





Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi

S.No	Contract Package	Description	Chainage	Length (Km)
3.	Package 3	From Nangloi - Najafgarh Road till Sector 24 Dwarka	Km 28.450 to 38.111.43	9.66
4.	Package 4	Spur to Sonipat By-pass (Bawana Industrial Area to Barwasni By-pass)	Km 0+000 to 28.300	28.3
5.	Package 5	Spur to Bahadurgarh By-pass {From Km 26+600 of UER 2 (Dichaun Kalan) to Bahadurgarh By-pass/ NH 10 near Village Balaur}	Km 0+000 to 7+600	7.6

The present report being submitted is only for Package 1.

### 3. TRAFFIC FORECAST

#### Traffic Volume

UER 2 has been divided into five sections (three sections for UER 2 & 2 sections of Spurs) in such a way that traffic intensity within a particular section will be more or less uniform. The homogenous sections (HS) identified and their estimated average annual daily traffic in PCU are listed below:

**Table 0-2: Annual Average Daily Traffic (PCUs)**

S. No.	SECTION	2017	2020	2025	2030	2035	2040	2045	2047
I	NH-1 Intersection to NH 10 Intersection	20,455	28,010	44,358	65,927	93,147	1,25,991	1,49,357	1,74,098
II	NH 10 Intersection to Najafgarh-Dwarka Road	20,987	28,639	45,086	66,674	94,084	1,27,025	1,60,323	1,76,105
III	Najafgarh Road to Dwarka Sector 24 Junction	16,484	22,507	35,440	52,404	73,954	99,838	1,26,066	1,38,500
IV	Spur to Sonipat	7,138	9,710	15,264	22,563	31,914	43,208	54,990	60,607
V	Spur to Bahadurgarh	10,601	14,381	22,575	33,349	47,338	64,340	82,765	91,609

The current package of which this report is being submitted falls under Homogenous section I. The project corridor under this study is expected to serve average annual daily traffic of more than 1,20,000 in next 20 years design period.

### 4. ALIGNMENT DESIGN

The report details out the alignment design considerations for entire project however; the section below describes the alignment design of Package 1 only



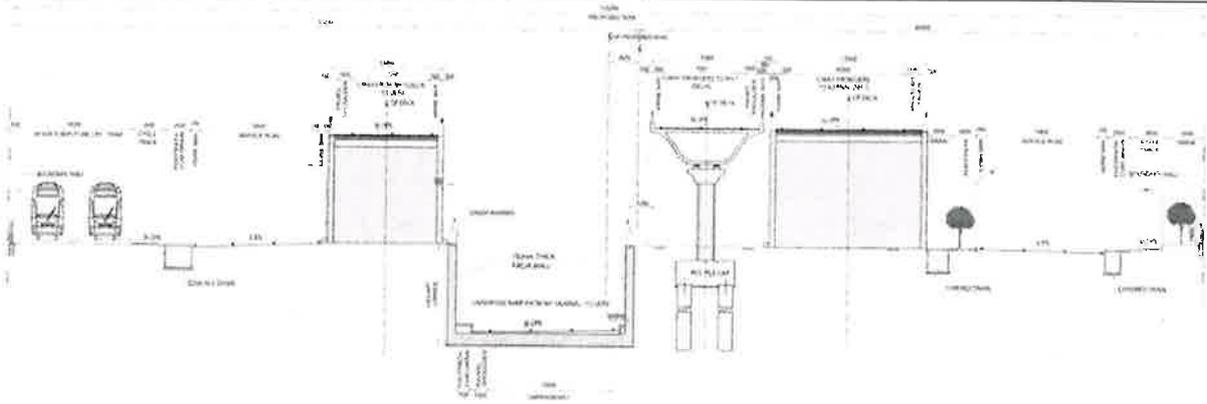


Figure 0-4: Typical Cross Section at Chainage 0+350 (UER 2)

The service roads of UER 2 will form an at-grade junction with service road of NH 1. Thereafter, a right turning underpass has been proposed from UER 2 (from NH 1) to Shahpur Garhi Junction at Chainage 1+750. Along with right turning underpass a right turning flyover has been proposed from Shahpur Garhi Junction to UER 2 (to Dwarka). Both these structures have been integrated with a U-turning structure to allow U-turning movement from UER 2.

After crossing Shahpur Garhi junction, alignment crosses Delhi-Ambala Railway line at Chainage 3+500. At present, land-acquisition along the access to Railway line hasn't been completed. A railway over bridge is proposed at this location. Figure 0-5 presents the proposed cross section at the RoB.

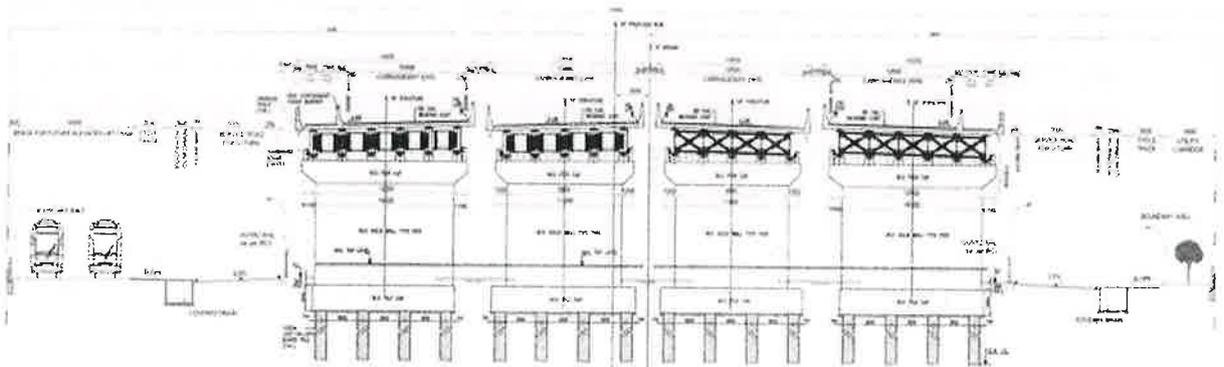


Figure 0-5: Typical Arrangement at Railway Over Bridge (Holambi Kalan)

After the RoB, an arrangement similar to the proposal at Shahpur Garhi Junction has been developed at Chainage 5+150 (Bawana Sector 5 Junction).

Spur to Sonipat By-pass is proposed to take-off from Bawana Sector 3/4 Industrial Area. To facilitate smooth traffic flow between the Sonipat by-pass & UER 2, grade separation has been proposed along the same. Figure 0-6 & Figure 0-7 present the cross section at the same location. A right turning flyover has been proposed from UER 2 (from NH 1) to Bawana Industrial Area and a right turning underpass has been proposed from Bawana Industrial Area to UER 2 (Towards Dwarka). In

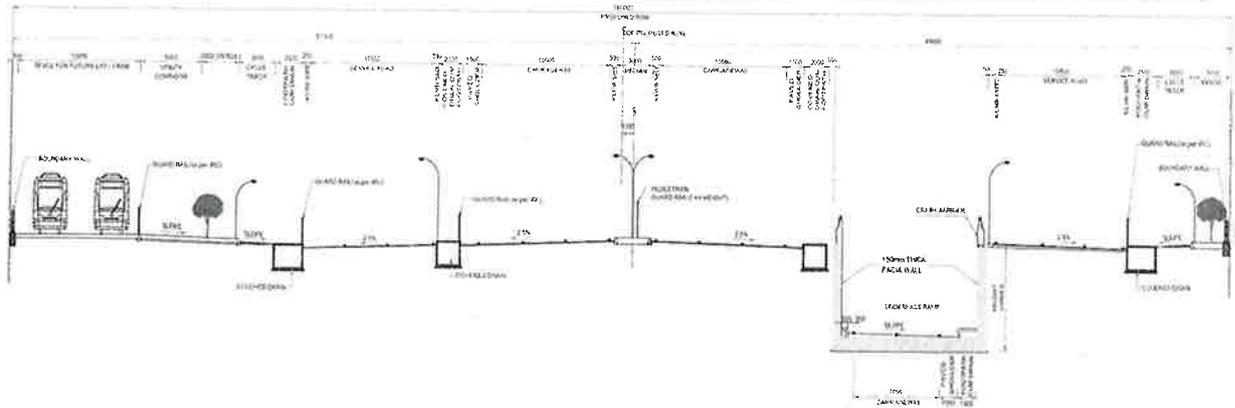


Figure 0-9: Typical Arrangement of Underpass at Rohini Sector 36/37 Junction (Chainage 11+600)

After crossing Rohini Sector 36/37 junction, flyover has been proposed for main carriageway at UER 2 junction with Karala-Kanjhawala road. Figure 0-10 presents the typical arrangement of UER 2 at Karala-Kanjhawala road junction.

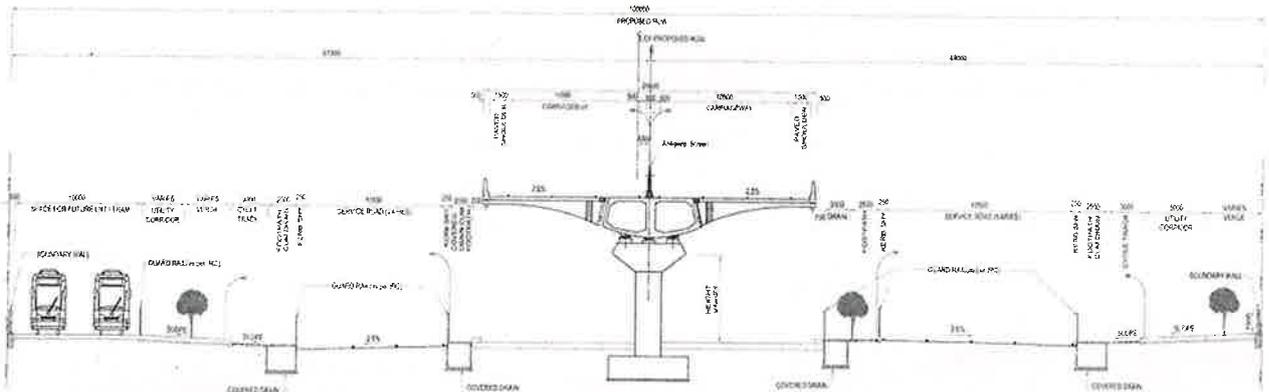


Figure 0-10: Typical Arrangement of UER 2 at Karala-Kanjhawala Road Junction (Chainage 14+000)

## 5. PROJECT DEVELOPMENT DESCRIPTION

### Proposed Pavement

Main Carriageway, Slip Road, Service road and all ramps of flyovers shall be flexible pavement except the approaches of Underpasses. The approaches of Underpasses shall be of rigid pavement.

Stone Matrix Asphalt 50mm thick laid in single layer shall be provided as wearing course on all grade separated structures and bridges.

### Design Life

For the design of pavement, the design life is defined in terms of the cumulative number of standard axles that can be carried before strengthening of the pavement is necessary.

