



Comprehensive Mobility Plan for Kanpur



Comprehensive Mobility Plan

What is CMP

Long term strategic document which provides the vision and goals to achieve the desirable mobility pattern for the city's populace in a sustainable and cost effective manner

Includes –

- Priority to pedestrians, NMT, all modes of public transport and IPT
- Land use Transport Integration
- Changing behavior and travel habits

Strategies :

- Congestion relief
- Improved safety
- Improved air quality
- Improved quality of life
- Improved opportunities for economic development

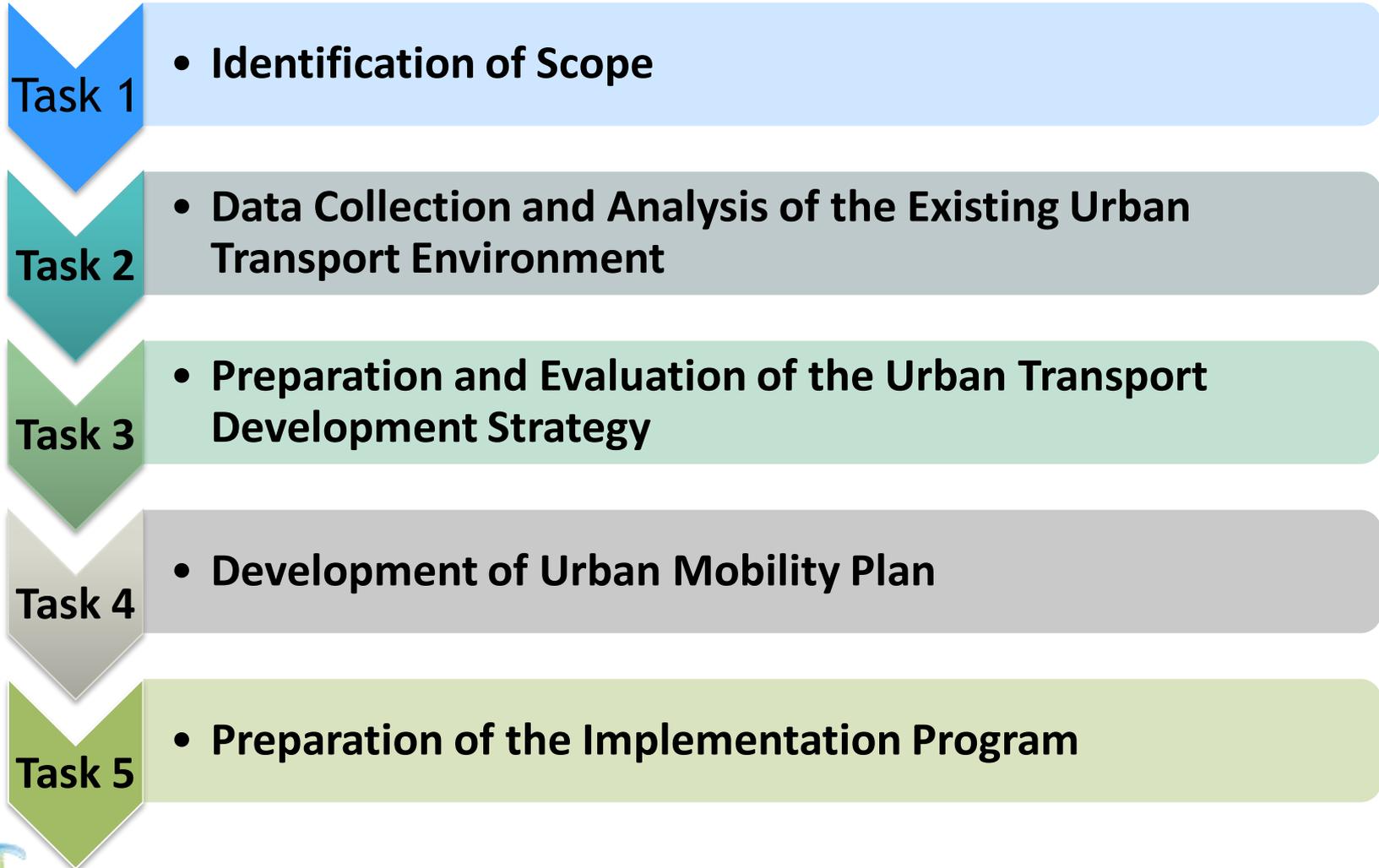


Vision of NUTP

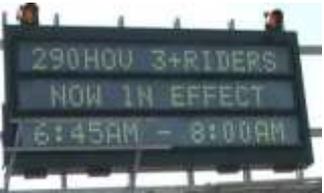
To make our cities more livable in the world and enable them to become the “engines of economic growth”.



Key CMP Tasks



Components of Urban Transport



Road Improvement

Rapid Transit

Local Transit

Pedestrian Safety

Enforcement

Freight

Integration

Traffic Management

IPT

Parking

NMT

Traffic Monitoring



Kanpur - History of Growth and Urbanization

- An insignificant village till the 18th Century,
- The city passed into British hands in 1801, marking a turning point in the history of Kanpur
- Development of textile and leather industries started after 1857 rebellion.
- Several industries emerged in the 20th century, giving a new identity to the city – Manchester of India

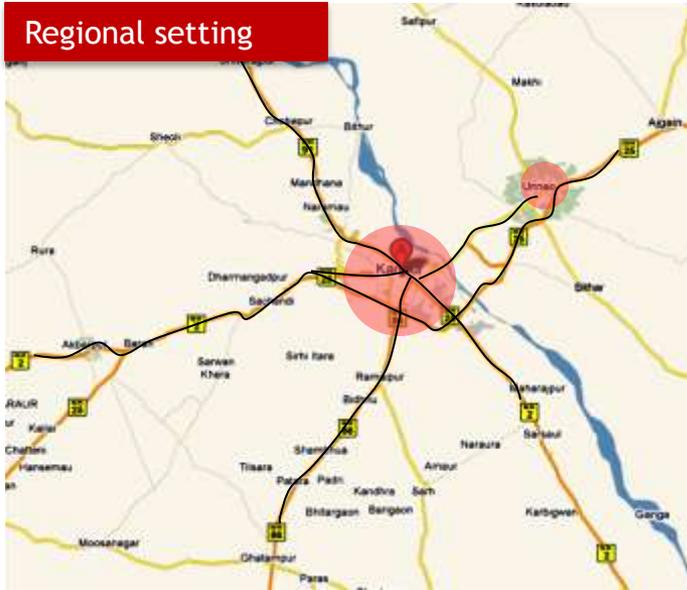


- Trams were introduced in Kanpur in June 1907.
- There were 4 miles of track and 20 single-deck open trams. The single line connected the railway station with Sirsaya Ghat on the banks of the Ganges.
- Tram service closed at Kanpur on 16 May 1933.



Regional Setting – Major Roads/Highways

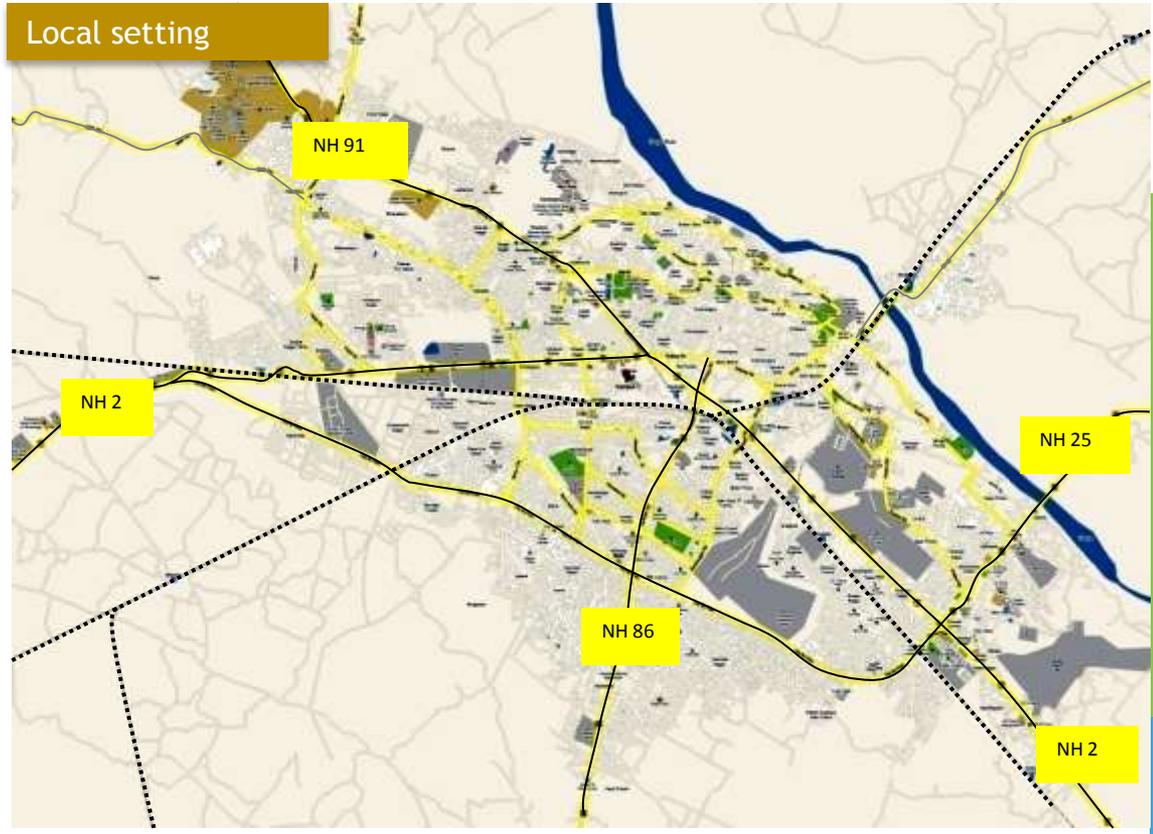
Regional setting



Network of Highways passing through Kanpur, however no significant sub urban centre in the vicinity.

NH 25, across River Ganga connects Kanpur with Lucknow, via Unnao.

Local setting



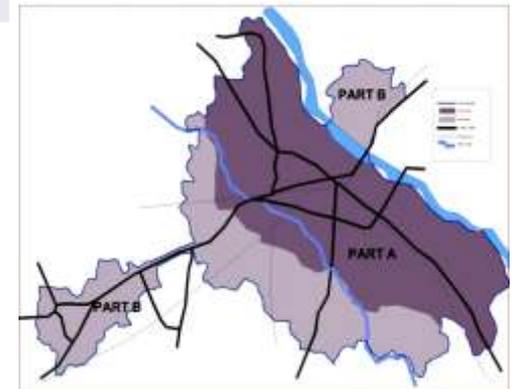
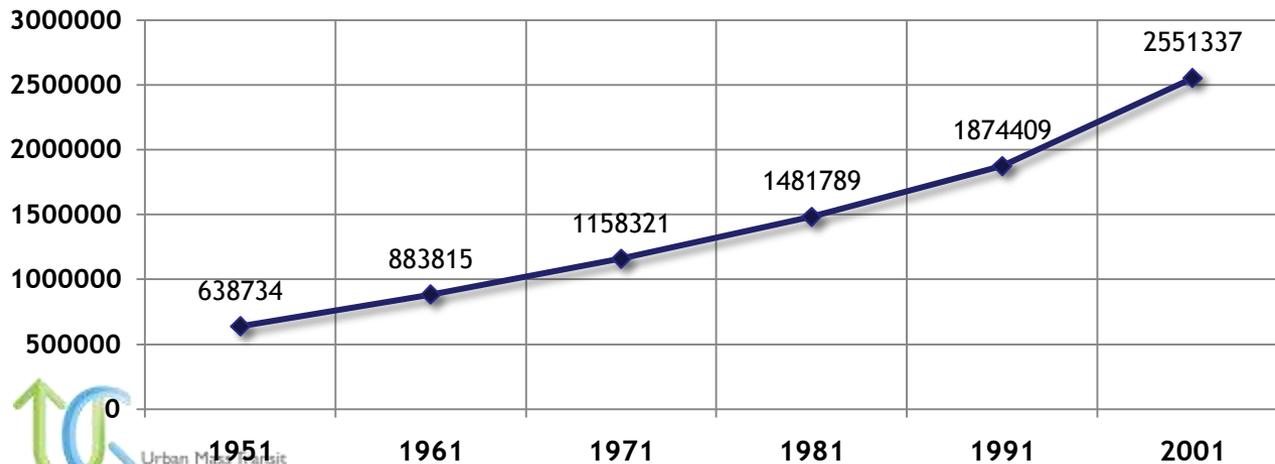
NHs act as major arterial roads inside the city. Additionally, Kanpur being a major railway junction for the North and East trunk lines, has multiple railway crossings inside the city.

Demographics

Components	Area (Ha)	% of Total Area	Population	% of Total Population
Kanpur Nagar Nigam	26223	88.47%	2554354	94.06%
Central Railway Coloney	39	0.13%	1457	0.05%
Northern Railway Coloney	446	1.50%	29783	1.10%
Kanpur Cantonment Board	1718	5.80%	100794	3.71%
Armanpur Estate	692	2.33%	20584	0.76%
Chakeri	521	1.76%	8581	0.32%
Total	29639	100.00%	2715553	100.00%

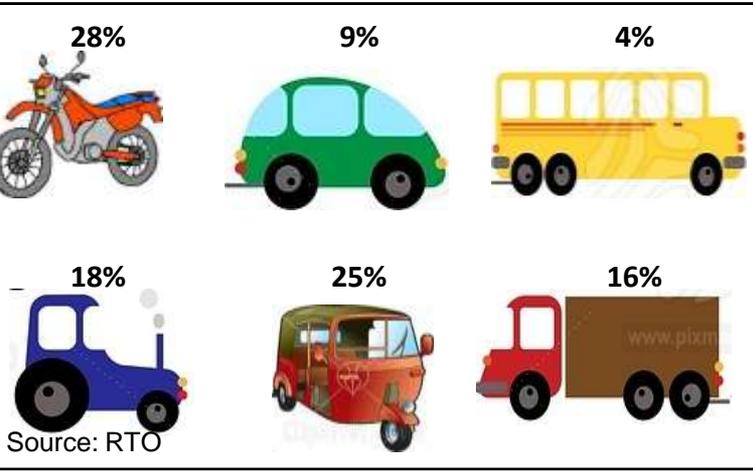
Part A is the existing urban limit which includes KMC, Cantonment, Chakeri, Armapur Estate and Railway Coloneys
 Part B is the rural portion of KDA which will accommodate the projected increase in population

Population Growth

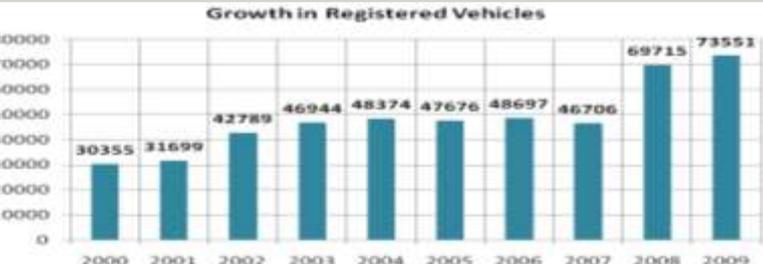
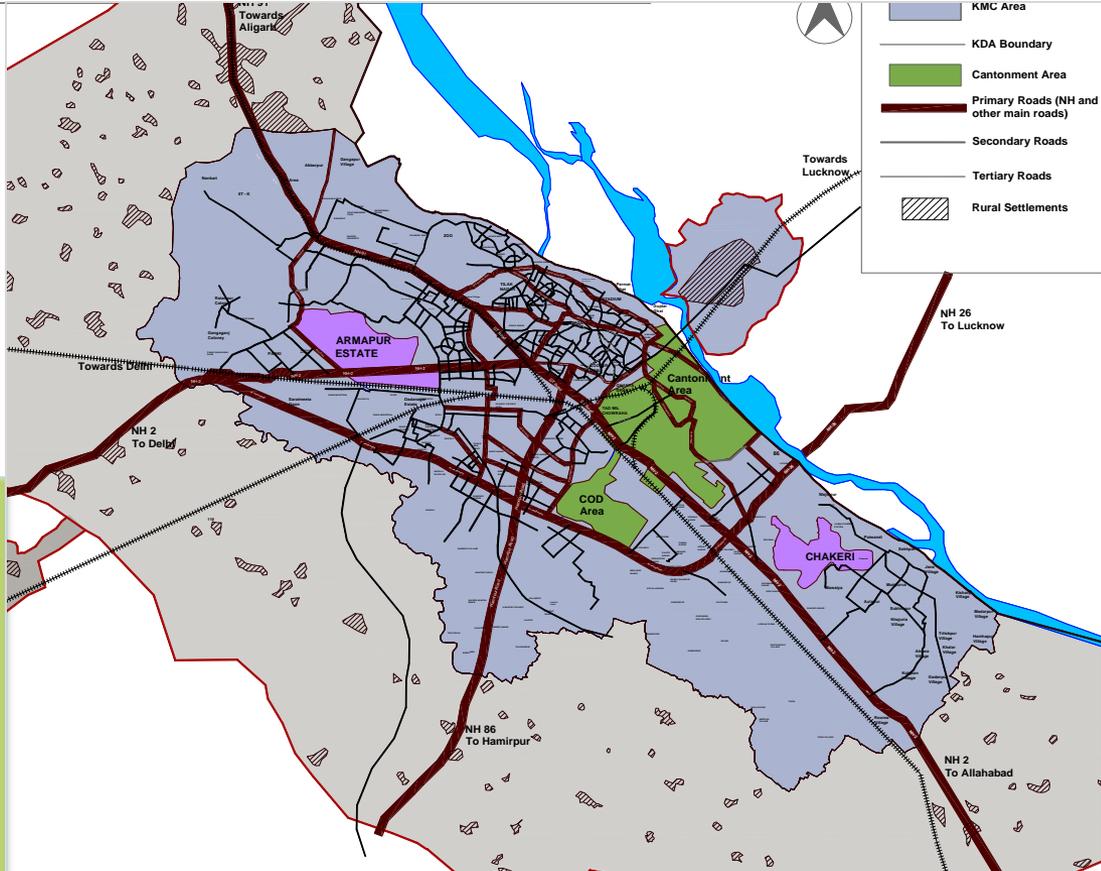


Development area limits extend by upto 8 kms beyond KMC boundary

Overview of City



- Total vehicle population has grown by almost 44%
- Population density of about 97.6 persons per hactare
- Population Growth Rate- 28.6%
- Density of core area – 6 times outer areas



- Study Area**
- Kanpur Development Authority area – incl. KNN limits extending upto 8k m.
 - Kanpur Nagar Nigam area - 261.50 sq. km.

