

UTTIPEC April '09



Transit Oriented Development
the roadmap

Where we are.... Where we want to go....

MPD 2021 identifies a current Modal Split of 60-40 (Public-Private Transport). It sets the following Targets for the near future:

“70-30 Modal Split by 2011”

“80-20 Modal Split by 2021”

However, RITES study has recently revealed that the modal split of Delhi has actually dropped from 60-40 to 45-55!

Clearly – the direction where we are headed is contrary to the Spirit and direction intended by the Masterplan.

Clearly – a paradigm shift is needed.

MPD-2021 Statements & Goals:

12.4.1 SYNERGY BETWEEN TRANSPORT AND LAND USE

The concept of the Master Plan for Delhi 1962 was based on a poly-nodal, polycentric, distribution of work centres, largely based on road transport nodes. A major fall-out of this has been **distortion between infrastructure, transport and land use**.

To achieve spatial balance, development should take place according to new corridors of mass movement. This has implications in terms of land use planning along major transport corridors and the Mass Rapid Transport/Transit System.

This would not only help to solve, to some extent, the enormous problems of **mass transportation**, but would also generate a dynamic potential for **growth and employment**.

(p72)

MPD Statements & Goals:

Major Sources of Air Pollution:

Vehicular Emission = 70%; Industrial = 20%; Gensets; Cooking, etc = 10%

Public transportation planning must, therefore, drive the future policy.
(p57)

“The Plan contemplates a mechanism for the restructuring of the city based on mass transport.”
(p3)

MPD Statements & Goals:

3.3.1. REDEVELOPMENT STRATEGY

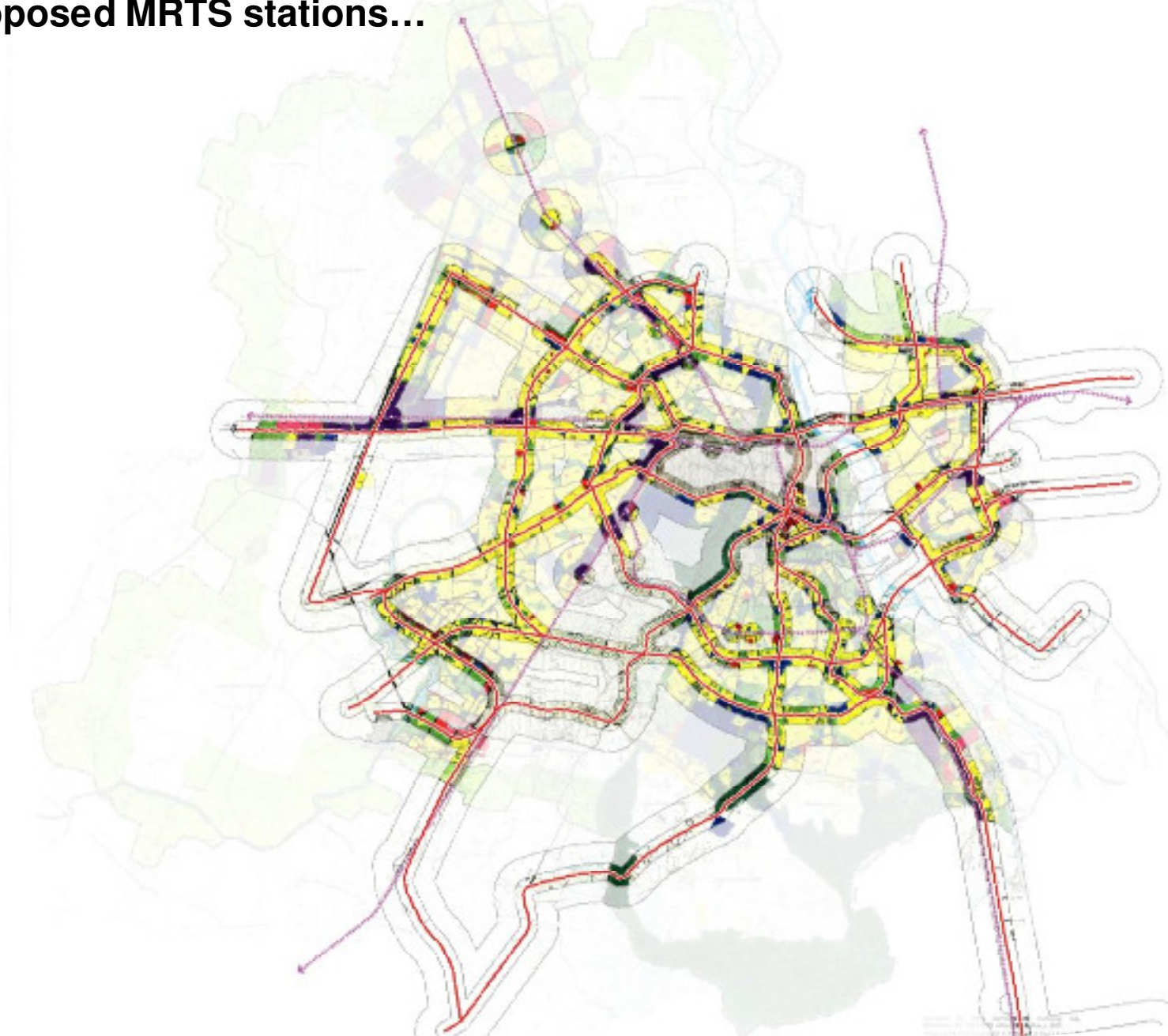
“ The proposed MRTS network will bring sizable urban area within walking distance from the proposed stations.

This changed scenario provides opportunities for city restructuring and optimum utilization of the land along the MRTS corridors.

... a sizable proportion of the additional population with requisite facilities and employment can be absorbed along these corridors.”

(p14)

~ 60% of the urban area will be within 15-minute walking distance from the proposed MRTS stations...



