

**NATIONAL HIGHWAYS AUTHORITY OF INDIA
(Ministry of Road Transport and Highways)
(Government of India)**

Construction of Four Lane divided carriageway from Vadipatti to Chittampatti section of NH-744A [Madurai Ring Road Package-I] on EPC mode under Bharatmala Pariyojana Phase-I in the state of Tamil Nadu.

April -2018

**National Highways Authority of India
G-5&6, Sector10, Dwarka,
New Delhi -110075**

SCHEDULES

SCHEDULE - A
(See Clause 2.1 and 8.1)

SITE OF THE PROJECT

1 THE SITE

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

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

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

1.4 Additional land required for toll plaza, Traffic Aid post, medical aid post and vehicle rescue post or for construction of works specified in the Change of Scope Order issued under of this Agreement shall be acquired in accordance with the provisions of this Agreement. Upon acquisition, such land shall form part of the Site and vest in Authority.

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

Annex - I (Schedule-A)

Site for Four Laning

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

1.1 The Site

The project is a part of NH-744A (Madurai Ring Road Package-I) starts from km 410/200 of NH-44 near Vadipatti to km 115/800 of NH-38 near Chittampatti [design chainage km 0+000 to km 29+960; length 29.960 km] in the State of Tamilnadu. The land, carriageway and stretches comprising the site are described below.

1.2 Description of the Project Highway

The project highway is a section of NH-744A, Bypassing Madurai city and connecting NH-44 to NH-38 through Vadipatti, Kalvelipatti, Pudupatti, Kulamangalam, Manthikulam, Arumbanur & Chittampatti villages. Latitude and longitude of the project corridor lies between, 10°4'6.65"N to 77°58'42.49"E and 9°58'46.57"N to 78°13'38.06"E, respectively. An index map showing the existing features of the Project Highway is given at **Appendix A-I**.

1.2.1 Referencing System

The details design chainages are given at **Appendix A-II**.

1.3 Terrain

The terrain along the project stretch is predominantly plain terrain.

2 Land

The site of the project highway comprises the land (sum total of land already in possession and land to be possessed) is detailed in Annex-II of this Schedule A.

3 Carriageway

The proposed alignment is a Bypass- connecting NH-44 to NH-38.

4 Major Bridges

The Site includes the following existing Major Bridges:

S.No.	Existing Chainage (Km)	Type of Structure			No. of Spans with span length (m)	Width (m)
		Foundation	Sub-structure	Superstructure		
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)	Type of Structure		No. of Spans with span length (m)	Width (m)	ROB/ RUB
		Foundation	Superstructure			
Nil						

6 Grade separators

The Site includes the following grade separators:

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

7 Minor bridges

The Site includes the following existing minor bridges:

S. No.	Existing Chainage (Km)	Type of structure			No. of Spans x length (m)	Overall Width (m)
		Type of Foundation	Sub Structure	Super Structure		
Nil						

8 Railway level crossings

The Site includes the following railway level crossings:

S.No.	Existing Chainage(Km)	Railway Chainage	Level Crossing No.	Remarks
Nil				

9 Underpasses (vehicular, non-vehicular)

The Site includes the following underpasses:

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

10 Culverts

The Site has the following existing culverts:

S. No.	Existing Chainage (Km)	Type of Culvert	Spans/Opening x span length/Pipe dia. (m)	Overall Width (m)
Nil				

11 Bus bays

The Stretch has the following Bus Bays /Bus Shelters:

S. No.	Chainage (km)	Bus Stop Name	Side	Remarks
Nil				

12 Truck Lay byes

The details of truck lay byes are as follows:

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

13 Road side drains

The Road Side Drains along the Project Highway is as follows:

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

14 Major junctions

The details of major junctions are as follows:

S. No.	Existing Chainage (Km)	At grade	Separated	Category of Cross Road			
				NH	SH	MDR	Others
Nil							

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

15 Minor junctions

The details of the minor junctions are as follows:

S. No.	Existing km	Type of Junction	Direction	Width of Road	Name of Place
Nil					

16 Bypasses

The details of the bypasses are as follows:

S. No.	Name of bypass (town)	Chainage (km)		Length (in Km)
		From km	to km	
1	Madurai Ring Road [Package-I]	km 410/200 of NH-44 near Vadipatti	km 115/800 of NH-38 near Chittampatti	29.960 km

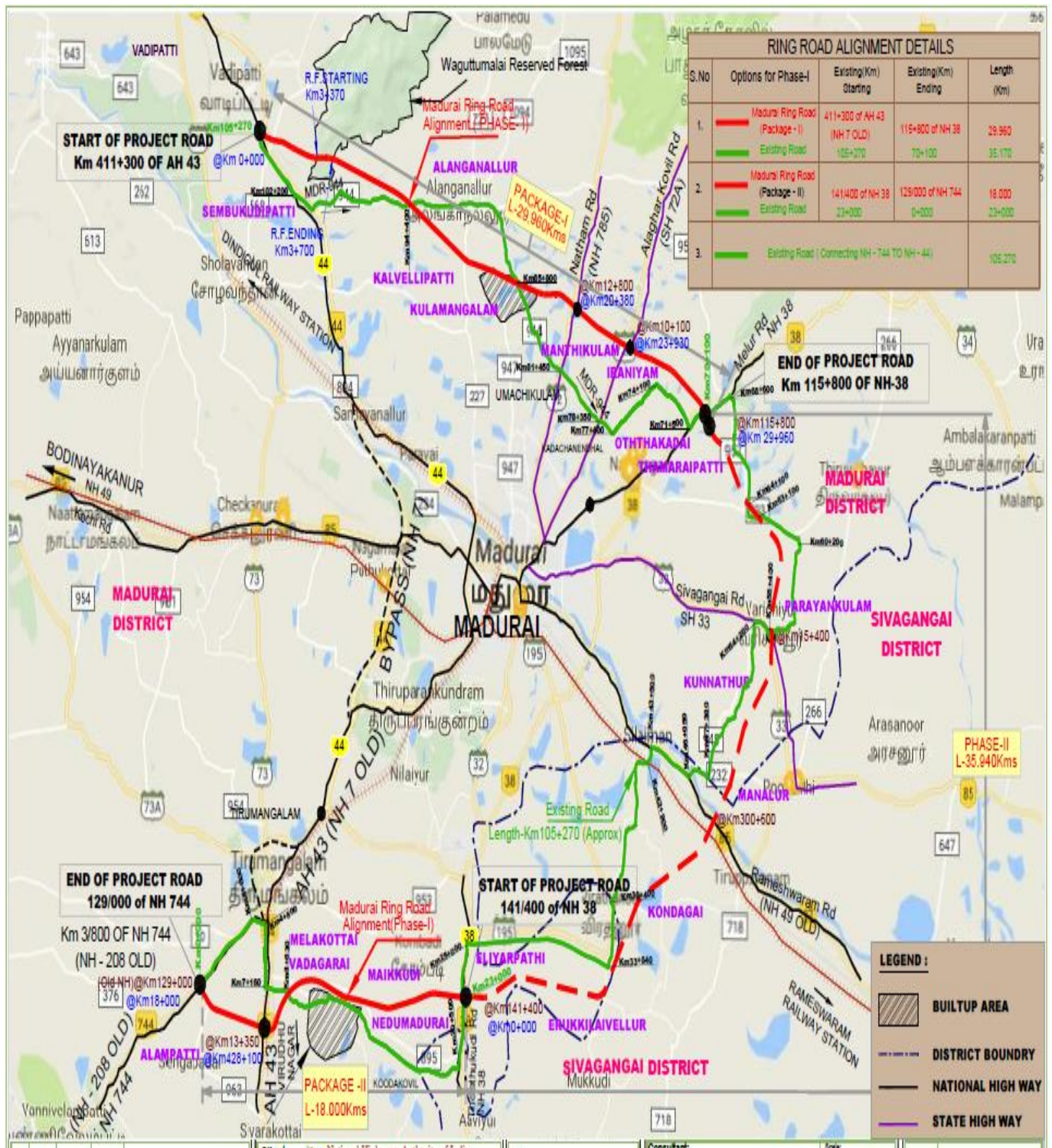
17 Details of any other Structures:-

S. No	Existing Chainage (Km)	Type of Structure	Height (m)	Remarks
Nil				

18 Submergence Locations

S.No.	Existing Chainage (Km)		Overtopping above the existing road (m)
	From	To	
Nil			

Appendix A-I Index map of Project Highway



Appendix A-II**Design Chainage corresponding to Existing Chainage**

S.No.	Existing (km)	Design Chainage
1	Km 410/200 of NH-44 at Vadipatti junction	0+000
2	Km 12/800 of NH-785 at Manthikulam	20+410
3	Km 10/100 of SH-72A at Iraniyam	23+930
4	Km 115/800 of NH-38 at Chittampatti	29+960

Annex II (Schedule-A)

Dates for providing Right of Way

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

S. No.	From Km to Km (Design Chainage)	Design Length (Km)	Width (m)	Date of Providing ROW*
1	2	3	4	5
(i) Right of Way	Design chainage 0+000 to 9+600	9.60	60m	90% of the total length of the project highway on appointment date, balance 10% within 150 days from the appointed date
(ii) Right of Way	Design chainage 9+600 to 9+700	0.10	50m	
(iii) Right of Way	Design chainage 9+700 to 16+800	7.10	60m	
(iv) Right of Way	Design chainage 16+800 to 16+900	0.10	50m	
(v) Right of Way	Design chainage 16+900 to 29+960	13.060	60m	
	Total length	29.960		

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

Alignment Plans:

The alignment of the Project Highway is enclosed in alignment plan. Finished road level indicated in the alignment plan are indicative and the finished road level of the project highway in any case, shall not be less than those indicated in the alignment plan. The proposed profile of the Project highway shall be followed by the contractor with minimum FRL as indicated in the alignment plan. The contractor shall, however, improve/upgrade the Road profile as indicated in Annexure-III based on site/design requirement.

**Annex - IV
(Schedule-A)**

Environment Clearances

Not required as per recent guidelines issued by MoEF Gazette S. O. No. 2559 (E*) dated 22.08.2013.

SCHEDULE - B
(See Clause 2.1)
DEVELOPMENT OF THE PROJECT HIGHWAY

1 Development of the Project Highway

Development of the Project Highway shall include design and construction of the Project Highway as described in this Schedule-B and in Schedule-C. The alignment plans of the Project Highway are specified in Annex-III of Schedule A and shall be deemed to be part of this Schedule B. The proposed profile of the project highway as indicated in the Annex-III of Schedule A shall be followed by the contractor with minimum FRL as indicated in the alignment plan. Based on site/design requirement, the Contractor may, however, improve/upgrade upon the alignment plans and profiles as indicated in Annexure - III of Schedule A and raise the finished roadway level (FRL) with approval from the Authority's Engineer within the available Right of Way.

2 Rehabilitation and Augmentation

Rehabilitation and augmentation shall include Four Laning of the Project Highway as described in Annex-I of this Schedule-B and in Schedule-C.

3 Specifications and Standards

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

Annex - I (Schedule - B)

Description of the Project

- 1** Construction of Four Lane divided carriageway from Vadipatti to Chittampatti section of NH-744A [Madurai Ring Road Package-I] on EPC mode under Bharatmala Pariyojana Phase-I in the state of Tamil Nadu.
- 1.1** The Project Highway shall follow the alignment shown in the alignment plans specified in Annex III of Schedule-A unless otherwise specified by the Authority. Notwithstanding anything to the contrary contained in this Agreement or Manual, the proposed profile of the project highway as indicated in the Annexure-III of Schedule-A shall be deemed to be part of this Schedule-B and shall be followed by the contractor with minimum FRL as indicated in the Alignment Plan. Based on Design/Site requirements, the contractor may, however, improve/upgrade upon the alignment plans and profile as indicated in Annexure-III of Schedule-A and raise the finished roadway level with approval from Authority's Engineer within the available ROW. Geometric deficiencies, if any, in the existing horizontal and vertical profiles shall be corrected as per the prescribed standards for Plain/Rolling/Hilly terrain to the extent land is available.
- 1.2 WIDTH OF CARRIAGEWAY**
 - 1.2.1** Four-lane divided carriageway shall be undertaken. The paved carriageway shall be provided as indicated below and referred to in Clause 2.11 of this Annex -I of Schedule-B and Annex -I of Schedule-D.
 - 1.2.2** Provided that in the built-up areas the carriageway width is as indicated below and referred to in Clause 2.11 of this Annex -I of Schedule-B and Annex -I of Schedule-D.
 - 1.2.3** Except as otherwise provided in this Agreement, the width shall be adjusted to fit into appropriate plans and cross sections developed in accordance with Schedule-D to accommodate all the features of four-laning described herein.
 - 1.2.4** Except as otherwise provided in this Agreement, but subject to provisions of Annex -I of this Schedule-B, the width of the paved carriageway shall conform to paragraph 1.2.1 above.
 - 1.2.5** The entire cross sectional elements shall be accommodated in the available/proposed ROW. If required, suitable retaining structures shall be provided to accommodate the highway cross section within the available/proposed ROW and the same 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.

S. No.	Proposed Typical Cross Sections (TCS)	Type of cross section
	Description	
1	Four-lane Carriageway in Rural section without Service Road as per Fig 2.4 of IRC:SP:84:2014 Manual	TCS-1
2	Four-lane Carriageway in Rural section in cutting without Service Road as per Fig 2.4 of IRC:SP:84:2014 Manual - Modified	TCS-1(A)
3	Four-lane Carriageway with Service Road on both sides as per Fig 2.5 of IRC:SP:84:2014 Manual-Modified	TCS-2
4	Four-lane Carriageway with Service Road on both sides in cutting as per Fig 2.5 of IRC:SP:84:2014 Manual-Modified	TCS-2(A)
5	Six-lane carriageway for Grade Separator approach with slip roads on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual - Modified	TCS-3
6	Six-lane divided carriageway in Forest section as per NHAI circular no.11041/11/2016-HR-I	TCS-4
7	Six-lane divided carriageway in Forest section in cutting as per NHAI circular no. 11041/11/2016-HR-I	TCS-4(A)
8	Six-lane carriageway for Interchange approaches with Ramp Diverging/merging on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified	TCS-5
9	Six-lane carriageway for Grade Separator approaches without slip road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified	TCS-5(A)
10	Six-lane carriageway for Interchange approaches with RE wall approach with Ramp Diverging/Merging as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified	TCS-5(B)
11	Typical Cross Section for Bus bays	TCS- X*
12	Typical Cross Section for Truck lay bye	TCS- Y*

*Typical Cross section applicable only for small sections

2.0 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. Extra widening shall be provided as per Clause 2.7.2 of the Manual at locations with radius of horizontal curves less than 300m.

2.2 Design speed

The design speed shall be ruling design speed of 100kmph as per clause 2.2 of the

Manual.

2.3 Improvement of the existing road geometrics

In the following stretches, where improvement of the existing road geometrics to the prescribed standards is not possible, the existing road geometrics shall be improved to the extent possible within the given right of way and proper road signs and safety measures shall be provided:

S. No.	Proposed Chainage (in km)		Type of Deficiency	Remarks
	Start	End		
Nil				

2.4 Right of Way

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

2.5 Type of shoulders and Footpath

- a) In built-up sections, footpaths/fully paved shoulders shall be provided as per the TCS as indicated and referred to in Clause 2.11 of this Annex-I of Schedule-B and Annex-I of Schedule-D. The footpaths shall be designed as per IRC:103-2012 “Guidelines for Pedestrian Facilities” duly incorporating the Guidelines issued in Ministry’s circular No. RW/NH-33044/28/2015/S&R(R) dated 17th June 2015.
- b) In open country, paved shoulders of 1.5 m width shall be provided as per the TCS and balance 2.0m width shall be covered with 150 mm thick compacted layer of granular material.
- c) Design and specifications of paved shoulders and granular material shall conform to the requirements specified in paragraphs 5.10 and 5.11 of the Manual.

2.6 Lateral and vertical clearances at underpasses

2.6.1 Lateral and vertical clearances at underpasses and provision of guardrails/crash barriers shall be as per the paragraph 2.10 of the Manual.

2.6.2 Lateral clearance: Lateral clearances at under passes shall be as follows:

S. No.	Design Chainage (Km)	Clear Span/ Clear Opening (m)	Remarks
1	2+946	1 x 12.00	LVUP for ODR (Sembukudipatti Road)
2	6+485	1 x 16.00	LVUP cum MNB (Channel) for ODR (Perumalpatti) (one side BT-Road)

S. No.	Design Chainage (Km)	Clear Span/ Clear Opening (m)	Remarks
3	7+135	1 x 17.50+ 1 x 50.00 + 1 x 17.50	Major bridge cum LVUP (Canal) (Both Side BT-Roads)
4	7+565	1 x 12.00	LVUP for ODR (Kalvelipatti)
5	8+985	1 x 25.00	SVUP cum MNB (Channel) (one Side bund Road)
6	9+679	1 x 15.00	VUP for MDR-944 (Sembukudipatti-Alanganallur road)
7	10+514	1 x 30.00	LVUP cum Canal MNB for ODR (Chellana goundapatti) (Both Side BT-Roads)
8	12+712	1 x 12.00	LVUP for Valasai Village Road
9	13+389	1 x 15.00	VUP for MDR-227 (Palamedu road)
10	13+752	1 x 30.00 + 1 x 20.00	LVUP cum Canal MNB (Both Side bund Roads)
11	16+796	1 x 30.00	VUP cum Canal MNB(MDR-944 Alanganallur-Oomachikulam) (one side BT-Road)
12	19+261	1 x 7.00	SVUP for Village road (Karuvanur-Kulapandi)
13	20+410	1 x 34.00 + 1 x 40.00 + 1 x 34.00	Flyover on NH-785 which is at (-1) level
14	23+913	1 x 15.00 + 1 x 25.00 + 1 x 15.00	Flyover on SH-72A (Alagar kovil road)
15	25+140	1 x 12.00	LVUP for Arumbanur road
16	26+815	1 x 24.00	LVUP cum Canal MNB (Both Side bund Roads)
17	27+860	1 x 12.00	LVUP for ODR (Chettikulam)
18	29+455	2 x 30.00 (in square)	Partial clover leaf Interchange to NH-38 at km115/800 (Trichy-Madurai-Thoothukudi road) near Chittampatti.

