National Highways & Infrastructure Development Corporation Limited

BUILDING INFRASTRUCTURE - BUILDING THE NATION

Ministry of Road Transport & Highways,
(Govt. of India)

SCHEDULES

For

"Up-gradation to 2 lane with paved shoulders of Dulte - Champhai road (International Corridor) of NH-6 from Design Chainage Km 84.800 to km 111.580 (Package-III)) in the State of Mizoram under Bharatmala Pariyojna on EPC mode"

December, 2020

National Highways & Infrastructure Development Corporation Ltd
3rd floor, PTI Building, 4-Parliament Street,
New Delhi – 110001

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Schedules

SCHEDULE-A

(*See Clauses 2.1 & 8.1*)

SITE OF THE PROJECT HIGHWAY

1 THE SITE

1.1 Site of the Two Lane with Paved Shoulders Project Highway shall include the land, buildings, structures and road works as described in **Annex-I** of this **Schedule-A**.

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

1.3 An inventory of the Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority Representative and the Contractor, and such inventory shall form part of the memorandum referred to in clause 8.2.1 of the Agreement.

1.4 The alignment plans of the Project Highway are specified in **Annex-III**. In the case of sections where no modification in the existing alignment of the Project Highway is contemplated, the alignment plan has not been provided. Alignment plans have only been given for sections where the existing alignment is proposed to be modified. The proposed profile of the Project Highway 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.

1.5 The status of the environment clearances obtained or awaited is given in **Annex IV.**

Annex - I

(*Schedule-A*)

Site for Two-Laning with Paved Shoulders of Project Highway

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

1. The Site

1.1 The site of the Two Lane Project Highway comprises the section of Champai-Seling National Highway No. 6 from existing km **105+950 (Khawzawl) to km 146+450 (Champai)** in the state of Mizoram. The project road starts at km 84+800 and ends at km. 111+580 of Champai-Seling NH 6 road, in the state of Mizoram. The land, carriageway and structures comprising the Site are described below.

Sr. No	Package No.	Existing Chainages	Design Chainages	Design Length
International Corridor				
1	**Package III**	From. Km 105+950 to Km 146+450	From De. Ch. 84.800 to Ch. 111.580	26.780
			Total Length (km)	**26.780**

1.2 Referencing System

Kilometer stones are existing in entire length of the project highway. It is called the "Existing Chainage". During topography survey with Total Station, observations made are referred to "Design Chainage". The relationship between the "Existing Chainage" and the "Design Chainage" as per field surveys of the location of existing km stones using the Total Station for the "**Project Highway**" is **given at Appendix A-I**. **The existing length of project road is 40.500 km and design length of project is 26.780 km.**

2. Land

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

S. No	Existing Chainage		Existing Length (km)	EROW (m)	Remark
	From	To			
1	105+950	146+450	40.500	-	**Bypass**
	Existing Length		**40.500 km**		

3. Carriageway

The present carriageway of the project highway is Single Lane Configuration. The type of the existing pavement is flexible.

4. Cross Drainage Structures

The Project Highway site doesn't include Major/ Minor Bridges, Slab/ Box culverts/ Hume Pipe culverts along the new link alignment of the project road. The detail of existing Major, Minor Bridges and existing Slab/ Box & Pipe Culverts are shown in **Table A-1**

Table A – 1

Type	Major Bridges	Minor Bridges	Culverts		Grade Separator	ROB	RUB	PUP
			Slab / Box Culvert	HP Culvert				
Existing Structure	Nil							

4.1 Major Bridges: - Nil.

The Site includes the following Major Bridges:

Sr. No	Existing Chainage	Type of Structure			No. of Spans with Span Length (m)	Width (m)		Remark
		Foundation	Sub Structure	Super Structure		Clear Width	Over all Width	
-----NIL-----								

5. Road over-bridges (ROB): Nil

The site includes following ROB (road over railway line)

S. No	Existing Chainage	Type of Structure			No. of Spans with Span Length (m)	Total Width (m)	ROB
		Foundation	Sub Structure	Super Structure			
-----NIL-----							

5.1 Road under-bridges (RUB): Nil

The site includes following RUB (road under railway line)

S. No	Existing Chainage	Type of Structure			No. of Spans with Span Length (m)	Total Width of RUB (m)	RUB
		Foundation	Sub Structure	Super Structure			
-----NIL-----							

6. Grade separators: - Nil

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

7. Minor Bridges: - Nil.

The Site includes the following Minor Bridges:

Sr. No	Existing Chainage	Type of Structure			No. of Spans with Span Length (m)	Width (m)	
		Foundation	Sub Structure	Super Structure		Clear Width	Over all Width
-----NIL-----							

8. Railway level crossings

The Site includes the following Railway level crossings:

S No	Existing Chainage	Railway Chainage	Level Crossing no	Remark
-----NIL-----				

9. Underpasses (vehicular, non-vehicular):- Nil

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

10. Culverts:-

The Site includes the following Culverts:-

(a) Slab/Box Culverts: -

Sr. No	Existing Chainage (Km)	Type of Culvert (Slab/Box)	No. x Span / Opening with Span Length (m)	Width (m)	
				Clear Width	Overall Width
-----NIL-----					

(b) HP Culverts: -

Sr. No	Existing Chainage	Type of Structure	No. x Span / Opening with Span Length (m)	Width (m)	
				Clear Width	Overall Width
-----NIL-----					

11. Bus Bays/Bus Shelters: -

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

Sr. No.	Chainage (km)	Location	Left Hand Side	Right Hand Side
-----NIL-----				

12. Truck Lay byes: - NIL

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

13. Road side drains

The details of the roadside drains are as follows:

Sr. No	Location		Type	
	From Km	to Km	Masonry/CC (Pucca)	Earthern (Kutcha)
NIL				

14. Major junctions: - 02 Nos.

The details of the Major junctions are as follows:

Sr. No.	Location		At Grade	Separated	Category of cross road			
	Existing Chainage	Location			NH	SH	MDR	Others
1	105+950	Khawzawl	T	-	-	-	MDR	-
2	146+450	Zokhawthar	T	-	-	-	MDR	-

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

15. Minor junctions: - Nil.

The details of the Minor junctions are as follows:

Sr. No.	Existing Chainage	Location	Type	Type of Road SH/MDR/VR/PMGSY
Nil				

16. Bypasses: - Nil

The details of the bypasses are as follows:

S. No.	Name of bypass (town)	Chainage (km) From km____ to km	Length (in Km)	Carriageway	
				Width (m)	Type
----------Nil----------					

17. Other structures: - 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:

Sr.no	Design Chainage		Design Length	PROW	Remark
	From	To			
1	84.800	111.580	26.780	24.0	Minimum 90% on Appointed Date. Remaining within 150 days of Appointed Date.

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

Annex - III
(Schedule-A)

Alignment Plans

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

Annex - IV
(Schedule-A)

Environment Clearances

The following environment clearances have been obtained:

Environmental Clearance is not required as per new Notification of MoEF dated 22/08/2013.

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Appendix A- I

DESIGN CHAINAGE CORRESPONDING TO EXISTING CHAINAGE

Sr. No.	As Per Existing Km stone	Design Chainage	Remarks
1	105+950	84.800	**Start of Project Road**
2	146+450	111.580	**End of Project Road**

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**. The alignment plans of the Project Highway are specified in **Annex-III of Schedule A**. 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 modified. The proposed profile of the Project Highway 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.

2. Rehabilitation and augmentation

Rehabilitation, up gradation and augmentation shall include Two-Laning with Paved Shoulder and widening/reconstruction/new construction of the Project Highway as described in Annex-I of this Schedule-B and Schedule-C.

3. Specifications and Standards

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

Annex - I
(Schedule-B)

DESCRIPTION OF TWO LANING WITH PAVED SHOULDER

1. REHABILITATION, UPGRADATION & WIDENING OF THE EXISTING HIGHWAY

1.1 The Project Highway starts at km.**105+950 (Khawzawl)** and ends at km **146+450 (Champai) [Design km.84.800 to km. 111.580]** in the state of Mizoram. Total Existing Length of Project road is **40.500** km. and Design Length of project is **26.780** km. The project highway Two Lane with Paved Shoulders shall be constructed as per Schedule D.

The Project Highway shall follow the existing alignment unless otherwise specified by the Authority and shown in the alignment plans specified in Annex III of Schedule-A. **Geometric deficiencies, if any, in the existing horizontal and vertical profiles shall be corrected as per the prescribed standards for plain/rolling terrain to the extent land is available.**

1.2 WIDTH OF CARRIAGEWAY

1.2.1 **Two Lane with paved shoulder: -** Two-Laning with paved shoulders shall be constructed in open country mountainous terrain. The paved carriageway shall be 10 m (meter) wide in open country -Mountainous terrain in accordance with the typical cross sections mentioned in paragraph 2.11 typical cross-section drawings and Schedule I as per the Manual (IRC:SP 73-2018).

Note:
1) Cross-section at Major/Minor Bridge approaches are to be followed matching to adjoining cross-sections with suitable transition.
2) Where Bus Bays & Truck Lay Byes constructed as per Schedule C a transition shall be provided as per the Manual (IRC:SP 73-2018)

1.2.2 **Two lane in built up area:-** Two Lane shall be constructed in built-up area - Mountainous terrain as mentioned in paragraph 2.11 typical cross-section drawings and Schedule I as per the Manual (IRC:SP 73-2018).

1.2.3 Except as otherwise provided in this Agreement, the Linear dimension and width of the paved Carriageway and cross-sectional features shall conform to paragraph 1.2 above & Cross Sections given at Schedule D. Invert levels of the longitudinal drains shall be decided as per adjoining draining area and properties.

2. GEOMETRIC DESIGN AND GENERAL FEATURES

2.1 General

Geometric design and general features of the Project Highway shall be in accordance with Section 2 of the Manual. (IRC:SP 73-2018).

2.2 Design Speed

The design speed shall be the minimum design speed of 30/40 km per hr for mountainous and steep terrain.

2.3 Improvement of the existing road geometrics

In the following sections, where improvement of the existing road geometrics to the prescribed standards is not possible, the existing road geometrics shall be improved to the extent possible within the given right of way and proper road signs and safety measures shall be provided for safe regulation of fast moving, slow moving and pedestrian traffic:

Sl. No.	Stretch/Design Chainages (from km to km)	Type of deficiency		Remarks
		Radius of curve	Design Speed	
NIL				

2.4 Right of Way

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

2.5 Type of shoulders

(a) In built-up sections, footpaths and walkway shall be constructed in the following stretches with covered RCC Drain.

(b) In open country - mountainous terrain**,** Two Lane with paved shoulders of 1.50 m width shall be provided and earthen shoulders shall be provided as per Schedule D.

(c) In Grade separated structure approaches, footpaths/fully paved shoulders and walkway shall be constructed by paver blocks in the following stretches with covered RCC Drain.

Sr. No.	Built-up stretch (township)	Location		Length (km)	Fully paved shoulders/footpaths	Typical cross section (Ref. to Manual)
		From (Km)	To (Km)			
------- NIL -------						

(d) Design and specifications of paved shoulders and granular material shall confirm to the requirements specified in paragraphs 5.10 and 5.11 of the Manual. (IRC: SP 73-2018).

2.6 Lateral and vertical clearances at underpasses

2.6.1. Lateral and vertical clearances at underpasses and provision of guardrails/crash barriers shall be as per paragraph 2.10 of the Manual (IRC:SP:73-2018).

2.6.2. Vehicular **Underpasses** shall be constructed at following locations:-

S. No.	Location (chainages) (from km to km)		Proposed Span/opening (in m)	Total Width of the Structure (in m)	Remark
	Design Chainage	Location			
-----NIL-----					

Note: Approach Gradient & RE Walls: Approach and exit gradient of road crossing through underpass shall be maintained.

2.7 Lateral and vertical clearances at overpasses :

2.7.1 Lateral and vertical clearances at overpasses shall be as per paragraph 2.11 of the Manual.

2.7.2 Lateral and vertical clearances at overpasses shall be as per paragraph 2.11 of the Manual (IRC:SP 73-2018). Overpass shall be constructed at following locations:-

S. No.	Design Chainage	Name of Intersecting Roads	Proposed Span arrangement (in m)	Total Width of the Structure (in m)	Remark
-----NIL-----					

2.8 a) Service roads:-

Service roads shall be constructed at the following locations and as per cross sections shown at Schedule D.

Sl. No.	Location of Service Road (Design Chainage)		Right hand side (RHS)/Left hand side (LHS)/or Both side	Length (Km) of Service Road	Remark
	From (km)	To (km)			
-----NIL-----					

b) Slip roads:-

Slip roads shall be constructed at the following locations and as per cross sections shown at Schedule D.

Sl.	Location of Slip	Right hand side	Length (Km) of	Remark

No.	Road (Design Chainage)		(RHS)/Left hand side (LHS)/or Both side	Service Road	
	From (km)	To (km)			
-----NIL-----					

Above length of the Service/Slip Road is indicative and minimum specified. The actual length of the service/slip road shall be determined by the contractor in accordance with the Manual requirements with approval from the Authority's Engineer. Any Increase in the Length specified in the clause of Schedule B shall not constitute a Change of Scope. Any New location as per site requirement and directed by Authority Engineer will be considered under a Change of Scope.

2.9 Grade separated structures

Grade separated structures shall be constructed as per paragraph 2.13 of the Manual IRC:SP:73-2018.

Sr. No.	Location of structure		Length (m)	Number & length of span (m)	Approach Gradient & RE Walls	Remarks, if any
	Location	(Design Ch.)				
-----NIL-----						

2.9.1 In the case of grade separated structures, the type of structure and the level of the Project Highway and the cross roads shall be as follows: [Refer to paragraphs 2.13 of the Manual and specify the type of vehicular under pass/ overpass structure and whether the cross road is to be carried at the existing level, raised or lowered]

2.10 Cattle and pedestrian underpass /overpass :

Cattle/pedestrian underpasses and provision of guardrails/crash barriers shall be as per paragraph 2.10 & 2.13 of the Manual (IRC: SP: 73-2018). Under pass shall be constructed at following locations.