Flexible pavement for new pavement or for widening and strengthening of the existing pavement shall be designed for a minimum design period of 20 years. Stage



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S. No.	Chainage of UER-II		Design Chainage of UER-II / Individual Link / Ramp		Length (m)	Width of Paved Carriageway (m)		Remarks
	From	To	From	To		Left C/w	Right C/w	
								between 1.0 m to 3.5 m 3. Existing road on lhs between chainage 2+670 to 2+828, width varying between 3 m to 4.5 m 4. Existing road on lhs between chainage 4+064 to 5+205 width varying between 0 m to 12.5 m, existing road on rhs between chainage 4+064 to 5+600 width varying from 6 m to 12.5 m. 5. Existing road on lhs between chainage 5+300 to 9+350 width varying from 0 m to 10.5 m, existing road on rhs between chainage 5+680 to 9+410 width varying between 0 m to 12.5 m 6. Existing road on lhs between chainage 9+380 to 9+470 width varying from 0 m to 12 m 7. Existing road on lhs between chainage 10+690 to 13+070 width varying from 0 m to 7.5 m, existing road on rhs between chainage 10+690 to 13+048 width varying from 0 m to 10.5 m 8. Existing road on lhs between chainage 13+155 to 13+418 width varying from 0 m to 12.5 m, existing road on rhs between chainage 13+155 to 13+432 width varying from 10 m to 12.5 m

**Interchange at NH 1 Interchange (UER 2-NH-1 Intersection)**

Table 0-4: Details of Interchange at NH 1

S. No.	Design Chainage of Individual Link / Ramp / Loop		Length (m)	Width of Paved Carriageway (m)	Remarks
	From	To			
Elevated Link from NH 1 (From Delhi) to UER 2 (Towards Dwarka) (MCS1)					
1	-0+251	0+443	694	10	7 m wide carriageway, 0.5 m wide kerb shy distance on right hand side, 1.5 m paved shoulder on left hand side and 0.5 m wide crash barrier on both sides





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S No.	Location	Salient Features	Minimum Length of viaduct to be provided	Road to be carried under/ above the structure	Remarks
		with Sector Road of Rohini Sector 34	2.9	Carriageway	of UER 2 remain at grade, rest all movements shall be grade separated.
6	7+750	Intersection of UER 2 with Sector Road of Bawana Industrial Area (Sector 3/4)/ Spur to Sonipat	As per Clause 2.9	Main Carriageway	Main Carriageway and Service road of UER 2 remain at grade, rest all movements shall be grade separated.
7	9+200	Intersection of UER 2 with Sector Road of Rohini Sector 34/35	As per Clause 2.9	Main Carriageway	Main Carriageway and Service road of UER 2 remain at grade, rest all movements shall be grade separated.
8	10+175	Intersection of UER 2 with Bawana Road (near Barwala Village)	As per Clause 2.9	Cross Road (Bawana Road)	Main Carriageway elevated through flyover near Barwala. Service road will have at grade intersection with Bawana Road and shall be controlled through signals. Installation of traffic signals and necessary improvements of cross road for a length of 100 m on both sides for developing intersection shall be included in the scope of works
9	11+300	Intersection of UER 2 with Sector Road of Rohini Sector 36/37	As per Clause 2.9	Main Carriageway	Main Carriageway and Service road of UER 2 remain at grade, rest all movements shall be grade separated.
10	14+000	Intersection of UER 2 with Karala-Kanjhawala Road	As per Clause 2.9	Cross Road (Karala Kanjhawala Road)	Main Carriageway elevated through flyover. Service road will have at grade intersection with Karala-Kanjhawala Road and shall be controlled through signals. Installation of traffic signals and necessary improvements of cross road for a length of 100 m on both sides for developing intersection shall be included in the scope of works

**(b) Improvement of Minor Junctions with at-grade Service roads**

All minor junctions as provided in Clause 15 of Schedule A needs to be improved to integrate them with the at-grade service road as per the requirements of Schedule D.

**Table 0-6: Minor Junction Improvement Proposal**

S No.	Location	Salient Features	Minimum Length of viaduct to be provided	Road to be carried under the structure	Remarks
1	0+800	Left in and Left out on Service Road	NA	NA	Cross Road connecting village Alipur
2	2+300	Left in and Left out on Service Road	NA	NA	Cross Road (connecting Alipur & Shahpur Garhi)
3	3+200	Left in and Left out on Service Road	NA	NA	Cross Road connecting Shahpur Garhi
4	4+100	Left in and Left out on Service Road	NA	NA	Cross Road (connecting Holambi Kalan & Holambi





Table 0-7: Existing Bridges (Minor Bridges)

S. No.	Design Chainage	Total Width (m)	Span Arrangement	Details of Repair/ Rehabilitation / widening
1	0+510	99 m	7.4 + 19.2 + 7.4	To be widened
2	2+310	102 m	1 x 21	To be widened
3	7+110	82 m	2 x 6.5 m + 2x3.5 + 2x4.3	To be widened

b) Proposal for Elevated Structure/Flyover/Underpass

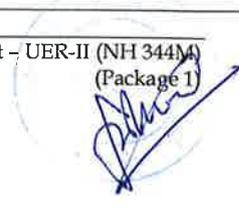
Table 0-8: Proposal for Elevated Structure, Flyover, Underpasses

S. No.	Design Chainage	Length (m)	Proposed Structure	Width (m)	Vertical Clearance (m)	Remarks
1	-0+173 to -0+040	133	Elevated Flyover	10	As per Design Profile	From NH-1 (Delhi) to UER-II (7 m wide carriageway, 1.5 m paved shoulders on left hand side, .5 m kerb shy distance on right hand side and 0.5 m crash barrier on both sides) MCS 1
	-0+040 to 0+160	200			5.5	
	0+160 to 0+342	182			As per Design Profile	
2	0+235 to 0+080	155	Elevated Flyover	13.5	As per Design Profile	Elevated Flyover from UER-II to NH-1 (Karnal) (10.5m wide carriageway, 0.5 m wide kerb shy distance on right hand side, 1.5 m paved shoulder on left hand side and 0.5 crash barrier on both sides) MCS 2
	0+080 to -0+060	140			5.5	
	-0+060 to -0+255	195			As per Design Profile	
3	0+372 to 0+060	312	Elevated Flyover	10	As per Design Profile	From UER-II to NH-1 (Delhi) (7 m wide carriageway, 1.5 m paved shoulders on left hand side, .5 m kerb shy distance on right hand side and 0.5 m crash barrier on both sides) MCR 1
	0+060 to -0+080	140			5.5	
	-0+080 to -0+344	264			As per Design Profile	
4	-0+100 to 0+080	180	Underpass Box	14.5	5.5	Underpass from NH-1 (Karnal) to UER-II (10.5 m wide Carriageway, 1.5 m wide paved shoulders on left hand side, 1.5 wide drain on left hand side, 0.5 m wide kerb shy distance on right hand side and 0.5 m wide kerb on right hand side) MCL 1
5	0+142 to 0+249	107	Elevated Flyover	10	As per Design Profile	U-Turning Elevated structure – MCU 1 (7.0 m wide carriageway, 1.5 m wide paved shoulders on left hand side, 0.5 m wide kerb shy distance on right hand side and 0.5 m wide crash barrier on both sides) Merging of MCU 2 & MCU 1 included in this section
	0+249 to 0+654	405		Varying from 10 m to 19.5 m	5.5	
	0+654 to 0+800	146		10	As per Design Profile	



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S. No.	Design Chainage	Length (m)	Proposed Structure	Width (m)	Vertical Clearance (m)	Remarks
						sides. (Merging section between MCU 3 & MCU 4 included in MCU 1)
13	5+015 to 5+201	334	Underpass Box	11 m – 14.5 m	5.5	Underpass from UER 2 (from NH 1) to Bawana Sector 5 Industrial Area
	5+186 to 5+015	172	Underpass Box	11 m – 14.5 m	5.5	U-turning Structure from right turning underpass
14	0+162 to 0+280	118	Elevated Flyover	10 m	As per Design Profile	Right Turning Flyover from UER 2 (from NH 1) towards Sector Road of Bawana Industrial Area above main carriageway – MCU 5 (7.0 m wide carriageway, 1.5 m wide paved shoulder on left hand side, 0.5 m wide kerb shy distance on left hand side, 0.5 m wide crash barrier on both sides)
	0+280 to 0+420	140			5.5	
	0+420 to 0+504	84			As per Design Profile	
15	7+205 to 7+272	102	Underpass Box	11 m	5.5	Right Turning Underpass from UER 2 (from Dwarka) towards Rohini Sector Road (Sector 34) (7.0 m wide Carriageway, 1.5 m wide paved shoulder on Left hand side, 1.5 m wide drain cum footpath on left hand side, 0.5 m wide kerb shy distance on right hand side, 0.5 m wide kerb on right hand side)
16	7+705 to 7+780	147	Underpass Box	11 m	5.5	Right Turning Underpass from Bawana Industrial Area to UER 2 (towards Dwarka) (7.0 m wide Carriageway, 1.5 m wide paved shoulder on Left hand side, 1.5 m wide drain cum footpath on left hand side, 0.5 m wide kerb shy distance on right hand side, 0.5 m wide kerb on right hand side)
17	0+164 to 0+283	119	Elevated Flyover	10 m	As per Design Profile	Right Turning Flyover from Sector Road of Rohini Sector 34/35 to UER 2 (Towards NH 1) above main carriageway – MCU 6 (7.0 m wide carriageway, 1.5 m wide paved shoulder on left hand side, 0.5 m wide kerb shy distance on left hand side, 0.5 m wide crash barrier on both sides)
	0+283 to 0+393	110			5.5	
	0+393 to 0+ 507	114			As per Design Profile	
18	9+683 to 9+920	237	Elevated Flyover	26.6	As per Design Profile	Main Carriageway Elevated at Bawana Cross road (10.5 m wide carriageway in bth directions, 1.5 m wide paved
	9+920 to 10+280	360			5.5	
	10+280 to 10+520	240			As per Design	





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Table 0-9: Details of all Grade Separated Structures

S. No.	Design Chainage	Length (m)	Proposed Structure	Remarks
1	-0+173 to 0+342	515	Flyover	Elevated Left Turning Ramp from NH-1 (From Delhi) to UER-II (Towards Dwarka) <b>MCS 1</b>
2	0+235 to -0+225	460	Flyover	Elevated Left Turning Ramp from UER-II (From Dwarka) to NH-1 (Karnal) <b>MCS 2</b>
3	0+372 to -0+344	716	Flyover	Elevated Right Turning Ramp From UER-II (from Dwarka) to NH-1(Towards Delhi) <b>MCR 1</b>
4	-0+100 to 0 +080	180	Underpass	Right Turning Underpass from NH-1 (From Karnal) to UER-II (Towards Dwarka) <b>MCL 1</b>
5	0+142 to 0+800	658	Flyover	U-Turning Elevated structure – <b>MCU 1</b>
6	0+180 to 0+453	273	Flyover	Right turning elevated flyover from Shahpur Garhi Industrial Area to UER 2 (towards Dwarka) <b>MCU 2</b>
7	1+581 to 1+765	312	Underpass Box	Underpass from UER 2 (from NH 1) to Shahpur Garhi Industrial Area
8	1+750 to 1+581	182	Underpass Box	U-turning Structure from right turning underpass
9	2+597 to 2+615	61	Underpass Box	Straight Underpass for connecting Shahpur Garhi with Budhpur
10	3+011 to 3+895	884	Railway Over Bridge	Main carriageway Elevated at Delhi-Ambala Railway Line
11	3+011 to 3+895	884	Railway Over Bridge	Service Road Elevated at Delhi-Ambala Railway Line
12	0+157 to 0+808	657	Flyover	U-Turning Elevated structure – <b>MCU 3</b>
13	0+135 to 0+465	330	Flyover	Right turning elevated flyover from Bawana Sector 5 Industrial Area to UER 2 (towards Dwarka) – <b>MCU 4</b>
14	5+015 to 5+201	334	Underpass Box	Underpass from UER 2 (from NH 1) to Bawana Sector 5 Industrial Area
15	5+186 to 5+015	172	Underpass Box	U-turning Structure from right turning underpass
16	0+162 to 0+504	342	Flyover	Right Turning Flyover from UER 2 (from NH 1) towards Sector Road of Bawana Industrial Area above main carriageway – <b>MCU 5</b>
17	7+205 to 7+272	102	Underpass Box	Right Turning Underpass from UER 2 (from Dwarka) to Rohini Sector Road (Sector 34)
18	7+705 to 7+780	147	Underpass Box	Right Turning Underpass from Bawana Industrial Area to UER 2 (towards Dwarka)
19	0+164 to 0+507	343	Flyover	Right Turning Flyover from Sector Road of Rohini Sector 34/35 to UER 2





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S No.	Chainage	Length(m)	Side	Average Height from Ground Level (m)	Remarks
5	0+066 to 0+180	114	Both	4 (Varying from 1 to 8)	For Right-Turning Structure at Shahpur Garhi Junction (MCU 2)
6	Km 2+828 to 3+011	183	Both	4 (Varying from 1 to 8)	Railway Over Bridge (Combined RE Wall for Service Road & Main Carriageway)
	Km 3+895 to 4+063	160	Both	4 (Varying from 1 to 8)	Railway Over Bridge (Combined RE Wall for Service Road & Main Carriageway)
7	0+065 to 0+157	92	Both	4 (Varying from 1 to 8)	For U-Turning Structure at Bawana Sector 5 Junction (MCU 3)
	0+808 to 0+954	146	Both	4 (Varying from 1 to 8)	
8	0+045 to 0+135	90	Both	4 (Varying from 1 to 8)	For Right-Turning Structure at Bawana Sector 5 Junction (MCU 4)
9	0+060 to 0+162	102	Both	4 (Varying from 1 to 8)	Elevated Link from UER-II (From NH-1) to Bawana Industrial Area (Sector 3/4) (MCU 5)
	0+504 to 0+612	108	Both	4 (Varying from 1 to 8)	
10	0+066 to 0+164	98	Both	4 (Varying from 1 to 8)	Elevated Right Turning Link from Rohini Sector Road (Sector 34/35) to UER-II (Towards NH-1) (MCU 6)
	0+507 to 0+611	104	Both	4 (Varying from 1 to 8)	
11	9+467 to 9+683	216	Both	4 (Varying from 1 to 8)	Main Carriageway Elevated at Bawana Road Junction
	10+520 to 10+691	171	Both	4 (Varying from 1 to 8)	
12	0+122 to 0+245	123	Both	4 (Varying from 1 to 8)	Elevated Right Turning Link from Rohini Sector Road (Sector 36/37) to UER-II (To NH-1) (MCU 7)
	0+530 to 0+635	105	Both	4 (Varying from 1 to 8)	
13	13+435 to 13+570	135	Both	4 (Varying from 1 to 8)	Main Carriageway Elevated at Karala-Kanjhawala Road Junction
	14+450 to 14+660	210	Both	4 (Varying from 1 to 8)	
14	6+800 to 7+080	280	Both	4 (Varying from 1 to 8)	RE Wall Along Minor Bridge at Western Yamuna Canal (Chainage 7+100)
	7+140 to 7+400	260	Both	4 (Varying from 1 to 8)	

