

**National Highways Authority of India
(Ministry of Road, Transport & Highways)**

Government of India

**Rectification of 8 Nos of Accident Spots and other
miscellaneous works in Salem - Ulundurpet Section
of NH-79 & Tindivanam – Ulundurpet Section of
NH- 132,32 & 38 in Tamilnadu on EPC mode**

TECHNICAL SCHEDULES (A to D)

May 2025

G-5 & 6, Sector – 10, Dwarka, New Delhi – 110 075

Name of the Project: Rectification of 8 Nos of Accident Spots and other miscellaneous works in Salem - Ulundurpet Section of NH-79 & Tindivanam – Ulundurpet Section of NH- 132,32 & 38 in Tamilnadu on EPC mode.

Schedule-A
(See Clauses 2.1 and 8.1)
Site of the Project

The Site

1. Site of the “Rectification of 8 Nos of Accident Spots and other miscellaneous works in Salem - Ulundurpet Section of NH-79 & Tindivanam – Ulundurpet Section of NH-132,32 & 38 in Tamilnadu on EPC mode.” Project Highway shall include the land, buildings, structures and road works as described in Annex-I of this Schedule-A. The dates of handing over the Right of Way to the Contractor are specified in Annex-II of this Schedule-A.
2. An inventory of the Site including the land, buildings, structures, road works, trees and any other immovable property on, or attached to, the Site shall be prepared jointly by the Authority Representative and the Contractor, and such inventory shall form part of the memorandum referred to in Clause 8.2 (i) of this Agreement.
3. The alignment plans of the Project Highway are specified in Annex-III. In the case of sections where no modification in the existing alignment of the Project Highway is contemplated, the alignment plan has not been provided. Alignment plans have only been given for sections where the existing alignment is proposed to be upgraded. The proposed profile of the Project Highways shall be followed by the contractor with minimum FRL as indicated in the alignment plan. The Contractor, however, improve/upgrade the Road Profile as indicated in Annex-III based on site/design requirement.
4. The status of the environment clearances obtained or awaited is given in Annex-IV.

Annex – I
(Schedule-A)

SITE

1. Site

The Site of the “Rectification of 8 Nos of Accident Spots and other miscellaneous works in Salem - Ulundurpet Section of NH-79 & Tindivanam – Ulundurpet Section of NH- 132,32 & 38 in Tamilnadu on EPC mode.” Project Highway comprises the section of National Highway NH-79 in the State of Tamil Nadu.

The land, carriageway and structures comprising the Site are described below.

2. Land

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

A. Salem to Ulundurpet section of NH-79

Sl. No.	Chainage (km)		Right of Way (m)	Remarks
	From	To		
1	28+342	28+358	60m	
2	130+975	132+490	60m	
3	133+565	134+965	60m	
4	105+895	106+970	60m	
5	108+550	109+375	60m	

B. Tindivanam to Ulundurpet section of NH-45

Sl. No.	Chainage (km)		Right of Way (m)	Remarks
	From	To		
1	124+500	124+810	60m	
2	152+440	153+330	50 to 60m	
3	172+325	172+800	50 to 60m	

3. Carriageway

The present carriageway configuration of the Project Highway is Four Lane divided carriage way. The type of the existing pavement is flexible.

4. Major Bridges

The Site includes the following Major Bridges:

Sl. No.	Chainage (km)	Type of Structure			No. of Spans with span length (m)	Width (m)	Remarks
		Foundation	Sub-Structure	Super-Structure			

1	Nil
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5. Road over-bridges (ROB)/ Road under-bridges (RUB)

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

S. No	Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)	ROB / RUB
		Foundation	Super-structure			
1	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 minor bridges:

Sl. No.	Chainage (km)	Type of Structure		No. of Spans with span length (m)	Width (m)
		Foundation	Super-Structure		
Nil					

8. Railway Level Crossings

The Site includes the following railway level crossings:

S. No.	Location (km)	Remarks
1	Nil	

9. Underpasses (Vehicular, Non-Vehicular)

The Site includes the following

B. Tindivanam to Ulundurpet section of NH-45

Sl. No.	Chainage (km)	Type of Structure	No. of Spans with span length (m)	Width (m)
1.	153+040	RCC Box	9.60 X 2.55	21.50m

10. Culverts

The Site has the following culverts:

A. Salem to Ulundurpet section of NH-79

Sl. No.	Chainage (km)	Type of Culvert	Span / Opening with span length (m)	Width (m)
1	109+140	Box culvert	2.40 x 2.10	28.50
2	131+428	Box culvert	1(0.9x0.8)	26.00
3	134+334	Box culvert	1(0.9x1.0)	26.00
4	131+342	Pipe Culvert	2 x 1.0	26.00
5	134+068	Pipe Culvert	3 x 1.0	26.00
6	134+245	Pipe Culvert	2 x 1.2	26.00

B. Tindivanam to Ulundurpet section of NH-45

Sl. No.	Chainage (km)	Type of Culvert	Span / Opening with span length (m)	Width (m)
1	172+370	Slab culvert	1(3.24 x5.767)	45.12
2	172+641	Slab culvert	1(2.75 x3.018)	27.35
3	172+778	Pipe culvert	1x0.90	31.35

11. Bus Bays

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

A. Salem to Ulundurpet section of NH-79

S. No.	Chainage (km)	Length (m)	Left Hand Side	Right Hand Side
1.	106+340	110	LHS	RHS

12. Truck Lay Bys

The details of truck lay bys are as follows:

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

13. Road Side Drains

The details of the roadside drains are as follows:

A. Salem to Ulundurpet section of NH-79

Sl. No.	Location		Type	
	From Km	To Km	RCC	Earthen (Kutchra)
Nil				

B. Tindivanam to Ulundurpet section of NH-45

Sl. No.	Location		Type		Remarks
	From Km	To Km	RCC	Earthen (Kutchra)	

1.	124+500	124+810	-	Pitched Drain (BHS)	
2	172+300	172+368	-	Pitched Drain (LHS)	
3	152+440	153+330	RCC drain RHS		
4	152+560	153+330	RCC drain LHS		

14. Major Junctions

The details of major junctions are as follows:

A. Salem to Ulundurpet section of NH-79

S. No.	Location Km	Side	Junction	Separated	Category of Cross Road			
					NH	SH	MDR	Others
1	134+730	LHS	T/Y Junction			SH		

B. Tindivanam to Ulundurpet section of NH-45

S. No.	Location Km	Side	Junction	Separated	Category of Cross Road			
					NH	SH	MDR	Others
1	152+855	LHS	T/Y Junction			SH		

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

15. Minor Junctions (3 legged intersection)

The details of the minor junctions are as follows:

A. Salem to Ulundurpet section of NH-79

S. No.	Location		Type	
	From km	side	Junction	Cross road
1	28+350	BHS	X Junction	Village Road
2	131+600	LHS	T/Y Junction	Village Road
3	132+480	RHS	T/Y Junction	Village Road
4	134+730	RHS	T/Y Junction	Village Road
5	106+180	LHS	T/Y Junction	Village Road
6	106+570	RHS	T/Y Junction	Village Road
7	106+880	RHS	T/Y Junction	Village Road
8	106+900	LHS	T/Y Junction	Village Road
9	108+874	LHS	T/Y Junction	Cross Road

B. Tindivanam to Ulundurpet section of NH-45

S. No.	Location		Type	
	From km	side	Junction	Cross road
1	124+670	BHS	X Junction	Village Road
2	153+060	RHS	T/Y Junction	Village Road
3	172+290	RHS	T/Y Junction	Village Road
4	172+570	LHS	T/Y Junction	Village Road

16. Bypasses

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

Sl. No.	Name of Bypass (Town)	Chainage (km)		Length (in Km)
		From km	To km	
	Nil			

17. Other structures

S.No	Chainage	Side	Type of Structure
			Nil

18. Flyover

S. No.	Design Chainage (In Km)	Description	Span Arrangement (C/C of Bearing) (m)	Total width (m)	Skew angle	Remarks
1						Nil

19. Utilities:

I) Electrical utilities:

The site includes the following utilities:

a) Extra High-Tension Lines (EHT Lines) *

S.No	Chainage		Length (in Km)				Crossings			
	From	To	400K V	220K V	110K V	66KV	400K V	220K V	110K V	66KV

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

A. Salem to Ulundurpet section of NH-79

	Chainage	Length in (km)	crossings	Transformer	Remarks
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S.N O	From (Km)	To (Km)	22kv	11kv	HT/LT	22kv	11kv	LT	No	Capacity	
1	131+420	132+550	1.130		HT	2					10Poles
2	133+565	134+965	1.400		HT	4					4 Poles
3	106+060	106+700	0.540		HT						5 Poles
4	108+550	109+375	0.825		HT	3			1	22 Kva	20 Poles

B.Tindivanam to Ulundurpet section of NH-45

S. N O	Chainage		Length in (km)			crossings			Transformer		Remarks
	From (Km)	To (Km)	22 kv	11 kv	HT/LT	22 kv	11k v	L T	N o	Capacit y	
1	124+500	124+810			0.310 km (HT/LT)		1				15 Poles
2	152+440	153+330			0.890 km (HT/LT)					1 No 11 KV DP	14 Poles

c) Public health utilities (Water / Sewage pipe lines) *

The site includes the following public health utilities: -

S.No.	Chainage		Length (in Km)				Crossings			
	From	To	Water supply line		Sewage line		Water supply line		Sewage line	
			With pumping	With Gravity Flow	With pumping	With Gravity Flow	With pumping	With Gravity Flow	With pumping	With Gravity Flow
1	124+500	124+810	0.310				1			
2	152+440	153+330	0.890				1			
3	172+270	172+800	0.530				1			

i) Any other line

(* This is illustrative and may change as per feature of existing utilities.)

Annex – II

(As per Clause 8.3 (i))

(Schedule-A)

Dates for providing Right of Way of Construction Zone

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

A. Salem to Ulundurpet section of NH-79

Sl. No.	Chainage		Right of Way (m)	Date of providing Right of Way
	From Km	To Km		
1	28+342	28+358	60m	30 days
2	130+975	132+490	60m	30 days
3	133+565	134+965	60m	30 days
4	105+895	106+970	60m	30 days
5	108+550	109+375	60m	30 days

B. Tindivanam to Ulundurpet section of NH-45

Sl. No.	Chainage (km)		Right of Way (m)	Date of providing Right of Way
	From	To		
1	124+500	124+810	60m	30 days
2	152+440	153+330	50 to 60m	30 days
3	172+270	172+800	50 to 60m	30 days

Annex - III

(Schedule-A)

Alignment Plans

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

1. The alignment of the Project Highway is enclosed in alignment plan. Finished road level indicated in the alignment plan shall be followed by the contractor as minimum FRL. In any case, the finished road level of the project highway shall not be less than those indicated in the alignment plan. The contractor shall, however, improve/upgrade the Road profile as indicated in Annex-III based on site/design requirement.
2. Traffic Signage plan of the Project Highway showing numbers & location of traffic signs is enclosed. The contractor shall, however, improve/upgrade upon the traffic signage plan as indicated in Annex-III based on site/design requirement as per IRC: SP: 84& IRC: 67.