S. No.	Design Chainages	Location	Span Arrangement (m)	Width (m)	Remark
-----NIL-----					

2.11 Typical cross-sections of the Project Highway

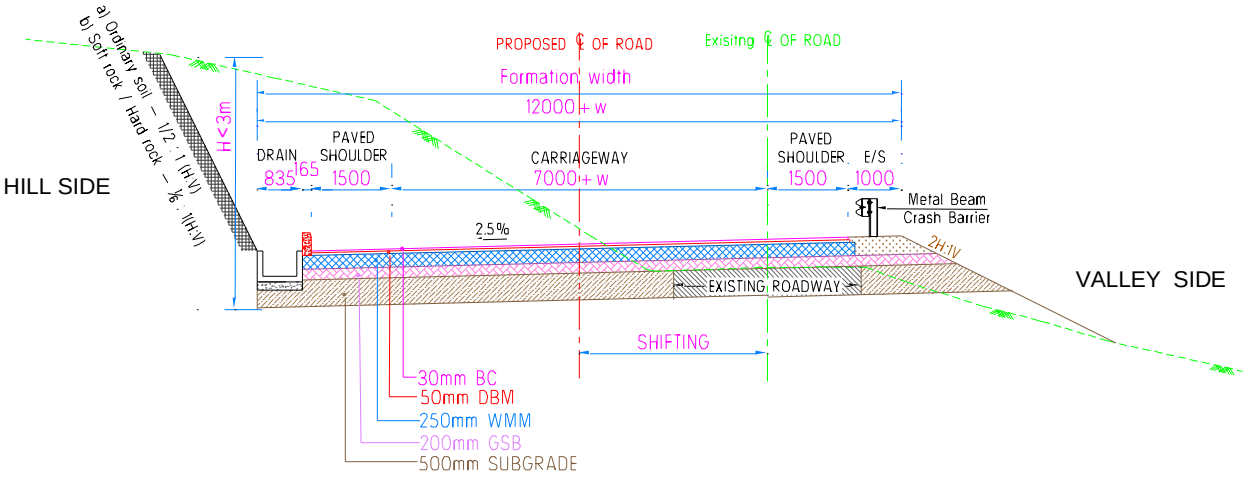

FIG. – 1A
2 – LANE CARRIAGEWAY WITHOUT BREAST WALL – HILLSIDE WIDENING
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

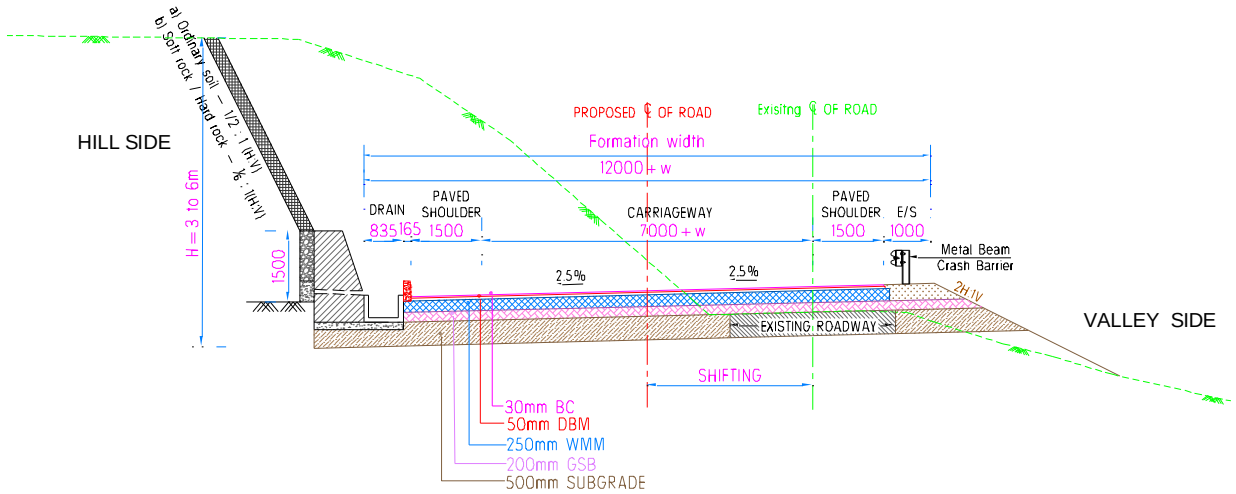

FIG. – 1B
2 – LANE CARRIAGEWAY WITH BREAST WALL OF 1.5M HEIGHT – HILLSIDE WIDENING
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

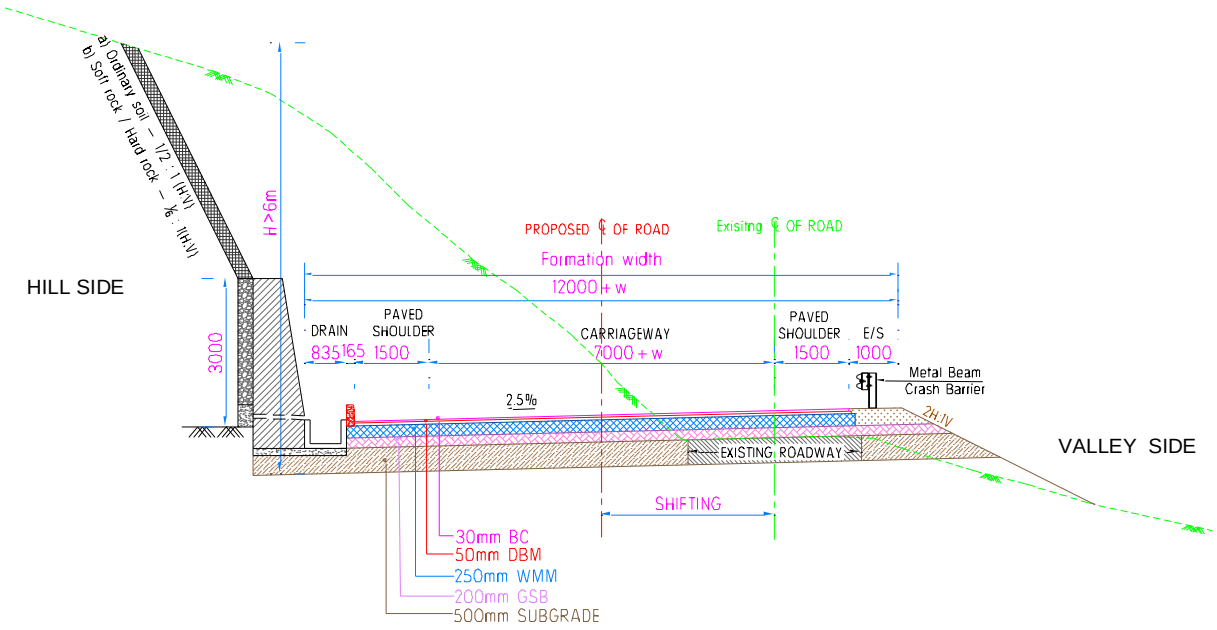

FIG. – 1C

2 – LANE CARRIAGEWAY WITH BREAST WALL OF 3M HEIGHT – HILLSIDE WIDENING (OPEN COUNTRY – MOUNTAINOUS TERRAIN)

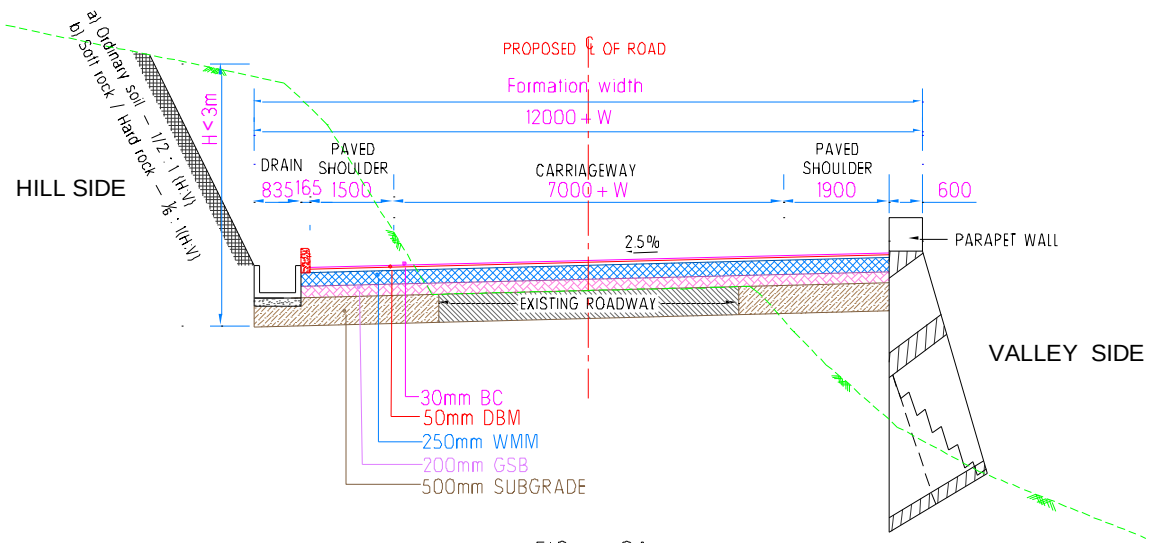

FIG. – 2A
2 – LANE CARRIAGEWAY WITHOUT BREAST WALL
AND WITH RETAINING WALL ON VALLY SIDE – CONCENTRIC WIDENING
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

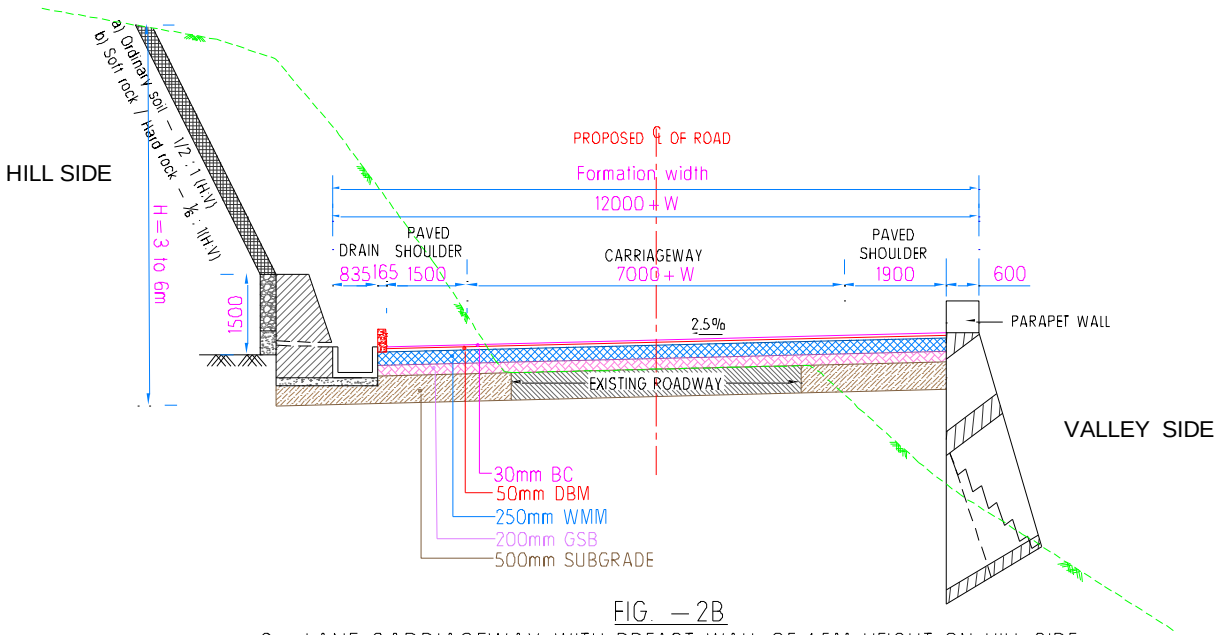

FIG. – 2B
2 – LANE CARRIAGEWAY WITH BREAST WALL OF 1.5M HEIGHT ON HILL SIDE
AND RETAINING WALL ON VALLY SIDE – CONCENTRIC WIDENING
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

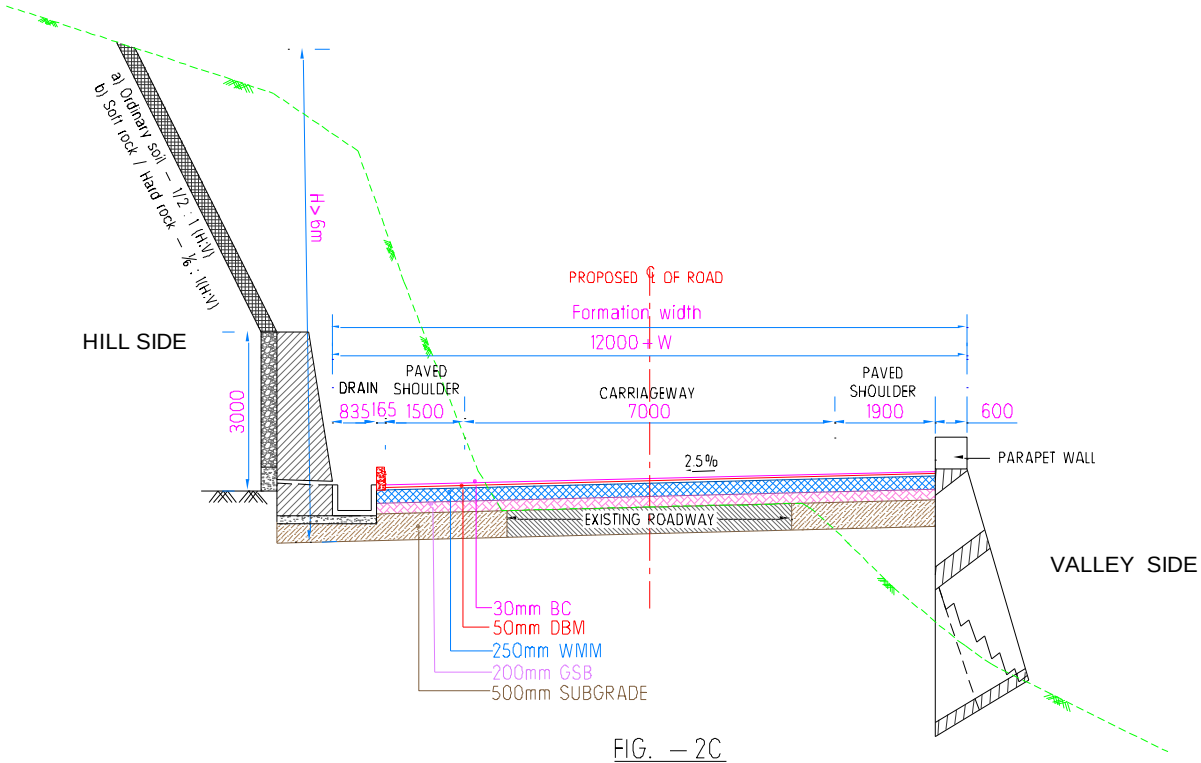

FIG. – 2C
2 – LANE CARRIAGEWAY WITH BREAST WALL OF 3M HEIGHT ON HILL SIDE AND RETAINING WALL ON VALLY SIDE – CONCENTRIC WIDENING (OPEN COUNTRY – MOUNTAINOUS TERRAIN)