**Table 0-12: Proposal for Retaining Wall**

SL No.	Chainage	Length(m)	Side	Average Height from Ground Level	Remarks
1	-0+346 to -0+100	246	Both	4.0m (Varying from 1m to 8 m)	Underpass from NH-1 (Karnal) to UER-II
	0+080 to 0+336	256	Both	4.0m (Varying from 1m to 8 m)	
2	1+391 to 1+581	190	Both	4.0m (Varying from 1m to 8 m)	Right Turning Underpass Structure at Shahpur Grahi Junction (from NH 1 to Shahpur Garhi Industrial Area)
	1+765 to -0+185	185	Both	4.0m (Varying from 1m to 8 m)	
3	1+393 to 1+581	188	Both	4.0m (Varying from 1m to 8 m)	U-Turning Underpass Structure at Shahpur Garhi Junction (merged with right turning underpass)
4	-0+200 to 2+597	400	Both	4.0m (Varying from 1m to 8 m)	Straight Underpass from Shahpur Garhi to Budhpur
	2+597 to -0+200				
5	-0+200 to 2+615	400	Both	4.0m (Varying from 1m to 8 m)	Straight Underpass from Budhpur to Shahpur Garhi
	2+615 to -0+200				
6	4+830 to 5+015	185	Both	4.0m (Varying from	Right Turning Underpass



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S No.	Stretch	Length (m)	Type	Width (m)	Side	Remarks
2	4+830 to 5+186	357	Rectangular RCC covered drain	1.5 m	LHS	Footpath-cum-Covered Drain (U-Turning Structure)
Underpass from UER 2 (from Dwarka) to Rohini Sector Road (Sector 34)						
1	7+519 to -0+260	612	Rectangular RCC covered drain	1.5 m	LHS	Footpath-cum-Covered Drain
Underpass from Bawana Sector 3/4 to UER 2 (towards Dwarka)						
1	-0+276 to 8+121	764	Rectangular RCC covered drain	1.5 m	LHS	Footpath-cum-Covered Drain
Underpass from UER 2 (from Dwarka) to Rohini Sector Road (Sector 36/37)						
1	-0+196 to 11+711	648	Rectangular RCC covered drain	1.5 m	LHS	Footpath-cum-Covered Drain
Main Carriageway						
1	0+000 to 3+405	3405	Rectangular RCC covered drain	2.0 m	Both	Footpath-cum-Covered Drain Demolition of existing is included in the scope of work
2	3+630 to 15+000	11370	Rectangular RCC covered drain	2.0 m	Both	Footpath-cum-Covered Drain Demolition of existing is included in the scope of work
Service Road						
1	0+000 to 3+405	3405	Rectangular RCC covered drain	2.5 m	Both	Footpath-cum-Covered Drain Demolition of existing is included in the scope of work
2	3+630 to 15+000	11370	Rectangular RCC covered drain	2.5 m	Both	Footpath-cum-Covered Drain Demolition of existing is included in the scope of work





## PROJECT NOTES

### 1. BACKGROUND

Delhi being National Capital generates and attracts huge quantum of traffic not only from within Delhi but also from surrounding region. In order to cater to this regional traffic, Inner and Outer ring roads were planned in 1962, of which only inner ring road could be completed whereas outer ring road is still not a full ring. Additionally, non-Delhi destined traffic i.e. traffic to/from North Indian States (which includes Punjab, Northern Haryana, Jammu & Kashmir) to remaining Indian states (which includes Rajasthan, Southern Haryana, Gujarat, Maharashtra) has to pass through Delhi due to absence of alternate network. This leads to heavy congestion on the existing ring roads.

To address this issue & further decongest Delhi, Delhi Development Authority (DDA) as part of the Delhi Master Plan 2021 proposed Urban Extension Road (UER) - 2 as 3rd ring road of Delhi connecting all the major National Highways in the western side of Delhi including NH 1, NH 10, NH 8 and NH 2. The RoW for UER was decided as 100 m. Although substantial chunk of land was acquired in western part of Delhi between NH 1 and NH 8 including construction of road for a length of 16 Km (approx.) however, no progress was made in the section between NH 8 and NH 2. Also the section between NH 8 and NH 1 has major hindrances in terms of land acquisition including built up structures. DDA then decided to get the UER 2 section between NH 8 and NH 1 to be developed by NHAI and requested to advise on suitable alignment options at hindrance locations. Henceforth, the mandate to develop UER 2 is currently with NHAI.

NHAI has further entrusted the task for preparation of Detailed Project Report (DPR) for development of UER 2 to URS Scott Wilson India Private Limited in association with AECOM India Private Limited as additional works to the contract agreement for Punjab-Package-I project of Bharatmala vide Letter No. NHAI/Planning/EC /Misc./2016/105069 dated 29/08/2017.

### 2. PROJECT DESCRIPTIONS

#### General

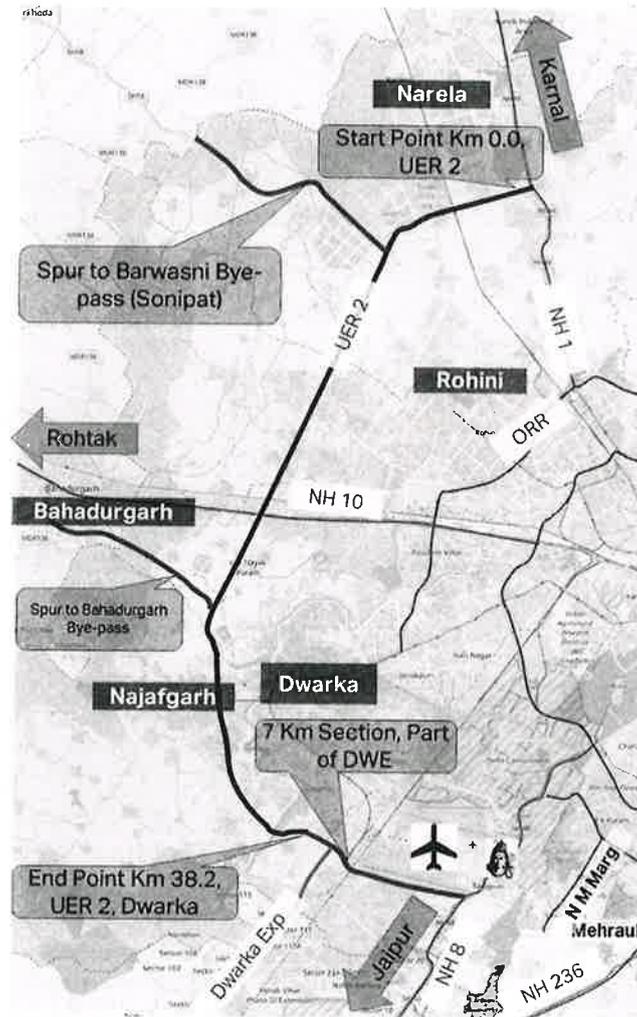
The alignment of UER 2 takes off from NH 1 (Ch. 23+800) near village Bankoli and terminates near the junction of Sector 24 in Dwarka. The present alignment is proposed to connect NH 1 with NH 8 passing through Bawana Industrial Area, Rohini Sector 34, 35, 36, 37, Mundka Industrial Area, Najafgarh & Dwarka. The proposed alignment crosses Delhi-Karnal Railway Line, NH 10 and Delhi-Rohtak Railway Line and merges with the contract package of UER 2 taken up with Dwarka Expressway at Sector 24 which further connects it with Shiv Murti at NH 8. Dwarka expressway meets UER 2 at Sector 21 Junction Dwarka and connects UER 2 with



Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)

State of Haryana till NH-8 at Km 40.070 near SPR Junction approx. 2 km before the Kherki Daula toll plaza.

The total length of UER 2 is 46.500 Km, out of which 38.11 Km is taken up as part of this project and a part alignment is being taken up with alignment of Dwarka expressway. The complete length of this corridor falls in the state of Delhi. **Figure 0-1** presents the alignment of UER-2.



**Figure 0-1: UER 2 Alignment**

In addition to the section of UER-2 two additional packages for spur to Barwasni By-pass (Sonipat) & Spur to Bahadurgarh By-pass are also to be developed along with it.

**Contract Packaging**

The total project has been further subdivided into 5 contract packages. The recommended contract packages and their respective lengths are described below:

**Table 0-1: Contract Packages (UER 2 & Spurs)**



**Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)**

S. No	Contract Package	Description	Chainage	Length (Km)
1.	Package 1	NH-1 Intersection to Karala-Kanjhawala Road	Km 0.000 to Km 15.000	15.0
2.	Package 2	From Karala Kanjhawala Road till Nagloi - Najafgarh Road	Km 15.000 to 28.450	13.45
3.	Package 3	From Nagloi - Najafgarh Road till Sector 24 Dwarka	Km 28.450 to 38.111.43	9.66
4.	Package 4	Spur to Sonipat By-pass (Bawana Industrial Area to Barwasni By-pass)	Km 0+000 to 28.300	28.3
5.	Package 5	Spur to Bahadurgarh By-pass {From Km 26+140 of UER 2 (Dichaun Kalan) to Bahadurgarh By-pass/ NH 10 near Village Balaur}	Km 0+000 to 7+600	7.6

The present report being submitted is only for Package II.

### 3. TRAFFIC FOPRECAST

#### Traffic Volume

UER 2 has been divided into five sections (three sections for UER 2 & 2 sections of Spurs) in such a way that traffic intensity within a particular section will be more or less uniform. The homogenous sections (HS) identified and their estimated average annual daily traffic in PCU are listed below:

**Table 0-2: Annual Average Daily Traffic (PCUs)**

S. No.	SECTION	2017	2020	2025	2030	2035	2040	2045	2047
I	NH-1 Intersection to NH 10 Intersection	20,455	28,010	44,358	65,927	93,147	1,25,991	1,49,357	1,74,098
II	NH 10 Intersection to Najafgarh-Dwarka Road	20,987	28,639	45,086	66,674	94,084	1,27,025	1,60,323	1,76,105
III	Najafgarh Road to Dwarka Sector 24 Junction	16,484	22,507	35,440	52,404	73,954	99,838	1,26,066	1,38,500
IV	Spur to Sonipat	7,138	9,710	15,264	22,563	31,914	43,208	54,990	60,607
V	Spur to Bahadurgarh	10,601	14,381	22,575	33,349	47,338	64,340	82,765	91,609

The current package of which this report is being submitted falls under Homogenous section I & II. The project corridor under this study is expected to serve average annual daily traffic of more than 1,20,000 in next 25 years design period.



Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)

4

#### .ALIGNMENT DESIGN:

The report details out the alignment design considerations for entire project however; the section below describes the alignment design of Package 2 only

#### Section 2: Between Karala-Kanjhawala Road & Nagloi-Najafgarh Road (Part of Package 2)

The alignment will follow a RoW of 75 metres from Madanpur Dabas to Delhi-Rohtak Railway Line. The arrangement of carriageway along the same section is as shown in Figure 0-2. The same has been done to minimise the land requirement along this section, since this will be covered under fresh land acquisition.

