Bicycle Planning in Urban Transport in India 1996-2006

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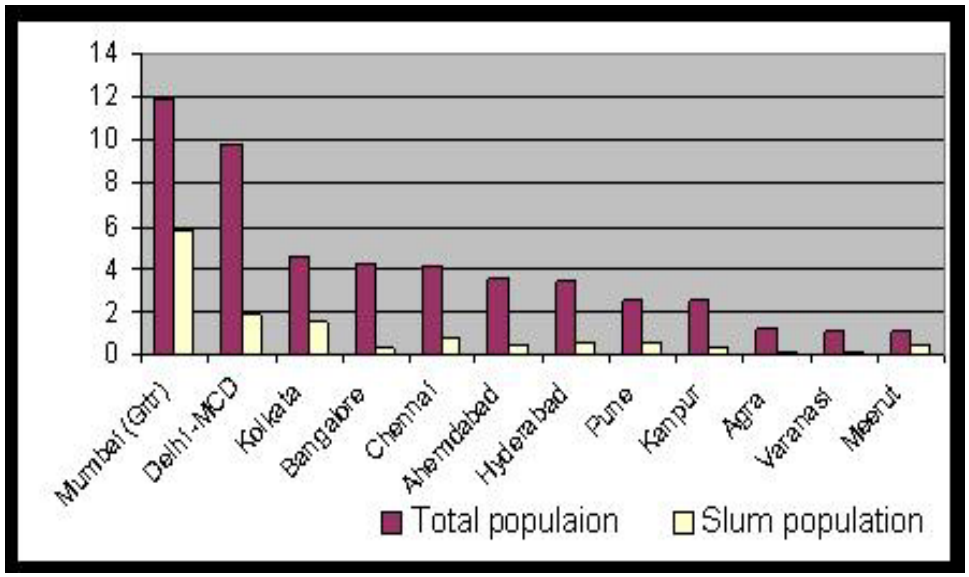
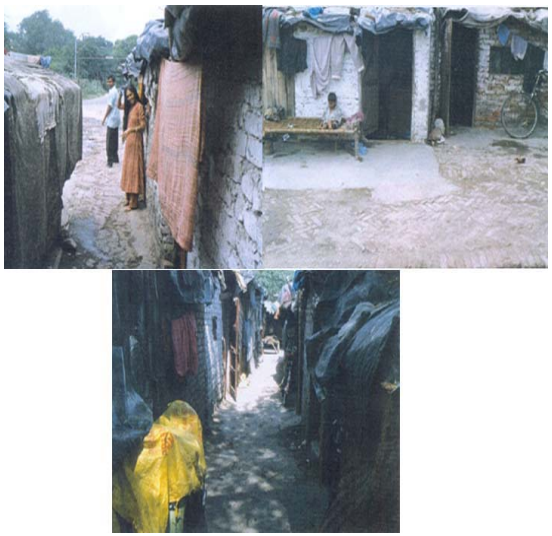
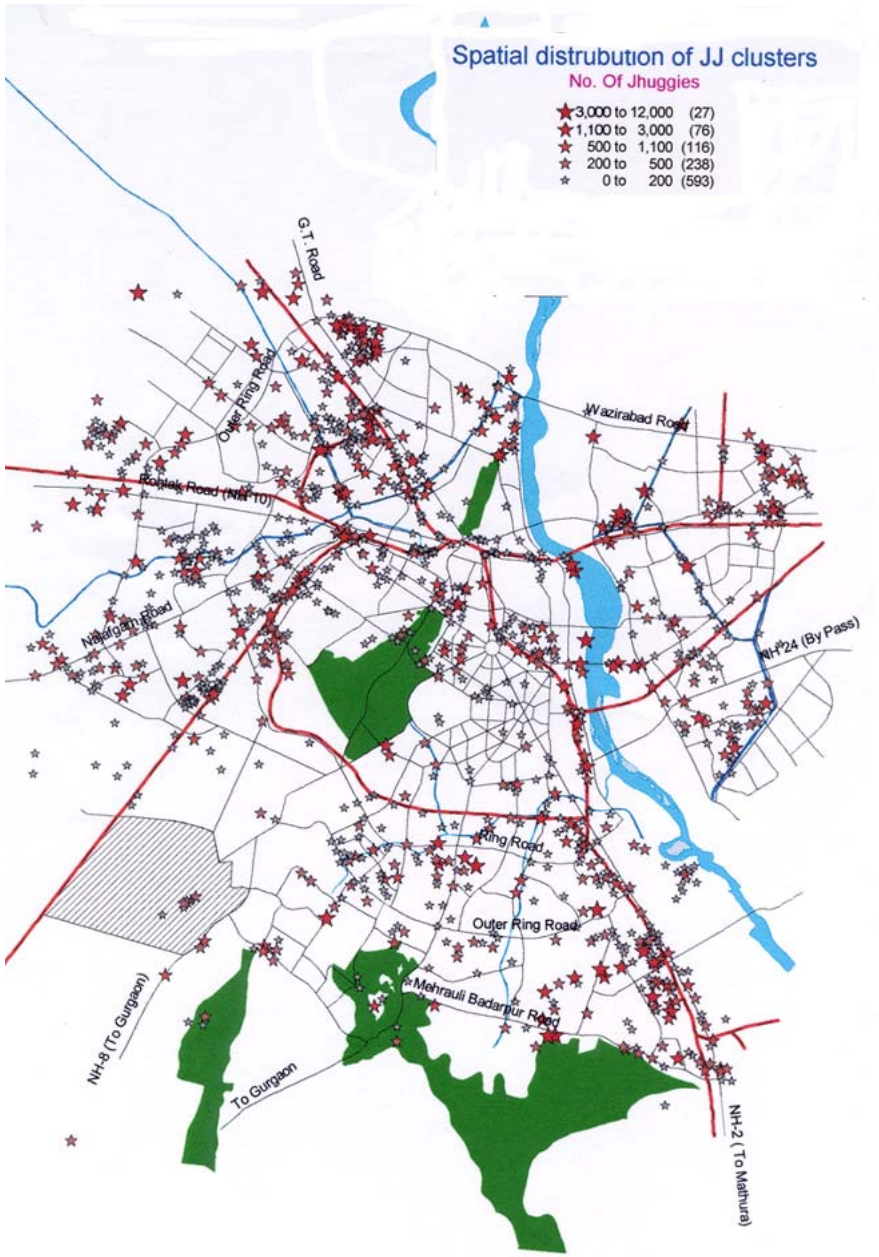
Urbanization in India

- **Relatively slow, yet one of the largest urban systems**
- **30-50% slum dwellers, 'unauthorized' self constructed dwellings, close to work**
- **Growth of informal sector often faster than formal sector**