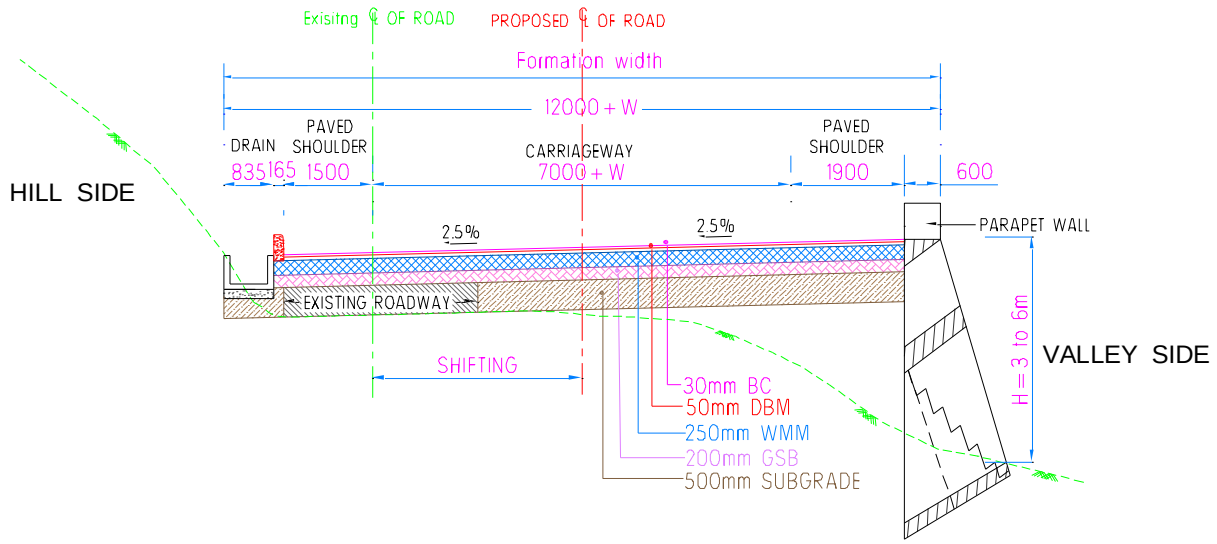

FIG. – 3A
2 – LANE CARRIAGEWAY WITH RETAINING WALL – VALLY SIDE WIDENING
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

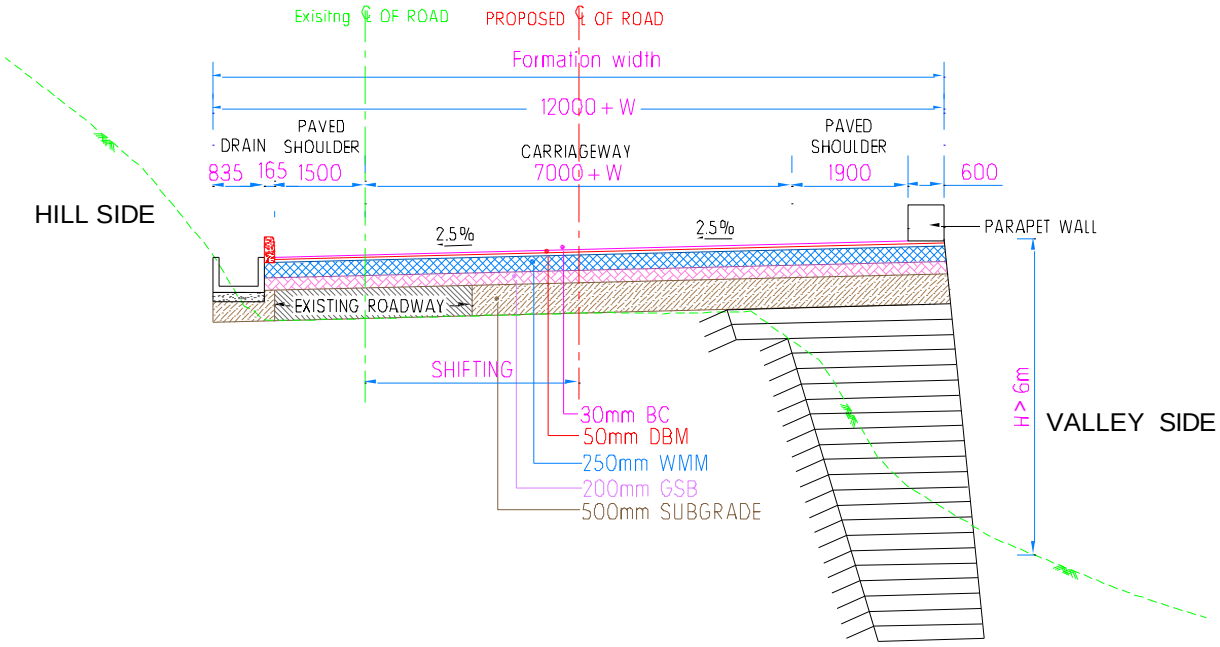

FIG. – 3B
2 – LANE CARRIAGEWAY WITH REINFORCED EARTH RETAINING WALL – VALLY SIDE WIDENING
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

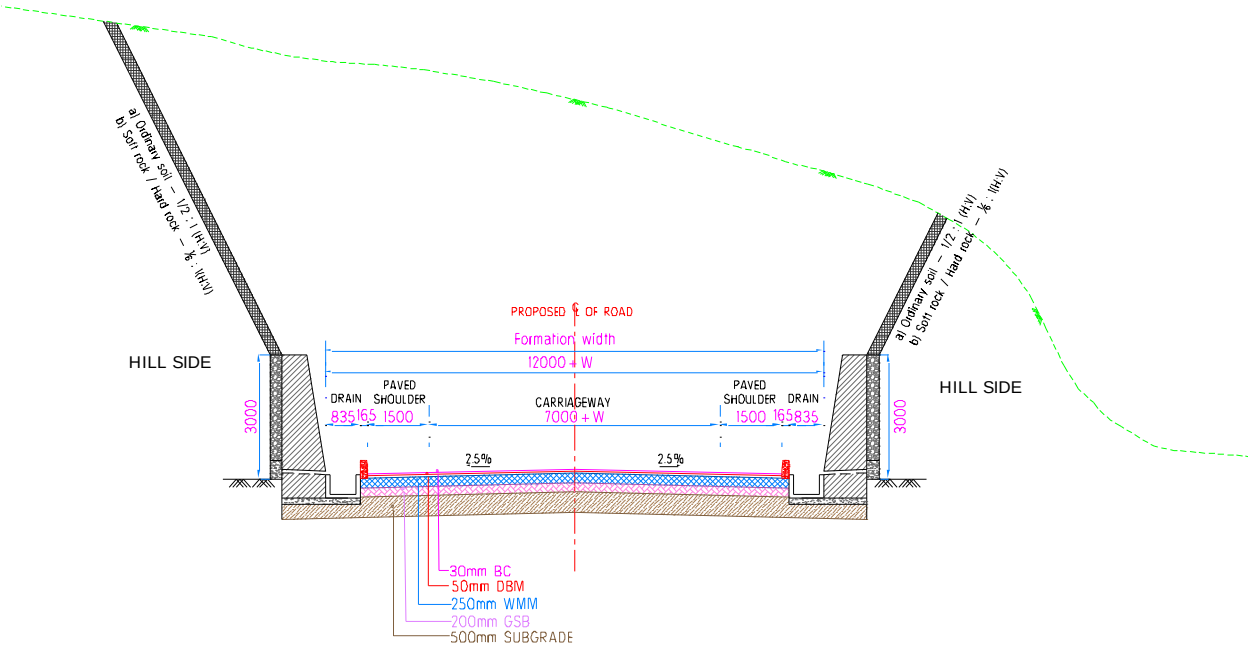

FIG. – 4
2 – LANE CARRIAGEWAY WITH BREAST WALL WITH BOX CUTTING – REALIGNMENT FROM HILL SIDE
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

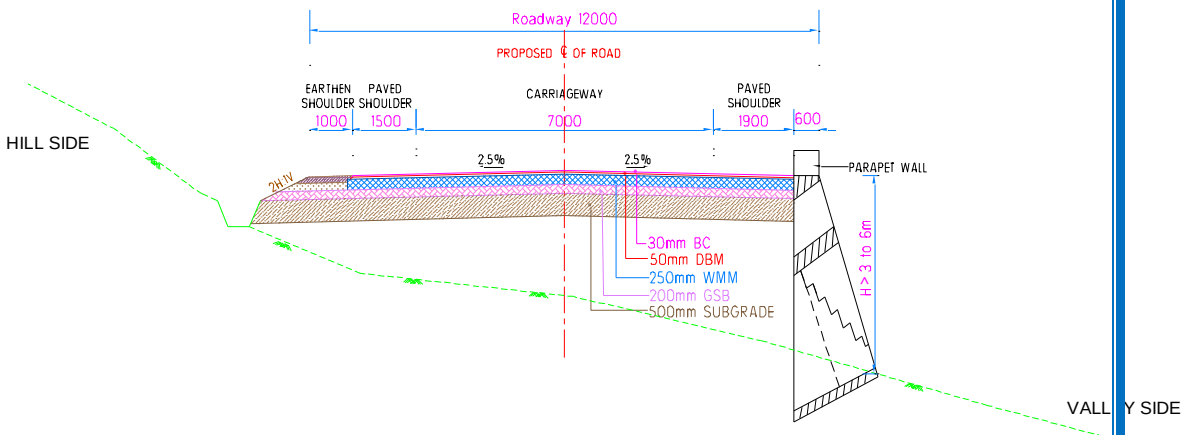

FIG. – 5A
2 – LANE CARRIAGEWAY WITH RETAINING WALL/REINFORCED EARTH RETAINING WALL – REALIGNMENT FROM VALLEY SIDE
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

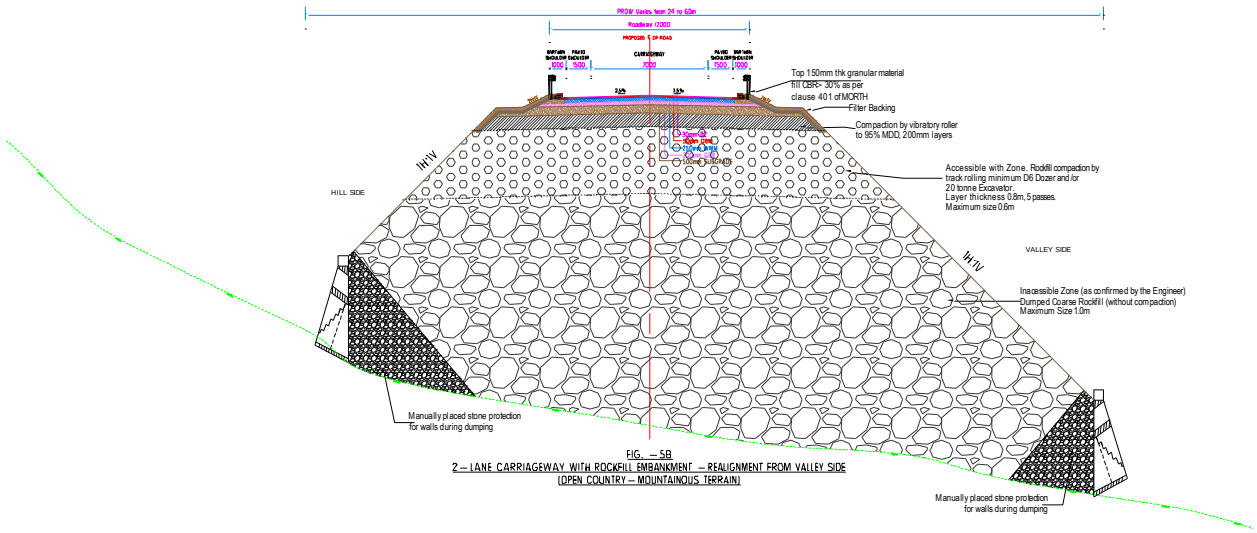

FIG. – 5B
2 – LANE CARRIAGEWAY WITH ROCKFILL EMBANKMENT – REALIGNMENT FROM VALLEY SIDE
(OPEN COUNTRY – MOUNTAINOUS TERRAIN)

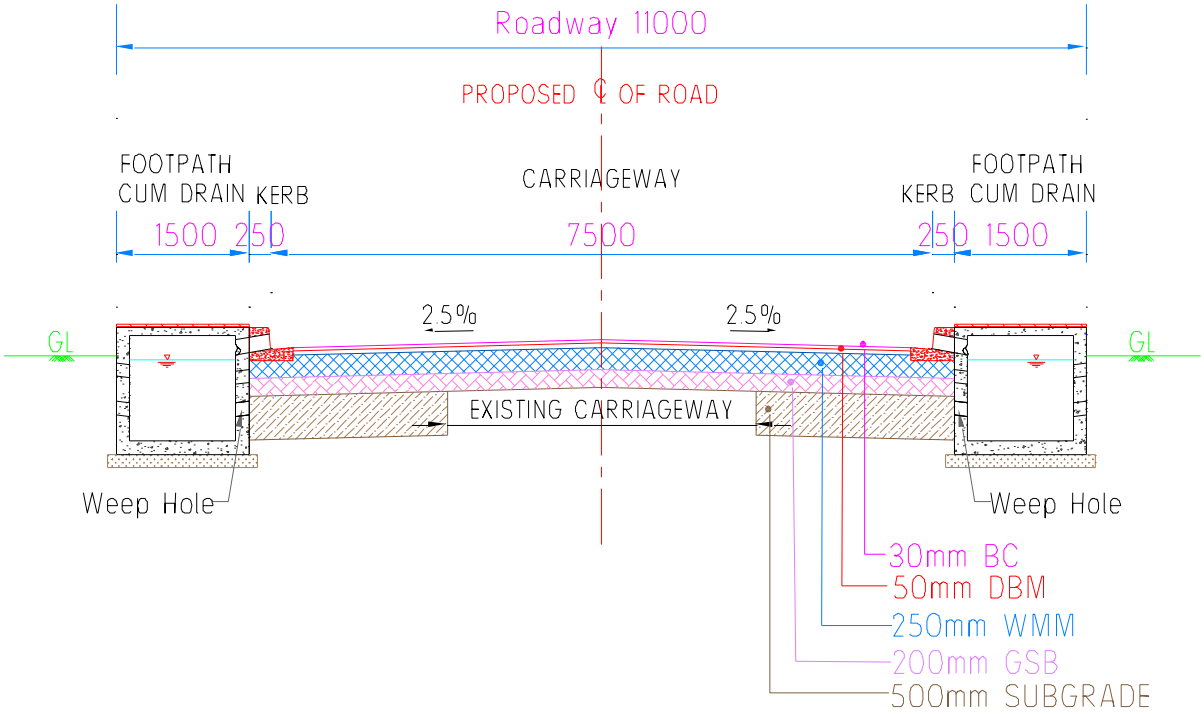

FIG. – 6
2 – LANE CARRIAGEWAY WITHOUT BREAST AND RETAINING WALL
(BUILT UP AREA – MOUNTAINOUS TERRAIN)

Note 1: The cross section schedule given in above table is indicative and stretches may

increase or decrease depending upon profile designed by contractor however, this shall not be treated as change of scope.