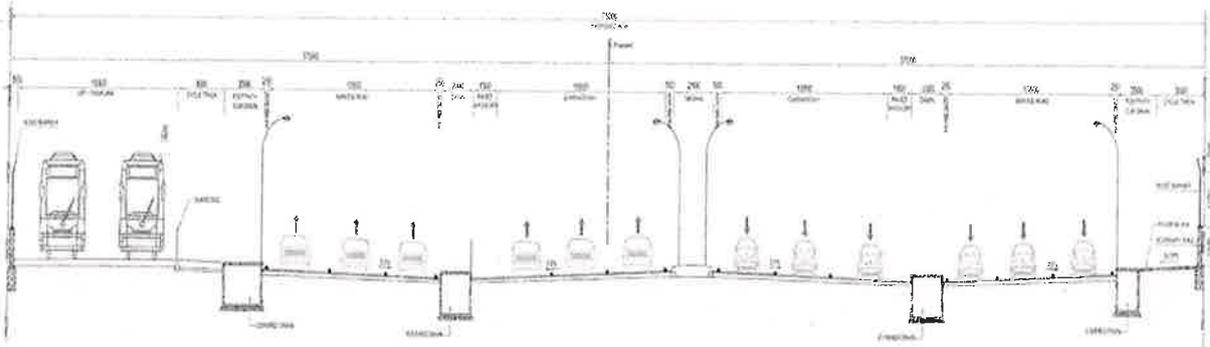


Figure 0-2: Typical Arrangement of UER 2 between Madanpur Dabas & Delhi-Rohtak Rail Line

After crossing Madanpur Dabas, the proposed alignment crosses Delhi-Rohtak Railway line at Km 20+700. Railway over Bridge (RoB) has been proposed for main carriageway & Service road at the railway crossing.

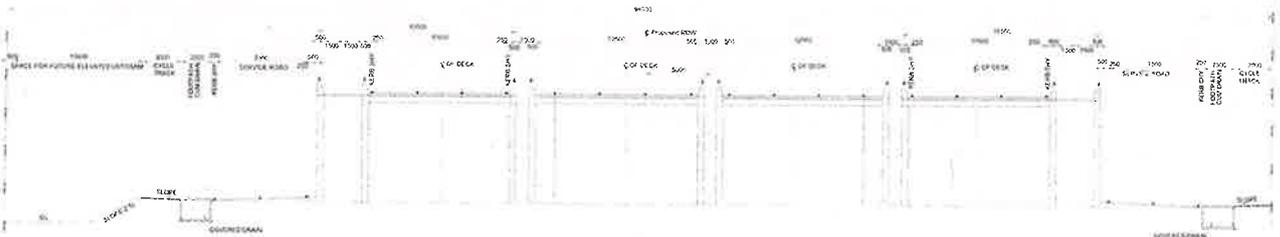


Figure 0-3: Typical Arrangement of UER 2 at Delhi Rohtak-Railway Line

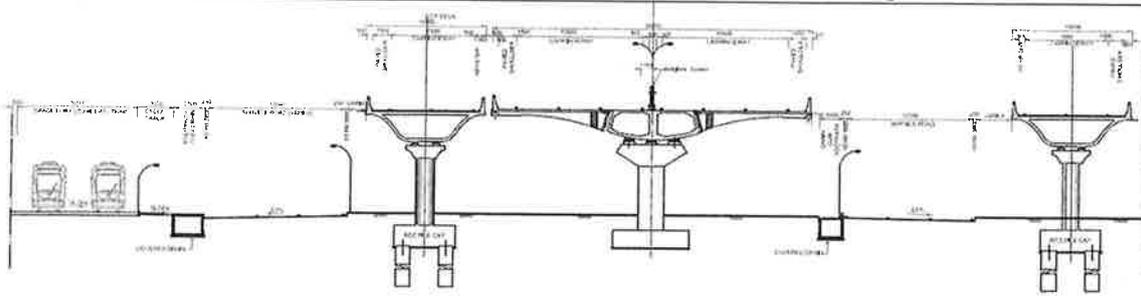
The RoB shall comprise of both footpath & Cycle tracks along with its service roads. Figure 0-3 presents the arrangement of RoB at Delhi-Rohtak Railway Line.

After crossing the RoB, the alignment of UER 2 crosses NH-10 at Chainage 21+450. Main carriageway of UER 2 is proposed to be grade separated at the junction of UER 2 & NH-10 and service roads are proposed to form an at-grade junction with NH-10 (Delhi-Rohtak Highway). Figure 0-4 presents the cross section at Chainage Km 21+950.

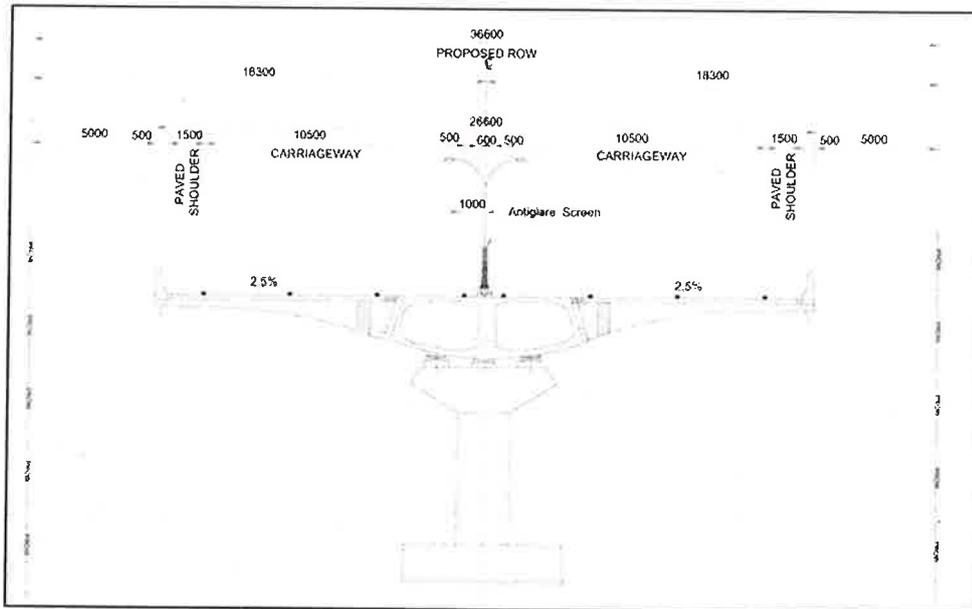




Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)



**Figure 0-7:** Typical Arrangement of UER 2 at Junction with Spur to Bahadurgarh By-pass (Km 26+500) After crossing the junction of UER 2 with Spur to Bahadurgarh, the road has been proposed to be elevated from Bani Air force camp cross road to Najafgarh-Nangloi Road. The same has been done to avoid any land-acquisition along the densely inhabited areas of Dichaon Enclave. **Figure 0-8** presents the cross section along the same.



**Figure 0-8:** Typical Arrangement of UER 2 along Mangeshpur Drain

The minimum & maximum Ground water table along Package 2 has been observed to be 6.1 m & 12.6 m respectively.

## 5. PROJECT DEVELOPMENT DESCRIPTION

### Proposed Pavement

Main Carriageway, Slip Road and the Service road and all ramps of flyovers shall be flexible pavement. Rigid pavement shall be provided in the toll plaza section.

Stone Matrix Asphalt 50mm thick laid in single layer shall be provided as wearing course on all grade separated structures and bridges.

### Design Life





Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)

For the design of pavement, the design life is defined in terms of the cumulative number of standard axles that can be carried before strengthening of the pavement is necessary.

Flexible pavement for new pavement or for widening and strengthening of the existing pavement shall be designed for a minimum design period of 20 years. Stage construction shall not be permitted. All rigid pavements should be designed for a minimum design period of 30 years. The minimum thickness of rigid pavement shall be 300 mm of Pavement Quality Concrete (PQC) and 150 mm of de-bonded Dry Lean Concrete (DLC)

Main carriageway shall be designed for minimum design traffic of 100 MSA. All other interchange ramps shall be designed for minimum design traffic of 20 MSA.

For new flexible pavement of all the above roads, following minimum thickness of the bituminous layers shall be maintained:

- BC - 50 mm
- DBM - 115 mm

For service roads, slip roads, flexible pavement shall be designed for minimum 20 MSA.

Proposal for Widening of Main Carriageway

For UER 2 and all ramps merging to or exiting from the Expressway under this scope of work, the paved carriageway including shyness shall be as per the table below:

Table 0-3: Details of Main Carriageway for UER 2 (Package II)

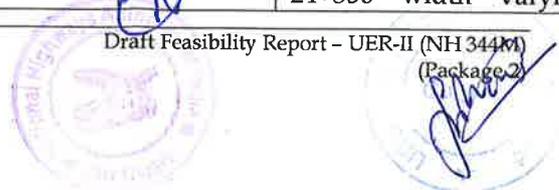
S. No.	Chainage of UER-II		Design Chainage of UER-II/ Individual Link/ Ramp		Length (m)	Width of Paved Carriageway (m)		Remarks
	From	To	From	To		Left C/w	Right C/w	
<b>Main Carriageway (MCR0)</b>								
1	15+000	20+002	15+000	20+002	5002	12.5	12.5	On Each Direction, 10.5 m wide Carriageway, 1.5 m wide paved shoulders on left hand side, 0.5 m wide kerb shy distance on right hand side
2	20+002	21+835	20+002	21+835	1833	13.5	13.5	On Each Direction, 10.5 m wide Carriageway, 1.5 m wide paved shoulders on left hand side, 0.5 m wide kerb shy distance on right hand side and 0.5 m wide crash barrier on both sides The details of existing carriageway are as follows:





**Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)**

S. No.	Chainage of UER-II		Design Chainage of UER-II/ Individual Link/ Ramp		Length (m)	Width of Paved Carriageway (m)		Remarks
	From	To	From	To		Left C/w	Right C/w	
								1. Existing road on LHS between Chainage 21+740 to 21+835 width varying from 0 m to 9.2 m
3	21+835	22+353	21+835	22+353	518	12.5	12.5	On Each Direction, 10.5 m wide Carriageway, 1.5 m wide paved shoulders on left hand side, 0.5 m wide kerb shy distance on right hand side (excluding crash barrier) The details of existing carriageway are as follows: 1. Existing road on LHS between Chainage 21+835 to 22+353 width varying from 6 m to 11.2 m
4	22+353	23+305	22+353	23+305	952	As per the requirement of Toll Plaza		The details of existing carriageway are as follows: 1. Existing Road on LHS from Chainage 22+253 to 23+305 width varying from 3 m to 20.8 m, Existing road on RHS between Chainage 22+782 to 22+305 width varying from 0 m to 10.5 m.
5	23+305	28+450	23+305	28+450	5145	12.5	12.5	On Each Direction, 10.5 m wide Carriageway, 1.5 m wide paved shoulders on left hand side, 0.5 m wide kerb shy distance on right hand side (excluding crash barrier) The details of existing carriageway are as follows: 1. Existing Road on LHS from Chainage 23+305 to 24+155 width varying between 0 m to 19 m, existing road on RHS from Chainage 23+305 to 24+350 width varying





Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)

S. No.	Chainage of UER-II		Design Chainage of UER-II/ Individual Link/ Ramp		Length (m)	Width of Paved Carriageway (m)		Remarks
	From	To	From	To		Left C/w	Right C/w	

Note:

1. Reconstruction of main carriageway (as per the requirement set forth in Schedule D and the Manual) along the location of overlap with existing carriageway shall be included in the scope of work.
2. The design & integration of UER 2-Package 2 with UER 2-Package 1 & UER 2-Package 3 and necessary co-ordination with various agencies including Delhi Irrigation & Flood Control Dept., DDA, DJB, Delhi Police, Indian Railways etc. shall be included in the "scope of works".

**Intersections**

A total of 10 major and 10 minor intersections are proposed to be improved as a part of upgradation project. The junction improvement plan for junctions is listed in Table given below:

**(a) Major Intersections**

**Table 0-4: Major Junction Improvement Proposal**

S. No.	Location	Salient Features	Minimum Length of viaduct to be provided	Road to be carried under/ above the structure	Remarks
1	16+000	Intersection of UER 2 with Karala-Madanpur Dabas Village Road	As per Clause 2.9	Main Carriageway	Main Carriageway Elevated & Service road to form at-grade junction with cross-road.
2	17+406	Intersection of UER 2 with Madanpur Dabas-Kanjhawala Industrial Area Cross Road	As per Clause 2.9	Main Carriageway	Main Carriageway Elevated & Service road to form at-grade junction with cross-road.
3	18+300	Intersection of UER 2 with Madanpur Dabas Cross Road	As per Clause 2.9	Main Carriageway	Main Carriageway Elevated & Service road to form at-grade junction with cross-road.
4	20+700	Intersection of UER 2 with Delhi-Rohtak Railway Line	As per Clause 2.9	Main Carriageway & Service Road	Main Carriageway & Service road Elevated (Railway Over Bridge)
5	21+465	Intersection of UER 2 with NH-10	As per Clause 2.9	Main Carriageway	Main Carriageway Elevated & Service road to form at-grade junction with cross-road.
6	24+456	Intersection of UER 2 with Neelwal-Nangloi Cross Road	As per Clause 2.9	Main Carriageway	Main Carriageway Elevated & Service road to form at-grade junction with cross-road.
7	25+582	Intersection of UER 2 with Baprola-Neelwal Cross Road	As per Clause 2.9	Main Carriageway	Main Carriageway Elevated & Service road to form at-grade junction with cross-road.
8	26+135	Intersection of UER 2 with Spur to Bahadurgarh By-pass	As per Clause 2.9	Main Carriageway	Full Interchange
9	26+790	Intersection of UER 2	As per Clause	Main	Main Carriageway Elevated &





**Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)**

S. No.	Location	Salient Features	Minimum Length of viaduct to be provided	Road to be carried under/ above the structure	Remarks
		with Bani Air For Camp Road	2.9	Carriageway	Service road to form at-grade junction with cross-road.
10	27+945	Intersection of UER 2 with Najafgarh-Nangloi Road	As per Clause 2.9	Main Carriageway	Main Carriageway Elevated & Service road to form at-grade junction with cross-road.

