mm and inner dia of 19 mm, Yield Load Carrying Capacity of minimum 400 KN in soil/ overburden/ rock suitable for drilling, placing and cement grouting. Installation with all accessories such as 76 mm dia dril bit, couplers, 10 mm thick base plate and nut and bolt complete in all respect but excluding the cost of cement grouting which will be paid extra as per relevant BOQ item.				
		Total	**12085.90**	Rm	Rm
10	Providing weep holes in Brick masonry/Plain/ Reinforced concrete abutment, wing wall/ return wall with 100 mm dia AC/PVC/HDPC pipe, extending through the full width of the structure with slope of 1V :20H towards drawing foce. Complete as per drawing and Technical Specifications (Reference to MORT&H's specifications 2706 & 2200).				
		Total	**336.00**	Rm	Rm
11	Providing and installing sub-surface drainage pipes- Perforated PVC pipe (Lined with Non-woven Geotextile) of 75 mm internal diameter as per the drawings etc. complete including the cost of drilling and as directed by Engineer-In-Charge.				
		Total	**103.40**	Rm	Rm
12	***Loose Scaling*** Scaling of rock chunk lying on the slope i/c all cost of machinaries, cost of crackamite powder if required, making the ramp i/c all cost of labour, material, breaking of rock piece using breaker and disposal of muck within a lead of 5.00 km as per drawings, Technical Specifications and direction of Engineer-In-Charge.				
		Total	**114.64**	cum	cum
13	***Vegetation Removal***				

	Clearing and grubbing road land including uprooting rank vegetation, grass, bushes, shrubs, saplings and trees girth up to 300 mm, removal of stumps of trees cut earlier and disposal of unserviceable materials and stacking of serviceable material to be used or auctioned, up to a lead of 1000 metres including removal and disposal of top organic soil not exceeding 150 mm in thickness. (Reference to MoRT&H's specification clause 201) By Manual Means. In area of light jungle.				
		Total	**1113.00**	Sqm	Sqm
	PCC M20				
14	Plain/Reinforced cement concrete in open foundation complete all including vibrating and compacting, finishing, curing, sampling, testing etc. as per drawing and Technical Specifications (Reference to MORT&H's specifications 1500, 1700 & 2200).				
	PCC Grade M20	**Total**	**18.78**	Cum	Cum
15	PCC 1:3:6 in Foundation cum 781.40 Plain cement concrete of 1:3:6 nominal mix with crushed stone aggregate 40 mm nominal maximum size mechanically mixed, placed in foundation and compacted by vibration including curing for 14 days as per the requirements of MORT&H's specification 1704.3.				
	PCC Grade M10	**Total**	**61.20**	Cum	Cum
16	Plain Cement concrete in open foundation complete as per Drawing and Technical Specification …….etc. PCC Grade M15				
		Total	**13.50**	Cum	Cum
17	Construction of Subgrade and Earthen Shoulders				

	Construction of sub-grade and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2 (Reference to MoRT&H's specification clause 305).				
		Total	**186.00**	Cum	Cum
18	By Mix in Place Method Construction of granular sub-base by providing graded materials such as natural sand/crushed gravel/crushed stone/combination depending upon the required grading , spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator and compacting with vibratory roller to achieve at least 98% of the maximum dry density for the material determined as per IS:2720 (Part 8), complete as per clause 401 desired density, complete as per clause 401 1B(v) Rate per cum for grading-V Material				
		Total	**37.20**	Cum	Cum
19	By Mix in Place Method Construction of granular sub-base by providing graded materials such as natural sand/crushed gravel/crushed stone/combination depending upon the required grading , spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator and compacting with vibratory roller to achieve at least 98% of the maximum dry density for the material determined as per IS:2720 (Part 8), complete as per clause 401 desired density, complete as per clause 401 1B(iii) Rate per cum for grading-III Material				
		Total	**37.20**	Cum	Cum
20	Wet Mix Macadam				

	Providing, laying, spreading and compacting graded stone aggregate conforming to the grading of table 400-13 revised vide table 2 of IRC : 109(2015) to wet mix macadam specification including premixing the Material with water at OMC in mechanical mix plant carriage of mixed Material by tipper to site ,laying in uniform layers with paver insub- base / base course on well-prepared surface and compacting with vibratory roller to achieve the desired density .The thickness of a single compacted layer shall not be less than 75 mm.(Reference to MoRT&H's specification 406.				
		Total	**93.00**	Cum	Cum
21	Providing and applying primer coat with bitumen emulsion on prepared surface of granular base including clearing of road surface and spraying primer at the rate of 0.60 Kg/sqm ……..etc.				
		Total	**372.00**	Sqm	Sqm
22	Providing and laying Dense Graded Bituminous Macadam with Continuous Type HMP (40-60 TPH) using crushed aggregates of specified grading premixed with bituminous binder .etc.				
		Total	**19.53**	Cum	Cum
23	Providing and laying 25 mm thick Mastic Asphalt wearing course with paving grade bitumen meeting the requirements given in table 500-29,……..etc.				
		Total	**390.60**	Sqm	Sqm
24	Road Marking with Hot Applied Thermoplastic Compound with Reflectorising Glass Beads …….etc.				
		Total	**18.00**	Sqm	Sqm
25					

	Supplying & fixing of Raised Pavement Marker (CATS EYE) confirm to ASTN D 4280 , body of the marker will be moulded from polycarbonate. The Marker double sided lens YELLOW / WHITE /RED colour. Dimension : 20m height,130mm width and 105 mm length , 3 M make.				
		Total	**22.00**	Nos.	Nos.
26	Road Delineators Supplying and installation of delineators (road way indicators, hazard markers, object markers), 80-100 cm high above ground level, painted black and white in 15 cm wide strips, fitted with 80 x 100 mm rectangular or 75 mm dia circular reflectorised panels at the top, buried or pressed into the ground and conforming to IRC-79 and the drawings (Reference to MORT&H's specification 806).				
		Total	**10.00**	Nos.	Nos.
27	Supplying & fixing Aluminium Flexible Prismatic Sheeting (AFP) consisting of non-metallic prismatic lenses that are formed in a transparent...etc.				
		Total	**2.10**	Sqm	Sqm
28	Median Marker made up of tough, impact resistant thermoplastic body, reflectorised on both sides using approximate, 85 X 85 mm…etc.				
		Total	**15.00**	Nos.	Nos.
29	Painting two coats, after filling the surface & applying a sealing primer, with synthetic enamel paint in all shades on new plastered concrete surfaces as per MORT7H's specification 803.6.2.(Reference to MORT&H's specification 803).				
		Total	**96.00**	Sqm	Sqm

Location near KM 37(Approx)

ii) Valley side restoration work at 37.00 km near Daragaon Devi Mandir of NH-55 (New NH-110) on EPC Mode in the State of West Bengal under N.H.Division-IX, During the Year 2024-25.

Abstract					
Sl.no.	**Description of items**	**Unit**	**Quantity**		
1	Earth work in excavation of foundation of structures as per drawing and technical specification, including setting out, construction of shoring and bracing, removal of stumps and other deleterious matter, dressing of sides and bottom……..etc.				
	Ordinary soil				
	Manual Means (Depth up to 3.00 m)				
		M^3	90.00		
2	**Dismantling** of Flexible pavement and disposal of dismantled materials up to a lead of 100 metres, ……..... etc.				
	By Manual Means (Bituminous courses.)				
	Manual Means (Depth up to 3.00 m)				
		M^3	54.00		
3	**Dismantling** of existing structure like culvert, bridges, retaing wall and other structure comprising of masonry, cement concrete ……..etc.				
	Rubble stone masonry in cement mortar.				
	Manual Means (Depth up to 3.00 m)				
		M^3	364.500		

4	**PLUM CONCRETE (1:3:6)**				
	Plain cement concrete of nominal mix (1:3:6) with coarse aggregates of which stone boulders of size 225 mm to 150 mm ……etc.				
		M^3	1045.50		
5	Plain cement concrete 1:3:6 nominal mix in foundation with crush stone aggregate 40 mm nominal size mechanically mixed ……etc.				
		M^3	220.50		
6	Plain Cement concrete in open foundation complete as per Drawing and Technical Specification …….etc.				
	PCC Grade M15				
		M^3	129.66		
7	**Back filling** behind abutment, wing wall and return wall complete as per drawing and Technical Specification …….….etc.				
i)	**Departmental Boulder**				
		M^3	218.70		
ii)	**Fresh Boulder**				
		M^3	1091.300		
8	Providing weep holes in brick masonary/plain/reinforced concrete abutment, wing wall/return wall with 100 mm AC pipe, extending through the full width of the structure …….etc.				
		Nos	615.00		
9	**Construction of Subgrade and Earthen Shoulders**				
	Construction of **sub-grade** and earthen shoulders with approved material obtained from borrow pits with all lifts & leads, transporting to site, spreading, grading to required slope and compacted to meet requirement of table No. 300-2 (Reference to MoRT&H's specification clause 305).				
		M^3	90.00		
10	**By Mix in Place Method**				
	Construction of granular sub-base by providing graded materials such as naturalsand/crushed gravel/crushedstone/combination depending upon the required grading , spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator and compacting with vibratory roller to achieve at least 98% of the maximum dry density for the				

	material determined as per IS:2720 (Part 8), complete as per clause 401 desired density, complete as per clause 401				
	1B(v) Rate per cum for grading-V Material				
		M^3	18.00		
11	**By Mix in Place Method**				
	Construction of granular sub-base by providing graded materials such as naturalsand/crushed gravel/crushedstone/combination depending upon the required grading , spreading in uniform layers with motor grader on prepared surface, mixing by mix in place method with rotavator and compacting with vibratory roller to achieve at least 98% of the maximum dry density for the material determined as per IS:2720 (Part 8), complete as per clause 401 desired density, complete as per clause 401				
	1B(iii) Rate per cum for grading-III Material				
		M^3	18.00		
12	**Wet Mix Macadam**				
	Providing, laying, spreading and compacting graded stone aggregate conforming to the grading of table 400-13 revised vide table 2 of IRC : 109(2015) to wet mix macadam specification including premixing theMaterial with water at OMC in mechanical mix plant carriage ofmixed Material by tipper to site,laying in uniform layers withpaver insub- base / base course on well-prepared surface and compacting with vibratory roller to achieve the desired density .The thickness of a single compacted layer shall not be less than 75 mm.(Reference to MoRT&H'sspecification 406.				
		M^3	45.00		
13	Providing and applying **primer coat** with bitumen emulsion on prepared surface of granular base including clearing of of road surface and spraying primer at the rate of 0.60 Kg/sqm …….etc.				
		M^2	180.00		
14	Providing and applying tack coat on the prepared surface……etc.				
		M^2	180.00		
15	Providing and laying **Dense Graded Bituminous Macadam with Continuous Type HMP (40-60 TPH)** using crushed aggregates of specified grading premixed with bituminous binder ..etc.				
		M^3	18.90		
16					
	Providing and laying 25 mm thick **Mastic Asphalt** wearing course with paving grade bitumen meeting the requirements given in table 500-29,……..etc.				