3. INTERSECTIONS AND GRADE SEPARATORS

All intersections and grade separators shall be as per Section 3 of the Manual (IRC:SP 73-2018). Existing intersections which are deficient shall be improved to the prescribed standards. For improvement of intersections and at grade junction standards and type plan MoRT&H and IRC:SP:41-1994 shall be followed.
Properly designed intersections shall be provided at the locations and of the types and features given in the tables below:

3.1 At-grade intersections:

1. Major Junction – 0 Nos.

SI. No.	Design Chainage (Km)	Category of Road	Type of Junction	Remark
-----NIL-----				

2. Minor Junction – 21 Nos

SI. No.	Design Chainage (Km)	Side	Type of Intersection	Remark
1	86.017	RHS	T Type	
2	87.235	RHS	T Type	
3	88.452	LHS	T Type	
4	89.669	RHS	T Type	
5	90.886	RHS	T Type	
6	92.104	RHS	T Type	
7	93.321	RHS	T Type	
8	94.538	LHS	T Type	
9	95.755	RHS	T Type	
10	96.973	RHS	T Type	
11	98.190	RHS	T Type	
12	99.407	RHS	T Type	
13	100.625	LHS	T Type	
14	101.842	RHS	T Type	
15	103.059	RHS	T Type	
16	104.276	LHS	T Type	
17	105.494	RHS	T Type	
18	106.711	RHS	T Type	

19	107.928	LHS	T Type	
20	109.145	RHS	T Type	
21	110.363	RHS	T Type	

Note: - It is clarified that if any other deficient junctions with cross BT/CC roads is identified during development period in addition to those mentioned above shall be improved as per standard set forth in Schedule 'D'. Any Increase in the junction specified in the clause of Schedule B shall not constitute a Change of Scope.

For cross road drainage facility new HP culverts on cross roads shall be constructed as per Clause 7.2.4 (c) of this Schedule and shall be as per Manual.

3.2 Grade separated intersection with ramps

Sr. No.	Location (Design Ch.)	Salient features	Minimum length of viaduct to be provided	Road to be carried under the structures
-----NIL-----				

Note: Approach Gradient & RE Walls: Approach and exit gradient of road crossing through underpass shall be provided as per Manual (IRC:SP:73-2018).

4. ROAD EMBANKMENT AND CUT SECTION

4.1 Reconstruction and up-gradation of the existing road embankment/cuttings and construction of new road embankment/cuttings shall conform to the Specifications and Standards given in section 4 of the Manual and the specified cross sectional details. Deficiencies in the plan and profile of the existing road shall be corrected.

4.2 Raising of the existing road:-

The existing road shall be raised in the following sections:

Sr. No.	Design Chainages		Design Length (km)	Remark
	From	To		
-----NIL-----				

Note: The chainages given in above table are indicative and stretches may increase or decrease depending upon profile designed by contractor, the raising for Reconstruction/ New Construction in approaches of Major/Minor Bridges shall be carried out by contractor as per **Schedule D** and in consultation with the Authority's Engineer and as per availability of land, however, this shall not be treated as change of scope.

5. PAVEMENT DESIGN

5.1 Pavement design shall be carried out in accordance with Section 5 of the Manual (IRC:SP 73-2018) IRC relevant codes and International Standards.

5.2 Type of pavement :-

Flexible Pavement – Flexible Pavement shall be constructed in entire length of 26.780 km (from km 84.800 to km 111.580) project highway.

Flexible Pavement shall be constructed in full length of Main Carriageway of project highway.

5.3 Design requirements

5.3.1 Design Period and strategy

Flexible pavement shall be constructed for new pavements and reconstruction of the existing road. Flexible pavement shall be designed for a minimum design period of 20 (Twenty) years and minimum CBR of subgrade should be 8%. Stage construction shall not be permitted.

5.3.2 Design Traffic

Notwithstanding anything to the contrary contained in this Agreement or the Manual, the Contractor shall design the pavement for design traffic of 375 CVPD (In Year 2019) consider future traffic projections for design life or as per the actual traffic whichever is higher. Minimum pavement composition should be adopted for new pavement/reconstruction of road as below:-

a) Main Carriageway:-

S. No.	Description	Minimum Crust Composition of Flexible Pavement (For 20 msa)
1	BC	30 mm
2	DBM	50 mm
3	WMM	250 mm
4	GSB	200 mm
	Total	**530 mm**

b) The Crust Composition for Truck Lay Byes shall be as per Main Carriageway Clause 5.3.2 (a) above.

c) The Crust composition for Minor roads, Bus bay shall be as per section 5 of IRC SP 73-2018

5.4 Widening & Reconstruction of stretches

The below mentioned length of the project road shall be widened & reconstructed by scarifying the existing carriageway and laying fresh pavement starting from sub-base level as per the plan and profile. These shall be designed as flexible pavement and minimum crust as per 5.3.2.

Sr. No.	Package Detail	Design Length (Km)
----------Nil----------		

5.5 New Construction of Bypasses and Realignments: -

Flexible pavement shall be constructed for bypasses, realignment and geometric improvements.

1. Realignments:-

Sr. No.	Package Detail	Design Length (Km)
----------Nil----------		

2. Bypasses :-

Sr. No.	Design Chainages		Design Length (Km)	Remark
	From	To		
1	84.800	111.580	26.780	**Total Green field**

3. **Geometric improvements:-**

Sr. No.	Package Detail	Design Length (Km)
----------Nil----------		

6. ROADSIDE DRAINAGE

Drainage system including surface and subsurface drains for the Project Highway shall be provided as per Section 6 of the Manual (IRC:SP 73-2018). RCC covered drain shall be provided in both side of Built-Up areas at following locations.

Sr. No.	Package Detail	Design Length (Km)
----------Nil----------		

On hill side open CC Drain with kerb shall be provided for typical cross sections mentioned in Clause 2.11 of Schedule B and as per cross section type given at Schedule D. In all built up areas RCC covered drains with Footpath shall be provided. Suitable crossing shall be provided at approaches to properties etc. invert levels of drains shall be decided on the basis of ground slopes of adjoining properties and open grounds.

In cutting portions CC open drain of suitable size shall be constructed for a minimum length of **7.615 Km** as per typical cross sections mentioned in Clause 2.11 of Schedule B in consultation with Authority Engineer.

Above length of the lined drains are indicative and minimum specified. The actual length of the lined drains shall be determined by the Contractor keeping in view the drainage location and in accordance with the Manual requirements with approval from the Authority's Engineer. Any increase in the length of drain as specified in above location shall not constitute a Change of Scope. Any New location as per site requirement and directed by Authority Engineer will be considered under a Change of Scope.

7 DESIGN OF STRUCTURES

7.1 General

7.1.1 All bridges, culverts and structures shall be designed and constructed in accordance with section 7 of the Manual (IRC: SP 73-2018) and shall conform to the cross-sectional features and other details specified therein. All designs shall be in conforming with is IRC and International Codes. The deviation shown in Schedule – D shall be taken in to considerations.

7.1.2 **New Major and Minor bridge**: Width of the carriageway of new Major bridges and structures shall be as follows:

The width of carriageway of new Major and Minor bridges shall be as mentioned below.

SI. No.	Bridge at km (Design Ch.)	Width of carriageway and cross sectional features	Remark
1	86+280	10.0 m Carriageway	Minor Bridge
2	95+050	10.0 m Carriageway	Minor Bridge

a Span arrangement of Major and Minor Bridge shall be designed by contractor on the basis of detailed surveys & investigations subject to minimum specified in GAD as per Para 7.3.2 of this schedule. Founding levels shall be decided after detailed Geo-

Technical investigation, Waterway, road top level, soffit etc. shall be decided on the basis of land survey conforming to various codal provision applicable

7.1.3 The following structures shall be provided with footpaths:

Sr. No.	Location at Km	Remarks
1	86+280	Minor Bridge
2	95+050	Minor Bridge

7.1.4 All bridges shall be high-level bridges.

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

Sr. No.	Bridge at Km	Utility service to be carried	Remark
1	86+280	Electrical/ Cables & Other etc.	Minor Bridge
2	95+050	Electrical/ Cables & Other etc	Minor Bridge

All Major / Minor Bridges, Box Culvert, Flyovers, Vehicular/Pedestrians Structures shall be designed to carry utility services like OFC Cables, Electricity Lines etc.

7.1.6 Cross-section of the new culverts and bridges at deck level for the Project Highway shall conform to the typical cross-sections given in section 7 of the Manual (IRC:SP 73-2018) and deviations given at Schedule D.

7.2 Culverts

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

7.2.2 Reconstruction of Existing Culverts

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

Refer to paragraph 7.3 (ii) of the Manual (IRC:SP 73-2018).

(a) SLAB CULVERT: Nil.

SI. No.	Culvert location		Proposed Span/ Opening (m.)	Proposed Width (m)	Remark
	Existing Chainage (Km)	Design Chainage (Km)			
----------NIL----------					

(b) PIPE CULVERTS: Nil.

SI. No.	Existing Chainage (Km)	Design Chainage (Km)	Proposed Span/ Opening (No. x Dia.) (m)	Proposed Width (m)	Remark
----------NIL---------					

Note: - It is clarified that as per site requirement New HP Culverts if required for drainage arrangement shall be identified & constructed if any during development shall be constructed as per standard set forth in Schedule 'D'& as per instruction of Authority Engineer.

7.2.3 Widening of existing culverts

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

(a) SLAB/BOX CULVERT: Nil.

Sr. No.	Existing Chainage (Km)	Design Chainage (Km)	Details of Existing Structure			Details of Proposed structure		
			Type of Structure	Span Arrang-ement	Width of Structure (m)	Span Arrang-ement	Proposed Width (m)	Remark
-----NIL-----								

(b) PIPE CULVERTS: Nil.

SI. No.	Existing Chainage (Km)	Design Chainage (Km)	Details of Existing Structure			Extend of widening	Remark
			Type of Structure	No. x Dia. (m)	Width of Structure (m)		
-----NIL-----							

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

(a) BOX CULVERT: 70 Nos.

SI. No.	Design Chainage (Km)	Proposed Span/ Opening (m.)	Proposed Width (m)	Type	Remark
1	85+590	1 X 3	12.00	Box Culvert	New Construction
2	85+870	1 X 3	12.00	Box Culvert	New Construction
3	86+575	1 X 3	12.00	Box Culvert	New Construction
4	87+110	1 X 2	12.00	Box Culvert	New Construction

SI. No.	Design Chainage (Km)	Proposed Span/ Opening (m.)	Proposed Width (m)	Type	Remark
5	87+580	1 X 2	12.00	Box Culvert	New Construction
6	87+700	1 X 3	12.00	Box Culvert	New Construction
7	88+420	1 X 2	12.00	Box Culvert	New Construction
8	89+060	1 X 2	12.00	Box Culvert	New Construction
9	89+310	1 X 3	12.00	Box Culvert	New Construction
10	89+490	1 X 3	12.00	Box Culvert	New Construction
11	90+290	1 X 2	12.00	Box Culvert	New Construction
12	90+800	1 X 3	12.00	Box Culvert	New Construction
13	91+200	1 X 3	12.00	Box Culvert	New Construction
14	91+650	1 X 2	12.00	Box Culvert	New Construction
15	91+800	1 X 3	12.00	Box Culvert	New Construction
16	92+120	1 X 2	12.00	Box Culvert	New Construction
17	93+970	1 X 2	12.00	Box Culvert	New Construction
18	94+710	1 X 2	12.00	Box Culvert	New Construction
19	95+400	1 X 3	12.00	Box Culvert	New Construction
20	95+510	1 X 3	12.00	Box Culvert	New Construction
21	95+928	1 X 3	12.00	Box Culvert	New Construction
22	95+990	1 X 3	12.00	Box Culvert	New Construction
23	96+030	1 X 3	12.00	Box Culvert	New Construction
24	96+590	1 X 3	12.00	Box Culvert	New Construction
25	96+820	1 X 3	12.00	Box Culvert	New Construction
26	97+000	1 X 3	12.00	Box Culvert	New Construction
27	97+100	1 X 3	12.00	Box Culvert	New Construction
28	97+350	1 X 4	12.00	Box Culvert	New Construction
29	97+440	1 X 4	12.00	Box Culvert	New Construction
30	97+884	1 X 4	12.00	Box Culvert	New Construction
31	98+370	1 X 2	12.00	Box Culvert	New Construction
32	99+050	1 X 2	12.00	Box Culvert	New Construction
33	99+700	1 X 2	12.00	Box Culvert	New Construction
34	99+800	1 X 2	12.00	Box Culvert	New Construction
35	99+950	1 X 2	12.00	Box Culvert	New Construction
36	100+100	1 X 2	12.00	Box Culvert	New Construction
37	100+400	1 X 2	12.00	Box Culvert	New Construction
38	100+710	1 X 2	12.00	Box Culvert	New Construction
39	101+080	1 X 4	12.00	Box Culvert	New Construction
40	101+270	1 X 2	12.00	Box Culvert	New Construction
41	101+546	1 X 4	12.00	Box Culvert	New Construction
42	102+200	1 X 2	12.00	Box Culvert	New Construction
43	102+690	1 X 2	12.00	Box Culvert	New Construction
44	103+150	1 X 4	12.00	Box Culvert	New Construction
45	103+600	1 X 4	12.00	Box Culvert	New Construction
46	103+870	1 X 4	12.00	Box Culvert	New Construction
47	104+255	1 X 2	12.00	Box Culvert	New Construction
48	104+670	1 X 2	12.00	Box Culvert	New Construction

SI. No.	Design Chainage (Km)	Proposed Span/ Opening (m.)	Proposed Width (m)	Type	Remark
49	104+800	1 X 2	12.00	Box Culvert	New Construction
50	104+990	1 X 2	12.00	Box Culvert	New Construction
51	105+250	1 X 2	12.00	Box Culvert	New Construction
52	105+520	1 X 2	12.00	Box Culvert	New Construction
53	105+580	1 X 4	12.00	Box Culvert	New Construction
54	105+830	1 X 2	12.00	Box Culvert	New Construction
55	106+040	1 X 2	12.00	Box Culvert	New Construction
56	106+400	1 X 4	12.00	Box Culvert	New Construction
57	106+490	1 X 2	12.00	Box Culvert	New Construction
58	106+870	1 X 2	12.00	Box Culvert	New Construction
59	107+600	1 X 2	12.00	Box Culvert	New Construction
60	108+020	1 X 2	12.00	Box Culvert	New Construction
61	108+450	1 X 2	12.00	Box Culvert	New Construction
62	108+550	1 X 4	12.00	Box Culvert	New Construction
63	108+760	1 X 2	12.00	Box Culvert	New Construction
64	108+950	1 X 2	12.00	Box Culvert	New Construction
65	109+155	1 X 4	12.00	Box Culvert	New Construction
66	109+380	1 X 2	12.00	Box Culvert	New Construction
67	109+525	1 X 4	12.00	Box Culvert	New Construction
68	110+220	1 X 2	12.00	Box Culvert	New Construction
69	110+610	1 X 3	12.00	Box Culvert	New Construction
70	110+755	1 X 4	12.00	Box Culvert	New Construction

(b) PIPE CULVERTS: 78 Nos.