Annex – IV

(Schedule-A)

Environment Clearances

Nil

Schedule - B

(See Clause 2.1)

Development of the Project Highway

1. Development of the Project Highway

The Project Highway shall generally follow the horizontal alignment shown in the plan specified In Annexure-III of Schedule-A, unless otherwise specified by the Authority. Notwithstanding anything to the contrary contained in this Agreement or of the manual, the proposed plan & profile, locations of different structures/drains/service & slip road/RE walls, chainages of different structures /drains / service & slip road/RE walls, length of different structures/drains/service & slip road/RE walls etc. of the project highway as indicated in the Schedule A, Schedule B, Schedule C and their Annexures shall be treated as minimum requirement. Based on site/design requirement, the Contractor shall finalise their Detailed Designs (Development Stage) including plan & profile of the project highway and submit the same to Authority & its Engineer for their Consent/Approval and Safety Audit by Safety Auditor, before the start of the execution of project. The designs so approved shall not be in contradiction with the scope of project. For avoidance of doubt, the provisions mentioned in schedule B & C cannot be changed, only the design of the components is to be submitted for consent/approval.

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1.1 Width of Carriageway

- 1.1.1 The width of carriageway, paved shoulder and earthen shoulder shall be provided as per Typical Cross section enclosed. Except as otherwise provided in this Agreement, the width shall be adjusted to fit into appropriate plans and cross sections developed in accordance with TCS enclosed. The entire cross-sectional elements shall be accommodated in the available/proposed ROW

A. Salem to Ulundurpet section of NH-79

S.No	Stretch	Type	Width(m)	Remarks
1.	Embankment with RE wall on both sides without footpath	Carriage way	2 x 10.5m	Approaches 1.No approaches at 28/350 2.LVUP at Km.131/580 3.VUP at Km.134/580. 4. VUP at km.109+000
		Crash Barrier With Shyness	2x 1.0 m	
		Kerb with Shyness	2 x 0.50m	
		Median width	4.5 m	
		Total	28.50m	
2.	VUP/LVUP/SVUP Box structure	Carriage way	2 x 10.5m	1.SVUP at Km.28/350 2.LVUP at Km.131/580 3.VUP at km.109+000
		Crash Barrier With Shyness	2x 1.0 m	
		Kerb with Shyness	2 x 0.50m	
		Median width	4.5 m	
		Total	28.50m	
3.	VUP RCC Girder Type	Carriage way	2 x 11.5m	1.VUP at Km.134/580.
		Crash Barrier With Shyness	4x 0.5m	
		Median	3.50 m	
		Total	28.50m	
4.	Service Road	Carriage way	2 x 7.0m	New Construction of 7m width Service Road on both sides 1.LVUP at Km.131/580

				2.VUP at Km.134/580. 3. VUP at km.109+000 4. From Km.105/895 to106/970
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B. Tindivanam to Ulundurpet section of NH-45

S.No	Stretch	Type	Width(m)	Remarks
1.	Embankment with RE wall on both sides without footpath	Carriage way	2 x 10.5m	Approaches 1.VUP at Km. 152/850 with skew angle of 18 deg,
		Paved Shoulder	2x1.50m	
		Crash Barrier With Shyness	2x 0.75 m	
		Kerb with Shyness	2 x 0.50m	
		Median width	1.5 m	
		Total	28.00m	
2.	VUP/LVUP Box structure	Carriage way	2 x 10.5m	1. LVUP at Km.124/670 2.VUP at Km. 152/850 with skew angle of 18 deg,
		Paved Shoulder	2x1.50m	
		Crash Barrier With Shyness	2x 0.75 m	
		Kerb with Shyness	2 x 0.50m	
		Median width	1.5 m	
		Total	28.00m	

3.	Service Road	Carriage way	2 x 7.0m	New Construction of 7m width Service Road on both sides 1. LVUP at Km.124/670 2.VUP at Km. 152/850 with skew angle of 18 deg, 3.Km.172+325 to Km.172+800 RHS & Km.172+570 to km.172+800 LHS 4. km 150/580-150/700 (LHS)
4.	Service Road	Carriage way	5.5m	1.From km 149/380 to 149/530 (LHS)
5.	Foot Over Bridge (Ramp with staircase)	Width	44 m	Km 172/330

1.2. Width of Median

1.2.1 The width of median shall be provided as per Typical Cross section enclosed

1.2.2.1 Suitable anti-glare measures shall be proposed as per Clause No. 2.5.6 of the manual.

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. Intermediate Sight distance shall be followed for design of all vertical curves including structures as well as highways. However, the profile given in Vol-III drawings for section shall be following owing to site condition (SSD/ISD)

2.2. Design Speed: The project road shall be designed for 80/100 Kmph for plain and rolling terrain. (clause No. 2.2 of the Manual).

2.3. Improvement of the existing road geometries

2.3.1. The existing road geometrics shall be improved as per the codal provisions. In the sections, where improvement of the existing road geometrics to the prescribed standards is not possible, the existing road geometrics shall be improved to the extent possible within the given right of way and appropriate road signs, pavement markings and safety measures shall be provided.

Sr. No.	Stretch (Design Chainage) Km		Type of Deficiency	Remarks
	From	To		
Nil				

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

2.3.3. Realignments /Reconstruction / Widening

Sr. No.	Stretch (Design Chainage) Km		Length (m)	Remarks
	From	To		
Nil				

2.3.4. Bypasses: Deleted

2.4. Right of Way

Details of the Right of Way along Project Highways and Side Roads are given in Annexure-II of Schedule-A.

2.5. Type of shoulders

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

Sl. No.	Stretch	Fully paved shoulders/ footpaths	Reference to cross section
	Nil		

2.5.2 Paved shoulders and strip on median side shall be of same specification and pavement composition as of main carriageway (clause No. 5.10 of the Manual)

2.5.3 The overlay on the main carriageway pavement and on the paved shoulders shall be uniform in thickness and composition. (Clause No. 5.10 of the Manual)

2.5.4 Deleted

2.5.5 In open country, the paved shoulders width shall conform to Section 1.1.1 of Schedule B.

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

2.5.8 The earthen shoulder for the width on shoulder side, shall be provided with top 150 mm on earthen shoulder with well graded naturals and morrum gravel crust stones or

combination thereof to fix MCB and confirm placement requirement of MCB and confirming to Clause 401 of MoRTH specification. (Clause No. 5.11 of the Manual

2.6. Lateral and Vertical Clearance at Underpasses

2.6.1. In case of VUP/ LVUP / SVUP, the proposed structure, the finish road level in VUP/ LVUP /SVUP shall be kept 150 mm above the ground level/service road / cross road (whichever is higher) to ensure that these VUP/ LVUP / SVUP don't become water accumulation points. (Clause No. 2.10 of the Manual)

2.6.2. The vertical and horizontal clearance at the underpasses shall be as per Clause 2.10.2 of the manual.

A. Salem to Ulundurpet section of NH-79

Sl. No.	Location (Chainage) (From km to km)	Span / opening (m)	Remarks
1	28/350	1 x 7 x 4m	Single Cell box type SVUP
2	109+000	2 x 20 x 5.50m	Twin Cell box type VUP
3	131/580	1 x 12 x 4.5m	Single Cell box type LVUP
4	134/307	1 x 20 x 5.5m	Single Cell RCC Girder VUP

B. Tindivanam to Ulundurpet section of NH-45

Sl. No.	Location (Chainage) (From km to km)	Span / opening (m)	Remarks
1.	124/670	1 x 12 x 4.0 m	Single Cell box type LVUP
2.	152/850	2 x 12 x 5.5m	Twin Cell box type VUP with skew of 18 deg

2.7 Lateral and vertical clearances at Overpasses - Deleted

2.8. Service roads/Slip roads/Connecting Roads:

2.8.1. Service Road: The height of embankment of service road shall confirm to clause 4.2.1of the Manual

2.8.2. The Service roads shall be constructed at the locations and for the lengths indicated below:

A. Salem to Ulundurpet section of NH-79

Sr. No.	Design Chainage (Km)		Length (m)		Paved Carriageway Width including shyness (m)	Total	Remarks
	From	To	LHS	RHS			

1.	131+200 131+200	131+960 132+450	760	1250	7m	2010m Excluding convergence and divergence	
2.	133+790	134+740	950	950	7m	1900m Excluding convergence and divergence	
3.	106+050	106+915	865	865	7m	1660m Excluding convergence and divergence	
4.	108+620 108+605	109+320 109.320	700	715	7m	1415m Excluding convergence and divergence	
	108+865	109+015	150	-	7m	150m Excluding convergence and divergence	

B. Tindivanam to Ulundurpet section of NH-45

Sr. No.	Design Chainage (Km)		Length (m)		Paved Carriageway Width including shyness (m)	Total	Remarks
	From	To	LHS	RHS			
1	124/664 124/664	124/750 124/770	86	106	7m	192m Excluding convergence and divergence	
2.	152/495	153/275	780	780	7m	1560m Excluding convergence and divergence	
3.	172/570 172/325	172/800 172/800	230	475	7m	705m Excluding convergence and divergence	
5.	149/380	149/530	-	150	7.0 m	150 m Excluding convergence and divergence	
6.	150/580	150/700	120	-	5.5 m	120m Excluding convergence and divergence	

2.8.3. The Parking bays shall be provided along service road-Deleted

2.9. Grade Separated Structures (clause No.3.4 of the Manual):

Grade separated structures shall be constructed as per paragraph 2.13 of the Manual. Proposed levels at structure locations as shown in plan & profile specified in Annexure-III of schedule A are minimum requirement and only for guidance and any increase in levels shall not constitute any change of scope. Entry/Exit arrangement from main carriageway shall be 50m before/after the start/end of approach road to grade

separator i.e. start/end of valley curve. RCC barrier shall start from start of valley curve and end after grade separator at end of valley curve (As per drawing for free slope embankment).