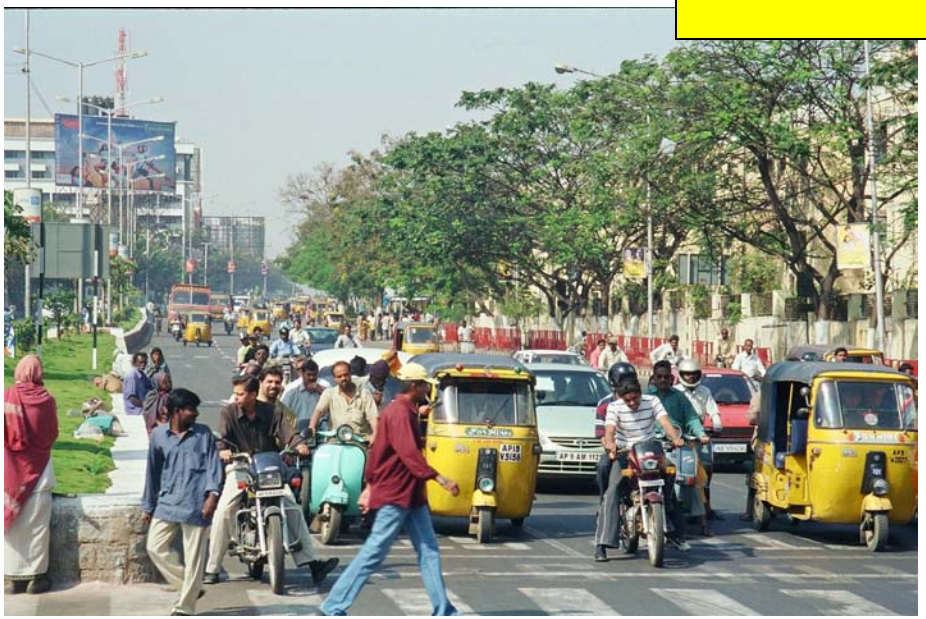
Distribution of Jhuggi Jhopri Clusters in Delhi

Cities within cities

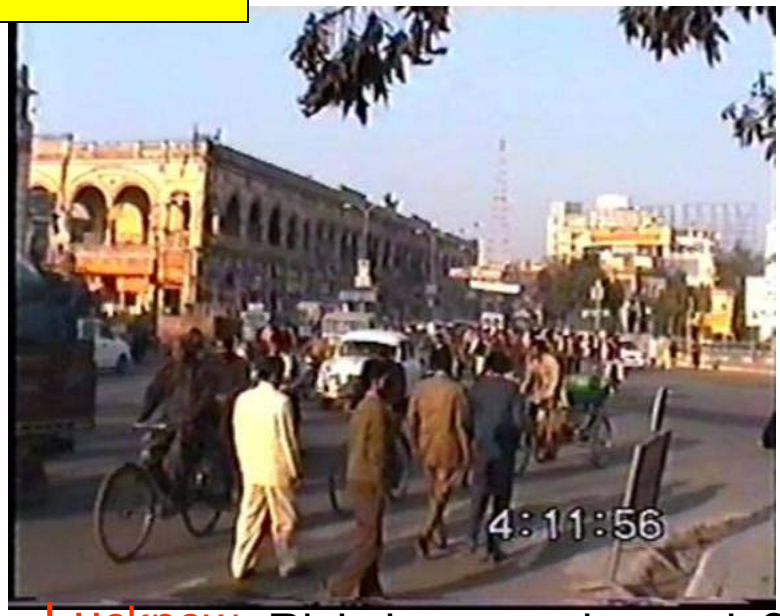
Patna Rickshaw polic

Public Transport?

Jaipur Three wheelers paratransit?



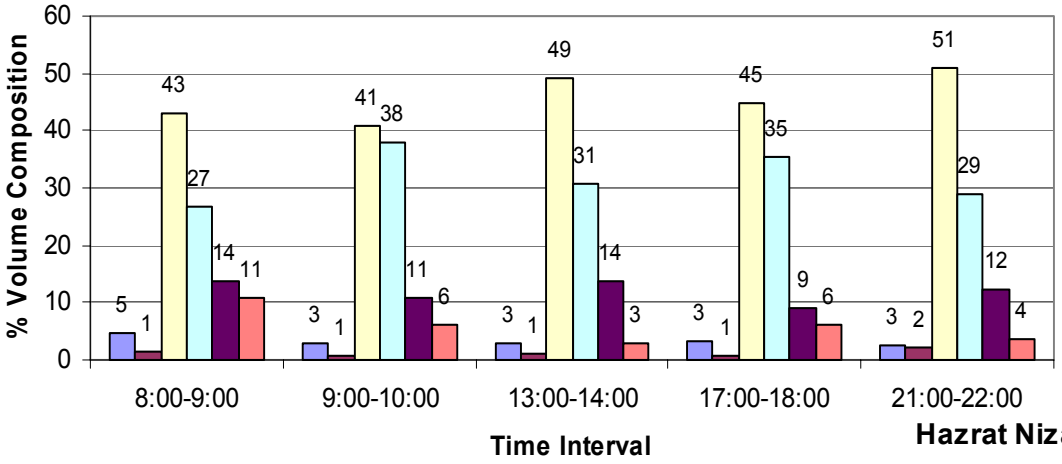
Hyderabad Two wheelers/three wheelers?



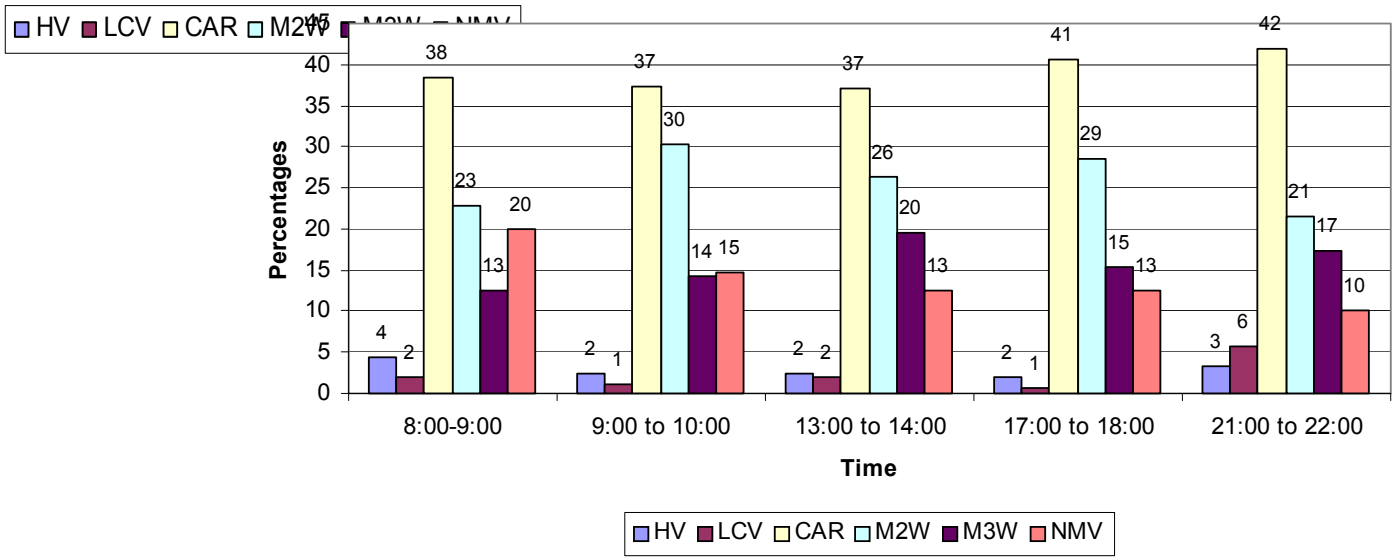
Lucknow Rickshaws,cycles peds?