**(b) Improvement of Minor Junctions with at-grade Service roads**

All minor junctions as provided in Clause 15 of Schedule A need to be improved to integrate them with the at-grade service road as per the requirements of Schedule D.

**Table 0-5: Minor Junction Improvement Proposal**

S. No.	Location	Salient Features	Minimum Length of viaduct to be provided	Road to be carried under the structure	Remarks
1	18+948	Left in and Left out on Service Road	NA	NA	Rasulpur Road
2	19+576	Left in and Left out on Service Road	NA	NA	Rani Khera Cross Road
3	20+880	Left in and Left out on Service Road	NA	NA	Veena Enclave Cross Road
4	21+020	Left in and Left out on Service Road	NA	NA	Veena Enclave Cross Road
5	21+820	Left in and Left out on Service Road	NA	NA	Mundka Industrial Area Cross Road
6	21+965	Left in and Left out on Service Road	NA	NA	Mundka Industrial Area Cross Road
7	23+495	Left in and Left out on Service Road	NA	NA	Bakkarwala-Hiran Kudna Road (Existing VUP)
8	23+850	Left in and Left out on Service Road	NA	NA	Bakkarwala Colony/JJ Colony
9	24+110	Left in and Left out on Service Road	NA	NA	Bakkarwala Colony/JJ Colony
10	25+100	Left in and Left out on Service Road	NA	NA	Dichaun Kalan-Bakkarwala Road

**Proposal of Flyovers, Bridges, Culverts and other Structures**

a) Bridges

There are no existing or proposed major or minor bridges on the project road under Package-II. However, 5 new culverts are to be constructed on the project corridor. Detail of the same given in Table 0-6.

**Table 0-6: Proposed Culverts**

Sl. No.	Chainage (km)	Type of Culvert	Span /Opening with span length (m)
1	15+460	Box	2*2
2	18+940	Box	1*6
3	24+434	Box	1*3
4	25+860	Box	2*2





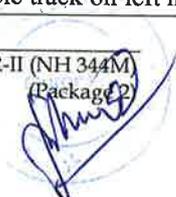
Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)

5	28+400	Box	2*2
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b) Proposal for Elevated Structure/Flyover/Underpass

Table 0-7: Proposal for Elevated Structure, Flyover, Underpasses

S. No.	Design Chainage	Length (m)	Proposed Structure	Width (m)	Vertical Clearance (m)	Remarks
1	15+989 to 16+010	21 (skewed)	VUP	28.5	5.5	Straight VUP for Karala-Madanpur Dabas cross-road (7 m wide carriageway, 1.5 m wide paved shoulders on left hand side, 0.25 m kerb shy distance on right hand side, 1.0 m wide footpath cum covered drain in both directions & 0.5 m wide central median)
2	17+400 to 17+412	12	VUP	28.5	5.5	Straight VUP for Kanjhawala Industrial Area - Madanpur Dabas cross-road (7 m wide carriageway, 1.5 m wide paved shoulders on both sides and 1.0 m wide footpath cum covered drain in both directions)
3	18+294 to 18+307	13 (skewed)	VUP	28.5	5.5	Straight VUP for Madanpur Dabas cross-road (7 m wide carriageway, 1.5 m wide paved shoulders on both sides and 1.0 m wide footpath cum covered drain in both directions)
4	20+176 to 20+628	452	RoB (Railway Over Bridge)	13.5 (each direction)	As per Design Profile	Main Carriage way Elevated (10.5 m wide carriageway, 1.5 m wide paved shoulders on left hand side, 0.5 m wide kerb shy distance on right hand side and 0.5 m wide crash barrier in both directions)
	20+628 to 20+747	119			6.65	
	20+747 to 20+989	242			As per Design Profile	
5	20+180 to 20+650	470	RoB (Railway Over Bridge)	15.5	As per Design Profile	Service Road Elevated NH 1 to Dwarka (10.5 m wide carriageway, 0.25 m wide kerb shy distance on both sides and 0.5 m wide crash barrier in both sides), 1.5 m wide footpath on left hand side, 1.5 m wide cycle track on left hand side & 0.5 m wide crash barrier on left hand side - MIC07
	20+650 to 20+768	118			6.65	
	20+768 to 21+173	405			As per Design Profile	
6	20+179 to 20+609	430	RoB (Railway Over Bridge)	15.5	As per Design Profile	Service Road Elevated from Dwarka to NH-1 (10.5 m wide carriageway, 0.25 m wide kerb shy distance on both sides and 0.5 m wide crash barrier in both sides), 1.5 m wide footpath on left hand side, 1.5 m wide cycle track on left hand
	20+609 to 20+725	116			6.65	
	20+725 to 21+130	405			As per Design Profile	





**Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)**

S. No.	Design Chainage	Length (m)	Proposed Structure	Width (m)	Vertical Clearance (m)	Remarks
						side & 0.5 m wide crash barrier on left hand side - <b>MC08</b>
7	20+989 to 21+887	898	Elevated Flyover	13.5	5.5	Main Carriage way Elevated from NH 1 to Dwarka (10.5 m wide carriageway, 1.5 m wide paved shoulders on left hand side, 0.5 m wide kerb shy distance on right hand side from NH-1 to Dwarka and 0.5 m wide crash barrier on both sides) <b>MC06</b> (central crash barrier shared with MC0A from Chainage 21+831 to 22+286 – Chainage of Main Carriageway) MC06 & MC0A constitute single structure from 21+860 to 22+286 of Centreline.
	21+887 to 22+067	180			As per Design Profile	
8	20+744 to 21+876	1132	Elevated Flyover	13.5	5.5	Main Carriage way Elevated from Dwarka to NH 1 (10.5 m wide carriageway, 1.5 m wide paved shoulders on left hand side, 0.5 m wide kerb shy distance on right hand side from Dwarka to NH-1 and 0.5 m wide crash barrier on both sides) <b>MC0A</b> (central crash barrier shared with MC06 from Chainage 21+831 to 22+286 - Chainage of Main Carriageway) MC06 & MC0A constitute single structure from 21+860 to 22+286 of Centreline.
	21+876 to 22+056	180			As per Design Profile	
9	24+444 to 24+467	23 (skewed)	VUP	29	5.5	Straight VUP at Nangloi-Neelwal Cross Road
10	25+576 to 25+589	13 (skewed)	VUP	29	5.5	Straight VUP at Baprola-Neelwal Cross Road
11	0+188 to 0+542	354	Elevated Flyover	10	As per Design Profile	Elevated Flyover from UER 2 (from NH-1) to Bahadurgarh By-pass (Package V) (7 m wide carriageway, 1.5 m wide paved shoulder on left hand side, 0.5 m wide shy distance on right hand side, 0.5 m wide crash barrier on both sides) – <b>MC01</b>
	0+542 to 0+620	78			5.5	
	0+620 to 0+808	188			As per Design Profile	
12	0+043 to 0+554	511	Elevated Flyover	10	As per Design Profile	Elevated Flyover from Bahadurgarh By-pass (Package V) to UER 2 (towards Dwarka) (7 m wide carriageway, 1.5 m



**Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)**

S. No.	Design Chainage	Length (m)	Proposed Structure	Width (m)	Vertical Clearance (m)	Remarks
	0+554 to 0+678	124			14	wide paved shoulder on left hand side, 0.5 m wide shy distance on right hand side, 0.5 m wide crash barrier on both sides – proposed flyover merges with flyover at Dichaun Kalan at UER 2) – MC02
	0+678 to 1+068	390			As per Design Profile	
13	0+000 to 0+240	240	Elevated Flyover	10	5.5	Elevated Flyover from UER II (From Dwarka) to Bahadurgarh By-pass (7 m wide carriageway, 1.5 m wide paved shoulder on left hand side, 0.5 m wide shy distance on right hand side, 0.5 m wide crash barrier on both sides – proposed flyover merges with flyover at Dichaun Kalan at UER 2) – MC04 (Includes diverging length from Main Elevated Corridor)
	0+240 to 0+445	205			As per Design Profile	
14	26+491 to 26+750	259	Elevated Flyover	26.6	As per Design Profile	Main Carriage way Elevated (10.5 m wide carriageway, 1.5 m wide paved shoulders on left hand side, 0.5 m wide kerb shy distance on right hand side and 0.5 m wide crash barrier in both directions)
	26+750 to 28+015	1265			5.5	
	28+015 to 28+244	229			As per Design Profile	
15	23+493 to 23+497	4 (skewed)	Straight LVUP	62 (skewed)		Widening of Existing Straight VUP for Cross Road

**Note:**

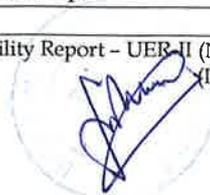
- Vertical clearance of 5.5m, wherever applicable as per the above table, shall be maintained between the at-grade service road, Service road and all the structural components of the elevated/ underground main carriageway / Link/ slip road/ Service Road.
- Width of elevated structure mentioned is the outer width including crash barrier.
- Width of underpass/VUP is clear width excluding the wall thickness. The width is typical and shall cater to adequate set back distance to ensure stopping sight distance corresponding to the design speed.
- Any Changes in GAD, span arrangement or any other features due to comments/observations or approval of the Indian Railways, Irrigation & Flood Control Dept. (Govt. of Delhi), DMRC & other agencies shall not be considered as "change in scope of works"
- No change of scope would be admissible for change of span arrangement of ROB provided total length of RoB remains same.
- For the VUP at Km 23+495, reconstruction of approaches/ ramps of cross road/slip roads shall be included in the scope of works.

**c) Details of Grade Separated Structures**

The summarised details of proposed grade separated structures are given below in table:

**Table 0-8: Details of all Grade Separated Structures**

S. No.	Design Chainage	Length (m)	Proposed Structure	Remarks
1	15+989 to 16+010	21 (skewed)	VUP	Straight VUP for Karala-Madanpur Dabas cross Road
2	17+400 to 17+412	12	VUP	Straight VUP for Kanjhawala Industrial Area - Madanpur Dabas cross-road





**Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)**

3	18+294 to 18+307	13 (skewed)	VUP	Straight VUP for Madanpur Dabas cross-road
4	20+176 to 20+989	813	RoB	Main Carriage way Elevated for Railway Over Bridge (Delhi-Rohtak Railway Line)
5	20+179 to 21+173	994	RoB	Service Road Elevated NH 1 to Dwarka (Delhi-Rohtak Railway Line) – MC07
6	20+179 to 21+130	951	RoB	Service Road Elevated Dwarka to NH -1 (Delhi-Rohtak Railway Line) – MC08
7	20+989 to 22+067	1078	Elevated Flyover	Main Carriage way Elevated from NH 1 to Dwarka – MC06
8	20+744 to 22+056	1312	Elevated Flyover	Main Carriage way Elevated from Dwarka to NH 1 – MC0A
9	24+444 to 24+467	23 (skewed)	VUP	Straight VUP at Nangloi-Neelwal Cross Road
10	25+576 to 25+589	13 (skewed)	VUP	Straight VUP at Baprola-Neelwal Cross Road
11	0+188 to 0+808	620	Elevated Flyover	Elevated Flyover from UER 2 (from NH-1) to Bahadurgarh By-pass (Package V) – MC01
12	0+043 to 1+068	1025	Elevated Flyover	Elevated Flyover from Bahadurgarh By-pass (Package V) to UER 2 (towards Dwarka) – MC02
13	0+000 to 0+445	445	Elevated Flyover	Elevated Flyover from UER II (From Dwarka) to Bahadurgarh By-pass – MC04
14	26+491 to 28+244	1753	Elevated Flyover	Main Carriage way Elevated at Dichaon Enclave
15	23+493 to 23+497	4 (skewed)	LVUP	Existing LVUP to be widened as per Carriageway width

**d) Pedestrian Facilities**

Pedestrian subways have been proposed at all the major junction locations. The list of subway is presented in Table below:

**Table 0-9: Proposal for Subway**

Sl. No.	Location	Type of Structure	Clear Size	Tentative Length	Remarks
			(Horizontal x Vertical)		
1	Km 21+700	Box	5m x 3m	75 m	
2	Km 24+000	Box	5m x 3m	75 m	
3	Km 28+150	Box	5m x 3m	80 m	

Besides the above, 2.5 m wide footpath and 3.0 m wide cycle track is proposed on both sides of the entire project stretch.