1.9.1. Vehicle Overpass (VOP)-Deleted

2.9.2. Vehicle Underpasses (VUP)

A. Salem to Ulundurpet section of NH-79

Sr. No.	Design Chainage (Km)	LHS overall width (m)	RHS overall width (m)	Superstructure provision in Median	Span arrangement (m)	Minimum vertical clearance (m)	Skew angle
1	134/307	12.50	12.50	Yes (3.5) Included in overall LHS/RHS width of 28.50m	1 x 20	5.5	0
2	109/900	12.50	12.50	Yes (3.5) Included in overall LHS/RHS width of 28.50m	2 x 20	5.5	0

B. Tindivanam to Ulundurpet section of NH-45

Sr. No.	Design Chainage (Km)	LHS overall width (m)	RHS overall width (m)	Superstructure provision in Median	Span arrangement (m)	Minimum vertical clearance (m)	Skew angle
1.	152/850	13.25	13.25	Yes (1.5) Included in overall LHS/RHS width of 28.00m	2 x 12	5.5	18

1.9.3. Light Vehicle Underpasses (LVUP)

A. Salem to Ulundurpet section of NH-79

Sr. No.	Design Chainage (Km)	LHS overall width (m)	RHS overall width (m)	Superstructure provision in Median	Span arrangement (m)	Minimum vertical clearance (m)	Skew angle
1.	131/580	12.00	12.00	Yes (4.5) Included in overall LHS/RHS width of 28.50m	1 x 12	4.5	0

B. Tindivanam to Ulundurpet section of NH-45

Sr. No.	Design Chainage (Km)	LHS overall width (m)	RHS overall width (m)	Superstructure provision in Median	Span arrangement (m)	Minimum vertical clearance (m)	Skew angle
1.	124/670	11.75	11.75	Yes (4.5) Included in overall LHS/RHS width of 28.00m	1 x 12	4.0	0

2.9.4. Small Vehicle Underpasses (SVUP)-

A. Salem to Ulundurpet section of NH-79

Sr. No.	Design Chainage (Km)	LHS overall width (m)	RHS overall width (m)	Superstructure provision in Median	Span arrangement (m)	Minimum vertical clearance (m)	Skew angle
1	28/350	12.00	12.00	Yes (4.5) Included in overall LHS/RHS width of 28.50m	1 x 7.0	4.0	0

2.9.5. Cattle and Pedestrian Underpasses -Widening

B. Tindivanam to Ulundurpet section of NH-45

Sr. No.	Design Chainage (Km)	LHS overall width widening (m)	RHS overall width widening (m)	Superstructure provision in Median	Span arrangement (m)	Minimum vertical clearance (m)	Skew angle	Remarks
1	153/040	3.50	3.50	-	1 x 9.6	3.0	0	Widening BHS

2.9.6. interchanges (IC) (clause No. 3.4 of the Manual)-Deleted

2.9.7. Details of Ramps, Crossroads and Connecting Roads at Interchanges (IC)

2.10. Typical Cross Section (TCS) of the Project Highway (clause No. 2.17 of the Manual)

The Project Highway shall be constructed to Six lane configuration Typical cross sections required to be developed in different sections of the Project Highway are given below.

A. Salem to Ulundurpet section of NH-79

Sr. No.	Design Chainage (Km)		Length (m)	TCS as per Manual with modification	Remarks
	From	To			
1.	28+342	28+358	16	TCS for VUP at Km 28+350	Muthampatti Junction (Type -1)
2.	131+200	131+960	760	TCS for LVUP at Km 131+580 with service road	Vellayur Junction (Type -1)
3.	133+790	134+740	950	TCS for VUP at Km 134+307 with service road	Ulundurpet bypass (Type -1)
4.	106+050	106+915	865	TCS for service road	Madur (Type -2)
5.	108+775	109+245	470	TCS for VUP at Km & 109+000 with service road	Kallakurichi Master complex (Type -1)

B. Tindivanam to Ulundurpet section of NH-45

Sr. No.	Design Chainage (Km)		Length (m)	TCS as per Manual with modification	Remarks
	From	To			
1.	124/500	124/810	310	TCS for LVUP at Km 124+670	Karnavur Junction (Type -1)
2.	152+570	153+200	630	TCS for VUP at Km 152+840 with service road	Mundiyambakkam Sugar factory junction (Type -2)
3.	172/570 172/325	172/800 172/800	230 475	TCS for service road	Karumboor (Type - 3&4)
4.	172+330		44	TCS for Foot over bridge	

Note:

- Any variations in the lengths specified in the above table shall not constitute a Change of Scope
- Lengths mentioned in the above list for cross section types concerned to structures are inclusive of structure length.
- Retaining wall/ RE wall shall be provided for full height on all structures.
- Chainages may be adjusted according to location of structures as per drawings.
- Carriageway width tapering shall be provided 1 in 50 as per manual Clause no 2.5.4. Intermediate Sight Distance shall be followed for design of all vertical curves (Summit and Valley Curves) including structures as well as highways. (Clause No.2.9.5 of the manual). However, the profile given in Vol-III drg for section shall be following owing to site condition (SSD/ISD).

3. Intersections and Grade Separated Intersections (Section 3, of the manual)

All at-grade intersections and grade separated intersections shall be as per Section 3 of the manual. Existing at-grade intersections shall be improved to the prescribed standards. The service road pavement composition shall be continued on cross roads of the intersections for the length specified for at-grade and grade separated intersections. Properly designed intersections shall be provided at the locations and of types and features given in the tables below:

3.1. At-grade intersections

(a) Major Junctions:

Sr. No.	Design Chainage (Km)	Junction Type	Leads to		Median Opening	Category of Cross Road	Carriageway Width of cross Road	Length of cross Road to be Developed	
			Left	Right				LHS	RHS
NIL									

(b) Minor Intersections:

A .Salem to Ulundurpet section of NH-79

Sr. No.	Design Chainage (Km)	Junction Type	Leads to		Median Opening	Category of Cross Road	Carriageway Width of cross Road	Length of cross Road to be Developed	
			Left	Right				LHS	RHS
1.	28+350	X - Junction	Valapa dy	Pudhupal ayam	-	Village Road		75	75
2.	131+580	T- Junction	Vellay ur	-	20.00	Village Road		75	-
3.	108+874	T- Junction	Collec tor office	-	-	Cross Road		75	-

B .Tindivanam to Ulundurpet section of NH-45

Sr. No.	Design Chainage (Km)	Junction Type	Leads to		Median Opening	Category of Cross Road	Carriageway Width of cross Road	Length of cross Road to be Developed	
			Left	Right				LHS	RHS
1.	124+670	4 - legged	Tindiv anam town	Karnavur	20.00	Village Road		75	75
2.	153+060	T- Junction	-	Mundiya pakkam sugar mill	-	Village Road		-	75
3.	172+290	T- Junction	-	Karadip akkam	-	Village Road		-	75

4.	172+570	T-Junction	Paitha matti	-	20.00	Village Road		75	-
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Note:

1. Type of Junction to be improved as per manual.
2. The Contractor shall take up 'Detailed Engineering study' to ascertain further details of all intersections and treatment of the intersections shall be designed in accordance with the latest guidelines mentioned out in section-3 of the manual. Auxiliary lanes including storage, acceleration and deceleration lane along with physical islands to be provided.

The cross road at the junctions which are having a level difference from the main carriageway, are to be improved at the level of main carriageway for the length of 30 metre and then to be merged with the cross road at the gradient not more than 1:50.

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

4. For U-turn, Self-Regulated U-Turn facility shall be created as per fig 3.6 of the manual.

5. The lengths mentioned in the table are the minimum, any additional length required based on the design requirements shall be developed and the same will not constitute a Change of Scope.

6. Intersection layout, entry/exit, right turning lane, U turn, geometric design and Typical Cross Section of Interchange is included in Annexure III of Schedule B.

3.2. At-Grade Intersections below Grade Separators/Interchanges: These shall be provided as given at para 2.9.2 of this Annexure-I of the Schedule B. (clause No. 3.2.4 of manual)

A . Salem to Ulundurpet section of NH-79

Sr. No.	Design Chainage (Km)	Junction Type	Leads to		U-Turn provision in Viaduct Spans	Category of Cross Road	Carriageway Width of cross Road (m)	Length of cross Road to be developed	
			Left	Right				LHS	RHS

1.	134+307	Y/T - Junction	Ulundurpet	-	20.00m	SH	7.00m	75	-
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B. Tindivanam to Ulundurpet section of NH-45

Sr. No.	Design Chainage (Km)	Junction Type	Leads to		U-Turn provision in Viaduct Spans	Category of Cross Road	Carriageway Width of cross Road (m)	Length of cross Road to be developed	
			Left	Right				LHS	RHS
1.	152+885	Y/T - Junction	Pondicherry	Mundiyambakkam	2 x 12.0 m	SH	7.00m	75	-

Note:

1. The Contractor shall take up 'Detailed Engineering study' to ascertain further details of all intersections and treatment of the intersections shall be designed in accordance with the latest guidelines mentioned out in section-3 of manual.
2. Junction improvement under grade separators shall be carried out as per manual with proper entry/exit to cross roads and slip/service roads, etc. Auxiliary lanes including storage, acceleration and deceleration lane along with physical islands to be provided (As per availability of land).
3. Location of grade-separated structures are indicative. Exact location should be decided in consultation with Independent Engineer/Authority Engineer.
4. Only Entry or Exit shall be designed at any location provision of entry/exit by ghost island not permitted).
5. The lengths mentioned in the table are the minimum, any additional length required based on the design shall be construction and the same will not constitute a Change of Scope.

4. Road Embankment and Cut Section

Construction of road embankment/cuttings shall conform to the Specifications and Standards given in section 4 of the manual. Notwithstanding anything to the contrary contained in this Agreement or Manual, the proposed profile of the project highway as indicated in the Annexure-III of Schedule A shall be treated as minimum requirement. Based on site/design requirement, the Contractor shall design the alignment plans and profiles of the project highway based on site/design requirement mentioned in Schedule B with approval from the Independent Engineer/Authority Engineer within

the available/Proposed Right of Way. However, it is clarified that bottom of subgrade level shall be at-least 1500 mm above HFL / Existing ground level for a greenfield/ bypass stretch.

The side slopes shall not be steeper than 2H:1V. In case, there is a ROW constraint than, suitable soil retaining structures shall be provided.

5. Pavement design

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

5.2. Type of Pavement and Design requirement

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

5.2.1. Design Period and Strategy: Pavement shall be constructed for the entire length of Project Highway including paved shoulders. Flexible Pavement shall be designed for a minimum design period of 20 years and minimum Effective Modulus/ CBR of 10% (As per clause 6.4 of IRC:37-2018).

5.2.2. Recommended Pavement Design Notwithstanding anything to the contrary contained in this Agreement or the manual, the Contractor shall design the pavement of main carriageway for minimum design traffic of 100 MSA.

5.2.3 The pavement for service road/slip roads shall be designed for projected traffic subject to minimum as follows:

i. **Service Roads - minimum 20 MSA**

ii. Slip Roads for minimum 20 MSA (when two National Highways are crossing/ joining the slip road shall be designed for the highest MSA of concerned NH's).