Sr. No.	Design Chainage (Km)	No. x Dia.(mm)	Proposed Width (m)	Type	Remark
1	85+200	1 x 1200	12.00	HPC	New Construction
2	85+520	1 x 1200	12.00	HPC	New Construction
3	85+720	1 x 1200	12.00	HPC	New Construction
4	85+780	1 x 1200	12.00	HPC	New Construction
5	85+985	1 x 1200	12.00	HPC	New Construction
6	86+700	1 x 1200	12.00	HPC	New Construction
7	86+886	1 x 1200	12.00	HPC	New Construction
8	86+980	1 x 1200	12.00	HPC	New Construction
9	87+330	1 x 1200	12.00	HPC	New Construction
10	87+490	1 x 1200	12.00	HPC	New Construction
11	87+900	1 x 1200	12.00	HPC	New Construction
12	88+090	1 x 1200	12.00	HPC	New Construction
13	88+310	1 x 1200	12.00	HPC	New Construction
14	88+720	1 x 1200	12.00	HPC	New Construction
15	88+910	1 x 1200	12.00	HPC	New Construction
16	89+745	1 x 1200	12.00	HPC	New Construction

Sr. No.	Design Chainage (Km)	No. x Dia.(mm)	Proposed Width (m)	Type	Remark
17	89+900	1 x 1200	12.00	HPC	New Construction
18	90+145	1 x 1200	12.00	HPC	New Construction
19	90+470	1 x 1200	12.00	HPC	New Construction
20	90+900	1 x 1200	12.00	HPC	New Construction
21	91+390	1 x 1200	12.00	HPC	New Construction
22	91+488	1 x 1200	12.00	HPC	New Construction
23	92+280	1 x 1200	12.00	HPC	New Construction
24	92+360	1 x 1200	12.00	HPC	New Construction
25	92+650	1 x 1200	12.00	HPC	New Construction
26	92+880	1 x 1200	12.00	HPC	New Construction
27	93+200	1 x 1200	12.00	HPC	New Construction
28	93+330	1 x 1200	12.00	HPC	New Construction
29	93+730	1 x 1200	12.00	HPC	New Construction
30	94+190	1 x 1200	12.00	HPC	New Construction
31	94+520	1 x 1200	12.00	HPC	New Construction
32	95+810	1 x 1200	12.00	HPC	New Construction
33	96+110	1 x 1200	12.00	HPC	New Construction
34	96+310	1 x 1200	12.00	HPC	New Construction
35	96+390	1 x 1200	12.00	HPC	New Construction
36	97+070	1 x 1200	12.00	HPC	New Construction
37	97+170	1 x 1200	12.00	HPC	New Construction
38	97+250	1 x 1200	12.00	HPC	New Construction
39	97+750	1 x 1200	12.00	HPC	New Construction
40	98+100	1 x 1200	12.00	HPC	New Construction
41	98+670	1 x 1200	12.00	HPC	New Construction
42	98+700	1 x 1200	12.00	HPC	New Construction
43	99+350	1 x 1200	12.00	HPC	New Construction
44	100+575	1 x 1200	12.00	HPC	New Construction
45	101+800	1 x 1200	12.00	HPC	New Construction
46	101+935	1 x 1200	12.00	HPC	New Construction
47	102+070	1 x 1200	12.00	HPC	New Construction
48	102+500	1 x 1200	12.00	HPC	New Construction
49	103+360	1 x 1200	12.00	HPC	New Construction
50	104+050	1 x 1200	12.00	HPC	New Construction
51	104+360	1 x 1200	12.00	HPC	New Construction
52	104+480	1 x 1200	12.00	HPC	New Construction
53	104+890	1 x 1200	12.00	HPC	New Construction
54	105+170	1 x 1200	12.00	HPC	New Construction
55	105+350	1 x 1200	12.00	HPC	New Construction
56	105+420	1 x 1200	12.00	HPC	New Construction
57	105+700	1 x 1200	12.00	HPC	New Construction
58	105+900	1 x 1200	12.00	HPC	New Construction
59	106+200	1 x 1200	12.00	HPC	New Construction
60	106+640	1 x 1200	12.00	HPC	New Construction

Sr. No.	Design Chainage (Km)	No. x Dia.(mm)	Proposed Width (m)	Type	Remark
61	106+760	1 x 1200	12.00	HPC	New Construction
62	107+030	1 x 1200	12.00	HPC	New Construction
63	107+085	1 x 1200	12.00	HPC	New Construction
64	107+170	1 x 1200	12.00	HPC	New Construction
65	107+350	1 x 1200	12.00	HPC	New Construction
66	107+520	1 x 1200	12.00	HPC	New Construction
67	107+790	1 x 1200	12.00	HPC	New Construction
68	107+890	1 x 1200	12.00	HPC	New Construction
69	108+200	1 x 1200	12.00	HPC	New Construction
70	108+370	1 x 1200	12.00	HPC	New Construction
71	109+270	1 x 1200	12.00	HPC	New Construction
72	109+700	1 x 1200	12.00	HPC	New Construction
73	109+950	1 x 1200	12.00	HPC	New Construction
74	110+050	1 x 1200	12.00	HPC	New Construction
75	110+420	1 x 1200	12.00	HPC	New Construction
76	110+930	1 x 1200	12.00	HPC	New Construction
77	111+235	1 x 1200	12.00	HPC	New Construction
78	111+560	1 x 1200	12.00	HPC	New Construction

Note: - It is clarified that as per site requirement New HP Culverts if required for drainage arrangement shall be identified & constructed if any during development shall be constructed as per standard set forth in Schedule 'D'& as per instruction of Authority Engineer.

(c) PIPE CULVERTS AT CROSS ROAD JUNCTIONS: Nil.

As per site requirement New HP Culvert shall be constructed for drainage arrangement at following junctions as per standard set forth in Schedule 'D'& as per instruction of Authority Engineer.
For Junction Locations Refer Clause 3.1 of this Schedule B.

Sr. No.	Type of Junction	Nos.	Details of Proposed Structure		
			No. x Dia.	Proposed Width (m)	Remark
-------NIL------					

Note: - It is clarified that if any other deficient junctions with cross BT/CC roads is identified during development period shall be improved with drainage facilities with pipe culvert & as per standard set forth in Schedule 'D'.

7.2.5 Repairs/replacements of railing/parapets, flooring and protection works of the existing culverts shall be undertaken as per Para 7.22 of manual (IRC:SP 73-2018).

BOX CULVERTS – Nil

Sr. No.	Location of Structure (km)	Type	Remark
Nil			

Note: - It is clarified that above repairing & strengthening measures are indicative and minimum specified. The condition survey of the existing structure shall be carried out by the contractor as per IRC 35, & Strengthening / repairing shall be carried out as per the requirement of site and as per instruction of Authority Engineer, for pier, abutment, sub structure & super structure, replacement of bearings, expansion joints & wearing coat, providing railing on bridge, painting & protection works etc. If any increase in the specified above shall not constitute a Change of Scope.

PIPE CULVERTS - NIL

Sr. No.	Location of Structure (km)	Type	Remark
--NIL--			

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

7.3 Bridges

7.3.1 **Existing bridges to be re-constructed**

The existing bridges at the following locations shall be re-constructed as new Structures: [Refer to paragraph 7.3.2 of the Manual]

(a) MAJOR BRIDGES: - Nil

Sr. No.	Existing Chainage (Km)	Design Chainage (Km)	Details of Existing Structure			Details of Proposed structure			Remark
			Type of Structure	Span Arrang-ement	Width of Structure (m)	Span Arrang-ement	Proposed Width (m)	Type of Bridge	
--NIL--									

(b) MINOR BRIDGES: - Nil

Sr. No.	Existing Chainage (Km)	Design Chainage (Km)	Details of Existing Structure			Details of Proposed structure			Remark
			Type of Structure	Span Arrang-ement	Width of Structure (m)	Span Arrang-ement*	Proposed Width (m)	Type of Bridge	
--NIL--									

Where the Existing Bridge reconstructed as New Bridge at same place, dismantling of Existing Major/Minor bridge shall be carried out with all lead and lifts. A temporary

diversion works shall be constructed as per Fig. 9.26 of manual IRC SP 73-2018 and as per para 112 of standards and specifications of Indian Roads Congress (MORTH) Fifth Revision-2013 with adequate cross drainage structure and traffic safety and control devices. The diversions shall be maintained in satisfactory condition till such time they are required and as directed by the Authority Engineer.

(i) **The following narrow Bridges shall be widened including Strengthening & repairing of Existing Bridge**.

(c) MAJOR BRIDGES: - NIL

Sr. No.	Design Chainage (Km)	Existing Width (m)	Extent of widening (m)	Cross-section at deck level for widening @
-----NIL-----				

(d) MINOR BRIDGES: - NIL

7.3.2 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.

(a) MAJOR BRIDGES: - NIL

Sr. No.	Bridge at km (Design Ch.)	Total Length of bridge (m)	Total Width (m)
1	100+860	1 X 60.00	12.00

(b) MINOR BRIDGES: -

Sr. No.	Bridge at km (Design Ch.)	Total Length of bridge (m)	Total Width (m)
1	86+280	1 X 15.0	12.0
2	95+050	1 X 40.0	12.0

7.3.3 The railings of all existing bridges shall be replaced by crash barriers as per manual.

S. No.	Location at km	Remarks
-----NIL-----		

7.3.4 Repairs/replacements of railing/parapets of the existing bridges shall be undertaken as per manual.

S. No.	Location at km.	Remarks
-----NIL-----		

7.3.5 Drainage system for bridge decks

An effective drainage system for bridge decks shall be provided as specified in paragraph 7.21 of the Manual IRC SP 73 2015

7.3.6 Structures in marine environment : - NIL

7.4. Rail-road bridges: -NIL

7.4.1. Design, Construction and detailing of ROB/RUB shall be specified in section 7 of the Manual.

SI. No.	Existing Chainage (Km)	Design Chainage (Km)	Proposed span arrangement (m)	Width (m)	Track	Lane
-----NIL-----						

7.4.2. Road Over Bridges: NIL

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

SI. No.	Existing Chainage (Km)	Design Chainage (Km)	Proposed span arrangement (m)	Width (m)	Track	Lane
-----NIL-----						

7.5 Grade separated structures: - Nil.

The grade separator structures shall be provided at the location and of the type and length specified in paragraph 2.9 and 3 of this Annex-I

7.6 Repairs and strengthening of bridges and structures

[Refer to paragraph 7.23 of the Manual IRC SP 73 2018 and provide details]

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

A. BRIDGES

(i) MAJOR BRIDGES: - Nil.

Sr. No.	Location of bridge (km)	Nature and extent of repairs /strengthening to be carried out
-----NIL-----		

(ii) MINOR BRIDGES: - Nil.

Sr. No.	Location of bridge (km)	Nature and extent of repairs /strengthening to be carried out
-----NIL-----		

Note: - It is clarified that above repairing & strengthening measures are indicative and minimum specified. The condition survey of the existing structure shall be carried out by the contractor as per IRC 35, & Strengthening / repairing shall be carried out as per the requirement of site and as per instruction of Authority Engineer, for pier, abutment sub structure & super structure, replacement of bearings, expansion joints & wearing coat, providing railing on bridge, painting & protection works etc. If any increase in the specified above shall not constitute a Change of Scope.

B. ROB/RUB

(i) **ROB: - NIL**

(ii) **RUB: - NIL**

Sr. No.	Location of RUB (km)	Remark
-----NIL-----		

C. Overpasses/Underpasses and Other Structures: -

Sr. No.	Location of Structures (Km)	Nature and Extend of repairs / strengthening to be carried out
-----NIL-----		

7.7 List of Major Bridges and Structures :-

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

Sl. No.	Location
-----NIL-----	

8 TRAFFIC CONTROL DEVICES AND ROAD SAFETY WORKS

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

8.2 Specifications of the reflective sheeting shall be provided in accordance with Section 9 of the Manual.

8.3 Details shall be as approved by Authority Engineer.

8.4 Reflective Traffic Safety Products/Round tree reflectors shall be provided on tree for easy visibility at night.

8.5 Solar lights blinkers shall be provided at major & minor junctions etc.

9 ROADSIDE FURNITURE

9.1 Roadside furniture shall be provided in accordance with the provisions of Section 9 of the Manual.

9.2 Overhead traffic signs: The locations are mentioned in below table and the size shall be evolved based on design of sign boards given in IRC 67.

S. No	Location (Design Chainage)	Type	Remark
----------NIL---------			

Note: All Traffic Signs for Road Users would be provided as per Manual. However the Contractor shall provide minimum numbers of Cautionary, Mandatory, Warning and Informatory Traffic Sign Boards as mentioned below:

S. No	Location	Numbers	Size
1	At Junction, at curves &Built-up	592	90 cm Equilateral Triangle
2	At Curve	12	60 cm Equilateral Triangle
3	At Curves	24	60 cm Circular
4	At Junction & Other	30	80X60 cm Rectangular
5	At Village	0	80X60 cm Rectangular
6	At Junction &Village	726	60X45 cm Rectangular
7	At Curve	0	60X60 cm Square
8	At Junction & Busbay	30	90 cm High Octagon
9	Route Marker Sign	At Every 10 Km.	0.9 Sqm
10	Delineators at Curve , median openings & Structures	1551	80 – 100 cm High above Ground
11	Hazard Marker	Both Side on every Bridge	As per IRC

10 COMPULSORY AFFORESTATION

Deleted.

11 HAZARDOUS LOCATIONS

The safety barriers shall be provided at the hazardous locations as per Clause 7.18 of the Manual (IRC:SP 73-2018). W-Beam metal crash barriers shall however be provided for a minimum length of **10.378** Km. at all hazardous locations. All hazardous locations shall be finalized in consultation with the Authority Engineer.