2.7 Lateral and vertical clearance at overpasses

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

2.7.2 Lateral clearance: Lateral clearances at over passes shall be as follows:

Sl.No.	Design Chainage (Km)	Lateral clearance / Clear span (m)	Remarks
1	0+000	1 x 15.00+ 2 x 30.00 1 x 15.00	VOP to NH744A (across Varanasi-Kanyakumari NH-44) at km 410/200 near Vadipatti.
2	0+465	2 x 30.00	VOP for MDR-568 (Vadipatti-Palamedu road)

2.8 Service Road/Slip Road

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

Sl.No.	Design Chainage (Km)		Length, m	Type (Service/Slip Road)	Side	Remarks
	From	To				
1	(Slip Road for NH-44)		840	slip road	Both	Width=7.5 m
2	0+000	0+750	750	Service road	Both	Width=7.0 m
3	2+630	3+300	670	slip road	Both	Width=7.5 m
4	5+920	6+900	980	slip road	Both	Width=7.5 m
5	7+350	8+000	650	slip road	Both	Width=7.5 m
6	9+280	10+100	820	slip road	Both	Width=7.5 m
7	19+830	20+970	1140	slip road	Both	Width=7.5 m
8	23+460	25+580	2120	slip road	Both	Width=7.5 m
9	27+620	28+280	660	slip road	Both	Width=7.5 m
10	28+280	28+740	460	Service road	Both	Width=7.0 m
11	28+740	29+100	360	Slip road	Both	Width=7.5 m
Total Length,m			18900			
	Clover leaf Interchange ramps/loops					
12	Ramp-1		730	Ramp	-	Width=7.5 m
13	Ramp-2		460	Ramp	-	Width=7.5 m
14	Loop-1		250	Loop	-	Width = 10.5m
15	Loop-2		250	Loop	-	Width = 10.5m
Total Length,m			1690			

Note: Above length of the service/slip road is indicative and minimum specified. The actual length of the service/slip road shall be determined by the

Contractor in accordance with the Manual requirements with approval from the Authority's Engineer. Any increase in the length specified in 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.

2.9 Grade separated structures

2.9.1 Grade separated structures shall be provided as per paragraph 2.13 of the Manual. The requisite particulars are given below:

Sl.No.	Design Chainage (Km)	Name of the Intersecting Road	Lateral clearance/Clear span (m)	Vertical clearance (m)	Proposed Structure Type (m)
1	0+000	VOP to NH744A (along Varanasi-Kanyakumari NH-44) at km 410/200 near Vadipatti	1 x 15.00 + 2 x 30.00 + 1 x 15.00	5.50	RCC , PSC I-Girder & slab
2	0+465	VOP to MDR-568 (Vadipatti-Palamedu road)	2 x 30.00	5.50	PSC I-Girder & slab
3	2+946	For ODR (Sembukudipatti Road)	1 x 12.00	4.00	RCC Box
4	6+485	ODR (Perumalpatti)	1 x 16.00	4.00	RCC T-Beam & slab
5	7+135	Periyar canal bank road	1 x 17.50 + 1 x 50.00 + 1 x 17.50	4.00	RCC T-Beam & Slab + PSC - Box Girder
6	7+565	ODR (Kalvelipatti)	1 x 12.00	4.00	RCC Box
7	8+985	Village Road (Kuttimeikpaati - Mariyamml Kulam)	1 x 25.00	4.00	PSC I-Girder & slab
8	9+679	MDR-944 (Sembukudipatti-Alanganallur road)	1 x 15.00	5.50	RCC T-Beam & slab
9	10+514	ODR (Chellana goundapatti)	1 x 30.00	4.00	PSC I-Girder & slab
10	12+712	Valasai Village Road	1x12.00	4.00	RCC Box

Sl.No.	Design Chainage (Km)	Name of the Intersecting Road	Lateral clearance/Clear span (m)	Vertical clearance (m)	Proposed Structure Type (m)
11	13+389	MDR-227 (Palamedu road)	1 x 15.00	5.50	RCC T-Beam & slab
12	13+752	Canal bank road	1 x 30.00 + 1 x 20.00	4.00	PSC I Girder + RCC T-Beam & Slab
13	16+796	(MDR-944 Alanganallur-Oomachikulam)	1 x 30.00	5.50	PSC I- Girder & Slab
14	19+261	SVUP for Village road (Karuvanur-Kulapandi)	1 x 7.00	4.00	RCC Box
15	20+410	NH - 785 Madurai - Natham Road	1 x 34.00 + 1 x 40.00 + 1 x 34.00	5.50	PSC - Box Girder
16	23+913	SH-72A (Alagar kovil road)	1 x 15.00 + 1 x 25.00 + 1 x 15.00	5.50	RCC T-Beam + PSC I Girder & Slab
17	25+140	Arumbanur Road	1 x 12.00	4.00	RCC Box
18	26+815	Canal bank road	1 x 24.00	4.00	RCC T-Beam & slab
19	27+860	ODR (Chettikulam)	1 x 12.00	4.00	RCC Box
20	29+455	NH-38 (Trichy-Madurai-Thoothukudi road)	2 x 30.00 (in square)	5.50	PSC I Girder & Slab

2.9.2 In the case of grade separated structures, the type of structure and the level of the Project Highway and the cross roads shall be as follows: [Refer to paragraphs 2.14.2 of the Manual and specify the type of vehicular under pass/overpass structure and whether the cross road is to be carried at the existing level, raised or lowered]

S. No.	Design chainage	Type of structure	Cross road at			Remarks, if any
			Existing * Level	Raised Level	Lowered Level	
1	0+000	VOP	171.781	-	-	NH-44 (Varanasi-Kanyakumari)

S. No.	Design chainage	Type of structure	Cross road at			Remarks, if any
			Existing * Level	Raised Level	Lowered Level	
2	0+465	VOP	175.026	-	173.544	MDR-568 (Vadipatti-Palamedu road)
3	2+946	LVUP	173.587	-	-	ODR (Sembukudipatti Road)
4	6+485	LVUP cum MNB (Channel)	173.487	-	-	ODR (Perumalpatti)
5	7+135	MJB (Canal) cum LVUP	167.696	-	-	Periyar canal bank road
6	7+565	LVUP	164.908	-	-	ODR (Kalvelipatti)
7	8+985	SVUP cum MNB (Channel)	160.000	-	-	Village Road (Kuttimeikpaati - Mariyamml Kulam)
8	9+679	VUP	160.674	-	-	MDR-944 (Sembukudipatti-Alanganallur road)
9	10+514	LVUP cum Canal MNB	161.889	-	-	ODR (Chellana goundapatti)
10	12+712	LVUP	157.827			Valasai Village Road
11	13+389	VUP	158.387	-	-	MDR-227 (Palamedu road)
12	13+752	LVUP cum Canal MNB	153.600	-	-	Canal bund Road
13	16+796	VUP cum Canal MNB	150.953	-	-	(MDR-944 Alanganallur-Oomachikulam)
14	19+261	SVUP	141.527	-	-	Village road (Karuvanur-Kulapandi)
15	20+410	Flyover	137.889	-	-	NH:785Madurai - Natham Road
16	23+913	Flyover	134.080	-	-	SH-72A (Alagar kovil road)
17	25+140	LVUP	134.837	-	-	Arumbanur Road
18	26+815	LVUP cum Canal MNB	142.103	-	-	Canal bank road

S. No.	Design chainage	Type of structure	Cross road at			Remarks, if any
			Existing *	Raised Level	Lowered Level	
19	27+860	LVUP	130.517	-	-	ODR (Chettikulam)
20	29+455	Partial Clover leaf Interchange	131.149	-	-	NH-38 (Trichy-Madurai-Thoothukudi road)

* Existing levels are only for guidance and any changes in levels shall not constitute any change of scope

2.10 Cattle and pedestrian under pass/over pass

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

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

2.11 Typical Cross-Sections of the Project Highway

From, km	To, km	Length (m)	TCS Type	REMARKS
410+860 (NH-44)	410+590 (NH-44)	270	TCS-2	Four-lane Carriageway with Service Road on both sides as per Fig 2.5 of IRC:SP:84:2014 Manual-Modified
410+590 (NH-44)	409+810 (NH-44)	780	TCS-3	Six-lane carriageway for Grade Separator approaches with slip road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified
409+810 (NH-44)	409+540 (NH-44)	270	TCS-2	Four-lane Carriageway with Service Road on both sides as per Fig 2.5 of IRC:SP:84:2014 Manual-Modified
0+000	0+180	180	TCS-2	Four-lane Carriageway with Service Road on both sides as per Fig 2.5 of IRC:SP:84:2014 Manual-Modified
0+180	0+520	340	TCS-2(A)	Four-lane Carriageway with Service Road on both sides in cutting as per Fig 2.5 of IRC:SP:84:2014 Manual-Modified
0+520	0+750	230	TCS-2	Four-lane Carriageway with Service Road on both sides as per Fig 2.5 of IRC:SP:84:2014 Manual-Modified
0+750	2+630	1880	TCS-1	Four-lane Carriageway in Rural section without Service Road as per Fig 2.4 of

From, km	To, km	Length (m)	TCS Type	REMARKS
				IRC:SP:84:2014 Manual-Modified
2+630	3+300	670	TCS-3	Six-lane carriageway for Grade Separator approaches with slip road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified
3+300	3+500	200	TCS-1	Four-lane Carriageway in Rural section without Service Road as per Fig 2.4 of IRC:SP:84:2014 Manual-Modified
3+500	3+600	100	TCS-4	Six-lane divided carriageway in Forest section as per NHAI circular no.11041/218/2007
3+600	3+730	130	TCS-4(A)	Six-lane divided carriageway in Forest section in cutting as per NHAI circular no.11041/218/2007
3+730	3+980	250	TCS-1(A)	Four-lane Carriageway in Rural section in cutting without Service Road as per Fig 2.4 of IRC:SP:84:2014 Manual-Modified
3+980	5+920	1940	TCS-1	Four-lane Carriageway in Rural section without Service Road as per Fig 2.4 of IRC:SP:84:2014 Manual-Modified
5+920	6+900	980	TCS-3	Six-lane carriageway for Grade Separator approaches with slip road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified
6+900	7+350	450	TCS-1	Four-lane Carriageway in Rural section without Service Road as per Fig 2.4 of IRC:SP:84:2014 Manual-Modified
7+350	8+000	650	TCS-3	Six-lane carriageway for Grade Separator approaches with slip road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified
8+000	9+280	1280	TCS-1	Four-lane Carriageway in Rural section without Service Road as per Fig 2.4 of IRC:SP:84:2014 Manual-Modified
9+280	10+100	820	TCS-3	Six-lane carriageway for Grade Separator approaches with slip road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified
10+100	12+340	2240	TCS-1	Four-lane Carriageway in Rural section without Service Road as per Fig 2.4 of IRC:SP:84:2014 Manual-Modified
12+340	14+000	1660	TCS-5(A)	Six-lane carriageway for Grade Separator approaches without slip road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-

From, km	To, km	Length (m)	TCS Type	REMARKS
				Modified
14+000	15+920	1920	TCS-1	Four-lane Carriageway in Rural section without Service Road as per Fig 2.4 of IRC:SP:84:2014 Manual-Modified
15+920	17+280	1360	TCS-5(A)	Six-lane carriageway for Grade Separator approaches without slip road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified
17+280	19+830	2550	TCS-1	Four-lane Carriageway in Rural section without Service Road as per Fig 2.4 of IRC:SP:84:2014 Manual-Modified
19+830	20+970	1140	TCS-3	Six-lane carriageway for Grade Separator approaches with slip road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified
20+970	23+460	2490	TCS-1	Four-lane Carriageway in Rural section without Service Road as per Fig 2.4 of IRC:SP:84:2014 Manual-Modified
23+460	25+580	2120	TCS-3	Six-lane carriageway for Grade Separator approaches with slip road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified
25+580	26+180	600	TCS-1	Four-lane Carriageway in Rural section without Service Road as per Fig 2.4 of IRC:SP:84:2014 Manual-Modified
26+180	27+620	1440	TCS-5(A)	Six-lane carriageway for Grade Separator approaches without slip road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified
27+620	28+280	660	TCS-3	Six-lane carriageway for Grade Separator approaches with slip road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified
28+280	28+740	460	TCS-2	Four-lane Carriageway with Service Road on both sides as per Fig 2.5 of IRC:SP:84:2014 Manual-Modified
28+740	29+100	360	TCS-3	Six-lane carriageway for Grade Separator approaches with slip road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified
29+100	29+300	200	TCS-5	Six-lane carriageway for Interchange approaches with Ramp Diverging/merging on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified

From, km	To, km	Length (m)	TCS Type	REMARKS
29+300	29+600	300	TCS-5(B)	Six-lane carriageway for Interchange approaches with RE wall approach with Ramp Diverging/Merging as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified
29+600	29+800	200	TCS-5	Six-lane carriageway for Interchange approaches with Ramp Diverging/merging on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified
29+800	29+960	160	TCS-3	Six-lane carriageway for Grade Separator approaches with slip road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified

Sl.No	Description	Type of cross section	Total Length (Km)
1	Four-lane Carriageway in Rural section without Service Road as per Fig 2.4 of IRC:SP:84:2014 Manual	TCS-1	15.550
2	Four-lane Carriageway in Rural section in cutting without Service Road as per Fig 2.4 of IRC:SP:84:2014 Manual-Modified	TCS-1(A)	0.250
3	Four-lane Carriageway with Service Road on both sides as per Fig 2.5 of IRC:SP:84:2014 Manual-Modified	TCS-2	1.410
4	Four-lane Carriageway with Service Road on both sides in cutting as per Fig 2.5 of IRC:SP:84:2014 Manual-Modified	TCS-2 (A)	0.340
5	Six-lane carriageway for Grade Separator approach with slip roads on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified	TCS-3	8.340
6	Six-lane divided carriageway in Forest section as per NHAI circular no.11041/218/2007	TCS-4	0.100
7	Six-lane divided carriageway in Forest section in cutting as per NHAI circular no.11041/218/2007	TCS-4(A)	0.130
8	Six-lane carriageway for Grade Separator approaches with service road on both sides as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified	TCS-5	0.400
9	Six-lane carriageway for Interchange/Grade Separator approaches with service road on both sides as per IRC:SP:84:2014 Manual-Modified	TCS-5(A)	4.460
10	Six-lane carriageway for Interchange approaches with RE wall approach with Ramp Diverging/Merging as per Fig 7.8 of IRC:SP:84:2014 Manual-Modified	TCS-5(B)	0.300

Sl.No	Description	Type of cross section	Total Length (Km)
	Total Length (29.960+1.320)		31.280

Note: Above length of indicative TCS to be followed for the project highway is indicative. The actual length of each TCS shall be determined based on the Detailed Engineering Design to be done by the Contractor in accordance with the Manual requirements and with approval from the Authority's Engineer. Any variation 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.

3. Intersections and grade separators

All intersections and grade separators shall be as per Section 3 of the Manual. Existing intersections, which are deficient, shall be improved to the prescribed standards. Properly designed intersections shall be provided at the locations and of types and features given in the tables below:

(a) At-grade intersections

Major Intersections: Nil

Minor Intersections: At grade intersection shall be provided with the intersecting roads at the following locations as given below, the cross roads shall be re-graded and strengthened to have a crust as same of main carriageway for a length shown in the Ministry's typed designs for intersections along-with provision of adequate cross drainage structure on the cross roads.

S. No.	Design Chainage (Km)	Type of Junction	Leads to Village	
			Left	Right
1	16+550	T-Junction (Left/Right) with Service Road	Village Road	Village Road
2	24+420	T-Junction (Left/Right) with Service Road	Tiruvilanpatti	Illupaikudi
3	24+600	T-Junction (Left/Right) with Service Road	Tiruvilanpatti	Illupaikudi
4	28+500	-Junction (Left/Right) with Service Road	Village Road	Village Road

(b) Junctions below LVUP:

S. No.	Design Chainage (Km)	Cross Road	Junction layout as per Manual
1	2+946	ODR (Sembukudipatti	Junction layout as per

S. No.	Design Chainage (Km)	Cross Road	Junction layout as per Manual
		Road)	Manual Fig 3.8
2	6+485	ODR (Perumalpatti)	Junction layout as per Manual Fig 3.8
3	7+135	Periyar canal bank road (Both Side BT-Roads)	Junction layout as per Manual Fig 3.8, on Both sides)
4	7+565	ODR (Kalvelipatti)	Junction layout as per Manual Fig 3.8
5	10+514	ODR (Pudupatti) (Both Side BT-Roads)	Junction layout as per Manual Fig 3.8, on Both sides)
6	25+140	Arumbanur Road	Junction layout as per Manual Fig 3.8
7	26+815	Canal Bund road (Both Side bund Roads)	Junction layout as per Manual Fig 3.8, on Both sides)
8	27+860	ODR (Chettikulam)	Junction layout as per Manual Fig 3.8

(c) Junctions below VUP/VOP/Interchange

S. No.	Design Chainage (Km)	Cross Road	Junction layout as per Manual
1.	0+000	NH-44 (Varanasi-Kanyakumari)	Junction layout as per Manual Fig 3.12
2.	0+465	MDR-568 (Vadipatti-Palamedu road)	Junction layout as per Manual Fig 3.10
3.	9+679	MDR 944 (Sembukudipatti - Alanganallur)	Junction layout as per Manual Fig 3.10
4.	20+410	NH 785 (Madurai - Natham)	Junction layout as per Manual Fig 3.12
5.	23+913	SH 72A (Madurai - Alagar koil)	Junction layout as per Manual Fig 3.12

S. No.	Design Chainage (Km)	Cross Road	Junction layout as per Manual
6.	29+455	NH 38 (Old NH 45B) (Trichy - Madurai) Cloverleaf	Junction layout as per IRC-92

(d) Grade separated intersection with/without ramps

S. No.	Design Chainage (Km)	Salient features	Minimum length of viaduct to be provided	Cross Road to be carried over/under the structures
1	0+000	NH-44 (Varanasi-Kanyakumari)	114.00	Over the structure
2	0+465	MDR-568 (Vadipatti-Palamedu road)	60.00	Over the structure
3	2+946	ODR (Sembukudipatti Road)	13.50	Under the structure
4	6+485	ODR (Perumalpatti)	16.00	Under the structure
5	7+135	Periyar canal bank road	85.00	Under the structure
6	7+565	ODR (Kalvelipatti)	13.50	Under the structure
7	9+679	MDR-944 (Sembukudipatti-Alanganallur road)	17.20	Under the structure
8	10+514	ODR (Chellana goundapatti)	30.00	Under the structure
9	12+712	Valasai Village Road	13.50	Under the structure
10	13+389	MDR-227 (Palamedu road)	17.20	Under the structure
11	13+752	Canal bund MNB	50.00	Under the structure
12	16+796	(MDR-944 Alanganallur-Oomachikulam)	30.00	Under the structure
13	20+410	NH:785 Madurai - Natham Road	108.00	Under the structure
14	23+913	SH-72A (Alagar kovil road)	59.60	Under the structure
15	25+140	Arumbanur Road	13.50	Under the structure
16	26+815	Canal bank road	24.00	Under the structure
17	27+860	ODR (Chettikulam)	13.50	Under the

S. No.	Design Chainage (Km)	Salient features	Minimum length of viaduct to be provided	Cross Road to be carried over/under the structures
				structure
18	29+455	NH-38 (Trichy-Madurai-Thoothukudi road)	65.00	Under the structure

Note:

- (i) Type of Junction to be improved as per manual and MOST type design for intersection on National Highways, 1992.
- (ii) Any other junction not mentioned above but observed during the construction of the project shall be improved as per manual requirements. The same 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.
- (iii) The concessionaire 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. The same 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.
- (iv) Junction improvement shall be carried out as per IRC Manual under grade separators with proper entry/exit to cross roads and slip/service roads.
- (v) Location and span arrangement of grade-separated structures are indicative. Exact location may be decided in consultation with IE. Any Change in span arrangement shall not be treated as 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 16.