		M^2	367.50		
17					
	Road Marking with Hot Applied Thermoplastic Compound with Reflectorising Glass Beads ……etc.				
		M^2	15.750		
18					
	Supplying & fixing of **Raised Pavement Marker (CATS EYE)** confirm to ASTN D 4280 , body of the marker will be molded from polycarbonate. The Marker double sided lens YELLOW / WHITE /RED colour. Dimension : 20m height,130mm width and 105 mm length , 3 M make.				
		Nos	18.000		
19					
	Painting two coats, after filling the surface & applying a sealing primer, with synthetic enamel paint in all shades on new plastered concrete surfaces as per MORT7H's specification 803.6.2.(Reference to MORT&H's specification 803).				
		M^2	50.16		

The above quantities are minimum to be executed and may exceed as per site requirement. Any increase in the height and quantity as per the site requirement shall not be considered as positive change of scope. The design *of the retaining structure and associated works* ***must be proof checked either*** *by* ***THDC India Limited, NIRM,*** *or* ***IIT*** *to ensure compliance with applicable standards and specifications*

14.CHANGE OF SCOPE

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

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

It is to note that the project explicitly permits the utilization of unused quantities from one location to another or swapping of quantities under this package. It is to emphasize that in such cases, neither the de-scoping of work nor COS shall be required, as per the project provisions.

(Schedule B-1)

1. The shifting of utilities and felling of trees shall be carried out by the Contractor. The cost of the same shall be borne by the Authority. The details of utilities are as follows:

Sr. No	Type of Utility	Unit	Quantity	Location/stretch (LHS/RHS)
A	~~Electrical Utilities~~		NA	
A1	~~Electrical Poles~~	Nos.	NA	
A2	~~Electrical cables~~	meters	NA	
A3	~~Transformers~~	Nos.	NA	
-	~~------~~	--	NA	
-	~~-------~~	--	NA	
B	~~Water/Sewage~~		NA	
	~~pipeline~~		NA	
B1	~~Sewage~~	meters	NA	
B2	~~Water supply~~	meters	NA	
-	~~-------~~	--	NA	
-	~~———~~	--	NA	
C	~~Felling of Tress~~	Nos.	NA	

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) Roadside furniture; as per schedule B

(b) ~~pedestrian facilities;~~

(c) ~~tree plantation;~~

~~(d) Other to be specified~~

2 Description of Project Facilities

Each of the Project Facilities is described below:

S. No.	Project Facility	Location	Design Requirements	Other essential details
NIL				

Note: Provide adequate details of each Project Facility to ensure their design and completion in accordance with the project-specific requirements and the provisions of the Manual.

SCHEDULE - D

(See Clause 2.1)

SPECIFICATIONS AND STANDARDS

1 Construction

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

2 Design Standards

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

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

IRC-37-2018 or latest: Guidelines for the design of flexible pavement.

Code for Practice of Road Signage- Latest IRC 67

Hill Road Manual IRC SP 48:2023 or latest should be referred.

Geotextiles: MoRTH 620, IRC: SP:91

Concrete Works (PCC/RCC): MoRTH 1500, 1700, 2100

Excavation & Backfilling: MoRTH Specifications 301, IRC:78

Weep Holes: MoRTH 2706

Road Delineators: MoRTH 806, IRC:79

Anchoring & Grouting: MoRTH 2200

Annex- I

TECHNICAL SPECIFICATIONS

1. Specifications and Standards

The following specification may also be adopted;

1. NAILING

1.1 General

This specification deals with permanent nails and shall be read in conjunction with the conditions of contract and the Specification for Excavation. The Contractor shall comply fully with the requirements of this specification in the design, erection and installation of nails.

Here the nailing will be done through the Existing Gabion Wall or through the Existing Hill Slope and then proposed mechanical connection arrangement shall be provided for proper load transfer between the soil nail and soil reinforcing polymeric strap of the reinforced steep slope at toe of hill slope. Soil nailing work will also be done through the existing hill slope above the existing toe wall or proposed reinforced steep slope. Similarly, the nailing works will be done through the Existing Gabion Wall at valley side road edge and below that through the existing valley slope.

This contract for soil nail work and reinforced soil structure is to be carried out by one single specialized agency or their subsidiary having capability and experience to design and execution of such projects in the past.

1.2 Scope of Works:

The contract comprises the provision of all labour, tools, plants, materials, transportation and all necessary equipment for the following works:
(a) Design, supply, install (including all material, grouting, mechanical connection system) and test of nails as part of a nail system.
(b) Any other incidental works necessary to ensure the safety and satisfactory performance of the nail system.

1.2.1. Responsibility of the Specialized Contractor

The Specialized Contractor shall be experienced in permanent nail design and execution and shall have equipment and manpower suitable for the work and available for the entire operation of the work. The Contractor shall be wholly responsible at all times for the safety of works. He shall instruct his workers and all other personnel about the danger zones during the construction works.

1.2.2. Reference Standards

FHWA: (FHWA0-IF-03-017) and Section 3200 of MORT&H (Fifth Revision), 2013

1.2.3. Submission by Specialized Contractor

The Contractor shall include in the submission of the tender, for the Engineer's review, details of his proposed soil nail with Assembly drawings. The Contractor's submission shall include the following information:

a) Nail layout
b) Nail design capacity
d) Grade and properties of the Nail
e) Method and details of drilling, Casing, if required, removal method to be adopted for drilling and grouting.
f) Grout cement type, strength, additives
g) Nail load, length, and bond diameter
h) Endorsement by the Contractor's Professional Engineer
i) Specification of the Polymeric Strap
j) Facing Details

The Contractor's submissions shall comply fully with the relevant recommendations of FHWA: (FHWA0-IF-03-017), the Contractor's submissions shall be in accordance with accepted principles of good engineering practice. It shall be the Contractor's responsibility to clearly itemize those matters.

The review of the Contractor's submission by the Engineer does not in any way absolve or reduce the duties and responsibilities of the Contractor to ensure the safety and adequacy of his works.

1.2.4. Nail Installation Method

Article 3202 under Section 3200 is to be replaced and following should be considered under NAIL INSTALLATION METHODS.

There are ever many drillings technique and tools that can be adopted for drilling holes : however, for this project only drill and grouted method shall be adopted, which is the most commonly used method worldwide for permanently stability. Basic requirement of proper or effective drilling for nail is deployment of suitable machines (appropriate combination of thrust, torgue, rotary speed per percussive forces and method) and skilled operator to ensure high quality installation and timely completion of the project.

While carrying out the drilling, following points must be ensured:

1. The drill diameter shall be as shown on detailed design and approved construction drawing.
2. Machines shall be capable of permitting continuous and straight penetration in material that invariably changes abruptly from some localized soft to extremely hard or rock strata, etc
3. The equipment used must be capable of providing a constant diameter, stable drilled hole, wholly and cleanly removing the debris.
4. Nail holes (drill holes) are drilled using one of several available drilling methods, including rotary, percussion, auger, and rotary/percussion drilling Rotary percussive drilling method using suitable top hammer or down the hole (DTH) hammer with proper drill bits (75mm to 300mm) to suit the types of materials can meet the above requirements.

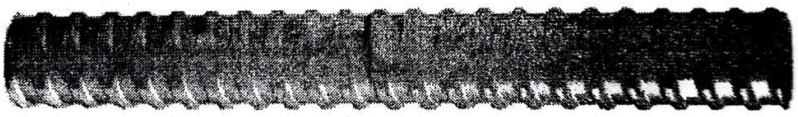
To ensure good performance and high pull-out strength of Nail, the hole has to be drilled and grouted immediately after drilling after inserting the reinforcement nail bar of desired minimum diameter and minimum strength inside the drilled hole for the desired minimum length as specified in drawing and to ensure effective length of the drilled hole just before grouting, an additional

drilled length of 0.25 m to the design nail length should be drilled to ensure the availability of minimum design length irrespective of presence of debris towards the bottom of the hole However, the nail length should remain same as per the design length.

1.2.5. Construction Materials

Nail Reinforcement

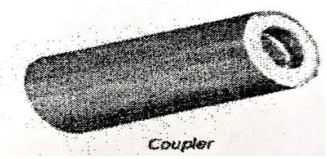
The Clause 3203.1 under Section 3200 of MORTR&I, Fifth Revision, 2013 shall be replaced and the following specifications shall be considered.
The main function of Nail reinforcement is to transfer load by tension when the whole nail lengths are bonded to the soil. Nail Reinforcements shall be high strength fully threaded Solid hot-dip galvanized Bars having minimum yield strength of 670Mpa and minimum ultimate strength 800Mpa. The delivered lengths of the deformed bar shall be continuous without splices or welds, new, straight, undamaged and hot dip galvanized. For permanent structures, the bar shall be hot-dip galvanized conforming to IS 4759: 1996 requirements, except that the average zinc coating weight on the outer surface is not less than 500gm/m2(equivalent thickness of 70 microns). If the required length is more than available length, then the bars can be joined together using galvanized couplers. Nail shall be free from dirt and soil. Excessive force shall not be allowed in inserting the Nail. In case of insertion condition as refusal, the nail shall be withdrawn and reinserted after re-drilling the drilled hole. The detailed specification is as follows:



Nominal Diameter	Grade	Cross Section mm2	Yield Load (KN)	Ultimate Load (KN)	Elongation Min. Agta (%)	Elongation Min A10d (%)
28	St 670/800 (grade 97)	616	412	492	5	7

Bar Coupler

Bar coupler if required, shall develop full ultimate tensile strength of the bar as certified by the manufacturer.



Nail Head Coupler

Clause No. 3203.2 as given under Section 3200 of MORT&H Specification, Fifth Revision 2013 shall be followed.

Nail Grout

The Clause 3203.3 under Section 3200 of MORTR&H, Fifth Revision, 2013 shall be replaced and the following specifications shall be considered.

Grout should be injected by tremie pipe inserted to the bottom of the drill-hole, to ensure that the grout evenly and completely fills the hole from the bottom to the surface without air voids. The

grout should flow continuously as the tremie pipe is withdrawn. The withdrawal rate should be controlled to ensure that the end of the tremie pipe is always below the grout surface. A record of the volume of grout placed should be maintained.