LANDUSE PLAN	
RESIDENTIAL	
R3	RESIDENTIAL AREA
R4	YOUNGER RESIDEN
COMMERCIAL	
C1	RETAIL SHOPPING, GENERAL BUSINESS AND COMMERCE
DC	DISTRICT CENTRE
C2	COMMUNITY CENTRE
NC	NON-HIERARCHICAL COMMERCIAL CENTRE
W1, W2	WHOLESALE & WAREHOUSING
D	CO-OP STORAGE AND OIL DEPOTS
I1	INDUSTRIAL
INDUSTRIAL	
M1	MANUFACTURING, SERVICE AND REPAIR INDUSTRY
RECREATIONAL	
R1	REGIONAL PARK
R2	CITY PARK, DISTRICT PARK, COMMUNITY PARK
R3	YOUTHFUL MOVEMENTS
TRANSPORTATION	
T1	AIRPORT
T2	TERMINAL / DEPOT - RAIL, LIGHTS / BUS / TRAM
T3	CONCILIATION - RAIL, LIGHTS / ROAD
UTILITY	
U1	WATER (TREATMENT PLANT ETC.)
U2	SEWERAGE (TREATMENT PLANT ETC.)
U3	ELECTRICITY (POWER HOUSE, SUBSTATION ETC.)
U4	SOLID WASTE (WASTEWATER LANDFILL ETC.)
U5	GRASS
GOVERNMENT	
G1	PRESIDENT'S OFFICE AND PARLIAMENT HOUSE
G2	GOVERNMENT OFFICE / COURTS
G3	GOVERNMENT LAND (NOT DEVELOPED)
PUBLIC & SEMIPUBLIC FACILITIES	
P1	HOSPITAL
P2	EDUCATION AND RESEARCH UNIVERSITY / UNIVERSITY CENTRE, COLLEGE
P3	SOCIAL - CULTURAL, SOCIAL - CULTURAL COMPLEX / CENTRE
P4	POLICE / POLICE HEADQUARTERS / POLICE LINES, FIRE STATIONS / DEWATER MANAGEMENT CENTRE
P5	RELIGIOUS
P6	BURIAL TEMPLATES / CEMETERY
P7	TRANSMISSION SITE / CENTRE
P8	SPORTS FACILITIES / COMPLEX / STADIUM / SPORTS CENTRE
AGRICULTURE / GREEN BELT AND WATER BODY	

Premise:

**Transit Oriented Development of Delhi
is therefore not **just** about redevelopment &
redensification along 500 M of MRTS corridors.**

It is about structuring a Transit Oriented City.

So What ***/S*** TOD?

TOD Definition:

Transit Oriented Development is essentially any development— be it macro or micro scale — that induces people to prefer the use of public transit.

“Transit-Oriented Development (TOD) is compact, mixed use development near new or existing public transportation infrastructure that provides housing, employment, entertainment and civic functions within walking distance of transit.

The pedestrian-oriented design features of TODs encourages residents and workers to drive their cars less and ride public transit more.

Transit Oriented Development can be a significant source of non-farebox revenue for the participating transit agency.

TOD Components:

(Source : Dr. Robert Cervero, U C Berkeley)

The 3 'D's of T.O.D.

- (High) **Density**
- **Diversity** (Mixed Use, Mixed Income)
- **Design** (Safe, Comfortable, active 24x7)

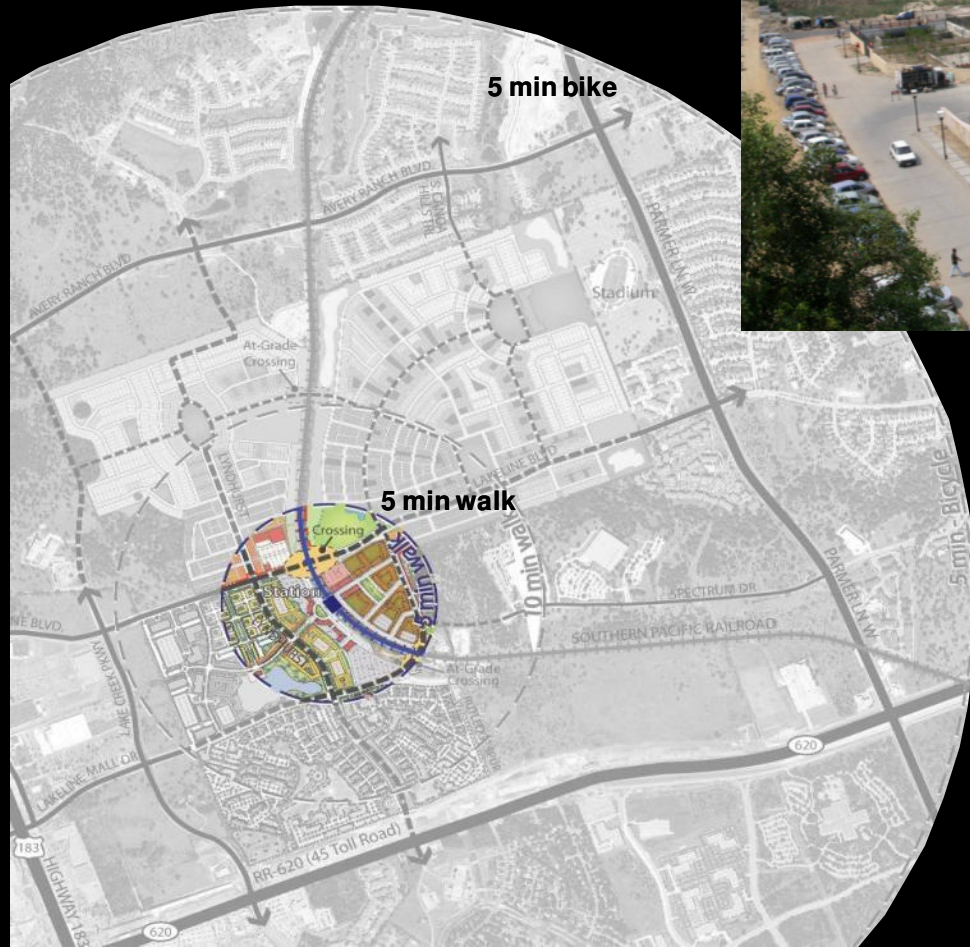
Starting with:

What is ***NOT*** TOD....

