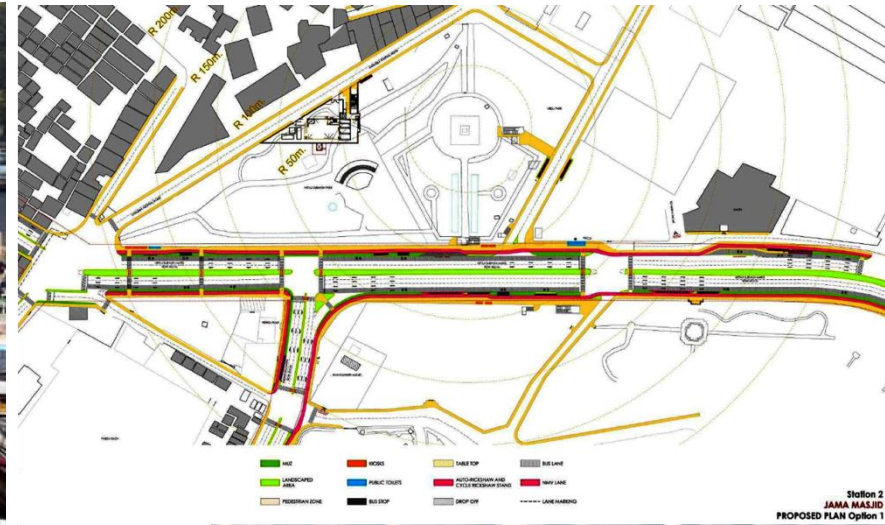




PWD, Delhi

Decongestion Strategies for Delhi Roads



Presented By: Sh.Manoj Kumar(CPM); Sh.Ravi Kant (S.E); Sh.A.K.Agrawal (S.E)
Public Works Department - GNCTD

Agendas

Main Challenges in Delhi

- Population, Land , Multiplicity of Authorities, Implementation

Traffic Scenario & Issues in Delhi

- Road Network, Vehicular Growth, Congestion, Air Quality.

Global Cities Comparison

- Commuters and Modal Share.

Best Likely Approaches – Pros & Cons in Delhi

- Multi Modal Integration, NMT, Junction Improvements, Bus System, Elevated Corridors, Parking Management, Smart Transport Systems and Enforcement.

Strategies for Improvement

- Multi modal integration, Junction Improvements, Elevated Corridors.

Main Challenges in Delhi

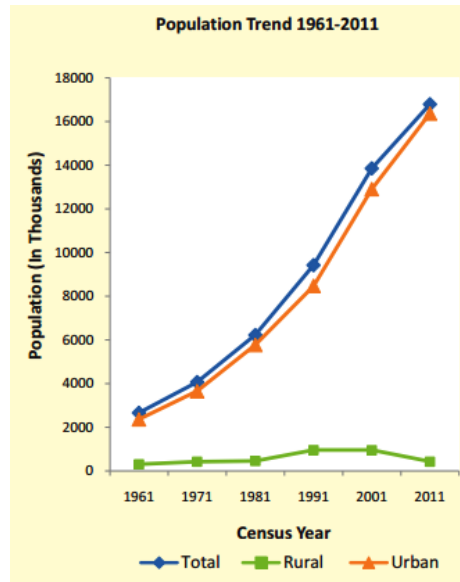
Main Challenges in Delhi

Population:

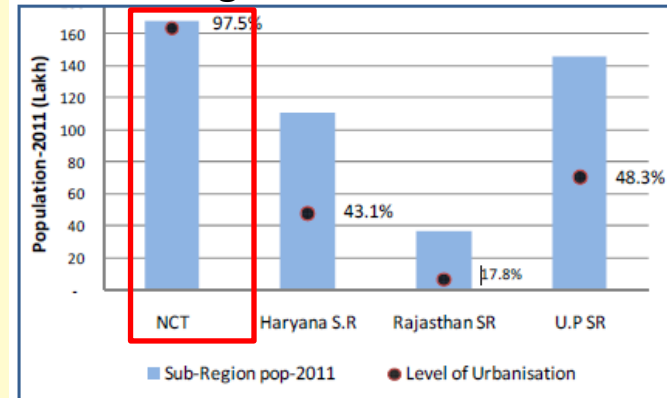
NCT- Delhi:

- **Area:** 1483 Sq.Km
- **Total Population (2011 Census):** 16,787,941
- **Urban Population:** 97.5%.
- **Pop Density:** 11,320 persons/Sq.Km
- **Growth Rate 2001- 2011:** 21.2

Source: Census of India 2011- Primary Census Abstract Report



Level of Urbanisation in Sub-Regions of NCR-2011



Source: Census of India, 2011* (Provisional)

Sub-Region Wise Distribution of Population NCR (1981-2011)

	Population				Share of Population in NCR (%)			
	1981	1991	2001	2011	1981	1991	2001	2011
NCT-Delhi	62,20,406	94,20,644	1,38,50,507	1,67,53,235	31.4	34.4	37.3	36.4
Haryana	49,38,541	66,43,604	86,87,050	1,10,37,548	24.8	24.3	23.4	24.0
Rajasthan	17,55,575	22,96,580	29,92,592	36,71,999	8.8	8.4	8.1	8.0
U.P	69,68,646	90,01,704	1,15,70,117	1,45,84,234	35.0	32.9	31.2	31.6
NCR	1,98,83,168	2,73,62,532	371,00,266	4,60,49,032	100.0	100.0	100.0	100.0

Source: Census of India 1981, 1991, 2001, 2011* (*provisional)- Primary Census Abstract Report

Land : Availability of land and problems in land acquisition have delayed many projects.

Forest & Tree Cover : 20.2 % (2009) aiming for 33%.

Multiplicity of Authorities

Agencies Responsible for Policy and Implementation

□ Lands:

- DDA
- MCD
- Delhi Cantonment Board
- NCRPB
- MoUD
- UTTIPEC
- PWD
- Railways
- Ministry of Defence
- State Govts (U.P, Haryana)

□ Roads

- PWD
- MCD
- NDMC
- Delhi Cantt Board

Multiplicity of Different Modes of Transport:

- Transport Department
- DTC
- DMRC- Metro
- Railways
- Taxi Associations

Policy Implementation Issues:

- Ownership of land rests with different departments.
- Budget allocations for planning and development.
- Inter-related departments under various jurisdictions :
 - Traffic Police- Central Govt.
 - Parking:
 - Planning- MCD, NDMC
 - Maintenance- PWD
- Absence of Innovative Approaches.

Traffic Scenario in Delhi

Glimpses of Traffic Issues in Delhi

Decongestion Strategies for Delhi Roads



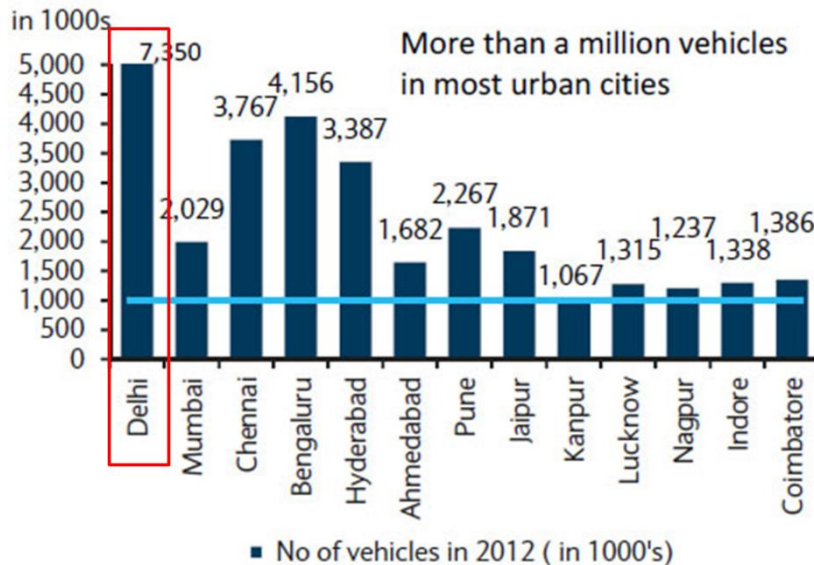
Traffic Scenario in Delhi

Traffic Congestion:

- **Defined as excess demand for road travel.**
Supply of road travel infrastructure is not sufficient to meet demand levels to a given level of service
- **Assess the level of congestion:**
 - Average speed, L.O.S (V/C), delay and travel time variability

Vehicles in Urban Cities:

More than a million vehicles in most of the leading developed cities in India

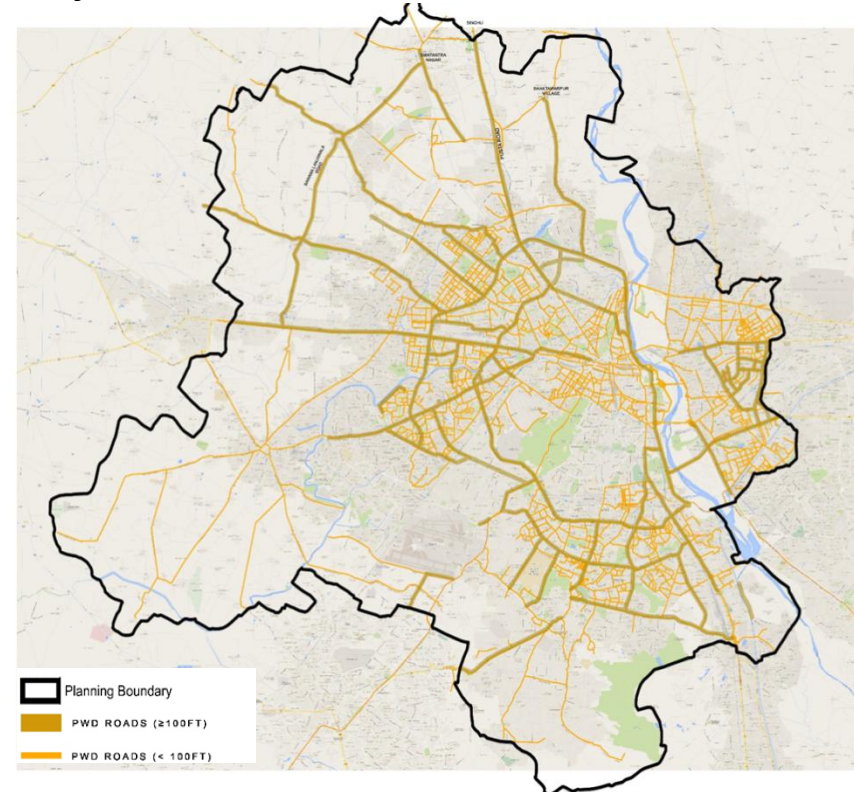


Source: MORTH, Barclays Research

Road Network & Length:

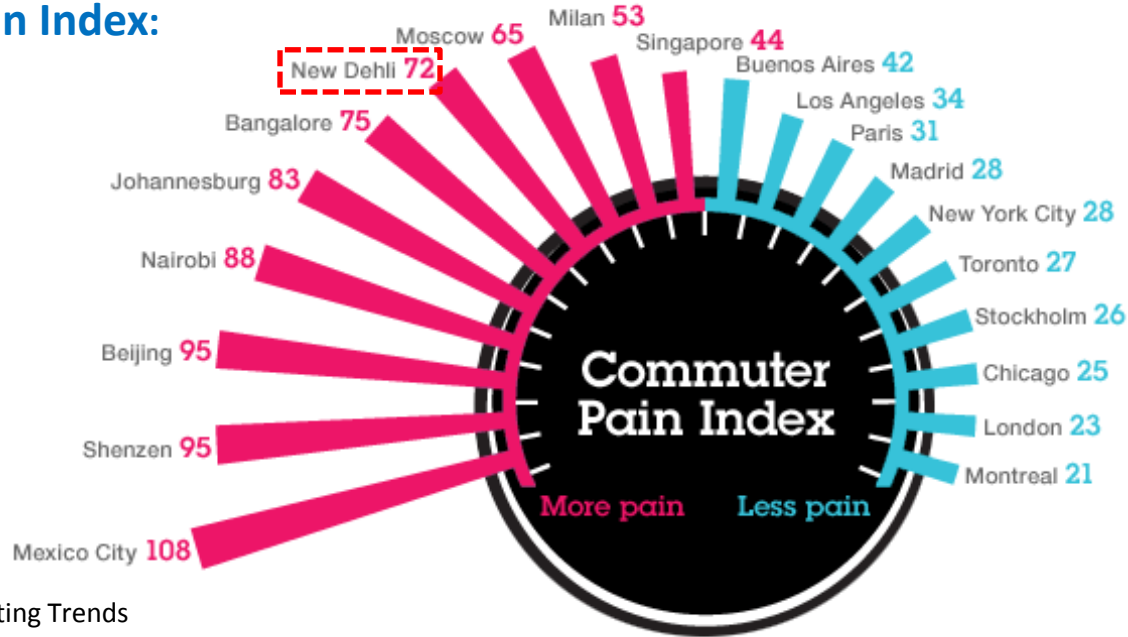
- Current Scenario:
 - **Road density** of about 20 Km per Sq.Km.
 - **Volume / Capacity Ratio** of roads has reached 0.8 to 2.0
 - **Average speed** is from 5 Km/ hours to 20 Km/hours.

Major Road Network in Delhi



Traffic Scenario in Delhi

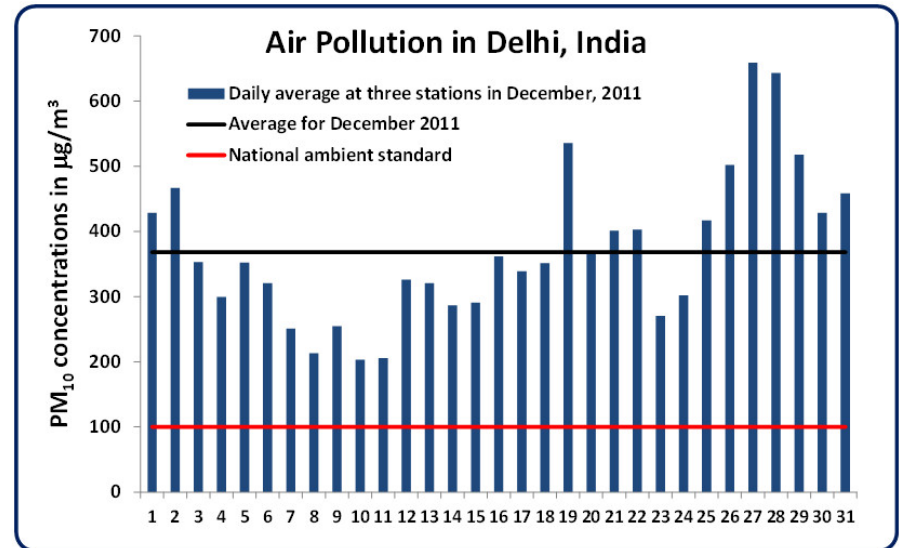
Commuter Pain Index:



Source: Online Marketing Trends

Air Quality:

- Delhi has lost the air quality gains of its first generation actions through public transport buses and three wheelers to natural gas, relocation of polluting industries and improvement in emissions.
- Largely because of the explosive increase in vehicle numbers due to increased dependence on personal vehicles.



Traffic Issues in Delhi

WHAT PLAGUES THE ROADS OF DELHI?

Delhi has arguably the widest roads in the country but still suffers from some of the worst choke points. Experts invited by HT have identified that the following 10 problems are largely responsible for clogging our streets and devised solutions that can unclog them.



FEWER BUSES

Bus service is unreliable. There are less than 6,500 buses though the requirement is 11,000. Taxis are few and autorickshaws usually overcharge.
SOLUTION: More fund allocation required so is a hike in number of buses and their proper maintenance. Curb overcharging by autorickshaws.



LAST-MILE CONNECTIVITY

Lack of last-mile connectivity prevents many from shifting to Delhi Metro. Metro's own feeder bus service is inadequate.
SOLUTION: Formulate a plan to make for an affordable, safe and reliable last-mile option. Cycle sharing can also be promoted.



ILLEGAL PARKING

Illegal parking along roads slows traffic. Rising number of cars and lack of adequate parking has led to this problem.
SOLUTION: Identify problem areas and work out area specific plans. Develop multi-level and underground parkings.



TRAFFIC VIOLATIONS

Bad driving practices add to congestion. Driving licences are easy to get and tests are not stringent enough.
SOLUTION: Making the process of getting driving licence tough. Hike penalties and run awareness drives.



FREIGHT VEHICLES

Trucks not destined for Delhi clog roads.
SOLUTION: Expedite peripheral highways so that unwanted trucks don't enter Delhi. Warehouses at borders will allow huge containers to unload goods to smaller vehicles.



MORE CARS

Number of private cars is growing at the rate of 7-8% annually.
SOLUTION: Introduce high parking rates, congestion taxing. Levy high taxes on second cars. Make personal parking must for anyone buying a new car.



ROAD ENGINEERING AND DESIGN

Delhi's roads are poorly designed and lack lane markings, zebra crossings and signages. Road geometry is poor and quality poor.
SOLUTION: Involve road engineers at the planning stage and build roads that conform to international standards.



PEDAL POWER

Almost 60% daily trips are less than 6km and can easily be done on bicycles but there are no cycle tracks.
SOLUTION: Develop cycle tracks along all major roads. Develop congested parts of the city exclusive for pedestrians and cyclists. Build cycle stands and promote bike sharing.



ENCROACHMENT

Most sidewalks have been encroached upon by shopkeepers and street vendors forcing pedestrians to walk on roads. Hawkers have eaten up right of way along important roads.
SOLUTION: Identify Hawker zones, making streets 'No Hawking Zones'. This needs coordination between civic agencies and police.



INTELLIGENT TRAFFIC MANAGEMENT SYSTEM

Traffic management is dependent on number of boots. Signals run on conventional system that give a particular time to each traffic arm leading to long queues on other sides.
SOLUTION: Intelligent traffic management system with sensors and cameras should be introduced immediately. There should be variable messaging system that guides motorists of heavy traffic areas and suggests alternative routes.

Modal Share Comparison in Different Cities.

DELHI

Figure 9: Mode Share in Delhi

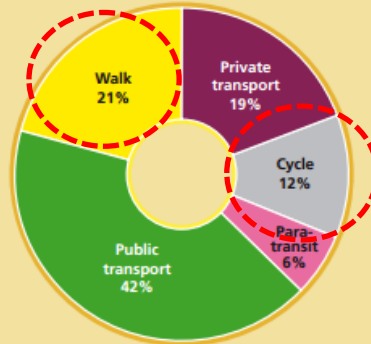
Population : 16 million
Land Area : 1483 sq.km

Mode share

Based on the number of journeys by main mode of transport. It includes all modes for all purposes. Mass transit constitutes 42% of all journeys.

Data Sources:

Census of India 2011
Ministry of Urban Development, 2008. Study on Traffic and Transportation Policies and Strategies in Urban Areas in India



LONDON

Figure 12: Mode Share in London

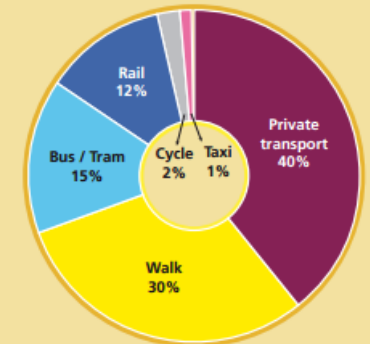
Population: 7.8 million
Land area: 1,579 km²

Mode share

Based on the number of journeys by main mode of transport. It includes all modes for all purposes. Mass transit constitutes 27% of all journeys.