Grouting should be done with a neat cement grout with non-shrink admixture or flyash/sand/cement mixture with the water-cement ratio typically ranging from 0.40-0.50 and a minimum 3-day compressive strength of 10.0 Mpa and a minimum 28-day compressive strength of 20 Mpa) is used to fill up the voids in the drilled hole. This strengthens the ground immediately adjacent to the drilled hole, enhances the bond strength and protects the bar against the corrosion. Grouting shall be carried out immediately after the drilling and insertion of Nail, unless otherwise approved by the Engineer as per the local working condition. If in any case grouting is done afterwards, then un-grouted drilled hole left overnight shall be protected with PVC pipe or for drilled hole that have been left un-grouted for too long or left overnight should be re-drilled.(larger by 15% longer) and flushed clean again by compressed air just before grouting. PVC Centralizers are used at suitable spacing on the Nail to ensure uniform annular space for grouting around the nail.

Centralizers

Clause No. 3203.4 as given under Section 3200 of MORT&H Specification, Fifth Revision 2013 shall be as followed.

Admixture

Admixtures that control bleed, improve flow ability, reduce water content, and retard setting time shall be used in the grout subject to review and acceptance by the engineer.
Accelerators are not permitted. Expansive admixtures shall only be used in grout used for filling sealed encapsulations.

1.2.6. Method Statement for Construction Operations:

Prior to commencement of works, the Contractor shall submit to the Engineer a detailed method statement, for the installation of soil nails. For the purpose of this Clause, the method statement shall be a document containing
a) A detailed construction sequence
b) Proposed drilling method
c) Proposed installation method
d) Material, plant and labour requirements at each construction stage.
e)Shop drawings showing, among other things, details of all special requirements for the construction activities.
f) Methods of testing.

During the execution of the works, the Engineer shall require the Contractor to submit detailed method statements of all the construction operation. If requested by the Engineer, the Contractor shall submit, within such times and in such detail as the Engineer may reasonably require, such information pertaining to the methods of construction (including the use of construction plant) which the Contractor proposes to use, and such calculations of the stresses and deflections that will arise in the permanent works or any part the re of during construction from the use of such methods, as will enable the Engineer to decide whether the permanent works can be executed with safety and in accordance with the contract if the methods are adhered to, and without detriment to the permanent works when completed.

The Engineer shall inform the Contractor in writing within 14days after receipt of the Contractor's method statement either:

a) That the Contractor's proposed methods have the consent of the Engineer, **or**

b) In what respect, in the opinion of the Engineer, the proposed methods fail to meet the requirements of the contract.

1.2.7. Geotechnical Aspects

Soil Investigation and Bond Strength as given under Clause 3206.1 and 3206.2 of Section 3200 of MORT&H Technical Specification, Fifth Revision, 2013 shall be followed.

Load Testing

The load test shall be conducted as per clause no 3210 of specifications for road and bridge works of ministry of road transport & highways fifth revision, 2013.

Measurement for Payments

The length of soil nail delivered and installed at site shall be considered for the measurement of payments of Nailing Works including all the different associated activities as mentioned above.

1.3. REINFORCED SOIL WALL/SLOPE

Since the proposed slope of the newly added Selected Reinforced fill on valley side is 65deg with horizontal, so the design and construction of the reinforced fill shall be generally as per the guidelines given for Reinforced Soil Slope under Clause No. 3107 of Section 3100 of MORT&H Technical Specification, Fifth Revision 2013 and specifically as per this specification.

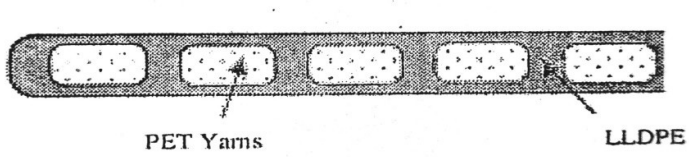
1.3.1. Reinforced Soil wall/ slope

Reinforced soil wall/ slope works shall consist of any part of permanent works comprising of construction of internally stabilized soil mass, built in layers, duly compacted with specific fill requirements as per specialized system provider's design, with reinforcing elements of designated grades and design strengths.

1.3.2. Soil Reinforcing Element

The soil reinforcing element shall be made of polyester material in the form of strip or strap co-extruded with Linear Low-Density Polyethylene (LLDPE). The material used as soil reinforcing element for the construction of the reinforced soil slope shall meet all the requirement in Clause 3103.7 under Section 3100 of MORT&H Technical Specification, Fifth Revision, 2013. Reinforcing Element will be directly connected to the Facia with mechanical / positive connector. The Long-Term Design Strength (LTDS) of the soil reinforcing element shall be 100kN per meter width of the reinforced soil structure. No other type of reinforcement like PVC/Latex/ Bitumen coated / HDPE geogrids, or mesh or sheet type shall be allowed to use.

The Polyester Strap used as soil reinforcing element shall be 50mm wide strap with trapezoidal groove-like rib (lateral teeth) on both side of the strap. The strap consists of discrete channels of closely packed high tenacity polyester fibres respectively encased in a Linear Low Density Polyethylene sheath (LLDPE) as shown in the figure.



The technical data for the strap shall be as under:

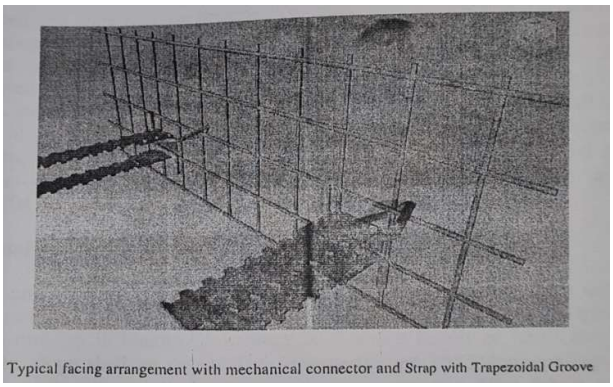
Grade		Width	Tolerance	Characteristics Strength
		mm	mm	KN
Polymeric Strap	25	50	+/-0.50	25.0
	37.5	50	+/-0.50	37.50
	50	50	+/-0.50	50.0
	65	50	+/-0.50	65.0

1.3.3. Selected Reinforced Fill Material

The Fill Material for the Reinforced Soil Slope shall be as per the guidelines given in Clause 3107.2 under Section 3100 of MORT&H Technical Specification, Fifth Revision, 2013. However, the friction angle of the fill material in this case shall not be less than 34 deg.

1.3.4. Facing for Reinforced Soil Slope

The facing shall be "Metallic Facing" in the form of prefabricated fusion welded metal (steel)grid/mesh made of appropriate aperture sized grid with proper galvanized steel bars of nominal diameter as 8mm and 12mm with galvanization of 500 grams per sqm or equivalent thickness of 70 microns. The general specification for the materials used for above facing type shall be as per Clause 3105.1.5 under Section 3100 of MORT&H Technical Specification, Fifth Revision, 2013. In this regard the Clause No. 3107.5 under Section 3100 of MORT&H Technical Specification, Fifth Revision, 2013 will also be followed.


Typical facing arrangement with mechanical connector and Strap with Trapezoidal Groove

1.3.5. Fill Material immediately behind the Metallic Facia

The Fill Material of 500mm thick immediately behind the Metallic Facia shall be with Stone or Rock Pieces of size 150 mm to 250 mm. This fill material used behind the facia shall be free from organic or other deleterious materials and shall not react adversely (chemically, electrically or biologically) with the reinforcement material and /or facia
material.

1.3.6. Non-Woven Geotextile Fabric Separator in Facing

To prevent the spilling of selected reinforced, backfill material, one layer of non-woven geotextile fabric of Type I (Severe Installation Condition) as mentioned in Section 700 of MORT&H Technical Specification, Fifth Revision, 2013 shall be used in wrapped around manner behind the above said 500 mm thick stone or rock filling between any two layers of backfill reinforcement all along total height of the reinforced slope.

1.3.7. Handling, Storage and Transporting

All elements shall be handled, stored and transported in such manner as to eliminate the danger of, fracture and excessive bending stresses. Elements in storage shall be supported on firm wooden / rubber blocks/pads placed adjacent to the Dowel bars to avoid bending.

1.3.8. Connection between the Facia and Reinforcement

Soil reinforcing element will be directly connected to the Facia with mechanical / positive connector. Since, the project site is located in high seismic zone, no other type of connection shall be allowed to use. As per the guidelines given in Clause No. 3107.4 under Section 3100 of MORT&H Technical Specification, Fifth Revision, 2013, the connection between facia and reinforcement in the reinforced soil slope shall satisfy the design requirement.

1.3.9. Chimney Drain

Chimney Drain of 600 mm thick with stones or gravel of size 20 mm to 40 mm behind reinforced soil zone shall be provided for entrapping of seepage / subsurface water from 150 mm dia PVC semi-perforated drainage pipe wrapped with minimum 160 gsm Type) non-woven geotextile filter fabric. The Non-woven Geotextile Filter Fabric of Type I grade (Severe Installation Condition)as mentioned in Section 700 of MORT&H Technical Specification, Fifth Revision, 2013 considering shall be given on both (reinforced soil side and nailed existing slope side) surface of granular chimney drain as mentioned above. The aggregate drain may be replaced with geo-composite drain as per the provision of MORT&H Technical Specification, Fifth Revision, 2013.

1.3.10. PVC Semi perforated Drainage Pipe

For draining out subsurface water both from the existing slope surface and also from the reinforced backfill slope the PVC semi-perforated drainage pipe of 150 mm Dia at spacing of 1000 mm c/c in longitudinal direction at every bench or berm level of multi tire reinforced slope shall be given. The semi-perforated PVC drainage pipe is also to be wrapped with minimum 160 gsm non-woven geotextile filter fabric of Type I grade (Severe Installation Condition) as mentioned in Section 700 of MORT&H Technical Specification, Fifth Revision, 2013.

1.3.11. Connection between the Soil Nailing and Backfill Soil Reinforcement

The Soil Nails shall be connected with the Backfill Soil Reinforcement mechanically for proper load transfer from Nail to Polymeric Strap and vice versa.

1.3.12. Laying and Compaction

It shall be as per the Clause no. 3107.6 under Section 3100 of MORT&H Technical Specification, Fifth Revision, 2013.

1.3.13. Measurement for Payments

The measurement for payment shall be made as per the BOQ item defined in the SBD as under;

- Polymeric Strap: This shall be measured in running meter length of the Strap supplied and installed at site including the cost of the mechanical connectors between facia and the strap.
- Steel mesh facing: The facing shall be measured in sqm of the steel mesh supplied and installed at site.
- Non-woven geotextile: This shall be measured in sqm of the geotextile supplied and installed at site.

1.4. Erosion Control Mat

Erosion control mat as mentioned in Clause No. 706 under Section 700 of road and bridge works of Ministry of Road Transport & Highways Fifth Revision, 2013shall be followed.

1.4.1.Measurements for Payments

This shall be measured in sqm of the geotextile supplied and installed at site.