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

5.3.1 Main carriageway, paved shoulder, median side paved strip, entry/exit locations, acceleration / deceleration lane, right turning lanes (Flexible) with GSB&WMM

Pavement Composition	Minimum Crust Thickness (mm)
Subgrade	500
GSB	200
WMM	250

DBM	125
BC	50

5.3.2 Main carriageway, paved shoulder, median side paved strip, entry / exit locations, Acceleration / deceleration lane, right turning lanes (Flexible) with CTB / CTSB& WMM -Deleted

5.3.3. Rigid Pavement -For Toll Plaza location. - Deleted

5.3.4 Crossroads/ service roads/ slip roads

Pavement Composition	Minimum Crust Thickness(mm)
Subgrade	500
GSB	200
WMM	250
DBM	75
BC	40

5.4 Reconstruction / Widening of Stretches with New pavement (Clause No. 5.9.4 of the manual)

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

A. Salem to Ulundurpet section of NH-79

Sr. No	Design Chainage (Km)		Pavement Composition	Remarks
	From	To		
1.	23+480	24+160	Same as 5.3.1	For SVUP at Km 23+740
2.	131+200	131+960	Same as 5.3.1	Approaches to LVUP at Km 131+580
3.	133+790	134+740	Same as 5.3.1	Approaches to VUP at Km 134+307
4.	108+775	109+245	Same as 5.3.1	Approaches to VUP at Km 109+000

Note: Top of the subgrade shall be at least 600mm above the general ground level in case of existing road

B. Tindivanam to Ulundurpet section of NH-45

Sr. No	Design Chainage (Km)		Pavement Composition	Remarks
	From	To		
1.	124+500	124+810	Same as 5.3.1	For LVUP at Km 124+670
2.	152+495	153+275	Same as 5.3.1	Approaches to VUP at Km 152+840

5.5 Bituminous Mix for Overlay -deleted**6. Roadside Drainage**

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

A. Salem to Ulundurpet section of NH-79

Sr. No	Design Chainage (km)		Length (m)		Width of Drain (m)	Total Length (m)
	From	To	LHS	RHS		
1	131+000	131+100	100		1.00	428
	131+500	131+800	300			
	Cross Drain	Cross Drain	14	14		
2	134+000	134+150	150	150	1.00	328
	Cross Drain	Cross Drain	14	14		
3	108+810	109+140	330		1.00	330
	Sub Total on each side		908	178		1086
	Total					1086

B.Tindivanam to Ulundurpet section of NH-45

Sr. No	Design Chainage (km)		Length (m)		Width of Drain (m)	Total Length (m)
	From	To	LHS	RHS		
1	152+485	153+275	790	790	1.15	1580

	Sub Total on each side	790	790		1580
	Total				1580

Pipe drain

S. No.	Design Chainage (km)		Side	Length (m)	Linear Length (m)	Remarks
	From	To				
	Nil					

V-Shaped Pitched drain

A. Salem to Ulundurpet section of NH-79

S. No.	Design Chainage (km)		Side	Length (m)	Linear Length (m)	Remarks
	From	To				
Nil						

B. Tindivanam to Ulundurpet section of NH-45

S. No.	Design Chainage (km)		Side	Length (m)	Linear Length (m)	Remarks
	From	To				
1	124+500	124+750	BHS	2 x 250	500	
2	172+325	172+800	RHS	1 X 475	475	
3	172+570	172+800	LHS	1 X 230	230	
Total (m)					1205	

As per site condition, if any additional length of RCC box drain requirement shall be provided and the same will not come under change of scope.

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

6.3. Median Drain -Deleted

6.4. Drainage arrangement between Main Carriageway and Service/Slip Roads -Deleted

6.5. Drainage where Embankment Height is more than 3m -Deleted

6.6. Drainage for Structures

A suitable drainage arrangement for draining storm water from deck slab shall be provided. Water shall not fall on any surface of the structures, or remain standing or flowing over the road below structure.

6.7. Drainage for Underpass and Subways Structures

A suitable drainage arrangement for draining storm water from Underpass and Subways shall be provided.

6.8. Drainage arrangement of Retaining Structures

In retaining wall portions, Vertical Drop-down drainage pipes with suitable cleaning provision shall be provided at suitable interval. Drainage fixtures and drop-down pipes shall be of rigid, corrosion resistant material not less than 100mm dia. The Storm water of main carriageway draining on service road is not permitted.

7. Design of Structures

7.1. General

Project Highway is proposed to be constructed to Six-lane configuration.

All structures except wherever expansion joints have been provided, The pavement layers WMM, DBM & BC shall be continued over the structures for smooth riding quality of the project highway. These structures shall be designed considering the dead load of pavement (WMM, DBM, BC, etc) layers.

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

7.1.2. The overall width of the structures shall be as given in Para 1.1.1 of Schedule- B.

7.1.3. Deleted.

7.1.4. Deleted.

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

7.1.6. Cross section of the new culverts and bridges at deck level for the Project Highway shall conform to the typical cross sections given Annexure III of Schedule B.

7.2. Culverts

7.2.1. Overall width of all culverts shall be equal to the roadway width of the approaches. The overall width of culverts shall be including width of main carriageway and slip/service roads/Entry ramps/Exit Ramps/ Acceleration/Deceleration lanes, etc. All culverts shall also be continued in median and in gap between main carriageway and service road.

7.2.2. Reconstruction of existing RCC pipe / slab culverts:

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

All existing RCC pipe / slab culverts shall be re-constructed as new Box culverts to the proposed roadway width of the Project Highway as per the typical cross section given in Annexure III of Schedule B.

Reconstruction of Pipe Culvert into RCC Box Culverts

Sr.no	Existing Chainage	Existing Culvert Type	Design Chainage	Proposed Culvert Type	Span / Opening (m)	Skew Angle	Culvert Crossing Type (Balancing / Stream etc.
	Nil						

7.2.3. Widening of existing RCC pipe culvert: The existing Pipe culverts at the following locations shall be widened with Pipe Culvert:

A. Salem to Ulundurpet section of NH-79

Sr. No	Design Chainage	Culvert Type	skew Angle	Span/Opening (m)	Repairs/ Rehabilitation proposals	Culvert Crossing Type (Balancing Stream, etc)	Remarks
1	131/342	Pipe culvert	0	2 x 1.0	Widening of Pipe culvert LHS-8.141 RHS-9.00	Stream	BHS
2	134/068	Pipe culvert	0	3 x 1.0	Widening of Pipe culvert LHS-10.24 RHS-9.51	Stream	BHS
3	134/245	Pipe culvert	0	2 x 1.2	Widening of Pipe culvert LHS-5.26 RHS-10.605	Stream	BHS

B. Tindivanam to Ulundurpet section of NH-45

Sr. No	Design Chainage	Culvert Type	skew Angle	Span/Opening (m)	Repairs/ Rehabilitation proposals	Culvert Crossing Type (Balancing Stream, etc)	Remarks
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1	172+778	Pipe culvert	0	1 X 0.90	Widening of Pipe culvert LHS-5.0 RHS-5.0	Stream	BHS
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7.2.4. New/Reconstruction Box Culverts:

B. Tindivanam to Ulundurpet section of NH-45

Sr. No	Design Chainage	Culvert Type	Skew Angle	Span / Opening (m)	New construction	Culvert Crossing Type (Balancing / Stream etc.	Remarks
Nil							

7.2.6. Widening of existing box culverts

All existing culverts which are to be retained shall be widened to the proposed roadway width of the Project Highway as given below:

Repairs and strengthening of existing structures where required shall be carried out.

A. Salem to Ulundurpet section of NH-79

Sr. No	Design Chainage	Culvert Type	Skew Angle	Span / Opening (m)	Widened	Culvert Crossing Type (Balancing / Stream etc.	Remarks
1	131/428	Box culvert	0	0.9 x0.8	LHS-8.919 RHS-9.00	Stream	BHS
2	134/384	Box culvert	0	0.9 x1.0	LHS-5.13 RHS-11.5	Stream	BHS
3	109+140	Box culvert	0	2.4 x2.10	LHS-10.515 RHS-10.866	Stream	BHS

B. Tindivanam to Ulundurpet section of NH-45

Sr. No	Design Chainage	Culvert Type	Skew Angle	Span / Opening (m)	Widened	Culvert Crossing Type	Remarks
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						(Balancing / Stream etc.)	
1	172+370	Box culvert	0	1 X 5.0 X 5.0	RHS-11.50	Stream	BHS
2	172/641	Box culvert	0	1 X 3.0 x3.0	LHS-11 RHS-11	Stream	BHS

7.2.7. Culverts on Crossroads -Deleted

7.2.8. Utility ducts -Deleted

7.3. Bridges

7.3.1. Existing bridges to be re-constructed/widened:

1. Existing bridges proposed for reconstructed as new structures

Sr.No	Design Chainage	Total proposed length (m)	Span Arrangement (m)	Total proposed width (m)		Type Of Crossing	Skew Angle
				MCW	SR		
Nil							

2. Existing narrow bridges proposed to be retained and widened:

Sr.No	Design Chainage	Total proposed length (m)	Span Arrangement (m)	Total proposed width (m)		Type Of Crossing	Skew Angle
				MCW	SR		
Nil							

7.3.2. Additional New Bridges-Deleted

7.3.3. Deleted

7.3.4. Deleted

7.3.5. Structures in marine environment - Deleted

7.4. Railroad Bridges (ROB/RUB) -Deleted

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, 2.10 and 3 Annexure-I of Schedule-B.

7.6 FoB /Skywalks

FoB/Skywalks shall be provided in built-up at the following locations.

Sr.No	location at (km)	FoB Type	Remarks
1.	Km. 172+330	44 m across NH with steps, Rams and other items as per approved drawing	

7.7A summary of Culverts, Bridges and Structures shall be presented as follows:

A. Salem to Ulundurpet section of NH-79

Sr.No	Name of the Structure	Total Numbers	Remarks
1.	Major Bridge	-	
2.	New Elevated Road/Bridge/Ramp	-	
3.	Minor Bridge	-	
4.	ROB	-	
5.	VUP (Single Span)	01	New construction
6.	VUP (Multi Span)	01	New construction
7.	LVUP	01	New construction
8.	SVUP	01	New construction
9.	FoB	-	
10.	Box Culverts	-	
11.	Widening of Box Culvert	03	Widening
12.	Widening of Pipe Culvert	03	Widening

B. Tindivanam to Ulundurpet section of NH-45

Sr.No	Name of the Structure	Total Numbers	Remarks
1.	Major Bridge	-	
2.	New Elevated Road/Bridge/Ramp	-	
3.	Minor Bridge	-	
4.	ROB	-	
5.	VUP (Single Span)	-	
6.	VUP (Multi Span)	01	
7.	LVUP	01	
8.	SVUP	-	

9.	PUP	01	Widening
10.	Box Culverts	-	
11.	Widening of Box Culvert	02	Widening
12.	Widening of Pipe Culvert	01	Widening
13.	Foot Over Bridge	01	New construction

B. Tindivanam to Ulundurpet section of NH-45

Other Road Safety Improvements

Sr.No	Location	Measures	Remarks
1.	Km.140+900	Centre median island redesign with Kerb and road marking	As per drawing
2.	Km.144+750	Centre median island redesign with Kerb and road marking	As per drawing
3.	Km.162+200	Centre median island redesign with Kerb and road marking	As per drawing
4.	Km.182+000	MCW & SR island redesign with Kerb and road marking	As per drawing
5.	Km .189+500	Tightening the Turning radius on LHS Cross road with shoulder marking & Road stud	As per drawing

8.0 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 of the manual.

8.2. Traffic Signs:

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

8.3. Pavement Marking:

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

8.4. Safety Barrier

The safety barriers shall be provided in accordance with Section-9 of the Clause 9.7 of the manual.