Landuse and Urban Growth

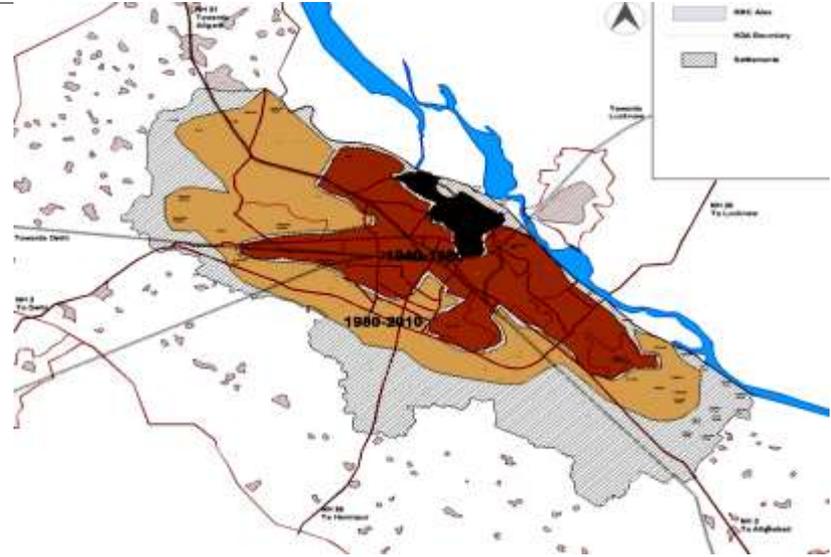
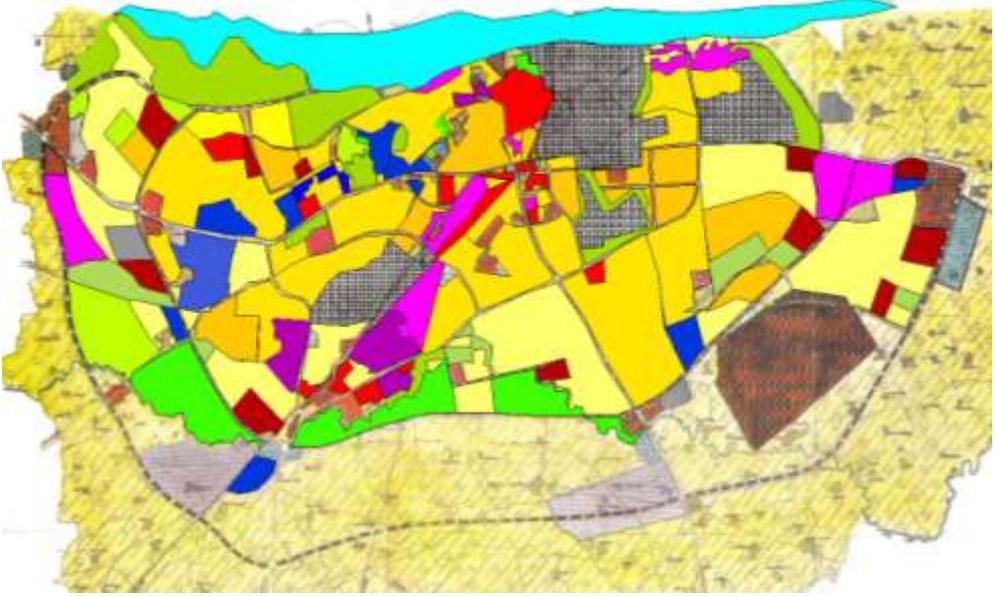
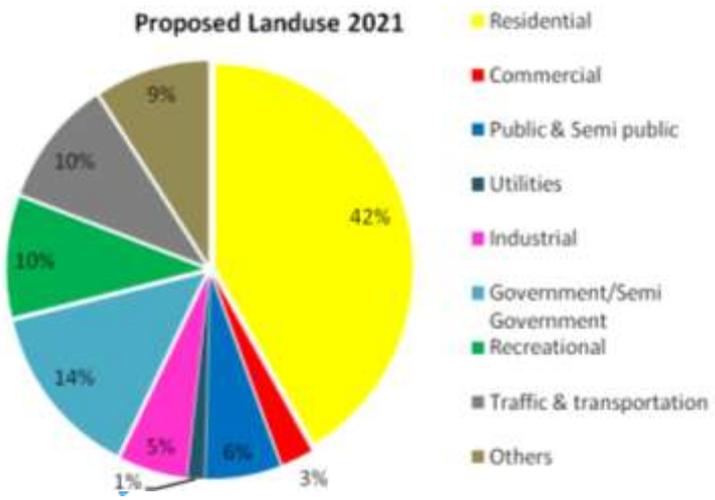


Figure - Evolution of Kanpur City

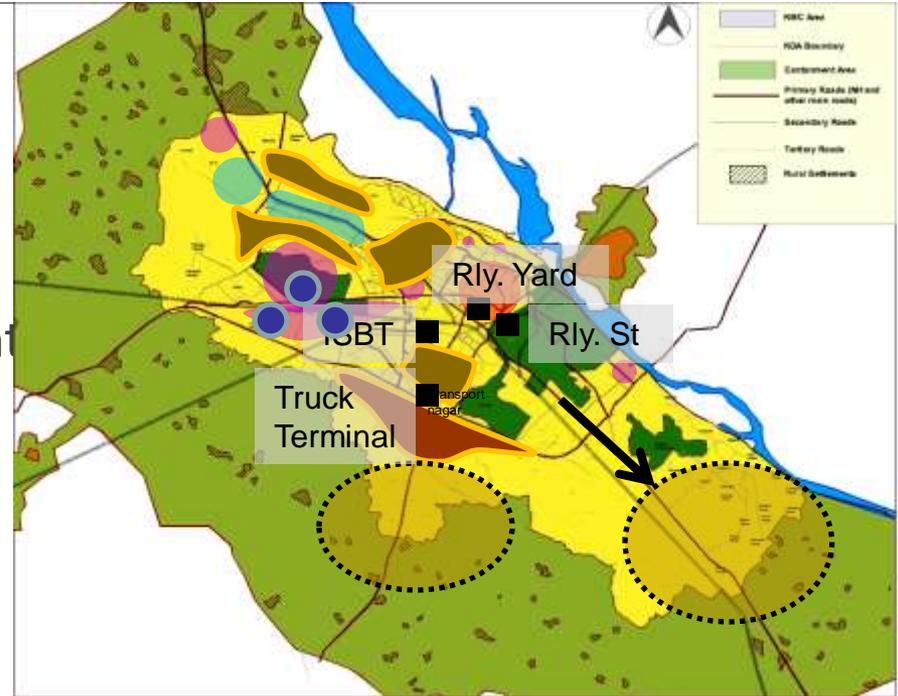
Figure - Proposed Landuse plan for Kanpur Urban Area



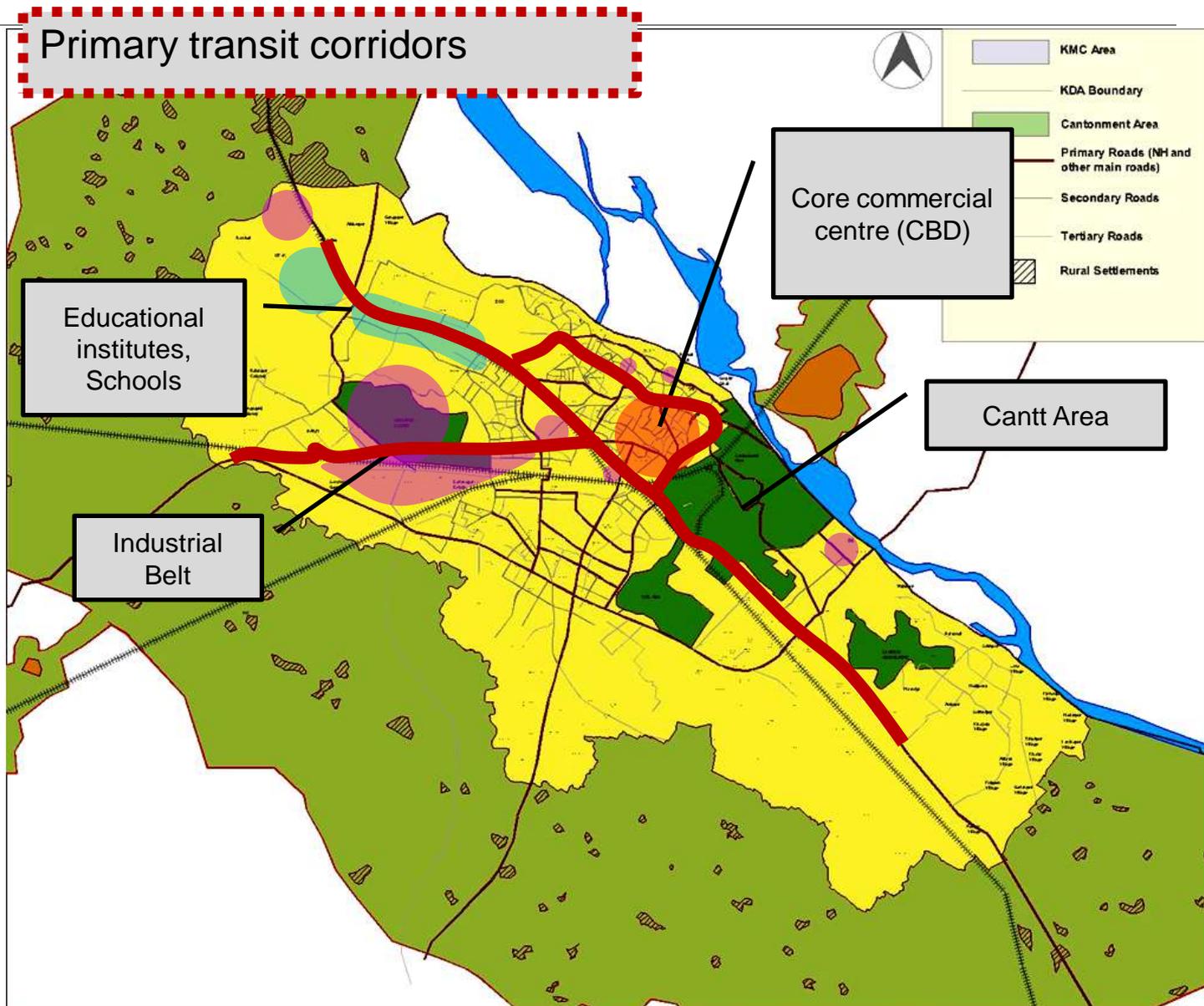
- Predominantly an industrial city.
- The city started growing southwards from the banks of Ganga in the early 18th century
- Colonization resulted in setting up of industrial estates, mills and Defense establishments in the city. This has resulted in the linear growth of the city ever since.
- Major activity centre (CBD) is still located in the north centre of the city

Growth Constraints

- HIG/MIG residential development originally towards the west of core CBD, now moving towards IIT along GT road
- LIG/EWS type residential development across bypass road towards South Kanpur
- Growth constraints towards South West due to Cantonment area along GT road
- Unappealing environs for HIG/MIG class housing towards South Kanpur as approach road passes through Transport Nagar
- Large areas inside the city have been utilized for terminal services, like Railway station and yard, ISBT and Truck Terminals and industrial units.
- West Kanpur witnessed growth limitation due to the presence of Defense equipment manufacturing units along NH 2



Major Trip Attraction Points



- Most of the trip attracting centers are located in the centre of the city
- Residential to work place trips take place in an inward radiating pattern.

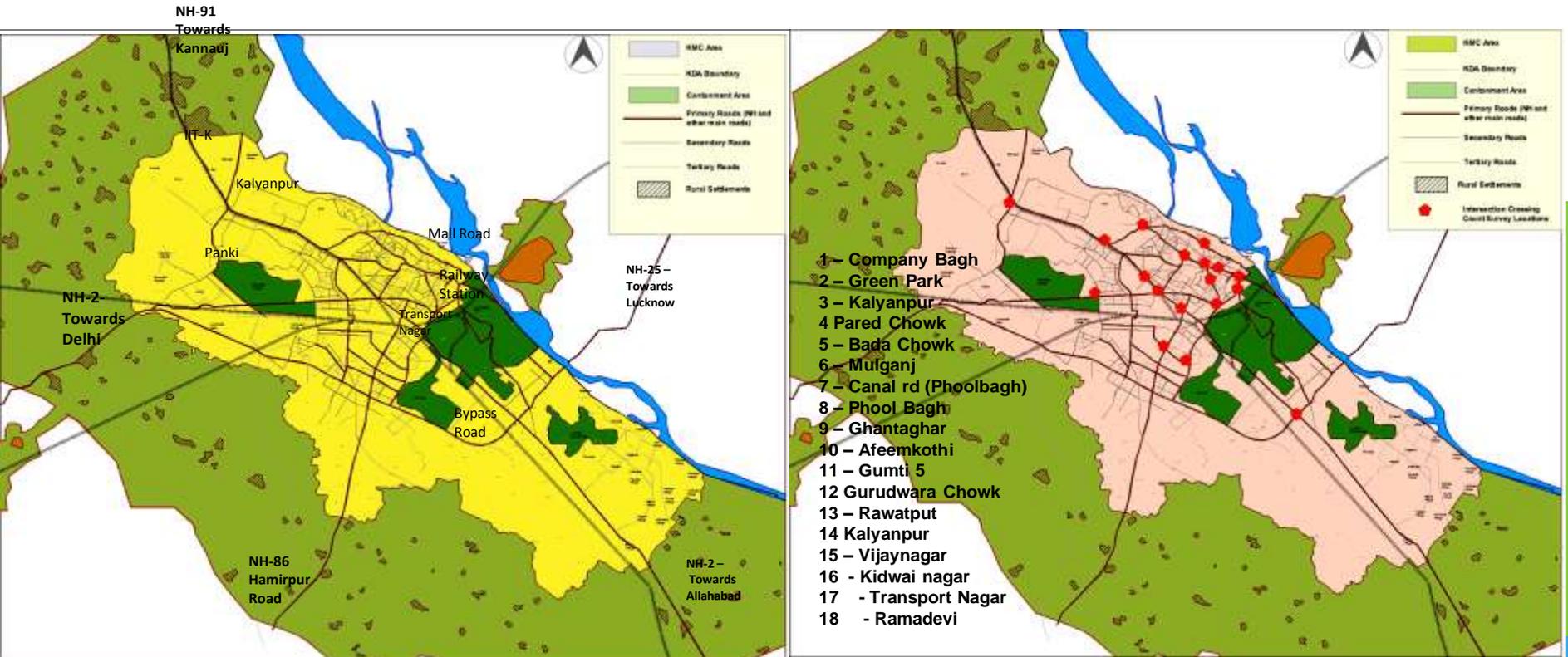


Primary Surveys and Analysis

Primary Surveys Conducted

- Road network inventory surveys - 210 km covered out of 350 km road network
- Screen line volume counts - 5 screen points located along railway line
- Cordon count and OD surveys - 6 Cordon locations on all entry roads
- Intersection classified volume count surveys - 19 major intersections
- Speed and delay surveys - 100 km of road network, mostly around CBD
- Parking surveys - 21 critical stretches (on street)
- Pedestrian count crossing roads/ junctions - 9 major intersections
- Household surveys - 2700 households
- Terminal OD surveys - 3 Bus Terminals
- Operator surveys - IPT and Truck operators

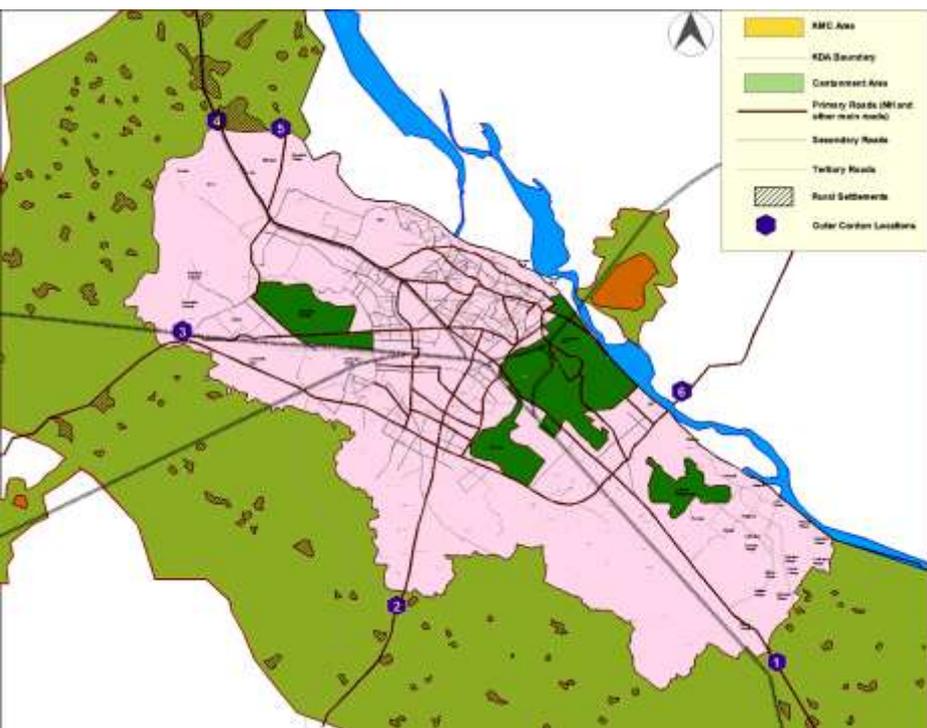
Network Inventory and Traffic Volume Count



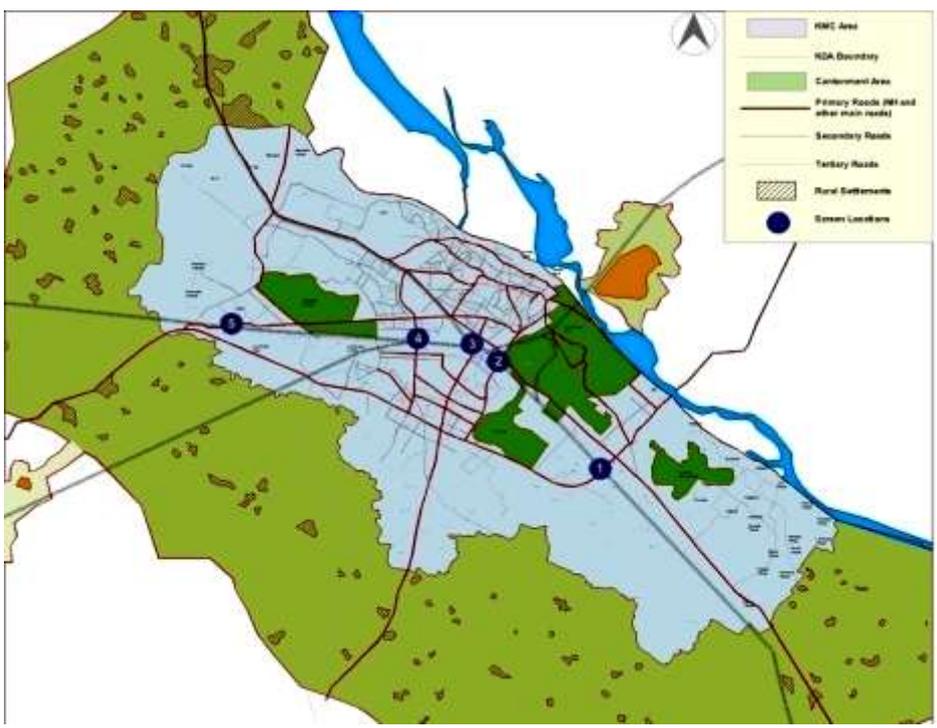
Out of a total 360kms of road network in Kanpur, Inventory survey carried out along 210 kms

Traffic volume count carried out on 18 important intersections

Location Maps for Primary Surveys

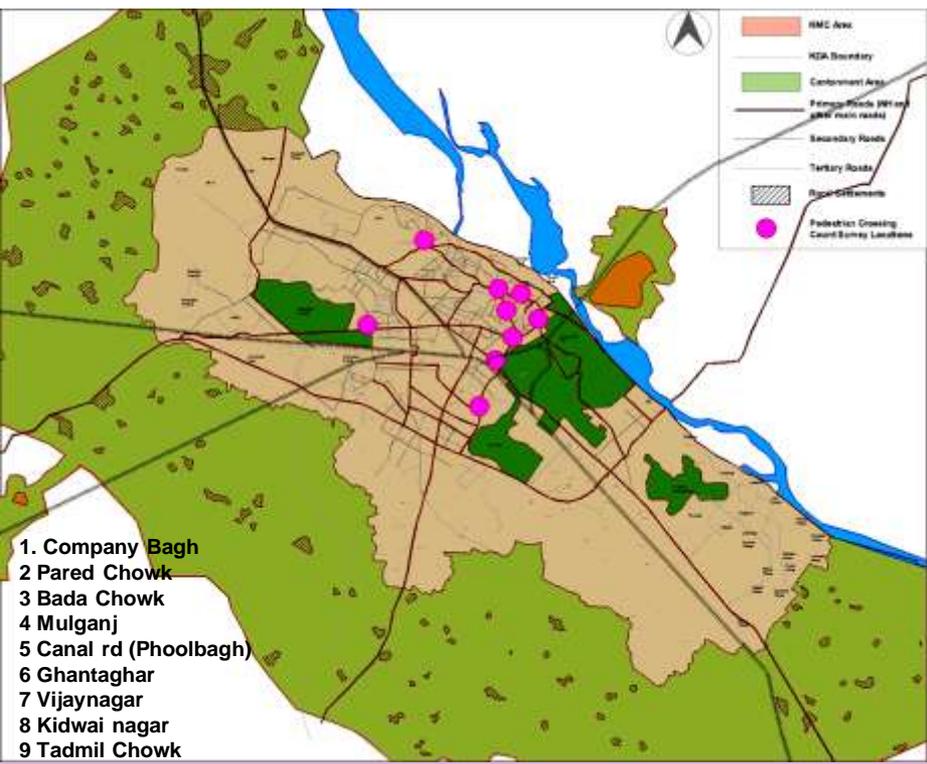


Six – Outer Cordon Locations for vehicle count and enquiry of tip origin destination information