1.5. Construction

i. Excavate Initial Cut

Excavations shall be in accordance with the requirements of General and Special Specifications.

a. Foundation Preparation

The foundation shall be graded level for a width equal to or exceeding the length of reinforcing element or as shown on the drawings. Prior to construction, the foundation shall be compacted with a smooth wheel vibratory roller or plate compactor. Any foundation soils found to be unsuitable shall be removed and replaced with compacted suitable material to the satisfaction of Engineer as per relevant specification of MORT&H, Fifth Revision, 2013

ii. Drill Hole for Nail

Nail holes are drilled at predetermined locations to a specified length and inclination using a drilling method appropriate for the ground conditions. Drilling methods include both uncased methods for more competent materials (rotary or rotary percussive methods using air flush, and dry auger methods) and cased methods for less stable ground (single tube and duplex rotary methods with air or water flush, and hollow stem auger methods) following technical specification of Nailing as stated before.

iii. Install and Grout Nail

Drilling is done first and then the Nail of required length is inserted and grouted immediately to avoid any possible collapse following technical specification of Nailing as stated before.

iv. Drainage

Drainage shall be very strictly followed as per drawing and relevant specifications of MORT&H, Fifth Revision, 2013 in detail.

v. Laying and Compaction

Backfill placement shall follow closely the erection of each lift. At each reinforcing element level, backfill should be roughly levelled before placing and connecting the reinforcing elements. Reinforcing elements shall be placed as shown on the drawings. The maximum layer thickness shall not exceed 200 mm. The Contractor shall decrease this thickness if that is necessary to obtain the specified density.

Where the available bed width is less than 2m, well graded gravels shall be used as backfill materials and compaction shall be carried out mechanically by using plate compactor.

At the end of each day's operation, the Contractor shall shape the last level of backfill asto permit runoff of rainwater away from the wall face. Backfill shall be compacted in accordance to the project specifications for embankment to a minimum required compaction of 95% of modified proctor density in the entire width between the facing and the existing slope, except up to 1.5m from the rear face of facing, where the required compaction shall be minimum 90 % of maximum density and shall determine by the standard test and that the moisture content shall be plus or minus 2% of the optimum Moisture Content as determined. Compaction in a strip of the 1.5 meter wide adjacent to the backside of the wall facing shall be achieved by the use of a manually operated vibrating compactor, such that adverse edge stresses are not transferred to the facing during construction.

vi. Repeat Process to Final Grade

The sequence of excavation, drilling, installation of Nail and grouting, laying of soil reinforcement, mechanically connecting the soil reinforcement with the back mesh and facing, and backfill compaction is repeated until the final grade is achieved.

Schedule – E

(See Clause 2.1 and 14.2)

MAINTENANCE REQUIREMENTS

1. Maintenance Requirements

1.1. The Contractor shall, at all-time 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 "SPECIFICATIONS FOR ROAD AND BRIDGE WORKS (FIFTH REVISION, April 2013)", including latest corrections slips, issued by the Ministry of Surface Transport & Highways, Government of India and the relevant IRC publications. Where the specifications for a work are not given, Good Industry Practice shall be adopted.

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: SP:35. 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.

Table -1: Maintenance Criteria for Pavements: -

Asset Type	Performance Parament	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specification
		Desirable	Acceptable					
Flexible Pavement (Pavement of MCW, Service Road, approaches	Potholes	Nil	< 0.1 % of area and subject to limit of 10 mm in depth	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC 82: 2015 and Distress Identification Manual for Long Term Pavement Performance Program, FHWA 2003 (http://www.tfhrc.com/pavement/lttp/reports/03031/)	24-48 hours	MORT&H Specification n 3004.2

Asset Type	Performance Para meter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specification
		Desirable	Acceptable					
s of Grade structure, approaches s of connecting roads, slip roads, lay byes etc. as applicable)	Cracking	Nil	< 5 % subject to limit of 0.5 sqm for any 50 m length	Daily			7-15 days	MORT&H Specification n 3004.3
	Rutting	Nil	< 5 mm	Daily	Straight Edge		15 -30 days	MORT&H Specification n 3004.2
	Corrugation ns and Shoving	Nil	< 0.1 % of area	Daily	Length Measurement t Unit like		2-7 days	IRC:82-2015

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
	Bleeding	Nil	< 1 % of area	Daily	Scale, Tape, odometer etc.		3-7 days	MORT&H Specification 3004.4
	Raveling / Stripping	Nil	< 1 % of area	Daily			7-15 days	IRC:82-2015 read with IRC SP 81
	Edge Deformation/ Breaking	Nil	< 1 m for any 100 m section and width < 0.1 m at any locatio	Daily			7- 15 days	IRC:82-2015

			n, restricted					

Asset Type	Performance Parament er	Level of Service (LOS)		Frequency of Inspect ion	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectificatio n/ Repair	Maintenance Specifications
		Desirable	Acceptable					
			d to 30 cm from the edge					
	Roughness BI	2000 mm/ km	2400 mm/km	Bi- Annually	Class I Profilometer SCRIM (Sideway- force Coefficient Routine Investigation Machine or equivalent)	Class I Profilometer: ASTM E950 (98) :2004 –Standard Test Method for measuring Longitudinal Profile of Travelled Surfaces with Accelerometer Established Inertial Profiling Reference ASTM E1656 -94: 2000- Standard Guide for Classification of Automatic Pavement Condition Survey Equipment	180 days	IRC:82-2015
	Skid Number	60 SN	50SN	Bi- Annually			180 days	BS: 7941-1: 2006
	Pavement Condition Index	3	2.1	Bi- Annually			180 days	IRC:82-2015

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
	Other Pavement Distresses			Bi-Annually			2-7 days	IRC:82-2015
	Deflection/ Remaining Life			Annually	Falling Weight Deflectometer	IRC 115: 2014	180 days	IRC:115-2014
Rigid Pavement (Pavement of MCW, Service Road, Grade structure,	Roughness BI	2200mm/km	2400mm/km	Bi-Annually	Class I Profilometer	ASTM E950 (98) :2004 and ASTM E1656 - 94: 2000	180 days	IRC:SP:83-2008
	Skid	Skid Resistance no. at different speed of vehicles		Bi-Annually	SCRIM (Sideway-force	IRC:SP:83-2008	180 days	IRC:SP:83-2008

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
approaches of connecting roads, slip roads, lay byes etc. as applicable)		Minimum SN	Traffic Speed (Km/h)		Coefficient Routine Investigation Machine or equivalent)			
		36	50					
		33	65					
		32	80					
		31	95					
		31	110					

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
Embankment/ Slope	Edge drop at shoulders	Nil	40mm	Daily	Length Measurement Unit like Scale, Tape, odometer etc.	IRC	7-15 days	MORT&H Specification 408.4
	Slope of camber/cross fall	Nil	<2% variation in prescribed slope of camber/cross fall	Daily			7-15 days	MORT&H Specification 408.4
	Embankment Slopes	Nil	<15 % variation in prescribe	Daily			7-15 days	MORT&H Specification 408.4

Asset Type	Performance Parameter	Level of Service (LOS)		Frequency of Inspection	Tools/Equipment	Standards and References for Inspection and Data Analysis	Time limit for Rectification/ Repair	Maintenance Specifications
		Desirable	Acceptable					
			side slope					
	Embankment Protection	Nil	Nil	Daily	NA		7-15 days	MORT&H Specification
	Rain Cuts/ Gullies in slope	Nil	Nil	Daily Specially During Rainy Season	NA		7-15 days	MORT&H Specification

In addition to the above performance criterion, the contractor shall strictly maintain the rigid pavements as per requirements in the following table Table -2:

Maintenance Criteria for Rigid Pavements:

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
CRACKING						
1	**Single Discrete Cracks Not intersecting with any joint**	w = width of crack L = length of crackd = depth of crack D = depth of slab	0	Nil, not discernible	No Action	Not applicable
			1	w < 0.2 mm. hair cracks		
			2	w = 0.2 - 0.5 mm, discernible from slow-moving car	Seal without delay	Seal, and stitch if L > lm.
			3	w = 0.5 - 1.5 mm, discernible from fast-moving car		Within 7days

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
			4	w = 1.5 - 3.0 mm	Seal, and stitch if L > l m. Within 7 days	Staple or Dowel Bar Retrofit, FDR for affected portion. Within 15days
			5	w > 3 mm.		
2	**Single Transverse(or Diagonal) Crack intersecting with one or more joints**	w = width of crack L = length of crackd = depth of crack D = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.2 mm, hair cracks	Route and seal with epoxy. Within 7 days	Staple or Dowel Bar Retrofit. Within 15days
			2	w = 0.2 - 0.5 mm, discernible from slow vehicle		
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route, seal and stitch, if L > 1 m. Within 7 days	

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
			4	w = 3.0 - 6.0 mm	Dowel Bar Retrofit. Within 15 days	Full Depth Repair Dismantle and reconstruct affected. Portion with norms and specifications - See Para 5.5 & 9.2
			5	w > 6 mm, usually associated with spalling, and/or slab rocking under traffic	Not Applicable, as it may be full depth	Within 15days
3	**Single Longitudinal Crack intersecting with one or more joints**	w = width of crack L = length of crackd = depth of crackD = depth of slab	0	Nil, not discernible	No Action	
			1	w < 0.5 mm, discernable from slow moving vehicle	Seal with epoxy, if L > 1 m. Within 7 days	Staple or dowel bar retrofit. Within 15days

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
			2	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route seal and stitch, if L > l m. Within 15 days	-
			3	w = 3.0 - 6.0 mm	Staple, if L > 1 m. Within 15 days	Partial Depth Repair with stapling. Within 15 days
			4	w = 6.0 - 12.0 mm, usually associated with spalling	Not Applicable, as it may be full depth	
			5	w > 12 mm, usually associated with spalling, and/or slab rocking under traffic		Full Depth Repair Dismantle and reconstruct affected portion as per norms and specifications -

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
						See Para 5.6.4 Within 15 days
4	**Multiple Cracks intersecting with one or more joints**	**w = width of crack**	0	Nil, not discernible	No Action	-
			1	w < 0.2 mm, hair cracks	Seal, and stitch if L > l m. Within 15 days	
			2	w = 0.2 - 0.5 mm. discernible from slow vehicle		
			3	w = 0.5 - 3.0 mm, discernible from fast vehicle	Full depth repair within 15 days	Dismantle, Reinstate subbase, Reconstruct whole slab as per specifications within 30 days
			4	w = 3.0 - 6.0 mm panel broken into 2 or 3 pieces		
			5	w > 6 mm and/or panel broken		