4 Road embankment and cut section

- 4.1 Widening and improvement of the existing road embankment/cuttings and construction of new road embankment/cuttings shall conform to the Specifications and Standards given in section 4 of the Manual and the specified cross sectional details. Deficiencies in the plan and profile of the existing road shall be corrected. Notwithstanding anything to the contrary contained in this Agreement or Manual, the proposed profile of the project highway as indicated in the Annex-III of Schedule A shall be deemed to be part of this Schedule B and shall be followed by the contractor with minimum FRL as indicated in the alignment plan. Based on site/design requirement, the Contractor may, however, improve/upgrade upon the alignment plans and profiles as indicated in Annexure - III of Schedule A and raise the Finished Roadway Level (FRL) with approval from the Authority's Engineer within the available Right of Way.

- 4.1.1 Raising of the existing road shall be in accordance with alignment plan and profile drawings provided in Annex III of schedule A. The Cut Section

Stretches are also mentioned therein.

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 corridor, except at toll plaza where rigid pavement shall be provided.

5.3 Design requirements

5.3.1 Design Period and strategy

Design of flexible as well as rigid pavement shall be carried out in accordance with Section 5 of the Manual subject to the minimum design requirements stipulated above.

5.3.2 Design Traffic

Notwithstanding anything to the contrary contained in this agreement or the Manual, the Concessionaire shall carryout the design of the pavement shall be carried out in accordance with Section 5 of the Manual subject to minimum design requirement as detailed below.

Main carriageway

S. No.	Section	Pavement layer	Minimum Design requirements			
			Traffic (MSA)	CBR (%)	Design period	Crust
1	Vadipatti - Natham road section	Base + Sub-base	123	10	15	450
		Bituminous	62	10	10	135
2	Natham road - Melur road section	Base + Sub-base	87	10	15	450
		Bituminous	45	10	10	120

Service/slip road (Flexible)

Design Traffic	CBR	Composition	
		Base + Sub-base layer	450 mm
10 MSA	10%	Bituminous layer	90 mm

Rigid pavement at Toll plaza location

Design of the rigid pavement at toll plazas shall be carried out in accordance with Section 5 of the Manual. However, minimum crust having composition of 280mm pavement quality concrete (PQC), 150mm dry lean concrete (DLC) and 150mm granular sub-base with a de-bonding interlayer separation layer between DLC and PQC of polythene sheet having a minimum thickness of 125 micron shall be constructed.

Note: The Crust Composition for paved shoulders, truck lay byes and bus bays shall be same as the main carriageway.

5.4 Reconstruction of stretches

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

S. No.	Design Chainage		Remarks
	From	To	
	Nil		

6. Road side drainage

Drainage system including surface and subsurface drains for the Project Highway shall be provided as per section 6 of the Manual. Lined Drains shall be provided in the following stretches as specified in the TCS of the project Highway:

S. No.	Starting Km.	Ending Km.	Length, m	Remarks
1	0+000	0+100	400	Vadipatti junction(NH-44)
2	0+100	0+750	750	TCS-2
3	20+250	20+450	400	Madurai-Natham Junction (NH-785)
4	28+280	28+740	460	TCS-2

Note: Above length of the lined drains shall be determined by the Contractor in accordance with the Manual requirements with approval from the Authority's Engineer. Any increase in the length specified in this Clause of Schedule-B shall not constitute a Change of Scope, 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. Unlined drain shall be proposed in the balance locations as per manual requirements.

7. Design of structures

7.1 General

All bridges, culverts and structures shall be designed and constructed in accordance with section-7 of the Manual and shall conform to the cross-sectional features and other details specified therein.

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

S. No.	Design Chainage (km)	Width of Bridge for Main Carriageway (m)	Width of Bridge for Service road Carriageway (m)
1	0+738	2 x14.50	2 x 10.8
2	1+243	2 x 16.00	-
3	1+626	2 x 16.00	-
4	3+203	2 x14.50	2 x 10.8
5	4+277	2 x16.00	-
6	4+380	2 x16.00	-
7	4+797	2 x16.00	-
8	5+245	2 x16.00	-
9	5+440	2 x16.00	-
10	5+678	2 x16.00	-
11	5+831	2 x14.50	2 x 10.8
12	6+485	2 x14.50	2 x 10.8
13	6+706	2 x14.50	2 x 10.8
14	7+135	2 x16.00	-
15	8+352	2 x16.00	-
16	8+985	2 x16.00	-
17	10+514	2 x 14.50	-
18	10+993	2 x16.00	-
19	13+275	2 x 16.00	-
20	13+752	2 x 14.50	-
21	16+354	2 x 16.00	-
22	16+796	2 x 14.50	-
23	17+600	2 x 16.00	-
24	18+572	2 x 16.00	-
25	19+800	2 x14.50	2 x 10.8
26	22+124	2 x16.00	-
27	23+064	2 x 16.00	-

S. No.	Design Chainage (km)	Width of Bridge for Main Carriageway (m)	Width of Bridge for Service road Carriageway (m)
28	24+210	2 x 14.50	2 x 10.8
29	24+410	2 x 14.50	2 x 10.8
30	25+790	2 x 16.00	-
31	26+815	2 x 14.50	-
32	27+275	2 x 16.00	-
33	27+775	2 x 14.50	2 x 10.8
34	28+192	2 x 14.50	2 x 10.8
35	28+749	2 x 14.50	2 x 10.8

7.1.2 The following structures shall be provided with footpaths:

As per table mentioned in 7.1.1

7.1.3 All bridges shall be high-level bridges.

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

S.No.	Design Chainage (Km)	Utility service to be carried	Remarks
All Bridges to be Designed to carry Utility Services			

7.1.5 Cross-section of the new culverts and bridges at deck level for the Project Highway shall conform to the typical cross-sections given in section 7 of the manual and TCS in para 2.11.

7.2 Culverts

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

7.2.2 Reconstruction of existing culverts -Nil

7.2.3 Widening of existing culverts -Nil

7.2.4 New culverts (given in table below) shall be constructed for width equal to the roadway width of the Project Highway & as per typical cross-section given in the TCS specified in para 2.11 and alignment plan. The details are given as under:

S. No.	Design Chainage (km)	TCS Type	Width of culvert(m)	Proposed Span ,m	Type of Culvert
1	0+950	TCS - 1	26.00	1 x 2.0	RCC Box

S. No.	Design Chainage (km)	TCS Type	Width of culvert(m)	Proposed Span ,m	Type of Culvert
2	1+400	TCS - 1	26.00	1 x 2.0	RCC Box
3	2+350	TCS - 1	26.00	1 x 5.0	RCC Box
4	2+862	TCS - 3	50.50	1 x 4.0	RCC Box
5	6+010	TCS - 3	50.50	1 x 3.0	RCC Box
6	6+200	TCS - 3	50.50	1 x 5.0	RCC Box
7	6+320	TCS - 3	50.50	1 x 3.0	RCC Box
8	7+261	TCS - 1	41.00	1 x 4.0	RCC Box
9	7+860	TCS - 3	50.50	1 x 2.0	RCC Box
10	7+990	TCS - 3	50.50	1 x 2.0	RCC Box
11	8+710	TCS - 1	26.00	1 x 2.0	RCC Box
12	9+255	TCS - 3	50.50	1 x 2.0	RCC Box
13	10+010	TCS - 3	50.50	1 x 2.0	RCC Box
14	10+854	TCS - 3	50.50	1 x 3.0	RCC Box
15	11+997	TCS - 1	26.00	1 x 2.0	RCC Box
16	12+380	TCS - 1	33.00	1 x 3.0	RCC Box
17	13+000	TCS - 5A	44.00	1 x 2.0	RCC Box
18	14+210	TCS - 1	26.00	1 x 3.0	RCC Box
19	14+668	TCS - 1	56.50	1 x 3.0	RCC Box
20	15+045	TCS - 1	26.00	1 x 5.0	RCC Box
21	15+552	TCS - 1	26.00	1 x 2.0	RCC Box
22	15+933	TCS - 1	33.00	1 x 2.0	RCC Box
23	19+400	TCS - 1	26.00	1 x 5.0	RCC Box
24	20+000	TCS - 3	50.50	1 x 5.0	RCC Box
25	21+046	TCS - 3	50.50	1 x 5.0	RCC Box
26	21+346	TCS - 1	26.00	1 x 2.0	RCC Box
27	22+245	TCS - 1	26.00	1 x 2.0	RCC Box
28	22+725	TCS - 1	26.00	1 x 2.0	RCC Box
29	23+300	TCS - 1	26.00	1 x 5.0	RCC Box
30	24+677	TCS - 3	50.50	1 x 2.0	RCC Box
31	24+896	TCS - 3	50.50	1 x 2.0	RCC Box
32	25+065	TCS - 3	50.50	1 x 3.0	RCC Box
33	25+543	TCS - 3	50.50	1 x 3.0	RCC Box
34	26+252	TCS - 3	50.50	1 x 3.0	RCC Box
35	26+928	TCS - 3	50.50	1 x 2.0	RCC Box

In addition to above, additional 5 nos. box culverts of size 2m x 2m shall be provided as per site requirements for facilitating access of farmers to field channels on either side of the carriageway. The location of such culverts shall be decided in consultation with Authority Engineer.

Pipe culverts of 1.2m dia shall be provided on each side of cross roads to maintain the continuity of drain water flow and also to access from/to service or slip roads to crossroads. The details of such locations are as given below:

S.No.	Design Chainage	Size of culvert (m)	Type of Junction	No. of culverts
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S.No.	Design Chainage	Size of culvert (m)	Type of Junction	No. of culverts
1	2+946	1 x 1.2	+	2
2	7+565	1 x 1.2	+	2
3	8+960	1 x 1.2	+	2
4	9+679	1 x 1.2	+	2
5	12+712	1 x 1.2	+	2
6	13+389	1 x 1.2	+	2
7	24+410	1 x 1.2	+	2
8	25+140	1 x 1.2	+	2
9	26+815	1 x 1.2	+	2
10	27+860	1 x 1.2	+	2

Additional pipe culverts shall also be provided to four arms of service road and in 2 loops of the partial clover leaf interchange as per details given below:

S. No.	Location/size in Partial clover leaf Interchange at Ch:30/500	No. of culverts	Length of culverts
1	Loop-1: 1 x 1.2m dia	2	To match with base width of embankment
2	Loop-2: 1 x 1.2m dia	2	To match with base width of embankment
3	Service road-1: 1 x 1.2m dia	2	To match with base width of embankment
4	Service road-2: 1 x 1.2m dia	2	To match with base width of embankment

Note:

1. The overall width of the above culverts shall be equal to Roadway width. In other words, the above culverts shall also be provided in median gap and also in gap between main carriageway & service road, in case there is any service road. Any additional Barrier length required as per site conditions 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 13.
2. Location and span arrangements of the above culverts are indicative. Exact location of these culverts may be decided in consultation with Authority Engineer. The actual vent way/span arrangements of culverts shall be determined on the basis of detailed investigations by the Contractor in accordance with the Specifications and Standards. Any variations in vent way/span arrangements 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.

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

S. No.	Existing Span Arrangement						Type of Repair Required
	Design Chainage (Km)	Structure Number	Type	No of Spans	Span length (m)	Overall Width (m)	
NIL							

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

7.2.7 In case of culverts proposed for widening/repair as per details in Clause 7.2.3 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.

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

7.2.9 Utility ducts in form of NP-4 Hume Pipe shall be provided across the Project Highway and along with inspection chamber for crossing of underground utilities at every 1 Km interval of the project Highway. Location for such utility crossing shall be finalized in consultation with Authority Engineer.

7.3 Bridges

7.3.1 Existing bridges to be re-constructed/widened

The existing bridges at the following locations shall be re-constructed/widened: Nil

7.3.2 New bridges

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

Major Bridges:

S. No.	Design Chainage (In Km)	Type of Super structure	Span Arrangement (m)	Total width (m)	Remarks
1	7+135	RCC T-beam & slab + PSC Box girder	1 x 17.50 + 1 x 50.0 + 1 x 17.50	2 x 16.00	Periyar Canal MJB cum LVUP
2	17+600	PSC I girder & slab	10 x 30.00	2 x 16.00	Irrigation Tank
3	27+275	PSC I girder & slab	3 x 30.00	2 x 16.00	Irrigation Tank

Minor Bridges:

S. No.	Design Chainage (In Km)	Type of Super structure	Span Arrangement (m)	Total width (m)	Remarks
1	0+738	RCC T-Beam & Slab	1 x 20.0	2 x 14.50 + 2 x 10.8	-
2	1+243	RCC T-Beam & Slab	1 x 20.0	2 x 16.00	-
3	1+626	RCC T-Beam & Slab	1 x 16.0	2 x 16.00	-
4	3+203	RCC Solid Slab	1 x 12.0	2 x 14.50 + 2 x 10.8	-
5	4+277	RCC T-Beam & Slab	1 x 16.0	2 x 16.00	-
6	4+380	RCC Solid Slab	1 x 12.0	2 x 16.00	-
7	4+797	RCC T-Beam & Slab	1 x 16.0	2 x 16.00	-
8	5+245	RCC T-Beam & Slab	1 x 20.0	2 x 16.00	-
9	5+440	RCC T-Beam & Slab	1 x 20.0	2 x 16.00	-
10	5+678	RCC Solid Slab	1 x 12.0	2 x 16.00	-
11	5+831	RCC T-Beam & Slab	1 x 16.0	2 x 14.50 + 2 x 10.8	-
12	6+485	RCC T-Beam & Slab (MCW) + RCC Box (SR)	1 x 16.0 (MCW) + 1 x 2.5 (SR)	2 x 14.50 + 2 x 10.8	LVUP cum MNB (channel)
13	6+706	RCC T-Beam & Slab	1 x 16.0	2 x 14.50 + 2 x 10.8	-
14	8+352	RCC Solid Slab	1 x 12.0	2 x 16.00	-
15	8+985	PSC I-Girder & Slab	1 x 25.0	2 x 16.00	SVUP cum MNB (channel)
16	10+514	PSC I-Girder & Slab	1 x 30.0	2 x 14.50	LVUP cum MNB (canal)
17	10+993	RCC Solid Slab	1 x 10.0	2 x 16.00	-
18	13+275	RCC T-Beam & Slab	1 x 20.0	2 x 16.00	Canal MNB
19	13+752	PSC I Girder + RCC T-Beam & Slab	1 x 30.0 + 1 x 20.0	2 x 14.50	LVUP CUM Canal MNB
20	16+354	PSC I Girder & slab	1 x 25.0	2 x 16.00	-
21	16+796	PSC I Girder & slab	1 x 30.0	2 x 14.50	VUP cum Canal MNB

S. No.	Design Chainage (In Km)	Type of Super structure	Span Arrangement (m)	Total width (m)	Remarks
22	18+572	RCC T-Beam & Slab	1 x 16.0	2 x 16.00	-
23	19+800	RCC Solid Slab	1 x 10.0	2 x 14.50 + 2 x 10.8	-
24	22+124	RCC T-Beam & Slab	1 x 16.0	2 x 16.00	-
25	23+064	RCC T-Beam & Slab	1 x 16.0	2 x 16.00	-
26	24+210	RCC T-Beam & Slab	1 x 16.0	2 x 14.50 + 2 x 10.8	-
27	24+410	RCC Solid Slab	1 x 12.0	2 x 14.50 + 2 x 10.8	-
28	25+790	RCC Solid Slab	1 x 12.0	2 x 16.00	-
29	26+815	RCC T-Beam & Slab	1 x 24.0	2 x 14.50	LVUP CUM Canal MNB
30	27+775	RCC Solid Slab	1 x 10.0	2 x 14.50 + 2 x 10.8	
31	28+192	RCC Solid Slab	1 x 10.0	2 x 14.50 + 2 x 10.8	
32	28+749	RCC Solid Slab	1 x 12.0	2 x 14.50 + 2 x 10.8	

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

7.3.4 Repair/replacements of railing/parapets of the existing bridges shall be undertaken as follows: Nil

7.3.5 Drainage system for bridge decks

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

7.3.6 Structures in marine environment: Nil

7.4 Rail-road bridges

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

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

Sl.No.	Design Chainage	Proposed Span Arrangement (m)	Name of crossing	Width (m)
Nil				

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

7.5 Grade separated structures

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

7.6 Repairs and strengthening of Bridge/Structures

The existing structures to be repaired/strengthened, and the nature and extent of repairs strengthening required: Nil

7.7 List of Major Bridges and Structures

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

Sl.No.	Name of the Structure	Total Numbers
1	ROB	Nil
2	Major Bridge	2 Nos
3	Major Bridge cum LVUP	1 No
4	Minor Bridge	25 Nos
5	Canal Minor Bridge	1 No
6	LVUP cum Canal Minor Bridge	3 Nos
7	VUP cum Canal Minor Bridge	1 No
8	LVUP cum Minor Bridge (Channel)	1 No
9	SVUP cum Minor Bridge (Channel)	1 No
10	Flyover	2 Nos.
11	VUP	2 Nos.
12	VOP	2 Nos
13	LVUP	5 Nos.
14	SVUP	1 No
15	Partial clover leaf Interchange	1 No

8. Traffic control devices and road safety works

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

(a) Traffic Signs:

Traffic signs include roadside signs, overhead signs and curb mounted signs along the entire Project Highway.