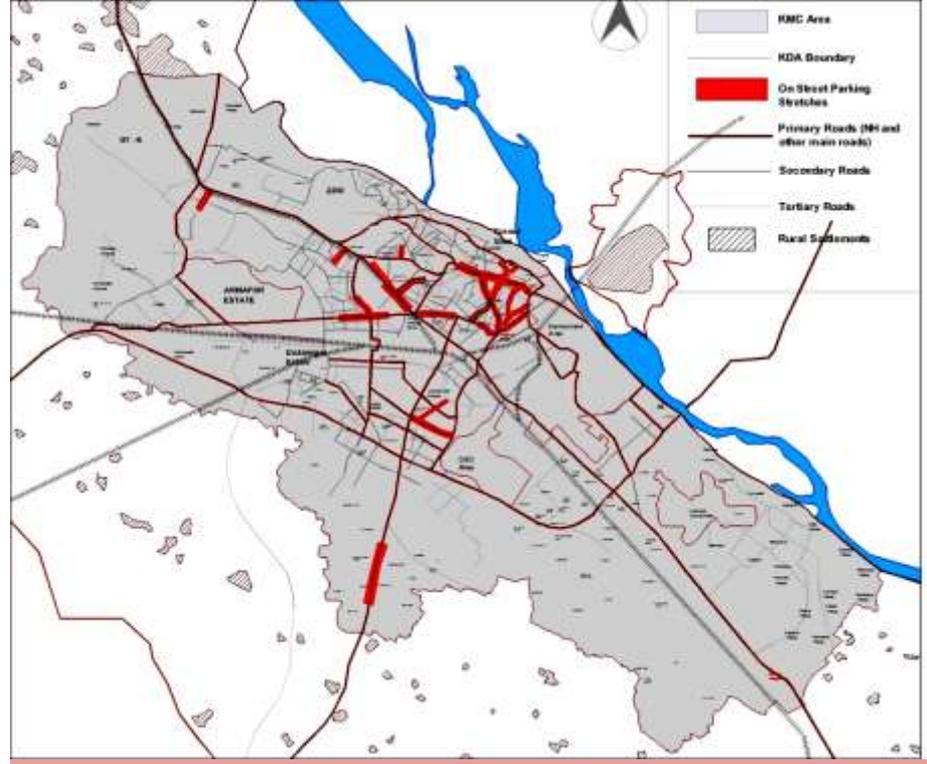


Railway Line assumed as screen, five locations identified on the railway crossing for vehicle number count and occupancy count

Location Maps for Primary Surveys



Nine major intersections identified for pedestrian count survey

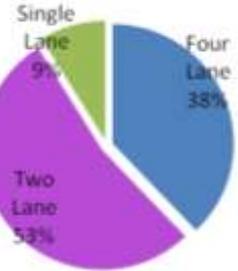


Twenty one critical stretches identified for assessment of parking demand and supply survey

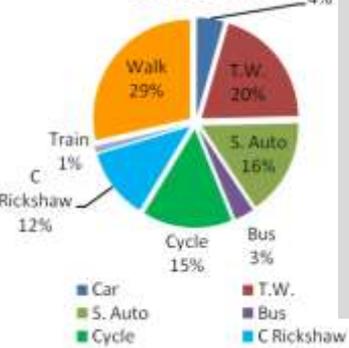
Road Network

- Medians are absent for about 73% of roads in the study area for directional segregation of traffic.
- Only 37% of roads have foot paths.
- Road quality varies from good to poor as one moves from city centre to peripheral areas
- Per capita trip rate (PCTR) – 1.24 (incl walk)
- 0.67 (motorized)

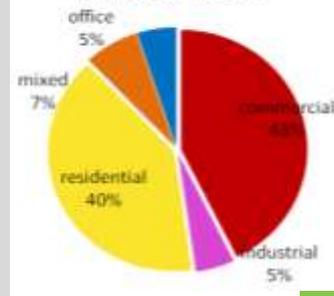
Number of Lanes



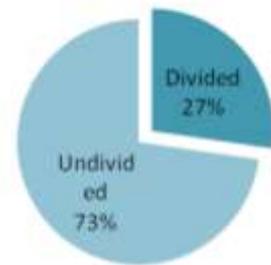
Mode of Travel



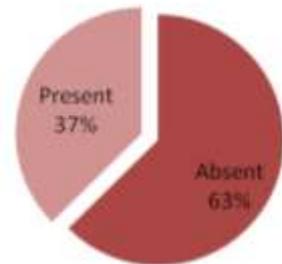
Landuse along Arterial and Sub Arterial Roads



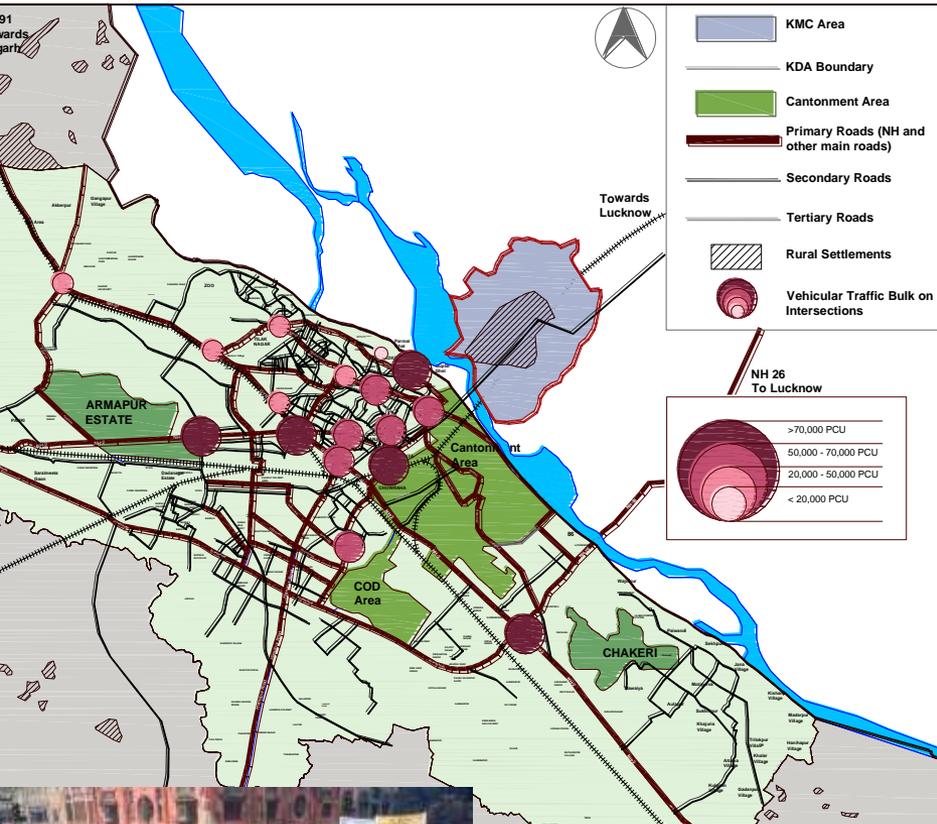
Type of Carriageway



Footpath



Traffic at Major Intersections



Slow Traffic

Max- 54% at Mulganj

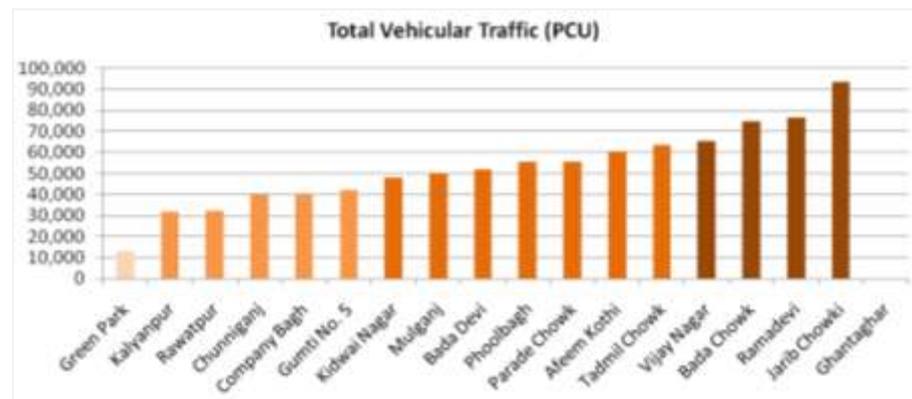
Min – 24% at Ramdevi Chowk

Peak Hour

No distinctive morning or evening peak at most intersections



Gumti No. 5 intersection

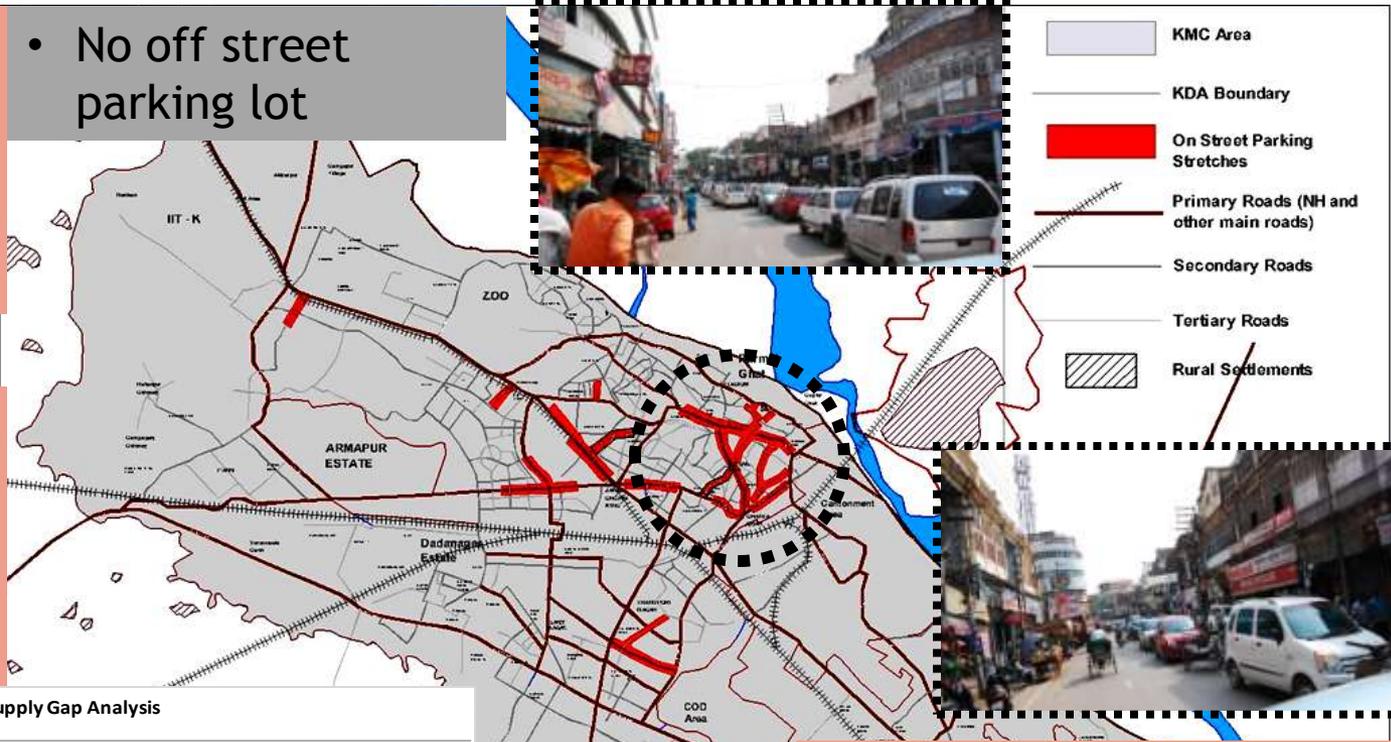


Existing Scenario: Road Traffic and Parking

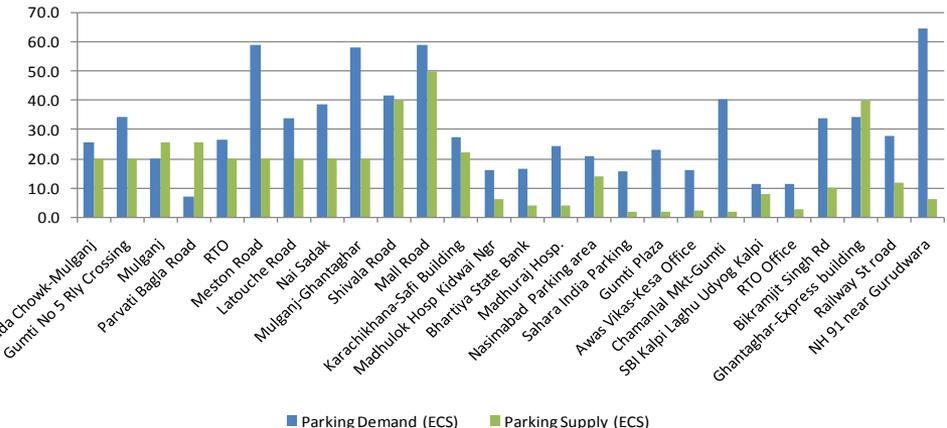
- Congestion in all CBD roads due to on street parking , either as a median or on the sides

- Poor approach to Railway Station as the station rear entry faces the city area.

- No off street parking lot

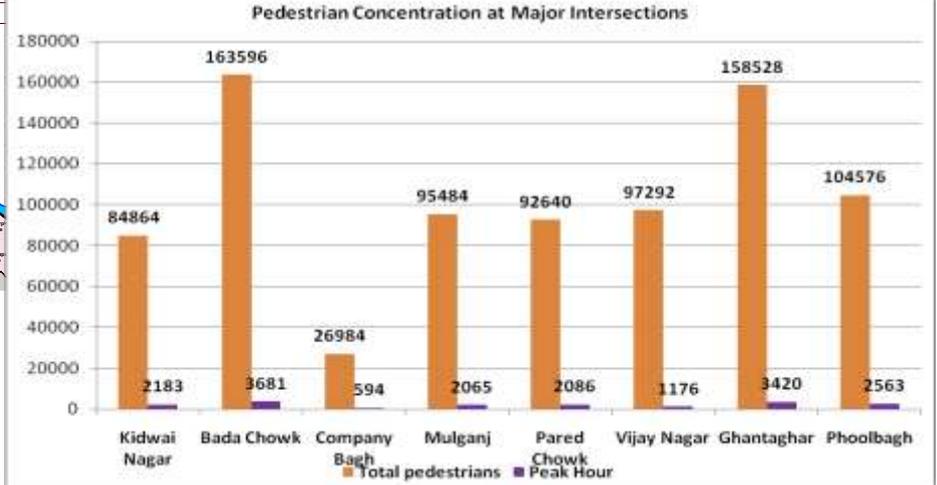
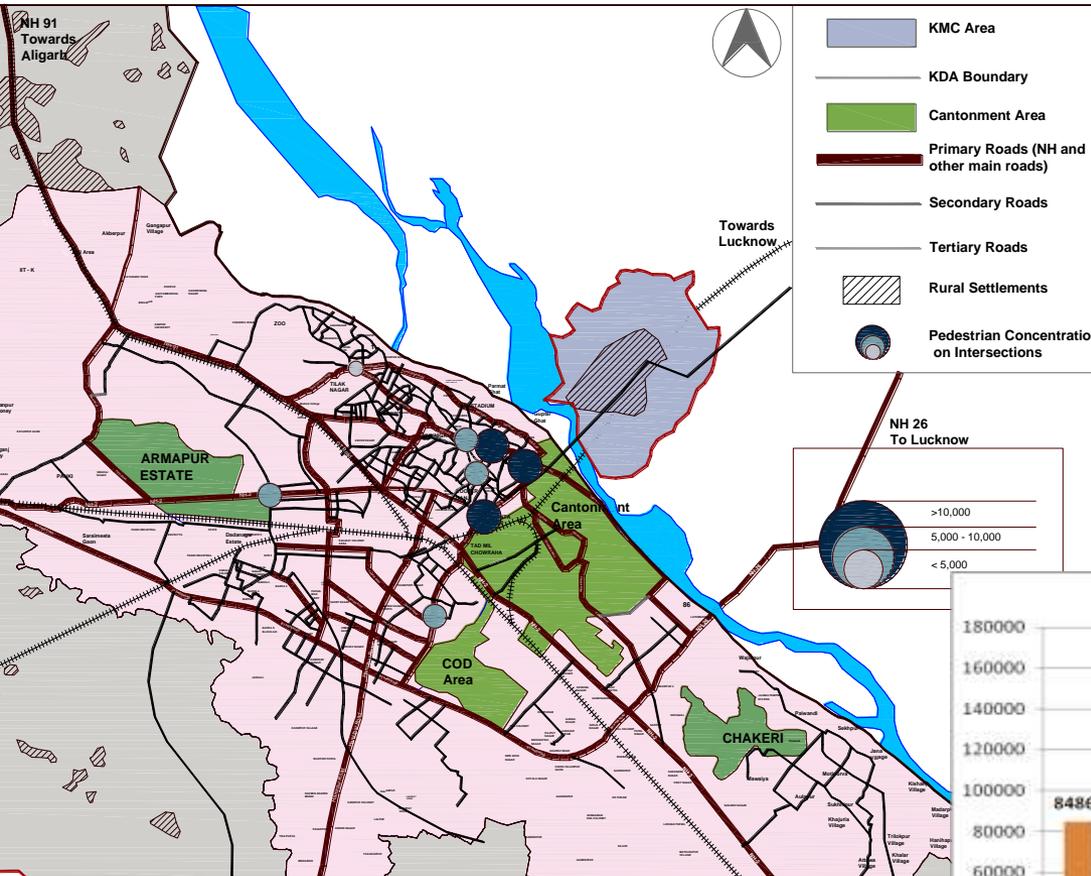


Parking Demand-Supply Gap Analysis



- Commonly found congestion issue on all other roads due to poor traffic management on junctions and railway crossings

Pedestrians at Major Intersections



Speed Delay Profile

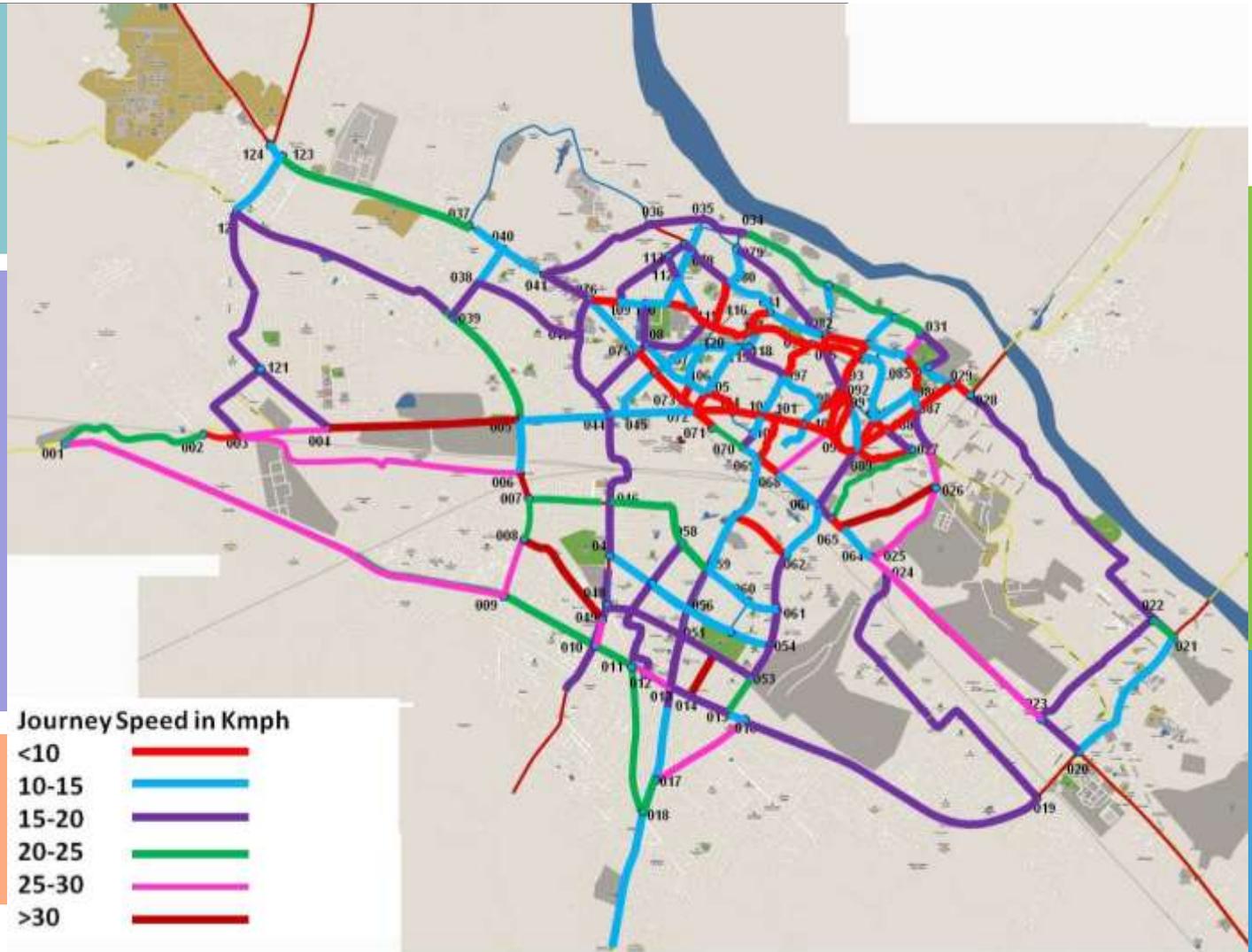
Average journey speed - 15.6 kmph

Average running speed - 21 kmph.