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
				into more than 4 pieces		
5	**Corner Break**	w = width of crack L = length of crack	0	Nil, not discernible	No Action	-
			1	w < 0.5 mm; only 1 corner broken	Seal with low viscosity epoxy to secure broken parts Within 7 days	Seal with epoxy seal with epoxy Within 7days
			2	w < 1.5 mm; L < 0.6 m, only one corner broken		
			3	w < 1.5 mm; L < 0.6 m, two corners broken	Partial Depth (Refer Figure 8.3 of IRC:SP: 83-2008) Within 15 days	Full depth repair
			4	w > 1.5 mm; L > 0.6 m or three corners broken		
			5	ree or four corners broken		Reinstate sub-base, and reconstruct the

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
						slab as per norms and specifications within 30days
6	Punchout (Applicable to Continuous Reinforced Concrete Pavement (CRCP) only)	w = width of crack L = length (m/m2)	0	Nil, not discernible		No Action
			1	w < 0.5 mm; L < 3 m/m^2	Not Applicable, as it may be full depth	Seal with low viscosity epoxy to secure broken parts. Within 15days
			2	either w > 0.5 mm or L < 3 m/m^2		
			3	w > 1.5 mm and L < 3 m/m^2		
			4	w > 3 mm, L < 3 m/m^2 and deformation		Full depth repair - Cut out and replace damaged area taking care not to damage reinforcement. Within 30days
			5	w > 3 mm, L > 3 m/m^2 and deformation		

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
Surface Defects						
7	Ravelling or Honeycomb type surface	r = area damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	**Short Term** No action.	**Long Term** Not Applicable
			1	r < 2 %	Local repair of areas damaged and liable to be damaged. Within 15 days	
			2	r = 2 - 10 %		
			3	r = 10-25%	Bonded Inlay, 2 or 3 slabs if affecting.	
			4	r = 25 - 50 %		

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
					Within 30 days	
			5	r > 50% and h > 25 mm	Reconstruct slabs, 4 or more slabs if affecting. Within 30 days	
8	**Scaling**	r = damaged surface/total surface of slab (%) h = maximum depth of damage	0	Nil, not discernible	**Short Term**	**Long Term**
					No action.	Not Applicable
			1	r < **2 %**	Local repair of areas damaged and liable to be damaged. Within 7days	
			2	r = 2 - 10 %		

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
			3	r = 10 - 20%	Bonded Inlay within 15 days	
			4	r = 20 - 30 %		
			5	r > 30 % and h > 25 mm	Reconstruct slab within 30 days	
9	**Polished Surface/Glazing**	t = texture depth, sand patch test	0		No action.	Not Applicable
			1	t > 1 mm		
			2 '	t = 1 - 0.6 mm	Monitor rate of deterioration	
			3	t = 0.6 - 0.3 mm		
			4	t = 0.3 - 0.1 mm		

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
			5	t < 0.1 mm	Diamond Grinding if affecting 50% or more slabs in a continuous stretch of minimum 5 km. Within 30 days	
10	**Popout (Small Hole), Pothole Refer Para 8.4**	n = number/m^2 d = diameterh = maximum depth	0	d < 50 mm; h < 25 mm; n < 1 per 5 m^2	No action.	Not Applicable
			1	d = 50 - 100 mm; h < 50 mm; n < 1 per 5 m^2	Partial depth repair 65 mm deep. Within 15 days	
			2	d = 50 - 100 mm; h > 50 mm; n < 1 per 5 m^2		

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case d < D/2	For the case d > D/2
			3	d = 100 - 300 mm; h < 100 mm n < 1 per 5 m^2	Partial depth repair 110mm i.e.10 mm more than the depth of the hole. Within 30 days	
			4	d = 100 - 300 mm; h > 100 mm; n < 1 per 5 m^2		
			5	d > 300 mm; h > 100 mm: n > 1 per 5 m^2	Full depth repair. Within 30 days	

Joint Defects						
11	**Joint Seal Defects**	loss or damage = Length as % total joint length	0	Difficult to discern.	**Short Term**	**Long Term**
					No action.	Not Applicable
			1	Discernible, L< 25% but of little immediate consequence with regard to ingress of water or trapping incompressible material.	Clean joint, inspect later.	
			3	Notable. L > 25% insufficient protection against ingress of water and trapping incompressible material.	Clean and reapply sealant in selected locations. Within 7 days	
			5	Severe; w > 3 mm negligible protection against ingress of water	Clean, widen and reseal the joint. Within 7 days	

				and trapping incompressible material.		
12	**Spalling of Joints**	w = width on either side of the joint L = length of spalled portion (as % joint length)	0	Nil, not discernible	No action.	Not Applicable
			1	w < 10 mm	Apply low viscosity epoxy resin/ mortar in cracked portion. Within 7 days	
			2	w = 10 - 20 mm, L < 25%		
			3	w = 20 - 40 mm, L > 25%	Partial Depth Repair. Within 15 days	
			4	w = 40 - 80 mm, L > 25%	30 - 50 mm deep, h = w + 20% of w, within 30 days	
			5	w > 80 mm, and L > 25%	50 - 100 mm deep repair. H = w + 20% of w. Within 30 days	
13	**Faulting (or Stepping)**	f = difference of level	0	not discernible, < 1 mm	No action.	No action.

	in Cracks or Joints		1	f < 3 mm		
			2	f = 3 - 6 mm	Determine cause and observe, take action for diamond grinding	Replace the slab as appropriate. Within 30days
			3	f = 6 - 12 mm	Diamond Grinding	
			4	f= 12 - 18 mm	Raise sunken slab.	Replace the slab as appropriate. Within 30days
			5	f> 18 mm	Strengthen subgrade and sub-base by grouting and raising sunken slab	
14	**Blowup or Buckling**	h = vertical displacement from normal profile	0	Nil, not discernible	**Short Term**	**Long Term**
			1	h < 6 mm	No Action	
			2	h = 6 - 12 mm	Install Signs to Warn Traffic	

			3	h = 12 - 25 mm	within 7 days	
			4	h > 25 mm	Full Depth Repair. Within 30 days	
			5	shattered slabs, i.e. 4 or more pieces	Replace broken slabs. Within 30 days	
15	**Depression**	h = negative vertical displacement from normal profile L =length	0	Not discernible, h < 5 mm	No action.	Not Applicable
			1	h = 5 - 15 mm		
			2	h = 15-30 mm, Nos <20% joints	Install Signs to Warn Traffic within 7 days	
			3	h = 30 - 50 mm		
			4	h > 50 mm or > 20% joints	Strengthen subgrade. Reinstate pavement at normal level	

			5	h > 100 mm	if L < 20 m. Within 30 days	
16	**Heave**	h = positive vertical displacement from normal profile. L = length	0	Not discernible. h < 5 mm	**Short Term**	**Long Term**
					No action.	scrabble
			1	h = 5 - 15 mm	Follow up.	
			2	h = 15 - 30 mm, Nos <20% joints	Install Signs to Warn Traffic within 7 days	
			3	h = 30 - 50 mm		
			4	h > 50 mm or > 20% joints	Stabilize subgrade. Reinstate pavement at normal level if length < 20 m. Within 30 days	
			5	h > 100 mm		
17	**Bump**	h = vertical	0	h < 4 mm	No action	

		displacement from normal profile	1	h = 4 - 7 mm	Grind, in case of new construction within 7 days	Construction Limit for New Construction.
			3	h = 7 - 15 mm	Grind, in case of ongoing Maintenance within 15 days	Replace in case of new construction. Within 30days
			5	h > 15 mm	Full Depth Repair. Within 30 days	Full Depth Repair. Within 30days
18	**Lane to Shoulder Dropoff**	f = difference of level	0	Nil, not discernible < 3mm	**Short Term** No action.	**Long Term**
			1	f = 3 - 10 mm	Spot repair of shoulder within 7 days	
			2	f = 10 - 25 mm		
			3	f = 25 - 50 mm	Fill up shoulder	

			4	f = 50 - 75 mm	within 7 days	For any 100 m stretch Reconstruct shoulder, if affecting 25% or more of stretch. Within 30days
			5	f > 75 mm		
Drainage						
19	**Pumping**	quantity of fines and water expelled through open joints and cracks Nos	0	not discernible	No Action	
			1 to 2	slight/ occasional Nos < 10%	Repair cracks and joints Without delay.	Inspect and repair sub-drainage at distressed sections and upstream.
			3 to 4	appreciable/ Frequent 10 - 25%	Lift or jack slab within 30 days.	
		Nos/100 m stretch	5	abundant, crack development > 25%	Repair distressed pavement sections. Strengthen subgrade and subbase. Replace slab. Within 30 days	

20	**Ponding**	Ponding on slabs due to blockage of drains	0-2	No discernible problem	No action.	
			3 to 4	Blockages observed in drains, but water flowing	Clean drains etc within 7 days, Follow up	Action required to stop water damaging foundation within 30 days.
			5	Ponding, accumulation of water observed	-do-	

Table -3: Maintenance Criteria for Safety Related Items and Other Furniture Items:

<table>
<tr><th>Asset Type</th><th>Performance Parameter</th><th colspan="3">Level of Service (LOS)</th><th>Frequency of Measuremen t</th><th>Testing Method</th><th colspan="2">Recommended Remedial measures</th><th>Time limit for Rectification</th><th>Specification s and Standards</th></tr>
<tr><td rowspan="5">Highway</td><td rowspan="5">Availability of Safe Sight Distance</td><td colspan="3">As per IRC SP :84-2014, a minimum of safe stopping sight distance shall be available throughout.</td><td rowspan="5">Monthly</td><td rowspan="5">Manual Measurement s with Odometer along with video/ image backup</td><td colspan="2" rowspan="5">Removal of obstruction within 24 hours, in case of sight line affected by temporary objects such as trees, temporary encroachments.

