

Schedule-A

(See Clauses 2.1 and 8.1)

Site of the Project

1 The Site

- 1.1 The site of four lane divided carriageway Project Highway shall include 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 10.3.1 of this Agreement.
- 1.4 The alignment plans of the Project Highway are specified in Annexure-III of Schedule-A.
- 1.5 The status of the environment clearances obtained or awaited is given in Annex-IV.

Annex - I

(Schedule-A)

Site for Project

1 Site

- 1.1 The Site of the Project Highway comprises the section of NH 66 commencing from Km 527.425 to km 529.695 in the State of Goa. The land, carriageway and structures comprising the Site are described below.

• Referencing System

Kilometre 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 “Existing 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 and design length of project is 2.270 km.

Design Chainage (Km)	Easting#	Northing#
527.425	379966.0217	1707070.8698
529.695	381602.5812	1705581.2858

#-UTM co-ordinates based on WGS 84 datum and 43N zone

An index map showing the existing features of the Project Highway is given at Annex-III of Schedule-A. The design chainage co-ordinates (centre line) at every 500m distance are given at Annex-V of Schedule-A.

2 Land

The Site of the Project Highway is 4 lane with paved shoulder, comprises the land (sum total land already in possession and land to be possessed) as described below.

Sl. No.	Existing Chainage (km)		Right of Way (m)	Remarks
	From	To		
1	527.425	529.695	45 - 60	-

Detailed break-up of land is given as Annexure-II of Schedule-A.

3 Carriageway

The details of existing carriageway are as given under.

Sl. No.	Chainage (Km)		Length (Km)	Lane Configuration (Two Lane / Four Lane)	Carriageway (m)
	From	To			

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Sl. No.	Chainage (Km)		Length (Km)	Lane Configuration (Two Lane / Four Lane)	Carriageway (m)
	From	To			
1	527.425	529.695	2.270	4 lane + paved shoulder	2 x 10.0m

4 Major Bridges

The Site includes the following Major Bridges.

Sr. No.	Existing Chainage (Km)	Type of Structure			No. of Spans with Span length (m)	Width (m)
		Foundation	Sub Structure	Super Structure		
-Nil-						

5 Road over-bridges (ROB)/ Road under-bridges (RUB)

The Site includes the following ROB (road over railway line)/RUB (road under railway line).

S. No.	Existing Chainage (km)	Span Arrangement (No x Span length(m))	Super Structure	Deck Width (m)	ROB/ RUB
-Nil-					

6 Grade separators

The Site includes the following grade separators.

Sr. No.	Existing Chainage (Km)	Type of Structure		No. of Spans with Span length (m)	Width (m)
		Foundation	Super Structure		
-Nil-					

7 Minor bridges

The Site includes the following minor bridges.

S. No.	Existing Chainage (km)	Span Arrangement (No. x Span length in m)	Super Structure	Deck Width (m)
-Nil-				

8 Railway Level Crossings

The site includes the following Railway level crossings:

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

S. No	Design Chainage (Km)	Railway Line
-Nil-		

9 Vehicular Underpass

The Site includes the following vehicular underpasses.

S. No.	Existing Chainage (km)	Type of Structure	No. of Spans with span length (m)	Deck width (m)
-Nil-				

10 Culverts

The Site has the following culverts.

10.1 Hume Pipe Culverts

Sl. No.	Chainage (km)	Dia of Opening (m)
1	527+516	1 X 0.9 Ø
2	527+582	1 X 0.9 Ø
3	527+734	1 X 0.9 Ø
4	527+768	1 X 0.9 Ø
5	527+939	1 X 0.9 Ø
6	528+022	1 X 0.9 Ø
7	528+082	1 X 0.9 Ø
8	528+148	1 X 0.9 Ø
9	528+221	1 X 1.0 Ø
10	528+570	1 X 1.0 Ø
11	528+755	1 X 1.0 Ø
12	528+907	1 X 1.0 Ø
13	529+002	1 X 1.0 Ø
14	529+105	1 X 1.0 Ø
15	529+285	2 X 1.4 Ø
16	529+371	1 X 0.9 Ø
17	529+449	1 X 0.9 Ø
18	529+620	1 X 0.9 Ø
19	529+661	1 X 0.9 Ø

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

10.2 Slab Culverts

Sl. No.	Chainage (km)	Span /Opening with span length (m)
-Nil-		

10.3 Box Culverts

Sl. No.	Existing Chainage (km)	Span /Opening with span length (m)
-Nil-		

11 Bus bays

The details of bus bays are as follows:

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

12 Truck lay byes

The details of the truck lay byes are as follows:

Sr. 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.	Existing Chainage (Km)		Side	Type	
	From	To		Masonry/CC (Pucca)	Earthen (Kutcha)
1	527.425	529.695	RHS	-	Unlined

14 Major junctions

The details of Major Junctions/Road Crossings are as follows:

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

S. No	Existing Location (Km)	Type of Intersection	Leads to		Category of Cross Road	Remarks
			Left	Right		
1	526.929	+	Goa Velha	Siridao	Old NH	Development of cross road for a length of 50 m
2	530.270	Y	Agaciam	-	Old NH	

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

15 Minor junctions

The details of the minor junctions are as follows:

Sr. No.	Existing Chainage (Km)	Type of Intersection	Location	Side
1	527.559	T	Houses	LHS
2	528.000	T	Houses	LHS
3	528.926	T	Houses	LHS
4	529.320	T	Houses	LHS

16 Bypasses

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

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

17 Toll Plaza

The details of Toll Plaza are as follows:

Sl. No	Existing Chainage (Km)	Location	Side	Remarks
Nil				

18 Cattle / Pedestrian Underpass

The Site includes the following cattle / pedestrian underpasses.

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

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

19 Bus shelters

S. No	Existing Chainage (km)	Side	Location
Nil			

20 Wayside Amenities

The details of wayside amenities are as follows:

Sl. No	Existing Chainage (Km)	Location	Side	Remarks
Nil				

21 Utilities

The site includes utilities. Details at Annexure-V of Schedule-A.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Design Chainage corresponding to Existing Chainage

Sl. No.	Existing Chainage (Km)	Design Chainage (Km)
1	527.425	527.425
2	527.500	527.500
3	528.000	528.000
4	528.500	528.500
5	529.000	529.000
6	529.500	529.500
7	529.695	529.695

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Annex - II

(Schedule-A)

Dates for providing Right of Way of Construction Zone

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

Design Chainage (Km)		Length (km)	Existing ROW (m)	PROW (m)	Date of Providing ROW
From	To				
527.425	529.695	2.270	45-60	45-60	On Appointed Date

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Annex - III

(Schedule-A)

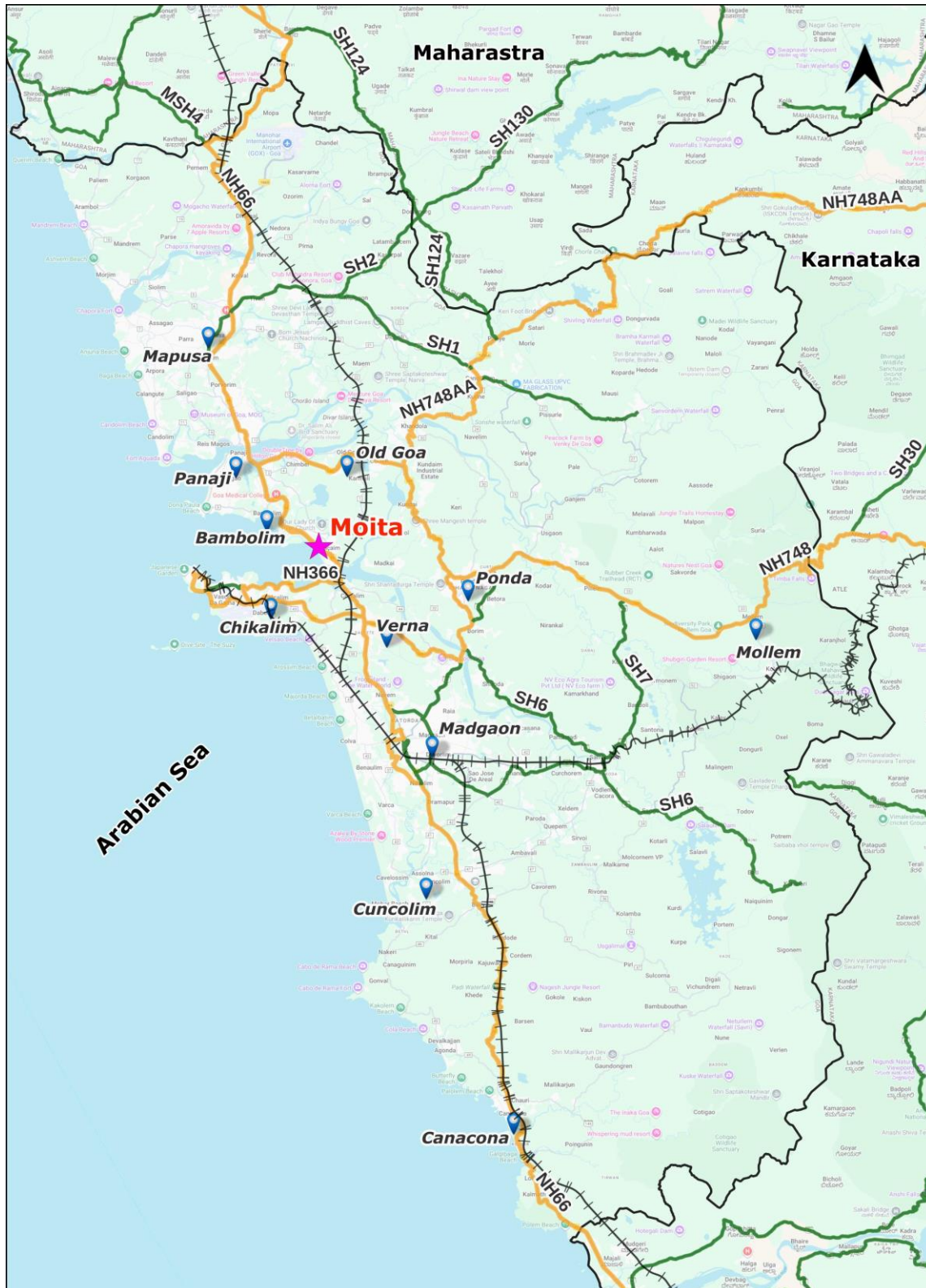
Alignment Plans

The alignment of the Project Highway is enclosed in alignment plan. Contractor shall follow the existing road level as minimum FRL. However, the contractor shall improve/upgrade the Road profile based on site/design requirement.

Coordinates:-

Design Chainage (Km)	Easting	Northing
527.425	379948.5277	1707078.1941
529.695	381621.8037	1705585.0499

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.



Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Annex - IV

(Schedule-A)

Environment Clearances

1. **Forest Clearance:** Not required
2. **Environmental Clearance:** The MoEF clearance is not required as per Notification of MoEF dated 22/08/2013 for this project highway.

Annex - V

(Schedule-A)

The site includes the following electrical utilities:-

(i) Electrical Utilities *

Extra High-Tension Lines (EHT Lines) *

S. No	Chainage (Km)		Length (in km)				Crossings			
	From	to	400KV	220KV	110KV	66KV	400KV	220KV	110KV	66KV
Nil										

High Tension/ Low Tension Lines (HT/LT Lines) *

Chainage (Km)	Section	Along the road length (In km)			Road Crossings (in Nos.)			DTC	
		33 kV (U/G)	11 kV (U/G)	L.T.	33 kV (U/G)	11 kV (U/G)	L.T.	kVA	Nos.
Km. 527.425 to Km. 529.695	Moita	-	3.00	0.80	-	2	1	100	2

Note: - Above length/numbers/scope of the existing LT/HT line shifting with pole and others electrical structures is indicative and minimum specified. The actual length/numbers/scope of the existing LT/HT line shifting with pole and others electrical structures shall be determined by the Contractor as per existing site conditions. Any increase in the length/numbers/scope specified in this Clause of Schedule A shall not constitute a Change of Scope.

(ii) Public Health Utilities (Water/ Sewage Pipe Lines) *

The site includes the following Public Health Utilities:-

Sr. No	Type of Utility	Unit	Quantity	Chainage	Location
Water pipeline					
1	150mm DI	M	2800	Km 527.425 to Km 529.695	Moita

Note: - Above length/numbers/scope of the existing pipe line and other items are indicative and minimum specified. The actual length/numbers/scope of the pipelines for shifting shall be determined by the Contractor as per existing site conditions. Any increase in the length/numbers/scope specified in this Clause of Schedule A shall not constitute a Change of Scope.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Annexure VI

Schedule - A

Centreline Coordinates

The Co-ordinates of centreline are given below:-

Centre Line co-ordinates at every 500m Interval

S. No.	Chainage (Km.)	Easting	Northing
1	527.425	379948.5277	1707078.1941
2	527.500	379985.5335	1707044.5724
3	528.000	380350.8438	1706703.1805
4	528.500	380727.9573	1706375.8564
5	529.000	381086.8322	1706027.7185
6	529.500	381466.0493	1705702.073
7	529.695	381621.8037	1705585.0499

Northing and Easting in UTM co-ordinates are based on WGS84 as datum and Zone 43N.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Schedule - B

(See Clause 2.1)

Development of the Project Highway

1 Development of the Project Highway

Development of the Project shall include design and construction of the Project as described in this Schedule-B and in Schedule-C. The alignment plans of the Project are specified in Annex-III of Schedule A.

Requirement specifically mentioned in Schedule B and Schedule C shall prevail over general requirements given in Manual mentioned in Schedule-D.

2 Project Highway

Project shall include construction of Cattle Underpass, Service roads and Provision of road safety measures between Km 527.425 to km 529.695 on NH-66 in the state of Goa as described in Annex-I of this Schedule-B and in Schedule-C.

3 Specifications and Standards

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

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Annex – I

(Schedule-B)

1 Development of the Project Highway

The Project Highway shall generally follow the horizontal alignment shown in the plan specified in Annex-III of Schedule-A, unless otherwise specified by the Authority. Notwithstanding anything to the contrary contained in this Agreement or IRC:SP:84, the proposed plan & profile, locations of different structures/drain, chainages of different structures/drain, length of different structures/drain etc. of the project highway as indicated in the Schedule A, Schedule B, Schedule C and their Annexures shall be treated as minimum requirement. Based on site/design requirement, the Contractor shall finalize their Detailed designs (Development stage) including plan & profile of the project highway and submit the same to Authority & its Engineer for consent/ approval and safety audit by safety auditor, before the start of the execution of project. The designs so approved shall not be in contradiction with the scope of project. For avoidance of doubt, the provisions mentioned in Schedule B & C cannot be changed, only design of the components is to be submitted for consent/approval.

Any changes in the finally accepted DPR in respect of the proposed provision in Schedule B and Schedule C shall not constitute a change of scope, save and except any variations arising out of a change of scope expressly undertaken in accordance with the provision of Article 16.

1.1 Width of Carriageway

1.1.1 Width of Carraigeway shall be as specified in the TCS enclosed

1.1.2 Except as otherwise provided in this Agreement, the width shall be adjusted to fit into appropriate plans and cross sections developed in accordance with TCS enclosed.

1.1.5 The entire cross-sectional elements shall be accommodated in the available/proposed ROW. If required, suitable retaining structures shall be provided

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

to accommodate the highway cross section within the available/ proposed ROW. The details of such sections are mentioned in Schedule-B. In case of any other section not included in Schedule-B, where retaining structures are to be provided, shall not constitute a Change of Scope.

1.1.6 The Project Highway shall follow the existing alignment unless otherwise specified by the Authority and shown in the alignment plan specified in Annex-III of Schedule-A. The Contractor shall, however, improve/upgrade the Road profile as indicated in Annex-III of Schedule A based on site/design requirement.

1.2 Width of Median

The width of median including kerb shyness shall be 2.5 metre.

1.2.1 Median Opening

1.2.1.1 Median Opening shall be provided at following locations:

	Design Chainage	Opening (m)	Width including shyness (m)	Remarks
-Nil-				

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.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

2.2 Design speed

The design speed shall be the as per clause no. 2.2 of Manual for Plain/rolling terrain.

2.3 Improvement of the existing road geometrics

2.3.1 The existing road geometrics shall be improved as per the codal provisions. In the 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 appropriate road signs, pavement markings and safety measures shall be provided.

2.3.2 The entire cross-sectional elements shall be accommodated in the available/proposed ROW. If required, suitable full height retaining structures shall be provided to accommodate the highway cross section within the available/ proposed ROW. The details of such sections are mentioned in Schedule-B. In case of any other section not included in Schedule-B, where retaining structures are to be provided, shall not constitute a Change of Scope.

2.3.3 Realignments: The existing road shall be improved to the standards as specified in the manual at the following locations.

	Design Chainage (Km)		Length (km)	Location
	From	To		

2.3.4 Bypasses: The existing road shall be bypassed to the standards as specified in the manual at the following locations.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	Design Chainage (Km)		Length (km)	Location
	From	To		
-Nil-				

2.4 Right of Way

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

Construction of the highway shall be made within the ROW available.

Note: No additional land beyond proposed ROW as given in Annex II of Schedule A shall be permitted. Therefore, wherever required retaining wall of suitable heights shall be provided to confine free side slopes of highway embankment for main carriageway / service road etc. on either side to accommodate the typical cross sections as given in Schedule -B within the limit of proposed ROW without any additional cost to the Client.

2.5 Type of shoulders

2.5.1 The Design Specification of paved shoulders shall conform to the requirements specified in paragraph 5.10 of the manual.

2.5.2 Shoulders shall be constructed in accordance with the paragraph 2.6 of the Manual.

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

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	Stretch (from km to km)	Fully paved shoulders/ footpaths	Side	Reference to cross section
	527.425 to 527.520	Fully Paved Shoulder & Footpath	Both	X
	527.520 to 527.750	Fully Paved Shoulder & Footpath	Both	I
	527.750 to 527.800	Fully Paved Shoulder & Footpath	Both	II
	527.800 to 527.845	Fully Paved Shoulder & Footpath	Both	VII
	527.845 to 527.875	Fully Paved Shoulder & Footpath	Both	IX
	527.875 to 527.920	Fully Paved Shoulder & Footpath	Both	VII
	527.920 to 527.970	Fully Paved Shoulder & Footpath	Both	II
	527.970 to 528.105	Fully Paved Shoulder & Footpath	Both	I
	528.105 to 528.180	Fully Paved Shoulder & Footpath	Both	II

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	Stretch (from km to km)	Fully paved shoulders/ footpaths	Side	Reference to cross section
	528.180 to 529.080	Fully Paved Shoulder & Footpath	Both	IV
	529.080 to 529.200	Fully Paved Shoulder & Footpath	Both	III
	529.200 to 529.560	Fully Paved Shoulder & Footpath	Both	V
	529.560 to 529.695	Paved Shoulder	Both	VI

2.5.4 The earthen shoulder of 1.0m width on shoulder side shall be provided as per the TCS enclosed with top 150 mm on earthen shoulder with well graded naturals and morrum gravel crust stones or combination thereof, confirming to Clause 401 of MoRTH specification. (Clause No. 5.11 IRC: SP:84).

2.5.5 Design and specifications of paved shoulders and granular material shall conform to the requirements specified in the relevant Manual.