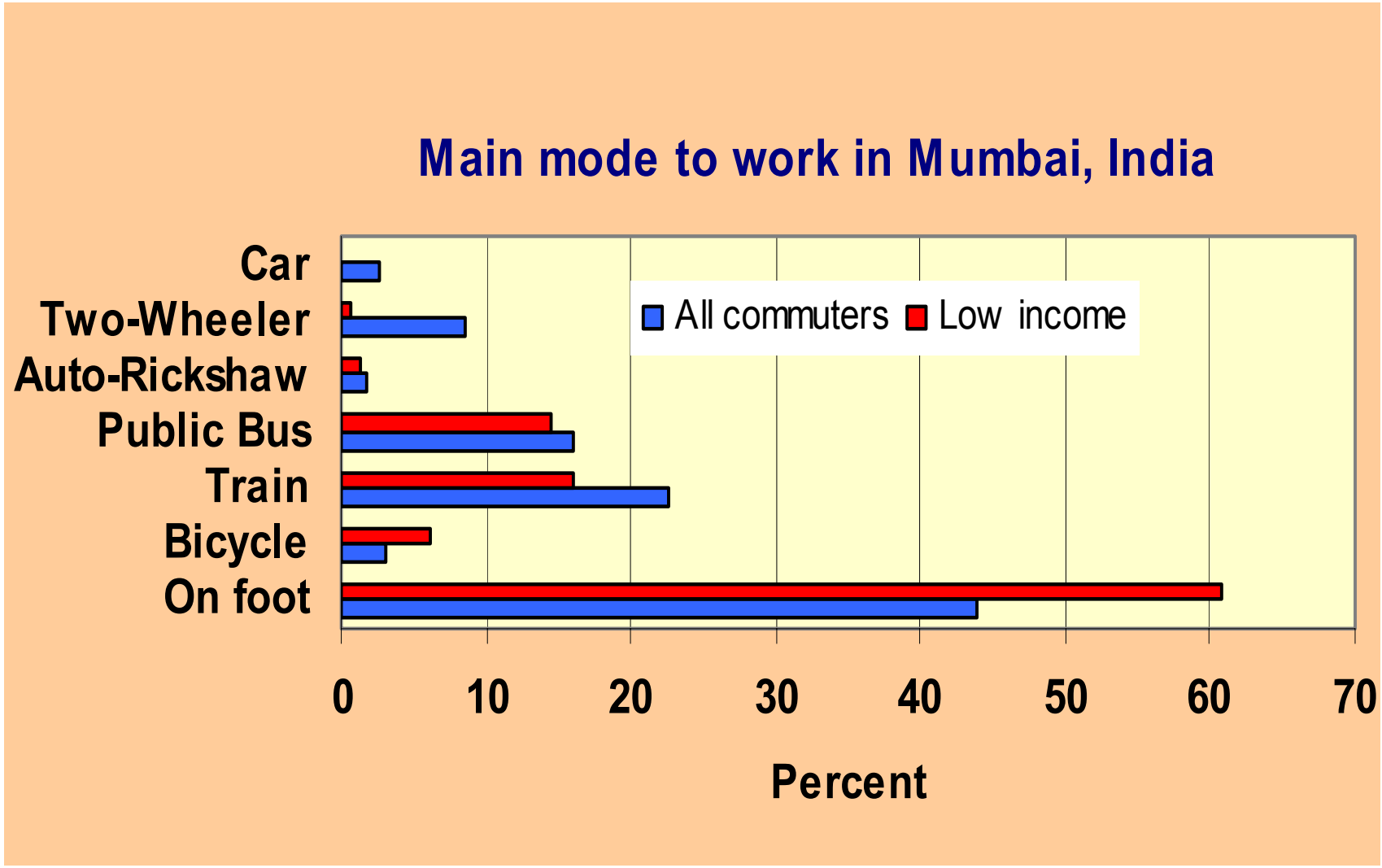
Modal Shares in Delhi 2002

Aurobindo Intersection



Hazrat Nizamuddin Intersection





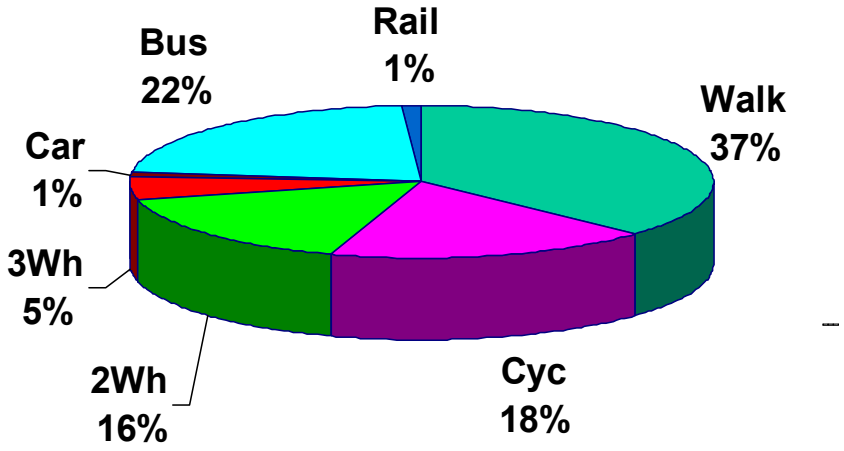
80%motorised trips by PT, 44% train, 36%bus

Source: Baker, J. et al (2004) Urban Poverty and Transport: The Case of Mumbai (Personal communication)

IIT Delhi 2004

Travel Demand

Intra PMA Trips by Mode



TOTAL TRIPS 52 LAKHS

BUS SHARE 11 LAKHS

PER CAPITA TRIP RATE 1.14

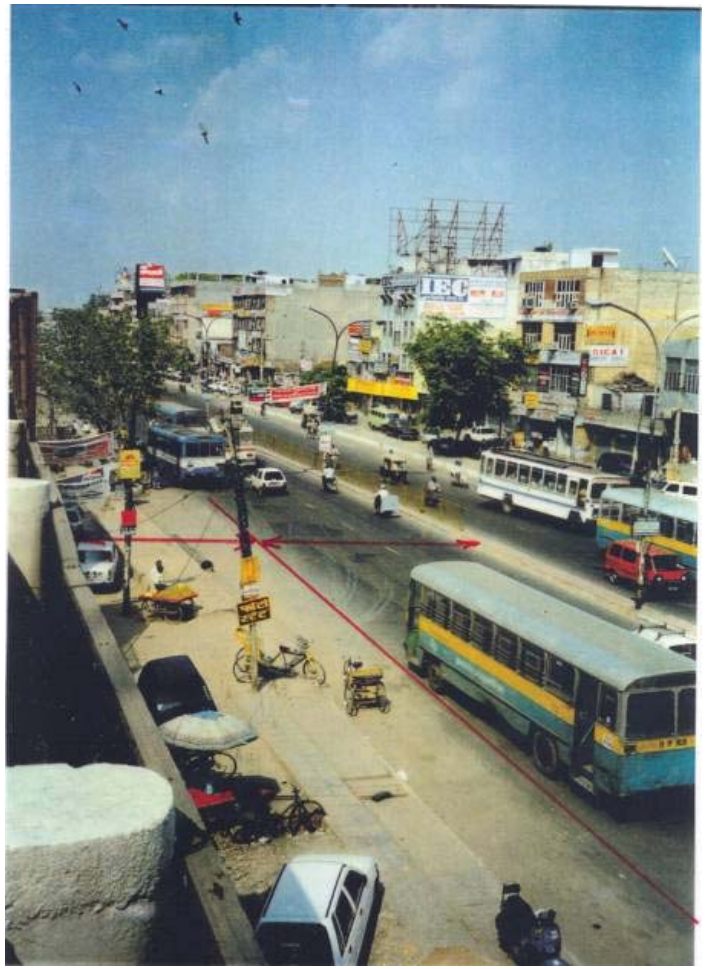
AVG. TRIP LENGTH 5.4 Km

Will this change in future?