Data Sources:

GLA Intelligence Update 11-2011, Greater London Authority, U.K.
Travel in London, Supplementary Report: London Travel Demand Survey (LTDS) 2011, Transport for London, U.K.



MUMBAI

Figure 15: Mode Share in Mumbai

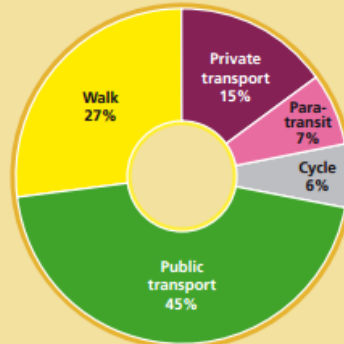
Population: 12.5 million
Land area: 603 km²

Mode share

Based on the number of journeys by main mode of transport. It includes all modes for all purposes. Mass transit constitutes 45% of all journeys.

Data Sources:

Census of India 2011
Ministry of Urban Development, 2008. Study on Traffic and Transportation Policies and Strategies in Urban Areas in India



SEOUL

Figure 21: Mode Share in Seoul

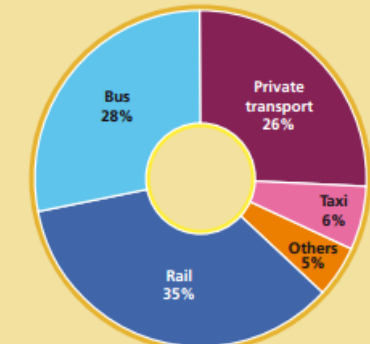
Population: 10.6 million
Land area: 605 km²

Mode share

Based on the number of journeys by main mode of transport. It includes **only motorised modes** for all purposes. Mass transit constitutes 63% of motorised journeys.

Data Sources:

Seoul Statistics – Population Trend in 2010
Seoul Statistics – Composition of Daily Passenger Transportation in 2009



BANGALORE

Figure 2: Mode Share in Bangalore

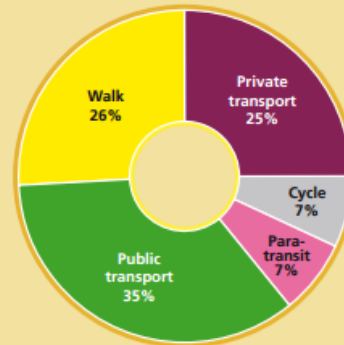
Population: 8.4 million
Land area: 226 km²

Mode share

Based on the number of journeys by main mode of transport. It includes all modes for all purposes. Mass transit constitutes 35% of all journeys.

Data Sources:

Census of India 2011
Ministry of Urban Development, 2008. Study on Traffic and Transportation Policies and Strategies in Urban Areas in India



SHANGHAI⁴

Figure 22: Mode Share in Shanghai

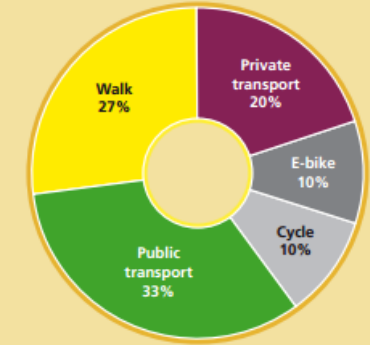
Population: 16.4 million
Land area: 2,141 km²

Mode share

Based on the number of journeys by main mode of transport. It includes all modes for all purposes. Mass transit constitutes 33% of all journeys.

Data Sources:

Shanghai Yearbook 2011
Shanghai Construction and Transport Commission 2009 (data provided directly)



Best Strategies and Approaches in Delhi

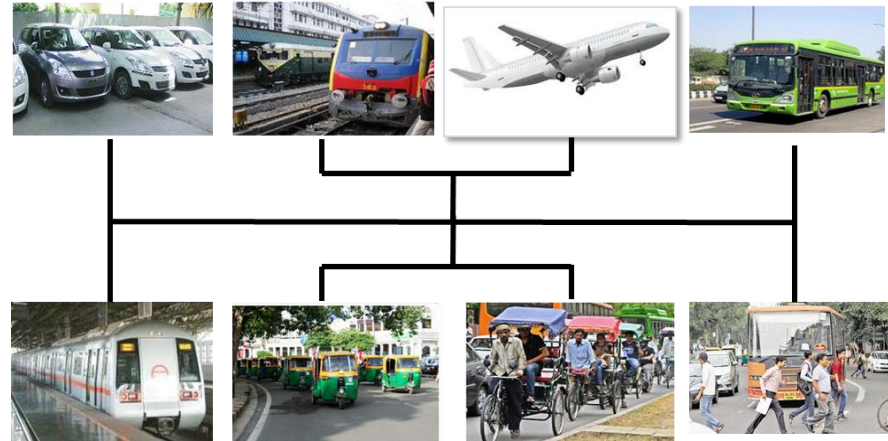
Target: *To decongest Delhi through prioritization and promotion of public transport and inducing people to shift towards it from their private vehicles.*

- ✓ Multi Model Integration at Metro Stations, Railways and ISBT.
- ✓ NMT- Bicycle sharing system with bicycle tracks throughout the city
- ✓ Improvement of junctions
- ✓ Bus services & BRT Corridor development
- ✓ Integrated Road Network-new bypass / elevated roads
- ✓ Parking Pricing & Management
- ✓ Smart Transport System

Best Strategies and Approaches in Delhi

Multi Model Integration at Metro Stations, Railways and ISBT:

- Delhi Metro shall soon be the city's life-line.
- Need a comprehensive strategy for affecting the modal share of the commuters.
- Improved accessibility in Metro stations design for pedestrians and NMT.
- Last mile connectivity within a 2 Km zone of all Metro Stations to optimize trips and connectivity.



Multi Model Integration

NMT- Bicycle sharing system

- Delhi has a high mode share of walking and cycling trips - totalling nearly 46%.
- With a mix of slow and fast moving traffic on the roads, travel by bicycle and rickshaws is very unsafe.
- Need for dedicated cycling infrastructure.



Best Strategies and Approaches in Delhi

Improvement of junctions

- Poor design of junctions is primary reason for traffic jams and also pedestrian and cyclist fatalities on roads.
- Less number and poor design / management of junctions which greatly reduces the capacity of the road network to throughput and disperse traffic.
- Adequate number of junctions and proper geometric design– help disperse traffic efficiently in multiple directions, while ensuring safety of all road users.



Bus services & BRT Corridor Improvement:

- Delhi still carries more than 60% of the passengers on buses from the overall mass transit ridership –higher than Metro.
- Bus Rapid Transit System, when designed & run as an efficient and integrated system.
- In Delhi, on the pilot corridor, studies have shown that the speed of the bus increased thereby carrying more passengers per min.



Best Strategies and Approaches in Delhi

Integrated Road Network-new bypass / Elevated Roads :

- To reduce congestion on the existing roads, it will be more appropriate to identify additional / alternative links and access corridors along drain and railway line to augment the current network as no other land is not available for road network development.



Parking Pricing & Management:

- Parking is one of the major problems being faced in Delhi.
- Attributed to phenomenal increase in personalized vehicles and their use and the related aspect of unregulated and under-priced parking.
- Absence of organized parking space and facilities, valuable road space is being used for parking.
- **‘Demand Management’** approach through enforcement and pricing policy.



Best Strategies and Approaches in Delhi

Smart Transport System & Enforcement:

- Smart Transport Systems like ITS, have long been the backbone of all successful public transport systems across the world.
- **Traffic rules and regulations enforcement:** Responsible for efficient operations and traffic management in Delhi.



Multi-Modal Interchange Integration Plan in Delhi

Multi-Modal Interchange Integration Plan- Jama Masjid

Project Site Location:

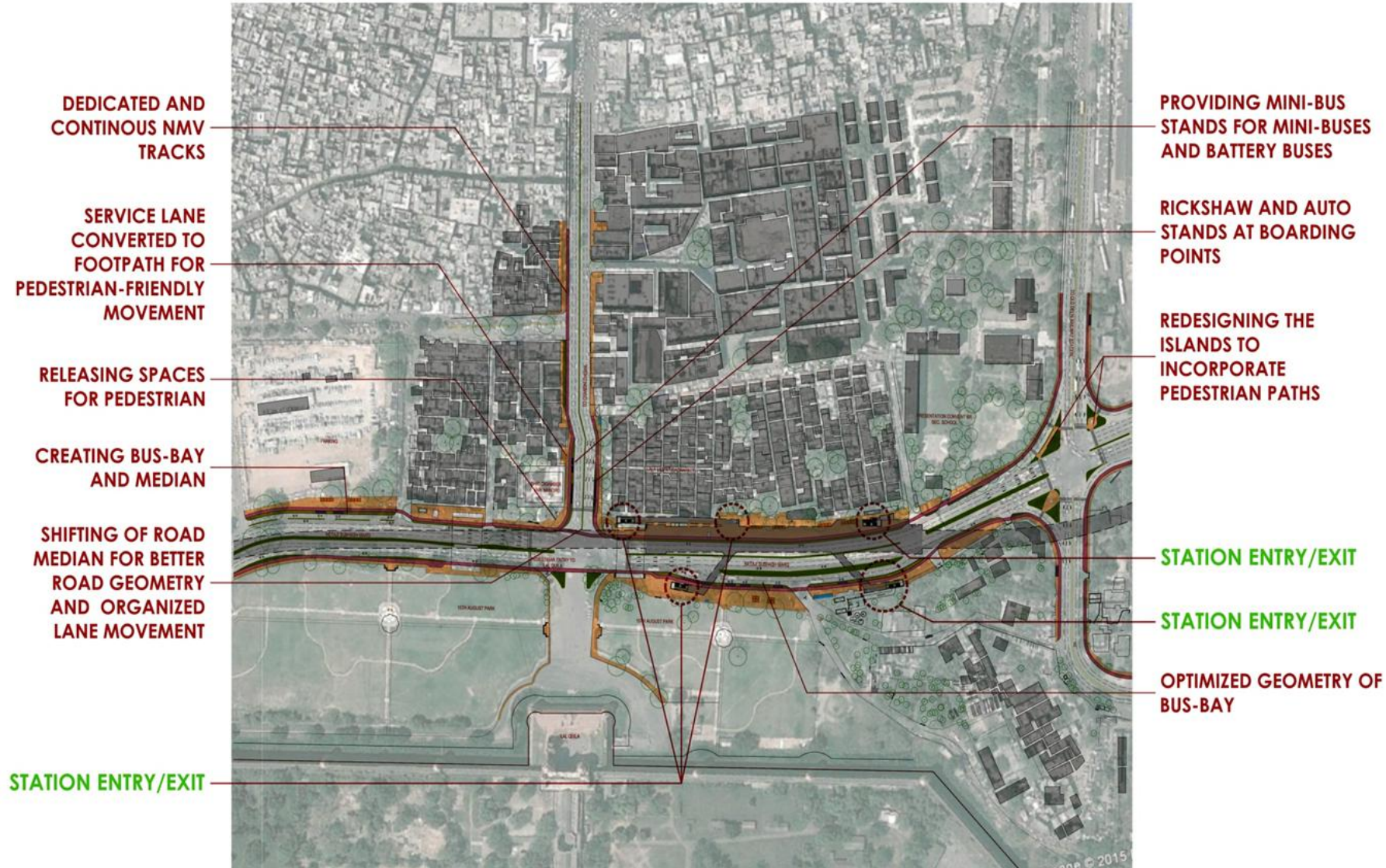


MULTIMODAL INTEGRATION AT PHASE III METRO STATIONS

Multi-Modal Interchange Integration Plan- Jama Masjid

Proposed Concept Plan:

Decongestion Strategies for Delhi Roads



Multi-Modal Interchange Integration Plan- Jama Masjid

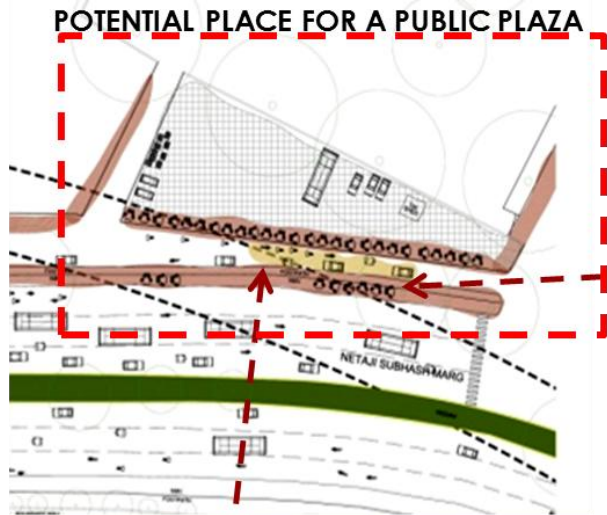
Concept Proposal:



- LANDSCAPED AREA
- PUBLIC TOILETS
- AUTO-RICKSHAW AND CYCLE RICKSHAW STAND
- NMV LANE
- PEDESTRIAN ZONE
- BUS STOP
- DROP OFF
- LANE MARKING

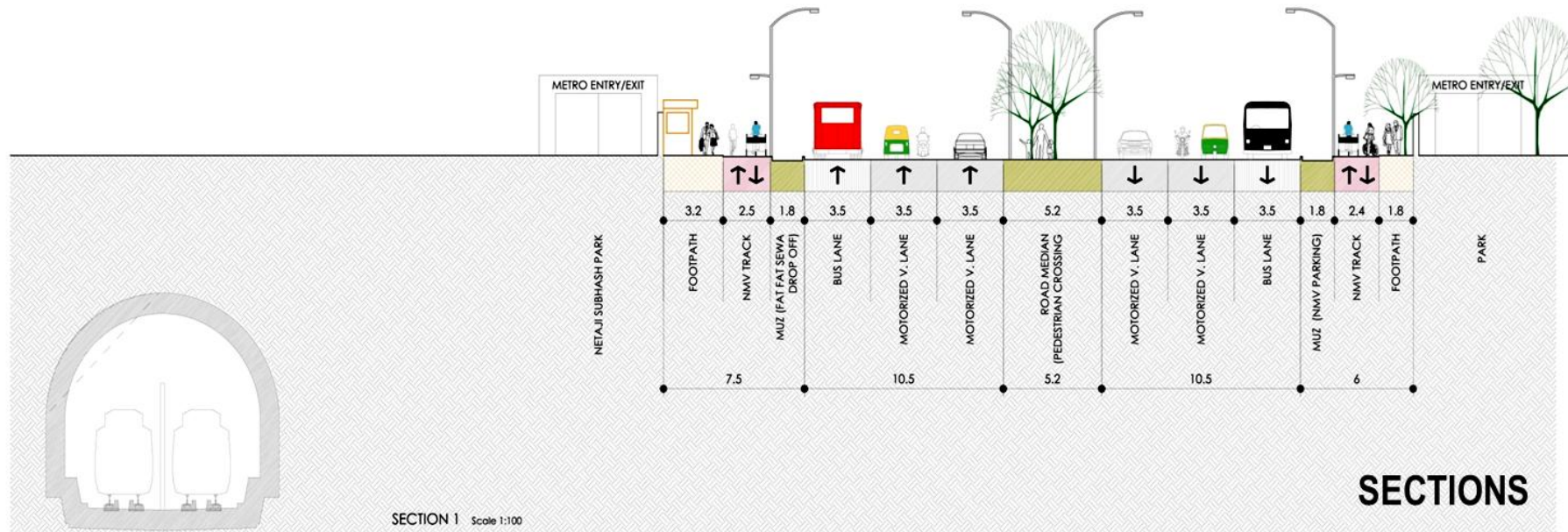
Multi-Modal Interchange Integration Plan- Jama Masjid

Jama Masjid:



Multi-Modal Interchange Integration Plan- Jama Masjid

Jama Masjid Sections:



MULTIMODAL INTEGRATION AT PHASE III METRO STATIONS

Multi-Modal Interchange Integration Plan- Jama Masjid

Lal Quila- Existing Situation:

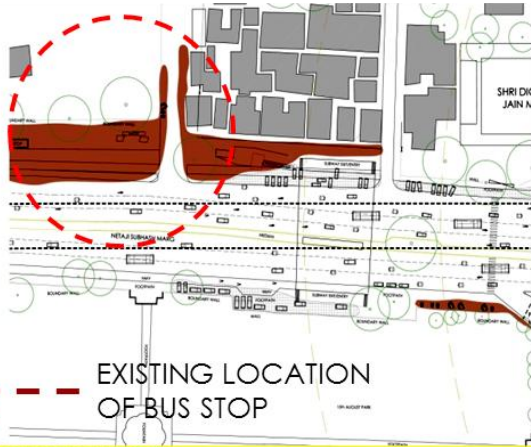


MULTIMODAL INTEGRATION AT PHASE III METRO STATIONS

Decongestion Strategies for Delhi Roads

Multi-Modal Interchange Integration Plan- Jama Masjid

Lal Quila- Existing Situation:



EXISTING LOCATION OF BUS STOP

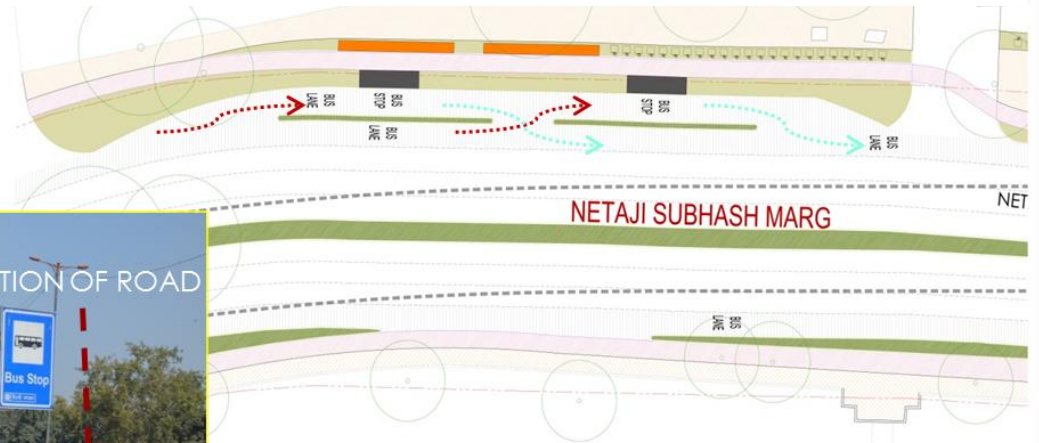


WHOLE OF THE AREA BEING ENCROACHED BY THE HAWKERS

EXISTING SITUATION

MAJOR PROBLEMS FACED:

- BUS STOP NOT BEING USED BECAUSE OF ITS LOCATION AWAY FROM THE BUS LANE.
- NO SPACE FOR PEDESTRIAN OR NMV MOVEMENT BECAUSE OF THE ENCROACHMENT BY HAWKERS



BUS BAY 1

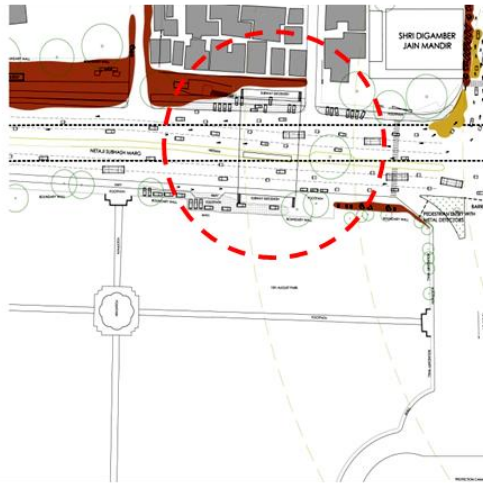
MAJOR INTERVENTIONS :