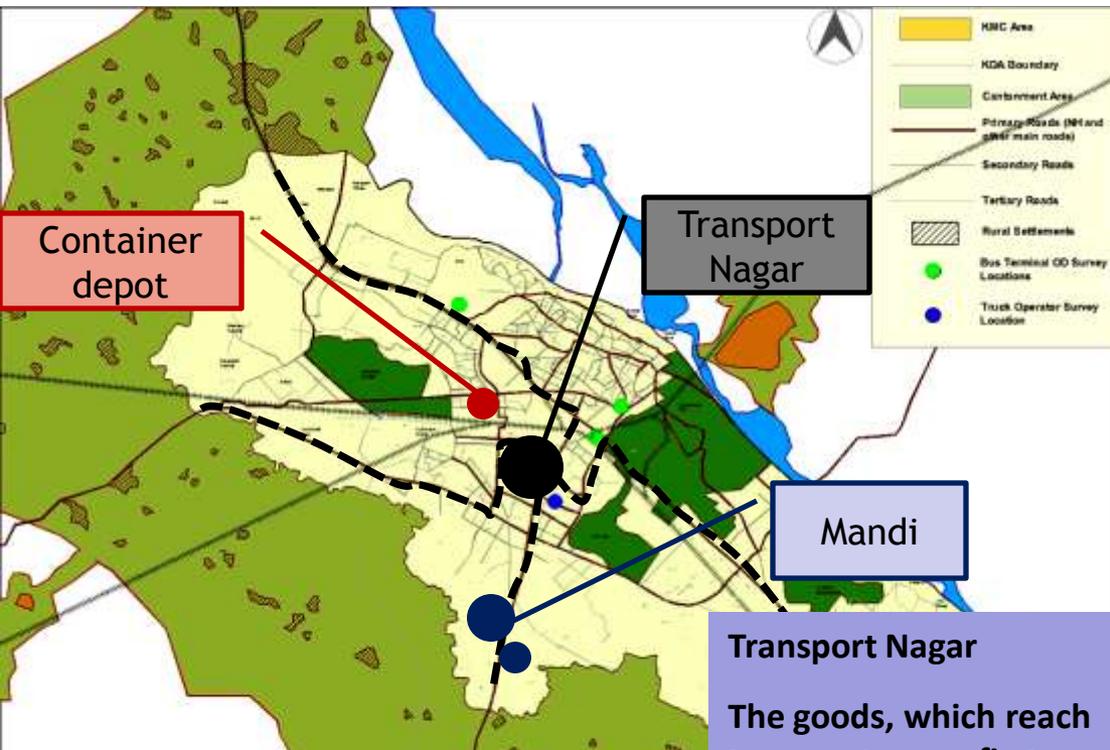
Reasons for Delay

- pedestrian movement
- Slow vehicles
- On street parking
- Poor Roads
- limited Right of Way

Spillover effect of CBD on GT road causing reduced speeds



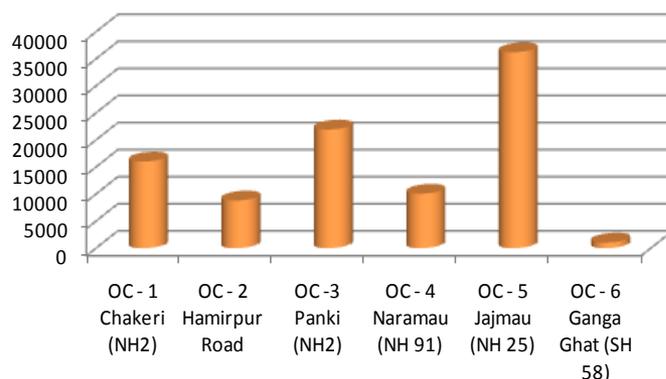
Transport System – Existing Scenario: Freight System



Freight movement is an integral city function

- Only one transport nagar for the entire city/region
- Location of transport nagar acts as a hindrance to development in southern localities of Kanpur
- Movement of goods takes place on slow moving vehicles and animal and hand carts almost throughout the day.

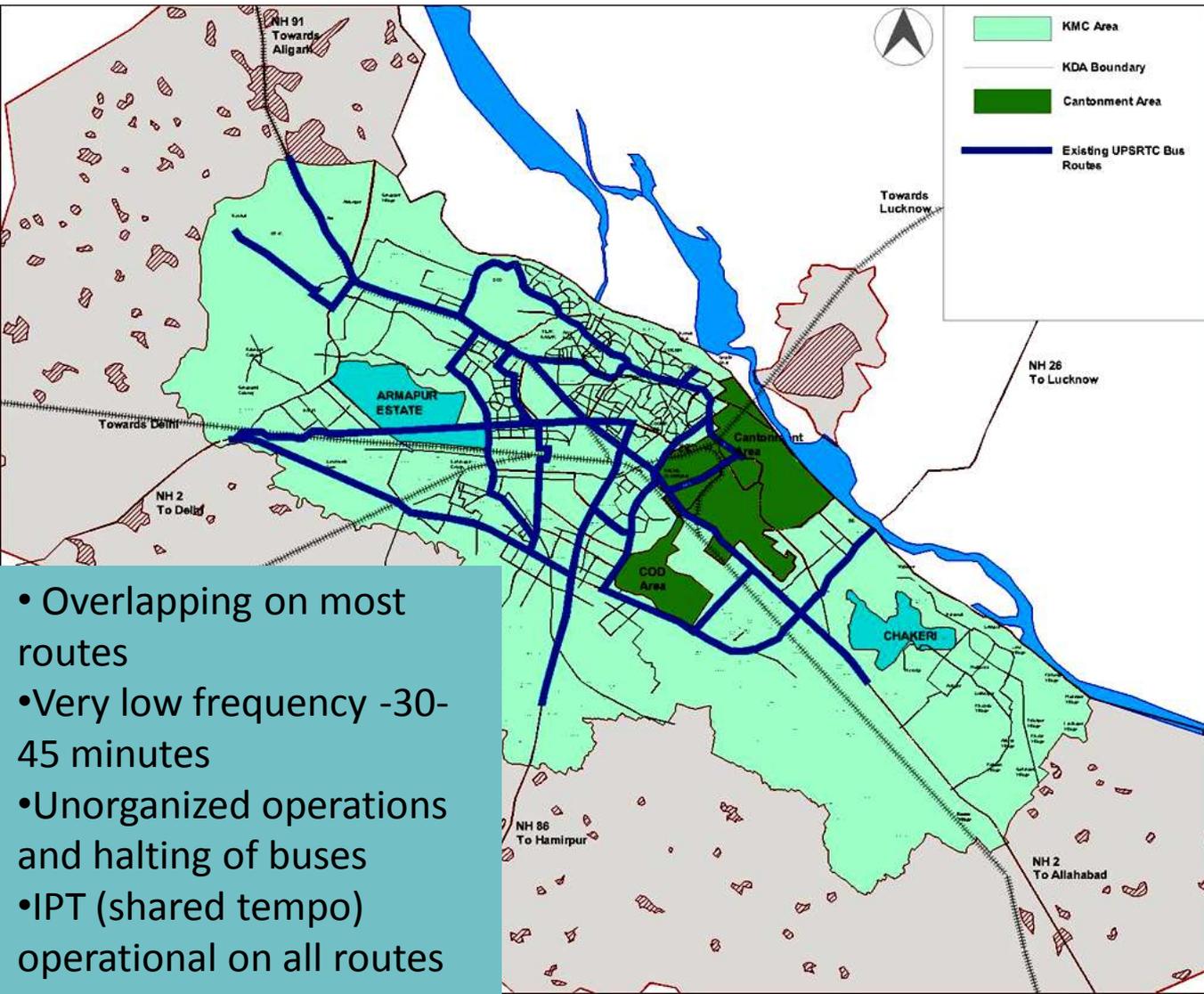
Goods Vehicles



Transport Nagar

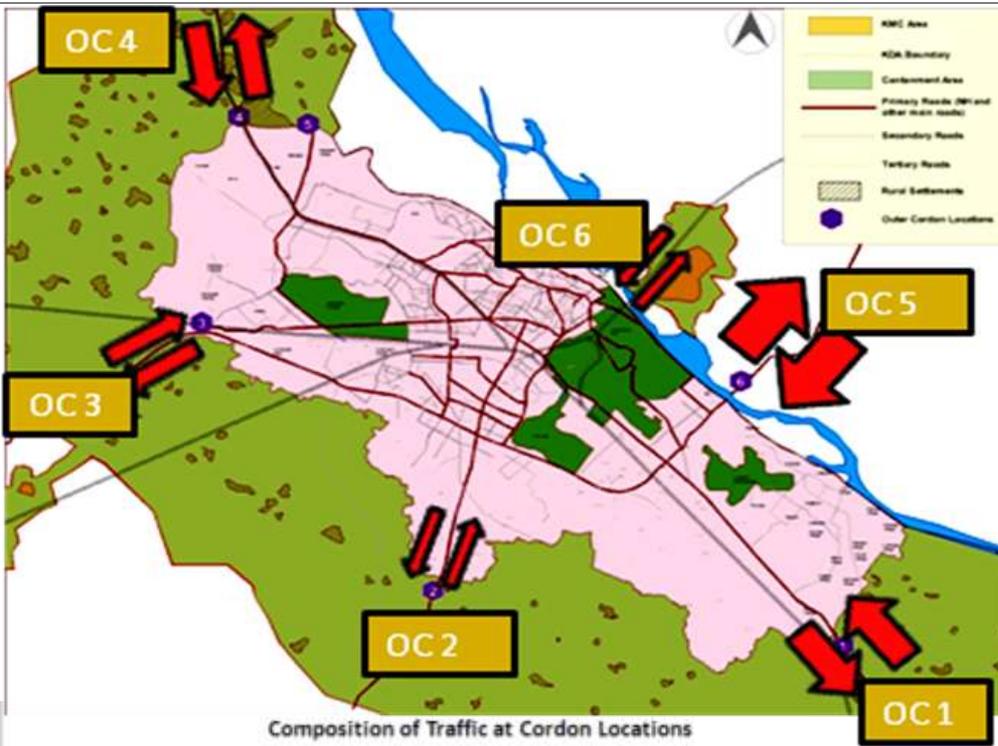
The goods, which reach transport nagar first, are carted to wholesalers in inner city and after its re-packaging again transported back to transport nagar for further distribution to other cities in eastern U.P. and part of Bihar.

Public Transport and IPT

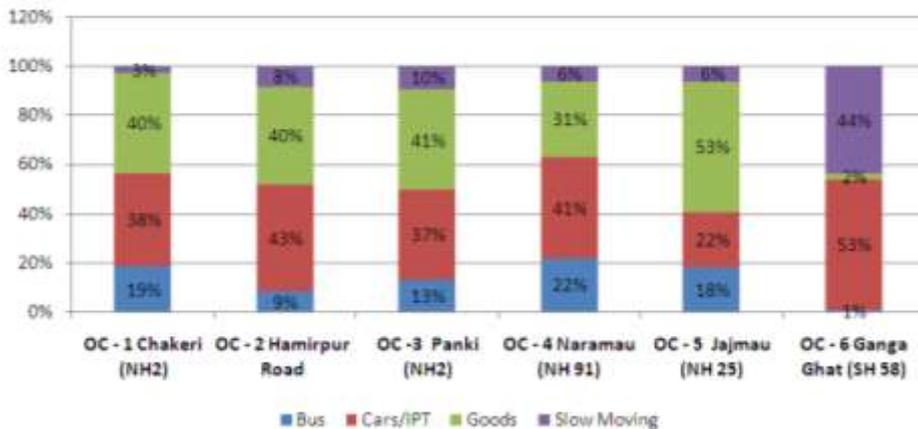


- Overlapping on most routes
- Very low frequency -30-45 minutes
- Unorganized operations and halting of buses
- IPT (shared tempo) operational on all routes

Outer Cordon Traffic



Composition of Traffic at Cordon Locations



- about 1.50 lakh vehicles are entering and exiting Kanpur every day
- total daily traffic accounts about 2,05,102 PCU

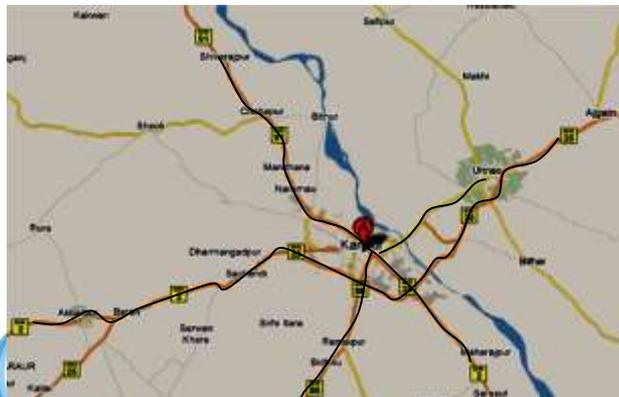


Major Issues

Transport System – Existing Scenario: Key Issues

- **Land use**

- Unidirectional growth of the city
- Large portions of urban land in the city centre remain underutilized
- Location of large scale industries (Defense and PSU) inside the city
- Single CBD for the entire region
- Poor access inside old commercial area (CBD) due encroachment on roads and mixing of slow and fast moving traffic



- **Regional Connectivity**

- Good network of highways radiating outwards, however, absence of a ring road connectivity to link peripheral areas

Transport System – Existing Scenario: Key Issues

- **Traffic Congestion**

- ROB/RUBs required on at grade railway crossings at several locations on the city periphery
- Enforcement of traffic rules is a major focus area that needs attention



- **Road Network**

- Unlike the northern portion of the city, Southern half (beyond the railway line) of the city has narrow, poor quality roads and undeveloped intersections
- Road geometrics need to be improved for several road intersections for maintaining a smooth traffic flow.
- Poor access to the railway station

Transport System – Existing Scenario: Key Issues

- **Public Transport**

- Organized public transport is required in the city, where in all modes of IPT act as feeders to the main service instead of any route competition.
- No single authority responsible for organized operations of shared tempos



- **Parking**

- Absence of any off street car parking facility
- No formal system of parking fee collection in most areas.
- On street (median) parking of vehicles inside the CBD area leads to congestion on the roads almost throughout the day

Transport System – Existing Scenario: Key Issues

- **NMT**

- Development of footpaths and suitable street furniture is required on major roads of the city
- Use of animal carts for transporting goods throughout the day, leads to congestion on the road and goes against safety issues.
- Absence of pedestrian crossing facilities on almost all intersections



- **Freight System**

- The city is in dire need for a freight management strategy as goods mobility is a very important aspect for Kanpur along with mobility for people



Vision, Goals and Objective

Vision

Vision

To have a modern world class transportation system, truly addressing the mobility needs of the people and goods and reviving Kanpur's past glory of being a major economic growth centre



- It should enhance the integration and connectivity of the transportation system, across and between modes, for people and freight
- support the economic vitality of the metropolitan area and improve the overall quality of life.

Goal

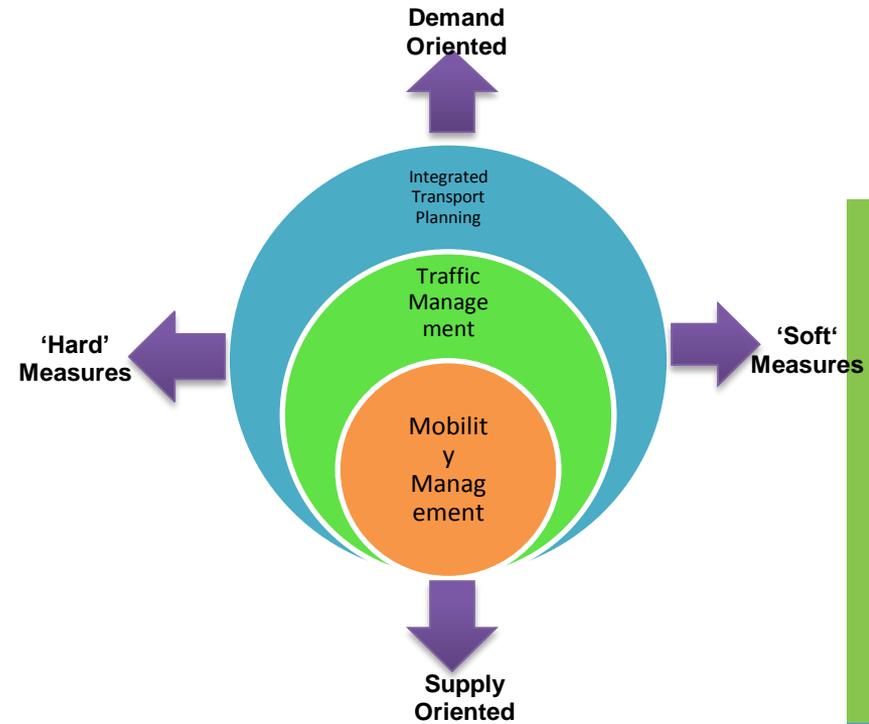
Goal 1: Towards free-flowing towns and cities

Goal 2: Towards smarter urban transport

Goal 3: Towards accessible urban transport

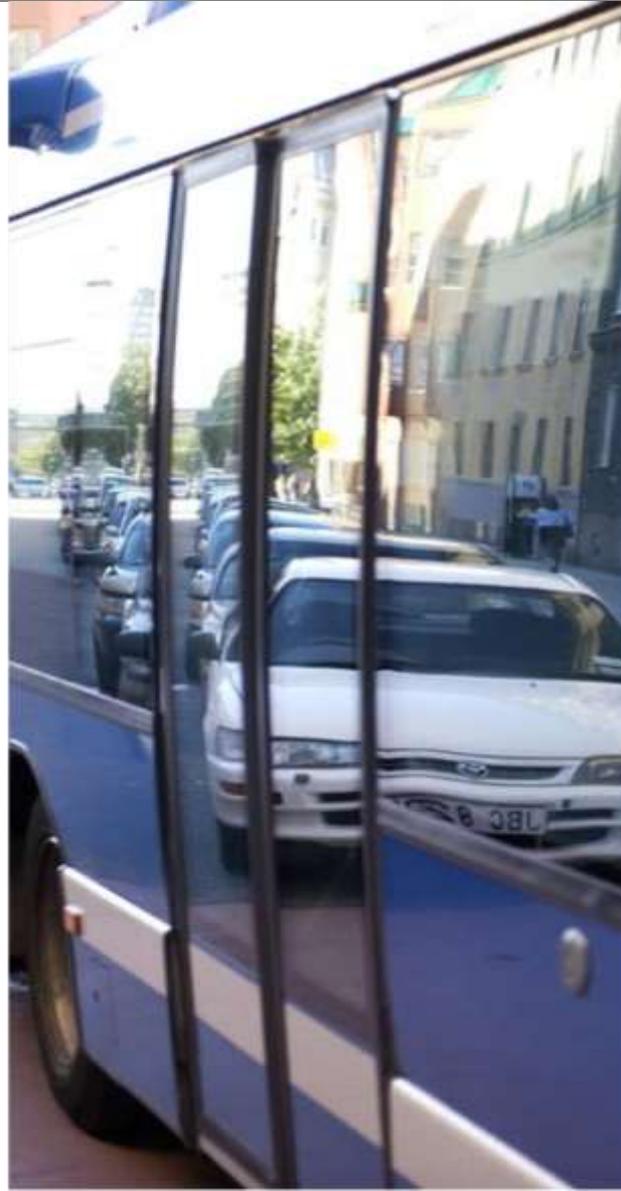
Goal 4: Towards safe and secure urban transport