Priorities for optimal modal mix

- Preserving walking and bicycle trips in all cities
  - Mixed Landuse,
  - relationship between informal and formal sector
  - City speed limits 50km/h
  - Safe infrastructure
- PT for serving 5-15kms long trips (30-40%) of total trips
  - Safe walking and bicycling
  - Medium density to generate sufficient demand
  - Fares to compete with MTW operating cost

- Mismatch between road design and usage
- Poor utilization of space(~50%)
- 3 lane wide road is used as 2 lane road

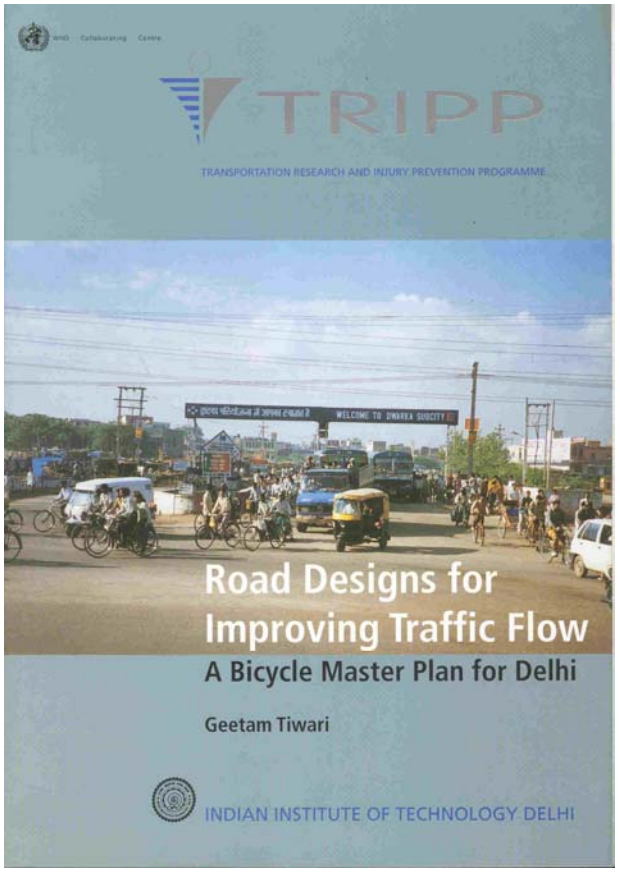


Bicycle Master Plan for Delhi

- TRIPP, IIT Delhi prepared Bicycle Master Plan for Delhi in 1998 for Transport Department of Delhi.

- The final report was submitted in August 1998. The report was based on extensive research involving survey of traffic and travel patterns, landuse patterns and detailed layout plan for two selected corridors.

- The report contained eight chapters



1. Introduction

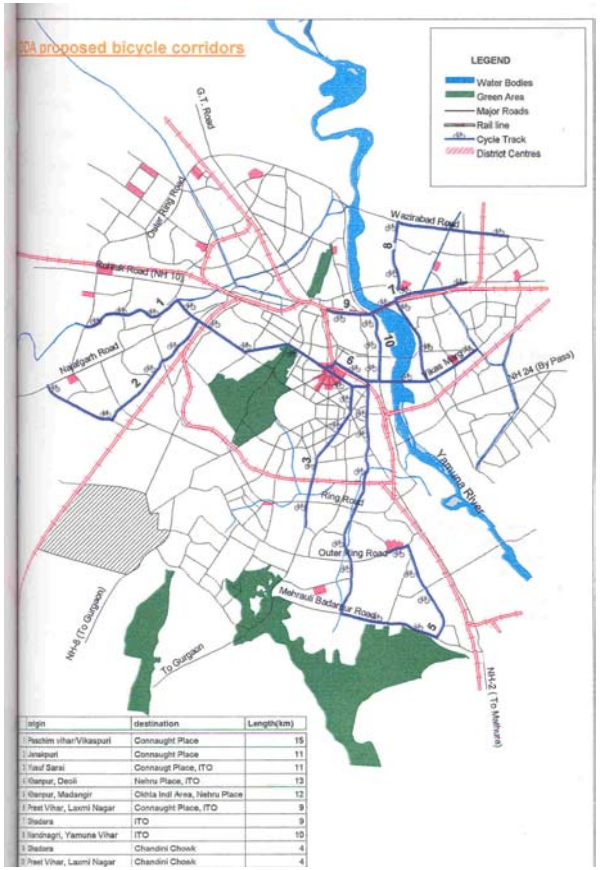
- Motorised vehicles cannot use the left most lane even when bicycle flow rates are minimal. This reduces the overall capacity of the road.
- Bicyclists are exposed to higher risk of getting involved in traffic accidents.
- Share of bicycle trips may have decreased in the city, however, for about 30% of the households in Delhi, even a subsidized bus system is too expensive. Members of these households would continue to use bicycle.
- Segregated bus lanes are required for improving bus efficiency. This cannot be done unless a segregated lane for cycle and other slow moving vehicle is made.
- Several European cities have witnessed increase in bicycle trips after planning bicycle lanes in cities.

Review of Delhi Network

- More than 500 km of arterial roads in Delhi have 45m or more ROW. Segregated tracks can be made in another 250 km of roads by changing the priority of traffic on the roads.
- Traffic analyses shows it is more efficient to provide one bicycle lane and one or two motorized lanes instead of non-segergated three lanes.
- 58 traffic zones have 5-10% bicycle traffic. Another 26 traffic zones have more than 10% bicycle traffic. 31 zones have 3-5% bicycle traffic.These are spread all over the city.

Review of existing proposals

- Five tracks proposed by DDA reviewed
- They do not form a network
- Major deficiency in geometric design
- Often do not follow shortest routes

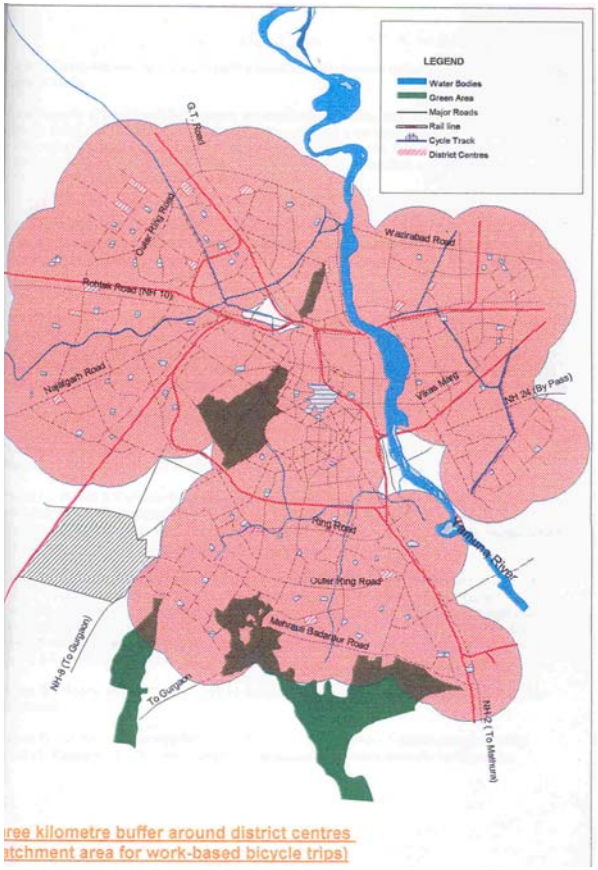


origin	destination	Length(km)
Paschim vihar/Vikaspuri	Connaught Place	15
Janakpuri	Connaught Place	11
Yusuf Sarai	Connaught Place, ITO	11
Ganpur, Deoli	Nehru Place, ITO	13
Ganpur, Madangir	Okhla Indl Area, Nehru Place	12
Preet Vihar, Laxmi Nagar	Connaught Place, ITO	9
Shadara	ITO	9
Nandnagri, Yamuna Vihar	ITO	10
Shadara	Chandini Chowk	4
Preet Vihar, Laxmi Nagar	Chandini Chowk	4

Myths:

- NMT Infrastrucure exists in the form of Service Lanes.
- Mere widening of roads in Delhi, will serve the purpose of capacity augmentation and congestion relief.