In case of permanent structure or design deficiency:
Removal of obstruction/improvement of deficiency at the earliest
Speed Restriction boards

and suitable traffic calming measures such as transverse bar marking, blinkers, etc. shall be applied during the period of rectification.</td><td rowspan="5">IRC:SP 84-2014</td></tr>
<tr><td>Design Speed, kmph</td><td>Desirable Minimum Sight Distance (m)</td><td>Safe Stopping Sight Distance (m)</td></tr>
<tr><td>100</td><td>360</td><td>180</td></tr>
<tr><td>80</td><td>260</td><td>130</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Pavemen t Marking</td><td>Wear</td><td colspan="3"><70% of marking remaining</td><td>Bi-Annually</td><td>Visual Assessment as per Annexure-F of IRC:35-2015</td><td>Re - painting</td><td>Cat-1 Defect – within 24 hours
Cat-2 Defect - within 2 months</td><td>IRC:35-2015</td></tr>
</table>

<table>
<tr><th>Asset Type</th><th>Performance Parameter</th><th colspan="3">Level of Service (LOS)</th><th>Frequency of Measuremen t</th><th>Testing Method</th><th>Recommended Remedial measures</th><th>Time limit for Rectification</th><th>Specification s and Standards</th></tr>
<tr><td></td><td>Day time Visibility</td><td colspan="3">During expected life Service Time
Cement Road - 130mcd/m^2/lux
Bituminous Road - 100mcd/m^2/lux</td><td>Monthly</td><td>As per Annexure-D of IRC:35-2015</td><td>Re - painting</td><td>Cat-1 Defect – within 24 hours
Cat-2 Defect – within 2 months</td><td>IRC:35-2015</td></tr>
<tr><td></td><td>Night Time Visibility</td><td colspan="3">Initial and Minimum Performance for Dry Retro reflectivity during night time:
Design Speed | (RL) Retro Reflectivity (mcd/m^2/lux)
Initial (7 days) | Minimum Threshold level (TL) & warranty period required up to 2 years
Up to 65 | 200 | 80
65 - 100 | 250 | 120
Above 100 | 350 | 150
Initial and Minimum Performance for Night Visibility under wet condition (Retro reflectivity):</td><td>Bi-Annually</td><td>As per Annexure-E of IRC:35-2015</td><td>Re - painting</td><td>Cat-1 Defect – within 24 hours
Cat-2 Defect – within 2 months</td><td>IRC:35-2015</td></tr>
</table>

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measuremen t	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specification s and Standards
		Initial 7 days Retro reflectivity: 100 mcd/m^2/lux Minimum Threshold Level: 50 mcd/m^2/lux					
	Skid Resistance	Initial and Minimum performance for Skid Resistance: Initial (7days): 55BPN Min. Threshold: 44BPN *Note: shall be considered under urban/city traffic condition encompassing the locations like pedestrian crossings, bus bay, bus stop, cycle track intersection delineation, transverse bar markings etc	Bi-Annually	As per Annexure-G of IRC:35-2015		Within 24 hours	IRC:35-2015
Road Signs	Shape and Position	Shape and Position as per IRC:67-2012. Signboard should be clearly visible for the design speed of the section.	Daily	Visual with video/image backup	Improvement of shape, in case if shape is damaged. Relocation as per requirement	48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs) 15 Days in case of Gantry/Cantileve r Sign boards	IRC:67-2012
	Retro reflectivity	As per specifications in IRC:67-2012	Bi-Annually	Testing of each	hange of ignboard	48 hours in case of Mandatory	RC:67-2012

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measuremen t	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specification s and Standards
				signboard using Retro Reflectivity Measuring Device. In accordance with ASTM D 4956-09.		Signs, Cautionary and Informatory Signs (Single and Dual post signs) 1 Month in case of Gantry/Cantilever Sign boards	
Kerb	Kerb Height	As per IRC 86:1983 depending upon type of Kerb	Bi-Annually	Use of distance measuring tape	Raising Kerb Height	Within 1 Month	RC 86:1983
	Kerb Painting	Functionality: Functioning of Kerb painting as intended	Daily	Visual with video/image backup	Kerb Repainting	Within 7-days	RC 35:2015
Other Road Furnitur e	Reflective Pavement Markers (Road Studs)	Numbers and Functionality as per specifications in IRC:SP:84-2014 and IRC:35-2015, unless specified in Schedule-B.	Daily	Counting	New Installation	Within 2 months	IRC:SP:84-2014, IRC:35-2015
	Pedestrian Guardrail	Functionality: Functioning of guardrail as intended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:SP:84-2014
	Traffic Safety Barriers	Functionality: Functioning of Safety Barriers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84-2014, IRC:119-2015
	End Treatment of	Functionality: Functioning of End Treatment as intended	Daily	Visual with video/image	Rectification	Within 7 days	IRC:SP:84-2014,

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measuremen t	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specification s and Standards
	Traffic Safety Barriers			backup			IRC:119-2015
	Attenuators	Functionality: Functioning of Attenuators as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP-2014, IRC:119-2015
	Guard Posts and Delineators	Functionality: Functioning of Guard Posts and Delineators as intended	Daily	Visual with video/image backup	Rectificatio n	Within 15 days	IRC: 79 - 1981
	Overhead Sign Structure	Overhead sign structure shall be structurally adequate	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:67-2012
	Traffic Blinkers	Functionality: Functioning of Traffic Blinkers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84-2014
Highway Lighting System	Highway Lights	Illumination: Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC:SP:84-2014
		No major failure in the lighting system	Daily	-	Rectification of failure	24 hours	IRC:SP:84-2014
		No minor failure in the lighting system	Monthly	-	Rectification of failure	8 hours	IRC:SP:84-2014
	Toll Plaza Canopy Lights	Minimum 40 Lux illumination on the road surface	Daily	The illumination level shall be measured with luxmeter	Improvement in Lighting System	24 hours	IRC:SP:84-2014
		No major/minor failure in the lighting system	Daily	-	Rectification of failure	8 hours	IRC:SP:84-2014

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measuremen t	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specification s and Standards
Trees and Plantatio n including median plantatio n	Obstruction in a minimum head-room of 5.5 m above carriageway or obstruction in visibility of road signs	No obstruction due to trees	Monthly	Visual with video/image backup	Removal of trees	Immediate	IRC:SP:84-2014
	Deterioration in health of trees and bushes	Health of plantation shall be as per requirement of specifications & instructions issued by Authority from time to time	Daily	Visual with video/image backup	Timely watering and treatment.Or Replacement of Trees and Bushes.	Within 90 days	IRC:SP:84-2014
	Vegetation affecting sight line and road structures	Sight line shall be free from obstruction by vegetation	Daily	Visual with video/image backup	Removal of Trees	Immediate	IRC:SP 84-2014
Rest Areas	Cleaning of toilets	-	Daily	-	-	Every 4 hours	
	Defects in electrical, water and sanitary installations	-	Daily	-	Rectification	24 hours	

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measuremen t	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specification s and Standards
Other Project Facilities and Approac h roads	Damage or deterioration in Approach Roads, pedestrian facilities, truck lay-bys, bus-bays, bus-shelters, cattle crossings, Traffic Aid Posts, Medical Aid Posts and other works		Daily	-	Rectification	15 days	IRC:SP 84-2014

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measuremen t	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Pipe/box/slab culverts	Free waterway/ unobstructed flow section	85% of culvert normal flow area to available.	2 times in a year (before and after rainy season)	Inspection by Bridge Engineer as per IRC SP: 35-1990 and recording of depth of silting and area of vegetation.	Cleaning silt up soils and debris in culvert barrelafter rainy season, removal of bushes and vegetation, U/s of barrel, under barrel and D/s of barrel before rainy season.	15 days before onset of monsoon and within 30 days after end of rainy season.	IRC 5-2015, IRC SP:40-1993 and IRC SP:13-2004
	Leak-proof expansion joints if any	No leakage through expansion joints	Bi-Annually	Physical inspection of expansion joints as per IRC SP: 35- 1990 if any, for leakage strains on walls at joints.	Fixing with sealant suitably	30 days or before onset of rains whichever comes earlier	IRC SP:40-1993 and IRC SP:69-2011
	Structurally sound	Spalling of concrete not more than 0.25 sqm	Bi-Annually	Detailed inspection of all components of culvert as per IRC SP:35-1990 and recording the defects	Repairs to spalling, cracking, delamination, rusting shall be followed as per IRC:SP:40-1993.	15 days	IRC SP 40-1993 and MORTH Specifications clause 2800
		Delamination of concrete not more than 0.25 sq.m.					

		Cracks wider than 0.3 mm not more than 1m aggregate length					

	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sqm, damage to solid apron (concrete apron) not more than 1 sqm	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching	30 days after defect observation or 2 weeks before onset of rainy season whichever is earlier.	IRC: SP 40-1993 and IRC:SP:13-2004.
Bridges including ROBs Flyover etc. as applicable	Riding quality or user comfort	No pothole in wearing coat on bridge deck	Daily	Visual inspection as per IRC SP:35-1990	Repairs to BC or wearing coat	15 days	MORT&H Specification 2811
Bridge -Super Structure	Bumps	No bump at expansion joint	Daily	Visual inspection as per IRC SP:35- 1990	Repairs to BC on either side of expansion joints, profile correction course on approach slab in case of settlement to approach embankment	15 days	MORT&H Specification 3004.2 & 2811.
	User safety (condition of crash barrier and guard rail)	No damaged or missing stretch of crash barrier or pedestrian hand railing	Daily	Visual inspection and detailed condition survey as per IRC SP: 35- 1990.	Repairs and replacement of safety barriers as the case may be	3days	IRC: 5-1998, IRC SP: 84-2014 and IRC SP: 40-1993.

	Rusted reinforcement	Not more than 0.25 sq.m	Bi-Annually	Detailed condition survey as per IRCSP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out the repairs to affected concrete portion with epoxy mortar / concrete.	15 days	IRC SP: 40-1993 and MORTH Specification 1600.
	Spalling of concrete	Not more than 0.50 sq.m					
	Delamination	Not more than 0.50 sq.m					
	Cracks wider than 0.30 mm	Not more than 1m total length	Bi-Annually	Detailed condition survey as per IRCSP: 35-1990 using Mobile Bridge Inspection Unit	Grouting with epoxy mortar, investigating causes for cracks development and carry out necessary rehabilitation.	48 Hours	IRC SP: 40-1993 and MORTH Specification 2800.
	Rainwater seepage through deck slab	Leakage - nil	Quarterly	Detailed condition survey as per IRCSP: 35-1990 using Mobile Bridge Inspection Unit	Grouting of deck slab at leakage areas, waterproofing, repairs to drainage spouts	1 months	MORTH specifications 2600 & 2700.
	Deflection due to permanent loads and	Within design limits.	Once in every 10 years for spans more	Load test method	Carry out major rehabilitation works on bridge to retain original design loads capacity	6 months	IRC SP: 51-1999.

	live loads		than 40 m				
	Vibrations in bridge deck due to moving trucks	Frequency of vibrations shall not be more than 5 Hz	Once in every 5 years for spans more than 30m and every 10 years for spans between 15 to 30 m	Laser displacement sensors or laser vibro-meters	Strengthening of super structure	4 months	AASHTO LRFD specifications
	Leakage in Expansion joints	No damage to elastomeric sealant compound in strip seal expansion joint,no leakage of rain water through expansion joint in case of buried and asphalt plug and copper strip joint.	Bi-Annually	Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge Inspection Unit	Replace of seal in expansion joint	15 days	MORTH specifications 2600 and IRC SP: 40-1993.
	Debris and dust in strip seal	No dust or debris in expansion joint	Monthly	Detailed condition survey as per IRC SP:35-1990 using	Cleaning of expansion joint gaps thoroughly	3 days	MORTH specification s 2600 and

	expansion joint	gap.		Mobile Bridge Inspection Unit			IRC SP: 40-1993.
	Drainage spouts	No down take pipe missing/broken below soffit of the deck slab. No silt, debris, clogging of drainage spout collection chamber.	Monthly	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	Cleaning of drainage spouts thoroughly. Replacement of missing/broken down take pipes with a minimum pipe extension of 500mm below soffit of slab. Providing sealant around the drainage spout if any leakages observed.	3 days	MORTH specification 2700.
Bridge-substructure	Cracks/spalling of concrete/ rusted steel	No cracks, spalling of concrete and rusted steel	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	All the corroded reinforcement shall need to be thoroughly cleaned from rusting and applied with anti-corrosive coating before carrying out repairs to substructure by grouting/guniting and micro concreting depending on type of defect noticed	30 days	IRC SP: 40-1993 and MORTH specification 2800.