Goal 5: Achieve Service Level Benchmark



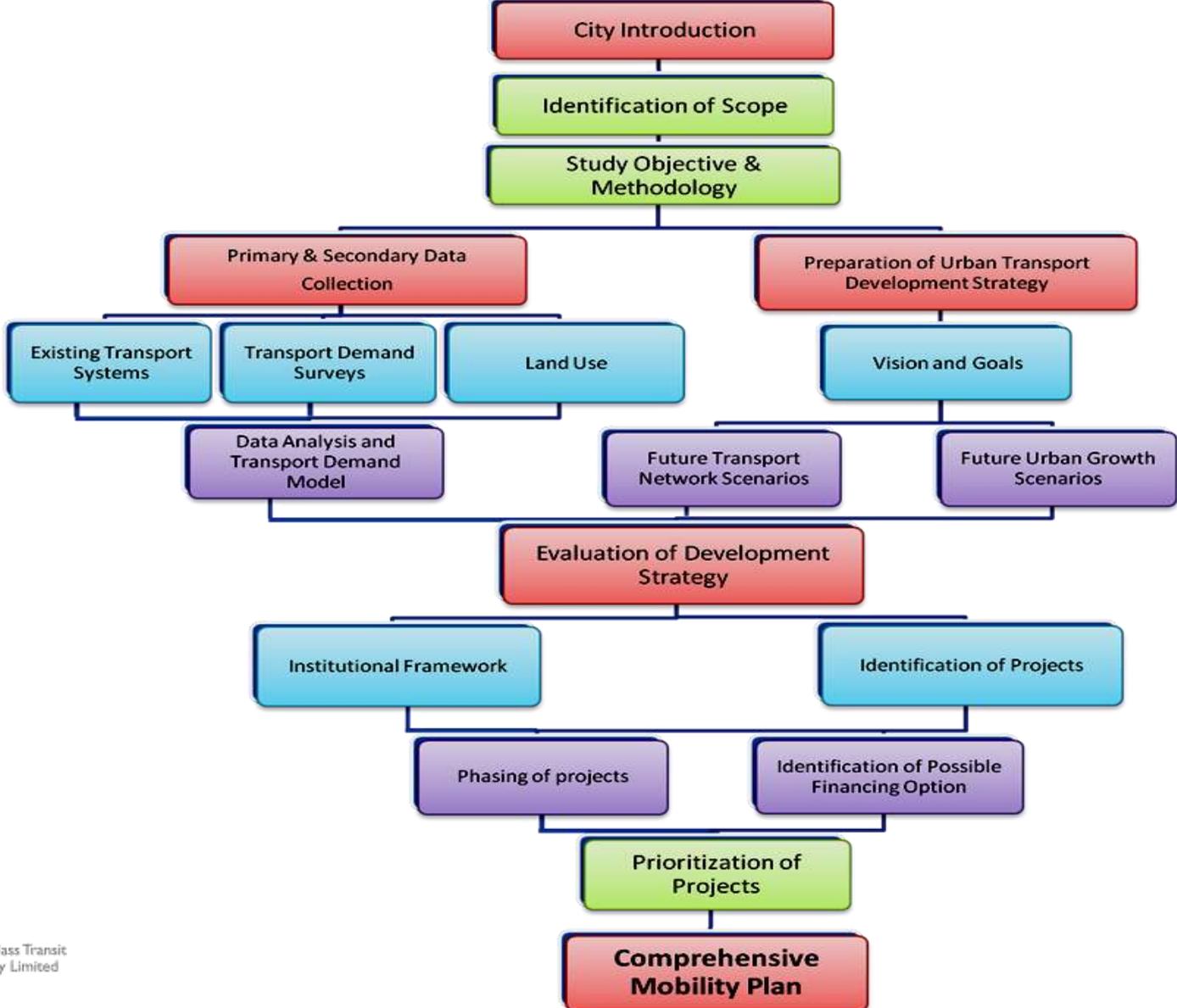
Objective

- Encourage public transport and pedestrian movement in the core city.
- Develop a pedestrian oriented mobility plan
- Restrict use of personal vehicles,
- Reduction of on street parking
- PT improvement plan
- Integration with existing IPT System,
- Provision of NMT facilities
- Implementing bus priority systems at junctions



- Implement traffic management measures
- Innovative traffic management techniques
- Restrict parking at critical locations in the city
- Create off street parking near major activity centers, transit stations/ terminals
- Develop immediate/ short term, medium and long term measures strategies to ease flow of traffic

Methodology





Mobility Plan Strategies

Strategic Framework to Approach Mobility Plan

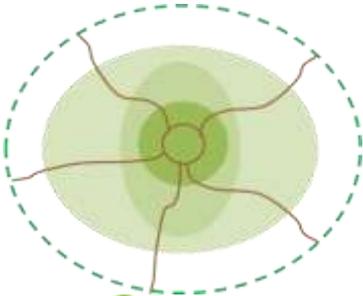
2031 Mobility Indicators			
Indicators		Do Nothing	Bench mark
	Average Journey Speed	10 Kmph	30 kmph
	Public Transit Share	7%	30%
	Walkability (Footpath Length /Road Length)	18%	100%
	Cyclability (Cycle path Length /Road Length)	0%	50%
	Fatality Index (Fatalities/ Lakh Population)	33	Reduce by 50%

- Land Use and Transport Integration
- Development of Mobility Corridors
- Making public transport a choice mode
- Non-Motorized Transport Strategy
- Freight Mobility
- Transportation Demand Management
- Traffic Engineering Measures

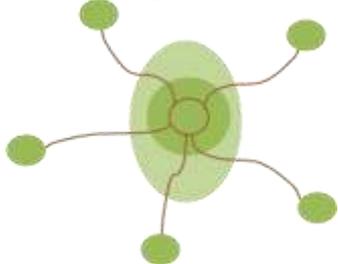


Land Use Transport Integration- Concept

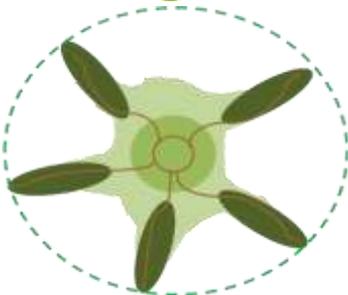
Concentric Growth



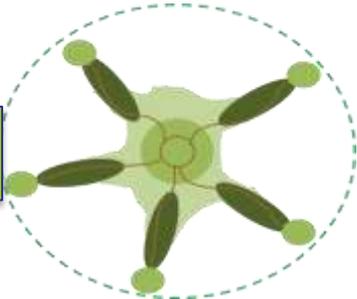
Ring Town



Corridor Development



Corridor-Node Development



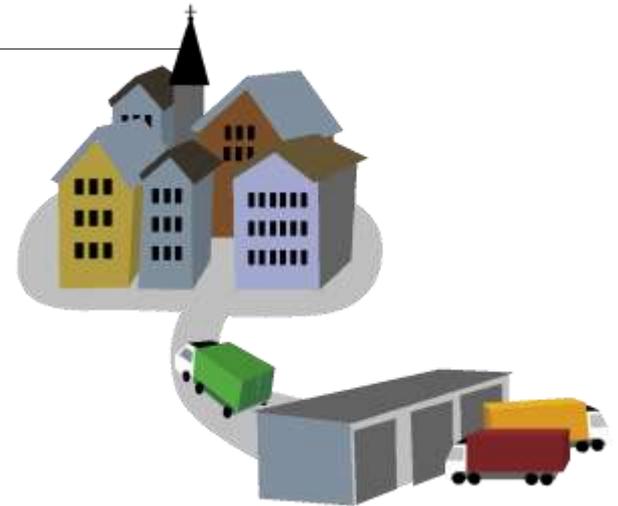
Non Motorised Transport Strategy

- Development of NMT network
- Provision of grade separated facilities
- Establishing connected walking networks preventing encroachment, vehicle parking and other uses from blocking walkways
- Street furniture (e.g. benches)
- Integrate cycling with transit
- Addressing security concerns of pedestrians and cyclists.

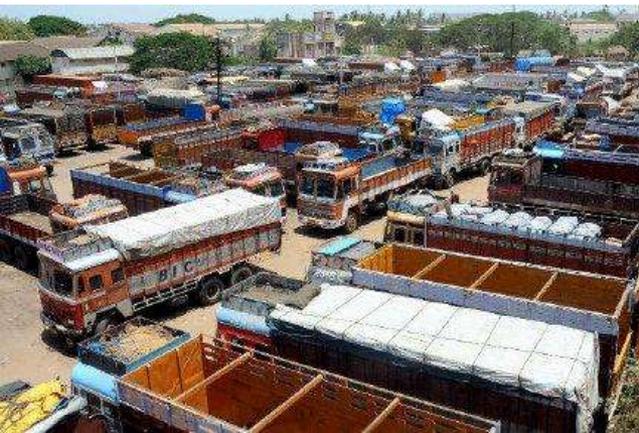


Improved Goods Mobility

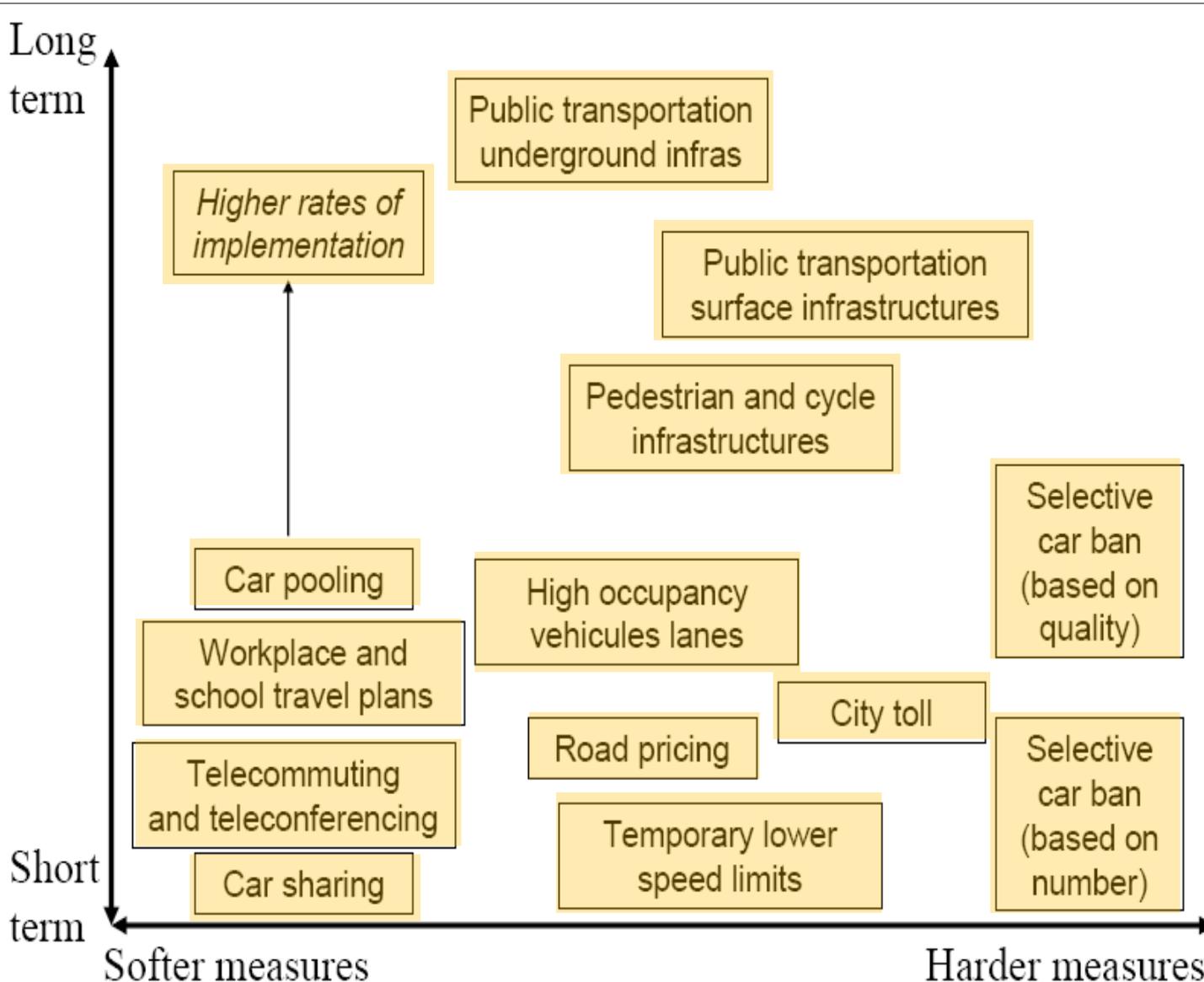
- Complete key roadway projects to enhance freight mobility
- Shift the wholesale markets from the congested city core
- Preserve and maintain the city's existing multimodal freight transportation system



- Improved Goods Distribution
- Right location for a logistics centre.
- Provide initial funding
- Offer assistance with administrative and legal issues
- storing facilities
- deliveries on time
- packing/unpacking of goods



Transportation Demand Management- Measures



Strategies

- Operational (such as dynamic route information on highways)
- Physical (such as auto restrictions in city centers)
- Financial/pricing (such as congestion charging)
- Organizational (such as sustainable travel planning)

Transportation Demand Management- Strategies

Physical

- Access control system for restricting vehicle entry in the core areas
- Improvements in PT systems-
- park-and-ride facilities on the periphery of cities & offering express bus or rail service into city centers.
- infrastructure, such as subway entrances, bus stops and routes
- Organizational (such as sustainable travel planning)
- Public education and awareness programs



Financial/pricing

- Local infrastructure needs to be adjusted for the implementation of restricting zones.
- Municipal efforts to support clean vehicles

Operational

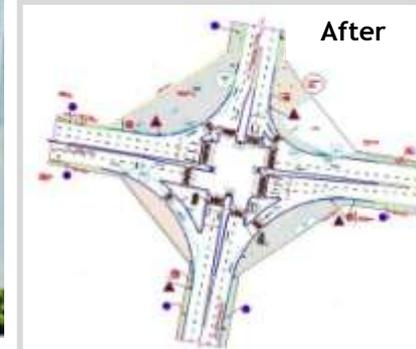
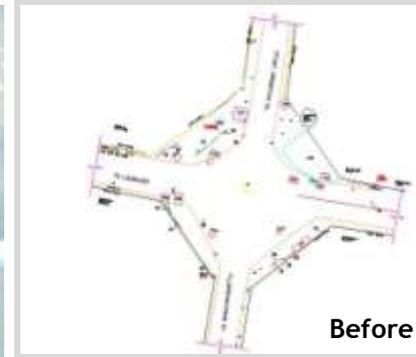
- Road Space Rationing by restricting travel at certain times and places.
- “Real time” traffic and parking information to share traffic load
- Traffic signal co-ordination

Traffic Engineering Measures



Strategies

- Junction improvements (geometrics and signage) and redesign
- Traffic control devices
- Area Traffic Control (ATC) and ITS
- One way
- Parking management
- Speed restrictions
- Road rectification
- Traffic calming techniques



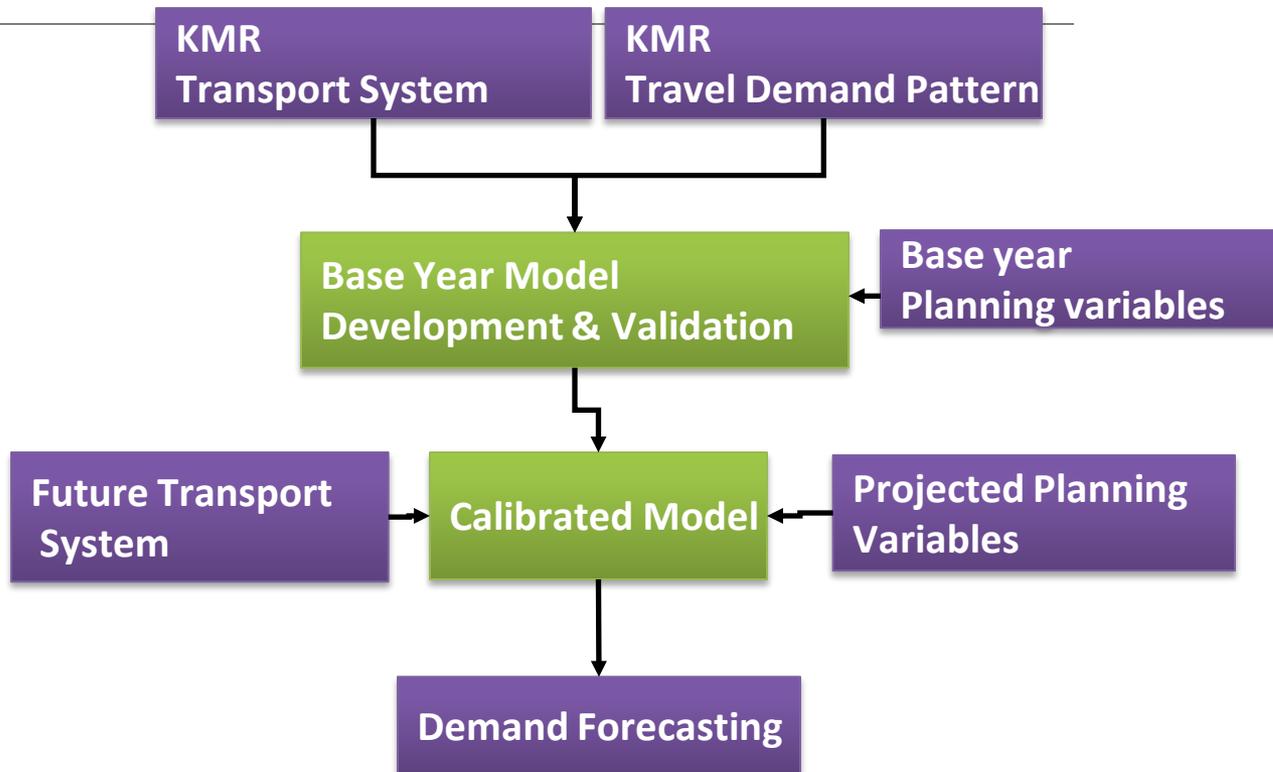
Road Markings	Signages	Intersection improvement
Traffic separator/channelizer	Traffic Calming Techniques	Delineators
Footpath repair works	Signalization of intersections	One way streets
Road rectification-patch repair	Resurfacing/strengthening of road stretch	Speed limits



Transport Demand Model

Public Transport Plan

Transport Model



Cube (Modeling Software)

- State-of-Art Software
- Highway & Public Transit Modeling
- Doubly Constrained Gravity Model

Transportation System

- 1082 Links
- 52 zones
- 711 nodes
- 18 Bus Routes

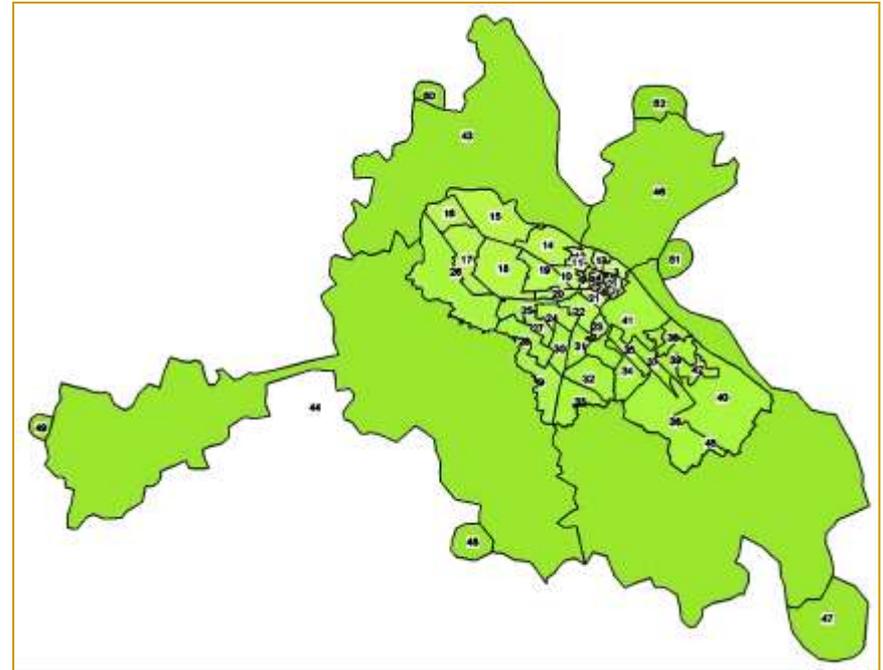
Travel Demand (Mode-wise O-D)

- Public Transit
- Car
- Two Wheeler
- Auto Rickshaw

Zoning and Road Network

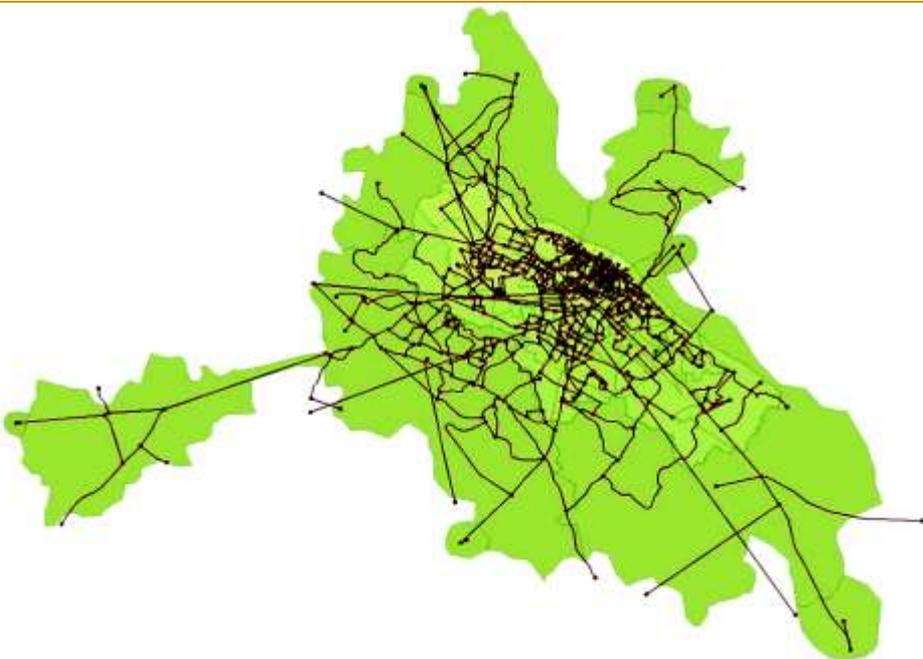
Zoning

- KNN area : 110
- Grouped Internal zones: 46
- Cantonment/Defence Area : 3
- External zones: 6