Planning for bicycle routes



ree kilometre buffer around district centres
tchment area for work-based bicycle trips)

- Delhi is a polycentric city
- Radius of 3 km around major work centres- destinations for bicyclists cover the whole city.

All roads must become bicycle friendly

Network Level Proposal

- Bicycle network should be developed such that :
  - Traffic flow of all vehicles using that corridor should improve.
  - Number of accidents involving bicyclists should reduce
  - Potential bicyclists should be encouraged to use bicycles.
- Cycle routes should be part of the total traffic system. Cyclists deserve equal treatment as other road users.

Bicycle Master Plan Proposal

- Origin and destination of bicyclists are same as other vehicle user. Catchment area of work-based bicycle trips with a radius of 3 km from major work centers covers all arterial roads. This requires that all arterial roads should be developed for bicycle routes. This can be prioritized as follows:

  - Phase I: Routes which have heavy bicycle traffic (90 km).
  - Phase II: Major arterials which carry fast traffic (276km).
  - Roads with 30 m ROW to complete the network.(370 km.
  - Through parks and green belts for enhancing the capacity.

Bicycle network priority

- Phase I: Routes which have heavy bicycle traffic (90 km).
- Phase II: Major arterials which carry fast traffic (276km).
- Roads with 30 m ROW to complete the network.(370 km.
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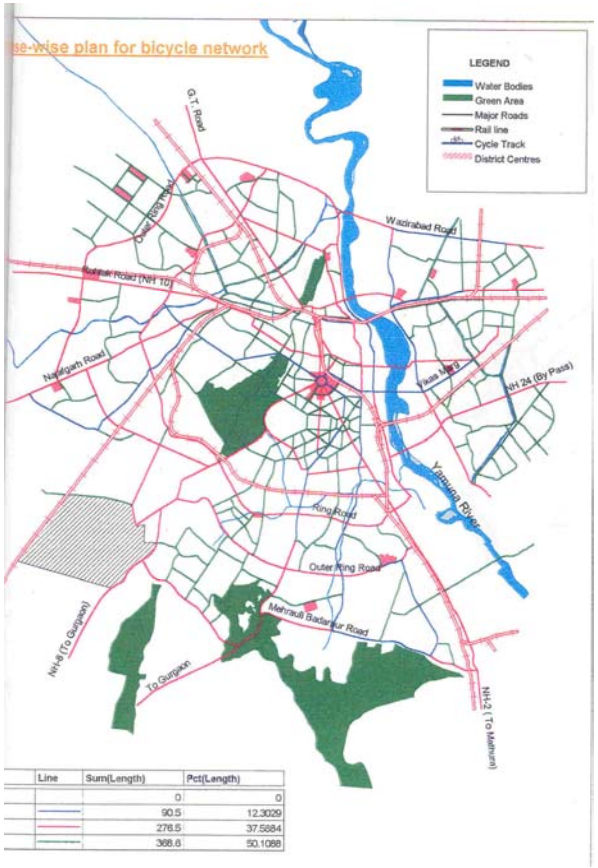


Guiding Principles

- Road geometric standards from Buses/VRUs perspective
- Traffic management policies that enable safe mobility of VRUs
- Road side vendors/ informal sector to be viewed as service providers

Corridor Designs

- General arrangement drawings were prepared for two corridors. These were (1) Preet Vihar to Connaught Place and Wazirabad Bridge to Nand Nagari. Design criteria included the following:
  - MV lane width 3m
  - Bus lane 3.3m
  - NMV lane 2.5m
  - Separate service lane and footpath.
  - Intersection modification to include restricting free left turn, modifying traffic signal, roadside furniture to ensure bicycle safety.

Feedback on Proposed Designs

- Community meetings organized in 5 locations (JJ clusters). Suggestions raised the issue of linking residential locations with transport plans and work places. Rickshaw stands should be near bus stands. Pedestrian lanes should be separate. Cycle tracks should be wide enough to accommodate rickshaws.
- 8-10 workshops were organized with MCD, PWD, NDMC, DDA, Traffic Police and Transport department. Following concerns were raised:
  - Restriction on free left turn may affect the intersection capacity(for motorized vehicles).
  - Sufficient parking should be given near the commercial areas.
  - Provision should be made for had pulled carts and rickshaws.
  - Bus stops should be located to improve the efficiency of bus system
  - Existing round about design needs improvement.