The details of the location are as below:

A. Salem to Ulundurpet section of NH-79

Sr.No	Item	LHS		RHS		Total Length	Remarks
		From	To	From	To		
1.	RCC Crash barrier after RE wall & Retaining wall	Nil					
2.	Thrie-beam Single faced metal crash barrier	Nil					
3.	wire rope safety barrier	Nil					
4.	W-beam Double faced metal crash barrier	28+292 28+358	28+342 28+408	28+292 28+358	28+342 28+408	100 m 100 m	convergence & Divergence
		131+125 131+960	131+200 132+035	131+125 131+960	131+200 132+035	150m 150m	convergence & Divergence
		133+715 134+740	133+790 134+815	133+715 134+740	133+790 134+815	150m 150m	convergence & Divergence
		108+600	108+700	108+600	108+700	100m 100m	convergence & Divergence
5.	Thrie-beam Double faced metal crash barrier	Nil					
6.	Concrete Single faced barriers	Nil					
7.	Double faced barriers	Nil					
8.	Pedestrian guardrails	Nil					

Sr.No	Item	LHS		RHS		Total Length	Remarks
		From	To	From	To		
9.	End Treatment for Steel Barriers	Nil					
10.	Wind barrier	NIL					
11.	Antiglare screen	NIL					

B. Tindivanam to Ulundurpet section of NH-45

Sr.No	Item	LHS		RHS		Total Length	Remarks
		From	To	From	To		
1.	RCC Crash barrier after RE wall & Retaining wall	Nil					
2.	Thrie-beam Single faced metal crash barrier	Nil					
3.	wire rope safety barrier	Nil					
4.	W-beam Double faced metal crash barrier	152+495 152+495	152+570 152+570	153+200 153+200	153+275 153+275	150 m 150 m	convergence & Divergence
				173+630 173+630	173+705 173+705	75m 75m	
		172+570	172+800	172+325	172+800	230m 475m	Service road & MCW separator
		149+400	-	149+400	-	180	(median A1 & A2)
		171+000	-	171+000	-	100	(median A1 & A2)
5.	Thrie-beam Double faced metal crash barrier	Nil					
6.	Concrete Single faced barriers	Nil					
7.	Centre median - Concrete New Jerrsey Barrier	153+275	-	-	152+485	790	(Jerrsey Barrier) Median
8.	Pedestrian guardrails	132+650	-	132+650	-	300 m	(Median A1 & A2)

Sr.No	Item	LHS		RHS		Total Length	Remarks
		From	To	From	To		
		145+450	-	145+450	-	400 m	(Median A1 & A2)
		156+200	156+700	156+200	156+700	600 m	(Median A1 & A2)
9.	End Treatment for Steel Barriers	Nil					
10.	Wind barrier	NIL					
11.	Antiglare screen	NIL					

The length/ Numbers mentioned in the above Table are minimum, any additional length/ numbers required as per design and site condition shall be provided and the same shall not constitute change of scope.

9. Roadside Furniture

9.1. It shall be provided as per the details mentioned in Schedule-C.

10. Hazardous Locations-Deleted

11. Special Requirement:

Retaining Structure and protection works shall be provided at locations as indicated below and as provided in TCS schedule in Clause 2.10 of schedule-B.

Sr.No	Design chainage		Length (m)	side	Maximum Height (m)	Retaining structure / Toe wall	Type of Safety barrier	Remarks
	From	To						
1	172+320	172+650	250	RHS	4.00	Retaining wall	RCC carsh barrier	-

RE wall with friction slab crash barrier/ End retaining wall in the approach of grade separators/ any other locations as shown in Typical Cross Section drawings shall be provided. Minimum length of RE walls along with friction slab crash barrier shall be as per the details given in Clause 2.10 of Schedule-B. Any additional length / height required as per design shall be provided.

12. Open Well within RoW-Deleted

13. Shifting of Utilities

The Contractor shall undertake the work of shifting of any utility (including electric lines, water pipes, gas pipelines and telephone cables) to an appropriate location or alignment, in accordance with the provisions of Concession Agreement.

The bidders may visit the site and assess the quantum of shifting of Utilities for the project before submission of their bid. Copy of utility preliminary estimate enclosed.

The specification of concerned Utility Owning Department shall be applicable and followed.

- I. **Transplantation of tree:** 425nos of avenue trees shall be transplanted, plantation of 1:10 and maintenance by contractor as per IRC-21.

- II. **Electrical utilities**

The Utilities mentioned in Schedule-A are to be shifted to facilitate construction of project scope as per the estimate of utility agencies.

Note:

- a. **Utility shifting shall be carried out as per the requirement and specifications of Utility Agency. Preliminary Estimate Copy enclosed.**
- b. The type/spacing/size/specifications of poles/towers/lines/cables to be used in shifting work shall be as per the guidelines of Utility Owning Department and it is to be agreed solely between the Contractor and the Utility Owning Department. No change of scope shall be admissible, and no cost shall be paid for using different type/spacing/ size/specifications in shifted work in comparison to those in the existing work or for making any overhead crossings to underground as per requirement of Utility Owning Department and/or construction of project highway. The Contractor shall carry out joint inspection with the Utility Owning Department and get the estimates from the Utility Owning Department. The assistance of the Authority is limited to forwarding letter on the proposal of Contractor to Utility Owning Department whenever asked by the Contractor. The decision/approval of the Utility owning Department shall be binding on the Contractor.
- c. The supervision charges at the rates/charges applicable of the Utility Owning Department shall be paid directly by the Authority to the Utility owning Department as and when Contractor furnishes demand of Utility Owning Department along with a copy of estimated cost given by the latter.
- d. The dismantled material/scrap of existing Utility to be shifted/dismantled shall belong to the Contractor who would be free to dispose-off the dismantled material as deemed fit by them unless the Contractor is required to deposit the dismantled material to Utility Owning Department as per the norms and practice and, in that amount of credit for dismantled material may be availed by the contractor as per the estimate agreed between them.

Sr. No	Design chainage		Construction activity	diversion	Traffic management plan	Barricading type III/IV/CC Barrier with lighting along barrier	Deployment of flagman in habitation/schools/hospital, etc.	Remarks
	From	To						

1.	124+5 00	124+8 10	Construction of LVUP	Yes	Required	Type-III	Yes	
2.	152+4 40	153+3 30	Construction of VUP					
3.	172+3 25	172+8 00	Construction of Service road					

Appendix - B1

Annexure - III (Schedule- B)

a. Alignment Plan and Longitudinal Section

b. GAD of structures

Alignment Plan and Longitudinal profile and GAD of structures of the Project highway are given in softcopy

Schedule - C

(See Clause 2.1)

Project Facilities

1. Project Facilities

The Concessionaire shall construct the Project Facilities described in this Annexure-II to form part of the Project Highway. The Project Facilities shall include:

- a) Roadside furniture
 - i. Kilometer and Hectometer Stones
 - ii. Traffic Signs
 - iii. Overhead Signs
 - iv. Road Marking
 - v. Road Delineators
 - vi. Reflective Pavement Markers & Solar Studs
 - vii. Traffic Impact Attenuators
 - viii. Boundary wall and Fencing
- b) Pedestrian Facilities
- c) Highway Lighting
- d) Environmental Management Plan
- e) Landscaping and Tree Plantation

Description of Project Facilities

Each of the Project Facilities is briefly described below:

1. Toll Plaza: - Deleted

2. Roadside furniture

2.1. Kilometre and Hectometre Stones (Clause No. 12.3 IRC: SP:84-2019)

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A. Salem to Ulundurpet section of NH-79

S.No.	Item	Number	Remarks
1	Kilometer	4	
2	Hectometer Stone	14	

B. Tindivanam to Ulundurpet section of NH-45

S.No.	Item	Number	Remarks
1	Kilometer	2	
2	Hectometer Stone	10	

2.2. Traffic Signs

Traffic Signs include roadside signs, overhead signs and kerb mounted signs etc. shall be provided along the entire Project Highway and on all Side, Roads joining the main carriageway/service road. A QR code shall be marked on back of each sign as per IRC 67.

All signs shall be of Micro Prismatic Grade Sheeting Corresponding to Class C sheeting as per ASTM D 4956 Type VIII, IX and XI.

All shoulder mounted signs shall be supported on GI Pipes. Overhead Signs shall be placed on a structurally sound gantry or cantilever structure made of GI pipes.

The siting of signs shall confirm to Table 4.1 and Fig 4.1 of IRC 67. The two successive signs shall be placed at a minimum distance of 48 metre.

The overhead gantry/Cantilever Gantry /VMS Gantry sign boards as given below:

S.No.	Item	Carriageway (Left, Right, Both)	Remarks
	Nil		

Note: Vertical support members of gantry shall be 7m away from the edge of paved shoulder. Vertical clear height of the gantry shall be at least 6m from FRL (from the lowest point of the gantry/ sign board).

The detailed minimum number of signages indicating places, direction, distances, and other features shall be marked on the alignment plan and submitted, which are as mentioned below.

A. Salem to Ulundurpet section of NH-79

S.No.	Road signs	Nos'	Remarks
I	Mandatory/Regulatory		
1.	Stop signs	-	
2.	Give Way Signs	-	
3.	Prohibitory signs	-	
4.	No Parking signs	-	
5.	No Stopping signs	-	
6.	No standing signs	-	
7.	Speed Limit signs (Circular)	-	
8.	Speed Limit signs (Vehicle Type)	-	
9.	Vehicle Control signs	-	
10.	Restriction Ends sign	-	
II	Cautionary/Warning		
1.	Left/Right Curve	-	
2.	Right/Left Hairpin Bend	-	
3.	Right/Left Reverse Bend	-	
4.	Series of Bends	-	
5.	270 Degree Loop	-	
6.	Side Road		
7.	Y-intersection	-	
8.	Cross Road	-	
9.	Roundabout	-	
10.	Traffic Signals	-	
11.	T-Intersection	-	
12.	Major Road Ahead	-	
13.	Staggered Inter-section	-	
14.	Merging Traffic Ahead	8	

S.No.	Road signs	Nos'	Remarks
15.	Narrow Road Ahead	-	
16.	Road Widens	-	
17.	Narrow Bridge Ahead	-	
18.	Steep Ascent/Descent	-	
19.	Reduced Carriageway	-	
20.	Start / End of Dual Carriageway	8	
21.	Gap in Median	-	
22.	Pedestrian Crossing	-	
23.	Pedestrian crossing with backing board	-	
24.	School Ahead	-	
25.	Built Up Area	-	
26.	Two Way Operation (on main carriage way/ service road	-	
27.	Two-way Traffic on Cross Road Ahead	-	
28.	Danger Warning Sign	-	
29.	Deaf or Blind Persons Likely on Road Ahead	-	
30.	Cycle Crossing	-	
31.	Cycle Route Ahead (Warning for Cycles on road ahead)	-	
32.	Dangerous Dip	-	
33.	Speed Breaker	20	
34.	Rumble Strip	-	
35.	Rough Road	-	
36.	Dangerous Ditch	-	
37.	Slippery Road	-	
38.	Slippery Road because of Ice	-	
39.	Opening or Swing Bridge	-	
40.	Overhead Cable	-	
41.	Playground Ahead	-	
42.	Quay Side or Riverbank	-	
43.	Sudden Side Winds	-	
44.	Tunnel Ahead Warning	-	