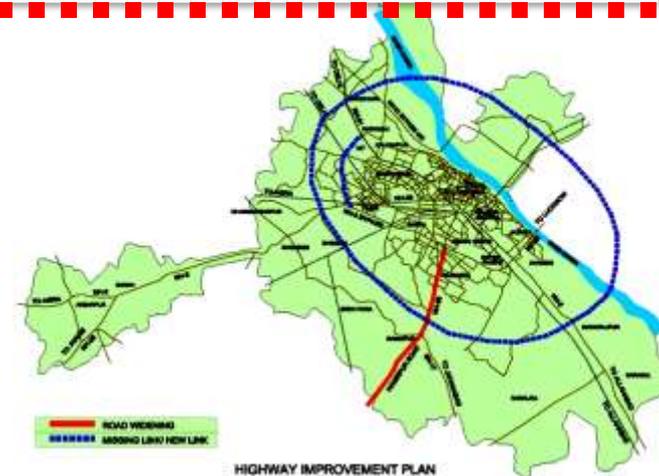
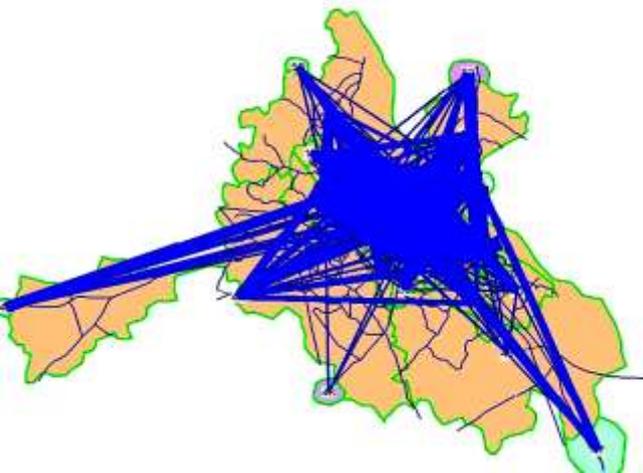
Road Network

- Total Road length: 1062Km
- No of Nodes : 711
- No of links : 1082



Comparison of Travel Characteristics

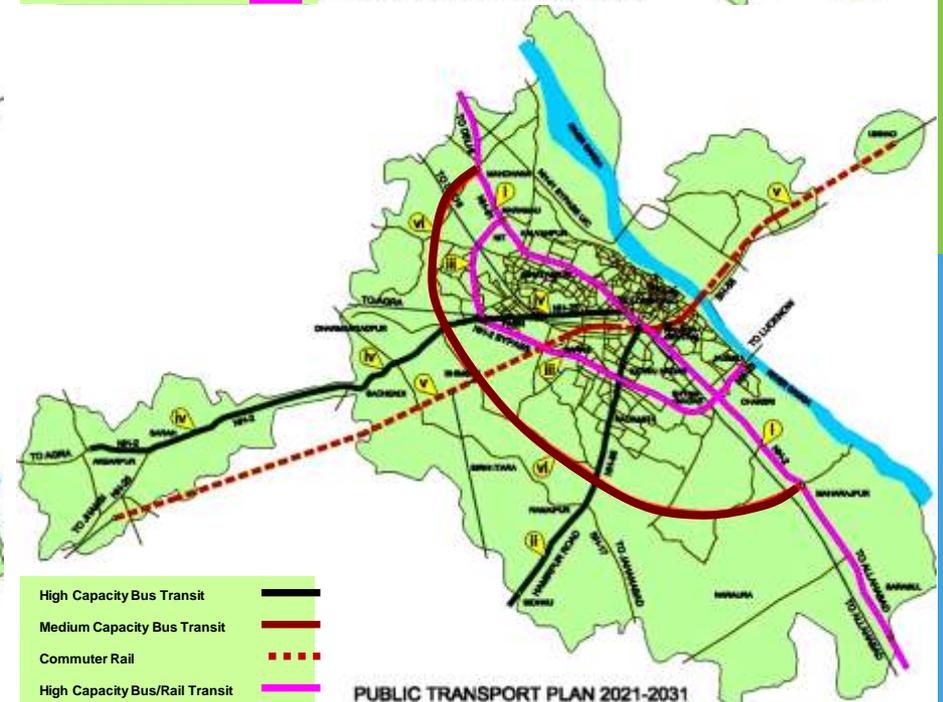
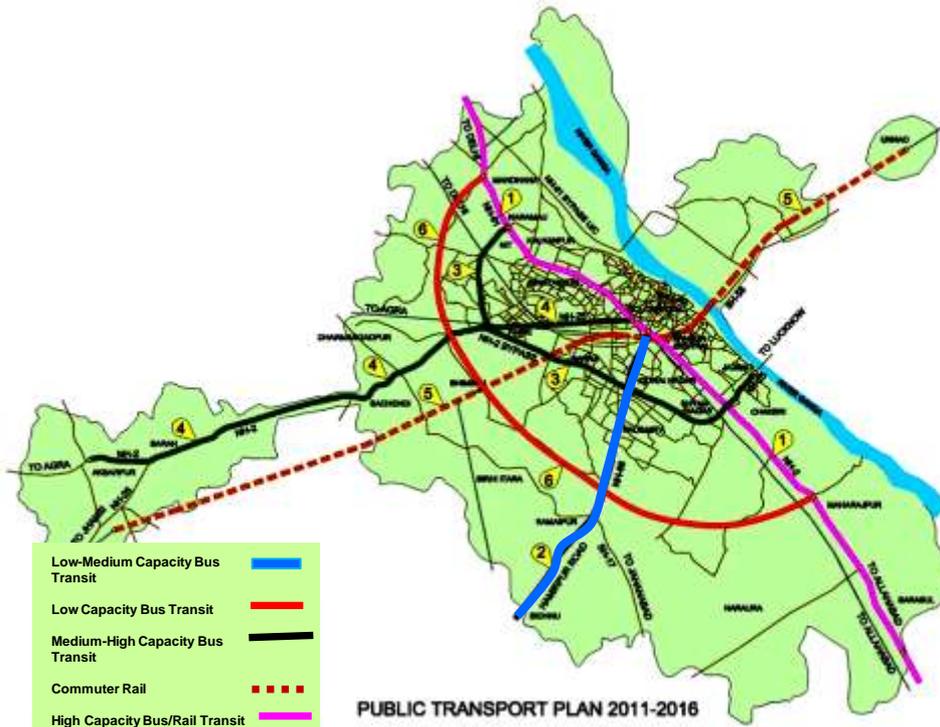
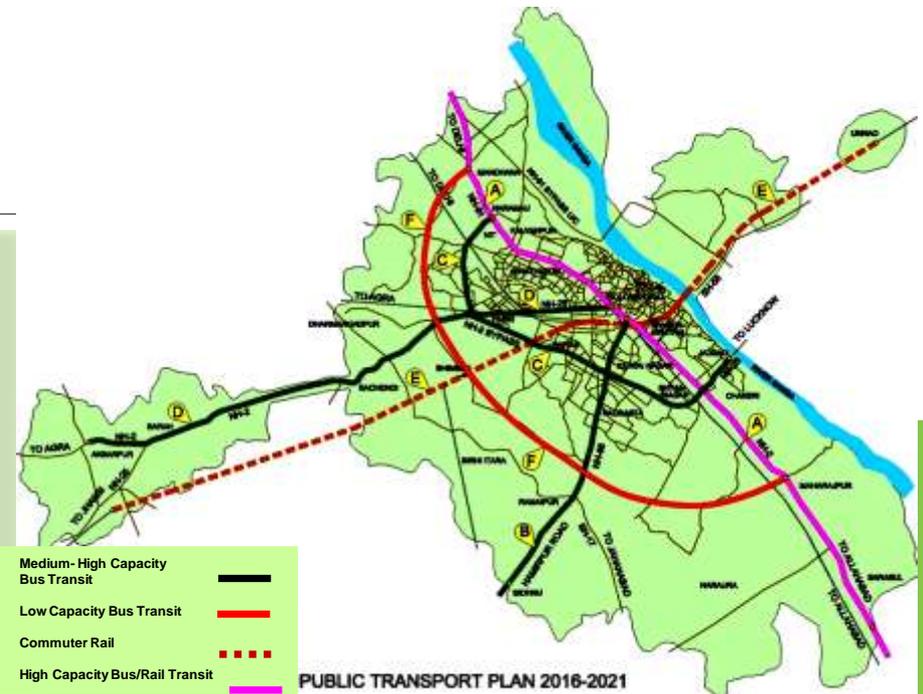
S No.	Scenario	Private vehicle share (%)	IPT Share (%)	PT Share (%)	Average Trip length(PT) in Km	Emission in Tons/day
1	Base Year	53	35	12	10.20	30.08
2	Do Nothing -2031	58	35	7	7.31	59.58
3	Highway Improvements	64	30	6	6.71	61.31
4	Bus augmentation	64	21	15	7.21	59.13
5	Highway Improvements+ Bus augmentation+ Mass Transit system	49	21	30	14.41	44.78



Public Transport Plan

Highway Improvements+ Bus augmentation+ Mass Transit system

- 2011 – 2016
- 2016 – 2021
- 2021 - 2031

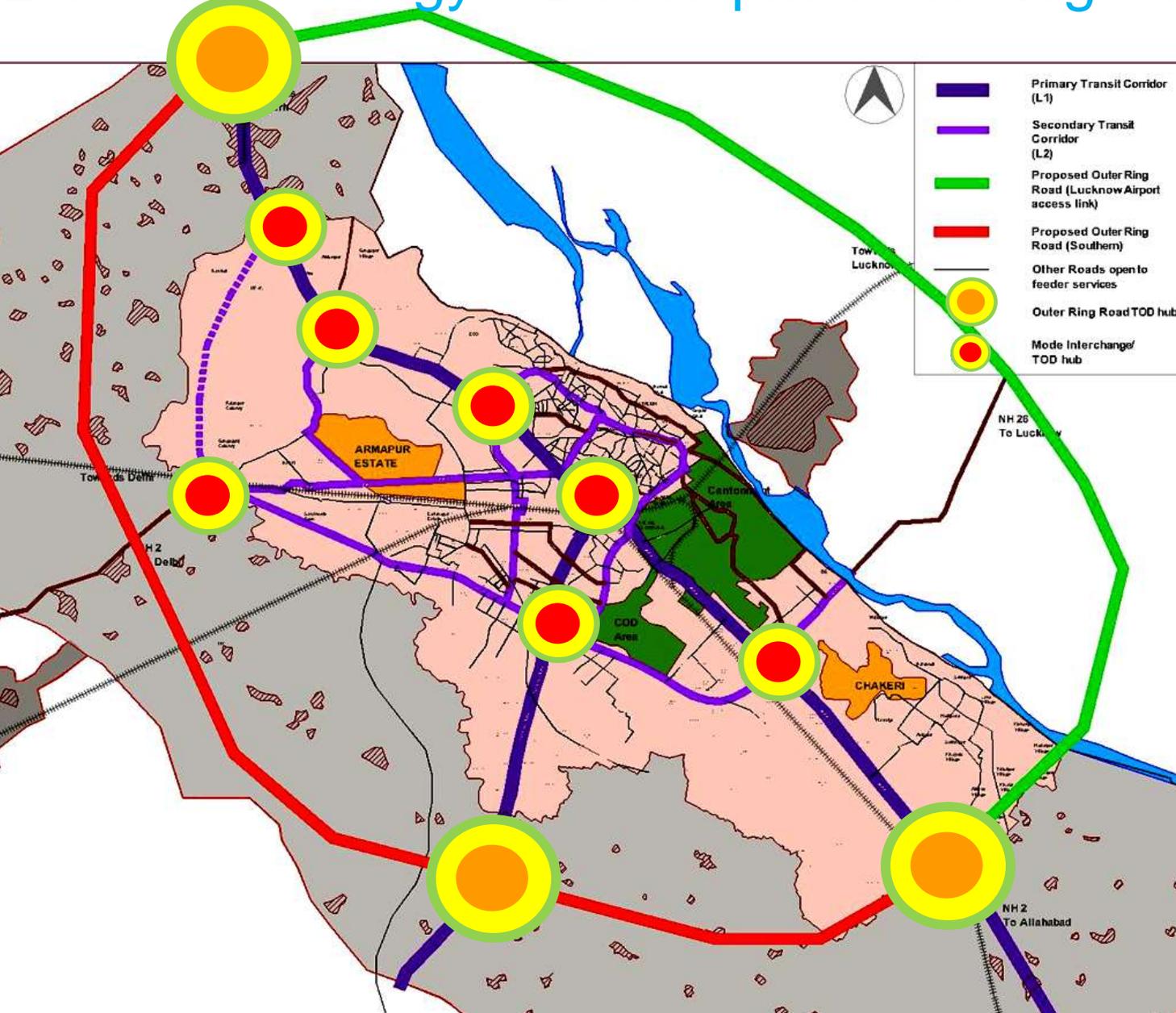




Mobility Plan

REGIONAL HUB / TOD CENTRES

Landuse Strategy – Development of Regional Hubs



Recommendation
Integrated system of Public Transport with interchange hubs within the urban limits and TOD hubs on Outer Ring Road

Impact
• Induced urban growth in underdeveloped localities with the city limits.

Regional Hub

- Development of three regional hubs on along the outer ring road on NH 91, beyond Naramau, Hamirpur Road, near Ramaipur and NH 2 near Chakeri Railway Station
- Development of hubs to be based upon proposed area plans for all three hubs, comprising of a mixed office/commercial core, surrounded by residential cover and a green belt



Small subcity to act as a dense, compact, pedestrian-scaled mixed-use development to support transit ridership by providing multi-modal connectivity to Kanpur mother city and serve as the "social" heart of the neighborhood.

MOBILITY CORRIDORS

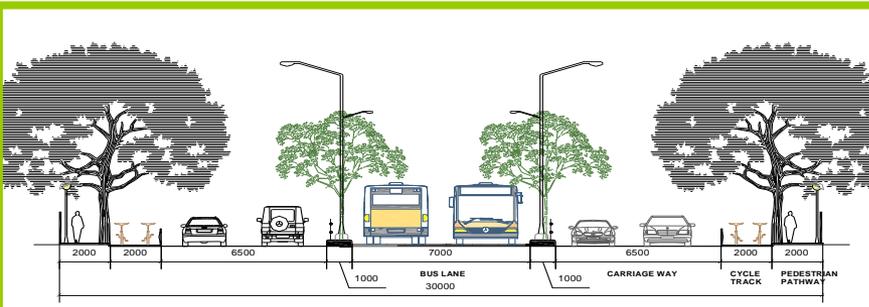
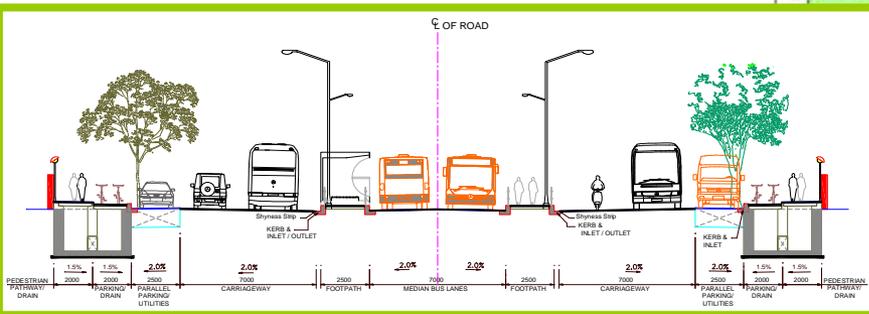
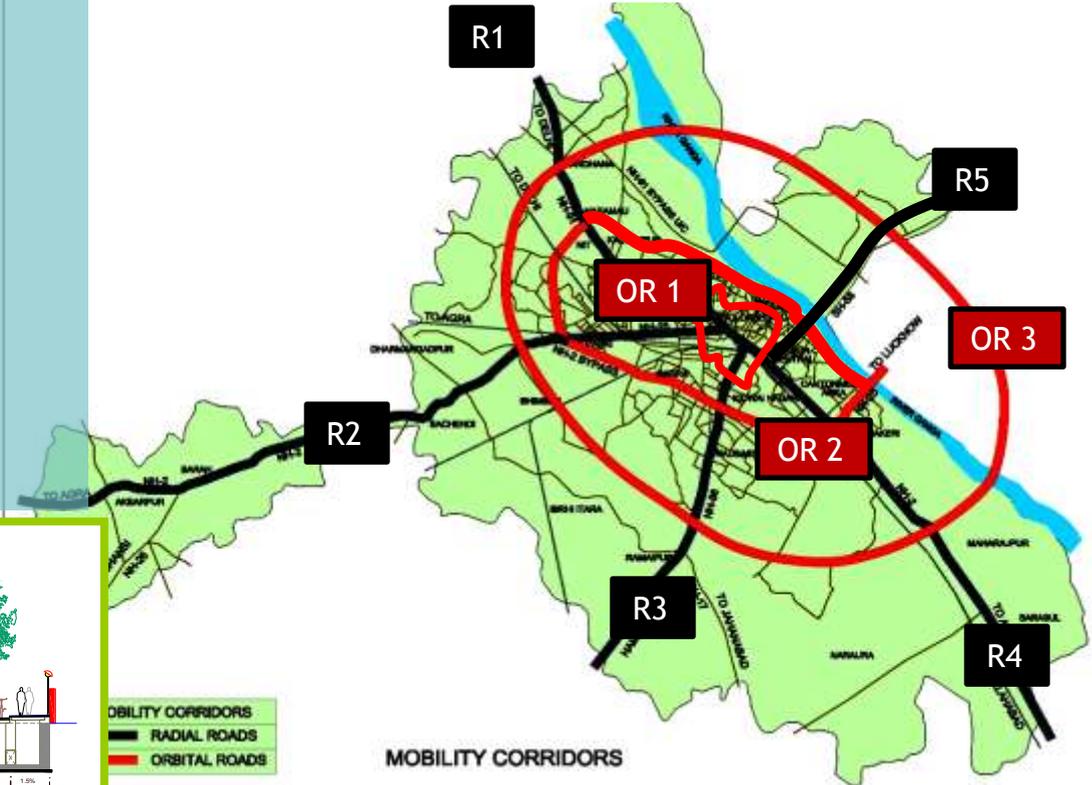
Land Use Transport Integration

– Mobility Corridors

Category	Speed (KPH)	Space Standard (m)
Arterial	50	50-60
Sub Arterial	30	30-40
Collector	20	20-30
Local Street	20	10-20

Radial Roads (R1/R2/R3/R4/R5)

- Road cross section - At least 25m for mixed traffic conditions or 30m for dedicated PT lane conditions.
- Continuous kerb, footpath-cum-drain & bi-cycle lanes.
- Service roads where feasible



Orbitals (OR1/OR2/OR3)

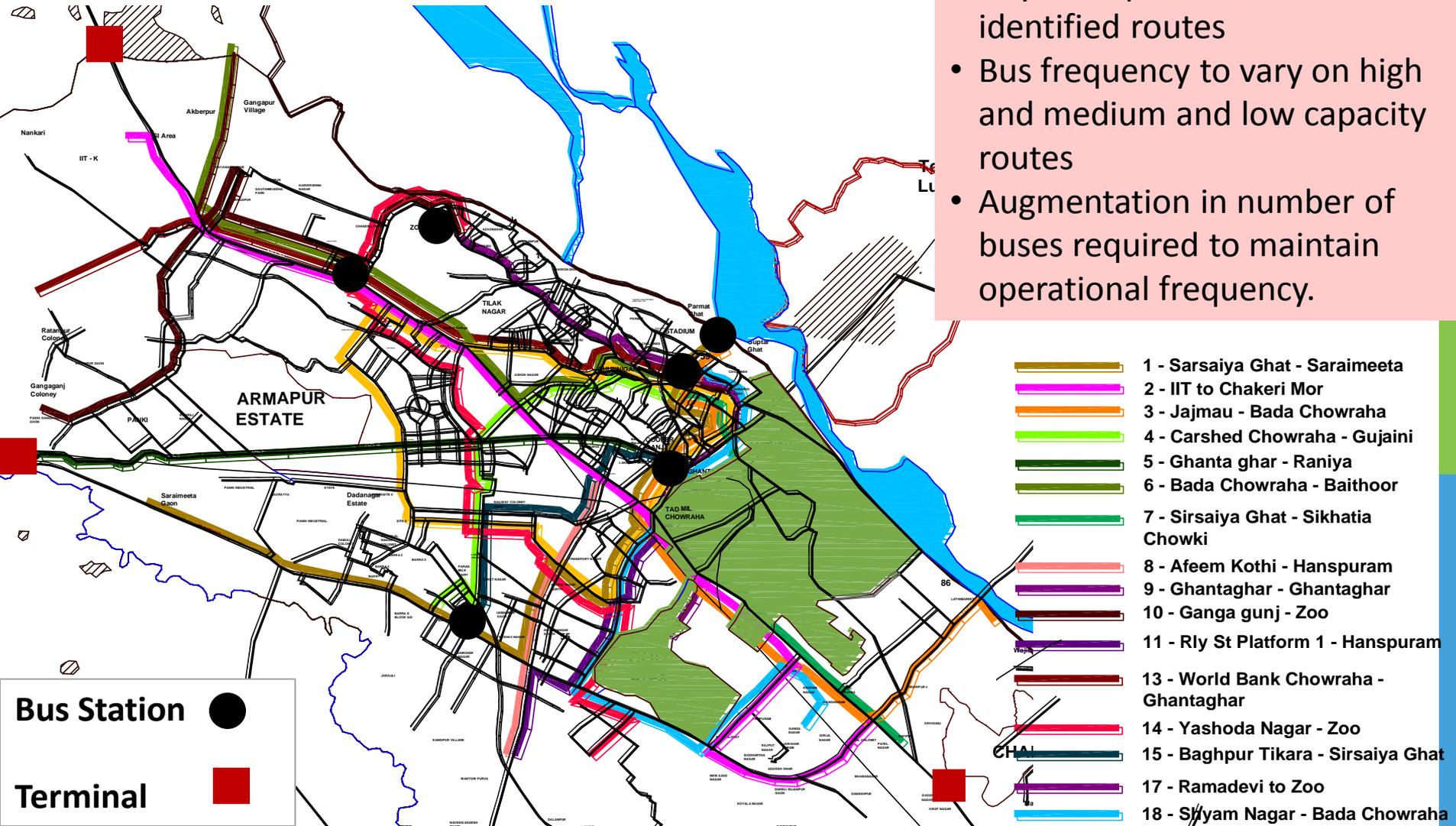
- Restriction or preferably prohibition of parking on the c/w / shoulders.
- At-grade/grade separated PT systems

CITY BUS OPERATIONS

City Bus Routes



- City bus operations on 18 identified routes
- Bus frequency to vary on high and medium and low capacity routes
- Augmentation in number of buses required to maintain operational frequency.