- RELOCATING THE BUS STOPS ADJACENT TO BUS LANE
- OPTIMIZED ROAD GEOMETRY FOR CLEAR 4 LANE MOVEMENT OF 3.5M WIDTH
- KIOSKS AND HAWKERS RELOCATED IN MUZ

PROPOSAL

Multi-Modal Interchange Integration Plan- Jama Masjid

Lal Quila- Existing Situation & Proposal:



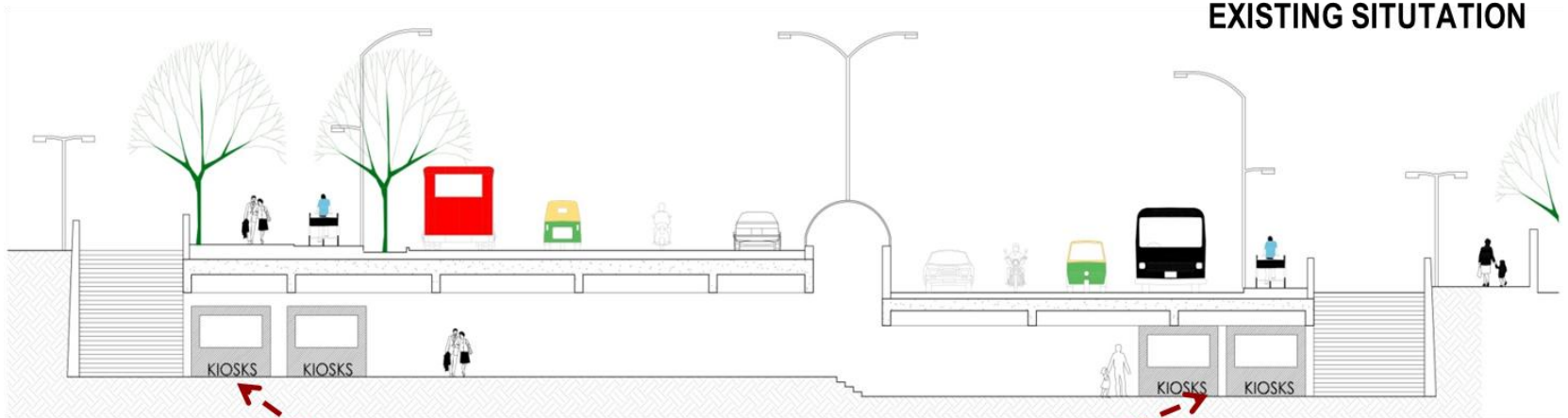
MAJOR INTERVENTIONS :

- PROVISION OF ADEQUATE LIGHTING INSIDE THE SUBWAYS
- POSITIONING OF VENDORS AT ENTRY/EXIT TO THE SUBWAYS
- ENRICHING WALKING EXPERIENCE THROUGH INTERNAL FACADE DESIGN

SUBWAYS



EXISTING SITUATION



POSITIONING OF VENDORS AT ENTRY/EXITS TO THE SUBWAY

PROPOSAL

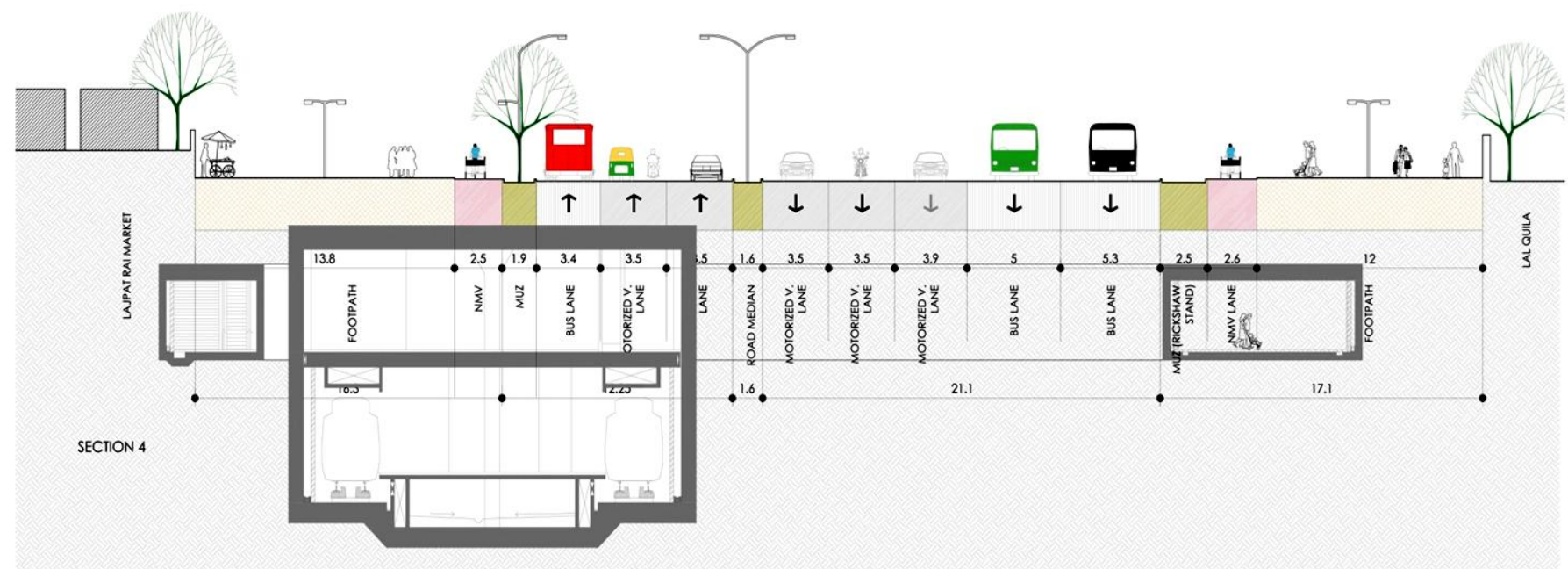
Multi-Modal Interchange Integration Plan- Jama Masjid

Lal Quila Sections:



KEY PLAN Scale 1:2000

4



Flyovers and Junctions Improvement Plan in Delhi

Flyovers and Junctions Improvement

Introduction of cast to avoid U turn
Opposite Dilshad Garden Metro Station



Flyovers and Junctions Improvement

Providing connection with the Mansarovar Metro Station concourse.



Flyovers and Junctions Improvement

Providing Cross barriers on centre of the Carriageway to avoid parking (near Shahdara metro station)