Current Trends: within 5-min walk of Metro Stations

No Walkable Design.
No Street Frontage.
No Diversity.
Not enough Density.

NOT TOD



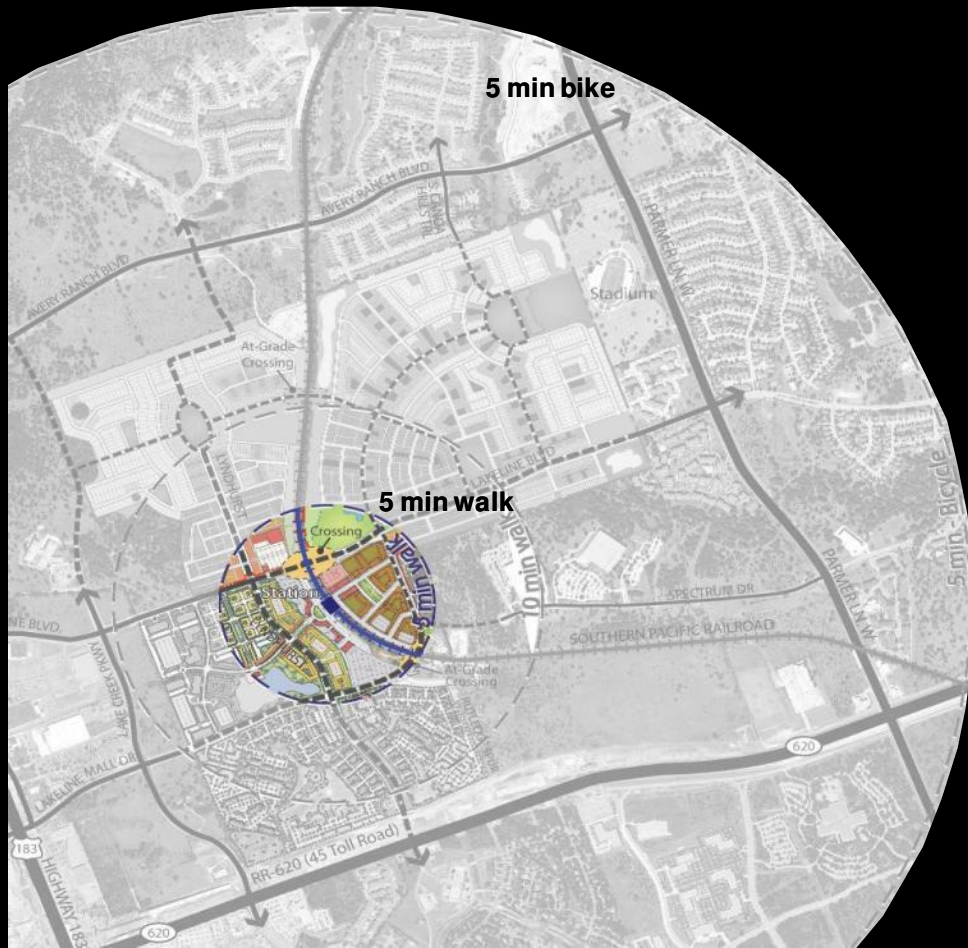
Principle A) Density & Diversity & Design:

- Minimized Walking & Biking Distance / Environment from MRTS & Amenities.

Within 5 min walk of
Station (500 M)...

- High Density Housing, Retail and Employment uses

Recommended:



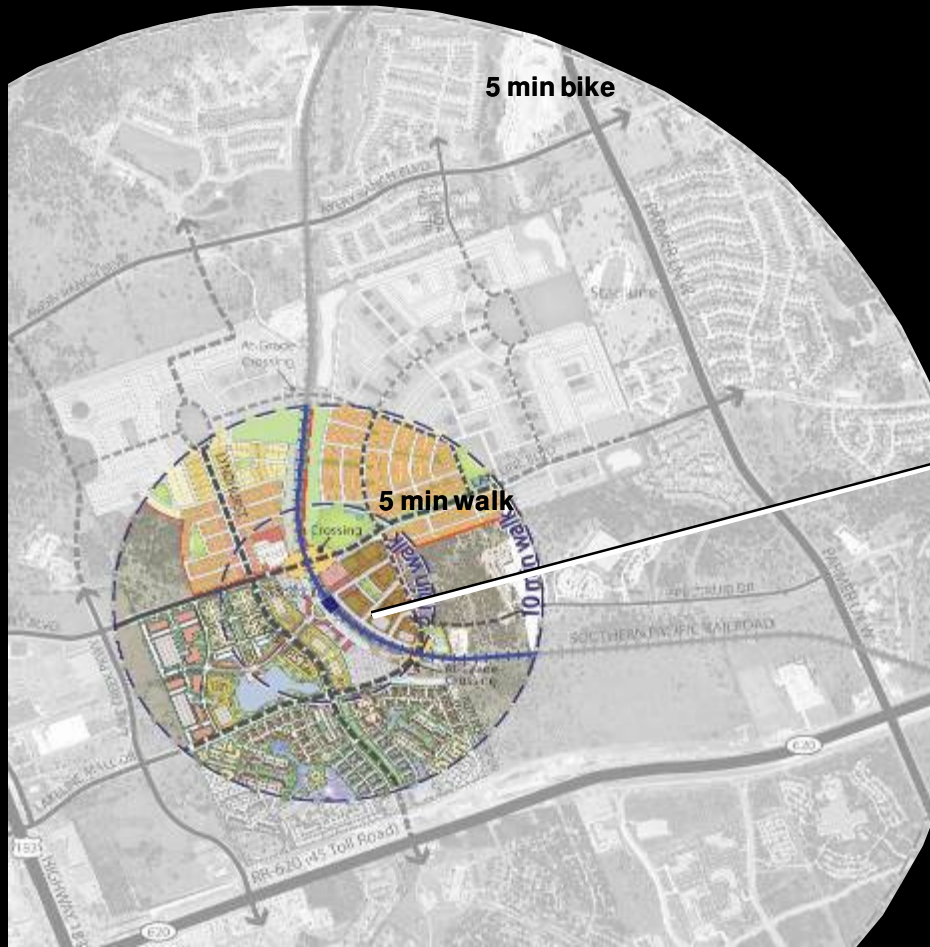
Principle A) Density & Diversity & Design:

- Minimized Walking & Biking Distance / Environment from MRTS & Amenities.