Above length of the W-Beam metal crash barriers is indicative and minimum specified. The actual length of the W-Beam metal crash barriers shall be determined by the Contractor in accordance with the Manual requirements with approval from the Authority's Engineer. Any increase in the length specified in this Clause of Schedule B shall not constitute a Change of Scope.

a) RCC Retaining Wall : Retaining Wall shall be constructed as per typical cross sections as per Schedule D and at other locations mentioned below:

Retaining Wall Chainages International Corridor					
RHS			LHS		
From	To	Length	From	To	Length
95.500	95.800	300.000	85.100	85.250	150.000
95.900	96.300	400.000	85.500	85.670	170.000
96.500	96.700	200.000	85.700	85.810	110.000
96.750	96.900	150.000	86.600	86.800	200.000
97.000	97.400	400.000	86.900	87.110	210.000
97.450	97.700	250.000	87.500	87.850	350.000

Retaining Wall Chainages International Corridor					
RHS			LHS		
From	To	Length	From	To	Length
97.720	97.900	180.000	89.800	90.000	200.000
97.920	98.300	380.000	91.000	91.400	400.000
98.320	98.600	280.000	94.900	95.400	500.000
98.630	98.900	270.000	101.100	101.300	200.000
98.910	99.250	340.000	108.800	109.075	275.000
99.300	99.650	350.000			
99.700	100.000	300.000			
100.010	100.500	490.000			
100.510	100.787	277.000			
	TOTAL	**4567.000 m**		**TOTAL**	**2765.000m**

Above length of the Retaining Wall is indicative and minimum specified. The actual length of the Retaining Wall shall be determined by the Contractor in accordance with the Manual requirements with approval from the Authority's Engineer. Any increase in the length specified in this Clause of Schedule B shall not constitute a Change of Scope.

b) Breast Wall: Breast Retaining Wall shall be constructed as per typical cross sections as per Schedule D and at other locations mentioned below:

Breast Wall Chainages (HT 1.5m) International Corridor					
RHS			LHS		
From	To	Length	From	To	Length
85.600	85.710	110.000	86.600	86.750	150.000
86.100	86.220	120.000	86.800	87.000	200.000
86.370	86.527	157.000	87.500	87.610	110.000
86.600	86.720	120.000	88.900	89.120	220.000
86.750	86.910	160.000	89.900	90.170	270.000
87.100	87.300	200.000	90.600	90.750	150.000
88.900	89.020	120.000	90.900	91.100	200.000
			91.300	91.460	160.000
			91.500	91.650	150.000
			92.110	92.250	140.000
			92.500	92.670	170.000
			92.800	93.070	270.000
			93.200	93.410	210.000
			93.600	93.780	180.000
			93.850	94.000	150.000
			94.200	94.450	250.000
			94.600	94.750	150.000
			94.840	95.110	270.000
			95.200	95.360	160.000
			95.400	95.620	220.000
			95.750	96.000	250.000

Breast Wall Chainages (HT 1.5m) International Corridor					
RHS			LHS		
From	To	Length	From	To	Length
			96.200	96.350	150.000
			96.410	96.460	50.000
	TOTAL	987.000m		TOTAL	4230.000m

Breast Wall Chainages (HT 3.0m) International Corridor					
RHS			LHS		
From	To	Length	From	To	Length
85.100	85.250	150.000	96.500	96.750	250.000
85.500	85.670	170.000	96.900	97.000	100.000
85.700	85.810	110.000	97.050	97.100	50.000
86.600	86.800	200.000	97.130	97.200	70.000
86.900	87.110	210.000	97.250	97.490	240.000
87.500	87.850	350.000	97.560	97.600	40.000
89.800	90.000	200.000	97.800	97.950	150.000
91.000	91.400	400.000	98.050	98.110	60.000
94.900	95.400	500.000	98.200	98.230	30.000
101.100	101.300	200.000	98.250	98.320	70.000
101.400	101.600	200.000	98.370	98.450	80.000
101.700	101.950	250.000	98.550	98.650	100.000
102.000	102.150	150.000	98.700	98.850	150.000
102.200	102.350	150.000	99.000	99.160	160.000
102.400	102.650	250.000	99.200	99.250	50.000
102.700	102.800	100.000	99.310	99.390	80.000
102.850	102.950	100.000	99.500	99.610	110.000
102.950	103.150	200.000	99.670	99.720	50.000
102.160	102.300	140.000	99.800	100.000	200.000
102.310	102.500	190.000	100.110	100.260	150.000
102.520	102.750	230.000	100.300	100.360	60.000
102.800	102.900	100.000	100.400	100.550	150.000
102.950	103.200	250.000	100.610	100.670	60.000
103.230	103.500	270.000	100.700	100.790	90.000
103.550	103.714	164.000	100.850	100.960	110.000
85.100	85.250	150.000	103.900	104.110	210.000
			104.200	104.450	250.000
			104.500	104.750	250.000
			104.810	104.950	140.000
			105.000	105.100	100.000
			105.150	105.280	130.000
			105.300	105.500	200.000
			105.550	105.650	100.000
			105.700	105.950	250.000
			106.000	106.230	230.000
			106.300	106.600	300.000

Breast Wall Chainages (HT 3.0m) International Corridor					
RHS			LHS		
From	To	Length	From	To	Length
			106.650	106.750	100.000
			106.800	106.970	170.000
			107.000	107.250	250.000
			107.300	107.600	300.000
			107.640	107.800	160.000
			107.850	108.000	150.000
			108.110	108.290	180.000
			108.350	108.600	250.000
			108.650	108.800	150.000
			108.900	109.100	200.000
			109.200	109.450	250.000
			109.500	109.700	200.000
			109.750	109.840	90.000
			109.860	110.000	140.000
			110.010	110.250	240.000
			110.260	110.350	90.000
			110.400	110.550	150.000
			110.560	110.750	190.000
			110.800	111.000	200.000
			111.000	111.204	204.000
			111.220	111.370	150.000
			111.400	111.500	100.000
	TOTAL	**5234.000m**		**TOTAL**	**8734.000m**

Above length of the Breast Wall is indicative and minimum specified. The actual length of the Breast Wall shall be determined by the Contractor in accordance with the Manual requirements with approval from the Authority's Engineer. Any increase in the length specified in this Clause of Schedule B shall not constitute a Change of Scope.

RE WALL (International Corridor)

RE Wall Chainages International Corridor					
RHS			LHS		
From	To	Length	From	To	Length
103.800	103.865	65.000	84.450	84.550	100.000
			85.700	85.810	110.000
			86.600	86.800	200.000
			86.900	87.110	210.000
			101.100	101.134	34.000
	Total	**65.000 m**		**Total**	**654.000 m**

Rock Fill / Toe Wall Chainages - (International Corridor)

SR. No.	Chainage		Length
	From	To	
1	100.780	100.620	160.000
		TOTAL	**160.000 m**

12 SPECIAL REQUIREMENT FOR HILL ROADS:-

The special requirements for Hill road as per Section 13 of Manual IRC 73 2018 shall be constructed & provided as per requirements with approval from the Authority's Engineer

13 CHANGE OF SCOPE

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

SCHEDULE - C
(See Clause 2.1)

PROJECT FACILITIES

1. Project Facilities

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

(a) toll plaza[s];

(b) roadside furniture;

(c) pedestrian facilities;

(d) Landscaping

(e) truck lay-byes;

(f) bus-bays and bus shelters;

(g) rest areas and public utility centers

(h) street lighting & high mast lighting

(i) Advanced Traffic Management System (ATMS)

(j) Rain Water Harvesting

(k) others

2. Description of Project Facilities

Each of the Project Facilities is briefly described below:

a) Toll Plazas : Nil

Toll Plaza	Design Chainage (in km)
-----NIL-----	

The tentative location is mentioned as above however the exact location identified shall be finalized in consultation with the Authority Engineer. Specifications and other requirements of the toll plazas shall be strictly as per Section 10 of Manual IRC SP 73-2018. Toll Plaza should be design such that roof canopy fixed with solar panels.

b) Road side Furniture shall be provided as follows: -

(i) Traffic Signs and Pavement Markings

Traffic signs and pavement markings shall include road side signs, overhead signs, curve mounted signs and road marking along the project highway. The locations for these provisions shall be finalised in consultation with Authority's Engineer and as per latest IRC Standard.

(ii) Concrete Crash Barrier, Metal beam crash barrier, Separators (MS railings)

The minimum length of *10.378 Km* ***Metal beam crash barrier, shall be provided as per Schedule D and for safety of traffic & users.***

(iii) Traffic Safety Devices in consultation with Authority's Engineer & Latest IRC standards

(iv) Boundary Stones shall be placed throughout the project road as per schedule 'D'

(v) Hectometer / Kilometer Stones as per schedule 'D'

(vi) Solar Traffic blinker signal (L.E.D) shall be provided at intersections.

c) Pedestrian Facilities

The additional pedestrians' facilities in the form of guard rails, footpath, lighting etc. shall be provided in built-up area.

d) Landscaping and Tree Plantation

Landscaping and road side plantation shall be provided in accordance with the Manual of Specifications and Standards as referred in Schedule B and D. Contractor Shall be responsible for implementation of Environment management Plan (EMP) on the project. The cost of EMP shall be Bourne by Contractor.

e) Truck Lay-byes

Truck Lay byes shall be provided at locations given below as per Manual.

Sr. No.	Existing Chainage (km)	Design Chainage (km)	Side	Remark
1	-	84.900	Both Side	Khawzawl
2	-	111.200	Both Side	Zakhawthar Junction

The tentative location is mentioned as above however the exact location identified shall be finalised in consultation with the Authority Engineer.

f) Bus-bays and Bus Shelter,

Bus Lay bye with bus shelter & bus shelter shall be provided at locations given below.

Sr. No.	Existing Chainage (km)	Design Chainage (Km)	Side	Village Name	Remark
1	-	86.500	LHS	Kawnzar	Bus Shelter
2	-	89.970	LHS	Hermon	Bus Shelter
3	-	92.100	RHS	Chawngtlai	Bus Shelter
4	-	94.750	RHS	Chawngtlai	Bus Shelter
5	-	97.440	LHS	Chawngtlai	Bus Shelter
6	-	101.560	RHS	Chawngtlai	Bus Shelter
7	-	102.330	RHS	Chawngtlai	Bus Shelter

Note: The locations of Bus Lay byes with bus shelter/ Bus shelter are tentative & shall be got approved / provided in consultation with the Authority / Authority's Engineer.

g) Rest Area: **Nil**.

h) Street Lighting & High Mast Lighting

i. Street/Highway Lighting

Street Light: Street lighting on decorative lamp post with LED /energy efficient lighting system of standard make with minimum 40 Lux capacity shall be provided @ 30m interval for entire project highway. Street lights shall be provided with dual lights on single pole and single lights on single pole. The height of street light pole shall be about 9m above FRL and that of high mast shall be 25m. The street light arrangement is given in following table:

Sr. No	Chainage		Length (km)	Spacing (m)	Height of Pole (m)	No of One way Light Poles	No of Two way Light Poles
	From	To					
----------NIL----------							

ii. **High Mast Lighting**

High mast lighting shall be provided at Major junctions, Flyovers toll plaza and Bus Bay /Truck Lay byes using LED / energy efficient lighting system. The high mast shall be provided at following locations:

Sr. No	Design Chainage	Location	Height of HM (m)	Qty. (Nos.)
----------NIL----------				

iii. Solar lights blinkers shall be provided at major & minor junctions etc.

iv. The lighting work shall be got done from the qualified specialised agency.

v. The scope include providing entire lighting systems, trenching, underground / building in cabling, transformers etc and obtaining electric supply / approval from concern Govt. department etc.

i) Advanced Traffic Management System (ATMS)

ATMS shall be provided as per para 12.15 of the Manual (IRS SP 73 2015).

j) Rain Water Harvesting System

Rain Water Harvesting System shall be provided at bus bay with bus shelter, truck lay byes locations.

3. Slope protection

The slope protection by lawn or any other method using green technology will be provided as per Manual and as directed by Authority.

4. Utility pipe ducts

Utility pipe ducts in C.C. Pipe – 600mm @ 1000.00m c/c for rural & urban length of project road across road with proper inlet and chamber for crossing service lines such as irrigation pipe lines and cables. In urban areas the ducts shall be constructed along the project road for linear underground utility lines. The ducts shall be laid at a suitable depth as approved by Authority Engineer.

5. Utilities

Utilities to be identified at site and certified by the Authority Engineer then shifting may be taken by contractor.

Note: In case of any discrepancy in numbers or locations of any of the project facilities mentioned in this Schedule C, shall be constructed and provided in consultation with the Authority Engineer as per site/design requirement.

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 with Paved shoulder (IRC: SP: 73-2018), referred to herein as the Manual for 2-Lane project road.

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Annex - I
(Schedule-D)

SPECIFICATIONS AND STANDARDS FOR CONSTRUCTION

1 Specifications and Standards

All Materials, works and construction operations shall conform to the Manual of Specifications and Standards for Two-Laning with Paved shoulder of Highways (IRC:SP:73-2018), referred to as the Manual, and MORTH Specifications for Road and Bridge Works. Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Authority's Engineer.

2 Deviations from the Manual

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

2.2 Notwithstanding anything to the contrary contained in Paragraph 1 above, Manual, the following Specifications and Standards shall apply to the Project Highway, and for purposes of this Agreement, the aforesaid Specifications and Standards shall be deemed to be amended to the extent set forth below:

S. No.	Clause No.	Provisions in Clause	Variation Proposed in Brief
1	Clause 2.2	For Mountainous and steep Ruling Min Speed is 40/30 km/h	For Mountainous and steep Ruling Min Speed is 40/30 km/h
2	Clause 2.16	Typical Cross Sections	Fig. 1, 2A, 2B, 3, 4 & 5 as Per Schedule - B

(See Clauses 2.1 and 14.2)

Maintenance Requirements

1. Maintenance Requirements

(i) The Contractor shall, at all times maintain the Project Highway in accordance with the provisions of this Agreement, Applicable Laws and Applicable Permits.

(ii) 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.

(iii) All Materials, works and construction operations shall conform to the MORTH Specifications for Road and Bridge Works, and the relevant IRC publications. Where the specifications for a work are not given, Good Industry Practice shall be adopted.