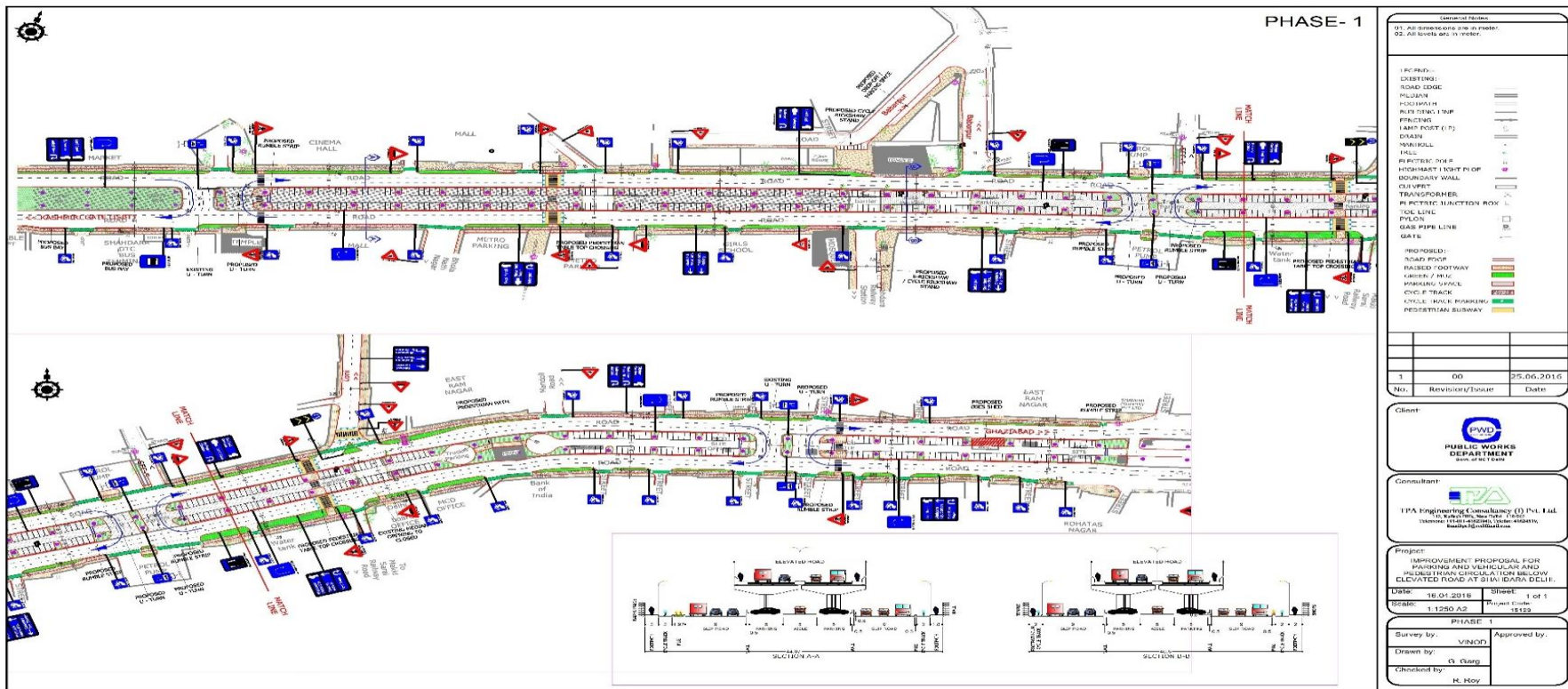
Flyovers and Junctions Improvement

Improvement of road Junctions Opp. Seelampur metro station



Flyovers and Junctions Improvement

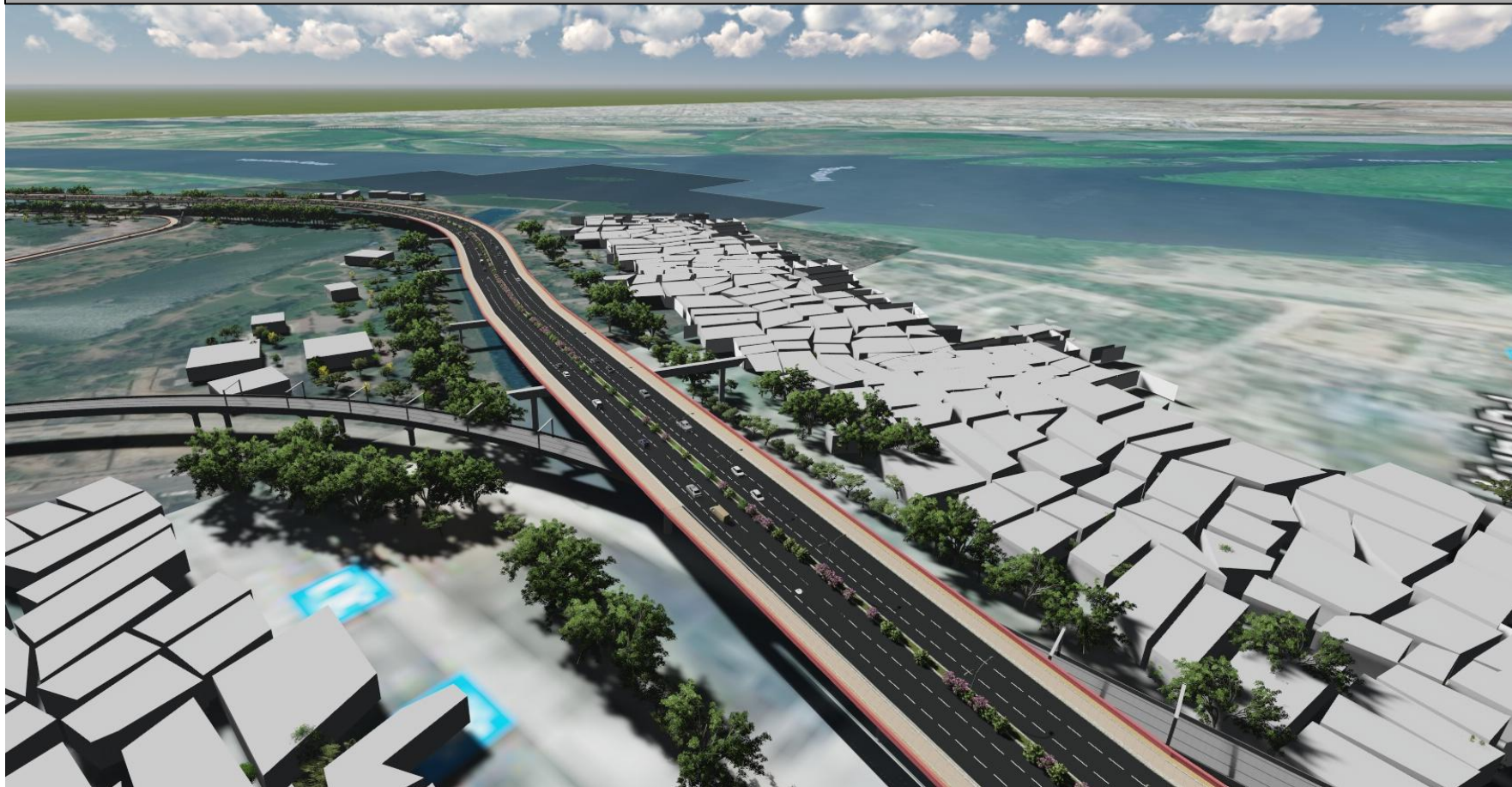
Junctions Improvement near Shahdara Flyover



Elevated Corridors Planning by PWD, Delhi

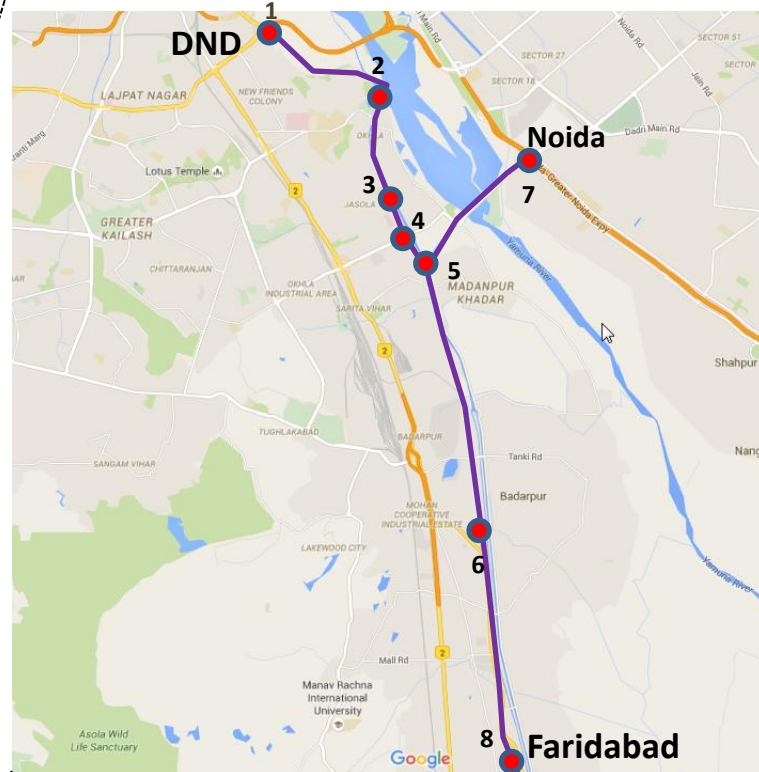
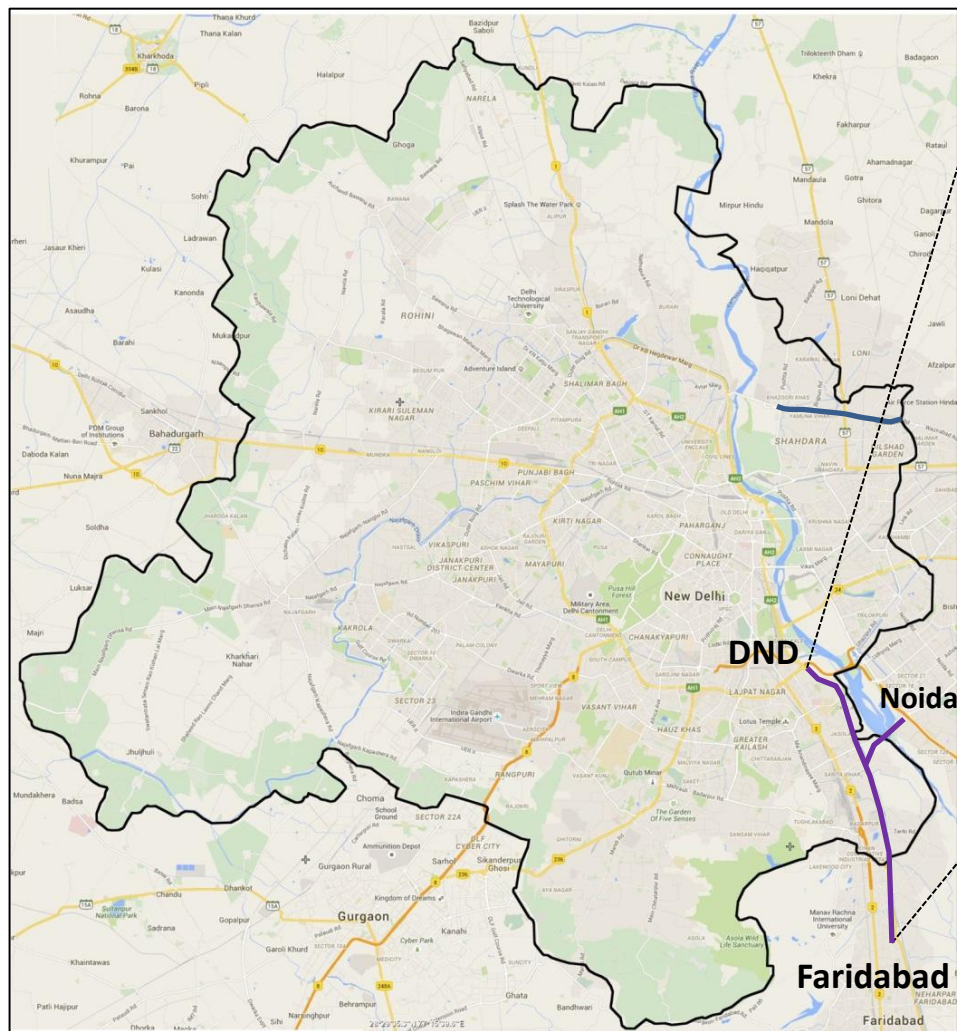
Kalindi Kunj Bye Pass- Faridabad to DND

Proposed Elevated Corridor in Delhi



Location of proposed Corridor (Kalindi Kunj Bypass- Faridabad to DND)

Kalindi Kunj Bye Pass



Major Nodes

- | | |
|----------------------------|--------------------|
| 1. DND | 5. Madanpur Khadar |
| 2. Okhla | 6. Badarpur |
| 3. Jasola | 7. Noida |
| 4. Shaheen Bagh (Road 13a) | 8. Faridabad |

Type of Corridor	Length of Corridor	No of Lanes	R.O.W
Single Elevated	Length -13.2 Km	3+3 Lanes (Total 6 Lanes)	30m