2.6 Typical cross-section (TCS) of the Project Highway

	Design Chainage (Km)	Length	TCS Type
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Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	From	To	(km)	
	527.425	527.520	0.095	V
	527.520	527.750	0.230	I
	527.750	527.800	0.050	II
	527.800	527.845	0.045	VII
	527.845	527.875	0.030	IV
	527.875	527.920	0.045	VII
	527.920	527.970	0.050	II
	527.970	528.105	0.135	I
	528.105	528.180	0.075	II
	528.180	529.080	0.900	IV
	529.080	529.200	0.120	III
	529.200	529.560	0.360	V
	529.560	529.695	0.135	VI
Total			2.270	

For Typical cross section figures refer Annex-II of Schedule-B.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Note:

1. Any variations in the lengths specified in the above table shall not constitute a Change of Scope.
2. Lengths mentioned in the above list for cross section types concerned to structures are inclusive of structure length.
3. Retaining wall/ RE wall shall be provided for full height on all structures.
4. Toe/retaining wall to be provided where ROW is restricted and at water bodies along the proposed highway on the sections specified in Schedule-B.
5. Chainages may be adjusted according to location of structures as per drawings.
6. Carriageway width tapering shall be provided 1 in 50 as per manual. (Clause no 2.5.4. IRC: SP:84)
7. Provide detailing of placement and specification of Railing, Fencing and electric poles, etc. (Clause No. 2.17 IRC: SP:84)
8. Cross sections mentioned above is indicative and shall be decided as per project requirement, existing gas pipe lines and availability of ROW. No COS shall be admissible on this account.
9. Detailing of placement and specification of railing, boundary wall and electric pole etc. to be provided as per drawings.

2.7 Service roads/Slip Roads

2.7.1 Service Road: The height of embankment of service road shall confirm to clause 4.2.1 of IRC:SP:84.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

2.7.2 The service roads shall be constructed at the locations and for the lengths indicated below:

	Design Chainage (Km)		Length (km)		Paved Carriageway Width including shyness (m)	Total Length (km)	Remarks
	From	To	LHS	RHS			
	527.425	529.60	2.135	2.135	7.5	4.270	-
	529.60	529.695	0.135	0.135	6.0 - 7.5	0.270	-
Total			2.27	2.270		4.54	

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

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2.7.3 Separator Between Main Carriageway and Service/Slip Road (clause No. 2.15.1 IRC:SP:84)

A separator between main carriageway and service/slip road shall be provided to prevent the pedestrians, local vehicles and animals entering the highway.

Note:

Above length of the service/slip roads is minimum specified. The actual length of the service/slip/connecting roads shall be determined by the Contracror in accordance with the approved plan & profile and design approved from the Authority. Any increase/decrease up to 5 percent length from the length specified in this Clause of Schedule-B shall not constitute a Change of Scope. Any additional length beyond 5% shall be dealt in Change of Scope.

The Acceleration, deceleration lane, right turning storage lane, entry/exit lanes shall be constructed as given in above table and shall be deemed to be part of the scope and no Change of Scope shall be considered for the same. (Clause No. 2.12.2 IRC: SP:84).

Retaining wall shall be provided as per actual site condition to accommodate the Typical cross section within available ROW & same shall be deemed to be included in the scope of work.

3. Intersections and Grade Separators

All at-grade intersections and grade separated intersections shall be as per Section 3 of the Manual (IRC: SP 84). Existing at-grade intersections 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 shall be followed.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Improvement of junctions shall be matched with design crossfall of main carriageway and within the extent of land availability. Side roads connecting to the main road shall be properly tie in with existing side road with acceptable gradient as per Manual.

The service road pavement composition shall be continued on crossroads of the intersections for the length specified for at-grade and grade separated intersections.

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

a) Major Intersections

Sl. No.	Designation	Junction Type	Leads to		Median opening	Carrriage way width of cross road (m)	Length of crossroad to be developed (m)	
			LHS	RHS			LHS	RHS
1								
2								
3								
4								
5								
6								
7								
8								
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49								
50								

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	De si gn Ch ai na ge (K m)	Ju n ct io n T y p e	Leads to		Medi an openi ng		Carr iag e wa y wi dt h of cros s roa d (m)	Length of crossroad to be developed (m)	
			L H S	R H S				L H S	R H S
-Nil-									

b) Minor Intersections

	De si gn Ch ai na ge (K m)	Ju n ct io n T y p e	Leads	Medi an Openi ng	Cat eg ory of Cros sroa d	Carri ag e wa y wi dt h of	Len gth of cros sroa d to be dev elop ed
--	--	--	-------	---------------------------	---	--	--

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	)				i n g	d	cro ssr oad (m)	(m)	
			L H S	RHS					
	527.559	T	H ou se s	-	N o	ot he r	3		
	528.000	T	H ou se s	-	N o	ot he r	3		
	528.926	T	H ou se s	-	N o	ot he r	3		
	529.320	T	H ou se s	-	N o	ot he r	3		

Note:

- 1) Type of Junction to be improved as per manual. (clause No. 3.2.5 IRC:SP:84)
- 2) The Contractor shall take up 'Detailed Engineering study' to ascertain further details of all intersections and treatment of the intersections shall be designed in

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

accordance with the latest guidelines mentioned out in section-3 of the manual. Auxiliary lanes including storage, acceleration, and deceleration lane along with physical islands to be provided as per the site conditions and ROW. The crossroad at the junctions which are having a level difference from the main carriageway, are to be improved at the level of main carriageway for the length of 30 metre and then to be merged with the crossroad at the gradient not more than 1:50. (Clause No. 3.2.2 IRC: SP:84)

3) For minor / major layout for left-in / left out arrangement with physical islands with hazard marking. Where there is space constraint to provide physical islands, the effect of junction kept wide opened can be avoided by ghost island with marking. (Fig 3.7, IRC: SP:84)

4) For U-turn, Self-Regulated U-Turn facility shall be created. (Fig 3.6 IRC:SP:84)

3.2 Grade separated intersection with/without ramps

	Design Chainage (Km)	Junction type	Existing span viaduct	Road to be carried over/under the structures
	526.929	+	30	Under the structure
	530.270	Y	30	Under the structure

3.2.1 Transverse Bar marking: - The crossroad junctions as mentioned above shall be provided with Transverse bar marking by thermoplastic paint at the approach of junctions as per IRC: 99.

Note: -

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

The list of above major & minor junctions is indicative only and any additional junctions required in the Project Highway shall have to be constructed by the Contractor in consultation with the Authority. However, no change of scope on account of additional junction will be accepted.

It is clarified that any other deficient junctions with cross BT/CC road 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 crossroad drainage facility, new HP culverts on crossroads shall be constructed as per Manual.

Improvement of culverts/drain up to 50m on the cross/connecting roads on Major & Minor junctions shall be in the scope of the Contractor.

The crossroad at junctions shall be regraded to attain gradient as per MoRTH standards & Type Designs for Intersections on National Highways.

The Contractor shall take up 'Detailed Engineering study' to ascertain further details of all intersections and treatment of the intersections shall be designed in accordance with the latest guidelines mentioned out in section-3 of manual.

Junction improvement under grade separators shall be carried out as per manual with proper entry/exit to crossroads and slip/service roads, etc. Auxiliary lanes including storage, acceleration and deceleration lane along with physical islands to be provided.

4. Road Embankment and Cut Section

Construction of road embankment/cuttings shall conform to the Specifications and Standards given in section 4 of the manual. Notwithstanding anything to the contrary

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

contained in this Agreement or Manual, the proposed profile of the project highway as indicated in the Annex-III of Schedule B shall be treated as minimum requirement.

Based on site/design requirement, the Contractor shall design the alignment plans and profiles of the project highway based on site/design requirement mentioned in Schedule B with approval from the Authority within the available Right of Way.

Use of Pond Ash and Design of Pond Ash embankment shall be specified (Clause No. 4.2.4 & 4.4.4.i (d) IRC: SP:84)

5. Pavement Design

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

5.2 Type of pavement

The pavement shall be flexible type for entire length of project highway.

5.2.1 Design requirements

Rigid Pavement shall be designed for a minimum design period of 30 years and minimum effective subgrade CBR of 8% and maximum effective subgrade CBR of 10%. Stage construction shall not be permitted. Design of Rigid pavement shall confirm to the guidelines of IRC: 58.

5.2.2 Design Traffic

Notwithstanding anything to the contrary contained in this Agreement or the Manual, the Contractor shall design the pavement for a design traffic of 4589 CVPD for main carriageway. In case the traffic is more than specified above at the time of the traffic survey done by Contractor and at the time of design of project highway, then the higher traffic shall be adopted for design. During construction of flexible pavement existing bituminous layers shall be dismantled & pavement shall be reconstructed

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

with the below given minimum crust or as per design done by Contractor whichever is higher.

5.2.3

Following crust thickness of Rigid pavement shall be followed for the Main Carriageway & Service/Slip roads:

Crust	Thickness (mm)
PQC	300
DLC	150
GSB	150
Total	600

5.2.3.2

Following crust thickness of Flexible pavement shall be followed for the Access road to Cattle Underpass:

Crust	Thickness (mm)
PQC	200

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

DLC	150
GSB	150
Total	600

Following crust thickness of Flexible pavement shall be followed for the cross road at Cattle underpass and other junctions:

Crust	Thickness (mm)
BT	30
DBM	50
WMM	250
GSB	200
Total	430

5.3 In order to meet the intended functional requirement of respective pavement layers on main carriageway, the minimum thickness of respective pavement layers for main carriageway and connecting crossroads/ service roads/ slip roads/ entry/exit locations, acceleration/ deceleration lane, right turning lanes shall, however, in no case be less than as given below:

5.4 Reconstruction of stretches with new pavement (clause no. 5.9.4 IRC:SP:84).

Reconstruction of the stretches is as per the TCS enclosed.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

5.5 Bituminous Mix for Overlay (clause no. 5.9.8 IRC:SP:84)

Bituminous Overlay shall be provided as per TCS schedule.

6 Roadside Drainage

6.1 Drainage system including surface and subsurface drains for the Project Highway including crossroads shall be provided as per section 6 of the Manual. RCC Drain cum footpaths shall conform to the cross-sectional features and other details as given in Annexures to Schedule-B and shall be provided as under:

Details of RCC Drain cum Footpath (Clause No. 2.13 & 6.2.6 IRC SP 84-2019)

	Design Chainage (Km)		Length (km)		Width of Drain (m)		Total Length (Km)
	From	To	LHS	RHS			
	52 7.4 25	52 7.5 20	0. 0 9 5	0. 0 9 5	1.5		0.1 90
	52 7.5 20	52 7.7 50	0. 2 3 0	0. 2 3 0	1.5		0.4 60

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	Design Chainage (Km)		Length (km)		Width of Drain (m)		Total Length (Km)
	From	To	LHS	RHS			
	52 7.7 50	52 7.8 00	0. 0 5 0	0. 0 5 0	1.5		0.1 00
	52 7.8 00	52 7.8 45	0. 0 4 5	0. 0 4 5	1.5		0.0 90
	52 7.8 45	52 7.8 75	0. 0 3 0	0. 0 3 0	1.5		0.0 60
	52 7.8 75	52 7.9 20	0. 0 4 5	0. 0 4 5	1.5		0.0 90
	52 7.9 20	52 7.9 70	0. 0 5 0	0. 0 5 0	1.5		0.1 00

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	Design Chainage (Km)		Length (km)		Width of Drain (m)		Total Length (Km)
	From	To	L H S	R H S			
	52 7.9 70	52 8.1 05	0. 1 3 5	0. 1 3 5	1.5		0.2 70
	52 8.1 05	52 8.1 80	0. 0 7 5	0. 0 7 5	1.5		0.1 50
	52 8.1 80	52 9.0 80	0. 9 0 0	0. 9 0 0	1.5		1.8 00
	52 9.0 80	52 9.2 00	0. 1 2 0	0. 1 2 0	1.5		0.2 40
	52 9.2 00	52 9.5 60	0. 3 6 0	0. 3 6 0	1.5		0.7 20

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	Design Chainage (Km)		Length (km)		Width of Drain (m)		Total Length (Km)
	From	To	L H S	R H S			
Total			2.135	2.135			4.270

Paverblocks shall be provided over drain slab as per the TCS drawings

Details of Load bearing RCC Drain (Clause No. 2.13 & 6.2.6 IRC SP 84-2019)

	Design Chainage (Km)		Length (km)		Width of Drain (m)		Total Length (Km)
	From	To	L H S	R H S			
Nil							

Design chainage given in the above table is including structure length. Drain should be designed for vehicle loading.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Notwithstanding to the above mentioned schedule, contractor shall provide Footpath cum drain as per the site requirement and as specified by the Authority. Any changes in length shall not be a change of scope.

Note: -

- i) No Change of Scope on account of change in above specified length shall be considered.
- ii) The invert level of Roadside drains shall be minimum 500 mm below GSB bottom level & additional weep holes of 100 mm dia @1m c/c spacing shall be provided at GSB level in inner wall of built-up drain.
- iii) Drain top level shall be kept such as to suit/match the surface drainage requirements as per proposed FRL in built-up sections.
- iv) The cross section of earthen drain in open country section shall have minimum bottom width of 0.5m with side slopes of 1:1. Invert level of earthen side drains shall be as per hydraulic requirement & minimum 1 mt. below adjoining ground level.
- v) Drain should connect to the nearest Cross Drainage Structures.
- vi) Longitudinal slope of the drain shall be as per Manual.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

In all built up areas RCC covered drains with Footpath shall be provided. FRP heavy duty chambers fitted with premoulded frame shall be provided at appropriate spacing. 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. Pedestrian guard rails shall invariably be provided in all built-up sections as per the site requirement and directed by the Authority for separating pedestrian traffic from the NH traffic as per IRC-99 and IRC-103.

Above length of the lined drains shall be determined by the Contractor in accordance with the Manual requirements with approval from the Authority. Any increase in the length specified in this Clause of 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.

6.2 Unlined Drains cleaning require for existing drain

Unlined Drains other than above mentioned locations shall be provided in the entire project length which gets terminated at all crossroad locations. In case the definite outfall is not available, a rainwater harvesting system shall be provided at the deepest location for dispersal of water.

6.3 Drainage where Embankment Height is more than 3m.

Chute drain shall be provided at suitable intervals on embankment slopes. The drainage arrangement shall include kerb, cement concrete drainage channel at the edge roadway, Cement Concrete Chutes, CC bedding, energy dissipation basin, etc. Mountable Kerb shall be provided beyond the post of MBCB to channelize storm water into chute. (Clause No. 6.8.2.4 of IRC: SP:84)

6.4 Drainage for Structures

A suitable drainage arrangement for storm water from deck slab shall be provided. Falling of water on any surface of the structures, flow of underneath or remain

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

standing or flowing over the road below the structure is not permitted in any circumstances. (Clause No. 6.8 IRC: SP:84)

7 Design of Structures

7.1 General

Project Highway is proposed to be constructed to two lane configuration. As such, superstructures of all bridges, culverts and other structures shall be designed for edge movement of the vehicle considering stitching of new superstructure in future during widening to additional lanes. IRC Special vehicle loading is to be considered in the design of all bridges, culverts and structures.

All structures except wherever expansion joints have been provided, the pavement layers shall be continued over the structures so as to ensure smooth riding quality in project highway. These structures shall be designed considering the dead load of pavement layers.

All major structures shall be designed preferably with continuous structure to reduce the number of expansion joints on the MJB/ ROB/ flyover/ Interchange etc.

7.1.1 Bridges, culverts and structures shall be designed for IRC class Special Vehicle (SV) loading as per recommendation of IRC: 6 and constructed in accordance with section-7 of the manual. All structures shall conform to the cross-sectional features and other details specified therein.

7.1.2 The overall width of the structures shall be given in Annex-I of Schedule-B (Clause No.7.3 IRC SP:84).

7.1.3 The Safety Barrier and Footpath on Bridges and RoB shall continue on approaches. The footpath shall be provided with paved surface & railing till the embankment height is more than 3m. (Clause No. 7.17 IRC: SP:84)

Details of Structures with footpaths

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	Location	Skew Angle	Footpath Width (m)		Remarks
			Left	Right	
-Nil-					

7.1.4 Bridges in the improvement proposal need to be of high level bridge.

7.1.5 All structures shall be designed to carry utility services on the outer side of RCC barrier/Railing as per site requirement.

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 2.10 of the Schedule-B.

7.1.7 In bypass/realignment locations if the structure in existing crossroads is replaced to new locations. No change of scope shall be allowed.

7.1.8 If any new structures are proposed at canal cum bund roads along the project highway in consultation with concerned irrigation department/IE. No change of scope shall be applicable.

7.1.9 Wherever liquefaction is observed, ground improvement shall be done by replacing suitable material and compacting the soil to increase the penetration resistance to satisfy the clause 8.4.4 (v) of IRC114.

7.1.10 Proposed levels at structure locations as shown in plan & profile are only for guidance and any changes in levels shall not constitute change of scope provided at any location of bridges and grade separated structures the FRL as in drawing shall not be lowered.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

7.1.11 The structures falling within acceleration / deceleration lane /taper shall be constructed to the required width at the location. These changes shall not be treated as a change of scope.

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

7.1.13 Repairs and rehabilitation of all existing bridges shall include but not limited to general cleaning of bridge and area around bridge, restoration of slopes and protective works, removal and relaying of existing wearing coat, repair and replacement of drainage spouts, construction of new crash barriers in place of old railing, providing of new expansion joints and bearings in place of old ones wherever required and repair and rehabilitation of damaged concrete, if any, and providing floor protection with rigid and flexible apron and embankment slope protection if any etc. to the complete satisfaction and as per directions of Independent Engineer/Authority. All the repairs and rehabilitation works shall be carried out as per standards and manuals.

7.1.14 The structures proposed to be retained, the FRL of those structures shall be maintained as per existing structure, widening/New construction shall be done as per the designed Finished Road level provided in any circumstances soffit level of proposed new bridge shall not be less than soffit of the existing bridge.

7.2 Culverts

7.2.1 Overall width of all culverts shall be equal to the roadway width of the approaches. Barrel Length may change as per height of embankment and shall get approval from Independent Engineer, this will not be considered under change of scope. The overall width of culverts shall be including width of main carriageway and slip/service roads/Entry ramps/Exit Ramps/ Acceleration/Deceleration lanes, etc. All culverts shall also be continued in median and in gap between main carriageway and service road.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

The locations, vents and type of Culverts are tentative and Changes in the locations, vents and type of Culverts, if any shall be finalized as per site conditions in consultation with Authority, which shall not constitute COS.

Changes in the location and number of culverts, if any shall be finalized as per site conditions in consultation with Authority which shall not be considered as Change of Scope.

The invert level of proposed Box type structure at cart track/Cross drainage locations shall not be lower than the existing ground level.

The Contractor required to use precast concrete elements/segments (box culverts and girders) complying with Ministry circular no. RW/NH-34049/01/2020-S&R (B) dated 08.04.2022.

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

7.2.4 Widening of existing pipe culverts:

The existing pipe culverts at the following locations shall be retained and widened:

(Culverts to be constructed in accordance with the paragraph 7.3 of the manual)

	De sig n Ch ain ag e (K m)	Exi sti ng Cul ver t Ty pe	S k e w A n g l e	Sp an / Op eni ng (m)	Proposal	Culvert Crossing type (Balancing/s tream, etc)
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Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	52 7+ 51 6	Pip e	-	1 X 0.9	R & W	Balancing
	52 8+ 22 1	Pip e	-	1 X 1.0	R & W	Balancing
	52 8+ 57 0	Pip e	-	1 X 1.0	R & W	Balancing
	52 8+ 75 5	Pip e	-	1 X 1.0	R & W	Balancing
	52 8+ 90 7	Pip e	-	1 X 1.0	R & W	Balancing
	52 9+ 00 2	Pip e	-	1 X 1.0	R & W	Balancing
	52 9+ 10 5	Pip e	-	1 X 1.0	R & W	Balancing

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

7.2.5 Widening of existing slab culverts to Box culverts:

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

(Culverts to be constructed in accordance with the paragraph 7.3 of the manual)

	De sig n Ch ain age (K m)	Exi sti ng Cul ver t Ty pe	S k e w A n g l e	Sp an / Op en in g (m)	New / Reconstruction		Culvert Crossing type (Balancin g/stream , etc)
					LHS	RHS	
-Nil-							

Note: - It is clarified that as per site requirement if any new culverts are identified and required for drainage arrangement same shall be constructed during development as per standard set forth in Schedule 'D' & as per instruction of Independent Engineer.

As per clause 2.10.2 of IRC: SP:84, Wherever box culverts and bridges allow a vertical clearance of more than 2 m, these can be used in dry season for pedestrian and cattle crossing by providing necessary flooring.