(b) Pavement Marking:

Pavement markings shall cover road marking for the entire Project Highway.

(c) Safety Barrier:

Provision of W-beam crash barrier for a minimum length of 20.88km along the project highway shall be provided at the high embankment locations and details to be prepared as per site requirement in consultation with the Authority Engineer.

8.2 Reflective sheeting shall be provided in accordance with section 9.2.3 of the Manual.

9. Roadside furniture

9.1 Roadside furniture like Road Boundary Stones, km/Hectometer Stones, Railings, Traffic Impact Attenuators, Delineators shall be provided in accordance with the provisions of Section 9 and Section 12 of IRC:SP:84-2014.

S. No.	Project Facility	Location	Design Requirements	Other essential
1	Traffic Signs and Pavement Markings	Entire length of project road	As per Schedule D	
2	Kilometer and 200m stones	Entire length of project road	As per Schedule D	
3	Road side Delineators	Horizontal curves of project road	As per Schedule D	
4	Pedestrian facilities such as railings, guard rails, footpath	Built-up stretches and intersections	As per Schedule D	

- a) Road Boundary Stone/wall: 60 cm high (above the adjoining ground level) and 150mm wide concrete boundary wall with DPC on top along with suitable foundation shall be provided at the outer edge of the RoW on either side of the entire project length except at cross-roads/built-up areas. Boundary stones shall be provided at the boundary on both sides of the ROW as per clause 9.8 of the manual in built-up areas.
- b) Pedestrian Guard Rail: Pedestrian guard rails shall be provided at each bus bay, bus shelter location, built-up sections and intersections as specified in the manual.
- c) Pedestrian Crossings: Pedestrian crossings facilities shall be provided on service roads, built-up sections and intersections as specified in the manual.
- d) Overhead Traffic Signs (excluding overhead signs at Toll Plaza): Location and Size

Design Chainage(Km)	Location	No.
Overhead Gantry signs		
410+200	NH-44 (Varanasi-Kanyakumari)	2
0+000	At Start of Project @ NH-44	1
20+410	Flyover @ NH-785 (Madurai-Natham road)	2
23+913	Flyover @ SH-72A (Alagar koil road)	2
29+455	Partial clover leaf interchange @ NH-38 (Trichy-Madurai)	3
Total		10
Cantilever Gantry signs		
410+200	NH-44 (Vadipatti Built-up)	1
9+679	MDR-944 (Alanganallur road)	2
14+500	Toll plaza	10
29+455	Partial clover leaf interchange @ NH-38 (Trichy-Madurai)	2
Total		15

10. Ccompulsory Afforestation

Landscaping and tree plantation (about 15000 trees of local species) shall be provided as per manual keeping in view IRC:SP:21-2009 & as given at Schedule C.

11. Hazardous Locations

Safety barriers shall be provided at the following hazardous location in consultation with the PWD and the Authority Engineer.

S.No.	Design Chainage (Km)		Side	Length, m
	From	To		
1	0+540	1+940	Both sides	1400
2	2+040	2+630	Both sides	590
3	3+300	3+540	Both sides	240
4	4+160	5+920	Both sides	1760
5	6+900	7+350	Both sides	450
6	8+240	8+380	Both sides	140
7	8+800	9+080	Both sides	280
8	14+000	14+500	Both sides	500
9	14+780	15+360	Both sides	580
10	17+280	18+140	Both sides	860
11	18+380	18+700	Both sides	320
12	19+300	19+440	Both sides	140
13	19+780	19+830	Both sides	50
14	21+960	22+400	Both sides	440
15	22+740	23+460	Both sides	720
16	25+580	26+180	Both sides	600
17	28+740	29+260	Both sides	520
18	29+560	29+960	Both sides	400

S.No.	Design Chainage (Km)		Side	Length, m
	From	To		
19	Loop-1		Both sides	125
20	Loop-2		Both sides	125
21	Ramp-1		Both sides	100
22	Ramp-2		Both sides	100
	Total Length			20880

12. Toe Wall and Retaining Walls

Retaining walls and protection works shall be provided at locations as indicated in TCS in cl. 2.11 of schedule-B. This is the minimum length. Any additional requirement as per site shall be provided in consultation with the AE and the Authority.

Sl.No.	Design Chainage (Km)		Height of Toe Wall/ Retaining wall, m	Side	Length (m)
	From	To			
1	0+540	0+750	As per site condition	Both sides	210
2	3+500	3+600		Both sides	100
3	16+600	16+780		Both sides	180
4	16+820	17+050		Both sides	230
5	26+600	26+800		Both sides	200
6	26+840	27+100		Both sides	260
7	29+100	29+300		Both sides	200
8	29+600	29+800		Both sides	200
		Total Length,m			3160

Note: Any additional length required as per site conditions 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 13.

13. Pond / Water body/ Tank Mitigatory Works

Pond/ water body/Tank mitigatory measures such as excavation (to enhance storage capacity of pond), guide bunds, grouted stone pitching (with filter median shall be provided as slope protection measure at the pond/ water body / tank location as per IRC 89 and As per Manual). Retaining wall shall be provided wherever applicable at pond / water body / tank locations. The provision shall be provided in consultation with NHAI and Authority Engineer.

14. Special Requirement for Hill Roads

Nil

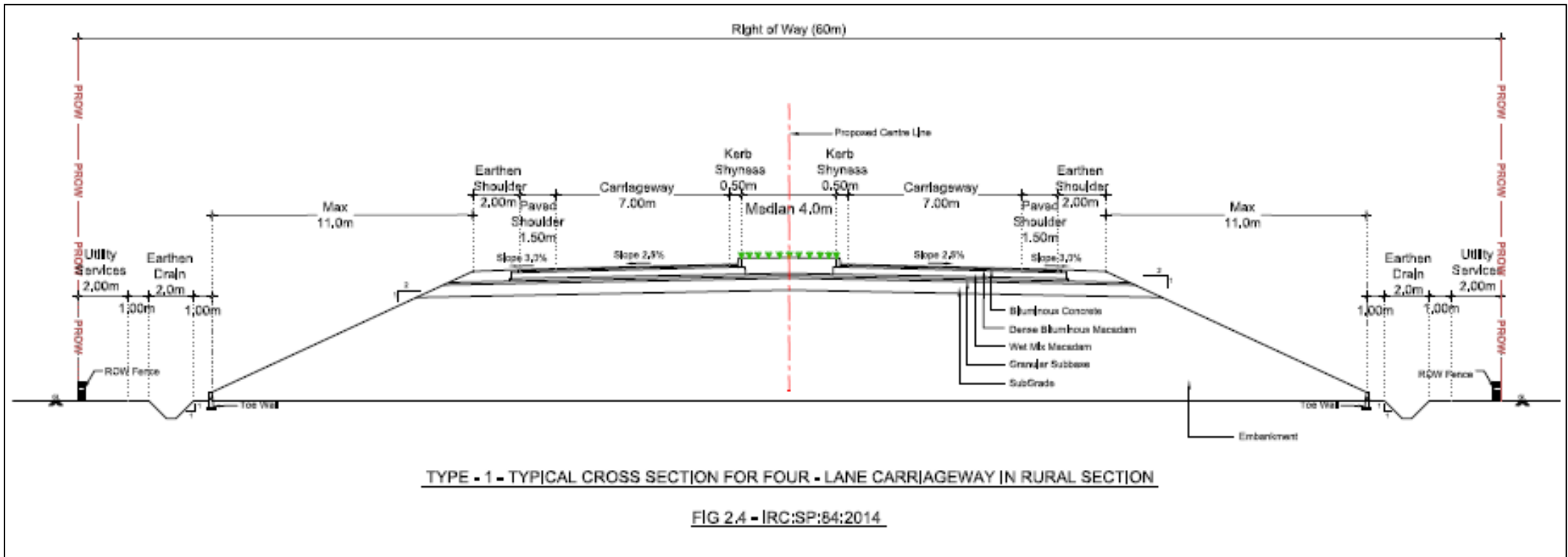
15. Rainwater Harvesting

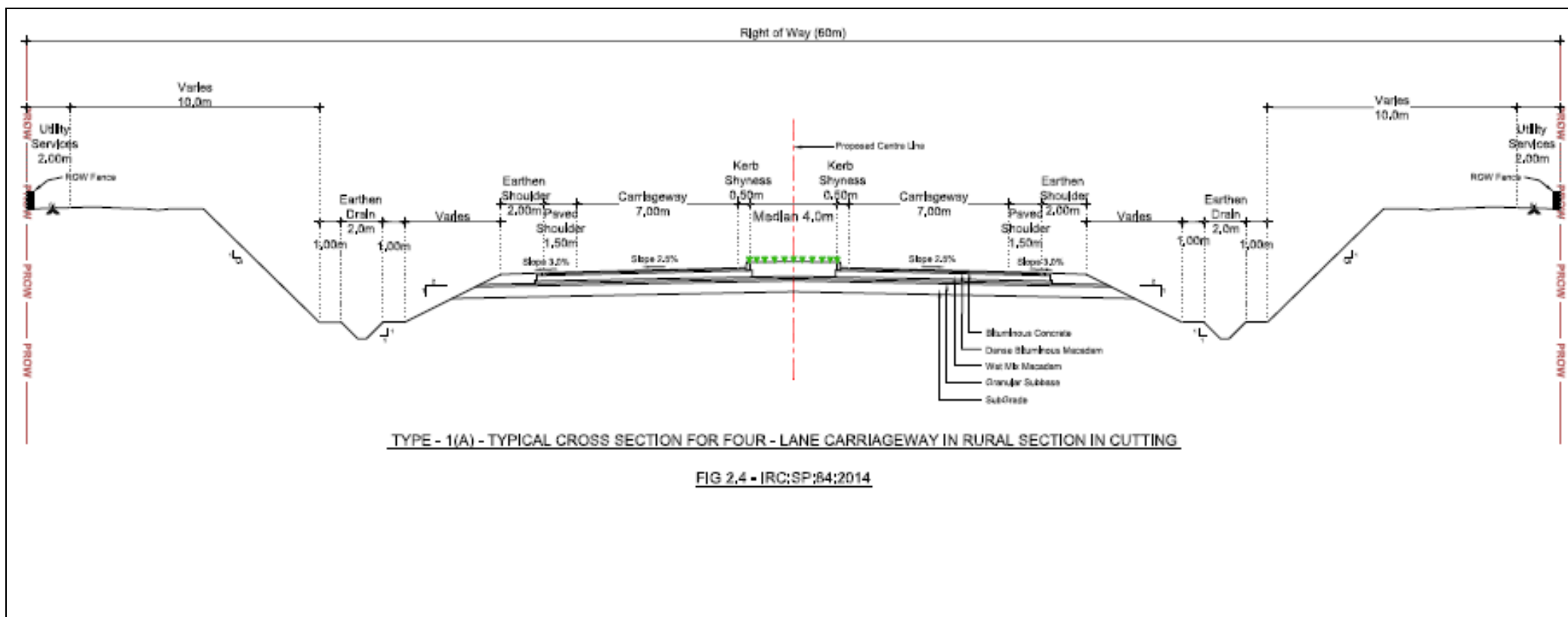
As per Ministry of Environment and Forests Notification, New Delhi dated 14.01.1997 (as amended on 13.01.1998, 05.01.1999 & 6.11.2000), the construction of rain water harvesting structure is mandatory in and around

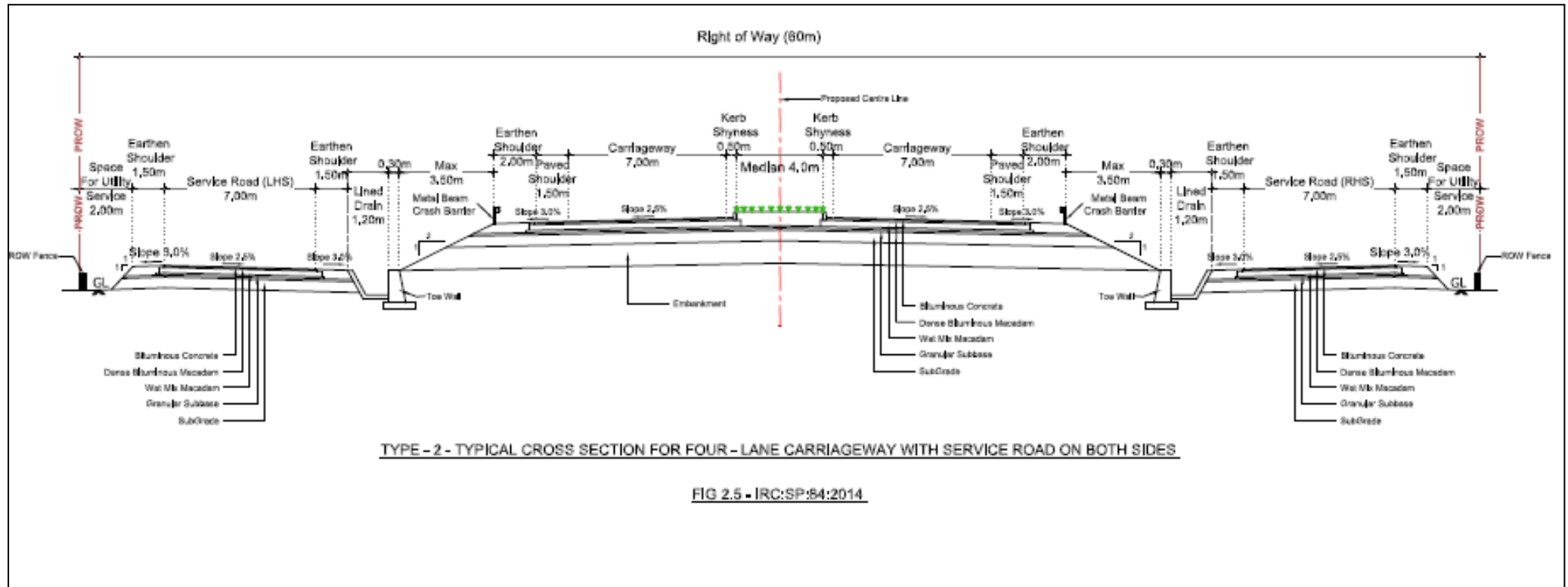
Water Crisis area, notified by the Central Ground Water Board. The provision of rain water harvesting be executed as per requirement of IRC SP: 42-2014 and IRC SP: 50-2013.

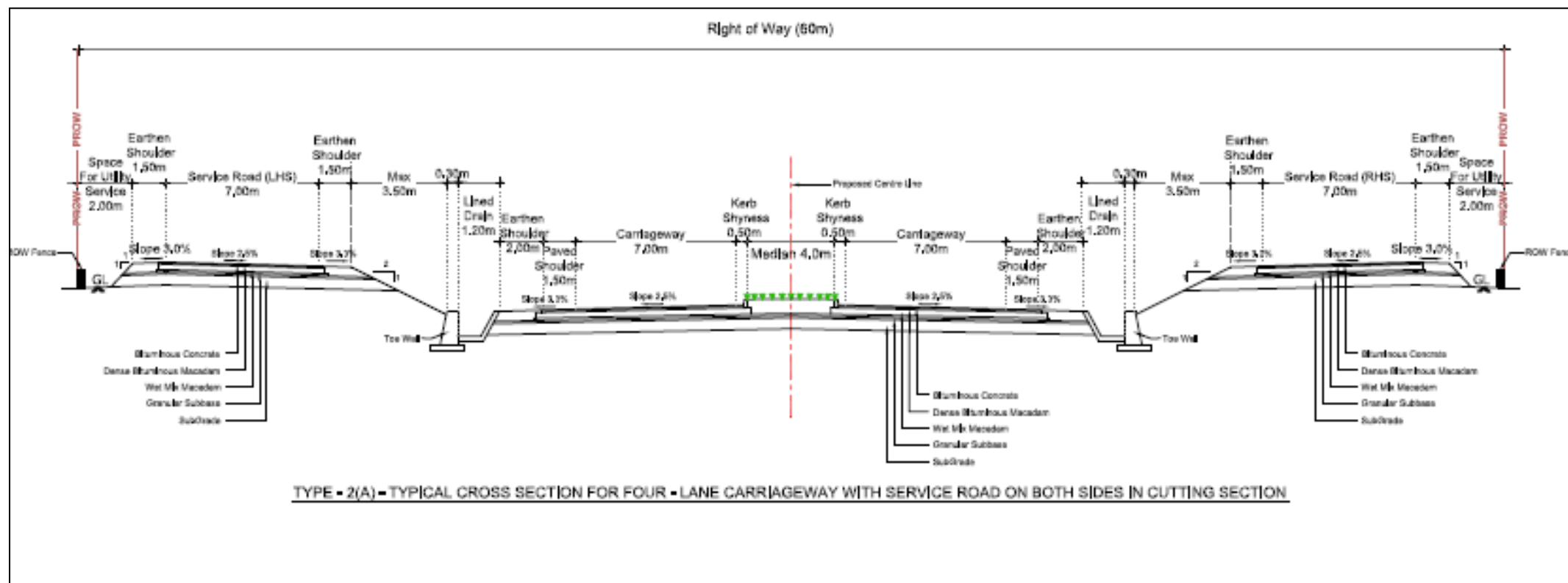
16. Change of Scope

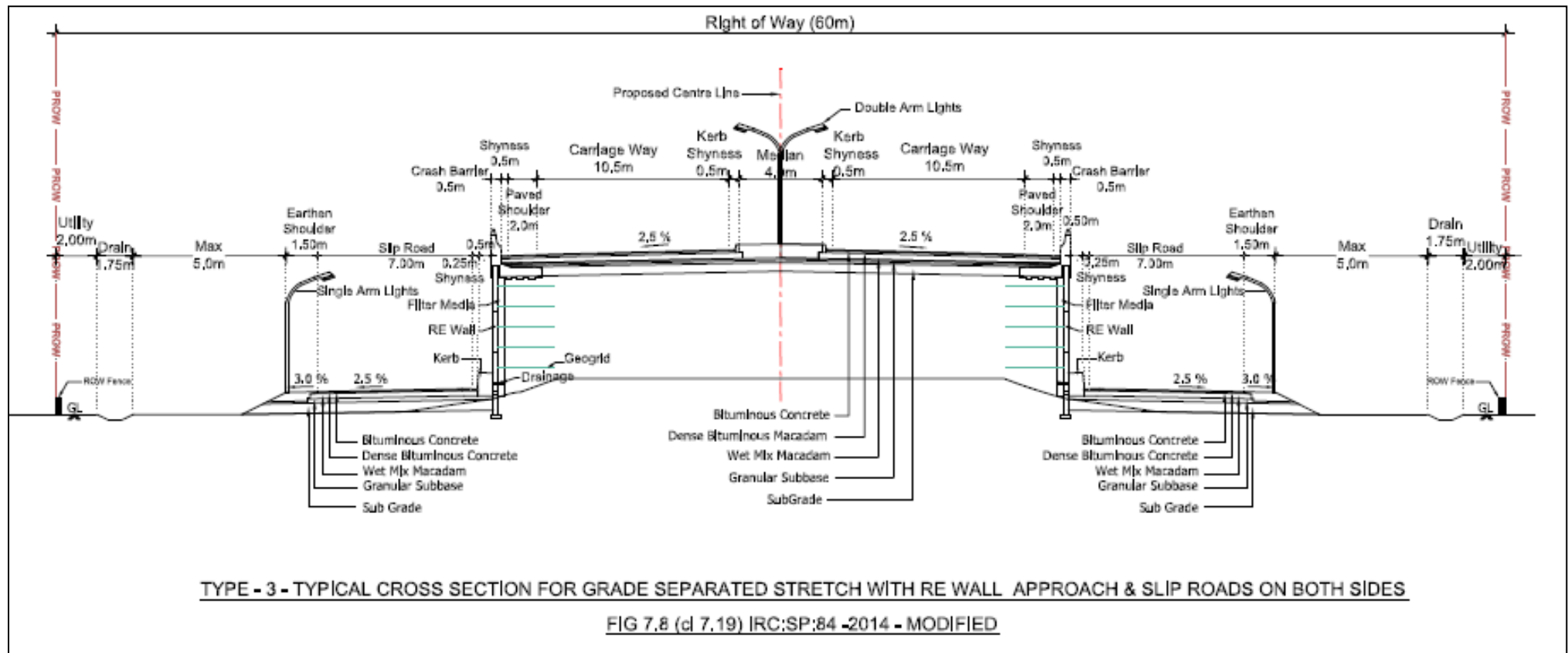
The length of Structures and bridges specified hereinabove shall be treated as an approximate assessment. The proposed span arrangement of above structures may be changed based on innovative design of structure, latest construction techniques and aesthetics of structures and the actual lengths of Structures and bridges 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.