Within 10 min walk of Station (1000 M)...

- High Density Housing, informal retail, commercial, public spaces.
- FAR bonuses provided for affordable housing, public spaces and parks, & infrastructure.

Recommended:



Principle A) Density & Diversity & Design:

- Minimized Walking & Biking Distance / Environment from MRTS & Amenities.

Within 5 min Cycle or Rickshaw-ride from Station:

- Incorporating bicycles and pedestrians in street and building design guidelines

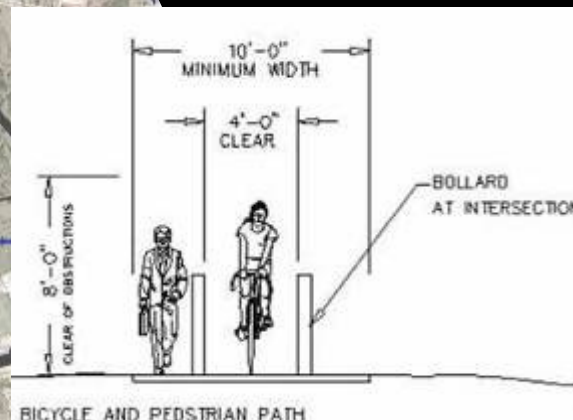
Recommended:



Bike lanes in most streets



Bike parking at destinations, transit stops



Principle B) Feeder Networks:

Within 500 M

- Pedestrians
- Cycles, NMVs

Beyond 500 M

- Rerouted DTC buses
- Battery operate feeders (p65 MPD)
- Rerouted DTC buses



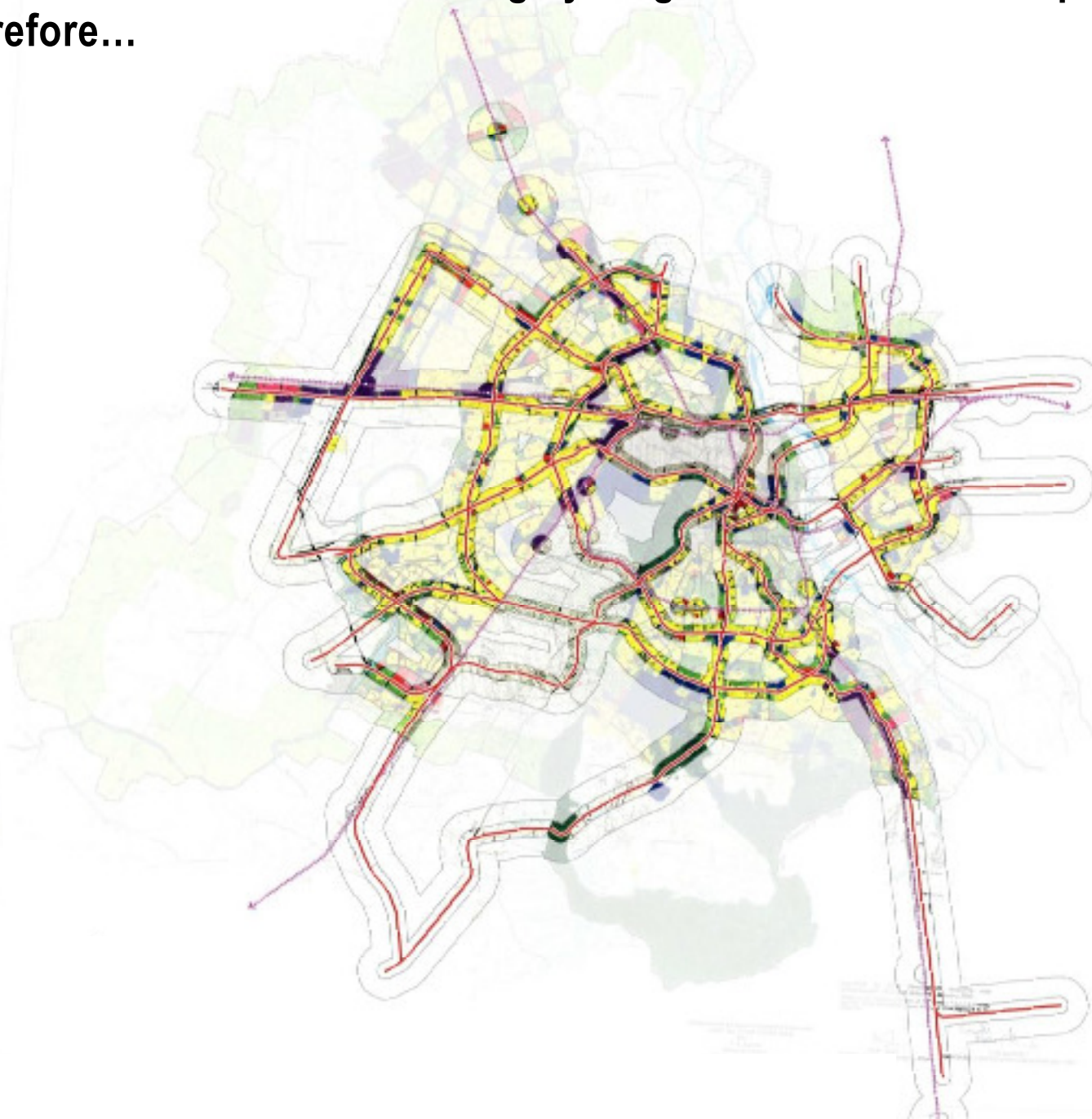
~ 500m

Rapid
Transit

Beyond 500m

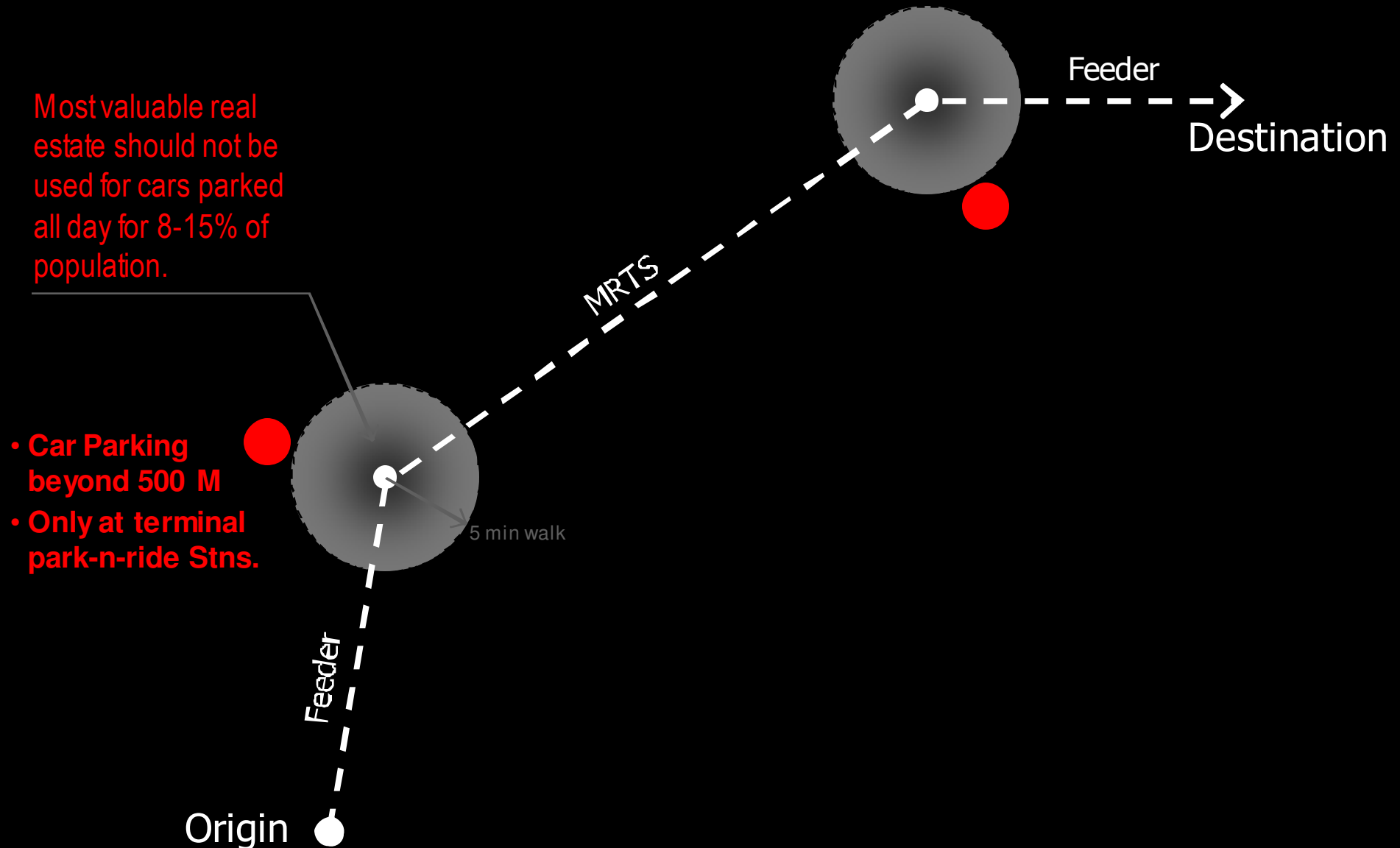


**Most of Delhi within 5 min walking/cycling/rickshaw distance of proposed MRTS.
Therefore...**



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	D COLD STORAGE AND OIL DEPOTS
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	BURIAL GROUND / CREMATION
	PS2 TRANSMISSION SITE / CENTRE
	PS3 SPORTS FACILITIES / COMPLEX / STADIUM / SPORTS CENTRE.
AGRICULTURE / GREEN BELT AND WATER BODY	
	A1 PLANT NURSERY
	A2 AGRICULTURE / GREEN BELT
	A3 RIVER AND WATER BODY
	URBANISABLE AREA