7.2.6 Reconstruction of existing Arch Cum Slab Culverts:

The existing Arch/Slab culvert at the following locations shall be re-constructed as new culverts:

(Culverts to be constructed in accordance with the paragraph 7.3 of the manual)

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	Design Chainage (Km)	Existing Culvert Type	Span/Opening (m)	New / Reconstruction	Culvert Crossing type (Balancing/stream, etc)
-Nil-					

Note: - It is clarified that as per site requirement if any new culverts are identified and required for drainage arrangement same shall be constructed during development as per standard set forth in Schedule 'D' & as per instruction of Independent Engineer.

Culverts should also extend to service road/slip lane as per applicable in 2 (viii) if this schedule. Also, culverts shall be provided for full width as per applicable Typical Cross section.

The dimensions and numbers given above are minimum and the proposed dimensions shall be based on hydraulic calculations and approval from Independent Engineer. Any changes to above dimensions shall not be constitute a change of scope.

7.2.7 Widening of existing box 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 the provision of relevant Manual. Repairs and strengthening of existing structures where required shall be carried out.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	Design Chainage (Km)	Skew Angle	Span/Opening (m)	Repairs / Rehabilitation proposals	Culvert Crossing Type (Balancing / Stream, etc)	Remarks
-Nil-						

7.2.8 Additional new box culverts

Additional new Box culverts shall be constructed at the following locations in the realignment sections as per particulars given in the table below:

Sl No.	Culvert location	Span/Opening (m)
-Nil-		

Note:- The above mentioned culverts are minimum to be provided on the Project Highway, however, the Contractor shall provide additional culverts if required as per hydraulic calculations, no Change of Scope on this account will be considered.

Note:- Location of the new box culverts are tentative and to be finalised in consultation with Authority, any changes in the location shall not be considered as Change of Scope.

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

Sl. No.	Location at km	Type of repair required
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Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

-Nil-

7.2.11 Details of Additional New Culverts:

Box culverts of minimum size 2m x 1.5m shall be provided on each side of crossroads to maintain the longitudinal continuity of drain water flow along the Project Highway as per section 6 of the Manual.

7.2.12 Dismantling & Reconstruction of Existing Hume pipe Culverts:

	Design Chainage (Km)	Existing Culvert Type	Slew Angle	Proposed Span/ Opening (m)	Culvert Crossing type (Balancing/stream, etc)
-Nil-					

7.2.13 Details of Retaining and Rehabilitation of Existing Culverts:

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	D e s i g n C h a i n a g e (K m)	Cul ver t Typ e	S k e v A r g l e	S p a n / O p e n i n g (m)	Repairs Rehabilitation proposals	Culver t Crossi ng Type (Balanc ing/ Strea m, etc)
	5 2 7 + 5 8 2	Hu me Pip e	N o r m a l	1 X 0 · 9	1. Existing culvert is retained with rehabilitation work such as removing debris / garbage / vegetation, clearing flow obstructing blockages, repairing Protection works - (aprons & curtain walls), pitching work, Safety barriers, painting, etc., 2. the drain Box's alignment needs to be adjusted appropriately to disperse water at the culvert location depending on the site	Balanc ing
	5 2 7 + 7 3 4	Hu me Pip e	N o r m a l	1 X 0 · 9		Balanc ing
	5 2 7	Hu me Pip	N o r	1 X		Balanc ing

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	D e s i g n C h a i n a g e (K m)	Cul ver t Typ e	S k e v A r g l e	S p a n / O p e n i n g (m)	Repairs Rehabilitation proposals	Culver t Crossi ng Type (Balan cing/ Strea m, etc)
	+ 7 6 8	e	r a l	0 . 9	conditions	
	5 2 7 + 9 3 9	Hu me Pip e	M o r r a l	1 X 0 . 9		Balanc ing
	5 2 8 + 0 2	Hu me Pip e	M o r r a l	1 X 0 .		Balanc ing

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	D e s i g n C h a i n a g e (K m)	Cul ver t Typ e	S k e v A r g l e	S p a n / O p e n i n g (m)	Repairs Rehabilitation proposals	Culver t Crossi ng Type (Balanc ing/ Strea m, etc)
	2			9		
	5 2 8 + 0 8 2	Hu me Pip e	M o i t a l	1 X 0 · 9		Balanc ing
	5 2 8 + 1 4 8	Hu me Pip e	M o i t a l	1 X 0 · 9		Balanc ing

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	D e s i g n C h a i n a g e (K m)	Cul ver t T y p e	S k e v A r g l e	S p a n / O p e n i n g (m)	Repairs Rehabilitation proposals	Culver t Crossi ng Type (Balanc ing/ Strea m, etc)
	5 2 9 + 2 8 5	Hu me Pip e	3 3 9	2 X 1 . 4		Balanc ing
	5 2 9 + 3 7 1	Hu me Pip e	2 0 9	1 X 0 . 9		Balanc ing
	5 2 9	Hu me Pip	M c r	1 X		Balanc ing

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	D e s i g n C h a i n a g e (K m)	Cul ver t Typ e	S k e v A r g l e	S p a n / O p e n i n g (m)	Repairs Rehabilitation proposals	Culver t Crossi ng Type (Balan cing/ Strea m, etc)
	+ 4 4 9	e	r a l	0 . 9		
	5 2 9 + 6 2 0	Hu me Pip e	M o r r a l	1 X 0 . 9		Balanc ing
	5 2 9 + 6 6	Hu me Pip e	M o r r a l	1 X 0 .		Balanc ing

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	D e s i g n C h a i n a g e (K m)	Cul ver t T y p e	S k e w A n g l e	S p a n / O p e n i n g (m)	Repairs Rehabilitation proposals	/	Culver t Crossi ng Type (Balan cing/ Strea m, etc)
	1			9			

7.3 Bridges

7.3.1 Existing bridges to be re- constructed/widened:

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

	De sig	E xi	Total Propo	Total proposed width (m)	Sk ew	Rem arks
--	-----------	---------	----------------	-----------------------------	----------	-------------

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	Chainage (km)	Span (m)	Bridge length (m)	MCW	SR	Angle	
-Nil-							

7.3.2 The following narrow bridges shall be widened:

	Location (km)	Existing width (m)	Extent of widening (m)	Cross-section at deck level for widening @
-Nil-				

7.3.3 Additional new Major 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.

Sl. No	Existing Chainage	Existing Type	Existing arrangement	Span
--------	-------------------	---------------	----------------------	------

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

-Nil-

7.3.4 Additional new Minor 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.

Sl. No.	Existing Chainage	Existing Type	Existing Span arrangement
-Nil-			

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

Sl. No.	Location at km	Remarks
-Nil-		

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

Sl. No.	Location at km	Remarks
Nil		

7.3.7 Drainage system for bridge decks

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

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

7.3.8 Structures in marine environment

All structures near to and within the vicinity of 15Km to sea coast is susceptible to chloride induced corrosion of reinforcement. As a precautionary measure, to meet with the service life of the bridge as per design. The reinforcement for all RCC works shall confirm to MoRTH circulars and guidelines in this regard.

Note:

Width is excluding Median (M) gap and the gap between Main Carriageway (MCW) & Service/Slip Road (SR).

Location and span are indicative. Exact location may be decided in consultation with PWD and the same shall not constitute a Change of Scope, save and except any variations arising out of a Change of Scope expressly undertaken in accordance with the provisions of Article 16.

Span arrangement mentioned above is tentative and may be changed based on design of structure, latest construction techniques and aesthetics of structures. The span lengths mentioned are optimum required span and should not be reduced. 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 increase 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.

In Case of bridges proposed for widening/repair as per details above, the same shall be re-constructed if the design shows that these are unsafe for design loads. No change of scope shall be considered in such cases.

Expansion joints shall be minimized by deck continuity/ continuous superstructure over multiple spans. Deck length between two expansion joints shall not be less than 120m except where structure length falls short of it. Expansion joints shall be Finger joint type in compliance with IRC: SP:69-2011, Table 5.4.1 criteria for adoption of different types of expansion joints. Contractor shall ensure quality control as per good industry practice and shall ensure presence of manufacturer of expansion joints at the time of installation for quality control supervision.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

7.4 Rail-road bridges

7.4.1 Design, construction and detailing of ROB/RUB shall be in accordance with Section 7 of the Manual.

7.4.2 Road over-bridges

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

	Design Chainage (Km)	Proposed Span Arrangement (m)	Type of super- structure	N a m e o f c r o s s i n g	To tal Wi dt h (m)		
-Nil-							

Note:

i) The proposed span arrangements of the ROB/RUBs are tentative and subject to change as per availability of railway boundaries / requirements of the railways and as per the latest circular of Railway. Any change in the proposed span arrangement / variation in length shall not be treated as change in scope of work.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

ii) ROB shall be designed, constructed, and maintained as per the requirements of Railway authorities. The construction plan shall be prepared in consultation with the concerned railway authority.

iii) The ROB shall be constructed and maintained by the Contractor under supervision of the Railways.

iv) All charges payable to the Railways like D&G, Capitalized maintenance, signalling, cabling, OHE modification, earthing etc. except P&E charges shall be borne by the Contractor.

v) The proposed span arrangements of the RUBs are tentative and subject to change as per availability of railway boundaries/requirement of the railways.

7.5 Grade separated structures

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

7.6 Cattle and pedestrian underpass /overpass

Cattle underpass shall be constructed as follows:

	Location (Chain age) (km)	Span/ opening (m)	Minimum Vertical Clearance	Type of Underp ass	Remarks
	528.91 5	1 x 7	3	Cattle underp ass	CUP with Access road

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Note:

1. The cattle underpass shall also be used by pedestrians and two-wheelers. An access road to the CUP shall be constructed, with retaining walls provided on both sides.
2. The contractor shall design the cattle underpass (CUP) taking into account potential waterlogging effects.
3. The cattle underpass shall be designed and constructed to ensure it remains operational in all seasons.
4. The Contractor shall provide adequate lighting within the cattle underpass and for the Access road to CUP.

7.7 FOB/ Skywalks

FoB/Skywalks shall be provided in built up areas/ near schools.

Sr. No.	Location at km	FoB Type	Remarks
-Nil-			

A summary of Culverts, Bridges and Structures shall be presented as follows:

	Name of the Structure	Total Number s	Remarks

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

	Name of the Structure	Total Number s	Remarks
	Cattle Underpass	01	New
	Pipe Culvert (Retained & Widening)	07	Retaining and widening
	Pipe Culvert (Retaining & Rehabilitation)	12	Retaining & Rehabilitation
Total		20	

8 Traffic Control Devices and Road Safety Works

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

Traffic Signs:

Traffic signs shall be provided as per IRC 67 as mentioned in Schedule-C.

Pavement Marking:

Pavement markings shall be completed as per IRC 35 as mentioned in Schedule-C.

Safety Barrier:

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

The safety barriers shall be provided in accordance with Section-9 of the Clause 9.7 of the manual. The Safety Barrier length proposed are excluding the safety barrier already proposed on Culverts, Grade Separated Structures, Interchange, Bridges, RoB and RUB as applicable cross sections respectively.

End Treatment of Steel barriers/Rope Barrier shall be specified i.e. MELT or P-4 confirming to EN 1317-4, TT, MBCB barrier to Concrete Barrier (Clause No. 9.7.2 (b) IRC: SP:84)

End Treatment to Concrete barrier shall be done as specified in Clause No. 9.7.3 (b) IRC: SP:84.

The details of the location are as below:

	Item	LHS		RHS		Total Length (Km)	Remarks
		(From in Km.)	(To in Km.)	(From in Km.)	(To in Km.)		
	New jersey crash barrier	527.425	529.695	527.425	529.695	4.540	Between MCW

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

			5				& SR
Total						4.5 40	
	Metal Beam Crash Barrier (single faced Thrie- Beam)	52 7. 42 5	5 2 9. 6 9 5	52 7. 42 5	529. 695	4.5 40	In Me dia n
Total						4.5 40	

Above length of the crash barriers is indicative and minimum specified. The actual length shall be determined by the Contractor in accordance with the Manual requirements with approval from Authority. Any increase in the length shall not constitute a Change of Scope.

The crash barrier shall follow the Codal provisions of IRC:119.

9 Roadside Furniture

9.1 Roadside furniture shall be provided in accordance with the provisions of Section 11 of the Manual. It shall be provided as per the details mentioned in Schedule-C.

Note: All Traffic Signs for Road Users would be provided as per IRC-SP-84 Manual. However, the Contractor shall provide numbers of Cautionary, Mandatory, Warning and Informatory Traffic Sign Boards at hazardous locations considering pedestrian

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

and vehicle safety. The locations shall be finalized in consultation with Independent Engineer.

10 Shifting of Utilities

Shifting of obstructing existing utilities indicated in Schedule A to an appropriate location in accordance with the standards and specifications of concerned Utility Owning Department is part of the scope of work of the Contractor. The bidders may visit the site and assess the quantum of shifting of utilities for the projects before submission of their bid. Copy of utility relocation plan is enclosed. The specifications of concerned Utility Owning Department shall be applicable and followed.

Notes:

The type/spacing/size/specifications of poles/towers/line/cables to be used in shifting work are as per the guidelines of utility owning department and it is solely between Contractor and the Utility owning department. No change of scope shall be admissible and no cost shall be paid for using different type / spacing / size / specifications in shifted work in comparison to those in the existing work or for making any overhead crossings to underground as per requirement of utility owning department and / or construction of project highway.

The Contractor shall carry out joint inspection with utility owning department and get the shifting scheme sanctioned from utility owning department.

The assistance of the Authority is limited to forwarding letter on the proposal of Contractor to utility owning department whenever asked by the Contractor.

The decision/approval of utility owning department shall be binding on the Contractor.

Project road is city road and may have various unknown underground utilities. During work/excavation if any utility gets damaged by the Contractor knowingly or un-knowingly, Contractor have to re-instruct the utility immediately at his own cost. If any new underground utilities are found during the execution at site, the Contractor shall shift the utilities and it does not constitute any change of scope.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

The supervision charges at the rates/charges applicable between the Authority and utility owning department as and when Contractor furnishing a demand of Utility Owning Department along with a copy of estimated cost given by the later shall be paid directly by the Authority to the Utility owning Department or the Contractor may pay these charges to the utility owning department if directed by Engineer in Charge & the same will be reimbursed to him by the Authority.

The dismantled material/scrap of existing Utility to be shifted/ dismantled shall belong to the Contractor/Contractor who would be free to dispose-off the dismantled material as deemed fit by them unless the Contractor is required to deposit the dismantled material to utility owning department as per the norm & practice and in that case the amount of credit for dismantled material may be availed by the Contractor as per estimate agreed between them.

The utilities shall be handed over after shifting work is completed to Utility Owning Department after due testing as desired by them & up to their entire satisfaction.

The maintenance liability shall rest with the Utility Owning Department after handing over process is complete as far as utility shifting works are concerned.

The above scope of electrical shifting involves all the necessary fixtures & fastenings as per site condition, specification & standard practice of utility owning entity

The above quantities may vary depending upon actual alignment & site conditions, hence above quantities are subjected to negative CoS.

The Contractor & Independent Engineer shall try to optimize the quantum of shifting. Actual length & location of shifting will be decided by Joint Inspection with Independent Engineer & Utility Owning Entity.

The above scope of water shifting involves all necessary sluice valves. Air Valves, Connections, Lowering, fixing, jointing fixtures & fastenings as per guidelines & specifications of utility owning entity.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Shifting of all existing, buried and overhead utility lines are to be shifted by the Contractor within the scope of the Contractor. No change of scope shall be accepted on account of any change in quantities / specifications of the utility lines to be shifted.

The Utilities shall be shifted to extreme edge of Row as per relevant TCS & as directed by Authority and concerned utility department.

11 Protection works

Retaining wall shall be constructed for a minimum length of 500m along the project wherever required additional retaining wall of suitable heights shall be provided to confine free side slopes of highway embankment on either side to accommodate the typical cross sections as given in Schedule –B within the limit of proposed ROW. The contractor shall design as per the site requirement and any change in length of retaining wall shall not be change of scope.

12 Change of Scope

The length of Drain, Footpath Cum Drain, Crash barrier specified here in above shall be treated as an approximate assessment. The actual lengths as required on the basis of detailed investigations shall be determined by the Contractor in accordance with the 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.

13 Work Zone Traffic Management Plans

The traffic diversion plans shall be prepared as per IRC SP 55 for smooth flow of traffic and safety. A diversion plan shall be proposed for construction of Culvert, Grade Separated Structures, Bridges, RoB/RUB, etc. and traffic management plan for widening/ reconstruction of carriageway. (Clause No. 7.19 IRC: SP:84)

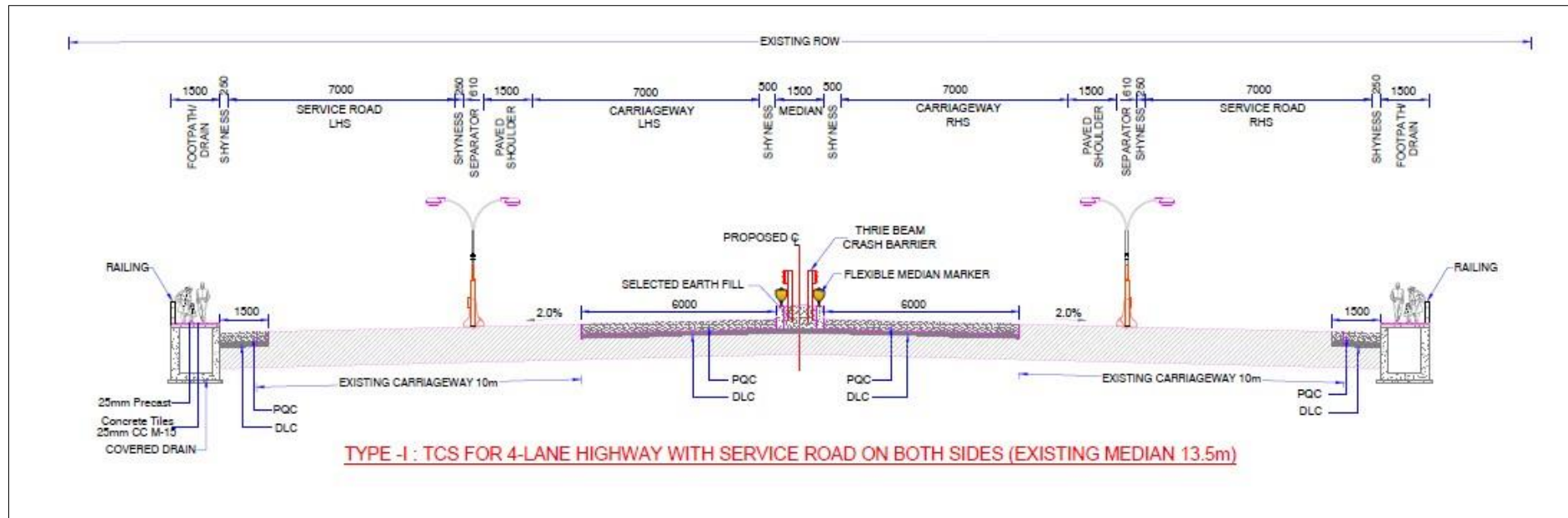
Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Annex-II

(Schedule-B)

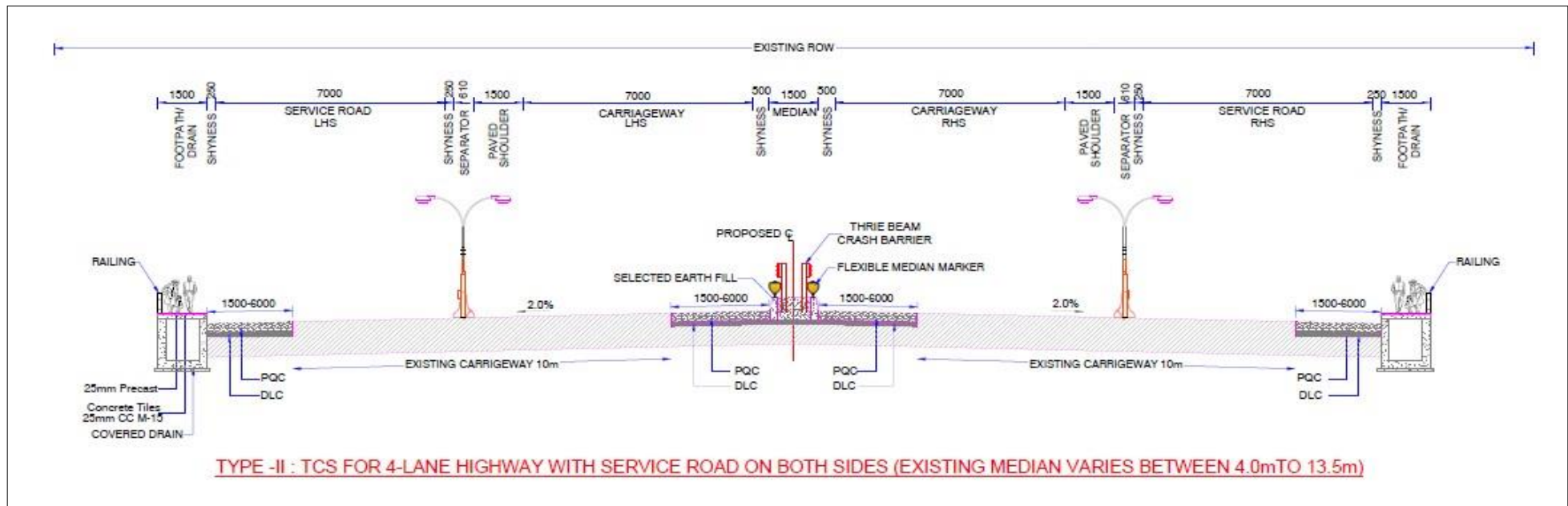
Typical Cross sections:

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.