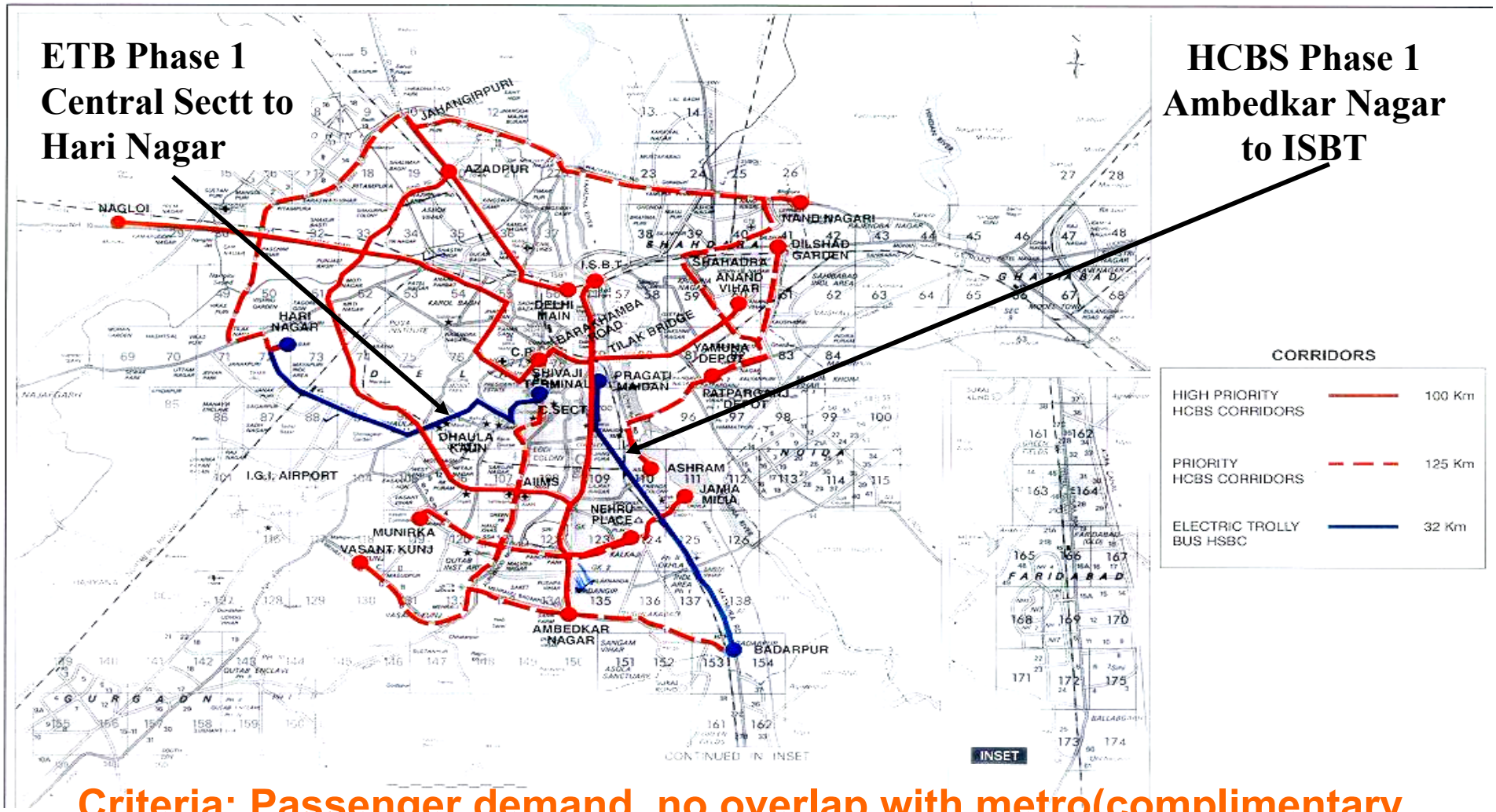
PROPOSAL FOR HCBS IN DELHI

- **DTC sponsored IDFC supported, International Workshop on High Capacity Bus System: Integrating Intelligent Systems and Transport, January 2002**
- **Recommendation of 'committee on sustainable transport' chaired by chief secretary September 2002, Operating Plan for Delhi, Transport Department, October 2002**
- **Focus**
  - **Alternatives in public transport found successful in several cities around the world**
  - **Augmenting public transport with financially viable options (HCBS,commuter rail, ETB)**
  - **Sustainable inter-modal transportation system meeting the needs of commuters**

High Capacity Bus System (HCBS) in Delhi
GNCTD 2002

TRIPP, IIT,: Technical specifications and designs for roads, bus stops and vehicles. IDFC Institutional restructuring and financial plans.
IPAN and Strategic Alliance and ITDP: Capacity building and Social Marketing
RITES Detailed engineering surveys and detailed engineering plans

Priority HCBS/ETB CORRIDORS IN DELHI

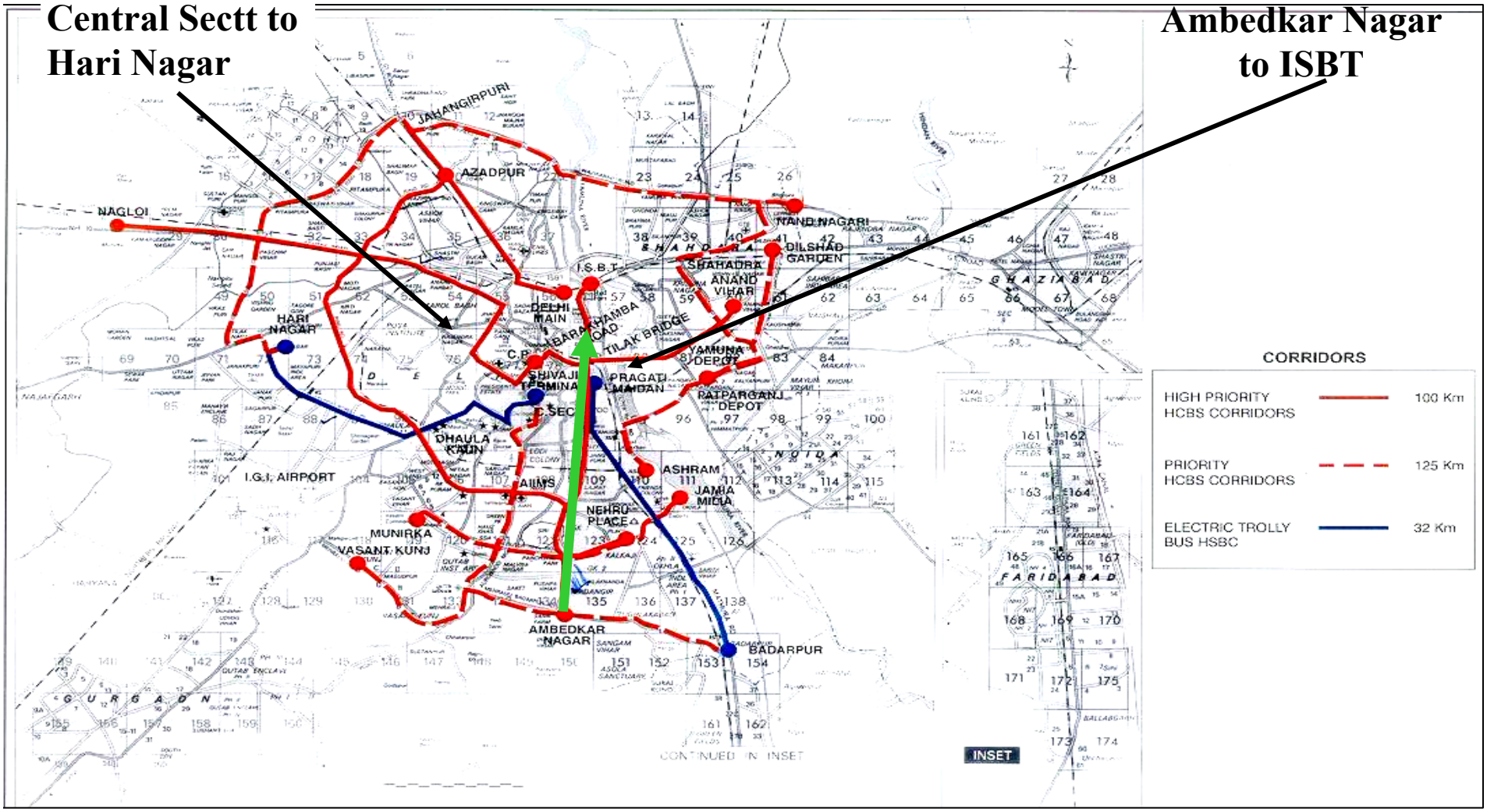


Criteria: Passenger demand, no overlap with metro(complimentary to metro) and existing right of way