[Specify all the relevant documents]

2. Repair/rectification of Defects and deficiencies

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

3. Other Defects and deficiencies

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

4. Extension of time limit

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

5. Emergency repairs/restoration

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

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

6. Daily inspection by the Contractor

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

7. Pre-monsoon inspection / Post-monsoon inspection

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

8. Repairs on account of natural calamities

All damages occurring to the Project Highway on account of a Force Majeure Event or wilful 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)

Annex –I 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 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					
Flexible Pavement (Pavement of MCW, Service Road, approaches of Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	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 3004.2
	Cracking	Nil	< 5 % subject to limit of 0.5 sqm for any 50 m length	Daily			7-15 days	MORT&H Specification 3004.3
	Rutting	Nil	< 5 mm	Daily	Straight Edge		15 -30 days	MORT&H Specification 3004.2
	Corrugations and Shoving	Nil	< 0.1 % of area	Daily	Length Measurement Unit like Scale, Tape, odometer etc.		2-7 days	IRC:82-2015
	Bleeding	Nil	< 1 % of area	Daily			3-7 days	MORT&H Specification 3004.4
	Ravelling/ 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 location, restricted to 30 cm from the edge	Daily			7- 15 days	IRC:82-2015
	Roughness BI	2000 mm/km	2400 mm/km	Bi-Annually	Class I Profilometer SCRIM (Sideway-force Coefficient	Class I Profilometer : ASTM E950 (98) :2004 –Standard Test Method for measuring Longitudinal Profile of Travelled Surfaces with	180 days	IRC:82-2015
	Skid Number	60SN	50SN	Bi-Annually			180 days	BS: 7941-1: 2006
	Pavement Condition Index	3	2.1	Bi-Annually			180 days	IRC:82-2015

<table>
<tr><th rowspan="2">Asset Type</th><th rowspan="2">Performance Parameter</th><th colspan="2">Level of Service (LOS)</th><th rowspan="2">Frequency of Inspection</th><th rowspan="2">Tools/ Equipment</th><th rowspan="2">Standards and References for Inspection and Data Analysis</th><th rowspan="2">Time limit for Rectification/Repair</th><th rowspan="2">Maintenance Specifications</th></tr>
<tr><th>Desirable</th><th>Acceptable</th></tr>
<tr><td rowspan="3"></td><td>Other Pavement Distresses</td><td></td><td></td><td>Bi-Annually</td><td rowspan="2">Routine Investigation Machine or equivalent)</td><td>Accelerometer Established Inertial Profiling Reference ASTM E1656 -94: 2000- Standard Guide for Classification of Automatic Pavement Condition Survey Equipment</td><td>2-7 days</td><td>IRC:82-2015</td></tr>
<tr><td>Deflection/ Remaining Life</td><td></td><td></td><td>Annually</td><td>Falling Weight Deflectometer</td><td>IRC 115: 2014</td><td>180 days</td><td>IRC:115-2014</td></tr>
<tr><td rowspan="2">Rigid Pavement (Pavement of MCW, Service Road, Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)</td><td>Roughness BI</td><td>2200mm/ km</td><td>2400mm/km</td><td>Bi-Annually</td><td>Class I Profilometer</td><td>ASTM E950 (98) :2004 and ASTM E1656 -94: 2000</td><td>180 days</td><td>IRC:SP:83-2008</td></tr>
<tr><td>Skid</td><td colspan="2">Skid Resistance no. at different speed of vehicles
<table><tr><th>Minimum SN</th><th>Traffic Speed (Km/h)</th></tr><tr><td>36</td><td>50</td></tr><tr><td>33</td><td>65</td></tr><tr><td>32</td><td>80</td></tr><tr><td>31</td><td>95</td></tr><tr><td>31</td><td>110</td></tr></table></td><td>Bi-Annually</td><td>SCRIM (Sideway-force Coefficient Routine Investigation Machine or equivalent)</td><td>IRC:SP:83-2008</td><td>180 days</td><td>IRC:SP:83-2008</td></tr>
<tr><td rowspan="4">Embankment / Slope</td><td>Edge drop at shoulders</td><td>Nil</td><td>40mm</td><td>Daily</td><td rowspan="3">Length Measurement Unit like Scale, Tape, odometer etc.</td><td rowspan="4">IRC</td><td>7-15 days</td><td>MORT&H Specification 408.4</td></tr>
<tr><td>Slope of camber/cross fall</td><td>Nil</td><td><2% variation in prescribed slope of camber /cross fall</td><td>Daily</td><td>7-15 days</td><td>MORT&H Specification 408.4</td></tr>
<tr><td>Embankment Slopes</td><td>Nil</td><td><15 % variation in prescribe side slope</td><td>Daily</td><td>7-15 days</td><td>MORT&H Specification 408.4</td></tr>
<tr><td>Embankment Protection</td><td>Nil</td><td>Nil</td><td>Daily</td><td>NA</td><td>7-15 days</td><td>MORT&H Specification</td></tr>
</table>

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					
	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:**

Sr. 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 crack d = 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. Within 7days
			3	w = 0.5 - 1.5 mm, discernible from fast-moving car		
			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 crack d = 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	

Sr. 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 Within 15days
			5	w > 6 mm, usually associated with spalling, and/or slab rocking under traffic	Not Applicable, as it may be full depth	
3	**Single Longitudinal Crack intersecting with one or more joints**	w = width of crack L = length of crack d = depth of crack D = 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
			2	w = 0.5 - 3.0 mm, discernible from fast vehicle	Route seal and stitch, if L > 1 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 - 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 > 1 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 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)	Full depth repair
			4	w > 1.5 mm; L > 0.6 m or three corners broken		

Sr. 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	three or four corners broken	Within 15 days	Reinstate sub-base, and reconstruct the 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/m²	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/m²		
			3	w > 1.5 mm and L < 3 m/m²		
			4	w > 3 mm, L < 3 m/m² 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/m² and deformation		
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**	**Long Term**
					No action.	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. Within 30 days	
			4	r = 25 - 50 %		
			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 %		
			3	r = 10 - 20%	Bonded Inlay within 15 days	

Sr. 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	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		
			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/m² d = diameter h = maximum depth	0	d < 50 mm; h < 25 mm; n < 1 per 5 m²	No action.	Not Applicable
			1	d = 50 - 100 mm; h < 50 mm; n < 1 per 5 m²	Partial depth repair 65 mm deep. Within 15 days	
			2	d = 50 - 100 mm; h > 50 mm; n < 1 per 5 m²		
			3	d = 100 - 300 mm; h < 100 mm n < 1 per 5 m²	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 m²		
			5	d > 300 mm; h > 100 mm: n > 1 per 5 m²	Full depth repair. Within 30 days	
Joint Defects						
					Short Term	**Long Term**
11	**Joint Seal Defects**	loss or damage L = Length as % total joint length	0	Difficult to discern.	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	

Sr. 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	Severe; w > 3 mm negligible protection against ingress of water and trapping incompressible material.	Clean, widen and reseal the joint. Within 7 days	
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) in Cracks or Joints**	f = difference of level	0	not discernible, < 1 mm	No action.	No action.
			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 within 7 days	
			3	h = 12 - 25 mm		
			4	h > 25 mm	Full Depth Repair. Within 30 days	

Sr. 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	shattered slabs, ie 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 sub-grade. Reinstate pavement at normal level if L < 20 m. Within 30 days	
			5	h > 100 mm		
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	Stabilise subgrade. Reinstate pavement at normal level if length < 20 m. Within 30 days	
			5	h > 100 mm		
17	**Bump**	h = vertical displacement from normal profile	0	h < 4 mm	No action	
			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**	**Long Term**
					No action.	
			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 within 7	

Sr. 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	f = 50 - 75 mm	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>Level of Service (LOS)</th><th>Frequency of Measurement</th><th>Testing Method</th><th>Recommended Remedial measures</th><th>Time limit for Rectification</th><th>Specifications and Standards</th></tr>
<tr><td>Highway</td><td>Availability of Safe Sight Distance</td><td>As per IRC SP: 84-2014, a minimum of safe stopping sight distance shall be available throughout.
<table><tr><th>Design Speed, kmph</th><th>Desirable Minimum Sight Distance (m)</th><th>Safe Stopping Sight Distance (m)</th></tr><tr><td>100</td><td>360</td><td>180</td></tr><tr><td>80</td><td>260</td><td>130</td></tr></table></td><td>Monthly</td><td>Manual Measurements with Odometer along with video/ image backup</td><td colspan="2">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>IRC:SP 84-2014</td></tr>
<tr><td rowspan="2">Pavement Marking</td><td>Wear</td><td><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>
<tr><td>Day time Visibility</td><td>During expected life Service Time
Cement Road - 130mcd/m²/lux
Bituminous Road - 100mcd/m²/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>
</table>

<table>
<tr><th>Asset Type</th><th>Performance Parameter</th><th>Level of Service (LOS)</th><th>Frequency of Measurement</th><th>Testing Method</th><th>Recommended Remedial measures</th><th>Time limit for Rectification</th><th>Specifications and Standards</th></tr>
<tr><td rowspan="2"></td><td>Night Time Visibility</td><td>Initial and Minimum Performance for Dry Retro reflectivity during night time:
<table><tr><td>Design Speed</td><td colspan="2">(RL) Retro Reflectivity (mcd/m²/lux)</td></tr><tr><td></td><td>Initial (7 days)</td><td>Minimum Threshold level (TL) & warranty period required up to 2 years</td></tr><tr><td>Up to 65</td><td>200</td><td>80</td></tr><tr><td>65 - 100</td><td>250</td><td>120</td></tr><tr><td>Above 100</td><td>350</td><td>150</td></tr></table>Initial and Minimum Performance for Night Visibility under wet condition (Retro reflectivity):
Initial 7 days Retro reflectivity: 100 mcd/m²/lux
Minimum Threshold Level: 50 mcd/m²/lux</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>
<tr><td>Skid Resistance</td><td>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</td><td>Bi-Annually</td><td>As per Annexure-G of IRC:35-2015</td><td></td><td>Within 24 hours</td><td>IRC:35-2015</td></tr>
</table>

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
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/Cantilever Sign boards	IRC:67-2012
	Retro reflectivity	As per specifications in IRC:67-2012	Bi-Annually	Testing of each signboard using Retro Reflectivity Measuring Device. In accordance with ASTM D 4956-09.	Change of signboard	48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs) 1 Month in case of Gantry/Cantilever Sign boards	RC:67-2012
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 Furniture	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

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	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 Traffic Safety Barriers	Functionality: Functioning of End Treatment as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84-2014, 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	Rectification	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 Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Trees and Plantation including median plantation	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	
Other Project Facilities and Approach 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 Measurement	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 barrel after 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 Delamination of concrete not more than 0.25 sq.m. Cracks wider than 0.3 mm not more than 1m aggregate length	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
	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

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
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 sqm	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 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 sqm					
	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 IRC SP: 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.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	Rainwater seepage through deck slab	Leakage - nil	Quarterly	Detailed condition survey as per IRC SP: 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 live loads	Within design limits.	Once in every 10 years for spans more than 40 m	Load test method	Carry out major rehabilitation works on bridge to retain original design loads capacity	6 months	IRC SP: 51-1999.
	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 expansion joint	No dust or debris in expansion joint gap.	Monthly	Detailed condition survey as per IRC SP:35-1990 using Mobile Bridge Inspection Unit	Cleaning of expansion joint gaps thoroughly	3 days	MORTH specifications 2600 and IRC SP: 40-1993.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	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.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
	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 sq.m, damage to solid apron (concrete apron) not more than 1 sq.m	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.
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	7 (seven) days
(vi)	Desilting of drains in urban/semi- urban	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**	
(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]**	

Nature of Defect or deficiency		Time limit for repair/ rectification
(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	within 48 (forty eight) hours
	Permanent measures	within15 (fifteen) days or as specified by the Authority's Engineer
(b)	**Foundations**	
(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
(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 4.1 (vii)(a))

Applicable Permits

1. Applicable Permits

(i) The Contractor shall obtain, as required under the Applicable Laws, the following Applicable Permits:

(a) Permission of the State Government for extraction of boulders from quarry;

(b) Permission of Village Panchayats and Pollution Control Board for installation of crushers;

(c) Licence for use of explosives;

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

(e) Licence from inspector of factories or other competent Authority for setting up batching plant;

(f) Clearance of Pollution Control Board for setting up batching plant;

(g) Clearance of Village Panchayats and Pollution Control Board for setting up asphalt plant;

(h) Permission of Village Panchayats and State Government for borrow earth; and

(i) Any other permits or clearances required under Applicable Laws.

(ii) Applicable Permits, as required, relating to environmental protection and conservation shall have been procured by the Authority in accordance with the provisions of this Agreement.

Schedule - G

(See Clauses 7.1 and 19.2)

Annex-I : Form of Bank Guarantee

(See Clause 7.1)

[Performance Security /Additional Performance Security]

To

_____[name of Authority]

_____ [address of Authority]

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 an {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**"[1]).

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.

[1] 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 of National Highways & Infrastructure Development Corporation Limited], 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 during and 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, fulfillment 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 of any other matter or thing whatsoever which under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.

6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Contract or for the fulfillment, 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 ****[$]. 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. This guarantee shall also be operatable at our…….Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.

14. 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, details of which is as under:

[$]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 periods of two years at one time and keep on renewing the same till the DLP is over if they have problems in getting the BG in one go for the entire DLP.

S.No.	Particulars	Details

1	Name of Beneficiary	National Highways & Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Canara Bank (erstwhile Syndicate Bank) transport Bhawan, 1st Parliament Street, New Delhi-110001

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

SIGNED, SEALED AND DELIVERED
For and on behalf of the Bank by:
(Signature)
(Name)
(Designation)
(Code Number)
(Address)

NOTES:

(i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.

(ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.

Annex - II

(Schedule - G)

(See Clause 19.2)

Annex – II: Form for Guarantee for Advance Payment

To

_____[name of Authority]

_____ [address of Authority]

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**")[2].

(C) We, through our branch at (the "Bank") have agreed to furnish this bank guarantee (hereinafter called the "Guarantee") for the Guarantee Amount.

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

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

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

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 ****[3] Unless a demand or

3 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).

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 authorised to receive such notice and to effect payment thereof forthwith, and if sent by post it shall be deemed to have been given at the time when it ought to have been delivered in due course of post and in proving such notice, when given by post, it shall be sufficient to prove that the envelope containing the notice was posted and a certificate signed by an officer of the Authority that the envelope was so posted shall be conclusive.

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.

11. 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.

12. This guarantee shall also be operatable at our…….Branch at New Delhi, from whom, confirmation regarding the issue of this guarantee or extension / renewal thereof shall be made available on demand. In the contingency of this guarantee being invoked and payment thereunder claimed, the said branch shall accept such invocation letter and make payment of amounts so demanded under the said invocation.

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, details of which is as under:

S.No.	Particulars	Details
1	Name of Beneficiary	National Highways & Infrastructure Development Corporation Limited
2	Beneficiary Bank Account No.	90621010002659
3	Beneficiary Bank Branch	IFSC SYNB0009062
4	Beneficiary Bank Branch Name	Transport Bhawan, New Delhi
5	Beneficiary Bank Address	Canara Bank (erstwhile Syndicate Bank) transport Bhawan, 1st Parliament Street, New Delhi-110001

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:
(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

(i) The bank guarantee should contain the name, designation and code number of the officer(s) signing the guarantee.

(ii) The address, telephone number and other details of the head office of the Bank as well as of issuing branch should be mentioned on the covering letter of issuing branch.