**e) Reinforced Earth Wall**

**Table 0-10: Proposal for RE Wall**

S No.	Chainage	Length(m)	Side	Average Height from Ground Level (m)	Remarks
1	15+540 to 15+989	449	Both	4 (Varying from 1 to 8)	RE Wall for Straight VUP for



**Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)**

S No.	Chainage	Length(m)	Side	Average Height from Ground Level (m)	Remarks
	16+010 to 16+520	510			Karala-Madanpur Dabas cross Road
2	17+007 to 17+400	393	Both	4 (Varying from 1 to 8)	RE Wall for Straight VUP for Kanjhawala Industrial Area - Madanpur Dabas cross-road
	17+412 to 18+294	882			
3	18+307 to 18+730	423	Both	4 (Varying from 1 to 8)	RE Wall for Straight VUP for Madanpur Dabas cross-road (Part of RE wall included in RE wall proposed with S. No. 2)
4	20+002 to 20+176	174	Both	4 (Varying from 1 to 8)	RE Wall Along RoB at Main Carriageway (Delhi Rohtak Railway Line)
5	22+067 to 22+298	231	Both	4 (Varying from 1 to 8)	RE Wall Along Elevated Flyover from NH-1 to Dwarka – MC06
6	22+056 to 22+287	231	Both	4 (Varying from 1 to 8)	RE Wall Along Elevated Flyover from Dwarka to NH 1– MC0A
7	23+960 to 24+444	484	Both	4 (Varying from 1 to 8)	RE Wall for Straight VUP at Nangloi-Neelwal Cross Road
	24+467 to 25+020	553			
8	25+108 to 25+576	468	Both	4 (Varying from 1 to 8)	RE Wall for Straight VUP at Baprola-Neelwal Cross Road
	25+589 to 26+140	551			
9	26+310 to 26+491	181	Both	4 (Varying from 1 to 8)	RE Wall Along Elevated Flyover at Dichaun Enclave
	28+244 to 28+357	113			
10	0+058 to 0+188	130	Both	4 (Varying from 1 to 8)	RE wall at Right Turning Structure from UER II (from NH-1) to Bahadurgarh By-pass (MC01)
	0+808 to 1+077	269			
11	1+068 to 1+100	32	Both	4 (Varying from 1 to 8)	RE wall at Right Turning Structure from Bahadurgarh By-pass to UER II (Towards Dwarka) (MC02)
12	0+445 to 0+583	138	Both	4 (Varying from 1 to 8)	RE Wall for Down Ramp from UER II (from Dwarka) to Bahadurgarh By-pass to (MC04)
13	1+100 to 1+187	87	Both	4 (Varying from 1 to 8)	Re Wall merging section from MC04 (merging into MC01) – width varying from 7.5 m to 0 m.
14	18+700 to 19+100	400	Both	4 (Varying from 1 to 8)	RE Wall along RoW Edge

f) Drains

The location of RCC Cover drains are given in **Table 0-11**.

**Table 0-11: Construction of New RCC Drain**

S No.	Stretch	Length (m)	Type	Width (m)	Side	Remarks
<b>VUP at 16+000</b>						
1	15+989 to 16+010	32	Rectangular RCC covered drain	1.0 m	Both	Footpath-cum-Covered Drain
<b>VUP at 17+406</b>						
1	17+400 to 17+412	32	Rectangular RCC covered drain	1.0 m	Both	Footpath-cum-Covered Drain
<b>VUP at 18+300</b>						



Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)

S No.	Stretch	Length (m)	Type	Width (m)	Side	Remarks
1	18+294 to 18+307	35	Rectangular RCC covered drain	1.0 m	Both	Footpath-cum-Covered Drain
<b>VUP at 24+456</b>						
1	24+444 to 24+467	36	Rectangular RCC covered drain	1.0 m	Both	Footpath-cum-Covered Drain
<b>VUP at 25+582</b>						
1	25+576 to 25+589	34	Rectangular RCC covered drain	1.0 m	Both	Footpath-cum-Covered Drain
<b>Main Carriageway</b>						
1	15+000 to 15+540	540	Rectangular RCC covered drain	2.0 m	Both	Covered Drain
2	15+540 to 16+520	980	Rectangular RCC covered drain	1.5 m	Both	Covered Drain
3	16+520 to 17+007	487	Rectangular RCC covered drain	2.0 m	Both	Covered Drain
4	17+007 to 18+730	1723	Rectangular RCC covered drain	1.5 m	Both	Covered Drain
5	18+730 to 20+002	1272	Rectangular RCC covered drain	2.0 m	Both	Covered Drain
6	21+835 to 22+315	480	Rectangular RCC covered drain	2.0 m	Both	Covered Drain
7	22+315 to 22+655	340	Rectangular RCC covered drain	2.0 m	RHS	Covered Drain
8	22+960 to 23+305	345	Rectangular RCC covered drain	2.0 m	LHS	Covered Drain
9	23+305 to 23+960	655	Rectangular RCC covered drain	2.0 m	Both	Covered Drain
10	23+960 to 25+020	1060	Rectangular RCC covered drain	1.5 m	Both	Covered Drain
11	25+020 to 25+108	88	Rectangular RCC covered drain	2.0 m	Both	Covered Drain
12	25+108 to 26+140	1032	Rectangular RCC covered drain	1.5 m	Both	Covered Drain
13	26+140 to 26+790	650	Rectangular RCC covered drain	2.0 m	RHS	Covered Drain
14	26+140 to 26+790	650	Rectangular RCC covered drain	1.5 m	LHS	Covered Drain
15	27+955 to 28+450	495	Rectangular RCC covered drain	2.0 m	Both	Covered Drain
<b>Service Road</b>						
1	15+000 to 20+645	5645	Rectangular RCC covered drain	2.5 m	Both	Covered Drain
2	20+725 to 21+435	710	Rectangular RCC covered drain	2.5 m	Both	Covered Drain
3	21+500 to 26+790	5290	Rectangular RCC covered drain	2.5 m	Both	Covered Drain (Demolition of existing is included in the scope of work)
4	27+955 to 28+450	495	Rectangular RCC covered drain	2.5 m	Both	Covered Drain

**Note:**

1. Detail design of outfall arrangement of all the drains is in scope of concessionaire





Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-II- Karala-Kanjhawala Road to Nagloi-Najafgarh Road (Design Km 15+000 to 28+450)

2. *Along all underpasses and their approaches, 1.5m wide RCC covered drain shall be constructed on left hand side.*
3. *Integration of drain arrangement of UER 2 (Package 1), UER 2 (Package 2) & UER 2 (Package 3) shall be included in the scope of work of the contractor. Necessary co-ordination with various agencies viz. Delhi Irrigation & Flood Control Dept., Delhi Jal Board, DDA, Delhi Police etc. shall also be included in the scope of work of contractor.*





Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-III- Nagloi-Najafgarh Road to Sector 24 Dwarka (Design Km 28+450 to 38+111)

## PROJECT NOTES

### 1. BACKGROUND

Delhi being National Capital generates and attracts huge quantum of traffic not only from within Delhi but also from surrounding region. In order to cater to this regional traffic, Inner and Outer ring roads were planned in 1962, of which only inner ring road could be completed whereas outer ring road is still not a full ring. Additionally, non-Delhi destined traffic i.e. traffic to/from North Indian States (which includes Punjab, Northern Haryana, Jammu & Kashmir) to remaining Indian states (which includes Rajasthan, Southern Haryana, Gujarat, Maharashtra) has to pass through Delhi due to absence of alternate network. This leads to heavy congestion on the existing ring roads.

To address this issue & further decongest Delhi, Delhi Development Authority (DDA) as part of the Delhi Master Plan 2021 proposed Urban Extension Road (UER) - 2 as 3rd ring road of Delhi connecting all the major National Highways in the western side of Delhi including NH-1, NH-10, NH-8 and NH-2. The RoW for UER was decided as 100 m. Although substantial chunk of land was acquired in western part of Delhi between NH 1 and NH 8 including construction of road for a length of 16 Km (approx.) however, no progress was made in the section between NH 8 and NH 2. Also the section between NH 8 and NH 1 has major hindrances in terms of land acquisition including built up structures. DDA then decided to get the UER 2 section between NH 8 and NH 1 to be developed by NHAI and requested to advise on suitable alignment options at hindrance locations. Henceforth, the mandate to develop UER 2 is currently with NHAI.

NHAI has further entrusted the task for preparation of Detailed Project Report (DPR) for development of UER 2 to URS Scott Wilson India Private Limited in association with AECOM India Private Limited as additional works to the contract agreement for Punjab-Package-I project of Bharatmala vide Letter No. NHAI/Planning/EC/Misc./2016/105069 dated 29/08/2017.

### 2. PROJECT DESCRIPTIONS

#### General

The alignment of UER 2 takes off from NH 1 (Ch. 23+800) near village Bankoli and terminates near the junction of Sector 24 in Dwarka. The present alignment is proposed to connect NH 1 with NH 8 passing through Bawana Industrial Area, Rohini Sector 34, 35, 36, 37, Mundka Industrial Area, Najafgarh & Dwarka. The proposed alignment crosses Delhi-Karnal Railway Line, NH 10 and Delhi-Rohtak Railway Line and merges with the contract package of UER 2 taken up with Dwarka Expressway at Sector 24 which further connects it with Shiv Murti at NH 8. Dwarka expressway meets UER 2 at Sector 21 Junction Dwarka and connects UER 2 with

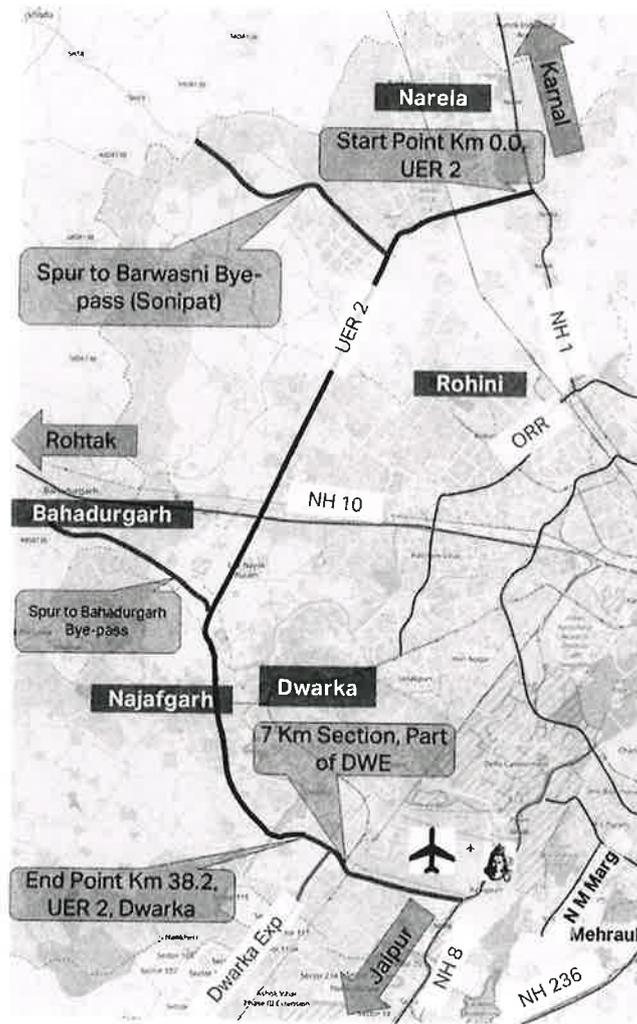




Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-III- Nagloi-Najafgarh Road to Sector 24 Dwarka (Design Km 28+450 to 38+111)

State of Haryana till NH-8 at Km 40.070 near SPR Junction approx. 2 km before the Kherki Daula toll plaza.

The total length of UER 2 is 46.500 Km, out of which 38.11 Km is taken up as part of this project and a part alignment is being taken up with alignment of Dwarka expressway. The complete length of this corridor falls in the state of Delhi. **Figure 0-1** presents the alignment of UER-2.



**Figure 0-1: UER 2 Alignment**

In addition to the section of UER-2 two additional packages for spur to Barwasni Bypass (Sonipat) & Spur to Bahadurgarh Bypass are also to be developed along with it.