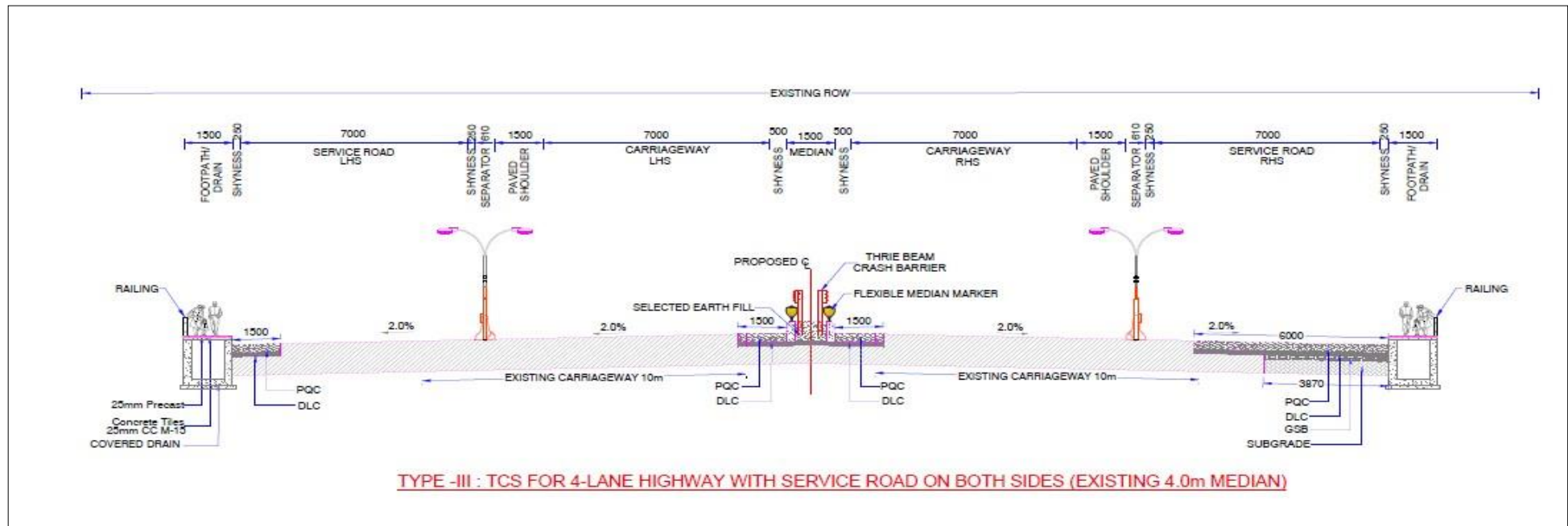
Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

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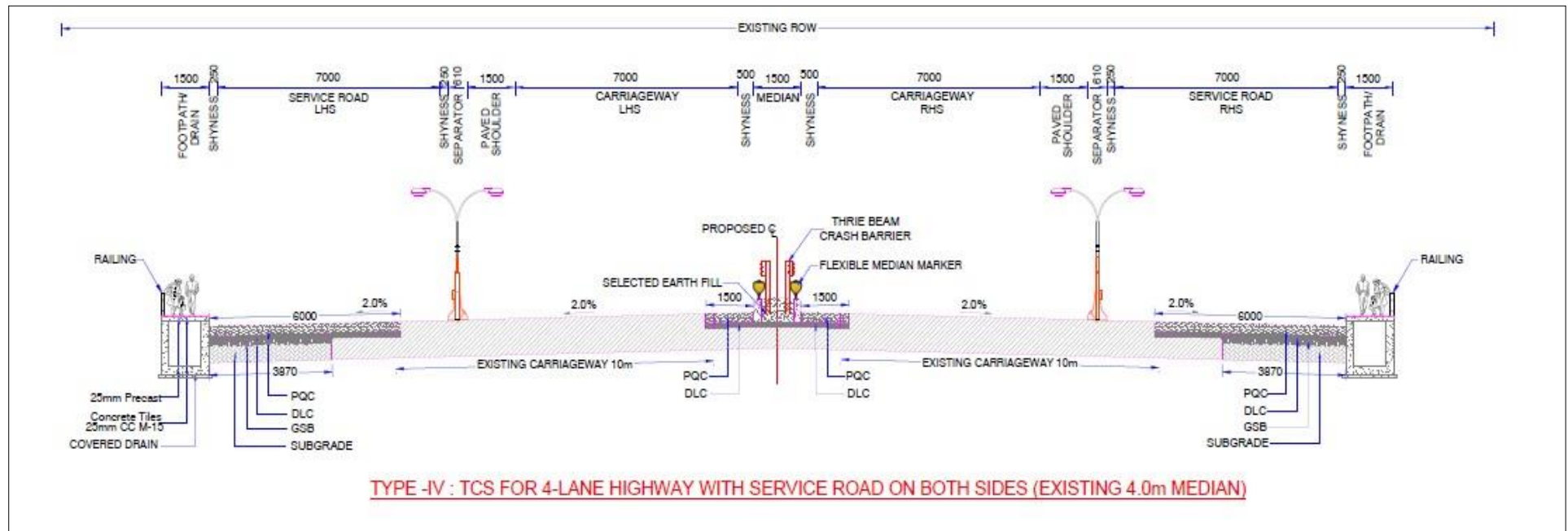


Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

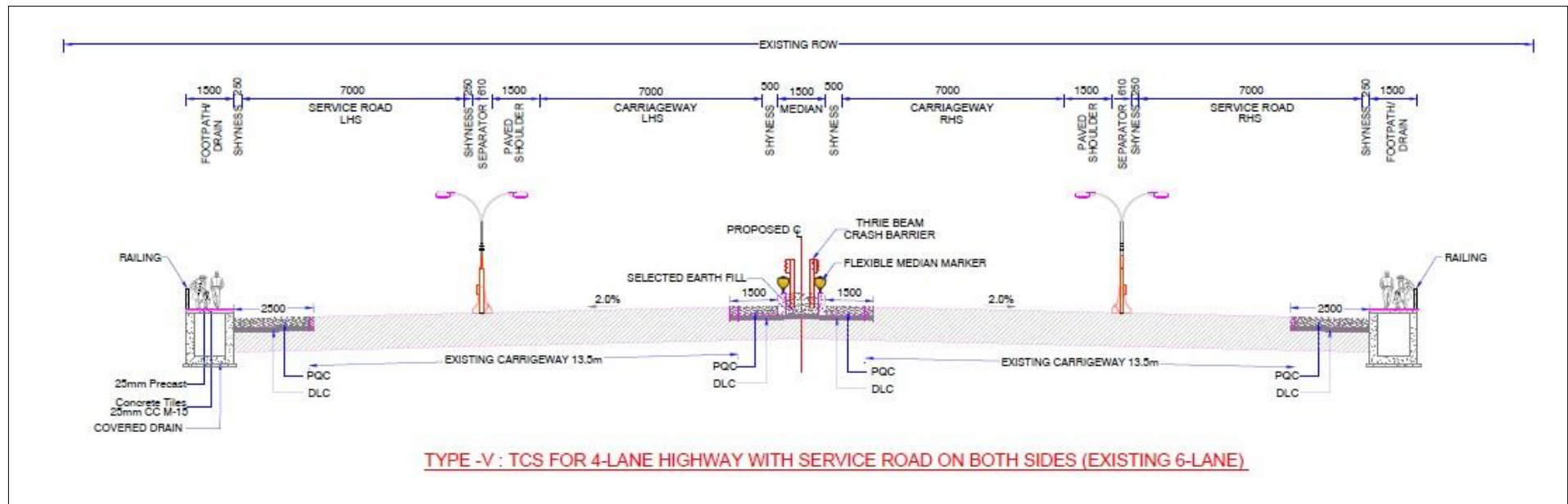
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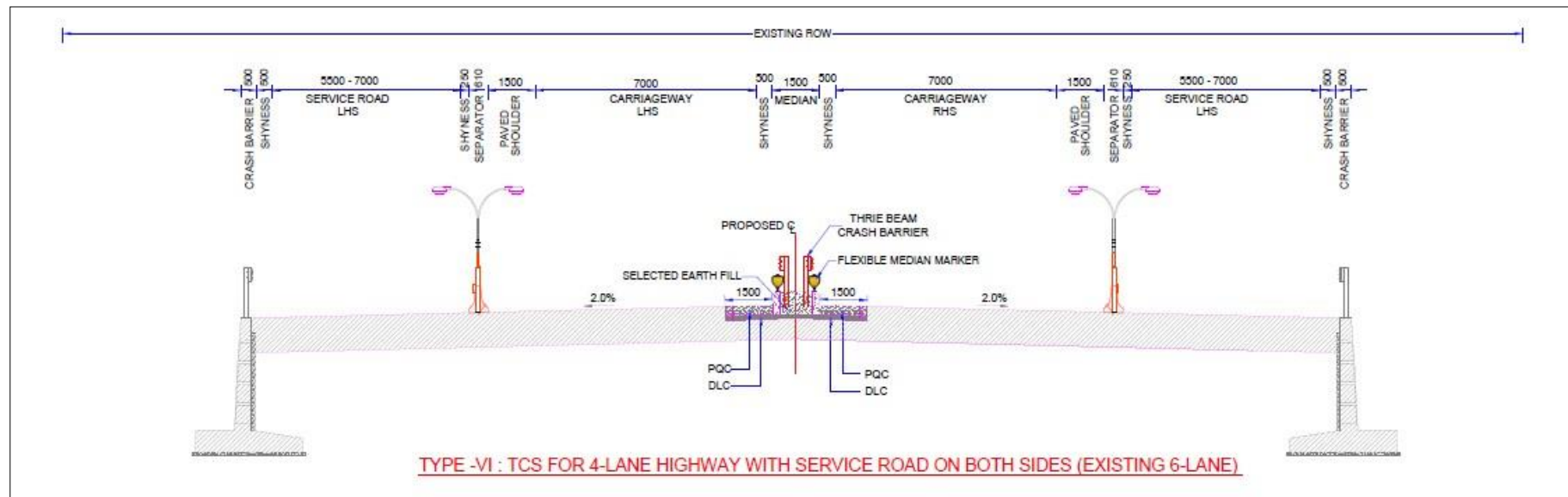
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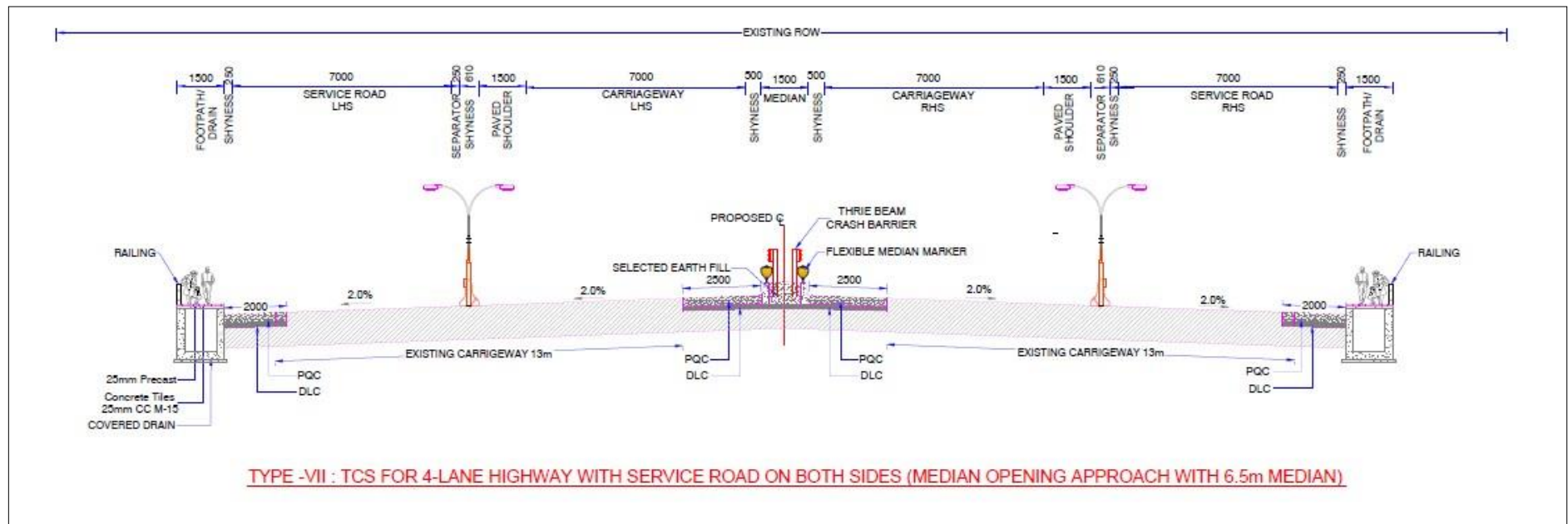
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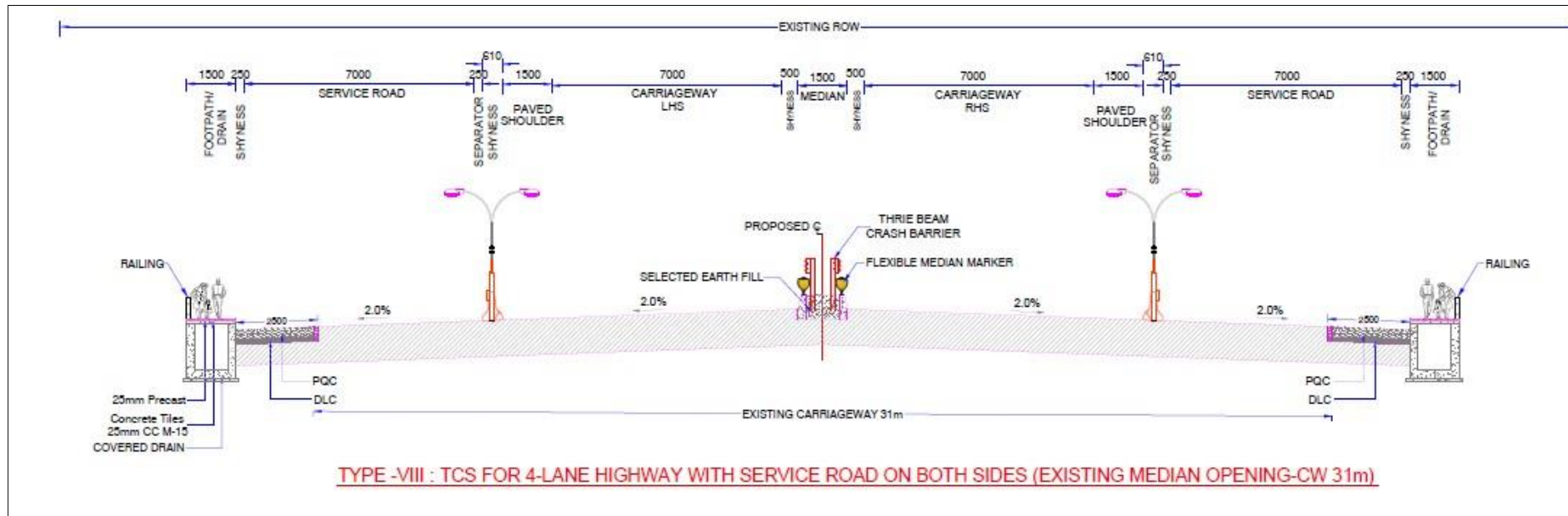
Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.



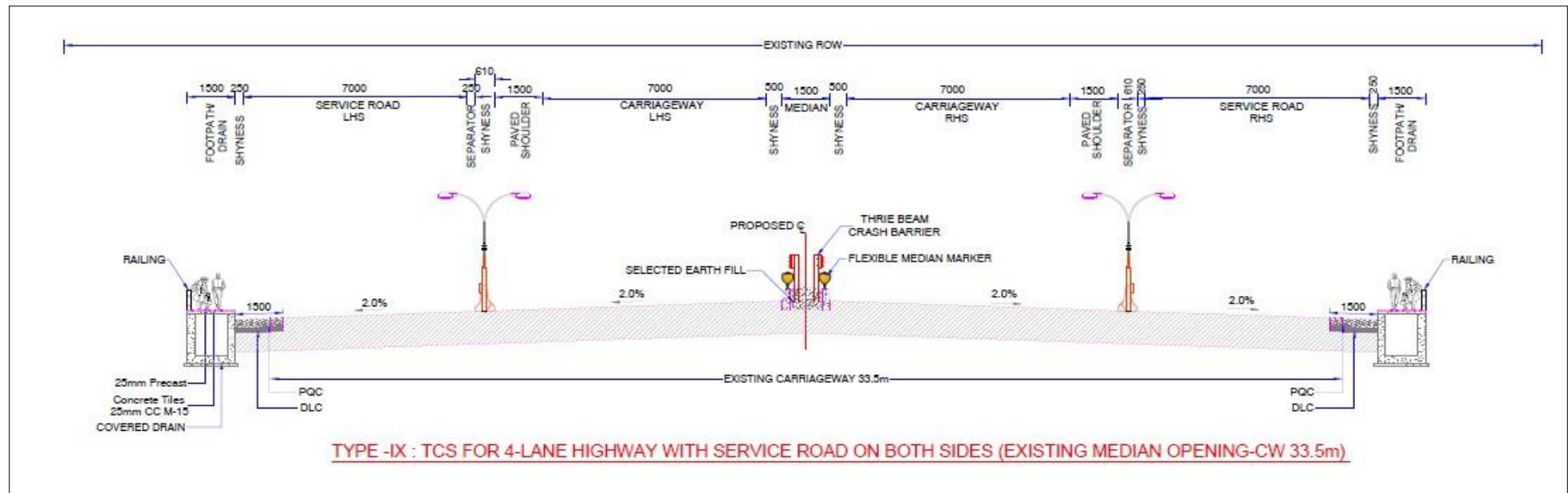
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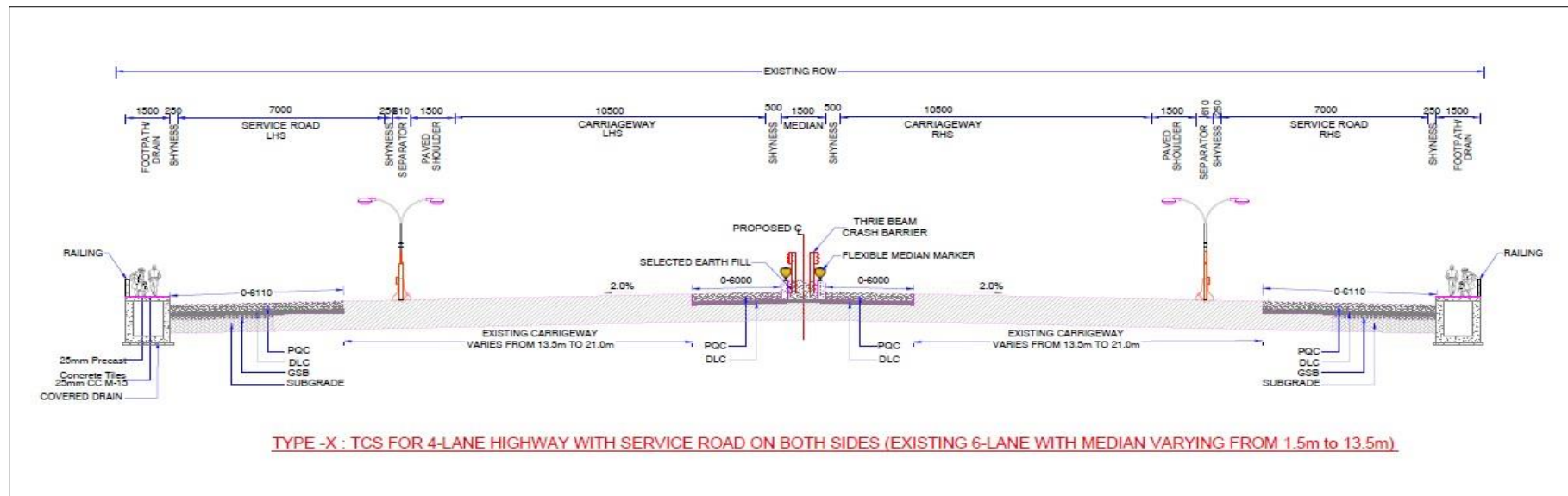
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Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.



Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

Schedule - C

(See Clause 2.1)

PROJECT FACILITIES

➤ Project Facilities

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

- 8.1 Roadside furniture.
- 8.2 Pedestrian facilities.
- 8.3 Highway lighting
- 8.4 Landscaping and Tree Plantation
- 8.5 Bus shelter
- 8.6 New Jersey Crash Barrier with antiglare screens
- 8.7 Toe wall and land development
- 8.8 Inspection Vehicle

1 Description of Project Facilities

Each of the Project Facilities is briefly described below:

a) Roadside Furniture shall be provided as follows: -

Traffic Signs and Pavement Markings:

Traffic signs and pavement markings shall include roadside signs, overhead signs, curve mounted signs and road marking along the project highway. Aluminium Composite Material (ACM) sheets shall be used for sign boards. Singange plan is enclosed for reference. The locations for these provisions shall be finalised in consultation with Authority and as per **IRC: 67 and IRC: 35** Standard. The detailed signage plan indicating places, direction, distances and other features marked on the change plan shall be prepared as per manual requirements, and the same shall be finalized in consultation with PWD as per site requirement.

Traffic Safety Devices shall be provided in consultation with Authority & Latest IRC standards.

Road studs, Flexible median markers, Roadway Delineators, reflective pavement markers, reflective stickers for the road side hazards (Trees, electrical poles, Buildings/shops/compound walls), convex mirrors, Solar Blinkers, Bollards, Yellow

Junction Box marking and traffic impact attenuators shall be provided in accordance with Schedule-D.

Transverse Zebra Crossing Markings shall be provided at all crossroad junction as per IRC: 35.

Hazard Markers shall be provided as per IRC standards.

Solar Traffic blinkers signal (L.E.D) and Convex mirrors shall be provided at intersections and hazardous locations.

Existing Non standards sign boards shall be removed.

Transverse bar marking Thermoplastic paint shall be provided at all crossroad junction as per IRC: 99.

b) Pedestrian Facilities

Pedestrian Facilities shall be provided in accordance with the Manual of Specifications and Standards as referred in Schedule D and IRC 103.

Pedestrian Facilities include the provision of:

i) Pedestrian Guard Rail:

Pedestrian Guard rails of corrosive resistant steel shall be provided along the footpath, bus shelter locations, built-up sections and intersections as specified in the manual.

ii) Pedestrian crossings:

Pedestrian crossings shall be provided at built-up sections and intersections as specified in the manual.

The additional pedestrian facilities in the form of guard rails, footpath, lighting etc. shall be provided in built-up area. Paver blocks shall be provided on Drain cum Footpath locations.

Bollards shall be provided in median opening locations.

c) Highway Lighting

Streetlight: Street lighting on decorative lamp post with LED /energy efficient lighting system of standard make with minimum 40 Lux capacity shall be provided for service road sections.

Note: -

- i) The above specified locations are minimum specified. If required, the Contractor shall provide high mast lighting wherever necessary in consultation with the Authority. However, this shall not be treated as Change of Scope.
- ii) Solar lights blinkers shall be provided at major junctions etc.
- iii) The lighting work shall be got done from the qualified specialised agency.

- iv) The scope includes providing entire lighting systems, trenching, underground / building in cabling, transformers etc. and obtaining electric supply / approval from concern Govt. department, if required.

Note: After construction, erection and energizing same shall be maintained/replaced, if required, till maintenance period by the Contractor.

d) Landscaping

a) Landscaping/turfing of the highway shall be done for the at grade island at Km 526.929 & 530.270 as per IRC: SP: 21

b) Dismantling and reconstruction of kerbs on Center island and Splitter islands shall be done.

e) Bus shelter

a. Bus shelter shall be provided at the locations given below. Bus shelter shall be designed based on IRC: SP:84, Clause 12.7 and Figure 12.3.

S. No.	Design Chainage (Km)	Side	Location Name
1	528.865	LHS	Moita
2	528.965	RHS	Moita

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

f) New Jersey Crash Barrier

The Grade of the New Jersey Crash Barrier shall be conforming to IRC:119 with grade of concrete M-40.

Antiglare screens shall be provided on New Jersey type crash barrier.

Crash barrier indicator shall be provided for the New jersey type median crash barrier.

g) Inspection Vehicle

One inspection vehicle (Ertiga / equivalent) including fuel and driver shall be provided for PWD .

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 Four Laning of Highways (IRC: SP: 84-2019) referred to herein as the Manual for 4-Lane project road.
- All materials, works & Construction operation shall conform to MORTH Specifications for Road and Bridge Works, IRC:58-2015 for Rigid Pavement Design, IRC:37-2018 for Flexible Pavement Design and other IRC codes based on design requirements.
- The provision of mandatory use of factory manufactured precast concrete elements in project within 100 km radius of the precast factory shall be governed by Ministry's Circular No. RW/NH-34049/01/2020-S&R(B) dated 08.04.2022. The minimum mandatory usage should be 25% of the total concrete volume other than the foundations and substructures of bridges/via duct/ ROB. Any relaxation may be granted by Authority only if the Contractor/Contractor is able to demonstrate that the manufacturer(s) is not able to provide such products matching to the works programme of the Contractor or the prices demanded by the manufacturer is more than the prices derived for cast-in-situ condition at the rates of SoR prevailing on 28th days before the bid due date.
- The use of fly ash in road/ flyover embankment construction on national highways work shall be governed by Ministry's Circular No. RW/NH-33044/01/2019-S&R(P&B) RSCE-Pt.1 dated 18.04.2022 and guidelines/ notification issued by MoEF& CC and MOP and applicable guidelines of Indian IRC & BIS.
- The use of UHPFRC shall be governed by Ministry's Circular No. RW/NH-33049/01/2020-S&R (B) Pt. dated 22.02.2022
- The use of manufactured aggregates in National Highway works shall be governed by Ministry's Circular No. RW/NH-34066/09/2017-S&R(B) dated 21.07.2020.
- Toll Plaza shall be governed by NHAI Circular No. NHAI/Policy Guidelines/Management of Plaza/2021, Policy Circular No. 17.5.82 Dated 24th May 2021.
- Circular No. RW/NH-34066/09/2017-S&R (B) dated 12.02.2021 on reinforcing

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa.

- Steel Bars: Clause 100.9.3.1 of Ministry's Specifications for Road and Bridge Works and Circular No. RW/NH-34049/03/2020-S&R(B) dated 22.01.2021 on use of Stainless Steel in Bridges on National Highways to be constructed in marine Environment Susceptible to Severe Corrosion.

Note: -Latest revisions of all relevant codes published 28 days before NIT date shall be applicable for this tender.

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 Four Laning of Highway through PPP (IRC: SP: 84-2019) 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 Independent Engineer.

Following Manual or references shall be followed

Reference	Description
Primary References	
IRC:SP:88	Road Safety Audit Manual
IRC:SP:84	Manual of Specifications and Standards for Four Laning of Highways
IRC:SP:55	Guidelines on Traffic Management in Roads
IRC:103	Guidelines for Pedestrian Facilities
IRC:67	Code of Practice for Road Signs
IRC:35	Code of Practice for Road Markings
IRC: 99	Guidelines on Traffic Calming measures in Urban and rural Roads
IRC SP 63	Guidelines for the use of Interlocking concrete block pavement
Other References	
IRC:SP:44-1996	Highway Safety Code
MoRTH	Manual for Safety in Road Design
IRC:SP:32	Road Safety for Children (5-12 Years old)
IRC:SP:31	New Traffic Signs
IRC:119	Guidelines for Traffic Safety Barriers

IRC:37	Guidelines for the Design of Flexible Pavements
IRC:SP-85	Guidelines for Variable Message Signs
IRC:73	Geometric Design Standards for Rural (Non-Urban) Highways
IRC:66	Recommended Practice for Sight Distance on Rural Highways
IRC:SP:23	Vertical Curves for Highways
IRC:53	Road Accident Forms A-1 and 4
MoRTH	National Road Safety Policy
MoRTH	Sundar Committee Report on Road Safety and Traffic Management
Additional References	
MoRTH Circular 602	Road Signs & Markings
MoRTH Circular 604	Highway Safety Railings
MoRTH Circular 605	Traffic Regulation
MoRTH Circular 606	Accidents
MoRTH Circular 607	Highway Patrolling
MoRTH Circular 1920	Safety measures
IRC:2	Route Marker Signs for National Highways
IRC:8	Type Designs for Highway Kilometer Stones
IRC:11	Recommended Practice for the Design and Layout of Cycle Tracks
IRC:31	Route Marker Signs for State Routes
IRC:62	Guidelines for Control of Access of Highways
IRC:64	Guidelines for Capacity of Roads in Rural Areas
IRC:79	Recommended Practice for Road Delineators
IRC:80	Type Designs for Pick-up Bus Stops on Rural (i.e., Non-Urban) Highways
IRC:93	Guidelines on Design and Installation of Road Traffic Signals

IRC:SP:41	Guidelines on Design of At-Grade Intersections in Rural & Urban Areas
IRC 112	Guidelines on Practice for Concrete road bridges
IRC 6	Guidelines on standard specifications and code for road bridges
IRC SP 56	Guidelines for Steel Pedestrian Bridges
MoRTH	Type Designs for Intersections on National Highways, 1992
NBC/IS Codes	Relevant guidelines for Installation, inspection, Maintenance and Operation of Lifts and Escalators
References from other countries / practices	
AASHTO	Highway Safety Manual
AASHTO	Highway Safety Design and Operations Guide
AASHTO	AASHTO Safety Leadership Forum V – Toward Zero Deaths (TZD): Aggressive Plans to Meet Aggressive Goals .
AASHTO	AASHTO Strategic Highway Safety Plan -- A Comprehensive Plan to Substantially Reduce Vehicle-Related Fatalities and Injuries on the Nation's Highways

2 Deviations from the Manual

Notwithstanding anything to the contrary contained in the aforesaid 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	Item	Clause in Manual	Provision as per Manual	Modified Provision
1	Typical Cross section	2.17	TCS as given in Fig. 2.2 to 2.3	As per modified TCS given in Schedule-B
2	ROW	2.3	ROW - 60m for 4 lane highway	ROW 45-60m considering LA issues and built-up sections.

IRC Codes: (Latest revision)

- IRC:5-2015 Standard Specifications and Code of Practice for Road Bridges, Section I - General Features of Design
- IRC:6-2017 Standard Specifications and Code of Practice for Road Bridges, Section-II Loads and Combinations
- IRC:38 - Guidelines for Design of Horizontal Curves for Highways and Design Tables
- IRC:58-2015 Guidelines for the Design of Plain Jointed Rigid Pavements for Highways (Fourth Revision).
- IRC:37-2018 Guidelines for the Design of Flexible Pavements (Fourth Revision).
- IRC:83-2015 (Part I) Standard Specifications and Code of Practice for Road Bridges, Section IX- Bearings, Part I : Roller & Rocker Bearings
- IRC:83-2018 (Part II) Standard Specifications and Code of Practice for Road Bridges, Section IX - Bearings (Elastomeric Bearings), Part II
- IRC:83-2018 (Part III) Standard Specifications and Code of Practice for Road Bridges, Section IX - Bearings, Part III: POT-CUM-PTFE, PIN and Metallic Guide Bearings
- IRC:119 - 2015 - Guidelines for Traffic Safety Barriers
- IRC: SP:23 - Vertical Curves for Highways
- IRC: SP:42 - Guidelines on Road Drainage
- IRC: SP:84 Manual of specifications & Standards for Four Laning of Highways with Paved Shoulders.
- IS: 6006-1983 (Reaffirmed 2008) - Specification for Uncoated Stress Relieved Strand for Pre-Stressed Concrete

The above latest version of IRC Codes and all other relevant latest IRC applicable as on 28 days prior to bid due date to be considered.

Schedules

Schedule - E

(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.
- (i) 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-fulfilment 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.
- (i) 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)

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)	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 and Distress Identification Manual for Long Term Pavement Performance Program, FHWA 2003 (http://www.tfhrcc.com/pavement/ltp/rereports/03031/)	24-48 hours	MORT&H Specification 3004.2
	Cracking	Nil	< 5 % subject to limit of	Daily			7-15 days	MORT&H Specification

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

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					
s of connecting roads, slip roads, lay byes etc. as applicable)			0.5 sqm for any 50 m length					n 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

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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					
	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

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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					
	Roughness BI	2000 mm/km	2400 mm/km	Bi-Annually	Class I Profilometer SCRIM (Sideway-force Coefficient Routine Investigation Machine or equivalent)	Class I Profilometer : ASTM E950 (98) :2004 -Standard Test Method for measuring Longitudinal Profile of Travelled Surfaces with Accelerometer Established Inertial Profiling Reference ASTM E1656 -94: 2000- Standard Guide for Classification of Automatic Pavement Condition Survey Equipment	180 days	IRC:82
	Skid Number	60SN	50SN	Bi-Annually			180 days	BS: 7941-1: 2006
	Pavement Condition Index	3	2.1	Bi-Annually			180 days	IRC:82
	Other Pavement Distresses			Bi-Annually			2-7 days	IRC:82
	Deflection/Remaining Life			Annually	Falling Weight Deflectomet	IRC 115	180 days	IRC:115

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

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					
					er			
Rigid Pavement (Pavement of MCW, Service Road, Grade structure, approaches of connecting roads, slip roads, lay byes etc. as applicable)	Roughness BI	2200mm/km	2400mm/km	Bi-Annually	Class I Profilometer	ASTM E950 (98) :2004 and ASTM E1656 -94: 2000	180 days	IRC:SP:83
	Skid	Skid Resistance no. at different speed of vehicles		Bi-Annually	SCRIM (Sideway-force Coefficient Routine Investigation Machine or equivalent)	IRC:SP:83-2008	180 days	IRC:SP:83
		Minimum SN	Traffic Speed (K m/h)					

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

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					
e)		36	50					
		33	65					
		32	80					
		31	95					
		31	110					
Embankment/ Slope	Edge drop at shoulders	Nil	40mm	Daily	Length Measurement Unit like Scale, Tape, odometer	IRC	7-15 days	MORT&H Specification 408.4
	Slope of camber/c	Nil	<2% variation in	Daily			7-15 days	MORT&H Specification

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

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					
	cross fall		prescribed slope of camber /cross fall		etc.			on 408.4
	Embankment Slopes	Nil	<15 % variation in prescribe side slope	Daily			7-15 days	MORT&H Specification on 408.4
	Embankment Protection	Nil	Nil	Daily	NA		7-15 days	MORT&H Specification
	Rain Cuts/ Gullies in	Nil	Nil	Daily Speciall	NA		7-15 days	MORT&H Specification

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

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					
	slope			y During Rainy Season				n

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

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

Table -2: Maintenance Criteria for Rigid Pavements:

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
CRACKING						
1	Single Discrete Cracks Not intersecting with any joint	w = width of crack L = length of 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	Staple or Dowel Bar

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
			5	$w > 3 \text{ mm.}$	m. Within 7 days	Retrofit, FDR for affected portion. Within 15days
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	$w < 0.2 \text{ mm}$, hair cracks	Route and seal with epoxy.	Staple or Dowel Bar Retrofit.
			2	$w = 0.2 - 0.5 \text{ mm}$, discernible from slow vehicle	Within 7 days	Within 15days
			3	$w = 0.5 - 3.0 \text{ mm}$, discernible from fast vehicle	Route, seal and stitch, if $L > 1 \text{ m.}$ Within 7 days	
			4	$w = 3.0 - 6.0 \text{ mm}$	Dowel Bar Retrofit.	Full Depth Repair

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
					Within 15 days	Dismantle and reconstruct affected.
			5	$w > 6$ mm, usually associated with spalling, and/or slab rocking under traffic	Not Applicable, as it may be full depth	Portion with norms and specifications - See Para 5.5 & 9.2 Within 15days
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, discernible from slow moving vehicle	Seal with epoxy, if $L > 1$ m. Within 7 days	Staple or dowel bar retrofit. Within 15days

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
			2	$w = 0.5 - 3.0$ mm, discernible from fast vehicle	Route seal and stitch, if $L > 1$ m. Within 15 days	-
			3	$w = 3.0 - 6.0$ mm	Staple, if $L > 1$ m. Within 15 days	Partial Repair with stapling. Depth with
			4	$w = 6.0 - 12.0$ mm, usually associated with spalling		Within 15 days
			5	$w > 12$ mm, usually associated with spalling, and/or slab rocking under traffic	Not Applicable, as it may be full depth	Full Depth Repair Dismantle and reconstruct affected portion as per norms and specifications - See Para 5.6.4

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
						Within 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.	
			2	$w = 0.2 - 0.5$ mm. discernible from slow vehicle	Within 15 days	
			3	$w = 0.5 - 3.0$ mm, discernible from fast vehicle	Full depth repair within 15 days	Dismantle, Reinstatement 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		

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
5	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	Seal with epoxy
			2	$w < 1.5$ mm; $L < 0.6$ m, only one corner broken	secure broken parts Within 7 days	seal with epoxy Within 7days
			3	$w < 1.5$ mm; $L < 0.6$ m, two corners broken	Partial Depth (Refer Figure 8.3 of IRC:SP: 83-2008) Within 15 days	Full depth repair
			4	$w > 1.5$ mm; $L > 0.6$ m or three corners broken		
				ree or four corners broken		Reinstate sub-base, and reconstruct the slab as per norms and specifications

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

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

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
				deformation		Cut out and replace damaged area taking care not to damage reinforcement. Within 30days
			5	$w > 3 \text{ mm}$, $L > 3 \text{ m/m}^2$ and deformation		
Surface Defects						
7	Ravelling Honeycomb surface	$r = \frac{\text{area damaged or surface of slab (\%)}}{\text{total surface of slab (\%)}}$ $h = \text{maximum depth of damage}$	0	Nil, not discernible	Short Term	Long Term
					No action.	Not Applicable
			1	$r < 2 \%$	Local repair of areas damaged	
			2	$r = 2 - 10 \%$	and liable to be damaged.	