Schedule - H

(See Clauses10.1 (iv) 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 percentage to the Contract Price	Stage for Payment	Percentage weightage to Particular item (col.2)
1	2	3	4
Road works including culverts, widening and repair of culverts.	62.28%	**A- Widening and reconstruction of existing road (Flexible Pavement)**	
		B.1- Reconstruction/New 2 - lane realignment/ bypass (Flexible Pavement)	
		(1) Earthwork up to top of the sub-grade	
		i) Earthwork including Site Clearance, Excavation in all type of Soil, Ordinary Rock & Hard Rock	33.73%
		ii) Earthwork with scarifying existing Bituminous surface with preparation upto Sub-Grade Top	14.61%
		(2) Sub-base Course	8.97%
		(3) Non Bituminous Base Course	12.07%
		(4) Bituminous Base Course	7.57%
		(5) Wearing Coat	4.93%
		(6) Shoulder	0.63%
		B.2- Reconstruction/New 2 - lane realignment/ bypass (Rigid Pavement)	
		C.1 - Reconstruction/New Service Road (Flexible Pavement)	
		C.2 - Reconstruction/New Service Road (Rigid Pavement)	
		D - Reconstruction/New Culverts on existing road, realignment, bypasses	
		Culverts (length <6m)	

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage to Particular item (col.2)
1	2	3	4
		i) Box Culverts (2X2)	6.10%
		ii) Box Culverts (3X3)	4.22%
		iii) Box Culverts (4X4)	3.94%
		iv) Box Culverts (6X6)	0.00%
		v) HPC (1X1200 Dia)	3.23%
Minor Bridges	5.33%	**A.1 - Widening and Repair of Minor Bridges (Length > 6m and < 60m)**	
		A.2 - New Minor Bridges (Length > 6m and < 60m)	
		(1) Foundation +Sub-Structure	
		i) Earthwork including excavation for Structures in Soil, Ordinary Rock & Hard Rock with Embankment Preparation	2.73%
		ii) foundation work including foundations for wing and return walls, abutments, piers upto the abutment/pier cap excluding excavation	67.18%
		(2) Super-structure	29.65%
		(3) Approaches	0.44%
Major Bridge (length >60m.) works	1.75%	**A.1- Widening and repairs of Major Bridges**	
		A.2 - New Major Bridges	
		(1) Foundation	
		i) Earthwork including excavation for Structures in Soil, Ordinary Rock & Hard Rock with Embankment Preparation	2.12%
		ii) foundation work including foundations for wing and return walls, abutments, piers upto the abutment/pier cap excluding excavation	10.58%
		(2) Sub-structure	38.31%
		(3) Super-structure	48.72%
		(4) Approaches (including Retaining walls, stone pitching and protection works)	0.27%

Item	Weightage in percentage to the Contract Price	Stage for Payment	Percentage weightage to Particular item (col.2)
1	2	3	4
Other works	30.64%	(i) Toll Plaza	0.00%
		(ii) Road side drains	5.35%
		(iii) Road signs, markings, km stones, safety devices, etc.	8.27%
		(iv) Project facilities	
		(a) Bus Bays	0.35%
		(b) Truck lay-byes	0.37%
		(c) Rest areas	0.00%
		(d) others	
		1) Stone Masonry Retaining wall	31.14%
		2) Stone Masonry Breast wall (1.50m Height)	7.92%
		3) Stone Masonry Breast wall (3.00m Height)	40.46%
		4) RE Wall including Anchor Bolts	3.75%
		5) Stone Masonry Toe wall (1.00m Height)	0.15%
		6) Turfing with Sods	0.07%
		7) Junction Improvement	2.07%
		8) Utility Pipe Ducts	0.10%

1.3 Procedure of estimating the value of work done.

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

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

Table 1.3.1

Stage of Payment	Percentage - weightage	Payment Procedure
A- Widening and reconstruction of existing road (Flexible Pavement)		
B.1- Reconstruction/New 2 - lane realignment/ bypass (Flexible Pavement)		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 **250m**.
(1) Earthwork up to top of the sub-grade		

Stage of Payment	Percentage - weightage	Payment Procedure
i) Earthwork including Site Clearance, Excavation in all type of Soil, Ordinary Rock & Hard Rock	33.73%	
ii) Earthwork with scarifying existing Bituminous surface with preparation upto Sub-Grade Top	14.61%	
(2) Sub-base Course	8.97%	
(3) Non Bituminous Base Course	12.07%	
(4) Bituminous Base Course	7.57%	
(5) Wearing Coat	4.93%	
(6) Shoulder	0.63%	
B.2- Reconstruction/New 2 - lane realignment/ bypass (Rigid Pavement)		
C.1 - Reconstruction/New Service Road (Flexible Pavement)		
C.2 - Reconstruction/New Service Road (Rigid Pavement)		
D - Reconstruction/New Culverts on existing road, realignment, bypasses		Cost of completed culverts shall be determined pro rata basis with respect to the total no. of culverts. The payment shall be made on the completion of **each** culvert.
Culverts (length <6m)		
i) Box Culverts (2X2)	6.10%	
ii) Box Culverts (3X3)	4.22%	
iii) Box Culverts (4X4)	3.94%	
iv) Box Culverts (6X6)	0.00%	
v) HPC (1X1200 Dia)	3.23%	

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

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

Where P = Contract Price

L = Total length in km

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

1.3.2 Minor Bridge works-

Procedure for estimating the value of Minor Bridge works shall be as stated in table 1.3.2:

Table 1.3.2

Stage of Payment	Percentage - weightage	Payment Procedure
A.1 - Widening and Repair of Minor Bridges (Length > 6m and < 60m)		
A.2 - New Minor Bridges (Length > 6m and < 60m)		
(1) **Foundation +Sub-Structure:** On completion of the foundation and substructure work including foundations for wing and return walls, abutments, piers upto the abutment/pier cap.		**Foundation:** Cost of each Minor Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Minor Bridge. Payment against foundation and substructure shall be made on pro-rata basis on completion of **each** foundation and substructure of the Minor Bridge. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
i) Earthwork including excavation for Structures in Soil, Ordinary Rock & Hard Rock with Embankment Preparation.	2.73%	
ii) foundation work including foundations for wing and return walls, abutments, piers upto the abutment/pier cap excluding excavation.	67.18%	
(2) **Super-structure:** On completion of the super-structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs & markings, tests on completion etc. complete in all respect.	29.65%	**(ii) Super-structure:** Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super-structure of atleast one span in all respects as specified in the column of "Stage of Payment" in this sub-clause. In case of structures where pre-cast girders have been proposed by the Contractor, 50% of the stage payment shall be due and payable on casting of girders for each span and balance 50% of the stage payment shall be made on completion of stage specified as above.

(3) **Approaches:** On completion of approaches including Retaining walls, stone pitching, protection works complete in all respect and fit for use.	0.44%	**(iii) Approaches:** Payment shall be made on pro-rata basis on completion of a stage i.e. completion of approaches in all respect as specified in the column of "Stage of Payment" in this sub-clause.

1.3.3 Major Bridges/Rail-road bridges

Procedure for estimating the value of Rail-road bridges works shall be as stated in table 1.3.3:

Table 1.3.3

Stage of Payment	Percentage - weightage	Payment Procedure
A.1- Widening and repairs of Major Bridges		
A.2 - New Major Bridges		**Foundation:** Cost of each Major Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridge. Payment against foundation shall be made on pro-rata basis on completion of **each** foundation of the major Bridge. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(1) Foundation		
i) Earthwork including excavation for Structures in Soil, Ordinary Rock & Hard Rock with Embankment Preparation	2.12%	
ii) foundation work including foundations for wing and return walls, abutments, piers upto the abutment/pier cap excluding excavation	10.58%	
(2) Sub-structure: On completion of abutments, piers upto the abutment/ pier cap	38.31%	**Sub-structure:** Payment against substructure shall be made on pro-rata basis on completion of **each** substructure of major bridge.
(3) Super-structure (including bearings) & Miscellaneous Items like Wearing Coat hand rails, crash barriers, road markings etc.	48.72%	**Super-structure:** Payment shall be made on pro-rata basis on completion of a stage i.e. completion of superstructure including bearings of at least one span in all respects as specified. In case of structures where pre-cast girders have been proposed by the Contractor, 50% of the stage payment shall be due and payable on casting of girders for each span and balance 50% of the stage payment shall be made on completion of stage specified as above.
(4) Approaches (including Retaining walls, stone pitching and protection works etc)	0.27%	(viii) **Approaches**: Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified.

Note: (1) In case of innovate Major Bridge projects like cable suspension/cable stayed/ Extra Dozed and exceptionally long span bridges, the schedule may be modified as per site requirements before bidding with due approval of Competent Authority.

(2) The Schedule for exclusive tunnel projects may be prepared as per site requirements before bidding with due approval of Competent Authority.

1.3.4 Other Works

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

Table 1.3.4

Stage of Payment	Percentage - weightage	Payment Procedure
(i) Toll Plaza	0.00%	
(ii) Road side drains	5.35%	Unit of measurement is linear in k.m Payment shall be made on pro rata basis on completion of a stage in a length on not less than **01 (one) Km**.
(iii) Road signs, markings, km stones, safety devices, ….	8.27%	
(iv) Project facilities		Payment shall be made on pro rata basis for completed facilities.
(a) Bus Bays	0.35%	
(b) Truck lay-byes	0.37%	
(c) Rest areas	0.00%	
(d) others		Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than **250m**.
1) Stone Masonry Retaining wall	31.14%	
2) Stone Masonry Breast wall (1.50m Height)	7.92%	
3) Stone Masonry Breast wall (3.00m Height)	40.46%	
4) RE Wall including Anchor Bolts	3.75%	
5) Stone Masonry Toe wall (1.00m Height)	0.15%	
6) Turfing with Sods	0.07%	
7) Junction Improvement	2.07%	
8) Utility Pipe Ducts	0.10%	

2. Procedure for payment for Maintenance

2.1 The cost for maintenance shall be as stated in Clause 14.1.1.

2.2 Payment for Maintenance shall be made in quarterly installments in accordance with

the provisions of Clause 19.7.

Schedule -I

(See Clause 10.2 (iv))

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.]

A minimum list of the drawings of the various components / elements of the Project Highway and project facilities required to be submitted by the Contractors given below:

a) Drawings of horizontal alignment, vertical profile and detailed cross sections.
b) Drawings of all Major and Minor Bridges.
c) Drawings of cross-drainage works.
d) Drawings of Major intersections,Grade Separated Structures, Viaduct.
e) Drawing of Toll Plaza layout and building.
f) Drawing of bus-bay and bus shelters.
g) Drawing of road furniture including traffic signage, marking, safety barriers etc.
h) Drawing of traffic diversion plan.
i) Drawing as per instruction of Authority's Engineer.
j) General arrangement showing area of base camp and administrative block.

Schedule - J

(See Clause 10.3 (ii))

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

(i) Project Milestone-I shall occur on the date falling on the **256th** day from the Appointed Date (the **"Project Milestone-**I").

(ii) 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

(i) Project Milestone-II shall occur on the date falling on the **438th** day from the Appointed Date (the **"Project Milestone- II").**

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

4. Project Milestone-III

(i) Project Milestone-III shall occur on the date falling on the **621th** day from the Appointed Date (the **"Project Milestone- III").**

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

5. Scheduled Completion Date

(i) The Scheduled Completion Date shall occur on the **730th day** from the Appointed Date.

(ii) 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 (ii))

Tests on Completion

1. Schedule for Tests

(i) 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.

(ii) 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

(i) 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 [***].

(ii) Riding quality test: Riding quality of each lane of the carriageway shall be checked with the help of a Network Survey Vehicle (NSV) fitted with latest equipments and the maximum permissible roughness for purposes of this Test shall be [2,000 (two thousand)] mm for each kilometre.

(iii) Tests for bridges: All major and minor bridges shall be subjected to the rebound hammer and ultrasonic pulse velocity tests, to be conducted in accordance with the procedure described in Special Report No. 17: 1996 of the IRC Highway Research Board on Nondestructive Testing Techniques, at two spots in every span, to be chosen at random by the Authority's Engineer. Bridges with a span of 15 (fifteen) metres or more shall also be subjected to load testing.

(iv) 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, except tests as specified in clause 5,but shall include measuring the reflectivity of road markings and road signs; and measuring the illumination level (lux) of lighting using requisite testing equipment.

(v) Environmental audit: The Authority's Engineer shall carry out a check to determine conformity of the Project Highway with the environmental requirements set forth in Applicable Laws and Applicable Permits.

(vi) 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.

5. The Authority Engineer will carry out tests with following equipment at his own cost in the presence of contractor's representative.

Sr. No.	Key metrics of Asset	Equipment to be used	Frequency of condition survey
1	Surface defects of pavement	Network Survey Vehicle (NSV)	At least twice a year (As per survey months defined for the state basis rainy season)
2	Roughness of pavement	Network Survey Vehicle (NSV)	At least twice a year (As per survey months defined for the state basis rainy season)
3	Strength of pavement	Falling Weight Deflectometer (FWD)	At least once a year
4	Bridges	Mobile Bridge Inspection Unit (MBU)	At least twice a year (As per survey months defined for the state basis rainy season)
5	Road signs	Retro-re flectometer	At least twice a year (As per survey months defined for the state basis rainy season)

The first testing with the help of NSV shall be conducted at the time of issue of Completion Certificate.

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

(i) Monthly lump sum payments for maintenance shall be reduced in the case of non-compliance with the Maintenance Requirements set forth in Schedule-E.

(ii) Any deduction made on account of non-compliance with the Maintenance Requirements shall not be paid even after compliance subsequently. The deductions shall continue to be made every month until compliance is done.

(iii) 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 on monthly basis

(i) The following percentages shall govern the payment reduction:

S. No.	Item/Defect/Deficiency	Percentage
(a)	**Carriageway/Pavement**	
(i)	Potholes, cracks, other surface defects	15%
(ii)	Repairs of Edges, Rutting	5%
(b)	**Road, Embankment, Cuttings, Shoulders**	
(i)	Edge drop, inadequate cross fall, undulations, settlement, potholes, ponding, obstructions	10%
(ii)	Deficient slopes, raincuts, disturbed pitching, vegetation growth, pruning of trees	5%
(c)	**Bridges and Culverts**	
(i)	Desilting, cleaning. vegetation growth, damaged pitching, flooring, parapets, wearing course, footpaths, any damage to foundations	20%
(ii)	Any Defects in superstructures, bearings and sub-structures	10%
(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	10%
(ii)	Any other Defects in accordance with paragraph 1.	5%

S. No.	Item/Defect/Deficiency	Percentage
(g)	**Defects in Other Project Facilities**	5%

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

$$R = {}^{P}/_{100} \times (M1 \text{ or } M2) \times {}^{L1}/_{L}$$

Where,

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

M1= Monthly lump-sum payment in accordance para 1.2 above of this Schedule

M2= Monthly lump-sum payment in accordance para 1.2 above of this Schedule

L1 = Non-complying length L = Total length of the road,

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

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

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

Schedule - N

(See Clause 18.1 (i))

Selection of Authority's Engineer

1. Selection of Authority's Engineer

(i) 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.

(ii) 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)

Annex –I: 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 required on 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 and Standards 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 required to 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.

8. Other duties and functions

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

9. 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 shall obtain a complete set of as-built Drawings, in 2 (two) hard copies and in micro film form or in such other medium as may be acceptable to the Authority, reflecting the Project Highway as actually designed, engineered and constructed, including an as-built survey illustrating the layout of the Project Highway and setback lines, if any, of the buildings and structures forming part of Project Facilities; and shall hand them over to the Authority against receipt thereof.

(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 of Contractor's Default within one week of its occurrence.

Schedule - O

(See Clauses 19.4 (i), 19.6 (i), and 19.8 (i))

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 (i) 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 (iii) (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 upto the last claim:

iv. For the Works executed (excluding Change of Scope orders);

v. For Change of Scope Orders, and

vi. 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 or damage occurring on account of Non Political Event of Force Majeure, malicious act, accidental damage, explosion, fire and terrorism:

(a) insurance of Works, Plant and Materials and an additional sum of [15 (fifteen)] per cent of such replacement cost to cover any additional costs of and incidental to the rectification of loss or damage including professional fees and the cost of demolishing and removing any part of the Works and of removing debris of whatsoever nature; and

(b) insurance for the Contractor's equipment and Documents brought onto the Site by the Contractor, for a sum sufficient to provide for their replacement at the Site.

(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 on the number of occurrences.

The insurance cover shall be not less than: Rs. [*****]

(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*******