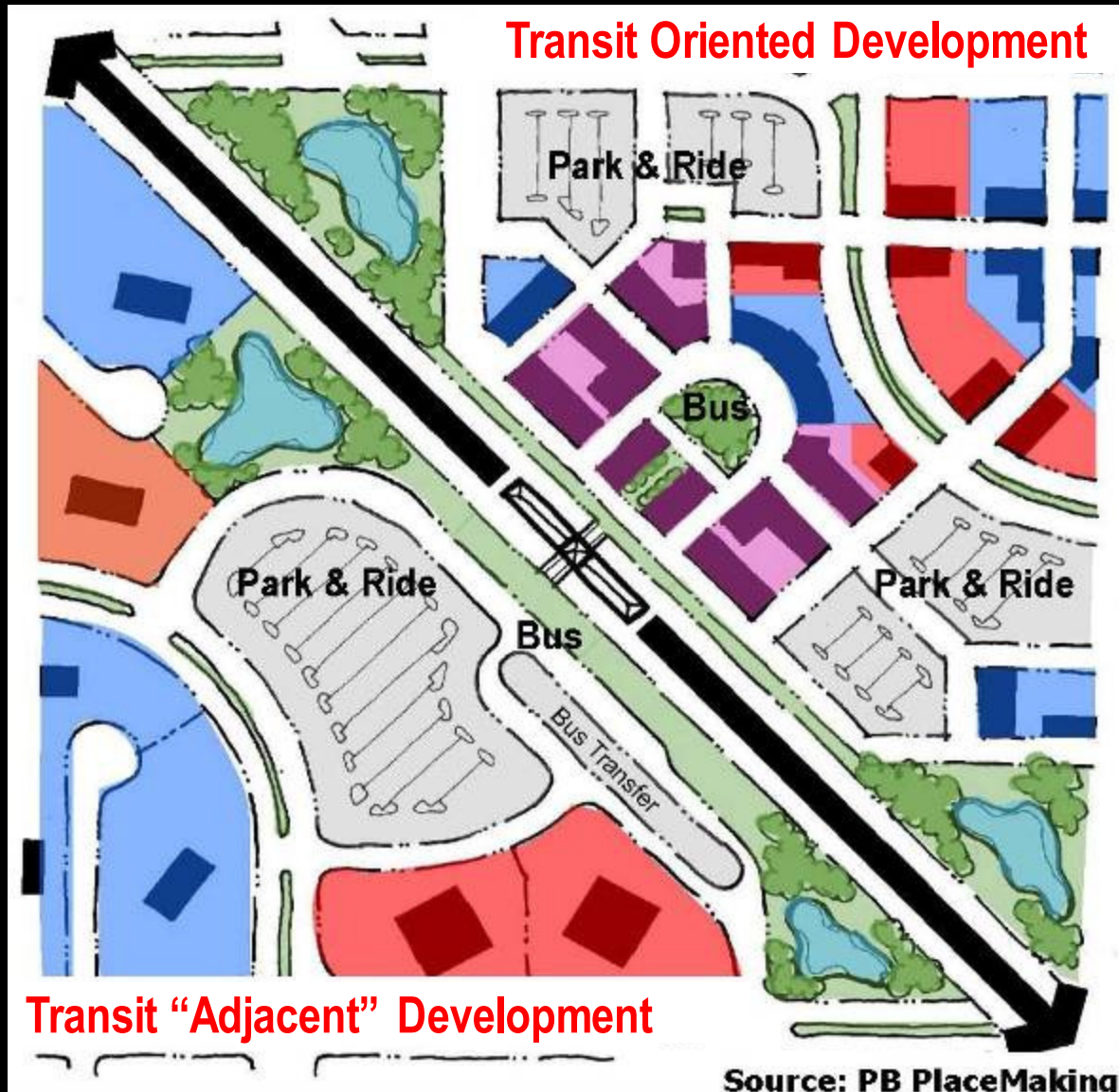
...Private Car: is the undesirable feeder



Location of Parking defines: TAD vs. TOD

TAD:

- Separates the Community from the Station.
 - Is Auto-oriented development
- e.g. Janakpuri West Station, Delhi



TOD:

- Encourages Walkability and Mixed Use
- eg: Dadar Station, Mumbai

Ridership: Parking Versus Joint Development Housing

- Surface parking
 - 100 spaces per acre
 - **200 rides per day**
 - All at peak period
- 3 Story Garage
 - 200 spaces per acre
 - **400 rides per day**



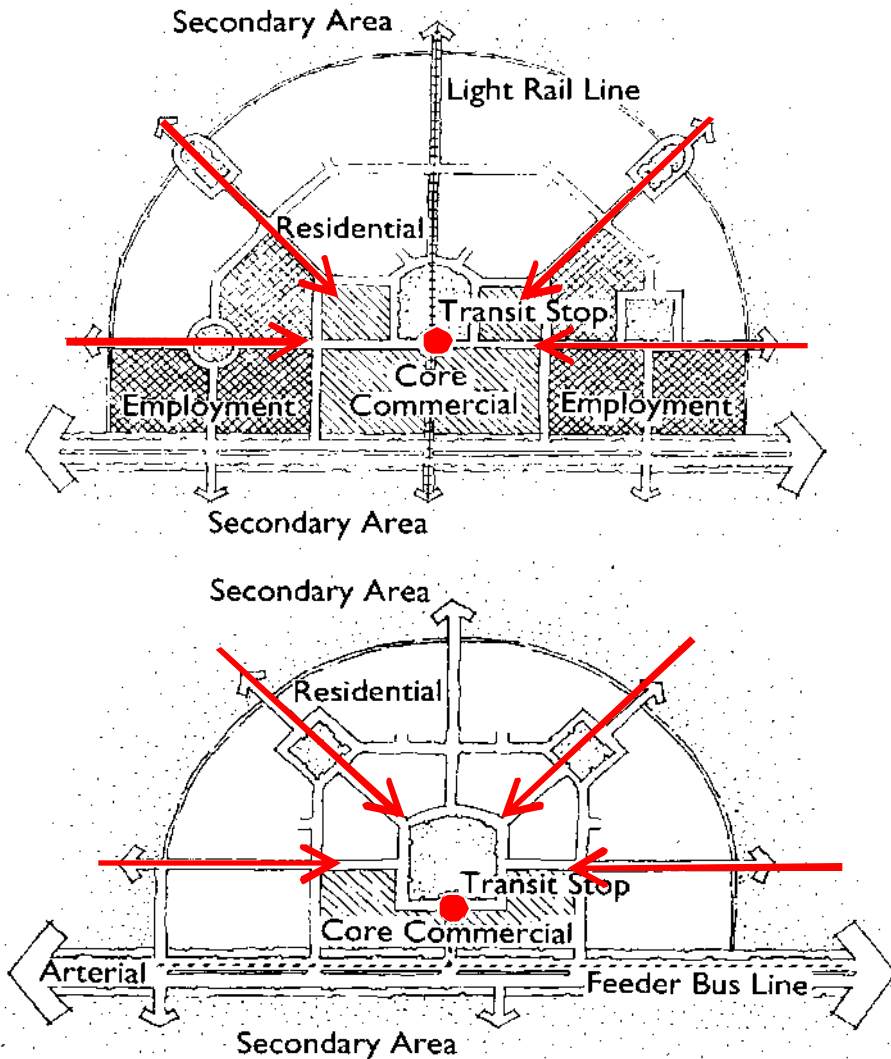
- Housing = ~1.6-4 rides per unit
- 50-100 units/acre = 200 rides per day
 - **100-200 units/acre = 400 rides/day**
 - Spread throughout day especially if affordable



Principle C) Direct Connectivity

- **Finer Street Network** for shortest routes to pedestrians & cyclists.
- **Faster to walk or cycle**; than to drive.