	Bearings	Delamination of bearing reinforcement not more than 5%, cracking or tearing of rubber not more than 2 locations per side, no rupture of reinforcement or rubber	Bi-Annually	Detailed condition survey as per IRC SP: 35-1990 using Mobile Bridge Inspection Unit	In case of failure of even one bearing on any pier/abutment, all the bearings on that pier/abutment shall be replaced, in order to get uniform load transfer on to bearings.	3 months	MORTH specification 2810 and IRC SP: 40-199.
Bridge Foundations	Scouring around foundations	Scouring shall not be lower than maximum scour level for the bridge	Bi-Annually	Condition survey and visual inspection as per IRC SP:35-1990 using Mobile Bridge Inspection Unit. In case of doubt, use Underwater camera for inspection of deep wells in major Rivers.	Suitable protection works around pier/abutment	1 month	IRC SP: 40-1993, IRC 83-2014, MORTH specification 2500
	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3	2 times ina year (before and after rainy season)	Condition survey as per IRC SP:35- 1990	Repairs to damaged aprons and pitching.	30 days after defect observation or2	IRC: SP 40-1993 and IRC:SP:13-2004.

		sq.m, damage to solid apron (concrete apron) not more than 1 sq.m				weeks before onset of rainy season whichever is earlier.	
Note: Any Structure during the entire contract period which is found that does not complies with all requirements of this Table will be prepared, rehabilitated or even reconstructed under the scope of the contractor.							

Table 4: Maintenance Criteria for Structures and Culverts:

Table 5: Maintenance Criteria for Hill Roads

In addition to above, for hill roads the following provisions for maintenance is also to done.

Hill Roads		
(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: For all tables 1 to 5 above, latest BIS & IRC standards (even those not indicated herewith) along with MoRTH specifications shall be binding for all maintenance activities.

A. Flexible Pavement

	Nature of Defect or deficiency	**Time limit for repair/ rectification**
	(b) Granular earth shoulders, side slopes, drains and culverts	
(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
(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 (twenty four) hours
(vii)	Railing, parapets, crash barriers	7 (seven) days (Restore immediately if causing safety hazard)

(c) Road side furniture including road sign and pavement marking		
(i)	Damage to shape or position, poor visibility or loss of retro- reflectivity	48 (forty eight) hours
(ii)	Painting of km stone, railing, parapets, crash barriers	As and when required/ Once every year
(iii)	Damaged/missing signs road requiring replacement	7 (seven) days
(iv)	Damage to road mark ups	7 (seven) days
(d) Road lighting		
(i)	~~Any major failure of the system~~	~~24 (twenty four) hours~~
(ii)	~~Faults and minor failures~~	~~8 (eight) hours~~
(e) Trees and plantation		

	Nature of Defect or deficiency	**Time limit for repair/ rectification**
(i)	Obstruction in a minimum head- room of 5 m above carriageway or obstruction in visibility of road signs	24 (twenty four)hours
(ii)	Removal of fallen trees from carriageway	4 (four) hours
(iii)	Deterioration in health of trees and bushes	Timely watering and treatment
(iv)	Trees and bushes requiring replacement	30 (thirty) days
(v)	Removal of vegetation affecting sight line and road structures	15 (fifteen) days
(f) Rest area		
(i)	Cleaning of toilets	Every 4 (four) hours
(ii)	Defects in electrical, water and sanitary installations	24 (twenty four) hours
(g) [Toll Plaza]		

(h)	**Other Project Facilities and Approach roads**	
(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
Bridges		
(a) Superstructure		
(i)	~~Any damage, cracks, spalling/ scaling Temporary measures~~ ~~Permanent measures~~	~~within 48 (forty eight) hours~~ ~~within 15 (fifteen) days or as specified by the Authority's Engineer~~
(b) Foundations		

	Nature of Defect or deficiency	**Time limit for repair/ rectification**
(i)	Scouring and/or cavitation	15 (fifteen) days
(c) Piers, abutments, return walls and wing walls		
(i)	~~Cracks and damages including settlement and tilting, spalling, scaling~~	~~30 (thirty) days~~
(d) ~~Bearings (metallic) of bridges~~		
(i)	~~Deformation, damages, tilting or shifting of bearings~~	~~15 (fifteen) days Greasing of metallic bearings once in a year~~
(e) Joints		
(i)	Malfunctioning of joints	15 (fifteen) days
(f) Other items		
(i)	Deforming of pads in elastomeric bearings	7 (seven) days

(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
	(g) Hill Roads	
(i)	Damage to retaining wall/breast wall	7 (seven) days
(ii)	Landslides requiring clearance	12 (twelve) hours

	Nature of Defect or deficiency	Time limit for repair/ rectification
(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 3.1.5(a))

APPLICABLE PERMITS

1. **Applicable Permits**

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 Panchayat and Pollution Control Board for installation of crushers;

(c) License for use of explosives;

(d) Permission of the State Government for drawing water from river/reservoir;

(e) License 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;

(i) Applicable clearances from RTO, PESO (Petroleum Explosive Safety Organization) and PCB (Pollution Control Board)for movement and operation of HIPR train and

(j) Any other permits, clearances or approvals required under Applicable Laws.

1.2 Applicable permits, as required, relating to environmental protection and conservation shall have been produced by the Authority in accordance with the provisions of this Agreement.

Schedule – G

Appendix-VII

(See Clauses 2.21)

FORM OF BANK GUARANTEE

[Performance Security/Additional Performance Security]

To,

Executive Director,
Regional Office – Siliguri (West Bengal)
National Highways & Infrastructure Development Corporation Ltd.
Unit No. 402, Quantum Building, Parivahan Nagar,
P.O. & P.S. Matigara, Pin Code 734010
Email: edp-siliguri@nhidcl.com

WHEREAS _____ [name and address of Contractor] (hereafter called the "Contractor") has undertaken, in pursuance of Letter of Acceptance (LOA) No. _____ Dated _____ for construction of _____ [name of the Project] (hereinafter called the "Contract").

AND WHEREAS the Contract requires the Contractor to furnish a {Performance Security/Additional Performance Security} for due and faithful performance of its obligations, under and in accordance with the Contract, during the {Construction Period/ Defects Liability Period and Maintenance Period}; in a sum of Rs….. cr. (Rupees …….. crore) (the "Guarantee Amount"[15]).

AND WHEREAS 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 Contract, 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.

[15] Guarantee Amount for Performance Security and Additional performance Security shall be calculated as per Contract.

2. A letter from the Authority, under the hand of an officer not below the rank of General Manager, NHIDCL, 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 Contract 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 under the Contract 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 Contract or to extend the time or period for the compliance with, fulfilment and/or performance of all or any of the obligations of the Contractor contained in the Contract 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 Contract 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 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 Contract or for the fulfilment, compliance and/or performance of all or any of the obligations of the Contractor under the Contract.

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 *****[5]. Unless a demand 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 authorized 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 Contract.

12. This Guarantee is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758, except that the supporting statement under Article 15(a) is hereby excluded.

13. The guarantor/bank hereby confirms that it is on the SFMS (Structural Finance Messaging System) platform & shall invariably send an advice of this Bank Guarantee to the designated bank of NHIDCL, detail of which is as under:

Sl. No.	Particulars	Details
1.	**Name of Beneficiary**	**National Highway Infrastructure Development Corporation**
2.	**Beneficiary Bank Account No.**	120035355901
3.	**Beneficiary Bank Branch Name and Address**	**Canara Bank,** Shivmandir Branch & Kadamtala , Siliguri.
4.	**Beneficiary Bank Branch IFSC**	CNRB0019716

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)

[S] Insert date atleast 2 (two) years from the date of issuance of this Guarantee (in accordance with Clause 2.21 of the RFP). The Contractors can submit the BG for peroids of two years at one time and keep on renwing the same till the DLP is over if they have problems getting the BG in one go for the entire DLP.

Annex - II

(Schedule - G)

(See Clause 19.2)

Form for Guarantee for Advance Payment

To,

Executive Director (P)
Regional Office - Siliguri (West Bengal)
National Highway & Infrastructure Development Corporation Ltd.
Unit 402, Quantum Building, Parivahan Nagar,
P.O & P.S. Matigara, Pin Code 734 010.
Email:edp-siliguri@nhidcl.com

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 the ***** section of [National Highway No. **] on Engineering, Procurement and Construction (the **"EPC"**) basis, 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 + 3%* 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

---

$ The Guarantee Amount should be equivalent to 110% of the value of the applicable instalment.

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.

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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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.

9. 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 authorized 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.

10. 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.

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.

$ 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).

(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. _____Cr.