Public Transport Infrastructure



Bus Terminals

1. Mandhana
 2. Ramadevi (near Ahirvan)
 3. Neat Bhanauti (beyond Panki)
- Area Required by each – 3-5 acres



Bus Stations

- Sarsaiya Ghat
- Bada Chauraha
- Rawatpur
- Near Chidiyaghar
- Near Rly. Station
- World Bank Chauraha



Bus Stops

- Bus stops required at a range of 0.5 – 1.5 km spacing along all routes

NMT PLAN

Non Motorized Transport Strategy- Pedestrian Mobility Plan

Other Facilities

•Grade Separated pedestrian facilities-

- Ghantaghar Chowk
- Bada Chowk
- Phoolbagh Chowk
- Ramadevi Chowk

•Pedestrian Phase at Intersections

- Pared Chowk
- Mulganj
- Jarib Chowki
- Company Bagh
- Vijaynagar Chowk
- Bada Devi Chowk
- Kalyanpur

Road Markings –

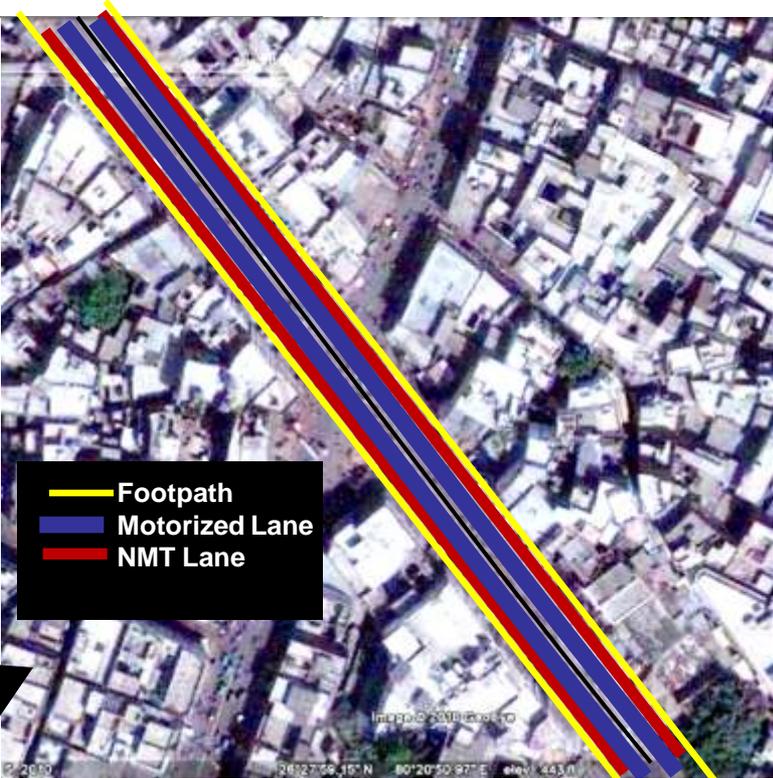
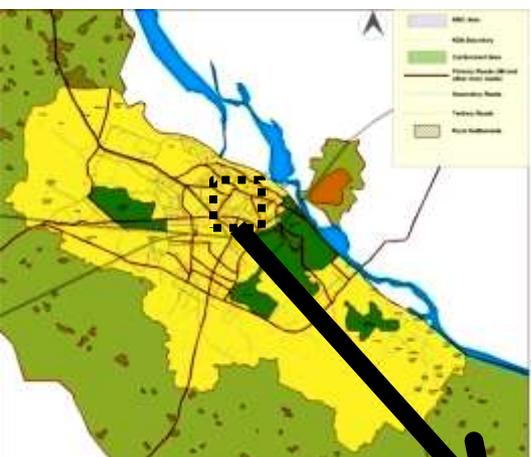
Suitable road markings in the form of “zebra crossings” at all intersections

Barricading –

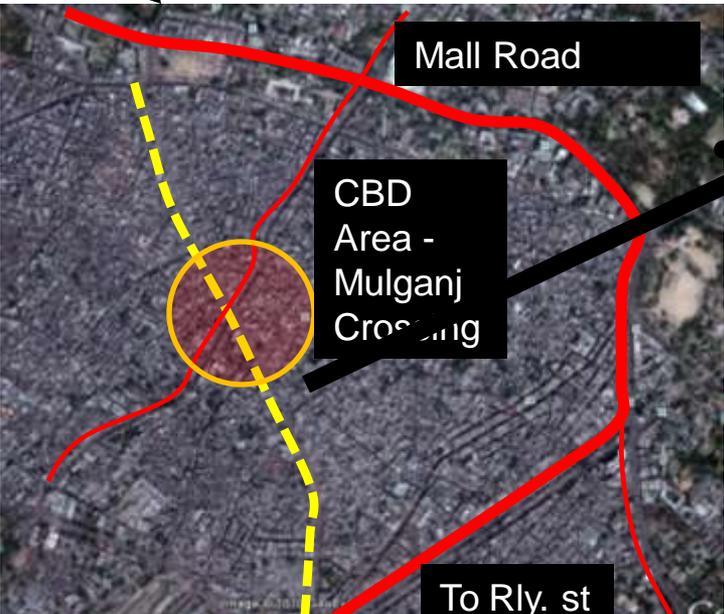
Barricading of footpath near every intersection for controlled crossing from an allocated vent



Mobility Plan Strategies – Non Motorised Transport



— Footpath
— Motorized Lane
— NMT Lane



Mall Road

CBD Area - Mulganj Crossing

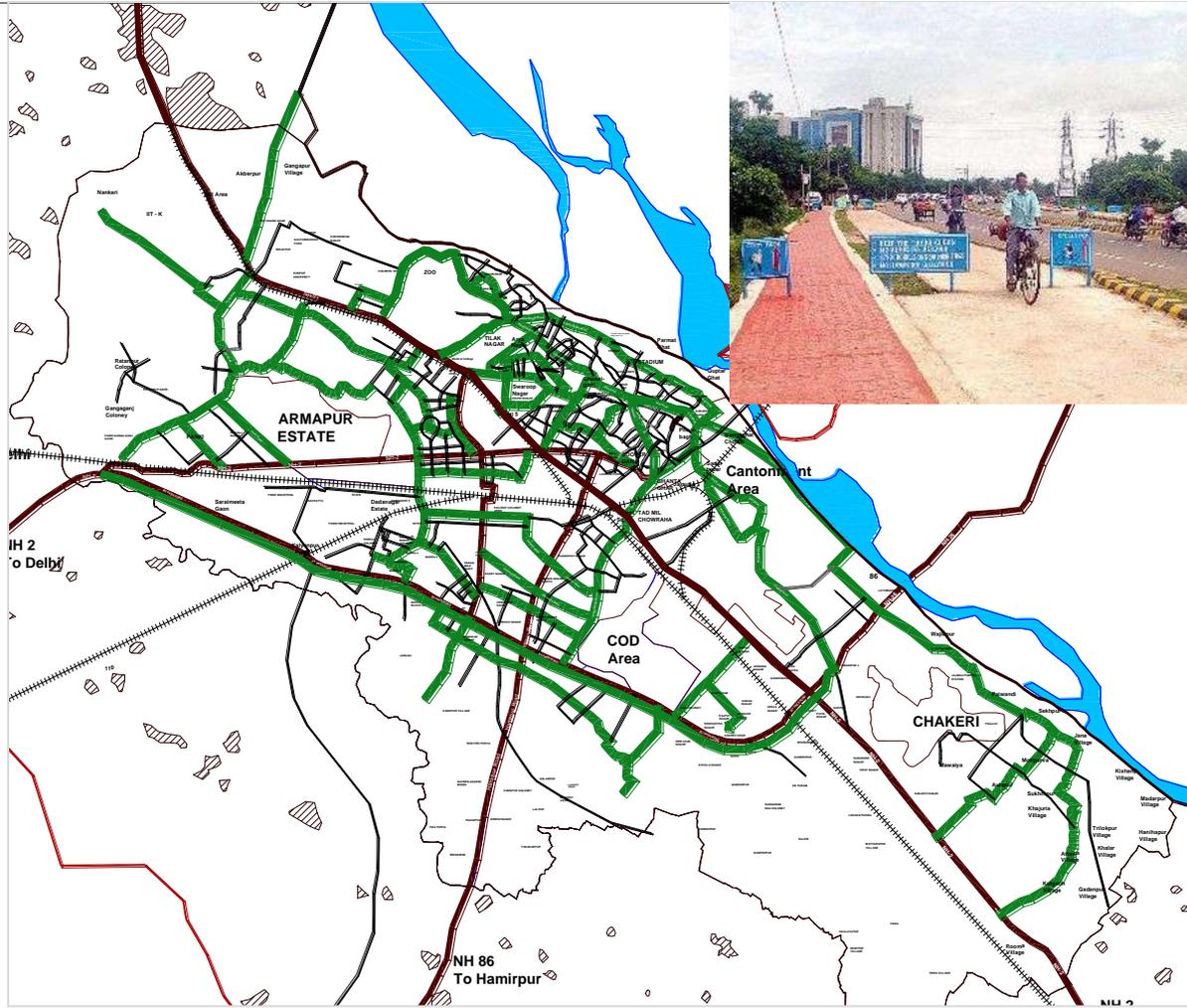
To Rly. st

Available ROW 25-28m – Master plan proposal – 30m widening
Recommendation for lane segregation for Motorized and Non Motorized (Animal, hand carts and bicycles) vehicles. Separate upto 1 m footpath on both sides



Improvement of pedestrian facilities along all roads, fixed timing for animal cart movement

Non Motorized Transport Strategy- NMT Network



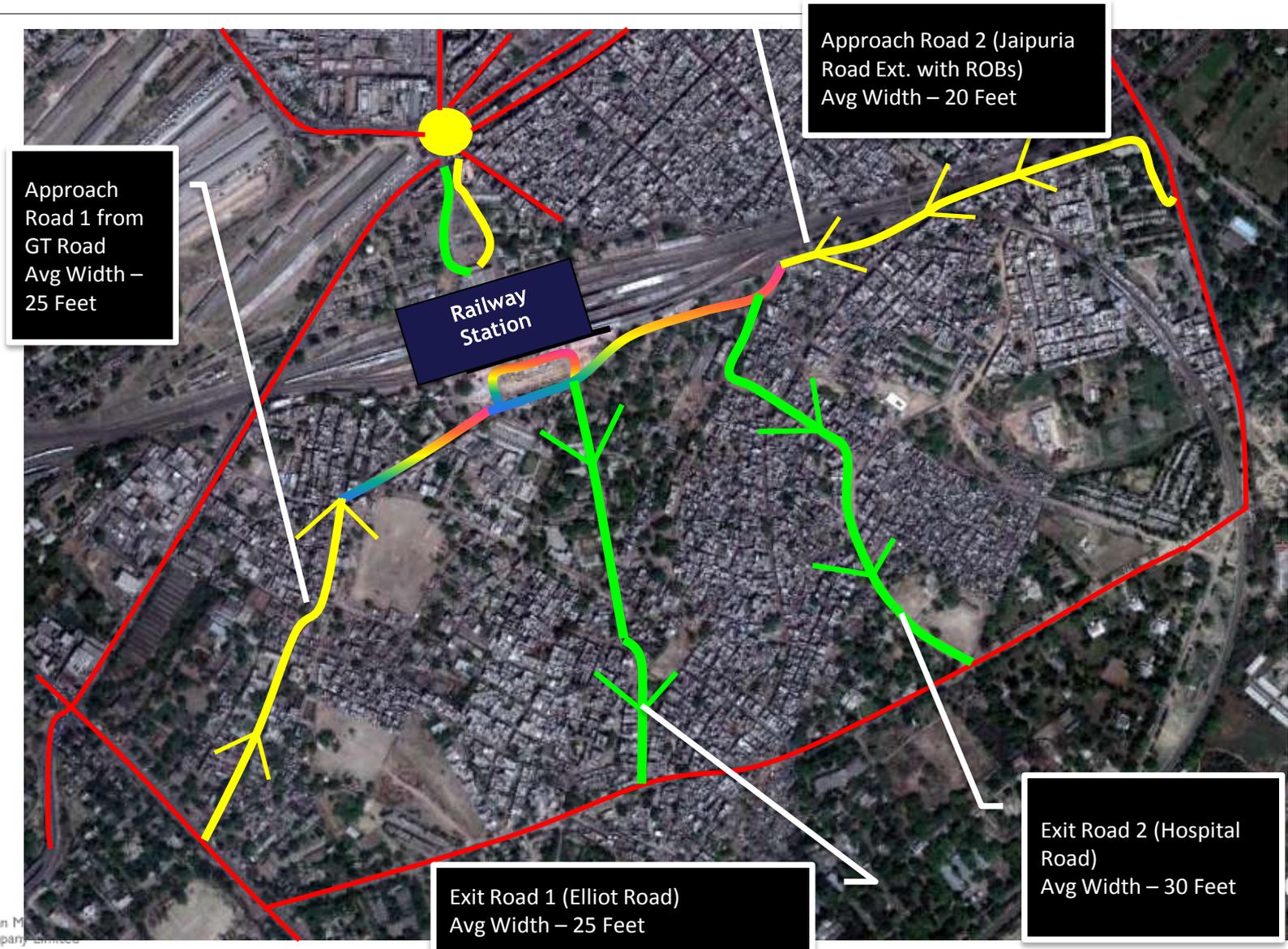
Need to create a linked Bicycle network at local area level, wherever possible.

Would encourage travel to key destinations on foot or via bicycle, rather than requiring a motorized trip

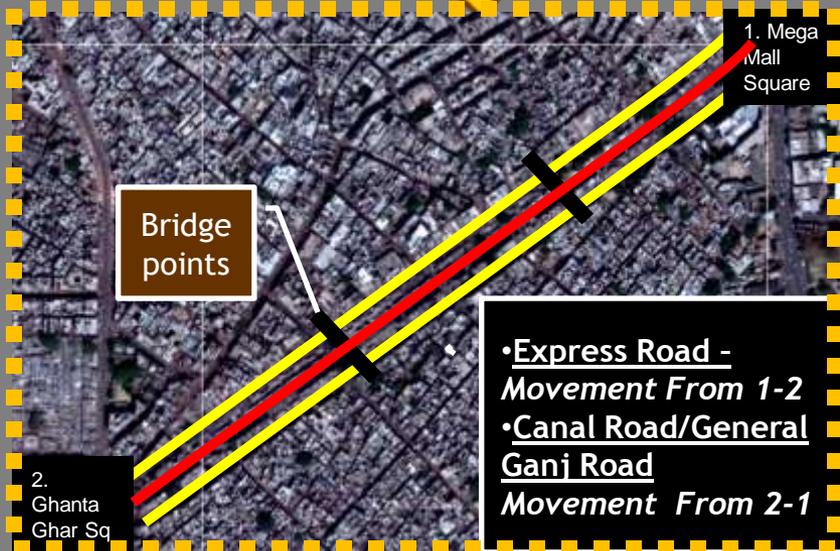
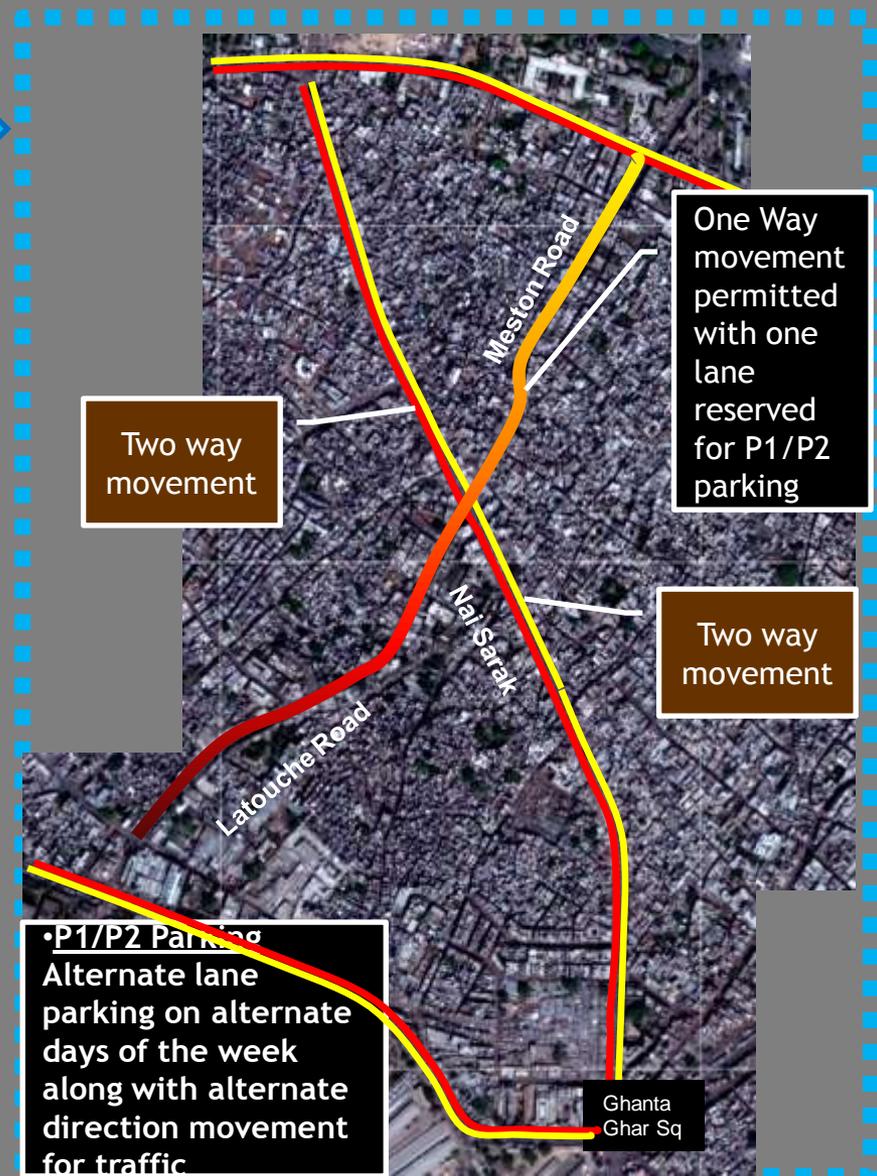
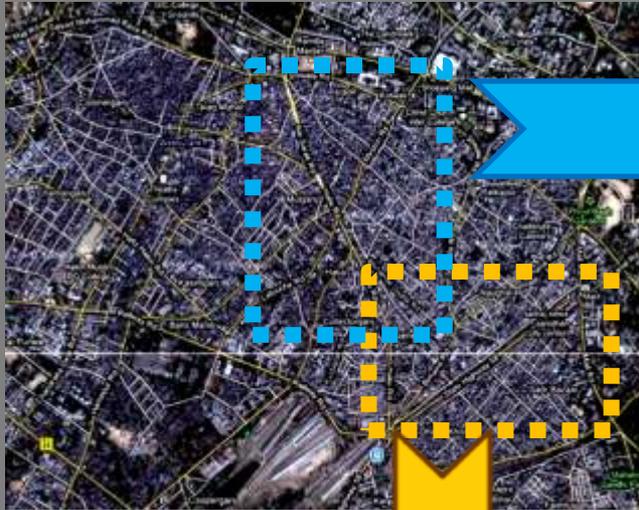