**Contract Packaging**

The total project has been further subdivided into 5 contract packages. The recommended contract packages and their respective lengths are described below:

**Table 0-1: Contract Packages (UER 2 & Spurs)**

S. No	Contract Package	Description	Chainage	Length (Km)
1.	Package 1	NH-1 Intersection to Karala-Kanjhawala Road	Km 0.000 to Km 15.000	15.0





Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-III- Nagloi-Najafgarh Road to Sector 24 Dwarka (Design Km 28+450 to 38+111)

S. No	Contract Package	Description	Chainage	Length (Km)
2.	Package 2	From Karala Kanjhawala Road till Nangloi - Najafgarh Road	Km 15.000 to 28.450	13.45
3.	Package 3	From Nangloi - Najafgarh Road till Sector 24 Dwarka	Km 28.450 to 38.111.43	9.66
4.	Package 4	Spur to Sonipat By-pass (Bawana Industrial Area to Barwasni By-pass)	Km 0+000 to 28.300	28.3
5.	Package 5	Spur to Bahadurgarh By-pass {From Km 26+600 of UER 2 (Dichaun Kalan) to Bahadurgarh By-pass/ NH 10 near Village Balaur}	Km 0+000 to 7+600	7.6

The present report being submitted is only for Package III.

### 3. TRAFFIC FOPRECAST

#### Traffic Volume

UER 2 has been divided into five sections (three sections for UER 2 & 2 sections of Spurs) in such a way that traffic intensity within a particular section will be more or less uniform. The homogenous sections (HS) identified and their estimated average annual daily traffic in PCU are listed below:

**Table 0-2: Annual Average Daily Traffic (PCUs)**

S. No.	SECTION	2017	2020	2025	2030	2035	2040	2045	2047
I	NH-1 Intersection to NH 10 Intersection	20,455	28,010	44,358	65,927	93,147	1,25,991	1,49,357	1,74,098
II	NH 10 Intersection to Najafgarh-Dwarka Road	20,987	28,639	45,086	66,674	94,084	1,27,025	1,60,323	1,76,105
III	Najafgarh Road to Dwarka Sector 24 Junction	16,484	22,507	35,440	52,404	73,954	99,838	1,26,066	1,38,500
IV	Spur to Sonipat	7,138	9,710	15,264	22,563	31,914	43,208	54,990	60,607
V	Spur to Bahadurgarh	10,601	14,381	22,575	33,349	47,338	64,340	82,765	91,609

The current package of which this report is being submitted falls under Homogenous section III. The project corridor under this study is expected to serve average annual daily traffic of more than 1,20,000 in next 25 years design period.

### 4. ALIGNMENT DESIGN:

The report details out the alignment design considerations for entire project however; the section below describes the alignment design of Package 3 only

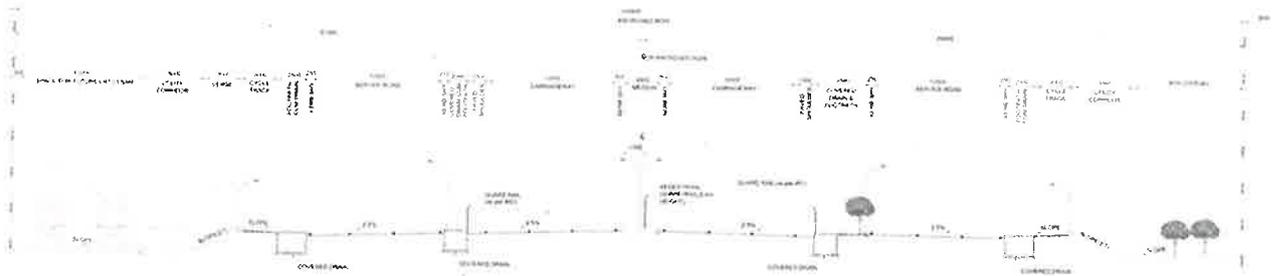


Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-III- Nagloi-Najafgarh Road to Sector 24 Dwarka (Design Km 28+450 to 38+111)

**Section 3: Between Najafgarh-Nangloi Road (Chainage 28+450) and Dwarka Sector 24 (Part of Package III) (Design Chainage 28+450 to 38+111.43)**

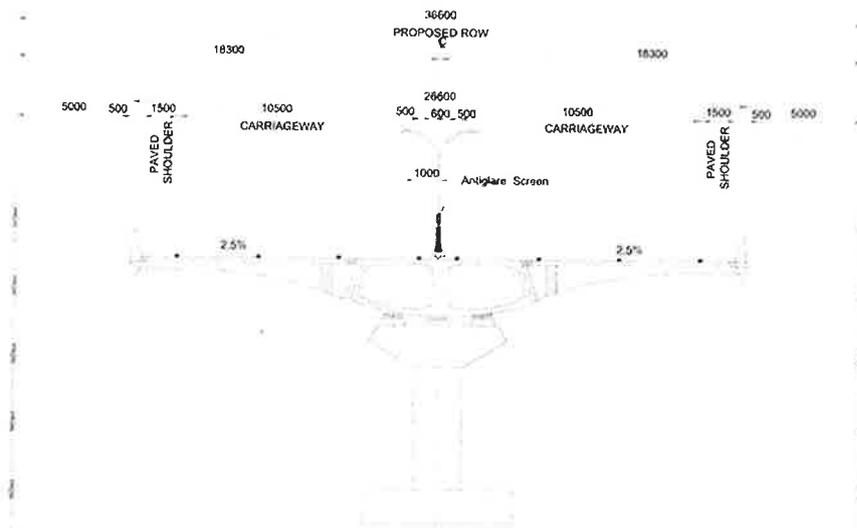
This is the third section of UER 2 to be taken up as Package III of the complete alignment of UER 2 being developed in Phase I. The alignment takes off at Chainage Km 28+450 of UER 2 and terminates at design chainage 38+111.43 of the proposed road. This section has 3 major junctions & 1 major bridge at Najafgarh drain crossing the alignment.

After the proposed flyover at Dichaun Enclave (part of Package II) the road section from will be at-grade till Aman Vihar Colony. **Figure 0-2** presents the cross section along the same.



**Figure 0-2: Typical Arrangement of UER 2 between Najafgarh Nangloi & Aman Vihar**

From Aman Vihar, the alignment has been proposed to be elevated till Roshanpura. This section of the proposed alignment will pass through the Water treatment plant of Delhi Jal Board. **Figure 0-3** presents the cross-section of the alignment passing through Delhi Jal Board. The road has been proposed to be elevated from Najafgarh-Janakpuri road till New Roshan pura.



**Figure 0-3: Typical Arrangement of UER 2 from Najafgarh Janakpuri Road to New Roshanpura**



Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-III- Nagloi-Najafgarh Road to Sector 24 Dwarka (Design Km 28+450 to 38+111)

The alignment is proposed to be at-grade from New Roshanpura till Goyla Village. Thereafter, the alignment is proposed to be elevated at Goyla Village. Service road of UER 2 will make an at-grade junction with Goyla Village Road. Figure 0-4 presents the typical cross section of UER 2 at Goyla Village.

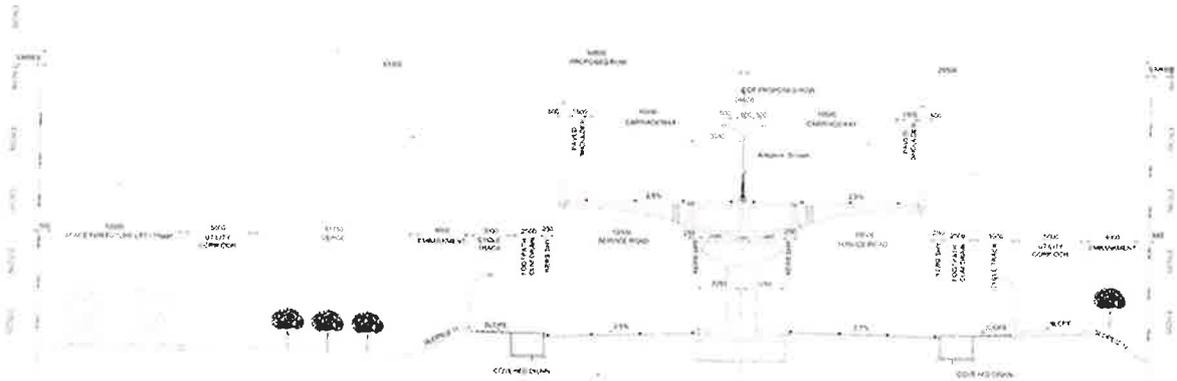


Figure 0-4: Typical Arrangement of UER 2 near Goyla Village

After crossing Goyla village, the alignment is proposed to be at-grade from Goyla Village till Dwarka Sector 24 merging with Dwarka Expressway, barring a VUP proposed at Chhawla-Tajpur Khurd Road.

A major bridge has also been proposed at Najafgarh Drain (Chainage Km 37+400) Figure 0-5 presents the TCS of the same. The bridge has been designed based on the HFL observed at Najafgarh Drain (recorded as 212.125 near Kakraula on 16.8.1977). The minimum & maximum Ground water table along Package 3 has been observed to be 9.5 m & 25.4 m respectively.

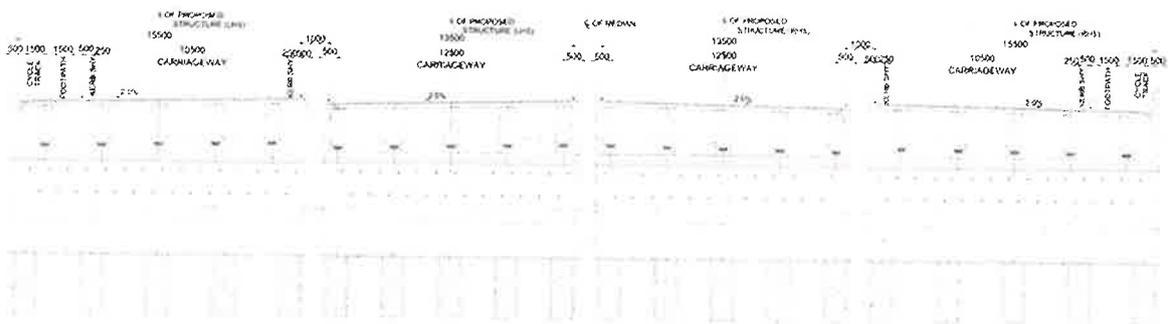


Figure 0-5: Typical Arrangement of UER 2 at Najafgarh Drain (Major Bridge)

The proposed TCS have also been attached in Volume 4-Drawings.



## 5. PROJECT DEVELOPMENT DESCRIPTION

### Proposed Pavement

Main Carriageway, Slip Road, Service road and all ramps of flyovers shall be flexible pavement.

Stone Matrix Asphalt 50mm thick laid in single layer shall be provided as wearing course on all grade separated structures and bridges.

### Design Life

For the design of pavement, the design life is defined in terms of the cumulative number of standard axles that can be carried before strengthening of the pavement is necessary.

Flexible pavement for new pavement or for widening and strengthening of the existing pavement shall be designed for a minimum design period of 20 years. Stage construction shall not be permitted. All rigid pavements should be designed for a minimum design period of 30 years. The minimum thickness of rigid pavement shall be 300 mm of Pavement Quality Concrete (PQC) and 150 mm of de-bonded Dry Lean Concrete (DLC)

Main carriageway, Interchange ramps shall be designed for minimum design traffic of 100 MSA. All other interchange ramps shall be designed for minimum design traffic of 20 MSA.

For new flexible pavement of all the above roads, following minimum thickness of the bituminous layers shall be maintained:

- BC - 50 mm
- DBM - 115 mm

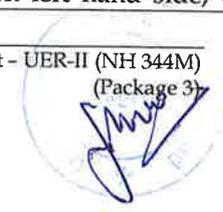
For service roads, slip roads, flexible pavement shall be designed for minimum 20 MSA.

### Proposal for Widening of Main Carriageway

For UER 2 and all ramps merging to or exiting from the Expressway under this scope of work, the paved carriageway including shyness shall be as per the table below:

Table 0-3: Details of Main Carriageway for UER 2

S. No.	Chainage of UER-II		Design Chainage of UER-II/ Individual Link / Ramp		Length (m)	Width of Paved Carriageway (m)		Remarks
	From	To	From	To		Left C/w	Right C/w	
Main Carriageway (MCR0)								
1	28+450	37+870	28+450	37+870	9420	12.5	12.5	10.5 wide Carriageway, 1.5 m wide paved should on left hand side, 0.5 m





Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-III- Nagloi-Najafgarh Road to Sector 24 Dwarka (Design Km 28+450 to 38+111)

S. No.	Chainage of UER-II		Design Chainage of UER-II/ Individual Link / Ramp		Length (m)	Width of Paved Carriageway (m)		Remarks
	From	To	From	To		Left C/w	Right C/w	
								wide kerb shy distance on right hand side (in both directions)
2	37+870	38+111.43	37+870	38+111.43	242	12.5 to 11.5	12.5 to 11.5	Merging section between UER 2 (Package 3) & Dwarka Expressway (Package 2)

Note:

1. Reconstruction of main carriageway (as per the requirement set forth in Schedule D and the Manual) along the location of overlap with existing carriageway shall be included in the scope of work.
2. The design & integration of UER 2-Package 3 with Dwarka Expressway-Package2 and necessary co-ordination with various agencies including DDA, DJB, Delhi Police, Indian Railways etc. shall be included in the "scope of works".