1.2 Proportions of the Contract Price for different stages of Construction of the Project Highway shall be as specified below:

Item	Weightage in Stage for Payment percentage to the Contract Price	Stage of Payment	Percentage eightage
1	2	3	4
I. Road works including culverts, widening and repair of culverts.	3.62	A- Widening and strengthening of existing road	
		(1) Earthwork up to top of the embankment	[**]
		(2) Sub-Grade	
		(3) Sub-Base Course	[**]
		(4) Non Bituminous Base Course	[**]
		(5) Bituminous Base Course	[**]
		(6) Wearing Coat	[**]
		(7) Widening and repair of culverts	[**]
		B.1- Reconstruction/ New realignment/ bypass (Flexible pavement)	
		(1) Earthwork up to top of the embankment	14.77
		(2) Sub-Grade	24.75
		(3) Sub Base Course	8.31

		(4) Non-Bituminous Base Course*	15.48
		(5) Bituminous Base Course	17.64
		(6) Wearing Coat	19.05
		B.2- Reconstruction/ New realignment/bypass (Rigid Pavement)	
		(1) Earthwork up to top of the embankment	[**]
		(2) Sub-Grade	
		(3) Sub Base Course	[**]
		(4) Dry Lean Concrete(DLC) Course	[**]
		(5) Pavement Quality Control (PQC) Course	[**]
		C.1- Reconstruction/ New service road (Flexible pavement)	
		(1) Earthwork up to top of the embankment	[**]
		(2) Sub-Grade	
		(3)Sub Base Course	[**]
		(4) Non-Bituminous Base Course*	[**]
		(5) Bituminous Base Course	[**]
		(6) Wearing Coat	[**]
		C.2- Reconstruction/ New Service road (Rigid Pavement)	

		(1) Earthwork up to top of the embankment	[**]
		(2) Sub-Grade	
		(3) Sub Base Course	[**]
		(4) Dry Lean Concrete(DLC) Course	[**]
		(5) Pavement Quality Control (PQC) Course	[**]
		D- Re-Con struction and New culverts on existing road, realignments, bypasses : Culverts (length < 6 m)	
IV. Other works	96.38	(i) Toll Plaza	[**]
		(ii) Road side drains	[**]
		(a) Drain	
		(b) Cover Slab	
		(iii) Road signs, markings, km stones, safety devices etc.	0.70
		(iv) Overhead gantry mounted signs	
		(v) Project facilities	[**]
		(vi) Road Dealineator	0.10
		(a) Bus Bays	
		(b) Truck lay-byes	
		(c) Rest areas	
		(d) others	
		(vi) Road side plantation	[**]

		(vii) Protection works# other than approaches to the bridges, elevated sections/ flyovers/grade separators and ROBs/RUBs.	91 (a+b+c+d+e+f+g)
		(a) Plum Concrete	6.02
		(b) Retaining Wall	4.85
		(c) Gabion	4.64
		(d) SDRA	58.72
		(e) Geotextile	1.42
		(f) Techslope Mesh	12.37
		(g) Geogrid Unit	2.98
		(Viii) Backfill	6.5
		(ix) Scaling	1.7

1.3 Procedure of estimating the value of work done shall be as follow:-

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage	Payment procedure
Road Works	3.62%			
		Earth work up to top of subgrade	14.77%	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 25%(Twenty Five) percent of the total length.
		subgrade	24.75%	
		Sub Base Course	8.31%	
		Non-Bituminous Base Course	15.48%	
		Bituminous Base Course	17.64%	
		Mastic Asphalt	19.05%	
Other Works	96.38	Retaining wall	4.85%	Unit of measurement is as per BOQ. Payment of each stage shall be made on pro rata basis on completion of length of not less than 10% (Ten) percent of the total work.
		SDRA	58.72%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of stage i.e 25% (Twenty Five) of the total running meter length of anchor
		Non Woven Geotextile	1.42%	Unit of Measurement is area(m2). Payment of each stage shall be made on pro rata basis on completion of a stage for full design height in a length of not less than 25(Twenty Five) percent of the Total Area
		Gabion	4.64%	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 25%(Twenty Five) percent of the total length
		Geogrid Unit	2.98%	Unit of Measurement is area(m2). Payment of each stage shall be made on pro rata basis on completion of a stage for full design height in a length of not less than 25(Twenty Five) percent of the Total Area

		tech slope mesh	12.37%	Unit of Measurement is area(m2). Payment of each stage shall be made on pro rata basis on completion of a stage for full design height in a length of not less than 25(Twenty Five) percent of the Total Area
		Plum concrete	6.02%	Unit of Measurement is as per BOQ. Payment of each stage shall be made on pro rata basis on completion of a stage of not less than 25 % (Twenty Five) percent of the total work.
		Road Delineators/Scaling/ Backfill/ Road marking/ cats eye/road delinator/AFP sheets/ Median marker/Painting.	9%	Cost Shall be determined on a pro-rata basis and payment shall be made on completion of minimum 25% of the total work.

1.3.1 Road works:

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

Table 1.3.1

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 inaccordance 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.]

- Detailed Topographical Drawing
- Contour Drawing
- As per Attached Annexure-D-I
- As per Attached Annexure-D-II

Schedule-J

(See Clause 10.3.2)

PROJECT COMPLETION SCHEDULE

1. Project Completion Schedule

During Construction period, the 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 Contractor shall notify the Authority 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 63th (One hundred and Twenty eight) 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 108th (two hundred and nineteen) day from the Appointment Date (the **"Project Milestone-II**").

Prior to the occurrence of Project Milestone-II, the Contractor shall have continued with the construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 35% (thirty five per cent) of the Contract Price.

4 Project Milestone-III

Project Milestone-II shall occur on the date falling on the 153rd (three hundred and Ten) day from the Appointment Date (the **"Project Milestone-III**").

Prior to the occurrence of Project Milestone-II, the Contractor shall have continued with the construction of the Project Highway and submitted to the Authority duly and validly prepared Stage Payment Statements for an amount not less than 70% (seventy per cent) of the Contract Price.

5 Schedule Completion Date

5.1 The Schedule Completion Date shall occur on the 180th (three hundred and sixty 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: all the tests specified in IRC code, manual and MORTH specifications for the road and Bridge works, 5th revision, 2013.

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 kilometer~~.

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) meters 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 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)

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 [construction of the ****section (km ** to km **) of National Highway No. ***] (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… , Scheduled Completed
Date for which was 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 admissible 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 deduction 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
(a)	**Carriageway/Pavement**	
(i)	Potholes, cracks, other surface defects	5%
(ii)	Repairs of Edges, Rutting	5%
(b)	**Road, Embankment, Cuttings, Shoulders& Retaining wall**	
(i)	Edge drop, inadequate crossfall, undulations, settlement, ponding, obstructions , tilting & partial failure of retaining wall	40%
(ii)	Deficient slopes, rain cuts, disturbed pitching, vegetation growth, pruning of trees, choking of weep holes	10%
(c)	~~**Bridges and**~~ **Culverts**	
(i)	Desilting, cleaning. vegetation growth, damaged pitching, flooring, parapets, wearing course, footpaths, any damage to foundations	5%
(ii)	Any Defects in superstructures, bearings and sub-structures	5%

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

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

R=P/100 * M * 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 noncompliance 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 noncompliance.

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 Authority 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 Authority 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 Authority shall not be eligible for appointment as Authority's Engineer.

Annex – I

(Schedule - N)

Terms of Reference for Authority's Engineer

1. Scope

(i) 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 [name and address of the Authority] (the "**Authority**") and ..... (the **"Contractor"**)# for [Two-Laning] of the **** section (km ** to km **) of National Highway No. ** in the State of *** on Engineering, Procurement, Construction (EPC) basis, and a copy of which is annexed hereto and marked as Annex-A to form part of this TOR.

- In case the bid of Authority's Engineer is invited simultaneously with the bid of EPC project,then the status of bidding of EPC project only to be indicated

(ii) The TOR shall apply to construction and maintenance of the Project Highway.

2. Definitions and interpretation

(i) 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.

(ii) 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.

(iii) The rules of interpretation stated in Article 1 of the Agreement shall apply, mutatis mutandis, to this TOR.

3. General

(i) 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.

(ii) 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) issuance of Completion Certificate or

(e) any other matter which is not specified in (a), (b), (c) or (d) above and which creates a financial liability on either Party.

(iii) 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.

(iv) 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.

(v) The Authority's Engineer shall aid and advise the Authority on any proposal for Change of Scope under Article 13.

(vi) 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

(i) During the Construction Period, the Authority's Engineer shall review and approve 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 (vi). The Authority's Engineer shall complete such review and approval 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.

(ii) The Authority's Engineer shall review and approve any revised Drawings sent to it by the Contractor and furnish its comments within 10 (ten) days of receiving such Drawings.

(iii) The Authority's Engineer shall review and approve 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.

(iv) The Authority's Engineer shall complete the review and approve 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.

(v) 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.

(vi) 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.

(vii) 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.

(viii) 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.

(ix) 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 (ix), 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.

(x) The Authority's Engineer shall test check at least 50 (fifty) percent of the quantity or number of tests prescribed for each category or type of test for quality control by the Contractor.

(xi) The timing of tests referred to in Paragraph 4 (ix), 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.

(xii) 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.

(xiii) 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 requiredon account of a Force Majeure Event, the provisions of Clause 21.6 shall apply.

(xiv) 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.

(xv) 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 12.2.

(xvi) 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.

(xvii) 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.

(xviii) 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, as the case may be. For carrying out its functions under this Paragraph 4 (xviii) 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

(i) 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.

(ii) 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.

(iii) 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.

(iv) 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 andStandards and shall also specify the time limit for repair or rectification of any deviation or deterioration beyond the permissible limit.

(v) 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

(i) The Authority's Engineer shall determine the costs, and/or their reasonableness, that are required to be determined by it under the Agreement.

(ii) The Authority's Engineer shall determine the period of Time Extension that is requiredto be determined by it under the Agreement.

(iii) The Authority's Engineer shall consult each Party in every case of determination in accordance with the provisions of Clause 18.5.

7. Payments

(i) 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 (iv) (d).

(ii) 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.

(iii) 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.

(iv) 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.

(v) Other duties and functions

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

8. Miscellaneous

(i) 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.

(ii) 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.

(iii) Within 90 (ninety) days of the Project Completion Date, the Authority's Engineer shallobtain 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 thebuildings and structures forming part of Project Facilities; and shall hand them over tothe Authority against receipt thereof.

(iv) 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.

(v) The Authority's Engineer shall inform the Authority and the Contractor of any event ofContractor'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

  (iii) Total of (i) and (ii) above.

(g) Net claim: (e) – (f) (iii);

(h) The amounts received by the Contractor up to 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

(i) 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 ordamage 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.

(ii) The insurance under sub para (a) and (b) of paragraph 1(i) 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 of not less than 15% of the Contract Price 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

(i) 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 onthe number of occurrences.
The insurance cover shall be not less than: Rs. 1,00,000.00 (Rs. One Crore only)

(ii) 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.

Schedule-Q

(See Clause 14.10)

Tests on Completion of Maintenance Period

1. Riding Quality test:

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 [2,200 (two thousand and two hundred only)] mm for each kilometre.

2. 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 measurement of cracking, rutting, stripping and potholes and shall be as per the requirement of maintenance mentioned in Schedule-E.

Schedule-R

(See Clause 14.10)

Taking Over Certificate

I, ……. (Name and designation of the Authority's Representative) under and in accordance with the Agreement dated …… (the "Agreement"), for [construction of the ****section (km ** to km **) of

****] (the "Project Highway") on Engineering, Procurement and Construction (EPC) basis through ……. (Name of Contractor), hereby certify that the Tests on completion of Maintenance Period in accordance with Article 14 of the Agreement have been successfully undertaken to determine compliance of the Project Highway with the provisions of the Agreement and I hereby certify that the Authority has taken over the Project highway from the Contractor on this day.....

SIGNED, SEALED AND DELIVERED

(Signature)

(Name and designation of Authority's Representative)

(Address)

End of the Document