Priority HCBS/ETB CORRIDORS FOR NCT OF DELHI

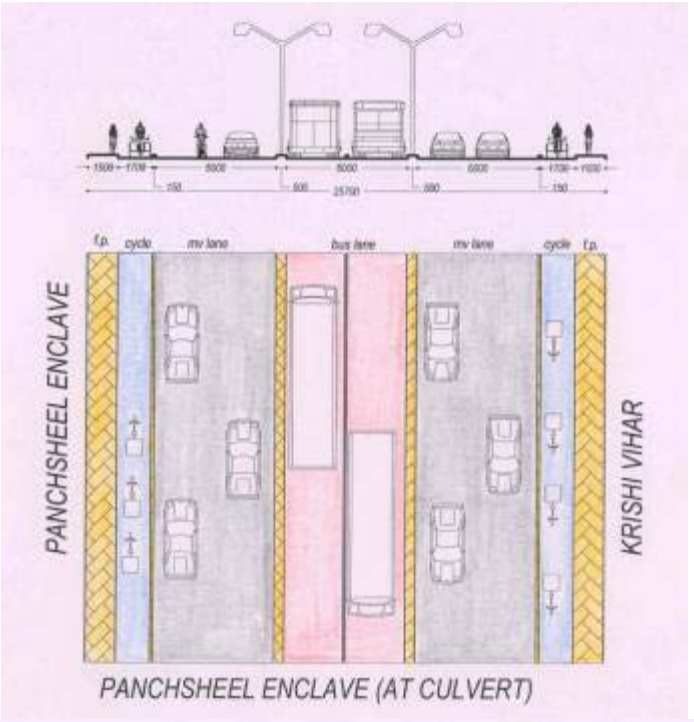
ETB Phase 1
Central Sectt to Hari Nagar

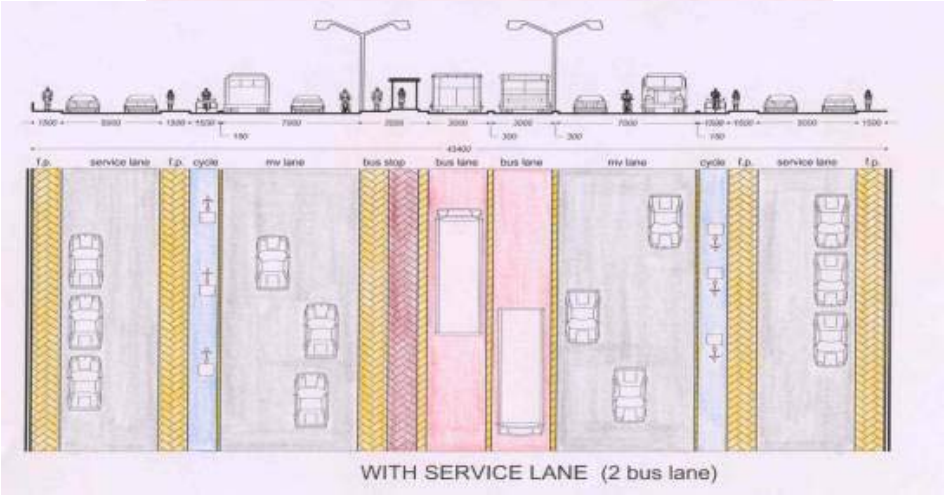
HCBS Phase 1
Ambedkar Nagar to ISBT

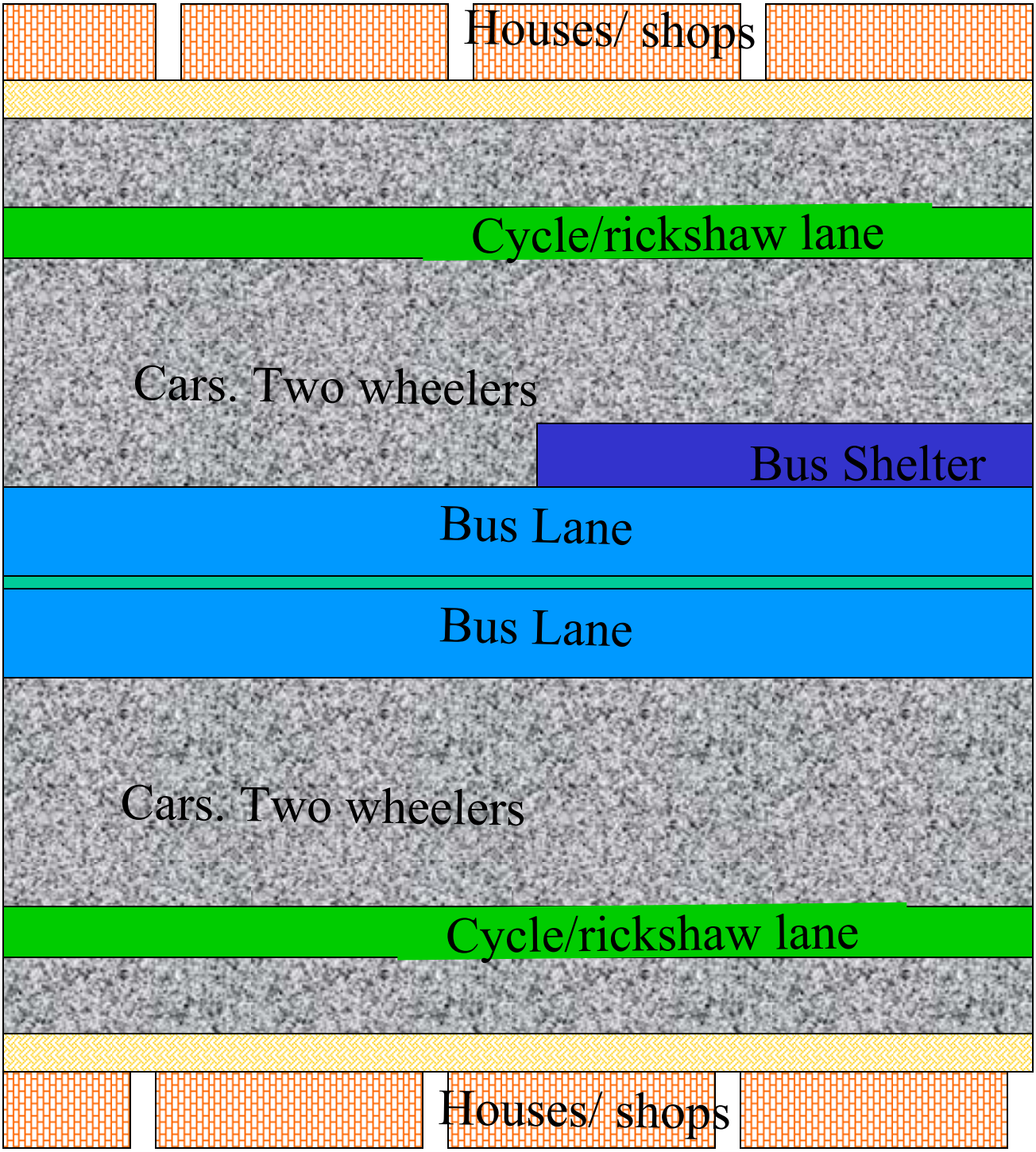


Proposed road cross sections

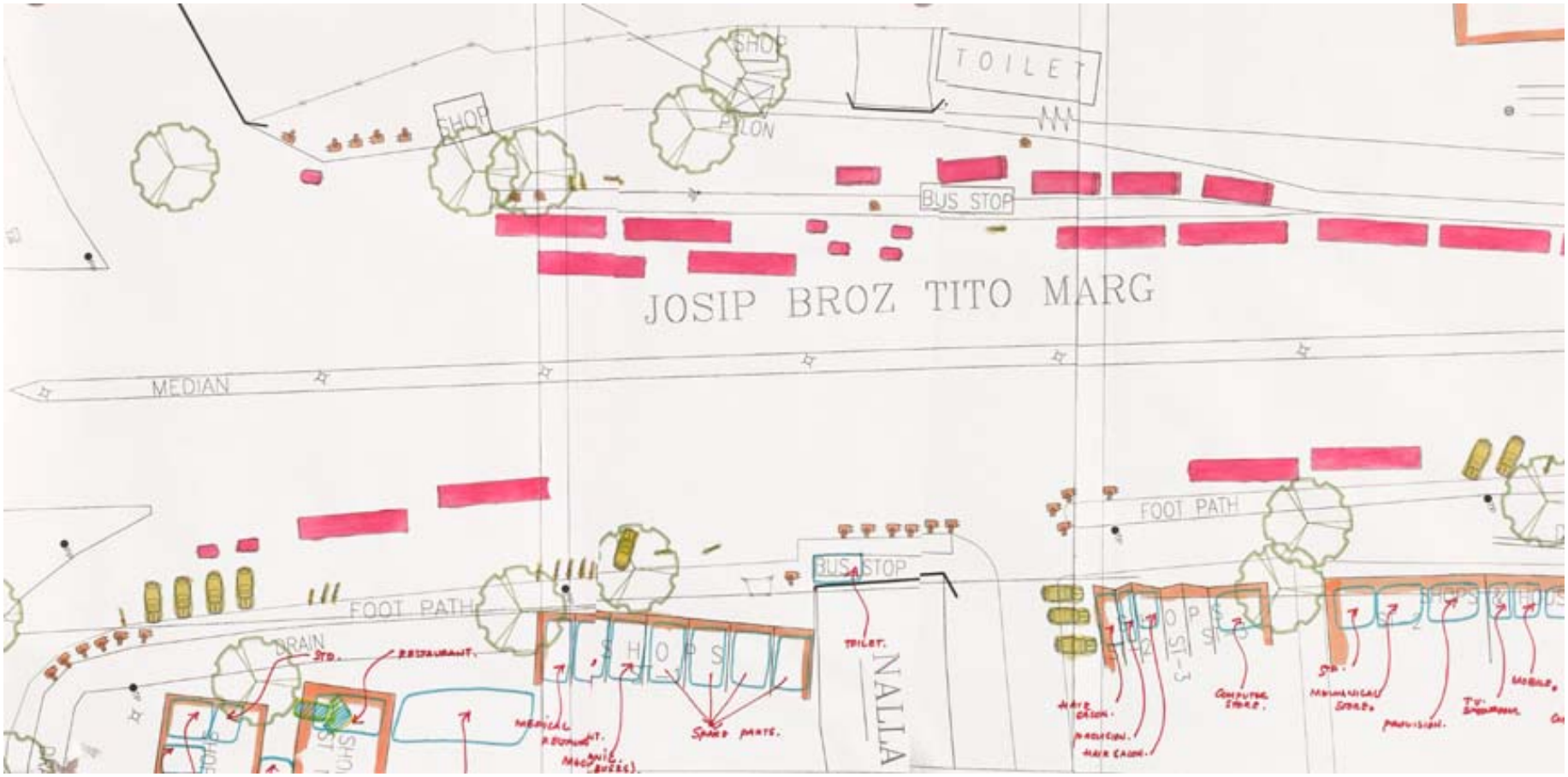
- MVlane width on main carriageway 3m (minimum), asphalt surface.
- Recommended lane width for buses 3.3 m (3 m minimum), cment concrete surface.
- Recommended lane width for bicycles 2.5 m (1.5 m minimum), cement concrete surface.
- Separate service lane(asphalt) and footpath (interlocking cement concrete blocks).
- *Road cross section required 30m - 51 m*






Houses/ shops
Cycle/rickshaw lane
Cars. Two wheelers
Bus Shelter
Bus Lane
Bus Lane
Cars. Two wheelers
Cycle/rickshaw lane
Houses/ shops

JB Road Existing conditions



J.B.Road Corridor planning

Intersection Design Principles

1. Min. (inner) turning radis of 8.5m and max. (outer of 12.8m for 9.5m long design vehicle for 15km/hr

2. Cycle track across asphalt in coloured concrete