### Intersections

A total of 3 major and 11 minor intersections are proposed to be improved as a part of upgradation project. The junction improvement plan for junctions is listed in Table given below:

#### (a) Major Intersections

Table 0-4: Major Junction Improvement Proposal

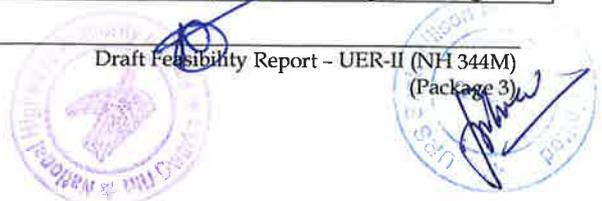
S No.	Location	Salient Features	Minimum Length of viaduct to be provided	Road to be carried under/ above the structure	Remarks
1	29+880	Intersection of UER 2 with Najafgarh-Janakpuri Road	As per Clause 2.9	Main Carriageway	Main Carriageway Elevated, rest all movements remain at-grade
2	33+435	Intersection of UER 2 with Goyla Village-Shyam Vihar Cross Road	As per Clause 2.9	Main Carriageway	Main Carriageway Elevated, rest all movements remain at-grade
3	35+113	Intersection of UER 2 with Tajpur Khurd-Chhawla Cross Road	As per Clause 2.9	Main Carriageway	Main Carriageway Elevated, VUP for straight traffic from Tajpur Khurd to Chhawla, rest all movements remain at-grade

#### (b) Improvement of Minor Junctions with at-grade Service roads

All minor junctions as provided in Clause 15 of Schedule A needs to be improved to integrate them with the at-grade service road as per the requirements of Schedule D.

Table 0-5: Minor Junction Improvement Proposal

S No.	Location	Salient Features	Minimum Length of viaduct to be provided	Road to be carried under the structure	Remarks
1	28+635	Left in and Left out on Service Road	NA	NA	Laxmi Vihar – Nangli Sakrawati Road
2	28+945	Left in and Left out on	NA	NA	Guru Nagar – Nangli





Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-III- Nagloi-Najafgarh Road to Sector 24 Dwarka (Design Km 28+450 to 38+111)

S No.	Location	Salient Features	Minimum Length of viaduct to be provided	Road to be carried under the structure	Remarks
		Service Road			Sakrawati Road
3	29+320	Left in and Left out on Service Road	NA	NA	Guru Nagar – Nangli Sakrawati/Indra Park Road
4	32+010	Left in and Left out on Service Road	NA	NA	New Roshanpura Cross Road
5	32+220	Left in and Left out on Service Road	NA	NA	New Roshanpura Road
6	32+350	Left in and Left out on Service Road	NA	NA	New Roshanpura Cross Road
7	34+740	Left in and Left out on Service Road	NA	NA	Tajpur Khurd-Rewla Rajpur Road
8	35+760	Left in and Left out on Service Road	NA	NA	Chawla-Qutub Vihar II Road
9	37+285	Left in and Left out on Service Road	NA	NA	Road Along Najafgarh Drain
10	37+455	Left in and Left out on Service Road	NA	NA	Road Along Najafgarh Drain
11	37+800	Left in and Left out on Service Road	NA	NA	Najafgarh Road

**Proposal of Flyovers, Bridges, Culverts and other Structures**

a) Bridges

There are no existing major or minor bridges on the project road under Package-III. However, 1 major bridge & 2 new culverts are to be constructed on the project corridor. Detail of the same given in Table 0-6 & Table 0-7.

**Table 0-6: Proposed Major Bridges**

Sl. No	Chainage (km)	Type of Structure	Span Arrangement (m)	Width (m)	Remarks
1	37+293 to 37+443	Slab	5 x 30.0m	61.0	Bridge over Najafgarh Drain

**Table 0-7: Proposed Culverts**

Sl. No	Chainage (km)	Type of Culvert	Span /Opening with span length (m)
1	35+400	Box	2*2
2	37+200	Box	2*2

b) Proposal for Elevated Structure/Flyover/Underpass

**Table 0-8: Proposal for Elevated Structure, Flyover, Underpasses**

S. No.	Design Chainage	Length (m)	Proposed Structure	Width (m)	Vertical Clearance (m)	Remarks
1	29+524 to 29+845	321	Elevated Flyover	26.6	As per design Profile	Main Carriage way Elevated (10.5 m wide carriageway, 1.5 m wide paved shoulders on left
	29+845 to 31+755	1910			5.5 m to 10.5 m	



Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-III- Nagloi-Najafgarh Road to Sector 24 Dwarka (Design Km 28+450 to 38+111)

S. No.	Design Chainage	Length (m)	Proposed Structure	Width (m)	Vertical Clearance (m)	Remarks
	31+755 to 32+156	401			As per design Profile	hand side, 0.5 m wide kerb shy distance on right hand side and 0.5 m wide crash barrier on both sides)
2	32+775 to 33+200	425	Elevated Flyover	26.6	As per design Profile	Main Carriage way Elevated (10.5 m wide carriageway, 1.5 m wide paved shoulders on left hand side, 0.5 m wide kerb shy distance on right hand side and 0.5 m wide crash barrier on both sides)
	33+200 to 33+565	365			5.5 m	
	33+565 to 33+894	329			As per design Profile	
3	35+096 to 35+130	34 (Skewed)	Underpass Box (VUP)	20	5.5	VUP for cross road (7 m wide carriageway in both directions, 1.5 m wide paved shoulder in both directions, 0.25 kerb shy distance on right hand side in both directions and 1 m wide footpath cum covered drain in both directions, 0.5 m wide median)

**Note:**

1. Vertical clearance of 5.5m, wherever applicable as per the above table, shall be maintained between the at-grade service road, Service road and all the structural components of the elevated/ underground main carriageway / Link/ slip road/ Service Road.
2. In all underpasses for the service road, links and ramps, the width of underpass including the merging locations shall cater to adequate set back distance to ensure stopping sight distance corresponding to the design speed.
3. Width of elevated structure mentioned is the outer width including crash barrier.
4. Width of underpass is clear width excluding the wall thickness. The width is typical and shall cater to adequate set back distance to ensure stopping sight distance corresponding to the design speed.
5. Any Changes in GAD, span arrangement or any other features due to comments/observations or approval of the Indian Railways & other agencies shall not be considered as "change in scope of works"

c) Details of Grade Separated Structures

The summarised details of proposed grade separated structures are given below in table:

**Table 0-9: Details of all Grade Separated Structures**

S. No.	Design Chainage	Length (m)	Proposed Structure	Remarks
1	29+524 to 32+156	2632	Elevated Flyover	Main Carriageway Elevated from Najafgarh-Janakpuri Road to Sewerage Treatment Plant (New Roshan Pura)
2	32+775 to 33+894	1119	Elevated Flyover	Main Carriageway Elevated for Goyla Village & Shyam Vihar Road
3	35+096 to 35+130	34 (skewed)	Underpass Box (VUP)	Cross VUP for Tajpur Khurd-Chhawla Road

d) Pedestrian Facilities

Pedestrian subways have been proposed at all the major junction locations. The list of subway is presented in Table below:

**Table 0-10: Proposal for Subway**



Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-III- Nagloi-Najafgarh Road to Sector 24 Dwarka (Design Km 28+450 to 38+111)

Sl. No.	Location	Type of Structure	Clear Size	Tentative Length	Remarks
			(Horizontal x Vertical)		
1	Km 28+800	Box	5m x 3m	95m	
2	Km 33+200	Box	5m x 3m	95m	
3	Km 34+700	Box	5m x 3m	95m	
4	Km 35+200	Box	5m x 3m	95m	
5	Km 35+800	Box	5m x 3m	95m	

Besides the above, 2.5 m wide footpath and 3.0 m wide cycle track is proposed on both sides of the entire project stretch.

e) Reinforced Earth Wall

Table 0-11: Proposal for RE Wall

S. No.	Chainage	Length(m)	Side	Average Height from Ground Level (m)	Remarks
1	29+355 to 29+524	169	Both	4 (Varying from 1 to 8)	Main Carriage way Elevated (10.5 m wide carriageway, 1.5 m wide paved shoulders on left hand side, 0.5 m wide kerb shy distance on right hand side and 0.5 m wide crash barrier on both sides)
	32+156 to 32+288	132	Both	4 (Varying from 1 to 8)	
2	32+603 to 32+775	172	Both	4 (Varying from 1 to 8)	Main Carriage way Elevated (10.5 m wide carriageway, 1.5 m wide paved shoulders on left hand side, 0.5 m wide kerb shy distance on right hand side and 0.5 m wide crash barrier on both sides)
	33+894 to 34+055	161	Both	4 (Varying from 1 to 8)	
3	34+615 to 35+096	481	Both	4 (Varying from 1 to 8)	Main Carriage way Elevated (10.5 m wide carriageway, 1.5 m wide paved shoulders on left hand side, 0.5 m wide kerb shy distance on right hand side & 0.5 m wide crash barrier in both directions. 3 m wide central median)
	35+130 to 35+640	510	Both	4 (Varying from 1 to 8)	
4	37+000 to 37+293	293	LHS	3 (Varying from 1 to 6)	RE Wall Along Major Bridge at Najafgarh Drain (Chainage 37+368) (Along Service Road)
	37+200 to 37+293	93	RHS	3 (Varying from 1 to 6)	

f) Drains

The location of RCC Cover drains are given in **Table 0-12**.

Table 0-12: Construction of New RCC Drain

S No.	Stretch	Length (m)	Type	Width (m)	Side	Remarks
Main Carriageway						
1	28+450 to 29+875	1,425	Rectangular RCC covered drain	2.0 m	Both	Covered Drain Demolition of existing is included in the scope of work
2	31+762 to 33+433	1,671	Rectangular RCC covered drain	2.0 m	Both	Covered Drain Demolition of existing is included in the scope of work



Development of Urban Extension Road-II (UER-II) NH-344M from Design Km 0+000 at NH-1 Intersection (Km 23+800, near Bankoli village) to Design Km 38+111 near Sector 24, Dwarka in the state of NCT of Delhi:- Package-III- Nagloi-Najafgarh Road to Sector 24 Dwarka (Design Km 28+450 to 38+111)

S No.	Stretch	Length (m)	Type	Width (m)	Side	Remarks
3	33+544 to 34+615	1,071	Rectangular RCC covered drain	2.0 m	Both	Covered Drain Demolition of existing is included in the scope of work
4	34+615 to 35+640	1,025	Rectangular RCC covered drain	1.5 m	Both	Covered Drain Demolition of existing is included in the scope of work (Along VUP RE Wall)
5	35+640 to 37+293	1,653	Rectangular RCC covered drain	2.0 m	Both	Covered Drain Demolition of existing is included in the scope of work
6	37+443 to 38+111.43	669	Rectangular RCC covered drain	2.0 m	Both	Covered Drain Demolition of existing is included in the scope of work
<b>Service Road</b>						
1	28+450 to 29+875	1,425	Rectangular RCC covered drain	2.5 m	Both	Footpath-cum-Covered Drain Demolition of existing is included in the scope of work
2	31+762 to 33+433	1,671	Rectangular RCC covered drain	2.5 m	Both	Footpath-cum-Covered Drain Demolition of existing is included in the scope of work
3	33+544 to 37+923	4,379	Rectangular RCC covered drain	2.5 m	Both	Footpath-cum-Covered Drain Demolition of existing is included in the scope of work
4	37+443 to 38+111.43	188	Rectangular RCC covered drain	2.5 m	Both	Footpath-cum-Covered Drain Demolition of existing is included in the scope of work

**Note:**

1. Detail design of outfall arrangement of all the drains is in scope of concessionaire
2. Along all underpasses/VUPs, 1.5m wide RCC covered drain shall be constructed on left hand side.
3. Integration of drain arrangement of UER 2 (package 3) & Dwarka Expressway (Package 2) shall be included in the scope of work of the contractor. Necessary co-ordination with various agencies viz. Delhi Jal Board, DDA, Delhi Police etc shall be included in the scope of work of contractor.