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
					Within 15 days	
			3	$r = 10-25\%$	Bonded Inlay, 2 or 3 slabs if	
			4	$r = 25 - 50 \%$	affecting. Within 30 days	
			5	$r > 50\%$ and $h > 25 \text{ mm}$	Reconstruct slabs, 4 or more slabs if affecting. Within 30 days	
8	Scaling	$r = \frac{\text{damaged surface}}{\text{total surface of slab}} (\%)$ $h = \text{maximum depth of damage}$	0	Nil, not discernible	Short Term	Long Term
					No action.	Not Applicable
			1	$r < 2 \%$	Local repair of areas	

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
					damaged	
			2	$r = 2 - 10 \%$	and liable to be damaged. Within 7days	
			3	$r = 10 - 20\%$	Bonded Inlay within 15 days	
			4	$r = 20 - 30 \%$		
			5	$r > 30 \%$ and $h > 25 \text{ mm}$	Reconstruct slab within 30 days	
9	Polished Surface/Glazing	t = texture depth, sand patch test	0		No action.	Not Applicable
			1	$t > 1 \text{ mm}$		

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S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
			2	$t = 1 - 0.6 \text{ mm}$	Monitor rate of deterioration	
			3	$t = 0.6 - 0.3 \text{ mm}$		
			4	$t = 0.3 - 0.1 \text{ mm}$		
			5	$t < 0.1 \text{ mm}$	Diamond Grinding if affecting 50% or more slabs in a continuous stretch of minimum 5 km. Within 30 days	
10	Popout (Small Hole), $n = \text{number/m}^2$		0	$d < 50 \text{ mm}; h < 25 \text{ mm}; n < 1 \text{ per}$	No action.	Not Applicable

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S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
8.4	Pothole Refer Para	d = diameter h = maximum depth		5 m ²		
			1	d = 50 - 100 mm; h < 50 mm; n < 1 per 5 m ²	Partial depth repair 65 mm deep.	
			2	d = 50 - 100 mm; h > 50 mm; n < 1 per 5 m ²	Within 15 days	
			3	d = 100 - 300 mm; h < 100 mm n < 1 per 5 m ²	Partial depth repair 110mm	
			4	d = 100 - 300 mm; h > 100 mm; n < 1 per 5 m ²	i.e.10 mm more than the depth of the hole. Within 30 days	
			5	d > 300 mm; h > 100 mm: n > 1 per 5 m ²	Full depth repair.	

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

S.No.	Type of Distress	Measured Parameter	Degree of Severity	Assessment Rating	Repair Action	
					For the case $d < D/2$	For the case $d > D/2$
					Within 30 days	

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

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

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

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.	
			2	w = 10 - 20 mm, L < 25%	Within 7 days	
			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		

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

			2	f = 3 - 6 mm	Determine cause and observe, take action for diamond grinding	Replace the slab as appropriate.
			3	f = 6 - 12 mm	Diamond Grinding	Within 30days
			4	f= 12 - 18 mm	Raise sunken slab.	Replace the slab as appropriate.
			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
					No Action	
			1	h < 6 mm		
			2	h = 6 - 12 mm		
			3	h = 12 - 25 mm		

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

			4	h > 25 mm	Full Depth Repair. Within 30 days	
			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 subgrade. Reinstate pavement at normal level if L < 20 m. Within 30 days	
			5	h > 100 mm		

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

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.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

			3	$h = 7 - 15 \text{ mm}$	Grind, in case of ongoing Maintenance within 15 days	Replace in case of new construction. Within 30days
			5	$h > 15 \text{ mm}$	Full Depth Repair. Within 30 days	Full Depth Repair. Within 30days
18	Lane Shoulder Dropoff	to $f = \text{difference of level}$	0	Nil, not discernible $< 3\text{mm}$	Short Term	Long Term
					No action.	
			1	$f = 3 - 10 \text{ mm}$	Spot repair of shoulder within 7 days	
			2	$f = 10 - 25 \text{ mm}$		
			3	$f = 25 - 50 \text{ mm}$	Fill up shoulder within 7 dayss	
			4	$f = 50 - 75 \text{ mm}$		For any 100 m stretch Reconstruct shoulder, if affecting 25% or
			5	$f > 75 \text{ mm}$		

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

						more of stretch. Within 30days
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	Clean drains etc within 7 days,	Action required to stop water

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

				flowing	Follow up	damaging foundation within 30 days.
			5	Ponding, accumulation of water observed	-do-	

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

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

Asset Type	Performance Parameter	Level of Service (LOS)			Frequency of Measurement	Testing Method	Recommended Remedial measures	Time limit for Rectification	Specifications and Standards
Highway	Availability of Safe Sight Distance	As per IRC SP :84-2014, a minimum of safe stopping sight distance shall be available throughout.			Monthly	Manual Measurements with Odometer along with video/ image backup	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.		IRC:SP 84-2014
		Design Speed, kmph	Desirable Minimum Sight Distance (m)	Safe Stopping Sight Distance (m)					
		100	360	180					
		80	260	130					
Pavement Marking	Wear	<70% of marking remaining			Bi-Annually	Visual Assessment as per Annexure-F of IRC:35-2015	Re - painting	Cat-1 Defect - within 24 hours Cat-2 Defect - within 2 months	IRC:35

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

	Day time Visibility	During expected life Service Time Cement Road - 130mcd/m ² /lux Bituminous Road - 100mcd/m ² /lux		Monthly	As per Annexure-D of IRC:35-2015	Re - painting	Cat-1 Defect - within 24 hours Cat-2 Defect - within 2 months	IRC:35
	Night Time Visibility	<u>Initial and Minimum Performance for Dry Retro reflectivity during night time:</u>		Bi-Annually	As per Annexure-E of IRC:35-2015	Re - painting	Cat-1 Defect - within 24 hours Cat-2 Defect - within 2 months	IRC:35
		Design Speed	(RL) Retro Reflectivity (mcd/m ² /lux)					
			Initial (7 days) Minimum Threshold level (TL) & warranty period required up to 2 years					
		Up to 65	200 80					
		65 - 100	250 120					
		Above 100	350 150					
		<u>Initial and Minimum Performance for Night Visibility under wet condition (Retro reflectivity):</u> Initial 7 days Retro reflectivity: 100 mcd/m ² /lux Minimum Threshold Level: 50						

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

		mcd/m ² /lux					
	Skid Resistance	Initial and Minimum performance for Skid Resistance: Initial (7days): 55BPN Min. Threshold: 44BPN *Note: shall be considered under urban/city traffic condition encompassing the locations like pedestrian crossings, bus bay, bus stop, cycle track intersection delineation, transverse bar markings etc	Bi-Annually	As per Annexure-G of IRC:35-2015		Within 24 hours	IRC:35
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
	Retro reflectivity	As per specifications in IRC:67-2012	Bi-Annually	Testing of each signboard using Retro Reflectivity Measuring Device. In accordance	Change of signboard	48 hours in case of Mandatory Signs, Cautionary and Informatory Signs (Single and Dual post signs)	IRC:67

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

				with ASTM D 4956-09.		1 Month in case of Gantry/Cantilever Sign boards	
Kerb	Kerb Height	As per IRC 86:1983 depending upon type of Kerb	Bi-Annually	Use of distance measuring tape	Raising Kerb Height	Within 1 Month	RC 86
	Kerb Painting	Functionality: Functioning of Kerb painting as intended	Daily	Visual with video/image backup	Kerb Repainting	Within 7-days	RC 35
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 IRC:35
	Pedestrian Guardrail	Functionality: Functioning of guardrail as intended	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:SP:84
	Traffic Safety Barriers	Functionality: Functioning of Safety Barriers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84 IRC:119
	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 IRC:119
	Attenuators	Functionality: Functioning of Attenuators as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP84 IRC:119
	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

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

	Overhead Sign Structure	Overhead sign structure shall be structurally adequate	Daily	Visual with video/image backup	Rectification	Within 15 days	IRC:67
	Traffic Blinkers	Functionality: Functioning of Traffic Blinkers as intended	Daily	Visual with video/image backup	Rectification	Within 7 days	IRC:SP:84
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
		No major failure in the lighting system	Daily	-	Rectification of failure	24 hours	IRC:SP:84
		No minor failure in the lighting system	Monthly	-	Rectification of failure	8 hours	IRC:SP:84
	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
		No major/minor failure in the lighting system	Daily	-	Rectification of failure	8 hours	IRC:SP:84
Trees and Plantation including median plantation	Obstruction in a minimum head-room of 5.5 m above carriageway or obstruction in visibility	No obstruction due to trees	Monthly	Visual with video/image backup	Removal of trees	Immediate	IRC:SP:84

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

	of road signs						
	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
	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
Rest Areas	Cleaning of toilets	-	Daily	-	-	Every 4 hours	
	Defects in electrical, water and sanitary installations	-	Daily	-	Rectification	24 hours	

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

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
	Table 4: Maintenance Criteria for Structures and Culverts:					

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

Asset Type	Performance Parameter	Level of Service (LOS)	Frequency of Measurement	Testing Method	Recommended Remedial measures
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.
	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
	Structurally sound	Spalling of concrete not more than 0.25 sqm	Bi-Annually	Detailed inspection of all components of culvert as per IRC SP:35-1990 and recording the defects	Repairs to spalling, cracking, delamination, rusting shall be followed as per IRC:SP:40-1993.
		Delamination of concrete not more than 0.25 sq.m.			
		Cracks wider than 0.3 mm not more than 1m aggregate length			
	Protection works in good condition	Damaged of rough stone apron or bank revetment not more than 3 sqm, damage to solid apron (concrete apron) not more than 1 sqm	2 times in a year (before and after rainy season)	Condition survey as per IRC SP:35-1990	Repairs to damaged aprons and pitching
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
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

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa on EPC Mode.

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.

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa

A. Flexible Pavement

Nature of Defect or deficiency		Time limit for repair/rectification
(b) Granular earth shoulders, side slopes, drains and culverts		
(i)	Variation by more than 1 % in the prescribed slope of camber/cross fall (shall not be less than the camber on the main carriageway)	7 (seven) days
(ii)	Edge drop at shoulders exceeding 40 mm	7 (seven) days
(iii)	Variation by more than 15% in the prescribed side (embankment) slopes	30 (thirty) days
(iv)	Rain cuts/gullies in slope	7 (seven) days
(v)	Damage to or silting of culverts and side drains	7 (seven) days
(vi)	Desilting of drains in urban/semi- urban areas	24 (twenty-four) hours
(vii)	Railing, parapets, crash barriers	7 (seven) days (Restore immediately if causing safety hazard)
(c) Road side furniture including road sign and pavement marking		
(i)	Damage to shape or position, poor visibility or loss of retro- reflectivity	48 (forty-eight) hours
(ii)	Painting of km stone, railing, parapets, crash barriers	As and when required/ Once every year
(iii)	Damaged/missing signs road requiring replacement	7 (seven) days
(iv)	Damage to road mark ups	7 (seven) days
(d) Road lighting		
(i)	Any major failure of the system	24 (twenty four) hours
(ii)	Faults and minor failures	8 (eight) hours
(e) Trees and plantation		

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa

Nature of Defect or deficiency		Time limit for repair/rectification
(i)	Obstruction in a minimum head- room of 5 m above carriageway or obstruction in visibility of road signs	24 (twenty four)hours
(ii)	Removal of fallen trees from carriageway	4 (four) hours
(iii)	Deterioration in health of trees and bushes	Timely watering and treatment
(iv)	Trees and bushes requiring replacement	30 (thirty) days
(v)	Removal of vegetation affecting sight line and road structures	15 (fifteen) days
(f) Rest area		
(i)	Cleaning of toilets	Every 4 (four) hours
(ii)	Defects in electrical, water and sanitary installations	24 (twenty four) hours
(g) [Toll Plaza]		
(h)	Other Project Facilities and Approach roads	
(i)	Damage in approach roads, pedestrian facilities, truck lay- byes, bus-bays, bus-shelters, cattle crossings, Traffic Aid Posts, Medical Aid Posts, Rain Water Harvesting/Artificial Recharge Unit 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		

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa

Nature of Defect or deficiency		Time limit for repair/ rectification
(i)	Any damage, cracks, spalling/ scaling Temporary measures Permanent measures	within 48 (forty eight) hours within 15 (fifteen) days or as specified by the Authority's Engineer
(b) Foundations		
(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

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa

Nature of Defect or deficiency		Time limit for repair/ rectification
(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.]

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa

Widening of existing carriageway and construction of Service road between km 527.425 to km 529.695 including Cattle Underpass near Moita at km 528.915 to achieve continuous four-lane with service road carriageway on NH - 66 in the state of Goa

*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;
 - (a) Permission of Village Panchayats and Pollution Control Board for installation of crushers;
 - (a) Licence for use of explosives;
 - (a) Permission of the State Government for drawing water from river/reservoir;
 - (a) Licence from inspector of factories or other competent Authority for setting up batching plant;
 - (a) Clearance of Pollution Control Board for setting up batching plant;
 - (a) Clearance of Village Panchayats and Pollution Control Board for setting up asphalt plant;
 - (a) Permission of Village Panchayats and State Government for borrow earth; and
 - (a) Any other permits or clearances required under Applicable Laws.

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
(See Clause 7.1)
Form of Bank Guarantee
[Performance Security/Additional Performance Security]

Chief Engineer,

To,

Authority

.....,

.....

.....,

.....

Public Works Department, Thane

WHEREAS:

- (A) _____[name and address of contractor] (hereinafter called the “**Contractor**”) and _____ [name and address of the authority], (hereinafter called the “**Authority**”) have entered into an agreement (hereinafter called the “**Agreement**”) for the construction of “ ***Widening of existing carriageway and construction of Service road between Km 527.425 to Km 529.695 including cattle Underpass near Moita at Km 528.915 to achieve continuous four-lane with service road carriageway on NH-66 in the state of Goa.***” on Engineering, Procurement and Construction (the “**EPC**”) basis, subject to and in accordance with the provisions of the Agreement.
- (B) The Agreement requires the Contractor to furnish a Performance Security for due and faithful performance of its obligations, under and in accordance with the Agreement, during the {Construction Period/ Defects Liability Period and Maintenance Period} (as defined in the Agreement) in a sum of Rs.....cr.(Rupees.....crore) (the “**Guarantee Amount**”).
- (C) We, ... through our branch at.....(the “**Bank**”) have agreed to furnish this bank guarantee (*hereinafter called the “**Guarantee**”*) by way of Performance Security.

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

1. The Bank hereby unconditionally and irrevocably guarantees the due and faithful performance of the Contractor’s obligations during the {Construction Period/ Defects Liability Period and Maintenance Period} under and in accordance with the Agreement,

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

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

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

(Schedule - G)

(See Clause 19.2)

Form for Guarantee for Advance Payment**Chief Engineer,**

To,

Authority

.....,

.....

.....,

.....

Public Works Department, Thane

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 “***Widening of existing carriageway and construction of Service road between Km 527.425 to Km 529.695 including cattle Underpass near Moita at Km 528.915 to achieve continuous four- lane with service road carriageway on NH-66 in the state of Goa.***” on Engineering, Procurement and Construction (the “**EPC**”) basis, subject to and in accordance with the provisions of the Agreement
- (B) In accordance with Clause 19.2 of the Agreement, the Authority shall make to the Contractor an interest bearing @Bank Rate + 3% advance payment (herein after called “**Advance Payment**”) equal to 10% (ten per cent) of the Contract Price; and that the Advance Payment shall be made in two installments subject to the Contractor furnishing an irrevocable and unconditional guarantee by a scheduled bank for an amount equivalent to 110% (one hundred and ten percent) of such installment to remain effective till the complete and full repayment of the installment of the Advance Payment as security for compliance with its obligations in accordance with the Agreement. The amount of {first/second} installment of the Advance Payment is Rs. _____ cr. (Rupees _____ crore) and the amount of this Guarantee is Rs. _____ cr. (Rupees _____ crore) (the “**Guarantee Amount**”) \$.
- (C) We, ... through our branch at (the “**Bank**”) have agreed to furnish this bank guarantee (hereinafter called the “**Guarantee**”) for the Guarantee Amount.

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

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 installment 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.
 2. A letter from the Authority, under the hand of an officer not below the rank of **Superintending Engineer, PWD Panaji**, that the Contractor has committed default in the due and faithful performance of all or any of its obligations for the repayment of the installment of the Advance Payment under and in accordance with the Agreement shall be conclusive, final and binding on the Bank. The Bank further agrees that the Authority shall be the sole judge as to whether the Contractor is in default in due and faithful performance of its obligations during and under the Agreement and its decision that the Contractor is in default shall be final and binding on the Bank, notwithstanding any differences between the Authority and the Contractor, or any dispute between them pending before any court, tribunal, arbitrators or any other authority or body, or by the discharge of the Contractor for any reason whatsoever.
 3. In order to give effect to this Guarantee, the Authority shall be entitled to act as if the Bank were the principal debtor and any change in the constitution of the Contractor and/or the Bank, whether by their absorption with any other body or corporation or otherwise, shall not in any way or manner affect the liability or obligation of the Bank under this Guarantee.
 4. It shall not be necessary, and the Bank hereby waives any necessity, for the Authority to proceed against the Contractor before presenting to the Bank its demand under this Guarantee.
 5. The Authority shall have the liberty, without affecting in any manner the liability of the Bank under this Guarantee, to vary at any time, the terms and conditions of the Advance Payment or to extend the time or period of its repayment or to postpone for any time, and from time to time, any of the rights and powers exercisable by the Authority against the Contractor, and either to enforce or forbear from enforcing any of the terms and conditions contained in the Agreement and/or the securities available to the Authority, and the Bank shall not be released from its liability and obligation under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the Contractor or any other forbearance, indulgence, act or omission on the part of the Authority or of any other matter or thing whatsoever which
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- under any law relating to sureties and guarantors would but for this provision have the effect of releasing the Bank from its liability and obligation under this Guarantee and the Bank hereby waives all of its rights under any such law.
6. This Guarantee is in addition to and not in substitution of any other guarantee or security now or which may hereafter be held by the Authority in respect of or relating to the Advance Payment.
 7. Notwithstanding anything contained hereinbefore, the liability of the Bank under this Guarantee is restricted to the Guarantee Amount and this Guarantee will remain in force for the period specified in paragraph 8 below and unless a demand or claim in writing is made by the Authority on the Bank under this Guarantee all rights of the Authority under this Guarantee shall be forfeited and the Bank shall be relieved from its liabilities hereunder.
 8. The Guarantee shall cease to be in force and effect on ****.\$ Unless a demand or claim under this Guarantee is made in writing on or before the aforesaid date, the Bank shall be discharged from its liabilities hereunder.
 9. The Bank undertakes not to revoke this Guarantee during its currency, except with the previous express consent of the Authority in writing, and declares and warrants that it has the power to issue this Guarantee and the undersigned has full powers to do so on behalf of the Bank.
 10. Any notice by way of request, demand or otherwise hereunder may be sent by post addressed to the Bank at its above referred branch, which shall be deemed to have been duly 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 up to the date specified in paragraph 8 above or until it is released earlier by the Authority pursuant to the provisions of the Agreement.

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

SIGNED, SEALED AND DELIVERED

For and on behalf of the Bank by:

(Signature)

(Name)

(Designation)

(Code Number)

(Address)

NOTES:

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

Contract Price Weightages

1.1 The Contract Price for this Agreement is Rs.34,53,78,161.00

1.2 Proportion of the contract price for different stages of construction of the Project Highway shall be as specified below.