S.No.	Road signs	Nos'	Remarks
45.	Falling Rocks	-	
46.	Cattle Crossing	-	
47.	Wild Animals likely to be on Road Ahead	-	
48.	Queues Likely Ahead	-	
49.	Low flying Aircraft	-	
50.	Unguarded Railway Crossing	-	
51.	Guarded Railway Crossing	-	
52.	Crash prone area ahead	-	
53.	U-Turn	-	
III	Chevron Signs		
1.	Single Chevron	-	
2.	Double Chevron	-	
3.	Triple Chevron	-	
IV	Object Hazard Marker Sign		
1.	Left/Right side Object Hazard Marker	40	
2.	Two-way Object Hazard Marker	8	
V	Informatory/Guide		
1.	Direction and Place Identification signs	20	
2.	Stack Type Advance Direction Sign (Shoulder Mounted)	-	
3.	Stack Type Advance Direction Sign with cautionary / regulatory signs (Shoulder Mounted)	-	
4.	Map Type Advance Direction Sign (Shoulder Mounted)	-	
5.	Map Type Advance Direction Sign for roundabout (Shoulder Mounted)	-	
6.	Flag Type Direction Sign	-	
7.	Reassurance Sign	-	
8.	Place Identification Sign	-	
9.	Truck Lay-By	-	
10.	Toll Booth Ahead	-	
11.	Weigh Bridge Ahead	-	
12.	Shoulder Mounted Sign in Advance of a Grade Separated Junction/ Interchange	-	
13.	Expressway Sign	-	

S.No.	Road signs	Nos'	Remarks
14.	Gantry Mounted advance Direction Sign Ahead of a Flyover in Urban/City Roads	-	
15.	Gantry Mounted advance Direction Sign Ahead of a At-grade Intersection	-	
16.	Gantry Mounted Advance Direction Sign for Interchange	-	
17.	Cantilever Gantry Mounted Advance Direction Sign for Interchange	-	
18.	Lane Dedicated Gantry Sign	-	
19.	Definition/Supplementary Plates	-	
20.	Tourism Related Sign	-	
21.	Tourist Destination Direction Information Signs Without Photograph	-	
22.	Tourist Destination Direction Information Signs with Photograph	-	
23.	Finger Destination direction Information Sign for Pedestrians	-	
24.	Tourist Map Information Sign	-	
25.	Boundary Sign at Entrance to a City/Place	-	
26.	Boundary Sign at Entrance to Tourist a Destination	-	
VI	Facility Information signs		
1.	Eating Place	-	
2.	Light Refreshment	-	
3.	Resting Place	-	
4.	First Aid Post	-	
5.	Toilet	-	
6.	Filling Station(Fuel Pump)	-	
7.	Hospital	-	
8.	U-Turn Ahead	-	
9.	Pedestrian Subway	-	
10.	Police Station	-	
11.	Picnic Site	-	
12.	Repair Facility	-	
13.	Railway Station/Metro Station/Monorail	-	
14.	Industrial Area	-	
15.	Cycle Rickshaw Stand	-	

S.No.	Road signs	Nos'	Remarks
16.	Taxi Stand	-	
17.	Auto Rickshaw Stand	-	
18.	Home Zone	-	
19.	Camp Site	-	
20.	Airport	-	
21.	Golf Course	-	
22.	National Heritage	-	
23.	No Through Road	-	
24.	No Through Side Road	-	
25.	Toll Road Ahead	-	
26.	Guide Sign on Toll Lane Portal	-	
27.	Country Border	-	
28.	Entry Ramp for Expressway	-	
29.	Exit Ramp for Expressway	-	
30.	Expressway Symbol	-	
31.	End of Expressway	-	
32.	Bus Stop	-	
33.	Bus Lane	-	
34.	Contra Flow Bus Lane	-	
35.	Cycle Lane	-	
36.	Contra Flow Cycle Lane	-	
37.	Holiday Chalets	-	
38.	Emergency Exit	-	
VII	Other Useful Information Signs	-	
1.	Signs For Persons With Disabilities	-	
2.	International symbol of Accessibility	-	
3.	Parking Information	-	
4.	Parking Areas	-	
5.	Ramped Entrance to Subway/Over Bridge	-	
6.	Telephone Facilities	-	

S.No.	Road signs	Nos'	Remarks
7.	Toilet Facilities	-	
8.	Way Finding	-	
9.	Parking Signs	-	
10.	Auto Rickshaw Parking	-	
11.	Cycle Parking	-	
12.	Cycle Rickshaw Parking	-	
13.	Scooter and Motorcycle Parking	-	
14.	Taxi Parking	-	
15.	Park and Ride	-	
16.	Parking Restrictions Signs for Traffic Management	-	
17.	Flood Gauge Sign	-	
VIII	Route Maker Signs	-	
1.	State Highway Route Marker	-	
2.	National Highway Route Marker	-	
3.	Asian Highway Route Marker Sign	-	
4.	Expressway Route Marker Sign	-	

B. Tindivanam to Ulundurpet section of NH-45

S.No.	Road signs	Nos'	Remarks
I	Mandatory/Regulatory		
11.	Stop signs	-	
12.	Give Way Signs	6	
13.	Prohibitory signs	-	
14.	No Parking signs	-	
15.	No Stopping signs	-	
16.	No standing signs	-	
17.	Speed Limit signs (Circular)	6	
18.	Speed Limit signs (Vehicle Type)	6	
19.	Vehicle Control signs	-	
20.	Restriction Ends sign	-	

S.No.	Road signs	Nos'	Remarks
II	Cautionary/Warning		
54.	Left/Right Curve	8	
55.	Right/Left Hairpin Bend	-	
56.	Right/Left Reverse Bend	-	
57.	Series of Bends	-	
58.	270 Degree Loop	-	
59.	Side Road		
60.	Y-intersection	-	
61.	Cross Road	6	
62.	Roundabout	-	
63.	Traffic Signals	-	
64.	T-Intersection	-	
65.	Major Road Ahead	6	
66.	Staggered Inter-section	-	
67.	Merging Traffic Ahead	6	
68.	Narrow Road Ahead	-	
69.	Road Widens	-	
70.	Narrow Bridge Ahead	-	
71.	Steep Ascent/Descent	-	
72.	Reduced Carriageway	-	
73.	Start / End of Dual Carriageway	8	
74.	Gap in Median	-	
75.	Pedestrian Crossing	6	
76.	Pedestrian crossing with backing board	-	
77.	School Ahead	2	
78.	Built Up Area	-	
79.	Two Way Operation (on main carriage way/ service road	-	
80.	Two-way Traffic on Cross Road Ahead	-	
81.	Danger Warning Sign	-	
82.	Deaf or Blind Persons Likely on Road Ahead	-	

S.No.	Road signs	Nos'	Remarks
83.	Cycle Crossing	-	
84.	Cycle Route Ahead (Warning for Cycles on road ahead)	-	
85.	Dangerous Dip	-	
86.	Speed Breaker	8	
87.	Rumble Strip	-	
88.	Rough Road	-	
89.	Dangerous Ditch	-	
90.	Slippery Road	-	
91.	Slippery Road because of Ice	-	
92.	Opening or Swing Bridge	-	
93.	Overhead Cable	-	
94.	Playground Ahead	-	
95.	Quay Side or Riverbank	-	
96.	Sudden Side Winds	-	
97.	Tunnel Ahead Warning	-	
98.	Falling Rocks	-	
99.	Cattle Crossing	-	
100.	Wild Animals likely to be on Road Ahead	-	
101.	Queues Likely Ahead	-	
102.	Low flying Aircraft	-	
103.	Unguarded Railway Crossing	-	
104.	Guarded Railway Crossing	-	
105.	Crash prone area ahead	-	
106.	U-Turn	-	
III	Chevron Signs		
4.	Single Chevron	16	
5.	Double Chevron	-	
6.	Triple Chevron	-	
IV	Object Hazard Marker Sign		
3.	Left/Right side Object Hazard Marker	8	

S.No.	Road signs	Nos'	Remarks
4.	Two-way Object Hazard Marker	8	
V	Informatory /Guide		
27.	Direction and Place Identification signs	8	
28.	Stack Type Advance Direction Sign (Shoulder Mounted)	-	
29.	Stack Type Advance Direction Sign with cautionary / regulatory signs (Shoulder Mounted)	-	
30.	Map Type Advance Direction Sign (Shoulder Mounted)	-	
31.	Map Type Advance Direction Sign for roundabout (Shoulder Mounted)	-	
32.	Flag Type Direction Sign	-	
33.	Reassurance Sign	-	
34.	Place Identification Sign	6	
35.	Truck Lay-By	-	
36.	Toll Booth Ahead	-	
37.	Weigh Bridge Ahead	-	
38.	Shoulder Mounted Sign in Advance of a Grade Separated Junction/ Interchange	2	
39.	Expressway Sign	-	
40.	Gantry Mounted advance Direction Sign Ahead of a Flyover in Urban/City Roads	-	
41.	Gantry Mounted advance Direction Sign Ahead of a At-grade Intersection	-	
42.	Gantry Mounted Advance Direction Sign for Interchange	2	
43.	Cantilever Gantry Mounted Advance Direction Sign for Interchange	-	
44.	Lane Dedicated Gantry Sign	-	
45.	Definition/Supplementary Plates	-	
46.	Tourism Related Sign	-	
47.	Tourist Destination Direction Information Signs Without Photograph	-	
48.	Tourist Destination Direction Information Signs with Photograph	-	
49.	Finger Destination direction Information Sign for Pedestrians	-	
50.	Tourist Map Information Sign	-	
51.	Boundary Sign at Entrance to a City/Place	-	
52.	Boundary Sign at Entrance to Tourist a Destination	-	
VI	Facility Information signs		

S.No.	Road signs	Nos'	Remarks
39.	Eating Place	-	
40.	Light Refreshment	-	
41.	Resting Place	-	
42.	First Aid Post	-	
43.	Toilet	-	
44.	Filling Station(Fuel Pump)	-	
45.	Hospital	-	
46.	U-Turn Ahead	-	
47.	Pedestrian Subway	-	
48.	Police Station	-	
49.	Picnic Site	-	
50.	Repair Facility	-	
51.	Railway Station/Metro Station/Monorail	-	
52.	Industrial Area	-	
53.	Cycle Rickshaw Stand	-	
54.	Taxi Stand	-	
55.	Auto Rickshaw Stand	-	
56.	Home Zone	-	
57.	Camp Site	-	
58.	Airport	-	
59.	Golf Course	-	
60.	National Heritage	-	
61.	No Through Road	-	
62.	No Through Side Road	-	
63.	Toll Road Ahead	-	
64.	Guide Sign on Toll Lane Portal	-	
65.	Country Border	-	
66.	Entry Ramp for Expressway	-	
67.	Exit Ramp for Expressway	-	
68.	Expressway Symbol	-	

S.No.	Road signs	Nos'	Remarks
69.	End of Expressway	-	
70.	Bus Stop	-	
71.	Bus Lane	-	
72.	Contra Flow Bus Lane	-	
73.	Cycle Lane	-	
74.	Contra Flow Cycle Lane	-	
75.	Holiday Chalets	-	
76.	Emergency Exit	-	
VII	Other Useful Information Signs	-	
18.	Signs For Persons With Disabilities	-	
19.	International symbol of Accessibility	-	
20.	Parking Information	-	
21.	Parking Areas	-	
22.	Ramped Entrance to Subway/Over Bridge	-	
23.	Telephone Facilities	-	
24.	Toilet Facilities	-	
25.	Way Finding	-	
26.	Parking Signs	-	
27.	Auto Rickshaw Parking	-	
28.	Cycle Parking	-	
29.	Cycle Rickshaw Parking	-	
30.	Scooter and Motorcycle Parking	-	
31.	Taxi Parking	-	
32.	Park and Ride	-	
33.	Parking Restrictions Signs for Traffic Management	-	
34.	Flood Gauge Sign	-	
VIII	Route Maker Signs	-	
5.	State Highway Route Marker	-	
6.	National Highway Route Marker	8	
7.	Asian Highway Route Marker Sign	-	

S.No.	Road signs	Nos'	Remarks
8.	Expressway Route Marker Sign	-	

Note:

The locations of the placement of signages shall be finalized in consultation with Independent Engineer/NHAI, as per site requirement. Type/ Number/ Location of traffic signs mentioned are minimum, any additional requirement shall be provided and the same shall not constitute change of scope.