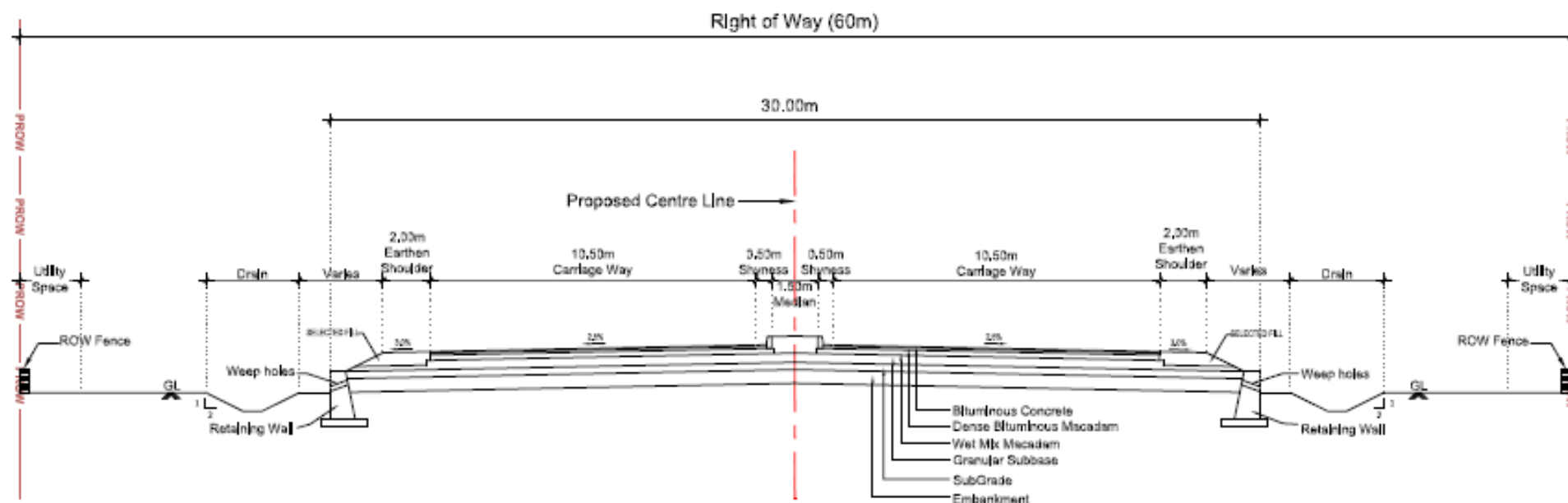




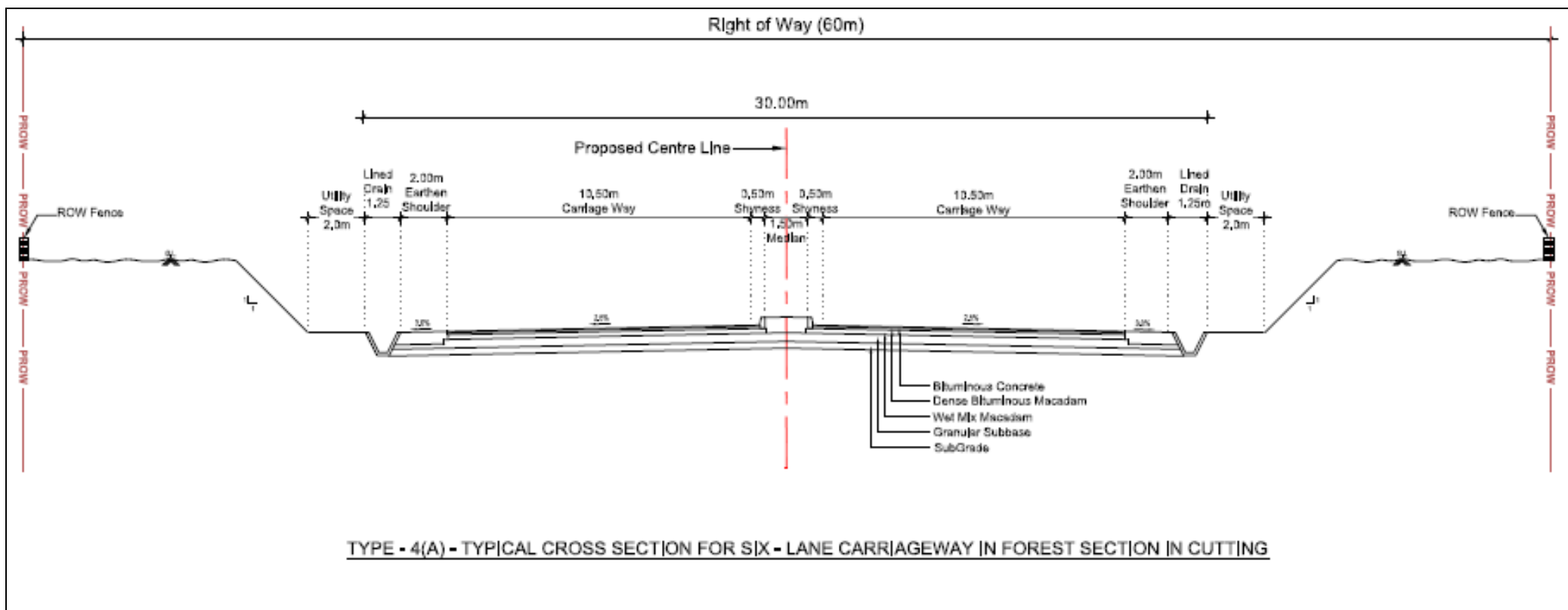


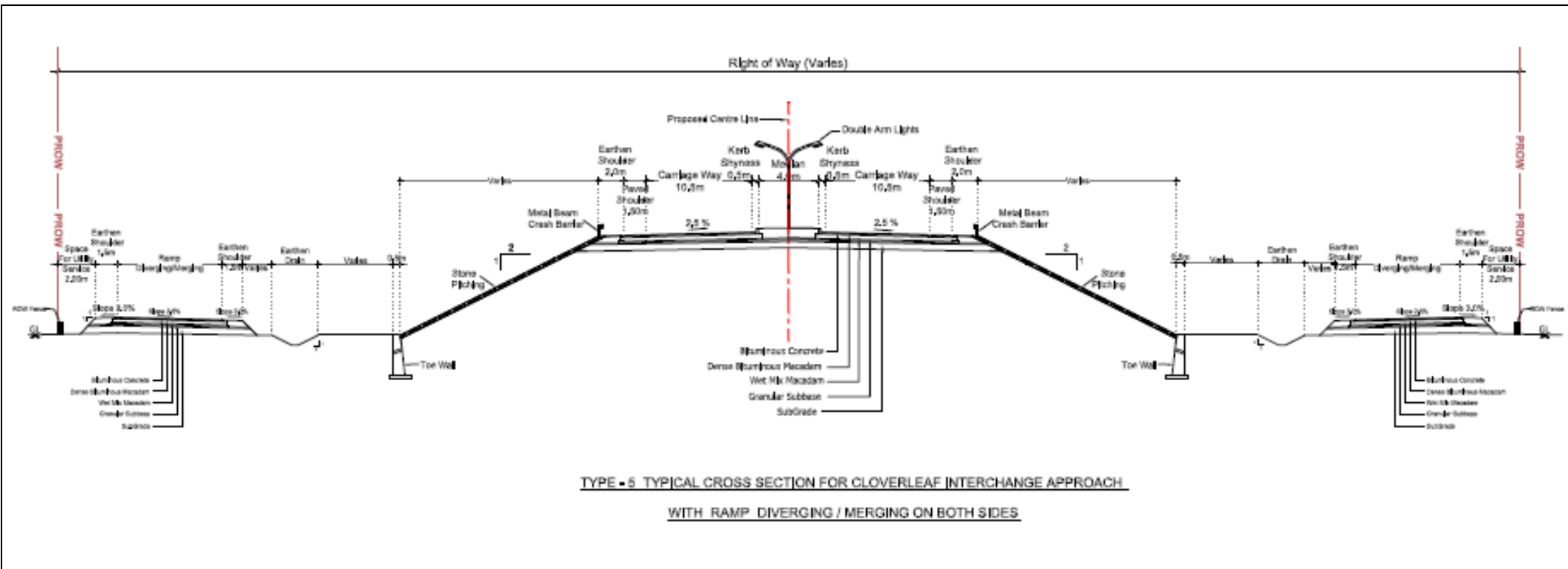


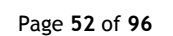


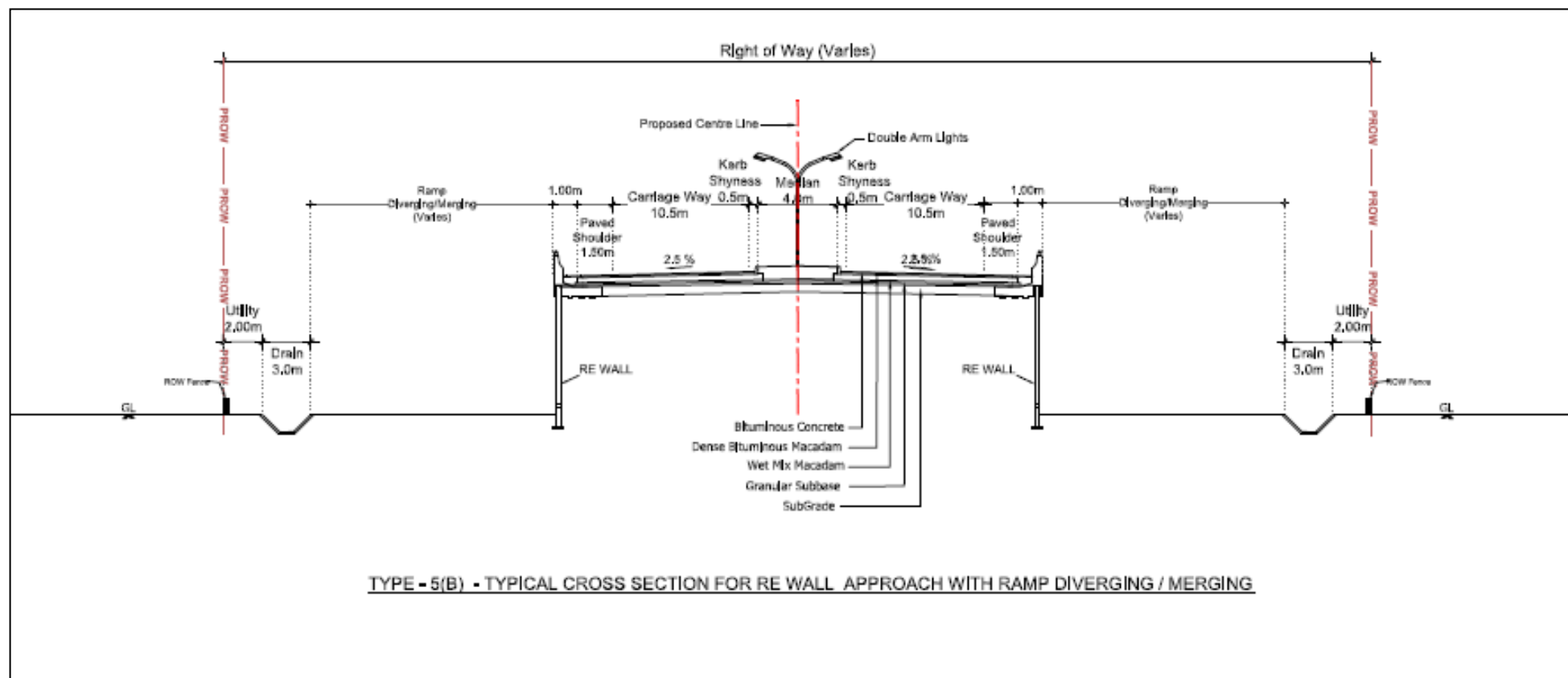


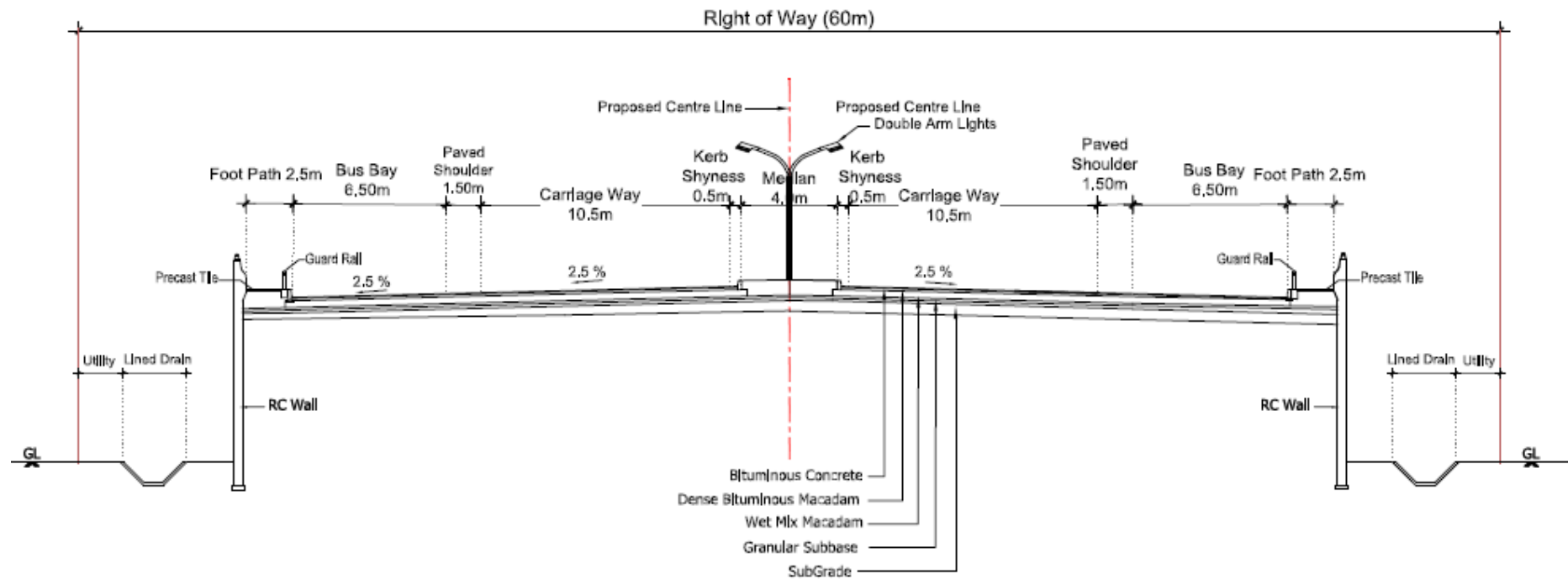
TYPE - 4 - TYPICAL CROSS SECTION FOR SIX - LANE CARRIAGEWAY IN FOREST SECTION



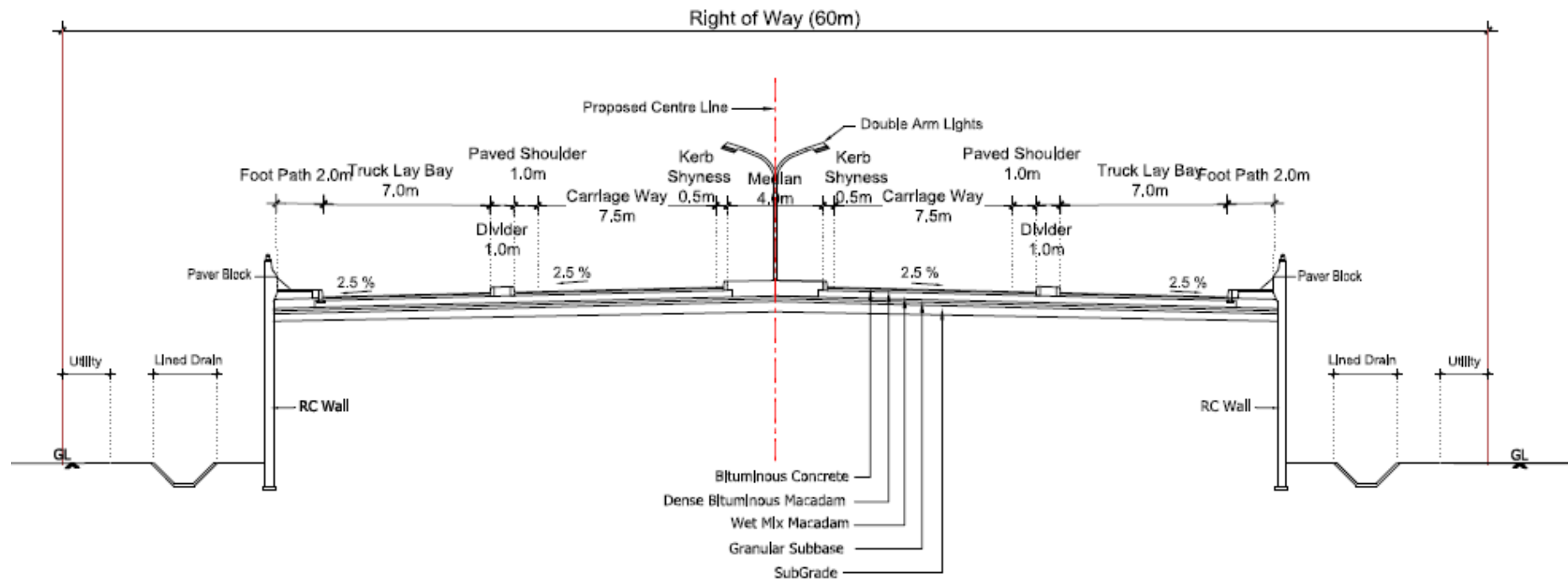








TYPE - X - TYPICAL CROSS SECTION FOR BUS BAYS



TYPE - Y - TYPICAL CROSS SECTION FOR TRUCK LAY BYE

SCHEDULE - C (See Clause 2.1)