3. Zebra crossing set back by 5m. To accommodate a car (stopped at ped. Crossing) outside cycle track.

4. 2.4m to 4.8m wide zebra crossing in different color of cobbled stone.

5. Stop line set back by min. 2.5m from xebra crrosing and perpendicular to carriageway. Cycle track ramps down to carriageway at stop line.

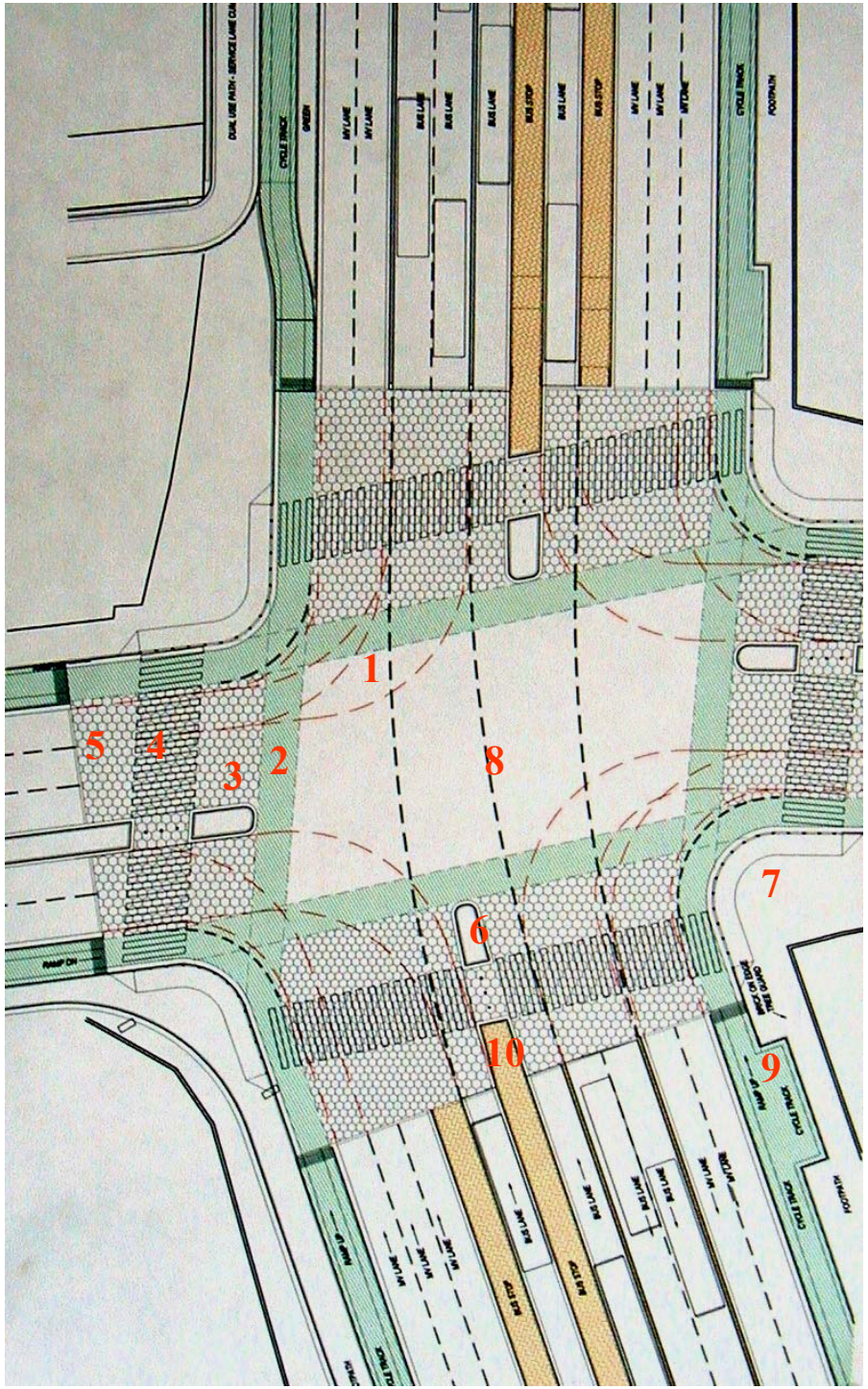
6. Median continues till cycle track with break (with bollards at 1.2m) for pedestrians at zebra xing.

7. Curb radius is max. 5.2m with sloping edge (at 1:12) and protection with bollards at 1.2m.

8. Lane indication for bus lane continues through intersection in paint and reflector studs.

9. Cycle rickshaw parking adjacent to cycle track

10. Bus shelters continue till intersection to allow easy commuter access from ped. Xings.



Achievements 2006

- MCD has instituted a bicycle cell with three professionals.
- **15 km corridor design integrating bicycle track in implementation phase.**
- 5 km corridor design in Pune accepted by PMC for implementation.
- Urban Transport Policy, Delhi master plan and NCRPB plan integrate bicycle for future plans.