Kalindi Kunj Bypass Elevated Corridor Alignment in Delhi

Existing Internal roads

Existing Main Roads & Ring Roads

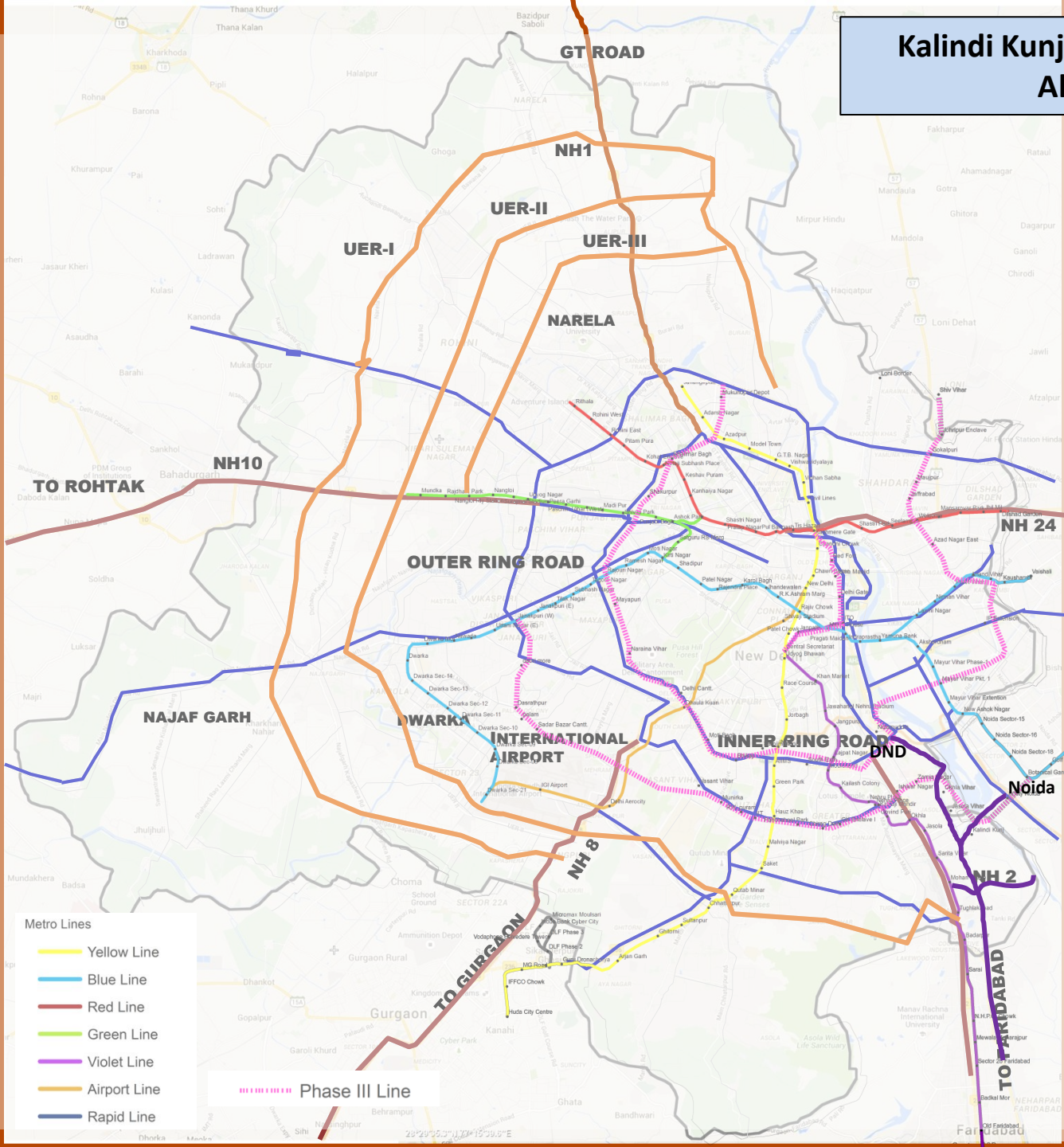
National Highways

Existing Metro Lines

Proposed Phase-3 Metro Lines

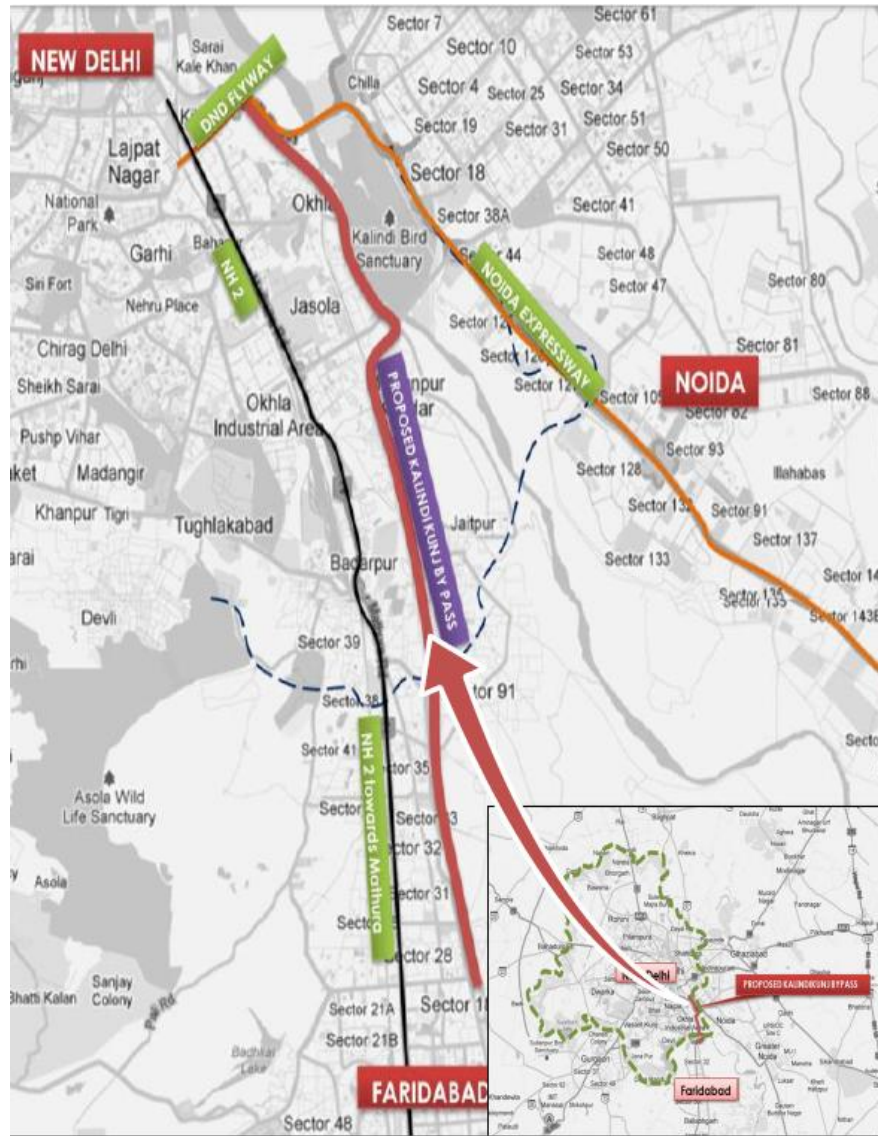
Proposed Urban UERs & Peripheral Roads

Proposed Elevated Corridor- Kalindi Kunj Bypass



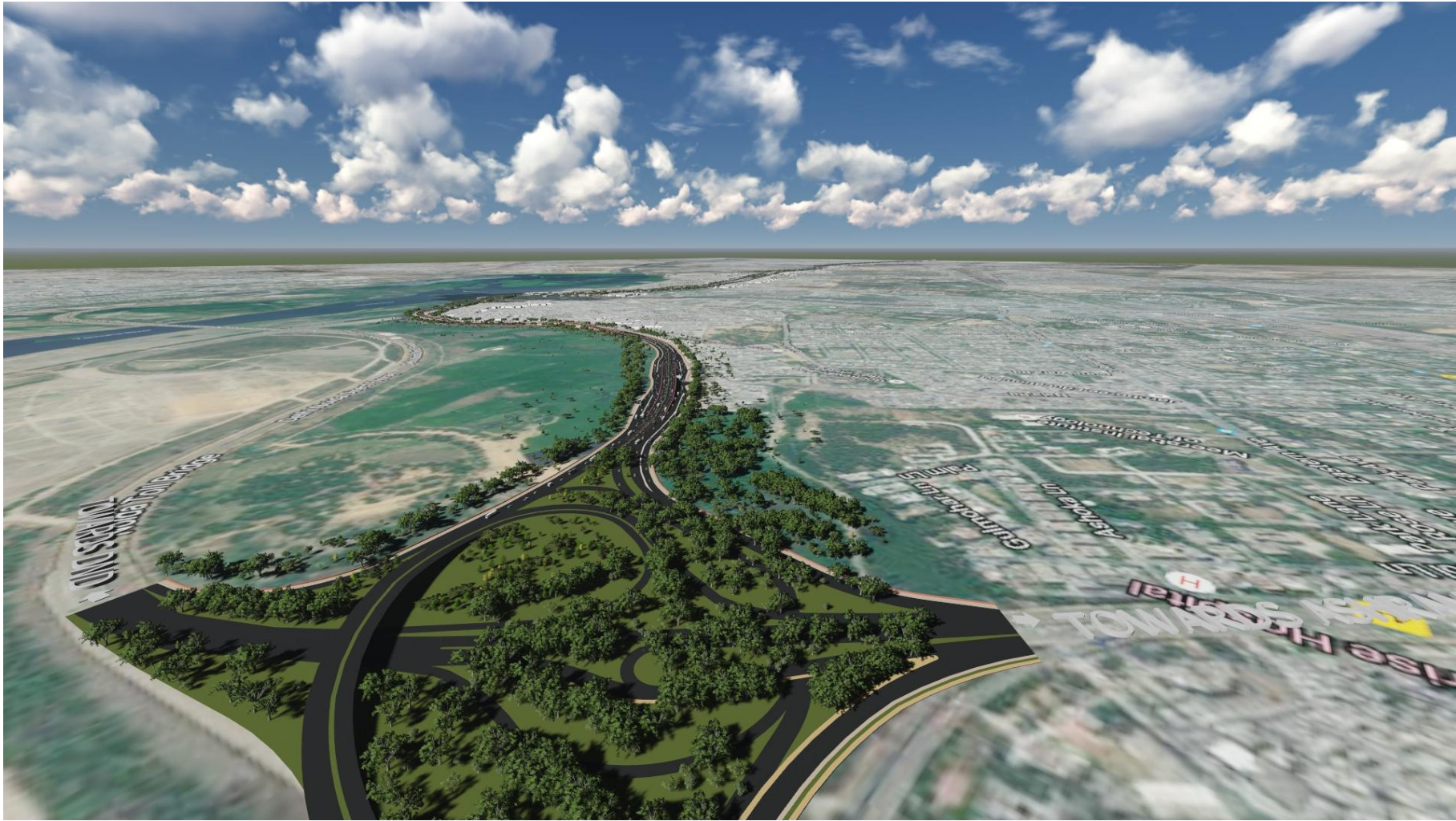
- Metro Lines**
- Yellow Line
 - Blue Line
 - Red Line
 - Green Line
 - Violet Line
 - Airport Line
 - Rapid Line
 - - - - - Phase III Line