Shortest walking distance for Pedestrians:



- Interconnected Street Network
- Small walkable blocks; Pedestrian cut-throughs every 100 M.
- Mix of uses to provide people of varied social groups with options to live, work and play within easy access to public transport and daily necessities.

Principle C) Direct Connectivity

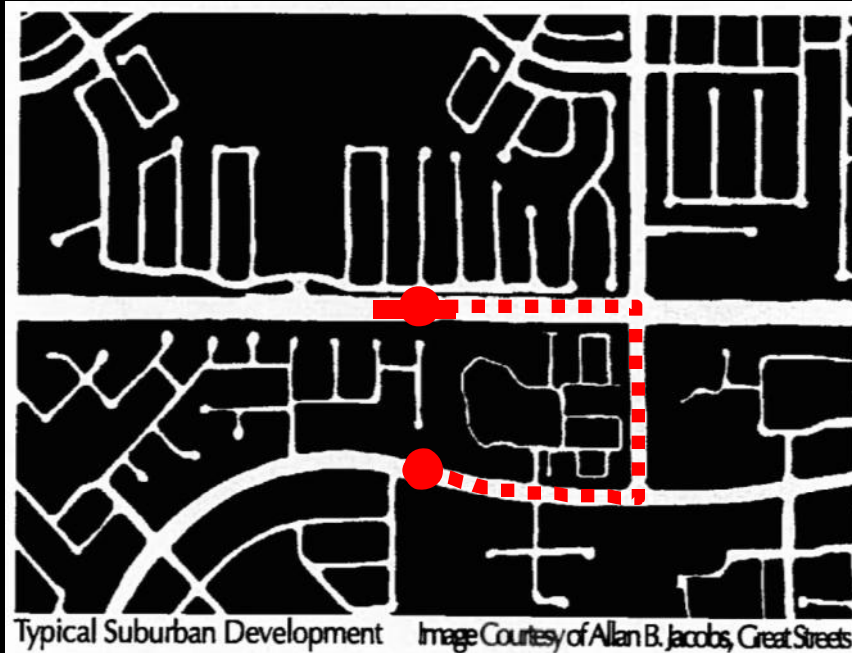
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Typical Delhi Housing Block