PROJECT FACILITIES

1 Project Facilities

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

- (a) Toll plazas;
- (b) Roadside furniture;
- (c) Pedestrian facilities;
- (d) Landscaping and tree plantation;
- (e) Truck lay-bys;
- (f) Bus-bays and Bus shelters;
- (g) Highway Lightings

2 Project Facilities

Description of Project Facilities

Each of the Project Facilities is described below:

(a) Toll Plaza[s];

As stipulated in Section 10 Manual of Specifications and Standards for Four-Laning of Highways through Public Private Partnership (IRC:SP:84-2014), Toll Plazas including all facilities shall be provided at the following locations:

ID	Existing Chainage (km)		Design Chainage (m)		Length (m)	Remark
	Start	End	Start	End		(Location)
TP-1	-		Km 14+500		635	Pannaikudi

Note:

- (i) Minimum sixteen toll booths shall be provided for both ways traffic as shown in the typical drawing annexure-I of this Schedule-C. Above mentioned toll lanes are indicative. Contractor shall assess actual requirement of toll lanes as per actual site condition and manual. These toll lanes shall be finalized in consultation with Independent Engineer/Project Director, NHAI. The additional toll lanes shall not be treated as change of scope.
- (ii) Solar panels shall be erected over the Toll Plaza Canopy to generate the green energy. The same shall be utilized for toll plaza lighting with LED lights and other energy requirement within toll plaza area. In addition to solar panels conventional lighting shall be provided by Contractor.
- (iii) All Toll Lanes to be equipped with Hybrid ETC equipments as per NHAI

Circular No. NHAI/13013/2016-17/CO/Hybrid ETC/112716 dt.08.02.2018. 2 lanes on each side shall be full ETC lanes.

- (iv) Minimum medium speed Weigh in Motion (WIM) devices shall be provided in toll lanes at Toll Plaza Location. In addition to WIM, Static weigh Bridge (SWBs) shall be provided on each direction as per manual.
- (v) Point of sale (POS) with card swapping machines shall be provided.
- (vi) Highway nest mini consisting of food and beverages kiosk, water ATM, separate toilet facility under Swach Bharat along with parking facility for road users shall be provided on each direction (LHS & RHS) near Toll Plaza as per typical layout Annexure-II to this Schedule C. Suitable advance signs as per NHAI latest letter no. NHAI/GM(T)HO/Highway Nest (mini)/2017/111993 dated 24-01-2018 shall be provided. However the sign boards shall be retroreflective Type XI. The Toilets facilities must be constructed with international standards layout and 24 hours functionality including operation and maintenance. The toilet facilities shall follow CPWD specifications including sanitary ware items and fitting. The number of persons that shall be deployed at each Nest Mini and Toilet complex shall be, at a minimum of 3 persons (1 in each 8 hour shift) for mini, 3 Safai wale (1 in each 8 hour shift) and one watchman in each shift. Each side (LHS/RHS) shall be treated as one Mini and Toilet complex. The operation and maintenance of the Nest mini and toilet complex is in the scope of contractor for the entire contract period.

(b) Roadside Furniture

Road side Furniture shall include the provision of the following:

1 Traffic Sign

Traffic Sign includes the Road Side Signs, Overhead signs and Kerb mounted signs along the entire Project Highway in accordance with section 9 of IRC: SP:84-2014. Below are the minimum sign boards and location of such signs shall be finalized in consultation with Authority Engineer.

S. No.	Project Facility	Location	Design Requirements	Other Essential details
1.	Traffic Signs and Pavement Markings	Entire length	As per Schedule D	-
2.	Overhead Traffic Signs	As mentioned in para 9 of Sch-B	As per Schedule D	-

2 Pavement Marking

Pavement Marking shall cover the road marking for the entire Project

Highway in accordance with section 9 of IRC: SP:84-2014.

3 Delineators

Delineators shall be provided along the entire Project Highway in accordance with section 9 of IRC: SP:84-2014.

S. No.	Project Facility	Location	Design Requirements	Other essential details
1	Road side Delineators	Horizontal curves, Junctions	As per Schedule D	-

4 Road Studs

Road Studs shall be provided along the entire Project Highway in accordance with section 9 of IRC: SP:84-2014.

5 Traffic Impact Attenuators

Traffic Impact Attenuators shall be provided along the entire Project Highway in accordance with section 9 of IRC:SP:84-2014.

6 Safety Barrier

W-beam metal Crash Barrier shall be provided along the entire Project Highway for a minimum length of 20.88 km [on high embankments, sharp curves and Bridge approaches] in accordance with section 9 of IRC:SP:84-2014. In addition to this, MS railings shall be provided at service road and built-up locations [minimum length of 2.42 km linear project length] as per manual requirements. The actual length of the metal beam crash barrier and MS railing shall be determined by the Contractor in accordance with the Manual requirements with approval from the Authority Engineer. Any increase in the length specified in this Clause of Schedule-C 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.

7 Boundary Stones/wall

60 cm high (above the adjoining ground level) and 150mm wide concrete boundary wall with DPC on top along with suitable foundation shall be provided at the outer edge of the RoW on either side of the entire project length except at cross-roads/built-up areas. Boundary stones shall be provided at the boundary on both sides of the ROW as per clause 9.8 of the manual in built-up areas.

8 Hectometer/km Stones

Hectometer/km Stones shall be provided along the entire Project Highway in accordance with section 12 of IRC: SP: 84-2014.

(c) Pedestrian Facilities

Pedestrian Facilities include the provision of:

- 1 Pedestrian Guard Rail: Pedestrian guard rails shall be provided at each bus bay, bus shelter location, built-up sections and intersections as specified in the manual.
- 2 Pedestrian Crossing: Pedestrian crossings facilities shall be provided on service roads, built-up sections and intersections as specified in the manual

(d) Landscaping and tree plantation;

- I. Tree Plantation: Minimum 15000 numbers (as per prevailing guidelines/norms) of trees of local species shall be planted and maintained throughout the contract period as per National Green Highway policy. If all of these trees are not planted in RoW due to non availability of land, in such case, the Concessionaire shall deposit the requisite amount to the forest department for planting the balance trees as a deposit work
- II. Median: Median plantation including maintenance shall be as per provision of IRC SP-21 and Manual requirements.
- III. In addition to compensatory afforestation specified in Clause 10 of Schedule B, tree plantation and landscaping shall be done as per IRC: SP:21: 2009 and Section 11 of the Manual on the project highway. Landscaping and tree plantation of the highway shall be done on the project highway, but not limited to the following:
 - Median [as per Clause 11.2.4 of the Manual]
 - Grade Separated intersections
 - Entry and Exit ramp
 - At grade islands of intersection locations
 - Toll Plaza Area
 - Wayside Amenities
 - Road side
 - Bus bays
 - Truck Lay byes
 - Palm/coconut plants shall be placed along the boundary of RoW on both sides at a spacing of 3m.
 - Any other locations as per requirements of Clause 11.3 of the Manual

(e) Truck Lay-Byes:

Truck Lay-Byes shall be provided at following locations:

S.No.	Existing Chainage (Km)	Design Chainage (Km)	Side	Location
1	-	Ch.8+550	Both Side	-

Toilet block on each Truck Lay bye shall be provided in consultation with Independent Engineer/Project Director, NHAI. These toilets facilities must be constructed with 24 hours functional including maintenance. For upkeep and maintenance of Toilet 3 Safai wale (1 in each 8 hour shift) shall be engaged and is in the scope throughout contract period. Typical drawing of Truck lay bye shall be followed as per Annex-V of Schedule C.

(f) Bus-Bays and Bus shelters:

Bus-bays with Bus shelters or Bus Shelters shall be provided at following locations. Locations for Bus Bays and Bus shelters are indicated in the table given below. The number indicated below shall be minimum requirement and any additional requirement shall not be treated as 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. However, the same shall be finalized as per suitability of location and site requirement in consultation with Independent Engineer and the Project Director, NHAI.

1) Bus bay With Bus Shelter:

S. No.	Chainage	Side	Location
1	Design Chainage (km.) 10+700	LHS	Chellana goundapatti
2	Design Chainage (km.) 10+700	RHS	Chellana goundapatti
3	Design Chainage (km.) 12+350	LHS	Kallanai
4	Design Chainage (km.) 12+350	RHS	Kallanai
5	Design Chainage (km.) 16+650	LHS	Kulamangalam
6	Design Chainage (km.) 16+650	RHS	Kulamangalam

2) Bus Shelter:

S. No.	Chainage	Side	Location
1	Design Chainage (km.) 0+600	LHS	Palamedu crossing
2	Design Chainage (km.) 0+300	RHS	Palamedu crossing
3	Design Chainage (km.) 3+100	LHS	Sembukudipatti crossing
4	Design Chainage (km.) 2+800	RHS	Sembukudipatti crossing
5	Design Chainage (km.) 6+600	LHS	Thathagoundanpatty
6	Design Chainage (km.) 6+300	RHS	Thathagoundanpatty
7	Design Chainage (km.) 7+700	LHS	Kalvelipatti
8	Design Chainage (km.) 7+400	RHS	Kalvelipatti
9	Design Chainage (km.) 9+900	LHS	Alanganallur road
10	Design Chainage (km.) 9+400	RHS	Alanganallur road
11	Design Chainage (km.) 20+500	LHS	Manthikulam
12	Design Chainage (km.) 20+100	RHS	Manthikulam
13	Design Chainage (km.) 24+100	LHS	Alagar koil road crossing
14	Design Chainage (km.) 23+700	RHS	Alagar koil road crossing
15	Design Chainage (km.) 28+000	LHS	Kodikulam
16	Design Chainage (km.) 27+700	RHS	Kodikulam

(g) Rest Areas and wayside amenities:

Development of site for wayside amenities and rest area shall be at the following location. The facilities shall conform to clause 12.6 of Manual. Comprehensive Rest Area (way side amenities) shall be provided with provision for food court/ restaurant, dhaba for truckers, retail arcade, toilet facilities, drinking water kiosk, car parking, bus/ truck parking and emergency health care facilities for accident victims. The Facilities at Rest Area shall be finalized in consultation with Independent Engineer/Project Director, NHAI. Typical drawing of Rest Area shall be followed as per Annex-III of Schedule C.

S.No.	Existing Chainage (km)	Design Chainage (km)	Side	Location
1	-	Ch.11+900	RHS	

(h) Highway Lighting

Highway lighting (LED) shall be provided at the following locations:

- (i) At Toll Plazas, Rest area, Truck lay bye, Bus bays and shelter as given in this schedule-C, Interchange with all Ramps, Grade separators including Slip roads, built up sections, ROB, Major Bridge, and at Grade Junctions at locations given in schedule-B, and as per Typical cross sections annexed to Schedule-B.
- (ii) Solar lighting shall be considered near junctions, interchanges with all ramps and at toll plaza locations. Solar Panels also to be established at any other preferred locations along with conventional lighting.
- (iii) High mast Lighting

High mast Lighting shall be provided as specified in clause 12.3 of the manual at the locations mentioned below:

S.No.	Design Chainage, km	Location	Numbers
1	0+000	Vadipatti junction	1
2	11+900	Rest area	1
3	14+500	Toll plaza	2
4	20+410	Madurai-Natham junction	1
5	29+455	Clover leaf Interchange	2

(i) Emergency Call boxes and Variable Message Signs

Emergency call boxes and Variable Message Signs shall be provided as per Manual.

(j) Utility Crossings

Utility ducts in form of 600mm dia Hume Pipe shall be provided across the Project Highway at every 1.0km interval and along with inspection chamber

for crossing of underground utilities. Location for such utility crossing shall be finalized in consultation with Authority Engineer.

(k) Mobile Patrol Units

Patrolling should be conducted through Mobile Patrol Team in accordance with Section with Section 12.8 of the Manual of Specifications and Standards with provision of latest available mobile handset with unlimited talk time replaceable after 2 years. The patrol vehicles shall be as per Annexure-I of NHAI/policy Guidelines/Strengthening the Incident Management services/2018, Policy No.12.19 dated the 20th March 2018, along with manpower and shall be maintained throughout the contract period.

(l) Traffic Aid Centres

The Contractor shall, in accordance with the type designs prescribed for such police outpost buildings by the State Government or a substitute thereof, construct buildings not exceeding 25 (twenty five) square meters of plinth area, for each of the Traffic Aid Posts, and hand them over to the Authority no later than 30 (thirty) days prior to the Scheduled Completion Date. The Traffic Aid Post(s) shall be deemed to be part of the Site and shall vest in the Authority. This shall be located nearer to the Traffic Control Centre at Toll Plaza location @ Km.14+500.

(m) Advance Traffic Management Systems (ATMS)

The Concessionaire is required to design, install, operate and maintain Highway Traffic Management System (HTMS)/Advanced Traffic Management System (ATMS) as part of the project facilities. Advanced Traffic Management System as specified in the manual, and shall be provided as per specifications given in NHAI circular No.11014/218/2007-Admn Dated 15-09-2016: Policy Matter - Technical (214/2016) and shall be maintained throughout the contract period. Briefly, the ATMS components to be deployed shall inter alia include:

- i) Video Surveillance System (CCTV PTZ Dome / Fixed Camera)
- ii) Video Incident Detection System
- iii) Vehicle Actuated Radar Speed Display
- iv) Emergency Roadside Telephones
- v) Fixed / Portable Variable Message Sign
- vi) Meteorological System
- vii) Portable Weigh in Motion
- viii) Automatic Traffic Counter cum Classifier
- ix) The ATMS Control Centre including the equipment (hardware, software, and local networking)
- x) Communications System utilizing Optic fiber, GSM/GPRS and Wi-Fi Communications linked to ATMS Control Centre.
- xi) Power supplies for field equipment: working on Mains power supported with back-up (largely on renewable energy) to facilitate 24x7 operation and for the ATMS Control Centre working on Mains

power supported by UPS and Diesel generator set of adequate capacities, to facilitate 24x7 operation.

(n) Medical Aid Posts

The Contractor shall, at its cost and in accordance with the type designs prescribed for such buildings by the State Medical Department (or a substitute thereof to be designated by the Authority), construct an aid post building and hand it over to the Authority, no later than 30 (thirty) days prior to COD. The Medical Aid Post(s) shall be deemed to be part of the Site and shall vest in the Authority. Medical Aid Post shall be set up at Administrative Block with 2 nos of Ambulance with round-the-clock services for victims of accidents on the Project Highway. Such Post and two residential quarters shall be constructed in accordance with the type designs prescribed by the State Medical Department and shall be maintained throughout the contract period. Ambulance shall be provided as per Annexure-I of NHAI/Policy Guidelines/Strengthening the Incident Management services/2018, Policy No.12.19 dated the 20th March 2018, along with all necessary manpower (including paramedic staff) and shall be maintained throughout the contract period.

(o) Vehicle Rescue Posts

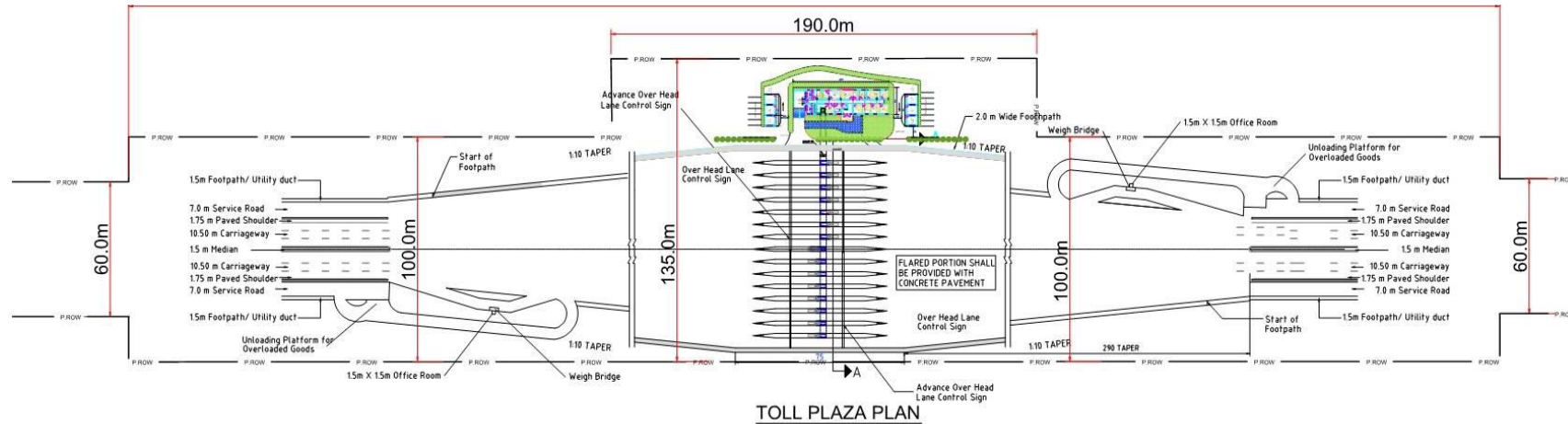
Vehicle rescue post shall be provided in accordance with Section 12.10 of the Manual of Specifications and Standards.