S No.	Item	Weightage in percentage to the Contract Price	Stage for payment	Percentage weightage
	1	200.0000%	3	4
I	Road works including culverts, widening and repair of culverts	34.5500%	A1 - Widening and Strengthening of existing Road	
			1. Earthwork up to top of the Embankment	1.48%
			2. Sub-Grade	
			3. Sub Base course	
			4. Dry Lean Concrete(DLC) Course	10.44%
			5. Pavement Quality Control(PQC) Course	29.00%
			6. Widening and repair of culverts	0.77%
			B.1 - Reconstruction/ New realignment/ bypass (flexible pavement)	
			1. Earthwork up to top of the Embankment	
			2. Sub-Grade	
			3. Sub Base course	
			4. Non Bituminous Base Course	
			5. Bituminous Base course	
			6. Wearing coat	
			B.2 - Reconstruction/ New realignment/ bypass (Rigid pavement)	
			1. Earthwork up to top of the Embankment	
			2. Sub-Grade	
			3. Sub Base course	
			4. Dry Lean Concrete(DLC) Course	
			5. Pavement Quality Control(PQC) Course	

			C.1 - Reconstruction/ New Service road (flexible pavement)	
			1. Earthwork up to top of the Embankment	
			2. Sub-Grade	
			3. Sub Base course	
			4. Non Bituminous Base Course	
			5. Bituminous Base course	
			6. Wearing coat	
			C.2(A) - Reconstruction/New Service Road (Rigid Pavement)	
			1. Earthwork up to top of the Embankment	
			2. Sub-Grade	
			3. Sub base course	
			4. Dry Lean Concrete(DLC) course	
			5. Pavement Quality Control(PQC) course	
			C.2(B) - Widening and Strengthening of existing Service Road	
			1. Earthwork up to top of the Embankment	0.59%
			2. Sub-Grade	2.48%
			3. Sub Base course	3.92%
			4. Dry Lean Concrete(DLC) Course	11.74%
			5. Pavement Quality Control(PQC) Course	39.58%
			D- Reconstruction and New Culverts on existing road, realignment, bypasses:	
			Culverts (length<6m)	
II	Minor Bridges/ Underpasses/ Overpasses	3.5500%	A.1 - Widening / Repairs of Minor Bridges (length>6m and <60m)	
			Minor Bridges	
			(1) Foundation: On completion of the foundation work of abutments and piers	
			(2) Sub-structure: On completion of abutments and piers with abutment/ pier cap.	

		(3) Super-structure: On completion of the superstructure in all respects including wearing coat, bearings, expansion joints, handrails, crash barriers, road signs and markings, tests on completion etc. complete in all respect.	
		(4) Approaches: On completion of approaches including wing walls/ return walls, Retaining walls, stone pitching, protection works for floor, embankment slope, etc. complete in all respect and fit for use.	
		A.2 -New Minor Bridges (length>6m and <60m)	
		(1) Foundation: On completion of the foundation work of abutments and piers	
		(2) Sub-structure: On completion of abutments and piers with abutment/ pier cap.	
		(3) Super-structure: On completion of the super-structure upto deck slab including bearings.	
		(4) Miscellaneous Works : On completion of wearing coat, expansion joint, crash barrier, railings, protection works and any remaining work associated to bridge including tests on bridge.	
		(5) Approaches: On completion of approaches including wing walls/ return walls, Retaining walls, stone pitching, protection works for floor, embankment slope etc. complete in all respect and fit for use.	
		(6) Guide Bunds and River Training Works: On completion of Guide Bunds and river Training Works complete in all respects	
		B.1-Widening / repair of Underpasses/Overpasses	
		Underpasses/Overpasses	
		B.2-New Structure CUP/Underpasses/Overpasses	

III	Major Bridge (length>60m) works and ROB/RUB/elevated sections/flyovers including viaducts,if any	0.0000%	(1) Foundation: On completion of the foundation work of abutments and piers	23.77%
			(2) Sub-structure: On completion of abutments and piers with abutment/ pier cap.	26.07%
			(3) Super-structure: On completion of the super-structure upto deck slab including bearing.	20.05%
			(4) Miscellaneous Works: On completion of wearing coat, expansion joint, crash barrier, railings and any remaining work associated to bridge including tests on bridge	7.23%
			(5) Approaches: On completion of approaches including Wing walls/ Return walls, Retaining walls/ Reinforced Earth walls, stone pitching, protection works complete in all respect and fit for use.	22.88%
			A.1 - Widening & Repairs of Major Bridges	
			1. Foundation	
			i) Pile Foundation	
			ii) Open Foundation	
			2. Sub-structure	
III	Major Bridge (length>60m) works and ROB/RUB/elevated sections/flyovers including viaducts,if any	0.0000%	3. Super-structure (including Bearings)	
			4. Wearing Coat including expansion joints	
			5. Miscellaneous Items like Hand rails, crash barrier, road markings etc.	
			6. Wing walls/return walls	
			7. Guide bunds, River Training works etc.	
			8. Approaches (including Retaining walls, stone pitching and protection works for floor, Embankment slope, etc.)	
			A.2 -New Major Bridges	
			1. Foundation	
			i) Well foundation	
			ii) Pile foundation	
			iii) Open Foundation	

		2. Sub-structure	
		3. Super-structure (including Bearings)	
		4. Wearing Coat including expansion joints	
		5. Miscellaneous Items like Hand rails, crash barrier, road markings etc.	
		6. Wing walls/return walls	
		7. Guide bunds, River Training works etc.	
		8. Approaches (including Retaining walls, stone pitching and protection works for floor, Embankment slope, etc.)	
		B.1 - Widening & Repair of	
		a) ROB	
		b) RUB	
		1. Foundation	
		i) Pile Foundation	
		ii) Open Foundation	
		2. Sub-structure	
		3. Super structure (Including bearings)	
		4. Wearing Coat (a) in case of ROB- wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB-rigid pavement under RUB including drainage facility complete in all respects as specified	
		5. Miscellaneous Items like hand rails, crash barriers, road markings, etc.)	
		6. Wing walls/return walls	
		7. Approaches (including Retaining walls, stone pitching and protection works)	
		B.2 New ROB/RUB	
		a) ROB	
		b) RUB	
		1. Foundation	
		i) Well foundation	
		ii) Pile foundation	
		iii) Open Foundation	

		2. Sub-structure	
		3. Super structure (Including bearings)	
		4. Wearing Coat (a) in case of ROB- wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB-rigid pavement under RUB including drainage facility complete in all respects as specified	
		5. Miscellaneous Items like hand rails, crash barriers, road markings, etc.	
		6. Wing walls/return walls	
		7. Approaches (including Retaining walls/Reinforced Earth wall, stone pitching and protection works)	
		C.1-Widening and repair of Elevated section/Flyovers/Grade Separators	
		1. Foundation	
		i) Pile Foundation	
		ii) Open Foundation	
		2. Sub-structure	
		3. Super structure (Including bearings)	
		4. Wearing Coat including expansion joints	
		5. Miscellaneous Items like hand rails, crash barriers, road markings, etc.)	
		6. Wing walls/return walls	
		7. Approaches (including Retaining walls/Reinforced Earth wall, stone pitching and protection works)	
		C.2-New Elevated section/Flyovers/Grade Separators	
		1. Foundation	
		i) Well foundation	
		ii) Pile foundation	
		iii) Open Foundation	
		2. Sub-structure	
		3. Super structure (Including bearings)	
		4. Wearing Coat including expansion joints	

IV	Other Works	50.3200%	5. Miscellaneous Items like hand rails, crash barrier, road markings etc.	
			6. Wing walls/Return walls	
			7. Approaches (including Retaining walls/Reinforced Earth wall, stone pitching and protection works)	
			Other works	
			1. Toll Plaza	
			2. Road side Drains	
			a) Unlined Toe Drain	
			b) Lined Drain	
			c) RCC Drain	24.74%
			d) RCC Cover Slab including Footpath Tiles	10.22%
			3. Road signs, Markings, Km stones, Safety devices, etc.	2.89%
			4. Overhead gantry mounted signs.	0.76%
			5. Project facilities	
			a) Bus Shelters	0.18%
			b) Truck lay-byes	
			c) Rest Areas	
			d) Others	
			6. Road side Plantation	
			7. Protection works other than approaches to the bridges, elevated sections/ flyovers/ grade separators and ROB/RUBs.	
			a) Crash barrier	
			i) W Beam Crash barrier	0.00%
			ii) Thrie Beam Crash Barrier	16.23%
			iii) New Jersey Barrier	12.94%
			b) Retaining wall	8.55%
			c) Breast wall	
			8. Safety, Traffic Management & Maintenance of Existing road during construction.	

			9. ATMS including video surveillance system, Video incident detection system, Emergency call system, Variable message signs, Meteorological data system, Automatic traffic counter, Speed violation detection system, Control room, Traffic impact attenuators, Ambulance, crane, Patrolling vehicles, Drone video recording for every six months, etc.	
			10. Other miscellaneous works like slope protection works, junctions, dismantling, Street Lighting, Anti glare screen, kerbs, etc.	
			i) Water Harvesting Chambers	0.41%
			ii) Utility Ducts	0.13%
			iii) Kerb	1.46%
			iv) Kerb & Crash Barrier Painting	0.83%
			v) Solar Blinkers	0.06%
			vi) Convex Mirrors	0.03%
			vii) Electrical lighting	11.88%
			viii) Cleaning of Culverts	0.29%
			ix) Junction & Cross Development	8.27%
			x) Tree Cutting, Dismantling,	0.13%
V	Electrical utilities and public Health Utilities (Water pipe lines and sewage lines)	11.5800%	Utilities	
			Water Supply & Sanitary	26.25%
			HT/LT line	73.75%

1.3 Procedure of estimating the value of work done

1.3.1 Road works

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

Table 1.3.1

Stage of Payment	Percentage - Weightage	Payment Procedure
A1 - Widening and Strengthening of existing Road		
1. Earthwork up to top of the Embankment	1.4800%	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
2. Sub-Grade		
3. Sub Base course		

4. Dry Lean Concrete(DLC) Course	10.4400%	of not less than 10 (ten) percent of the total length or 500m whichever is less
5. Pavement Quality Control(PQC) Course	29.0000%	
6. Widening and repair of culverts	0.7700%	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 atleast one culvert. 75% of the cost will be payable on completion of box/ abutments and slab/ pipe and head wall. Remaining 25% will become payable on completion of protection works including return/ wing walls and any other work associated with culverts.
B.1 - Reconstruction/ New realignment/ bypass (flexible pavement)		
1. Earthwork up to top of the Embankment		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 500 m length, whichever is less
2. Sub-Grade		
3. Sub Base course		
4. Non Bituminous Base Course		
5. Bituminous Base course		
6. Wearing coat		
B.2 - Reconstruction/ New realignment/ bypass (Rigid pavement)		
1. Earthwork up to top of the Embankment		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 500 m length, whichever is less.
2. Sub-Grade		
3. Sub Base course		
4. Dry Lean Concrete(DLC) Course		
5.Pavement Quality Control(PQC) Course		
C.1 - Reconstruction/ New Service road (flexible pavement)		
1. Earthwork up to top of the Embankment		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 500 m length, whichever is less.
2. Sub-Grade		
3. Sub Base course		
4. Non Bituminous Base Course		
5. Bituminous Base course		
6. Wearing coat		
C.2(A) - Reconstruction/New Service Road (Rigid Pavement)		

1. Earthwork up to top of the Embankment		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 500 m length, whichever is less.
2. Sub-Grade		
3. Sub base course		
4. Dry Lean Concrete(DLC) course		
5. Pavement Quality Control(PQC) course		
C.2(B) - Widening and Strengthening of existing Service Road		
1. Earthwork up to top of the Embankment	0.5900%	Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 500 m length, whichever is less.
2. Sub-Grade	2.4800%	
3. Sub Base course	3.9200%	
4. Dry Lean Concrete(DLC) Course	11.7400%	
5. Pavement Quality Control(PQC) Course	39.5800%	
D- Reconstruction and New Culverts on existing road, realignment, bypasses:		
Culverts (length<6m)		Cost of each culvert shall be determined on pro rata basis with respect to the total number of culverts. Payment shall be made on the completion of atleast one culvert. 75% of the cost will be payable on completion of box/ abutments and slab/ pipe and head wall. Remaining 25% will become payable on completion of protection works including return/ wing walls and any other work associated with culverts.
*Note- In case of CTB and AIL layer, this stage may be modified suitably to permit separate weightages for each of these layers. @ 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 other stages shall be worked out accordingly. Note: The length affected due to law and order problems or litigation during execution due to which the Contractor is unable to execute the work, may be deducted from the total project length for payment purposes. The total length calculated here is only for payment purposes and will not affect and referred in other clauses of the Contract Agreement.		

100.0000%

1.3.2 Minor Bridges and Underpasses/Overpasses.

Procedure for estimating the value of Minor bridge and Underpasses/Overpasses shall be as stated in table 1.3.2:

Table 1.3.2

Stage of Payment	Percentage - Weightage	Payment Procedure
A.1 - Widening / Repairs of Minor Bridges (length>6m and <60m)		
Minor Bridges		Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length (m) of the minor bridges.
(1) Foundation: On completion of the foundation work of abutments and piers		(1) Foundation: Payment against foundation shall be made on pro-rata basis on completion of a stage i.e completion of atleast two foundations of each bridge. In case where load testing is specified for foundation, the trigger of first payment shall include load testing also.
(2) Sub-structure: On completion of abutments and piers with abutment/ pier cap.		(2) Sub - structure – Payment shall be made on pro-rata basis on completion of stage i.e. completion of atleast one sub-structure upto abutment/ pier cap level of each bridge.
(3) Super-structure: On completion of the superstructure in all respects including wearing coat, bearings, expansion joints, handrails, crash barriers, road signs and markings, tests on completion etc. complete in all respect.		(3) Super-structure: Payment shall be made on pro-rata basis on completion of a stage i.e., completion of super-structure of at least one span in all respects as specified in the column of "Stage of Payment" in this sub-clause.
(4) Approaches: On completion of approaches including wing walls/ return walls, Retaining walls, stone pitching, protection works for floor, embankment slope, etc. complete in all respect and fit for use.		(4) Approaches: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of approaches including wing walls/ return walls, retaining walls, stone pitching in all respect as specified in the column of "Stage of Payment" in this sub clause for each bridge

A.2 -New Minor Bridges (length>6m and <60m)		Cost of each minor bridge shall be determined on pro rata basis with respect to the total linear length (m) of the minor bridges.
(1) Foundation: On completion of the foundation work of abutments and piers		(1) Foundation: Payment against foundation shall be made on pro-rata basis on completion of a stage completion of atleast two foundations of each bridge. In case where load testing is specified for foundation, the trigger of first payment shall include load testing also.
(2) Sub-structure: On completion of abutments and piers with abutment/ pier cap.		(2) Sub - structure – Payment shall be made on pro-rata basis on completion of stage i.e. completion of atleast one sub-structure upto abutment/ pier cap level of each bridge.
(3) Super-structure: On completion of the super-structure upto deck slab including bearings.		(3) Super-structure: Payment shall be made on pro-rata basis on completion of a stage i.e., completion of super-structure of at least one span upto deck slab including bearing as specified in the column of "Stage of Payment" in this subclause. If pre-cast girders/ segments are used, interim payments shall be made at 75% of the cost of that element, as derived from MoRTH Data Book, applicable SOR of State PWD on Base Date with tender discount/premium applied thereon.
(4) Miscellaneous Works : On completion of wearing coat, expansion joint, crash barrier, railings, protection works and any remaining work associated to bridge including tests on bridge.		(4) Miscellaneous Works: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of wearing coat, expansion joint, crash barrier, railing, protection works, drainage and any other remaining work associated to bridge including tests on bridge for each bridge

(5) Approaches: On completion of approaches including wing walls/ return walls, Retaining walls, stone pitching, protection works for floor, embankment slope etc. complete in all respect and fit for use.		(5) Approaches: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of approaches including wing walls/ return walls, retaining walls, stone pitching in all respect as specified in the column of "Stage of Payment" in this subclause for each bridge.
(6) Guide Bunds and River Training Works: On completion of Guide Bunds and river Training Works complete in all respects		(6) Guide Bunds and River Training Works: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of Guide Bunds and River training Works in all respects as specified for each bridge.
B.1-Widening / repair of Underpasses/Overpasses		
Underpasses/Overpasses		Cost of each underpass/overpass shall be determined on pro rata basis with respect to the total linear length of the underpasses/overpasses. Payment shall be made on the completion of widening & repair works of a underpass/overpass.
B.2-New Structure CUP/ Underpasses/Overpasses		Cost of each Underpass/Overpass shall be determined on pro rata basis with respect to the total linear length (m) of the Underpasses/Overpasses.
(1) Foundation: On completion of the foundation work of abutments and piers	23.7700%	(1) Foundation: Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one foundation of each underpass/overpass. In case where load testing is specified for foundation, the trigger of first payment shall include load testing also.
(2) Sub-structure: On completion of abutments and piers with abutment/ pier cap.	26.0700%	(2) Sub-structure: Payment shall be made on pro-rata basis on completion of stage i.e. completion of atleast one sub-structure upto abutment/ pier cap level of each bridge.

(3) Super-structure: On completion of the super-structure upto deck slab including bearing.	20.0500%	(3) Super-structure: Payment shall be made on pro-rata basis on completion of a stage 'i.e. completion of super-structure of at least one span upto deck slab including bearing as specified in the column of "Stage of Payment" in this subclause: If pre-cast girders/ segments are used, interim payments shall be made at 75% of the cost of that element, as derived from MoRTH Data Book, applicable SOR of State PWD on Base Date with tender discount/premium applied thereon.
(4) Miscellaneous Works: On completion of wearing coat, expansion joint, crash barrier, railings and any remaining work associated to bridge including tests on bridge	7.2300%	(4) Miscellaneous Works: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of wearing coat, expansion joint, crash barrier, railing, protection works and any other remaining work associated to bridge including tests on bridge for each bridge.
(5) Approaches: On completion of approaches including Wing walls/ Return walls, Retaining walls/ Reinforced Earth walls, stone pitching, protection works complete in all respect and fit for use.	22.8800%	(v) Approaches: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of either side of the abutment approaches including wing wall/ return wall, retaining walls, Reinforced Earth walls, stone pitching, protection works complete in all respect for each bridge.
100.0000%		

1.3.3 Major Bridge works, ROB/RUB Structures.

Procedure for estimating the value of Major Bridge works, ROB/RUB and Structures shall be as stated in table 1.3.3:

Table 1.3.3

Stage of Payment	Percentage - Weightage	Payment Procedure
A.1 - Widening & Repairs of Major Bridges		Cost of each Major Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridges.

1. Foundation		(1) Foundation: Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one foundation of each of the major Bridge as specified hereunder.
(i) Pile Foundation (a) Piling – On completion of pile upto bottom of pile cap (b) Pile Cap : On completion of pile cap		(i) Pile Foundation (a) Piling : Payment of 70% shall be made on completion of piling upto bottom of pile cap for each pile on prorata basis. (b) Pile Cap : Payment of 30% on prorata basis shall be made on completion of pile cap. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
ii) Open Foundation		(ii) Open Foundation: Payment shall be made on completion of a stage i.e. on completion of atleast one foundation.
2. Sub-structure		(2) Sub-Structure: Payment against Sub-structure shall be made on prorata basis on completion of a stage i.e. completion of atleast one substructure of abutments/piers upto abutment/pier cap level of each of the major bridge.
3. Super-structure (including Bearings)		(3) Super-structure: Payment shall be made on prorata basis on completion of a stage i.e. completion of superstructure upto deck slab including bearings of at least one span as specified here in under : If pre-cast RCC/PSC/Steel girders/ segments are used, interim payments shall be made at 75% of the cost of that element, as derived from MoRTH Data Book, applicable SOR of State PWD on Base Date with tender discount/premium applied thereon.
4. Wearing Coat including expansion joints		(4) Wearing Coat: Payment shall be made on completion of wearing coat including expansion joints

		complete in all respects as specified for each major bridge.
5. Miscellaneous Items like Hand rails, crash barrier, road markings etc.		(5) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified for each major bridge.
6. Wing walls/return walls		(6) Wing walls/return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified for each major bridge.
7. Guide bunds, River Training works etc.		(7) Guide Bunds, River Training works: Payments shall be made on completion of all guide bunds/river training works etc. complete in all respects as specified for each major bridge.
8. Approaches (including Retaining walls, stone pitching and protection works for floor, Embankment slope, etc.)		(8) Approaches: Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified for each major bridge.
A.2 -New Major Bridges		Cost of each Major Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridge.
1. Foundation		(1) Foundation: Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one foundation of each of the major Bridge as specified here in under:

(i) Well Foundation (a) On completion of Cutting Edge + Well Curb (b) Wellsteining : On completion of well steining upto bottom of well cap. (c) On completion of bottom plug + top plug (if provisioned as per design) + well cap	(i) Well Foundation (a) Cutting Edge + Well Curb: Payment of 10% shall be made on completion of a stage i.e. completion of cutting edge + well curb. (b) Well steining : Payment of 65% shall be made on completion of well steining upto bottom of well cap. The payment stage shall be further sub-divided on pro-rata basis i.e. (i) on completion upto 10 m and (ii) on completion of each subsequent 5 m or part thereof. (c) Bottom plug + top plug (if provisioned as per design) + well cap: Payment of 25% shall be made on completion of a stage i.e. completion of bottom plug, back fill, top plug and well cap.
(ii) Pile Foundation (a) Piling – On completion of pile upto bottom of pile cap (b) Pile Cap : On completion of pile cap	(ii) Pile Foundation (a) Piling : Payment of 70% shall be made on completion of piling upto bottom of pile cap for each pile on prorota basis. (b) Pile Cap : Payment of 30% shall be made on completion of pile cap. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(iii) Open Foundation	(iii) Open Foundation: Payment shall be made on completion of a stage i.e. on completion of atleast one foundation.
2. Sub-structure	(ii) Sub-Structure:. Payment against Sub-structure shall be made on prorata basis on completion of a stage i.e. completion of atleast one substructure of abutments/piers upto abutment/pier cap level of each of the major bridge.