2.3. Road Marking

Road Markings shall be Hot applied thermoplastic materials with reflectorized beads to achieve visibility conforming to clause 2.7.2 of IRC 35.

The cold applied plastics pavement markings shall be used for School Zone Markings, Audible Raised Profile Edge Lines and Block Markings (BM 01/02/03).

A. Salem to Ulundurpet section of NH-79

S.No.	Item	Unit		Remarks
		Length (m)	Number	
1.	Longitudinal Marking			
	Main Carriageway			
	a. Straight section	12024		
	Service road			
	a. Straight section	17424		
2.	Transverse Marking			
	Shoulder / Median line (Main Carriageway)			
	Shoulder / Median line (Service Road)			
3.	Hazard Marking			
	Diagonal Markings			
	Chevron Markings	996		
4.	Block Marking			
5.	Arrow Marking	250		
6.	Directional Marking			

S.No.	Item	Unit		Remarks
		Length (m)	Number	
7.	Facility Marking			
8.	Centre Line (main carriage-) way	4874		
8.a	Centre Line (Service road-) way	4571		
9.	Traffic Lane Lines			
10.	No Overtaking Lines			
11.	Warning Lines			
12.	Border or Edge Lines			
13.	Longitudinal Markings for Undivided Roads			
14.	Longitudinal Markings for divided Roads			
15.	Longitudinal Markings for Ramps/Slip Roads/One Way Streets			
16.	Stop Line			
17.	Give Way Lines			
18.	Diagonal Markings			
19.	Chevron Markings			
20.	Continuity Line			
21.	Word Messages			
22.	Lane Change			
23.	Merging/Diverging Markings	319		
24.	Hatch Markings			
25.	Raised Profile Edge			
26.	Lines Lane Reduction			
27.	Narrowing Situations and Transitions (lane Balancing)			
28.	Directional Arrows			
29.	Mandatory Turn Arrows			
30.	Guidance Arrows			
31.	Deflection Arrows			
32.	Bifurcation Arrows			

S.No.	Item	Unit		Remarks
		Length (m)	Number	
33.	Arrows on Side Road Approaches			
34.	Arrows on Main Road Approaches			
35.	Word Messages			
36.	Yellow Box Markings			
37.	Ghost Island			
38.	Marking for Speed breaker			
39.	Pedestrian Crossing Markings when highway			
40.	Passes through settlement fig 9.4 of IRC SP 87			
41.	Transverse Bar Markings			
42.	Bus bay Marking			
43.	Truck Lay-by Markings			
44.	Toll Plaza Marking			
45.	School Zone Markings			
46.	Object Markings within Carriageway			
47.	Objects Markings Adjacent to Carriageway Subway Piers,			
48.	Abutments, Culverts Head Walls, Concrete Barrier			
49.	ii. Electrical Poles			
50.	iii. Guard Rails			
51.	iv. Trees			
52.	v. Kerbs			
53.	Directional Markings as per Annexure: A 6			
54.	Facility Markings as per Annexure A.7 of IRC 35			

B. Tindivanam to Ulundurpet of NH - 45

S.No.	Item	Unit		Remarks
		Length (m)	Number	
1.	Longitudinal Marking			
	Main Carriageway			
	a. Straight section	4360		
	Service road			
	a. Straight section	5284		
2.	Transverse Marking			
	Shoulder / Median line (Main Carriageway)			
	Shoulder / Median line (Service Road)	420		
3.	Hazard Marking			
	Diagonal Markings			
	Chevron Markings	240		
4.	Block Marking			
5.	Arrow Marking	72		
6.	Directional Marking			
7.	Facility Marking			
8.	Center Line (main carriage-) way	1150		
8.a	Center Line (Service road-) way	600		
9.	Traffic Lane Lines			
10.	No Overtaking Lines			
11.	Warning Lines			
12.	Border or Edge Lines			
13.	Longitudinal Markings for Undivided Roads			
14.	Longitudinal Markings for divided Roads			
15.	Longitudinal Markings for Ramps/Slip Roads/One Way Streets			
16.	Stop Line	120		
17.	Give Way Lines	200		
18.	Diagonal Markings			

S.No.	Item	Unit		Remarks
		Length (m)	Number	
19.	Chevron Markings			
20.	Continuity Line			
21.	Word Messages			
22.	Lane Change			
23.	Merging/Diverging Markings	1200		
24.	Hatch Markings			
25.	Raised Profile Edge			
26.	Lines Lane Reduction			
27.	Narrowing Situations and Transitions (lane Balancing)			
28.	Directional Arrows			
29.	Mandatory Turn Arrows			
30.	Guidance Arrows			
31.	Deflection Arrows			
32.	Bifurcation Arrows			
33.	Arrows on Side Road Approaches			
34.	Arrows on Main Road Approaches			
35.	Word Messages			
36.	Yellow Box Markings			
37.	Ghost Island	250		
38.	Marking for Speed breaker	154		
39.	Pedestrian Crossing Markings when highway	-	-	-
40.	Passes through settlement fig 9.4 of IRC SP 87			
41.	Transverse Bar Markings			
42.	Bus bay Marking			
43.	Truck Lay-by Markings			
44.	Toll Plaza Marking			
45.	School Zone Markings			

S.No.	Item	Unit		Remarks
		Length (m)	Number	
46.	Object Markings within Carriageway			
47.	Objects Markings Adjacent to Carriageway Subway Piers,			
48.	Abutments, Culverts Head Walls, Concrete Barrier			
49.	ii. Electrical Poles			
50.	iii. Guard Rails			
51.	iv. Trees			
52.	v. Kerbs			
53.	Directional Markings as per Annexure: A 6			
54.	Facility Markings as per Annexure A.7 of IRC 35			

Note: The locations of the placement of signages shall be finalized in consultation with Independent Engineer/ NHAI, as per site requirement.

2.4. Road Delineators

A .Salem to Ulundurpet section of NH-79

S.No.	Item	Number / Length (m)	Remarks
1	Delineator	50 nos	

B.Tinidivanam to Ulunderpet of NH-45

S.No.	Item	Number / Length (m)	Remarks
1	Delineator	40 nos	

Note:

The locations of the placement of signages shall be finalized in consultation with Independent Engineer/ NHAI, as per site requirement. Type/ Numbers mentioned are

minimum, any additional requirement shall be provided and the same shall not constitute change of scope.

2.5. Reflective Pavement Markers & Solar Studs

The Prismatic Retro-Reflective type conforming to ASTM 0-4280 Pavement Markers & Solar Power Studs on Highway shall be provided in accordance with Schedule - D.

A. Salem to Ulundurpet section of NH-79

S.No	Item	Number	Location	Remarks
1	White Colour one coloured face Road Studs	1675	Traffic lane line & centre of carriageway	Uni - directional carriageway
2	Red Colour one coloured face Road Studs		Left hand edge of the carriageway, entry to truck lay bye / bus bay, start of service road, chevron/diagonal markings on gorge	
3	Yellow / Amber Colour one coloured face Road Studs		Median side edge line, zebra crossing	
4	Green Colour one coloured face Road Studs		Lay byes, left hand side of the carriageway in case of multi-lane divided carriageways, Crossable continuous line like in acceleration / deceleration lanes involving lane changing	

B. Tindivanam to Ulundurpet section of NH-45

S.No	Item	Number	Location	Remarks
1	White Colour one coloured face Road Studs	1198	Traffic lane line & centre of carriageway	Uni - directional carriageway
2	Red Colour one coloured face Road Studs		Left hand edge of the carriageway, entry to truck lay bye / bus bay, start of service road, chevron/diagonal markings on gorge	
3	Yellow / Amber Colour one coloured face Road Studs		Median side edge line, zebra crossing	
4	Green Colour one coloured face Road Studs		Lay byes, left hand side of the carriageway in case	

S.No	Item	Number	Location	Remarks
			of multi-lane divided carriageways, Crossable continuous line like in acceleration / deceleration lanes involving lane changing	

2.6 Traffic Impact Attenuators (Clause No. 9.6 of manual)

2.6.1 Provide Impact Attenuators in Gore Areas, It shall be self-restoring confirming to section 10.6

Sl.No	Item	Chainage	Number	Remarks
Nil				

2.6.2 Providing End Terminals

Provide End Terminals P-4 type confirming to EN 1317-4 to Parapet Walls of Culverts, Structures ends for the safety of approaching traffic etc.

Sl.No	Item	Chainage / Number	Remarks
1	Nil		

The numbers/ locations in the above Table are the minimum, any additional requirements shall be provided and the same shall not constitute change of scope.

2.7. Boundary wall and Fencing: - Deleted

3. Operation and Maintenance centres- Deleted.

4. Way side Amenities / Service Areas/Rest Area - Deleted

5. Truck lay-byes: - Deleted

6. Bus Bay and Bus shelter: (Clause No. 12.7 of manual)

Provision of Bus Bay and bus shelter on highways as per IRC 80 :2022 including paving of layby, signs, markings, speed calming measures, drainage, lighting etc., in built-up areas, intersections of NH/SH/MDR and roads leading to large settlements is as follows:

6.1. Bus Bays- - Deleted

6.2. Kerb Side Bus Stop with Pedestrian shelter shall be provided at the following

locations.

Sl.No	Design Chainage (Km)		Passenger Shelter length(m)	Remarks
	Left	Right		
1.	-	-		
2.	-	-		

6.3 Bus Bay Pavement- Deleted

Note: The locations of bus shelter be finalized in consultation with Independent Engineer/NHA, as per site requirement. The numbers in the above Table are the minimum, any additional requirements shall be provided and the same shall not constitute change of scope.