(p) Telecom System

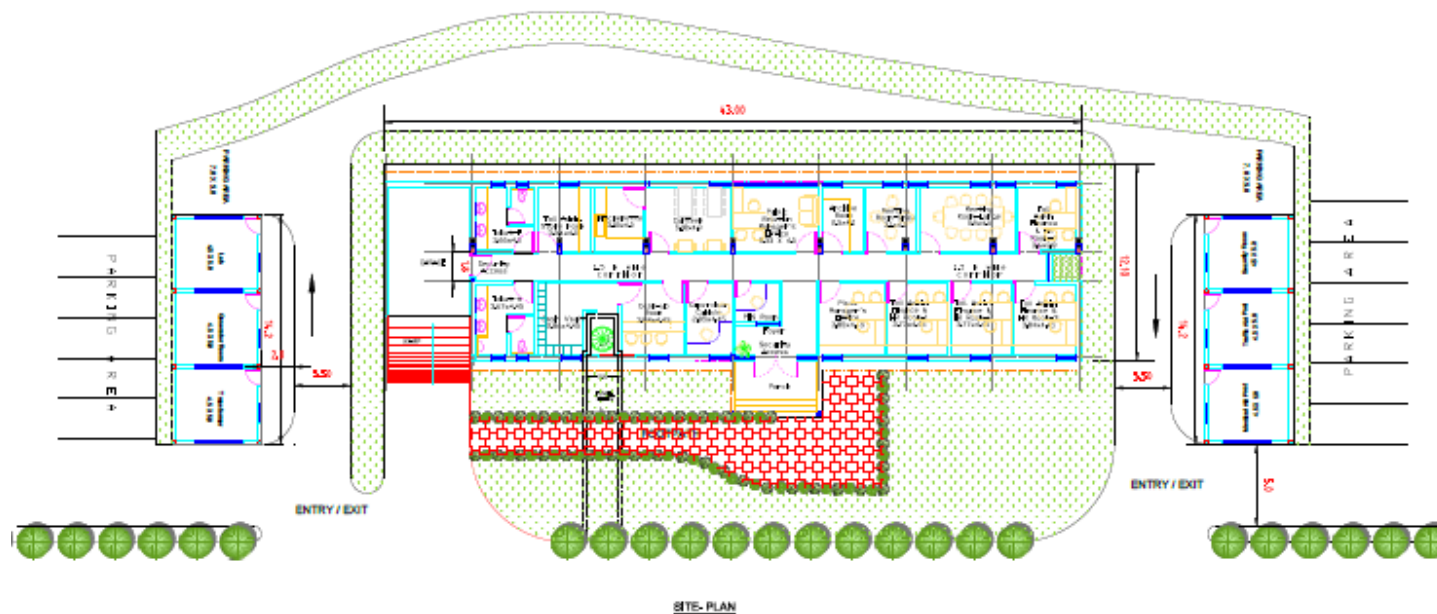
Telecommunication system shall be developed by providing necessary Network so that immediate actions can be taken in case of emergency accordance with Section 12.11 of the Manual of Specifications and Standards.

(q) Pedestrian Facilities:

The additional pedestrian facilities in the form of guard rails, footpath, lighting etc. shall be provided wherever required in accordance with Section 12.2 of the Manual of Specifications and Standards

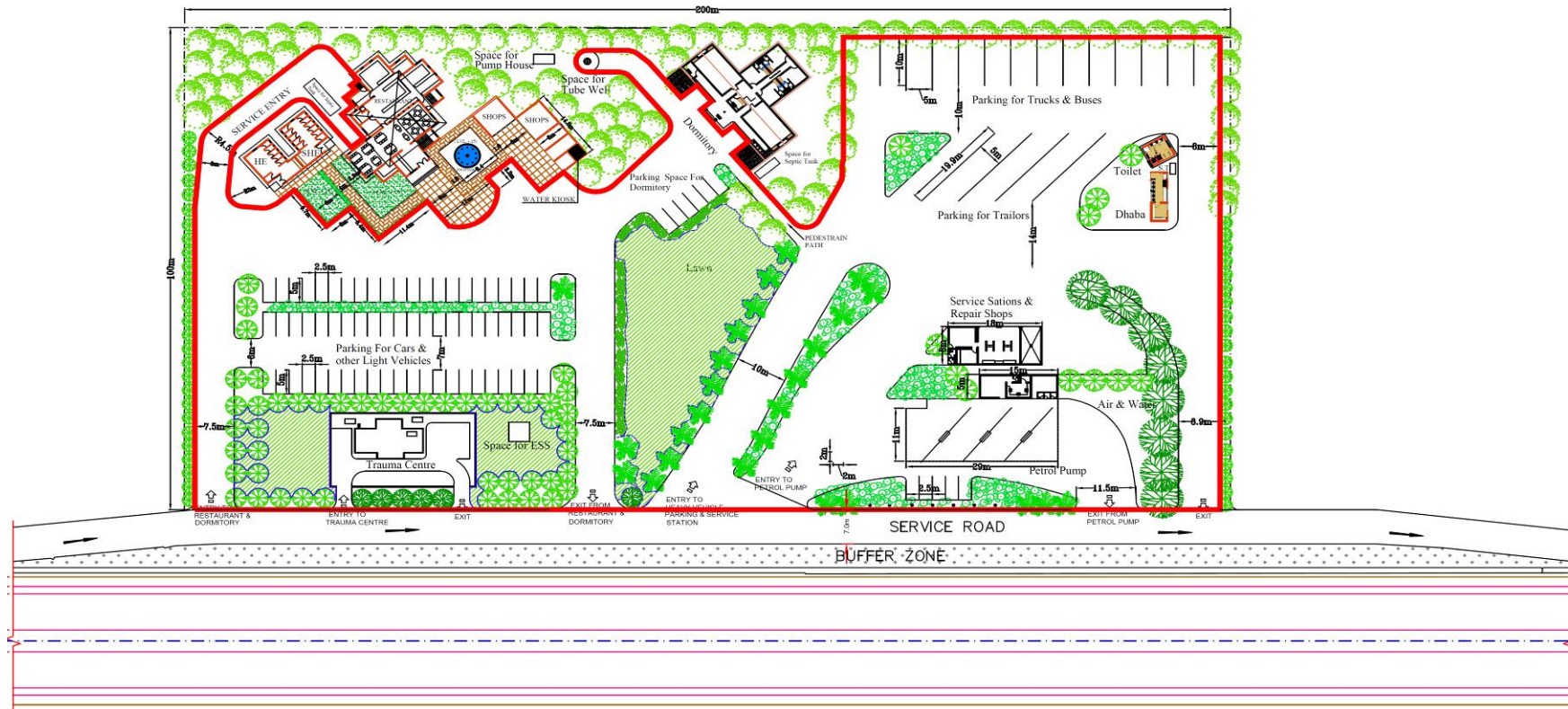
**Annex-I
(Schedule-C)****Typical Drawing for Toll Plaza**

Note: Above mentioned typical drawing is for reference, Concessionaire shall finalize the detailed drawing as per manual in consultation with Independent Engineer/ Project Director, NHAI



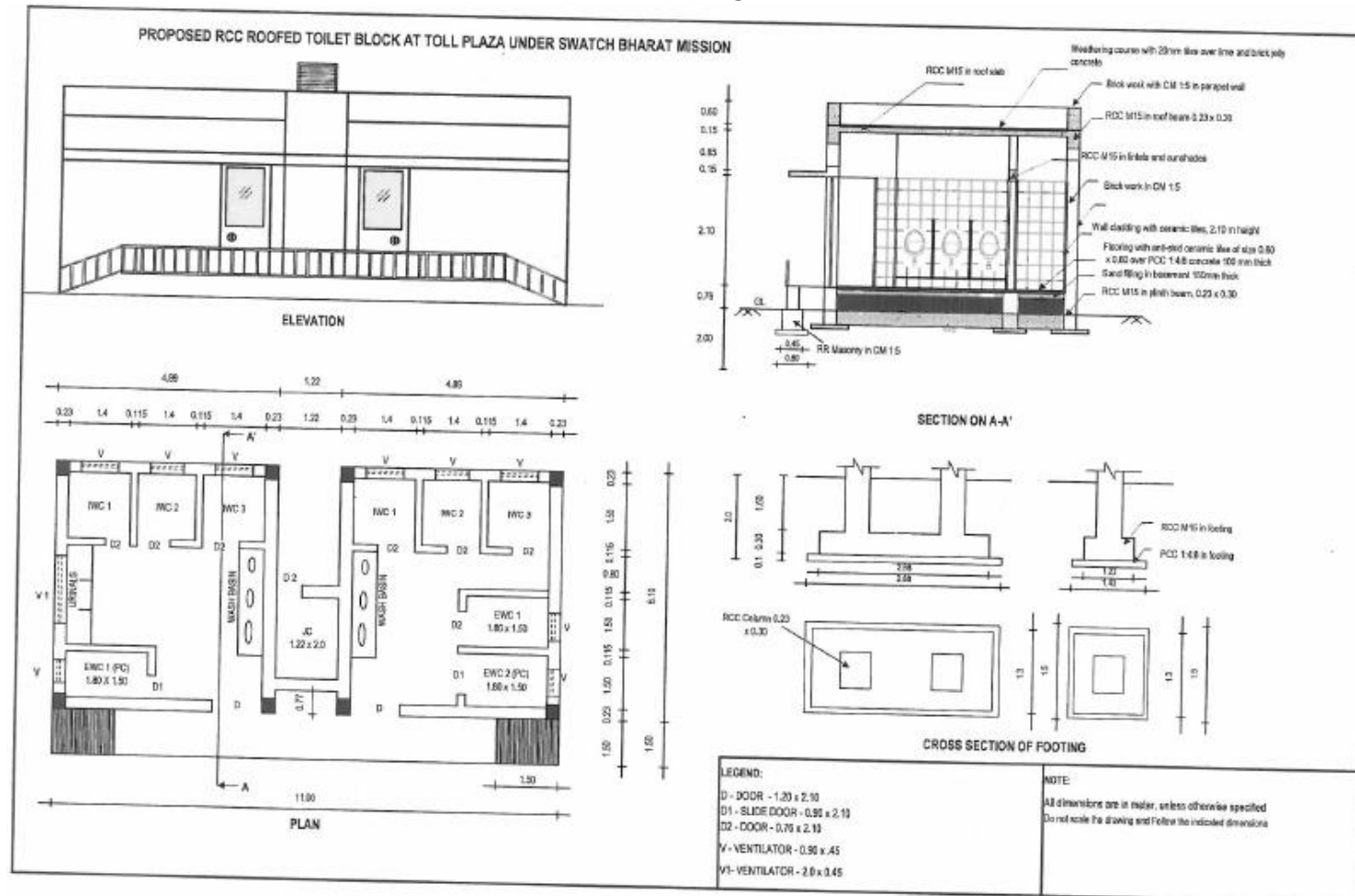
TOLL PLAZA BUILDING

**Annex-III
(Schedule-C)
Rest Area (Way side Amenities)**

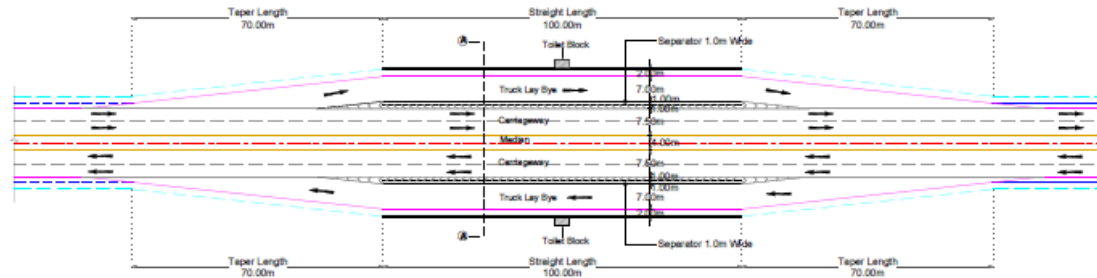


LAYOUT OF WAY SIDE AMENITIES

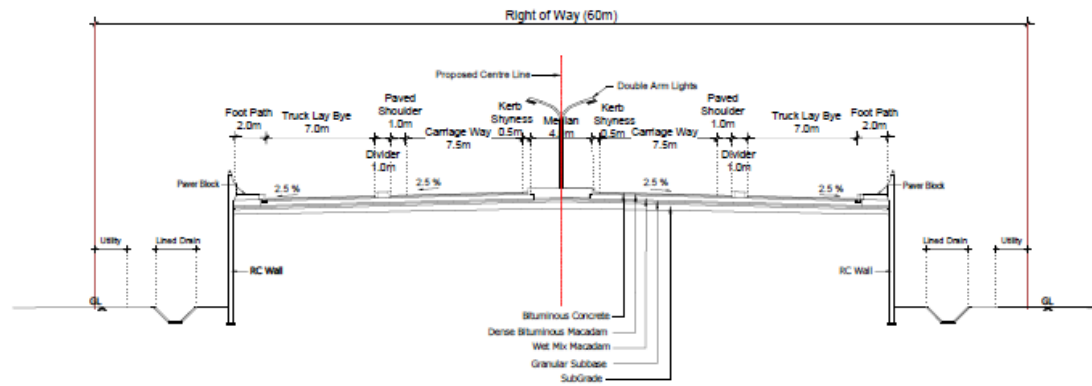
Annex-IV (Schedule-C) Standard Drawing for Toilet



Annex-V (Schedule-C) Truck Lay bye



Typical Layout of Truck Lay-Bye



CROSS SECTION - A - A

Note: Above mentioned typical drawing is for reference, Concessionaire shall finalize the detailed drawing as per manual in consultation with Independent Engineer/ Project Director, NHAI

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:84-2014), referred to herein as the Manual and any Circular/Guidelines revised by MORTH/NHA at least 60 days prior to the last date of bid submission, NHA circular No.11014/11/2016-HR-I Dated 12-06-2017 (Policy Matter - 10.1.16/2017)

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 Highways (IRC:SP:84-2014), referred to as the Manual, and MORTH Specifications for Road and Bridge Works. Where the specification for a work is not given, Good Industry Practice shall be adopted to the satisfaction of the Authority's Engineer.

2 Deviations from the Specifications and Standards

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

S. No.	Clause referred in the Manual	Item	Modified provision
1.	2.17	Fig 2.9	Type-4 & Type-4(A) as given in Para 2.11 of Annexure-I of schedule B
2.	10.4	Fig 10.1 -Typical layout for Toll plaza	Minimum number of Toll lanes shall be 8 lanes on each side as given in Drawing volume (Typical layout for Toll plaza)
3.	7.3	Fig 7.3	Cross section of Bridges in grade separated approaches structure shall be modified as per Fig.7.8 of Cl.7.19
4.	10.4.2.2	WIM (Weigh In Motion)	Provision for WIM with medium speed shall be made.
5.	-	ATCC	Provision for ATCC shall be made.
6.	-	Road Boundary Wall	Road Boundary walls shall be provided as specified in the Drawing No:Row-Fence-01
7.	-	Cloverleaf Interchange at Ch. 29+455	Junction Layout as per IRC-92

SCHEDULE - H**(See Clauses 10.1.4 and 19.3)****Contract Price Weightages**

- 1.1 The Contract Price for this Agreement in Rs.
- 1.2 Proportion of the contract price for different stages of construction of the Project Highway shall be as specified below.