3. Super-structure (including Bearings)		(3) Super-structure: Payment shall be made on prorata basis on completion of a stage i.e. completion of superstructure upto deck slab including bearings of at least one span as specified here in under: If pre-cast girders/ segments are used, interim payments shall be made at 75% of the cost of that element, as derived from MoRTH Data Book, applicable SOR of State PWD on Base Date with tender discount/premium applied thereon. (For cable stayed bridge and suspension cable bridge, detailed payment stage may be included on case to case basis)
4. Wearing Coat including expansion joints		(4) Wearing Coat: Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified for each major bridge.
5. Miscellaneous Items like Hand rails, crash barrier, road markings etc.		(5) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified for each major bridge.
6. Wing walls/return walls		(6) Wing walls/return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified for each major bridge.
7. Guide bunds, River Training works etc.		(7) Guide Bunds, River Training works: Payments shall be made on completion of all guide bunds/river training works etc. complete in all respects as specified for each major bridge.
8. Approaches (including Retaining walls, stone pitching and protection works for floor, Embankment slope, etc.)		(8) Approaches: Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified for each major bridge.
B.1 - Widening & Repairs of a) ROB b) RUB		Cost of each ROB/RUB shall be determined on pro rata basis with respect to the total linear length (m) of the ROB/RUBs.

1. Foundation		(1) Foundation: Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one foundation of each of the ROB/RUB as specified here in under.
(i) Pile Foundation (a) Piling – On completion of pile upto bottom of pile cap (b) Pile Cap : On completion of pile cap		(i) Pile Foundation (a) Piling : Payment of 70% shall be made on completion of piling upto bottom of pile cap for each pile on prorata basis. (b) Pile Cap : Payment of 30% on prorata basis shall be made on completion of pile cap. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
ii) Open Foundation		(ii) Open Foundation: Payment shall be made on completion of a stage i.e. on completion of atleast one foundation.
2. Sub-structure		(2) Sub-Structure:. Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one substructure of abutments/piers upto abutment/pier cap level of each of the ROB/RUB.
3. Super structure (Including bearings)		(3) Super-structure: Payment shall be made on prorata basis on completion of a stage i.e. completion of superstructure upto deck slab including bearings of at least one span as specified here in under: If pre-cast girders/ segments are used, interim payments shall be made at 75% of the cost of that element, as derived from MoRTH Data Book, applicable SOR of State PWD on Base Date with tender discount/premium applied thereon.

4. Wearing Coat (a) in case of ROB- wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB-rigid pavement under RUB including drainage facility complete in all respects as specified		(4) Wearing Coat: Payment shall be made on completion of (a) in case of ROB- wearing coat including expansion joints complete in all respects as specified for each of the ROB and (b) in case of RUB- rigid pavement under RUB including drainage facility complete in all respects as specified for each of the RUB.
5. Miscellaneous Items like hand rails, crash barriers, road markings, etc.)		(5) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified for each of the ROB/ RUB.
6. Wing walls/return walls		(6) Wing/ Return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified for each of the ROB/ RUB.
7. Approaches (including Retaining walls, stone pitching and protection works)		(7) Approaches: Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified for each of the ROB/ RUB.
B.2 New ROB/RUB		Cost of each ROB/RUB shall be determined on pro rata basis with respect to the total linear length (m) of the ROB/RUBs.
a) ROB		
b) RUB		
1. Foundation		(1) Foundation: Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one foundation of each of the ROB/RUB as specified here in under:

(i) Well Foundation (a) On completion of Cutting Edge + Well Curb (b) Wellsteining : On completion of well steining upto bottom of well cap. (c) On completion of bottom plug + top plug (if provisioned as per design) + well cap	(i) Well Foundation (a) Cutting Edge + Well Curb: Payment of 10% shall be made on completion of a stage i.e. completion of cutting edge + well curb. (b) Well steining : Payment of 65% shall be made on completion of well steining upto bottom of well cap. The payment stage shall be further sub-divided on pro-rata basis i.e. (i) on completion upto 10 m and (ii) on completion of each subsequent 5 m or part thereof. (c) Bottom plug + top plug (if provisioned as per design) + well cap: Payment of 25% shall be made on completion of a stage i.e. completion of bottom plug, back fill, top plug and well cap.
(ii) Pile Foundation (a) Piling – On completion of pile upto bottom of pile cap (b) Pile Cap : On completion of pile cap	(ii) Pile Foundation (a) Piling : Payment of 70% shall be made on completion of piling upto bottom of pile cap for each pile on prorota basis. (b) Pile Cap : Payment of 30% shall be made on completion of pile cap. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(iii) Open Foundation	(iii) Open Foundation: Payment shall be made on completion of a stage i.e. on completion of atleast one foundation.
2. Sub-structure	(2) Sub-Structure: Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one substructure of abutments/piers upto abutment/pier cap level of each of the ROB/RUB.

3. Super structure (Including bearings)		(3) Super-structure: Payment shall be made on prorata basis on completion of a stage i.e. completion of superstructure upto deck slab including bearings of at least one span as specified here in under: If pre-cast girders/ segments are used, interim payments shall be made at 75% of the cost of that element, as derived from MoRTH Data Book, applicable SOR of State PWD on Base Date with tender discount/premium applied thereon.
4. Wearing Coat (a) in case of ROB- wearing coat including expansion joints complete in all respects as specified and (b) in case of RUB-rigid pavement under RUB including drainage facility complete in all respects as specified		(4) Wearing Coat: Payment shall be made on completion of (a) in case of ROB- wearing coat including expansion joints complete in all respects as specified for each of the ROB and (b) in case of RUB- rigid pavement under RUB including drainage facility complete in all respects as specified for each of the RUB.
5. Miscellaneous Items like hand rails, crash barriers, road markings, etc.		(5) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified for each of the ROB/ RUB.
6. Wing walls/return walls		(6) Wing/ Return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified for each of the ROB/ RUB.
7. Approaches (including Retaining walls/Reinforced Earth wall, stone pitching and protection works)		(7) Approaches: Payments shall be made on completion of both approaches of each ROB including stone pitching, protection works, etc. complete in all respects as specified here in under : If reinforced soil wall is used with facia panel/blocks, interim payment shall be made @75% of the Cost of that element as derived from MoRTH data Book. Applicable SOR of State PWD on Base Date with tender

		discount/premium applied thereon.
C.1-Widening and repair of Elevated section/Flyovers/Grade Separators		Cost of each structure shall be determined on pro rata basis with respect to the total linear length (m) of the structures.
1. Foundation		(1) Foundation : Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one foundation of each of the structure as specified here in under :
(i) Pile Foundation (a) Piling – On completion of pile upto bottom of pile cap (b) Pile Cap : On completion of pile cap		(i) Pile Foundation (a) Piling : Payment of 70% shall be made on completion of piling upto bottom of pile cap for each pile on prorata basis. (b) Pile Cap : Payment of 30% on prorata basis shall be made on completion of pile cap. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
ii) Open Foundation		(ii) Open Foundation: Payment shall be made on completion of a stage i.e. on completion of atleast one foundation.
2. Sub-structure		(2) Sub-Structure: ..Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one substructure of abutments/piers upto abutment/pier cap level of each of the Structure.

3. Super structure (Including bearings)		(3) Super-structure: Payment shall be made on prorata basis on completion of a stage i.e. completion of superstructure upto deck slab including bearings of at least one span as specified here in under: If pre-cast girders/ segments are used, interim payments shall be made at 75% of the cost of that element, as derived from MoRTH Data Book, applicable SOR of State PWD on Base Date with tender discount/premium applied thereon.
4. Wearing Coat including expansion joints		(4) Wearing Coat: Payment shall be made on completion wearing coat including expansion joints complete in all respects as specified for each of the Structure.
5. Miscellaneous Items like hand rails, crash barriers, road markings, etc.)		(5) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified for each of the Structure.
6. Wing walls/return walls		(6) Wing/ Return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified for each of the Structure.
7. Approaches (including Retaining walls/Reinforced Earth wall, stone pitching and protection works)		(7) Approaches: Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects of each structure.
C.2-New Elevated section/Flyovers/Grade Separators		Cost of each structure shall be determined on pro rata basis with respect to the total linear length (m) of the structures.
1. Foundation		Foundation: Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one foundation of each of the structure as specified here in under :

(i) Well Foundation (a) On completion of Cutting Edge + Well Curb (b) Wellsteining : On completion of well steining upto bottom of well cap. (c) On completion of bottom plug + top plug (if provisioned as per design) + well cap	(i) Well Foundation (a) Cutting Edge + Well Curb: Payment of 10% shall be made on completion of a stage i.e. completion of cutting edge + well curb. (b) Well steining : Payment of 65% shall be made on completion of well steining upto bottom of well cap. The payment stage shall be further sub-divided on pro-rata basis i.e. (i) on completion upto 10 m and (ii) on completion of each subsequent 5 m or part thereof. (c) Bottom plug + top plug (if provisioned as per design) + well cap: Payment of 25% shall be made on completion of a stage i.e. completion of bottom plug, back fill, top plug and well cap.
(ii) Pile Foundation (a) Piling – On completion of pile upto bottom of pile cap (b) Pile Cap : On completion of pile cap	(ii) Pile Foundation (a) Piling : Payment of 70% shall be made on completion of piling upto bottom of pile cap for each pile on prorota basis. (b) Pile Cap : Payment of 30% shall be made on completion of pile cap. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(iii) Open Foundation	(iii) Open Foundation: Payment shall be made on completion of a stage i.e. on completion of atleast one foundation.
2. Sub-structure	(2) Sub-Structure: Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e. completion of atleast one substructure of abutments/piers

		upto abutment/pier cap level of each of the Structure.
3. Super structure (Including bearings)		(3) Super-structure: Payment shall be made on prorata basis on completion of a stage i.e. completion of superstructure upto deck slab including bearings of at least one span as specified here in under: If pre-cast girders/ segments are used, interim payments shall be made at 75% of the cost of that element, as derived from MoRTH Data Book, applicable SOR of State PWD on Base Date with tender discount/premium applied thereon.
4. Wearing Coat including expansion joints		(4) Wearing Coat: Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified for each of the structure.
5. Miscellaneous Items like hand rails, crash barrier, road markings etc.		(5) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc. complete in all respects as specified for each of the Structure.
6. Wing walls/Return walls		(6) Wing/ Return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified for each of the Structure.
7. Approaches (including Retaining walls/Reinforced Earth wall, stone pitching and protection works)		(7) Approaches: Payments shall be made on completion of both approaches including stone pitching, protection works, etc. complete in all respects as specified here in under : If reinforced soil wall is used with facia panel/blocks, interim payment shall be made @75% of the Cost of that element as derived from MoRTH data Book. Applicable SOR of State PWD on Base Date with tender discount/premium applied thereon.

0.0000%

1.3.4 Other Works

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

Table 1.3.4

Stage of Payment	Percentage - Weightage	Payment Procedure
Other Works		
1. Toll Plaza		Unit of measurement is each completed toll plaza. Payment for each toll plaza shall be made on pro rata basis with respect to the total of all toll plazas as specified here in under :
a) DLC (LHS)		(a) DLC (LHS) : Payment of 12.5% on pro-rata basis shall be made on completion of a stage i.e. completion of DLC on LHS.
(b) DLC (RHS)		(b) DLC (RHS) : Payment of 12.5% on pro-rata basis shall be made on completion of a stage i.e. completion of DLC on RHS.
(c) PQC (LHS)		(c) PQC(LHS): Payment of 25% on pro-rata basis shall be made on completion of a stage i.e. completion of PQC on LHS.
(d) PQC (RHS)		(d) PQC(RHS): Payment of 25% on pro-rata basis shall be made on completion of a stage i.e. completion of PQC on RHS.
(e) Admin Building		(e) Admin Building: Payment of 10% on pro-rata basis shall be made on completion of a stage i.e. completion of Admin Building and miscellaneous works.
(f) Toll Booth, canopy, safety items and all other associated works		(f) Toll Booth, canopy, safety items and all other associated works: Payment of 15% on pro-rata basis shall be made on completion of a stage i.e. completion of Toll Booth, canopy, safety items and all other associated works.

2. Road side Drains		
a) Unlined Toe Drain		Unit of measurement is linear length in metre. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 100 m on one side.
b) Lined Drain		Unit of measurement is linear length in metre. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 100 m on one side.
c) RCC Drain	24.7400%	Unit of measurement is linear length in metre. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 100 m on one side.
d) RCC Cover Slab including Footpath Tiles	10.2200%	Unit of measurement is linear length in metre. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 100 m on one side.
3. Road signs, Markings, Km stones, Safety devices, etc.	2.8900%	Unit of measurement is linear length in km. Payment shall be made on pro rata basis on completion of a stage in a length of not less than one Km on both sides.
4. Overhead gantry mounted signs.	0.7600%	Unit of measurement is each number. Payment shall be made on pro-rata basis on completion of each overhead gantry mounted sign
5. Project facilities		Unit of measurement is each number.
a) Bus Shelters	0.1800%	Payment shall be made on pro rata basis for completed facilities.
b) Truck lay-byes		
c) Rest Areas		
d) Others		
6. Road side Plantation		Unit of measurement is linear length in Km. Payment shall be made on pro rata basis on completion of one Km.

7. Protection works other than approaches to the bridges, elevated sections/ flyovers/ grade separators and ROB/RUBs.		Unit of measurement is linear length. Payment against items (a), (b) & '(c) shall be made on pro rata basis on completion of a stage in a length of not less than 10% (ten per cent) of the total length and 100 m whichever is less.
a) Crash barrier		
i) W Beam Crash barrier	0.0000%	
ii) Thrie Beam Crash Barrier	16.2300%	
iii) New Jersey Barrier	12.9400%	
b) Retaining wall	8.5500%	
c) Breast wall		
8. Safety, Traffic Management & Maintenance of Existing road during construction.		Payment shall be made on pro rata basis every six months
9. ATMS including video surveillance system, Video incident detection system, Emergency call system, Variable message signs, Meteorological data system, Automatic traffic counter, Speed violation detection system, Control room, Traffic impact attunators, Ambulance, crane, Patrolling vehicles, Drone video recording for every six months, etc.		Payment shall be made on Completion of scope in all respects.
10. Other miscellaneous works like slope protection works, junctions,dismantling, Street Lighting, Anti glare screen, kerbs, etc.		
i) Water Harvesting Chambers	0.4100%	Payment shall be made on Completion of scope in all respects.
ii) Utility Ducts	0.1300%	
iii) Kerb	1.4600%	
iv) Kerb & Crash Barrier Painting	0.8300%	
v) Solar Blinkers	0.0600%	
vi) Convex Mirrors	0.0300%	
vii) Electrical lighting	11.8800%	
viii) Cleaning of Culverts	0.2900%	
ix) Junction & Cross Development	8.2700%	
x) Tree Cutting, Dismantling,	0.1300%	
100.0000%		

1.3.5 Utility shifting

Procedure for estimating the value of Utility shifting done shall be as stated in table 1.3.5.

Table 1.3.5

Stage of Payment	Percentage - Weightage	Payment Procedure
Utility Shifting		
Water Supply & Sanitary	26.2500%	Unit of measurement is as per completed activities. Cost per activity shall be determined on Pro-rate basis as per its weightage with reference to total cost of Water/Sewer Pipeline Shifting. Payment shall be made for completed activity. (The average weightage of major activities (only for payment purpose) in shifting work is laying of pipe - 50%, charging of line including all miscellaneous works and dismantling and site clearance – 50%)
HT/LT line	73.7500%	Unit of measurement is as per completed activities. Cost per activity shall be determined on pro-rata basis as per its weightage with reference to total cost of LT/HT line. Payment shall be made for completed activity. (The average weightage of major activities (only for payment purpose) in shifting work is (i) Erection of Poles-20%, (ii) Conductor stringing including laying of cable-30%, (iii) DTR erection (if involved)-10% and (iv) Charging of line including dismantling and site clearance-40% (with DTR) and 50% without DTR)

100.0000%

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)

Annex-I: List of Drawings

1. Drawings of Horizontal Alignment, Vertical profile and Cross section.
 2. General Arrangement Drawings of Structures.
 3. General Arrangement Drawings of Cross drainage work.
 4. Drawings of Road Furniture items including traffic signage, road marking, safety barrier, Traffic Signal etc.
 5. Lighting Plans;
 6. Drainage Plan
 7. Utility Shifting Plans and;
 8. Any other drawings as per instruction of Authority/Authority's Engineer.
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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 corresponding to 50% financial progress shall occur on the date falling on the **[270]** 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 50% (fifty per cent) of the Contract Price.

3. Scheduled Completion Date / Project Milestone - II

- (iii) Project Milestone-II shall occur on the Scheduled Completion Date i.e [Scheduled Construction Period] 540 days from the Appointed Date.
- (iv) On or before the Scheduled Completion Date, the Contractor shall have completed construction in accordance with this Agreement.

4. 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 equipment's and the maximum permissible roughness for purposes of this Test shall be 2,000 (two thousand) mm for each kilometer.
 - (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) meters 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.

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-reflectometer	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 **Widening of existing carriageway and construction of Service road between Km 527.425 to Km 529.695 including cattle Underpass near Moita at Km 528.915 to achieve continuous four- lane with service road carriageway on NH-66 in the state of Goa.** (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:

Sr. 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/5 th km stones	5%
(f)	Miscellaneous Items	
(i)	Removal of dead animals, broken down/accident vehicles, fallen trees, road blockades or malfunctioning of mobile crane	10%

Sr. No.	Item / Defect / Deficiency	Percentage
(ii)	Any other Defects in accordance with paragraph 1.	5%
(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:

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

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 Deleted**

Executive Engineer is Authority Engineer

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:
 - i. For the Works executed (excluding Change of Scope orders);
 - ii. For Change of Scope Orders, and
 - iii. Taxes deducted

2. Monthly Maintenance Payment Statement

The monthly Statement for Maintenance Payment shall state:

- (a) the monthly payment admissible in accordance with the provisions of the Agreement;
 - (b) the deductions for maintenance work not done;
 - (c) net payment for maintenance due, (a) minus (b);
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- (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
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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 **Widening of existing carriageway and construction of Service road between Km 527.425 to Km 529.695 including cattle Underpass near Moita at Km 528.915 to achieve continuous four- lane with service road carriageway on NH-66 in the state of Goa..** (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)

Signature Not VerifiedDigitally signed by GAJANAN RAMESH
DESAI

Date: 2026.04.28 13:55:26 IST

Location: eProcure-EPROC