Need of the Project



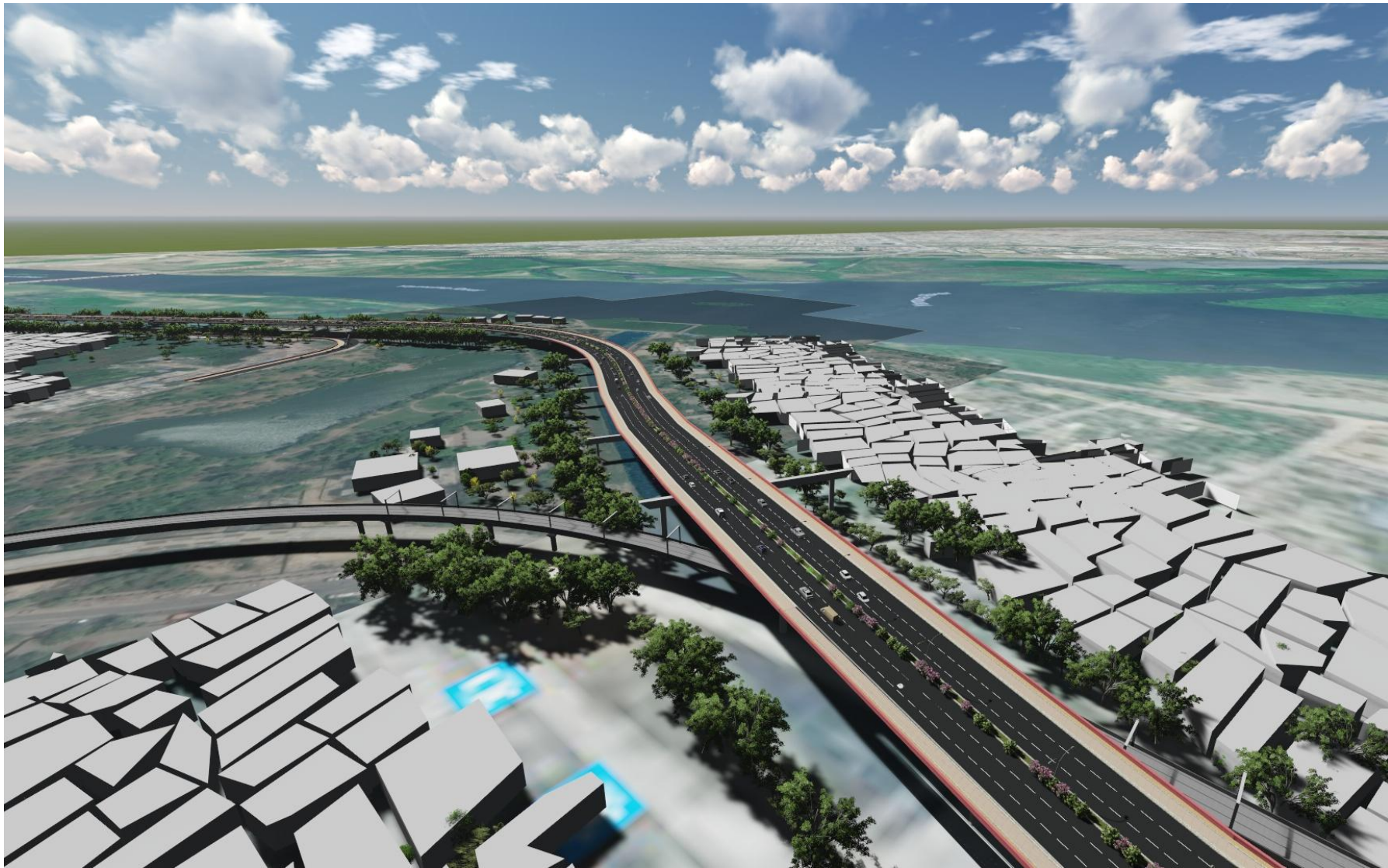
- Planned to decongest National Highway-2 (Mathura Road) and to alleviate the traffic of Ring road.
- As a solution for the clogged DND interchange and ring road section
- An alternate route to the NH-2 (Mathura Road) and bypass route up to Ballabhgarh on NH-2 and Delhi
- Additional access road to Jasola Business Centre and Mohan Cooperative Estate is needed which are coming up as a key work centres
- To improve the traffic conditions and decrease the load generated due to movement of High freight traffic on urban roads
- Decongested the traffic on Ashram chowk, DND interchange & Maharaniabagh.

Proposed 3d Views of the Corridor



Corridor View Near DND Flyover

Proposed 3d Views of the Corridor



View of Corridor above Metro Line

Proposed 3d Views of the Corridor

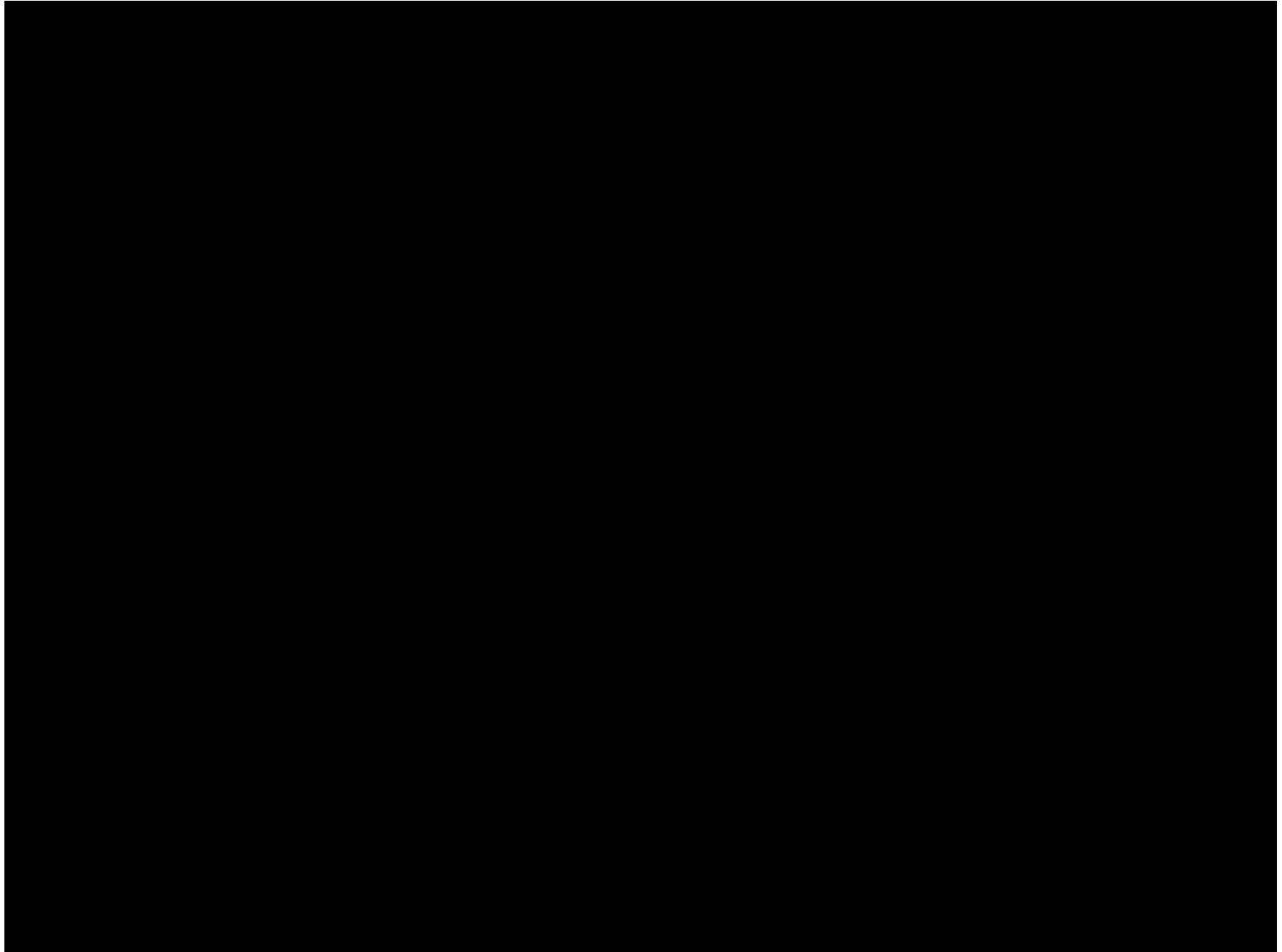
Kalindi Kunj Bye Pass



View of Corridor near Bypass

Kalindi Kunj Bye Pass Alignment- Walkthrough Video

Kalindi Kunj Bye Pass





Thank You