Item	Weightage in percentage to the Contract Price	Stage for payment	Percentage weightage
1	2	3	4
Road works including culverts, widening and repair of culverts	38.83%	A - Widening & Strengthening of existing Road	
		1. Earthwork up to top of Sub-grade	-
		2. Sub Base course	-
		3. Non Bituminous Base Course	-
		4. Bituminous Base course	-
		5. Wearing coat	-
		6. Widening and repair of culverts	-
		B.1 - Reconstruction/ New 2/4/6-lane realignment/ bypass (flexible pavement)	
		1. Earthwork up to top of the sub-grade	29.98%
		2. Sub Base course	11.28%
		3. Non Bituminous Base Course	11.74%
		4. Bituminous Base course	18.26%
		5. Wearing coat	9.41%
		B.2 - Reconstruction/ New 2/4/6-lane realignment/ bypass (Rigid pavement)	
		1. Earthwork up to top of the sub-grade	-
		2. Sub Base course	-

Item	Weightage in percentage to the Contract Price	Stage for payment	Percentage weightage
1	2	3	4
		3. Dry Lean Concrete(DLC) course	-
		4. Pavement Quality Control(PQC) course	-
		C.1 - Reconstruction/ New Service road (flexible pavement)	
		1. Earthwork up to top of the sub-grade	2.06%
		2. Sub Base course	2.51%
		3. Non Bituminous Base Course	2.62%
		4. Bituminous base course	2.13%
		5. Wearing coat	1.73%
		C.2- Reconstruction/New Service Road (Rigid Pavement)	
		1. Earthwork up to top of the sub-grade	-
		2. Sub Base course	-
		3. Dry Lean Concrete(DLC) course	-
		4. Pavement Quality Control(PQC) course	-
		D- Reconstruction and New Culverts on existing road, realignment, bypasses: Culverts(length<6m)	8.28%
Minor Bridges/ Underpasses/ Overpasses	28.38%	A.1 - Widening & Repairs of Minor Bridges (length>6m and length <60m)	
		Minor Bridges	-
		A.2 -New Minor Bridges (length>6m and length <60m)	

Item	Weightage in percentage to the Contract Price	Stage for payment	Percentage weightage
1	2	3	4
		(1)Foundation + substructure On completion of the foundation work including foundations for wing and return walls, abutments, Piers upto the abutment/pier cap	26.79%
		(2)Superstructure On completion of the Super-Structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs & markings, tests on completion etc.Complete in all respect	20.82%
		(3)Approaches On completion of Approaches including Retaining walls, Stone Pitching, Protection works complete in all respect and fit for use	8.92%
		(4)Guide bunds and River Training works On completion of Guide Bunds and River Training Works complete in all respects	2.97%
		B.1-Widening and repair of Underpasses/Overpasses	
		Underpasses/Overpasses	-
		B.2-New Underpasses/Overpasses	

Item	Weightage in percentage to the Contract Price	Stage for payment	Percentage weightage
1	2	3	4
		(1)Foundation + substructure On completion of the foundation work including foundations for wing and return walls, abutments, Piers upto the abutment/pier cap	8.03%
		(2)Superstructure On completion of the Super-Structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs & markings, tests on completion etc. Complete in all respect	2.14%
		Wearing Coat (a) in case of Overpass-Wearing coat including expansion joints complete in all respects as specified and (b)in case of Underpass-Rigid Pavement including drainage facility complete in all respects as specified	0.54%
		(3)Approaches On completion of approaches including Retaining walls/ Reinforced Earth Walls, Stone Pitching, Protection works complete in all respect and fit for use	29.79%
Major Bridge(length>60m)works and ROB/RUB/elevated	21.30%	A.1 - Widening & Repairs of Major Bridges	-
		1. Foundation	-

Item	Weightage in percentage to the Contract Price	Stage for payment	Percentage weightage
1	2	3	4
sections/flyovers including viaducts, if any		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. Guide bunds, River Training works etc.	-
		8. Approaches (including retaining walls, stone pitching and protection works)	-
		A.2 - New Major Bridges	-
		1. Foundation	13.67%
		2. Sub-structure	4.59%
		3. Super structure (Including bearings)	13.29%
		4. Wearing Coat including expansion joints	1.83%
		5. Miscellaneous Items like hand rails, crash barriers, road markings, etc.)	0.83%
		6. Wing walls/return walls	0.66%
		7. Guide bunds, River Training works etc.	-
		8. Approaches (including retaining walls, stone pitching and protection works)	1.01%
		B.1 - Widening & Repairs of	
		a) ROB	-
		b) RUB	
		1. Foundation	-
		2. Sub-structure	-

Item	Weightage in percentage to the Contract Price	Stage for payment	Percentage weightage
1	2	3	4
		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 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	-
		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 including drainage facility complete in all respects as specified	-

Item	Weightage in percentage to the Contract Price	Stage for payment	Percentage weightage
1	2	3	4
		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	-
		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	3.42%
		2. Sub-structure	6.60%
		3. Super structure (Including bearings)	3.89%
		4. Wearing Coat including expansion joints	0.99%

Item	Weightage in percentage to the Contract Price	Stage for payment	Percentage weightage
1	2	3	4
		5.Miscellaneous Items like hand rails,crash barriers,road markings,etc.)	0.66%
		6.Wing walls/return walls	-
		7.Approaches(including Retaining walls/ Reinforced earth wall,stone pitching and protection works)	48.56%
Other Works	11.49%	Other works	
		1. Toll Plaza (Includes Highway Nest mini, toilet complex, hybrid ETC and facilities etc, Rest areas, traffic aid, medical aid and vehicle rescue and ATMS)	41.76%
		2. Road side Drains	1.50%
		3. Road signs, markings, Km stones, safety devices, Turfing and pitching and boundary wall	15.88%
		4. Project facilities	
		a) Lightings	7.25%
		b) Junction Improvement	4.35%
		c) Bus lay bye with BusShelter	1.61%
		d) Boundary Wall	20.04%
		e) Truck lay bay	0.61%
		f) other Miscellaneous works	4.89%
		5. Site Clearance and Dismantling	1.11%

1.3 Procedure of estimating the value of work done

1.3.1 Road Works

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

Table 1.3.1

Stage of Payment	Percentage - Weightage	Payment Procedure
A - Widening & Strengthening of existing Road		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in a length of not less than 10% (ten per cent) of the total length.
1. Earthwork up to top of Sub-grade	-	
2. Sub Base course	-	
3. Non Bituminous Base Course	-	
4. Bituminous Base course	-	
5. Wearing coat	-	
6. Widening and Repair of culverts	-	Cost of completed culverts shall be determined on pro rata basis with respect to the total number of culverts. The Payment shall be made on the completion of atleast five culverts.
B.1 - Reconstruction/ New 2/4/6-lane realignment/ bypass (flexible pavement)		Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in full length or 5 (five) km length, whichever is less.
1. Earthwork up to top of the sub-grade	29.98%	
2. Sub Base course	11.28%	
3. Non Bituminous Base Course	11.74%	
4. Bituminous Base course	18.26%	
5. Wearing coat	9.41%	
B.2 - Reconstruction/ New 2/4/6-lane realignment/ bypass (Rigid pavement)		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 5 (five) km length, whichever is less.
1. Earthwork up to top of the sub-grade	-	
2. Sub Base course	-	

Stage of Payment	Percentage - Weightage	Payment Procedure
3. Dry Lean Concrete(DLC) course	-	
4. Pavement Quality Control(PQC) course	-	
C.1- Reconstruction/New Service Road (Flexible Pavement)		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 5(five) km length, whichever is less.
1. Earthwork up to top of the sub-grade	2.06%	
2. Sub Base course	2.51%	
3. Non Bituminous Base Course	2.62%	
4. Bituminous base course	2.13%	
5. Wearing coat	1.73%	
C.2- Reconstruction/New Service Road (Rigid Pavement)		Unit of measurement is linear length. Payment of each stage shall be made on pro rata basis on completion of a stage in full length or 5(five) km length, whichever is less.
1. Earthwork up to top of the sub-grade	-	
2. Sub Base course	-	
3. Dry Lean Concrete(DLC) course	-	
4. Pavement Quality Control(PQC) course	-	
D- Reconstruction and New Culverts on existing road, realignment, bypasses:		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 five culverts.
Culverts(length<6m)	8.28%	

* 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 Agreement.

1.3.2 Minor Bridges and Underpasses/Overpasses

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

Table 1.3.2

Stage of Payment	Weightage	Payment Procedure
A.1 - Widening & Repairs of Minor Bridges (length>6m and length <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. Payment shall be made on completion of widening & repair works of a minor bridge.
A.2 -New Minor Bridges (length>6m and length <60m) (i)Foundation + substructure On completion of the foundation work including foundations for wing and return walls, abutments, Piers upto the abutment/pier cap	26.79%	(i)Foundation+Substructure: Cost of each minor Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the minor Bridges. Payment against foundation+substructure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation+sub-structure of each bridge subject to completion of atleast two foundations along with substructure upto abutment or pier cap level of each bridge. In case where load testing is required for foundation,the trigger of first payment shall include load testing also where specified.

Stage of Payment	Weightage	Payment Procedure
(ii)Superstructure On completion of the Super-Structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs & markings, tests on completion etc.Complete in all respect	20.82%	(ii)Superstructure: Payment shall be made on pro rata basis on completion of a stage i.e. completion of superstructure of atleast one span in all respects as specified in the column of "Stage of Payment" in this sub-clause.
(iii)Approaches On completion of approaches including Retaining walls, Stone pitching, Protection works complete in all respect and fit for use.	8.92%	(iii)Approaches: Payment shall be made on pro rata basis on completion of a stage i.e. completion of approaches in all respects as specified in the column of "Stage of Payment" in this sub-clause.
(iv)Guide bunds and River Training works On completion of Guide Bunds and River Training Works complete in all respects	2.97%	(iv)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.
B.1-Widening and repair of 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. Payment shall be made on completion of widening & repair works of a Underpass/Overpass.
B.2-New Underpasses/Overpasses		

Stage of Payment	Weightage	Payment Procedure
(i)Foundation + substructure On completion of the foundation work including foundations for wing and return walls, abutments, Piers upto the abutment/pier cap	8.03%	Foundation+Substructure: Cost of each Underpass/Overpass shall be determined on pro rata basis with respect to the total linear length (m) of the Underpasses/Overpasses. Payment against foundation+substructure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation+sub-structure of each Underpass/Overpass subject to completion of atleast two foundations along with substructure upto abutment or pier cap level of each Underpass/Overpass. In case where load testing is required for foundation,the trigger of first payment shall include load testing also where specified.
(ii)Superstructure On completion of the Super-Structure in all respects including wearing coat, bearings, expansion joints, hand rails, crash barriers, road signs & markings, tests on completion etc.Complete in all respect	2.14%	Super-structure: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super-structure of atleast one span in all respects as specified in the column of "Stage of Payment" in this sub-clause
Wearing Coat (a) in case of Overpass- Wearing coat including expansion joints complete in all respects as specified and (b)in case of Underpass-Rigid Pavement including drainage facility complete in all respects as specified	0.54%	

Stage of Payment	Weightage	Payment Procedure
(iii) Approaches On completion of approaches including Retaining walls/Reinforced earth walls, Stone pitching, Protection works complete in all respect and fit for use.	29.79%	Approaches: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of approached in all respect as specified

1.3.3 Major Bridges, ROB/RUB and Structures

Procedure of estimating the value of Major Bridges, 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		
(i) Foundation	-	(i) Foundation: Cost of each Major Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridges. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of major bridge subject to completion of at least two foundations of Major Bridge In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(ii) Sub-structure	-	(ii) Sub-structure: Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of sub-structure of the major bridge subject to completion of at least two sub-structures of abutment/piers up to abutment/

		pier cap level of major bridge.
(iii) Super structure (Including bearings)	-	(iii) Super-structure: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super-structure including bearings of atleast one span in all respects specified.
(iv) Wearing Coat including expansion joints	-	(iv) Wearing Coat: Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified.
(v) Miscellaneous Items like hand rails, crash barriers, road markings, etc.)	-	(v) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc it all respects as specified.
(vi) Wing walls/return walls	-	(vi) Wing/ Return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
(vii) Guide bunds, River Training works etc.	-	(vii) 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.
(viii) Approaches (including Retaining walls, stone pitching and protection works)	-	(viii) Approaches: Payments shall be made on completion of both approaches including stone pitching, protection works etc. complete in all respects as specified.
A.2 -New Major Bridges		
(i) Foundation	13.67%	(i) Foundation: Cost of each Major Bridge shall be determined on pro rata basis with respect to the total linear length (m) of the Major Bridges. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of Major Bridge subject to completion of atleast two foundations of Major Bridge

		In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(ii) Sub-structure	4.59%	(ii) Sub-structure: Payment against Sub-structure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of sub-structure of the major bridge subject to completion of at least two sub-structures of abutment/piers up to abutment/pier cap level of major bridge.
(iii) Super structure (Including bearings)	13.29%	(iii) Super-structure: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super-structure including bearings of at least one span in all respects specified.
(iv) Wearing Coat including expansion joints	1.83%	(iv) Wearing Coat: Payment shall be made on completion of wearing coat including expansion joints complete in all respects as specified.
(v) Miscellaneous Items like hand rails, crash barriers, road markings, etc.)	0.83%	(v) 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.
(vi) Wing walls/return walls	0.66%	(vi) Wing/ Return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
(vii) Guide bunds, River Training works etc.	-	(vii) 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.

(viii) Approaches (including retaining walls, stone pitching and protection works)	1.01%	(viii) Approaches: Payments shall be made on completion of both approaches including stone pitching, protection works complete in all respects as specified.
B.1 - Widening & Repairs of a)ROB b)RUB		
(i) Foundation	-	(i) Foundation: Cost of each ROB/RUB shall be determined on pro rata basis with respect to the total linear length (m) of the ROB/RUBs. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of ROB/RUB subject to completion of at least two foundations of ROB/RUB. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(ii) Sub-structure	-	(ii) Sub-structure: Payment against sub-structure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of sub-structure of the ROB/RUB subject to completion of at least two sub-structures of abutment/piers up to abutment/pier cap level of ROB/RUB.
(iii) Super structure (Including bearings)	-	(iii) Super-structure: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super-structure including bearings of at least one span in all respects as specified.
(iv) Wearing Coat including expansion joints in case ROB. In case of RUB, rigid pavement under RUB including drainage facility as specified	-	(iv) 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 and (b) in case of RUB - rigid pavement under RUB including drainage facility complete in all respects as specified.

(v) Miscellaneous Items like hand rails, crash barriers, road markings, etc.	-	(v) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc in all respects as specified.
(vi) Wing walls/ Return walls	-	(vi) Wing/ Return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
(vii) Approaches (including Retaining walls, stone pitching and protection works)	-	(vii) Approaches: Payments shall be made on completion of both approaches including stone pitching, protection works complete in all respects as specified.
B.2 New ROB/RUB a) ROB b) RUB		
(i) Foundation	-	(i) Foundation: Cost of each ROB/RUB shall be determined on pro rata basis with respect to the total linear length (m) of the ROB/RUBs. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of the ROB/ RUB subject to completion of at least two foundations of the ROB/RUB. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(ii) Sub-structure	-	(ii) Sub-structure: Payment against sub-structure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of sub-structure of the ROB/RUB subject to completion of at least two sub-structures of abutment/piers up to abutment/ pier cap level of ROB/RUB
(iii) Super structure (Including bearings)	-	(iii) Super-structure: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super-structure including bearings of at least one span in all respects specified.

(iv) Wearing Coat including expansion joints in case ROB. In case of RUB, rigid pavement under RUB including drainage facility as specified	-	(iv) 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 and (b) in case of RUB - rigid pavement under RUB including drainage facility complete in all respects as specified.
(v) Miscellaneous Items like hand rails, crash barriers, road markings, etc.	-	(v) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc in all respects as specified.
(vi) Wing walls/Return walls	-	(vi) Wing Walls/ Return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
(vii) Approaches (including Retaining walls/ Reinforced Earth walls, stone pitching and protection works)	-	(vii) Approaches: Payments shall be made on completion of both approaches including stone pitching, protection works complete in all respects as specified.
C.1-Widening and repair of Elevated Section/ Flyovers/ Grade Separators		
(i) Foundation	-	(i) Foundation: Cost of each structure shall be determined on pro rata basis with respect to the total linear length (m) of the structures. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of the structure subject to completion of at least two foundations of structure. In case where load testing is required for foundation, the trigger of first payment shall include load testing also where specified.
(ii) Sub-structure	-	(ii) Sub-structure: Payment against sub-structure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of sub-structure of the structure subject to completion of at least

		two sub-structures of abutment/piers up to abutment/pier cap level of structure.
(iii) Super structure (Including bearings)	-	(iii) Super-structure: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super-structure including bearings of atleast one span in all respects as specified.
(iv) Wearing Coat including expansion joints	-	(iv) Wearing Coat: Payment shall be made on completion wearing coat including expansion joints complete in all respects as specified.
(v) Miscellaneous Items like hand rails, crash barriers, road markings, etc.)	-	(v) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc it all respects as specified.
(vi) Wing walls/return walls	-	(vi) Wing Walls/ Return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
(vii) Approaches (including Retaining walls/ Reinforced Earth wall, stone pitching and protection works)	-	(vii) Approaches: Payments shall be made on completion of both approaches including stone pitching, protection works etc. complete in all respects as specified.
C.2-New Elevated section/Flyovers/Grade Separators		
(i) Foundation	3.42%	(i) Foundation: Cost of each structure shall be determined on pro rata basis with respect to the total linear length (m) of the structure. Payment against foundation shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of foundation of the structure subject to completion of atleast two foundations of structure. In case where load testing is required for foundation, the trigger

		of first payment shall include load testing also where specified.
(ii) Sub-structure	6.60%	(ii) Sub-structure: Payment against sub-structure shall be made on pro-rata basis on completion of a stage i.e. not less than 25% of the scope of sub-structure of the structure subject to completion of atleast two sub-structures of abutment/piers up to abutment/pier cap level of structure.
(iii) Super structure (Including bearings)	3.89%	(iii) Super-structure: Payment shall be made on pro-rata basis on completion of a stage i.e. completion of super-structure including bearings of atleast one span in all respects as specified.
(iv) Wearing Coat including expansion joints	0.99%	(iv) Wearing Coat: Payment shall be made on completion wearing coat including expansion joints complete in all respects as specified.
(v) Miscellaneous Items like hand rails, crash barriers, road markings, etc.)	0.66%	(v) Miscellaneous: Payments shall be made on completion of all miscellaneous works like hand rails, crash barriers, road markings etc it all respects as specified.
(vi) Wing walls/return walls	-	(vi) Wing Walls/ Return walls: Payments shall be made on completion of all wing walls/return walls complete in all respects as specified.
(vii) Approaches (including Retaining walls/ Reinforced Earth wall, stone pitching and protection works)	48.56%	(vii) Approaches: Payments shall be made on completion of both approaches including stone pitching, protection works etc. complete in all respects as specified.

1.3.4 Other Works

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

Table 1.3.4: Other Works

Stage of Payment	Weightage	Payment Procedure
1. Toll Plaza (Includes Highway Nest mini, toilet complex, hybrid ETC and facilities etc, Rest areas, traffic aid, medical aid and vehicle rescue and ATMS)	41.76%	Unit of measurement is each completed toll plaza. Payment of each toll plaza shall be made on pro rata basis with respect to the total of all toll plazas.
2. Road side Drains	1.50%	Unit of measurement is linear length in km. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10 % (ten per cent) of the total length.
3. Road signs, markings, Km stones, safety devices, Turfing and pitching and boundary wall	15.88%	
4. Project facilities		Payment shall be made on pro rata basis for completed facilities.
a) Lightings	7.25%	
b) Junction Improvement	4.35%	
c) Bus lay bye with BusShelter	1.61%	
d) Boundary Wall	20.04%	
e) Truck lay bay	0.61%	
f) other Miscellaneous works	4.89%	
5. Site Clearance and Dismantling	1.11%	Unit of measurement is linear length. Payment shall be made on pro rata basis on completion of a stage in a length of not less than 10% (ten per cent) of the total length.

2 Procedure for payment for Maintenance

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

SCHEDULE - J
(See Clause 10.3.2)

PROJECT COMPLETION SCHEDULE

1 Project Completion Schedule

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

2 Project Milestone-I

2.1 Project Milestone-I shall occur on the date falling on the 300th (Three Hundredth) day from the Appointed Date (the "Project Milestone-I").

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

3 Project Milestone-II

3.1 Project Milestone-II shall occur on the date falling on the 450th (Four Hundred and Fiftieth) day from the Appointed Date (the "Project Milestone-II").

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

4 Project Milestone-III

4.1 Project Milestone-III shall occur on the date falling on the 600th (Six Hundredth) day from the Appointed Date (the "Project Milestone- III").

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

5 Scheduled Completion Date

5.1 The Scheduled Completion Date shall occur on the 730th (Seven Hundred and Thirtieth) day from the Appointed Date.

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

6 Extension of time

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