7. Pedestrian Facilities

Pedestrian Facilities shall be provided in accordance with the Manual of Specifications and Standards as referred in Clause 9.8 of Schedule D and IRC 1032022. This shall consist of footpath (sidewalks), pedestrian guard rails and pedestrian crossing.

The details are as mentioned below:

B.Tinidivanam to Ulunderpet of NH-45

Sl.No	Pedestrian facilities	Chainage		Side	Remarks
		From	To		
1	Pedestrian guardrails shall be 150 mm from Carriageway/Paved Shoulder i. center median	1.132+200	-	Median	1.300 mtrs A1 & A2
		2.145+750	-	Median	2.400 mtrs A1 & A2
		3.156+200	-	Median	3.500 mtrs A1 & A2
2	Footpath paving including fixing of tactile pavers	1.144+750	-	Median	1.80 mtr A1 & A2
		2.156+200	-	Median	2.96 mtr A1 & A2
		3.162+200	-	Median	3.256 mtr A1 & A2
		4.189+500	-	Median	4.76 mtr A1 & A2
3	Pedestrian Crossing I. With Zebra Marking	1.140+850	-	LHS	1. 78 mtr
		2.140+850	-	RHS	2. 57 mtr
		3.144+750	-	LHS	3. 48 mtr
		4.144+750	-	RHS	4. 39 mtr
		5.150+400	150+800	LHS	5. 45 mtr
		6.150+400	150+800	RHS	6. 27 mtr
		7.150+400	150+800	LHS -A2	7. 33 mtr (TBM)

8. Highway Lighting

The street light poles shall be 1 piece, continuous-tapered, octagonal poles and shall be manufactured from one length of steel sheet, formed in continuous tapered tube, with one continuous arc-welded vertical seam. The minimum wall thickness for lighting poles shall not be less than 4 mm. The Bottom Diameter shall be minimum 175 mm. The Top Diameter shall be minimum 75 mm. The door on window of pole shall be antitheft. All electrical cable should be concealed. All electrical lighting fixers shall be LED. The fixtures shall be concealed except on poles. Lighting poles shall be fixed on outer side of steel/concrete barrier. The lighting shall be providing at the following locations:

A. Salem to Ulundurpet section of NH-79

S.No	Lighting Facilities	Chainage		Side	Lighting Source : Electricity Board / Generator / Solar
		From	To		
1	Toll Plaza area: The lighting in and around toll plaza, toll booths, office building, on the approach road etc. shall be as per Section 12 of the Manual. In addition to at least two high mast light shall be provided on either side of toll plaza (High mast of 35m height with 12 nos. of lights) with minimum illumination of 40 Lux.			Nil	
2	Rest Areas: The entire Rest areas shall be provided with lighting with illumination to 40 Lux			Nil	
3	Truck lay-bye: The entire area of truck lay-byes and 50m length of the project highway on its either side shall be illuminated at night to provide an illumination of 40Lux. Suitable designed electric poles having aesthetic appeal and energy saving bulbs (LED) may be used to provide required illumination. Alternatively, photo voltaic lamps may be used			Nil	
4	Bus Bay & bus shelter locations: The entire bus bay & bus shelter area shall be provided with Lighting (illumination of 40Lux.).			Nil	

S.No	Lighting Facilities	Chainage		Side	Lighting Source : Electricity Board / Generator / Solar
		From	To		
5	Grade separated structures, interchanges, flyovers, underpasses (vehicular/pedestrian) and Vehicle overpasses: Lighting requirement shall be as per section 12 of the manual. The top and underside of the grade separated structures including service road / slip road, interchange area at the ground level up to 50m beyond the point from where flaring of the main carriageway takes place shall be provided with lighting. Also, on all legs of at grade interchange/ crossings the lighting shall be provided 50m beyond the point of Centre on all legs. The minimum illumination shall be 40 Lux., at the extreme edge of the Highway	LVUP at Km. 131+580 from Km.131+125 to Km.132+035 - 50nos. and LVUP Box lighting- 10nos VUP at Km. 134+307 from Km. 133+765 to Km.134+774 - 58nos and VUP Box lighting-10nos . VUP at Km.109.000 from Km.108+550 to 109+375 - 56 nos and VUP Box lighting-20nos			Electricity Board
6	Built-up sections on the project highway both in the median of main carriageway and on the service roads on both sides	Service road for Madur from Km. 105+895 to Km. 106+970 -72 Nos			Electricity Board
7	On Median Openings provide 1 no. high mast lighting of 25m height	-			-
8	On Major Bridges and its approaches higher than 3m	-	-	-	

B. Tindivanam to Ulundurpet section of NH-45

S.No	Lighting Facilities	Chainage		Side	Lighting Source: Electricity Board / Generator / Solar
		From	To		
1	Toll Plaza area: The lighting in and around toll plaza, toll booths, office building, on the approach road etc. shall be as per Section 12 of the Manual. In addition to at least two high	Nil			

S.No	Lighting Facilities	Chainage		Side	Lighting Source: Electricity Board / Generator / Solar
		From	To		
	mast light shall be provided on either side of toll plaza (High mast of 35m height with 12 nos. of lights) with minimum illumination of 40 Lux.				
2	Rest Areas: The entire Rest area shall be provided with lighting with illumination to 40 Lux			Nil	
3	Truck lay-bye: The entire area of truck lay-byes and 50m length of the project highway on its either side shall be illuminated at night to provide an illumination of 40Lux. Suitable designed electric poles having aesthetic appeal and energy saving bulbs (LED) may be used to provide required illumination. Alternatively, photo voltaic lamps may be used			Nil	
4	Bus Bay & bus shelter locations: The entire bus bay & bus shelter area shall be provided with Lighting (illumination of 40Lux.).			Nil	

S.No	Lighting Facilities	Chainage		Side	Lighting Source: Electricity Board / Generator / Solar
		From	To		
5	Grade separated structures, interchanges, flyovers, underpasses (vehicular/pedestrian) and Vehicle overpasses: Lighting requirement shall be as per section 12 of the manual. The top and underside of the grade separated structures including service road / slip road, interchange area at the ground level up to 50m beyond the point from where flaring of the main carriageway takes place shall be provided with lighting. Also, on all legs of at grade interchange/ crossings the lighting shall be provided 50m beyond the point of Centre on all legs. The minimum illumination shall be 40 Lux. at the extreme edge of the Highway	1. LVUP at Km. 124+500 from Km. 124+810 - 08 nos (single arm) and VUP Box lighting 2. VUP at Km. 152+495 from Km. 153+475- 42nos (Double arm) & 1 nos of High mast and VUP Box lighting 3. Km at 191+900 - 01 no of Highmast			Electricity Board
6	Built-up sections on the project highway both in the median of main carriageway and on the service roads on both sides				Electricity Board
7	On Median Openings provide 1 no. high mast lighting of 25m height	-			-
8	On Major Bridges and its approaches higher than 3m	-	-	-	

The numbers in the above Table are the minimum, any additional requirements shall be provided and the same shall not constitute change of scope.

9. Rainwater Harvesting

The provision of rainwater harvesting shall be provided at every 500m staggered in the entire project length and shall be executed as per requirement of IRC SP: 42-2014 and IRC SP: 50-2013. Additionally, wherever urban drains are provided, which do not have definite outfall for discharge of water, at such location one pit for

rainwater harvesting shall be provided along the side drains at the lowest point/ where the water stagnates. The type and location of rainwater harvesting is as follows:

S.No	Rain Water Harvesting Type	Chainage	Side	Depth of Recharge Structure
Nil				

10. Environmental Management Plan (Attach MOEF Mitigation Report in Schedule D)

The Concessionaire shall implement the Environmental Management plan & action Plan for undertaking possible mitigation measures in accordance with environmental clearance accorded by Ministry of Environment and Forests and climate change. The conditions & directions stipulated by the MOEF shall be complied by the contractor/ concessionaire.

11. Land Scaping and Tree Plantation (Section 11 of IRC SP 84 2019 / SP 87 2019)

The Contractor shall plant trees and shrubs of required numbers and types at the appropriate location within Right of Way and in the land earmarked by the Authority for afforestation as per Schedule D at the following areas:

B. Salem to Ulundurpet section of NH-79

SI No	Types of Plantations	Location (Km)	Numbers of trees to be planted	Remarks
1	Shrubs	Nil		
2	Land Scaping	Nil		
3	Plantation	From Km.131+125 to Km.132+035. From Km. 133+765 to Km.134+774. From Km. 105+895 to Km. 106+970 From km.108+550 to km.109+375	104(Transplantation) 115(Transplantation) 72(Transplantation) 134(Transplantation)	

12. Advanced Traffic Management System (ATMS) (NHAI Policy Circular No.11.53/2023 dated 10th October 2023) - Deleted

5.1. Deleted

5.2. Deleted

12.1.1 Video Surveillance System I Traffic Monitoring Camera system (TMCS)- Deleted

12.1.2 Video Incident Detection System (VIDS)& Enforcement System (VIDES)- Deleted

12.1.3 Vehicle Actuated Speed Display (VASD) System- Deleted

12.1.4 Variable Message Sign (VMS) System - Deleted

12.1.4.1 Fixed VMS- Deleted

12.1.4.1.1 Gantry (M Type) - Deleted

12.1.4.1.2 Cantilever (L Type)- Deleted

12.1.4.2 Portable VMS- Deleted

12.1.5 Communication Network with OFC Backbone- Deleted

12.1.6 ATMS Command and Control centre- Deleted

12.1.7 Power Supply for ATMS Command & Control Centre and Field Equipment - Deleted

12.1.8 Operation & Maintenance (O&M) of the entire ATMS Facility. - Deleted

12.1.9 Maintenance Vehicle- Deleted

13. Highway Patrol Units (Clause No.12.10 IRC: SP:87-2019) - Deleted

14. Emergency medical services (Clause No. 12.11 IRC: SP:87 -2019)- Deleted

15. Crane Service: (Clause No. 12.12 IRC: SP:87-2019)- Deleted

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), referred to herein as the Manual.

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)], 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.

1.1. Codes and Standards:

The codes and standards applicable for the design of the Project and Project Facilities are

- (i) Indian Road Congress (IRC) Codes and Standards; and
- (ii) Ministry of Shipping, Road Transport and Highways (MORTH) Specifications, for Road and Bridge works (5th Revision -2013)
- (iii) IRC: SP: 84-2019, Manual of Specification & Standards for Four laning of Highways.

Both as applicable to National Highways and shall include Policy Circulars, Guidelines and Specific Publications, issued in respect thereof by IRC or MORTH.

2. Deviations from the Specifications and Standards

- (i) The terms “Concessionaire”, “Independent Engineer” and “Concession Agreement” used in the Manual shall be deemed to be substituted by the terms “Contractor”, “Independent Engineer” (or) “Authority's Engineer” and “Agreement” respectively.
- (ii) Carriage way Cross section/structure as per Schedule-B to be followed.