TRAVEL DEMAND MANAGEMENT

TDM - Railway Station Approach

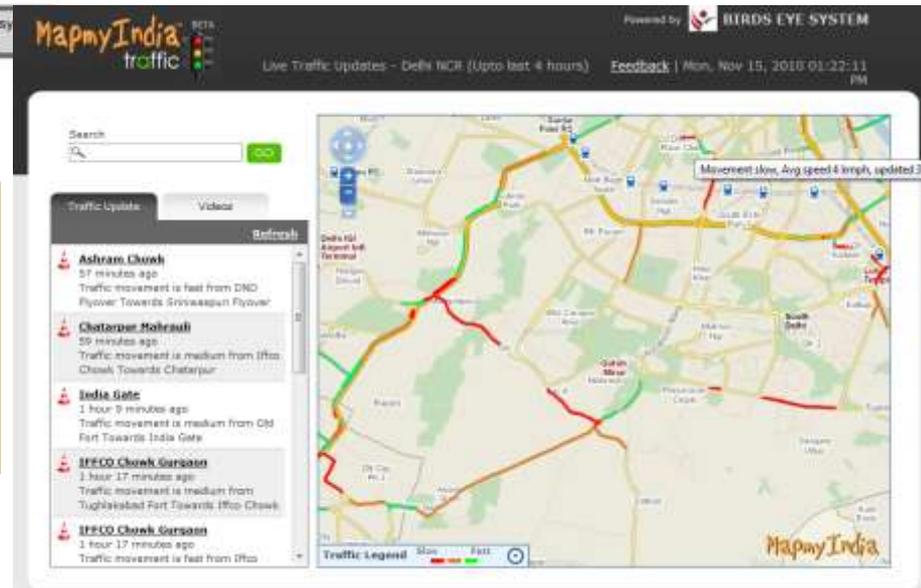


TDM – One Way System



TRAFFIC MANAGEMENT

Traffic Management Measures

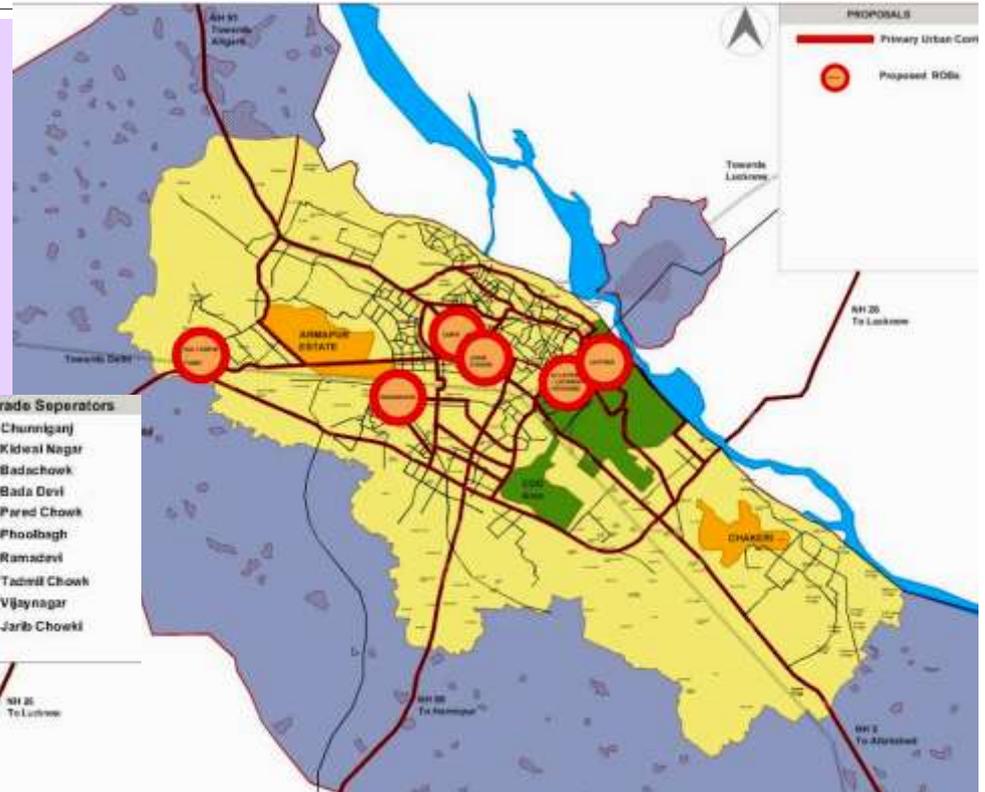
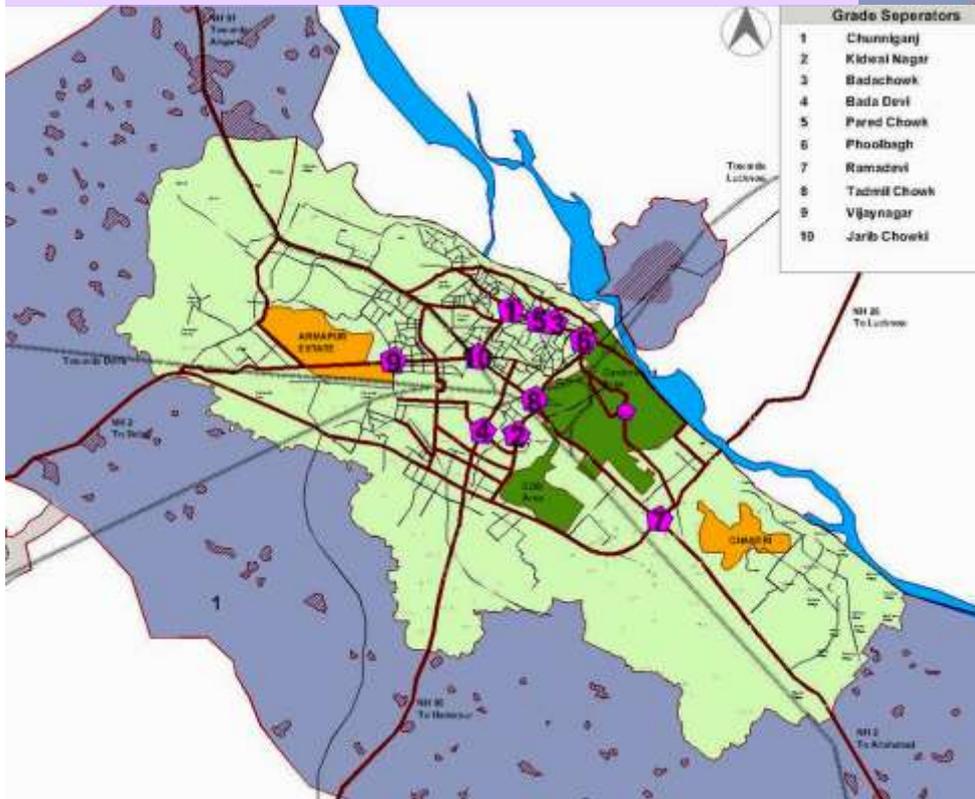


- Traffic Information and Management Centre (TIMC) centre for Kanpur city for real time traffic monitoring

ROBs and Grade Separators

Grade Separators

- Grade separators for 10 identified locations, to be developed in phases.
- Elevated/Underground road surface to be integrated with recommended NMT network

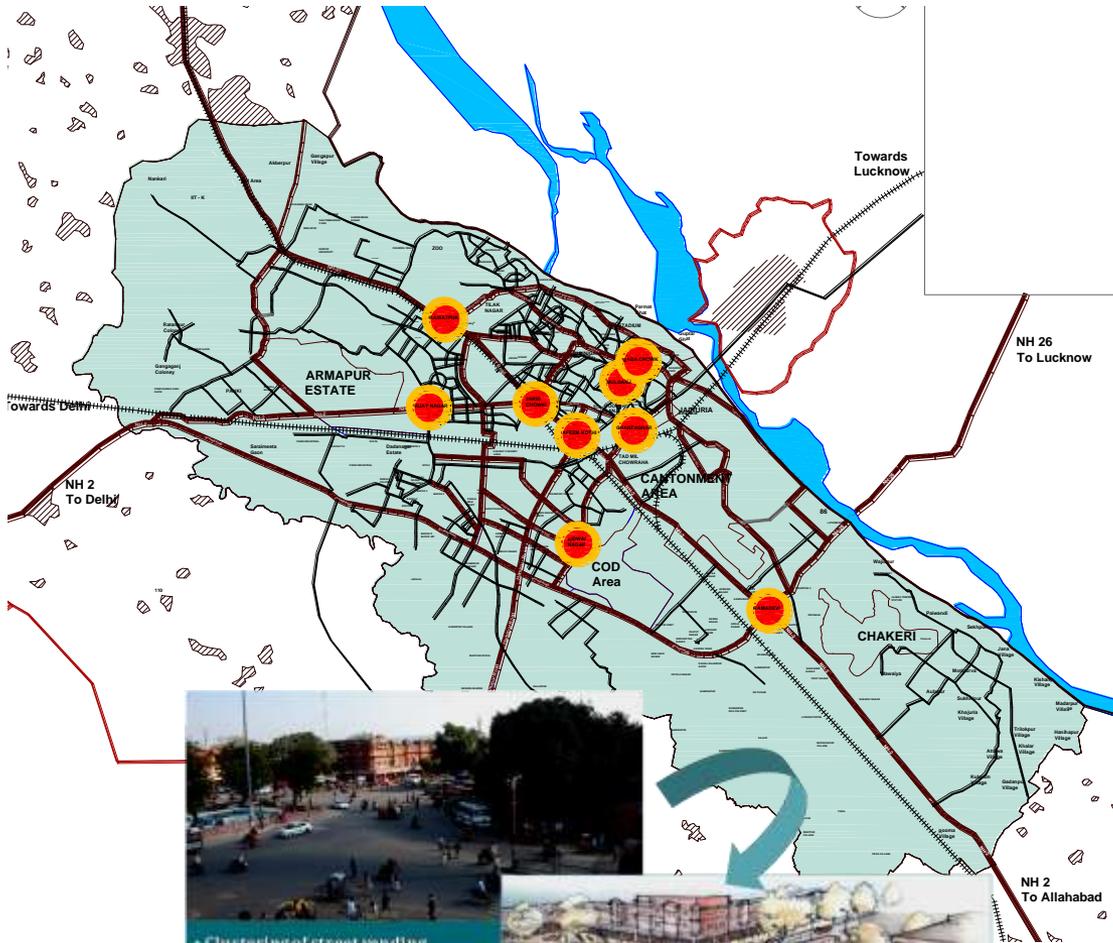


Railway Over Bridges (ROBs)

- 6 locations identified for development of ROBs to avoid stoppage period of vehicles at railway crossings

JUNCTION IMPROVEMENT

Traffic Engineering Measures- Junction Improvement



S.no	Name of the Junction
1	Ghantaghar
2	Ramadevi
3	Rawatpur
4	Vijaynagar
5	Mulganj
6	Kidwai Nagar
7	Jarib Chowki
8	Bada Chowk
9	Afeem Kothi



- Clustering of street vending
- Removing encroachment on public space
- Creation of public space with proper access
- Creation of better pedestrian network area



Intersection Improvement

Afeem Kothi- 4 Arm

Existing Scenario



Proposed Improvement



Major Issues

- Significant movement of freight movement on slow moving vehicles and animal carts
- Absence of proper road marking
- Absence of necessary channelizers
- Lack of pedestrian facilities
- Signals not in use
- Haphazard halting/parking of IPT modes and Buses
- Poor enforcement techniques

Intersection Improvement

Bada Chowraha – 5 Arm

Existing Scenario



Major Issues

- Absence of proper road marking
- Absence of necessary channelizers
- Footover bridge only present on one arm
- Signals not in use
- Haphazard halting/parking of IPT modes and private vehicles
- Poor enforcement techniques

Proposed Improvement



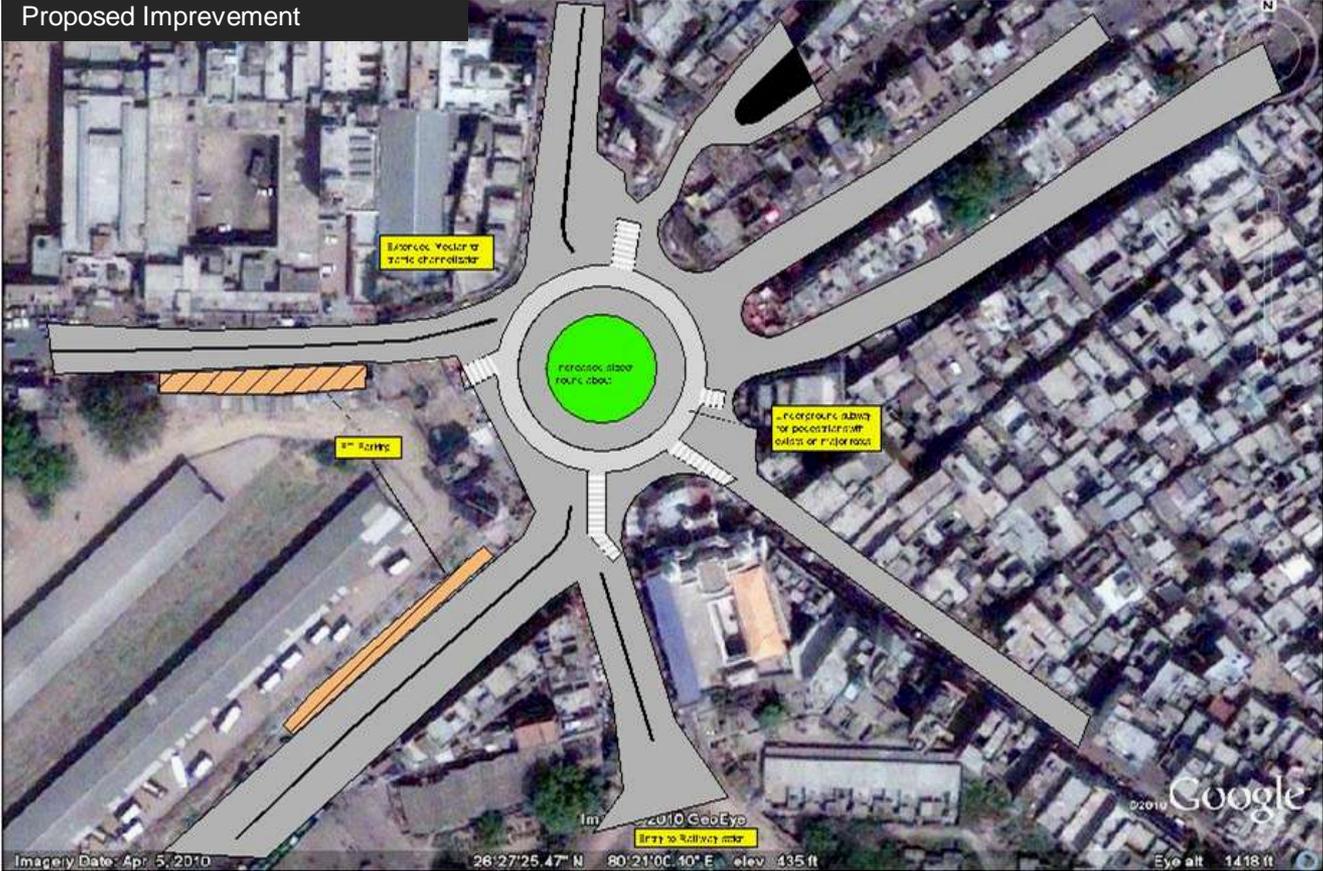
Intersection Improvement

Ghantaghar Intersection – 7 Arm

Existing Scenario



Proposed Improvement



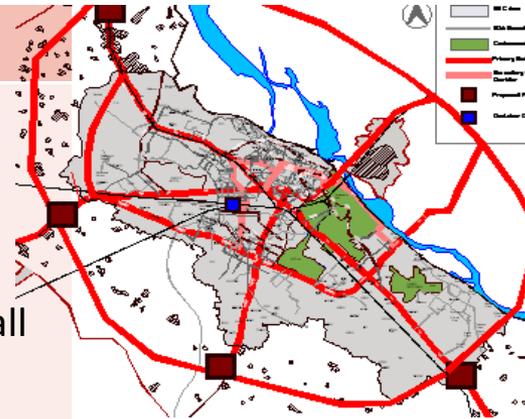
- Major Issues**
- Very high pedestrian movement
 - Important bus/IPT terminal with no designated bus stops and halt bays
 - Rear entry to the Railway Station right at the intersection
 - Absence of proper road marking
 - Absence of necessary channelizers

FREIGHT MANAGEMENT

Freight Management Plan

Phase # 1

- Improvement of Transport Nagar –
- Movement Restrictions of heavy vehicles in the city (09:00am – 07:00pm), GT Road – (11:00am-07:00pm)
- Movement restrictions for animal carts on all L1 roads from 09:00am - 06:00pm
- Abolishing renewal of licenses for all goods vehicles more than 5 years old.



Phase # 2

- New goods/truck terminal near Panki in proximity to the Outer Ring Road.
- Mobility Corridor for Goods Vehicles, movement to be restricted completely on all other roads
- Complete ban on all animal carts being used for goods movement

Phase # 3

- Setting up of truck terminals at the following locations
 - NH-2, near Sanchendi
 - NH-2 near Mandhana
 - Hamirpur Road, near Ramaipur
- Segregated high speed goods vehicle lane on Ring Road
- Promotion of Use of small and medium size vehicles with modern emission controls in the central city areas

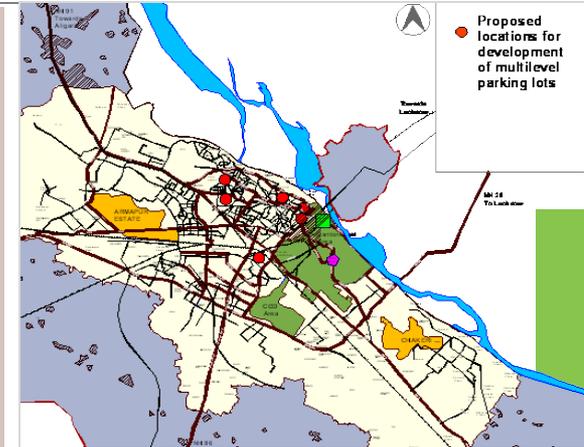
S No	Services/Facilities	Area (%)
1	Transport Operators – Office, godowns, loading/unloading	30
2	Service Industry – petrol pump, service area, weigh bridge etc.	6
3	Public/Semi public – Police station, post office, dispensary etc	3
4	Commercial	3
5	Parking-idle, transit, other vehicles,	18
6	Open spaces	10
7	Circulation	28
8	Others	2
	Total	100

TRAVEL DEMAND MANAGEMENT – PARKING POLICY

Parking Policy



- Revised parking tariff – to reflect the cost of the land occupied
- Policy that encourages greater use of public transport
- Amendments to the existing byelaws or adequate parking within residential, commercial and public buildings
- Parking to be a supplement to pedestrianization initiatives so that crowded parts of the city can be made vehicle free and there is greater encouragement of NMT



List of Stakeholders consulted

- Divisional Commissioner, Kanpur Division
- Municipal Commissioner, KMC
- Additional Commissioner, KMC
- DIG Police
- SP Traffic
- Secretary, KDA
- Chief Town Planner, KDA
- Regional Transport Officer, RTO
- Chief Engineer, PWD
- Regional Manager, UPSRTC
- Secretary, Indian Tourism & Research Centre
- Representative, Kanpur Parivartan Forum



Thank You