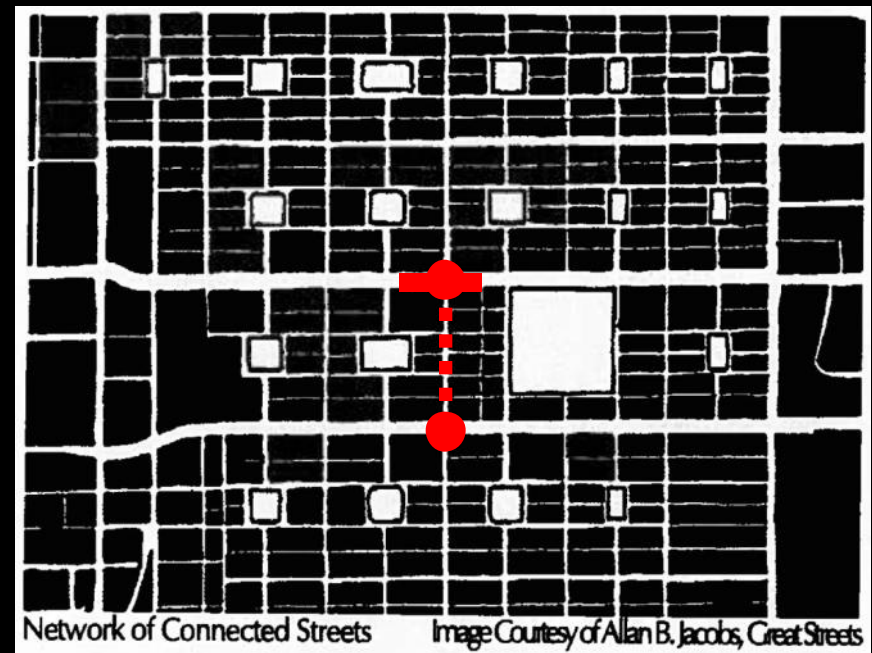


Vancouver Block: e.g. 80 x 125 M



Typical Suburban Development

15-minute walk



Network of Connected Streets

5-minute walk

Principle C) Direct Connectivity

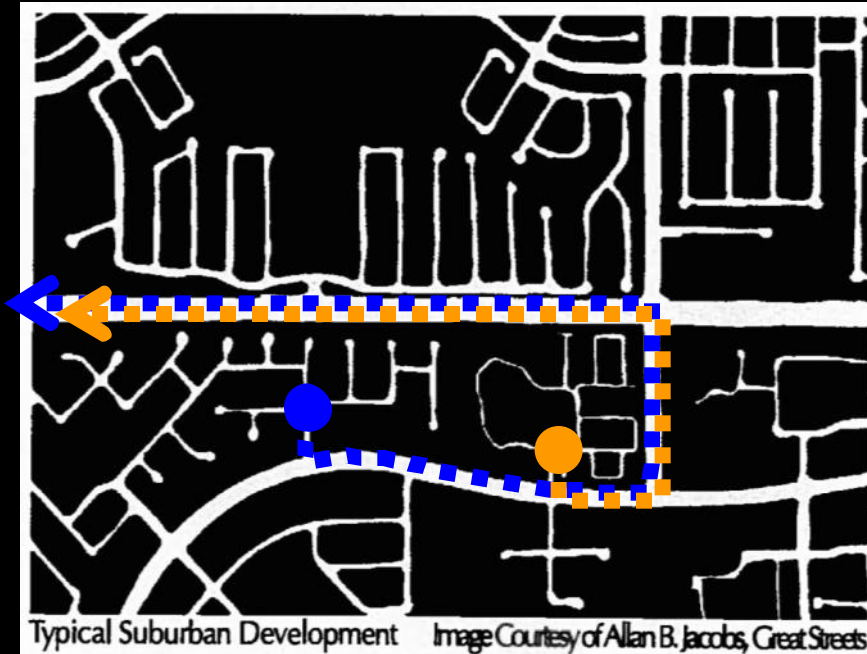
- **Finer Street Network** for shortest routes to pedestrians & cyclists.
- **Faster to walk or cycle**; than to drive.



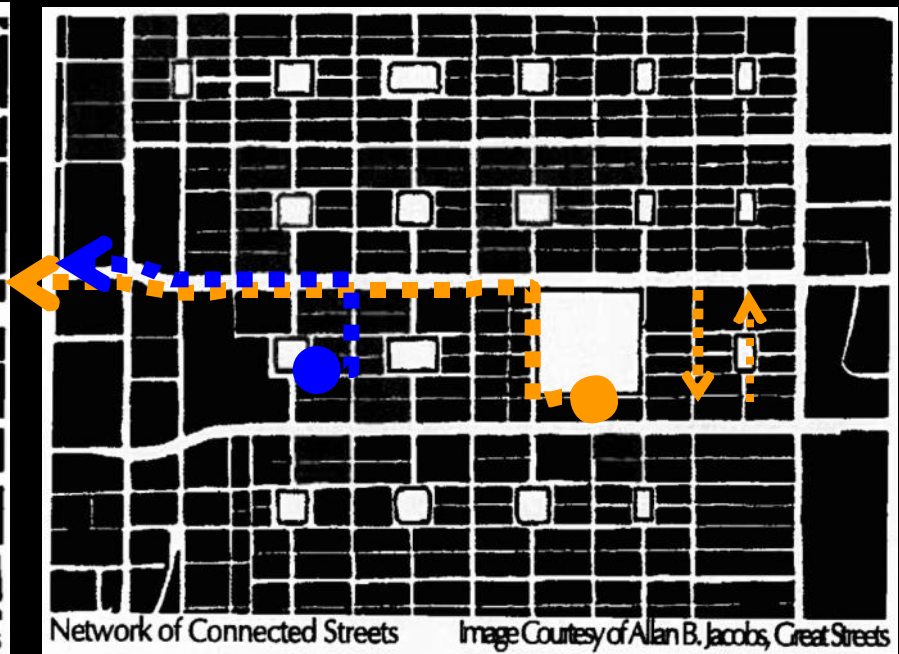
Typical Delhi Housing Block



Vancouver Block: e.g. 80 x 125 M



Concentrated traffic: Fewer, wider streets



Distributed traffic: More & narrower streets

Principle D)

Public Realm Design:

- Pedestrian/disabled friendly, safe, pollution free



Pedestrian experience around a Mall near a Metro Stop.

Remove Setbacks!

Build Sidewalks!!

TRANSFORMATION of a similar street in Los Angeles

Note: Street-lights are for Pedestrians, not cars!

Critical Zoning Laws that may need to be introduced:

Remove Setbacks,
Require Entries on sidewalks



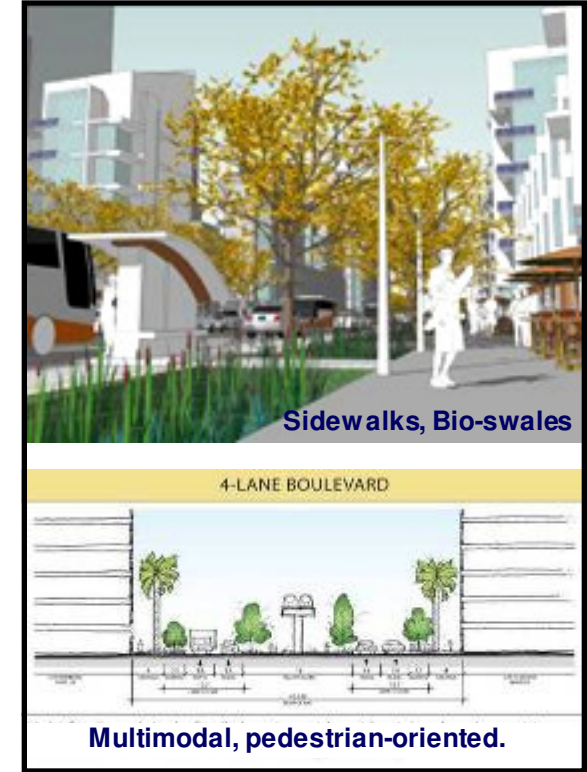
Building Entries/ windows on
Sidewalk (eyes on the street-
provides safety for pedestrians)

Regulate
Maximum Block Widths,
Minimum Frontages



Smaller blocks, interconnected
streets create shorter travel routes for
pedestrians.

Design Street Guidelines
for pedestrians, not cars!



Streets for Trains, Buses, cars
and Pedestrians.

Built-to-edge Buildings for Safety
& Comfort.

Principle E) - PlaceMaking

- Create Places, **not gated developments**.
- Build communities:
Create interaction places, public plazas, markets and parks – near public transport nodes & **along daily paths of people**
- Mix of uses to provide people of varied social groups with options to live, work, shop and play within easy access to public transport and daily necessities.

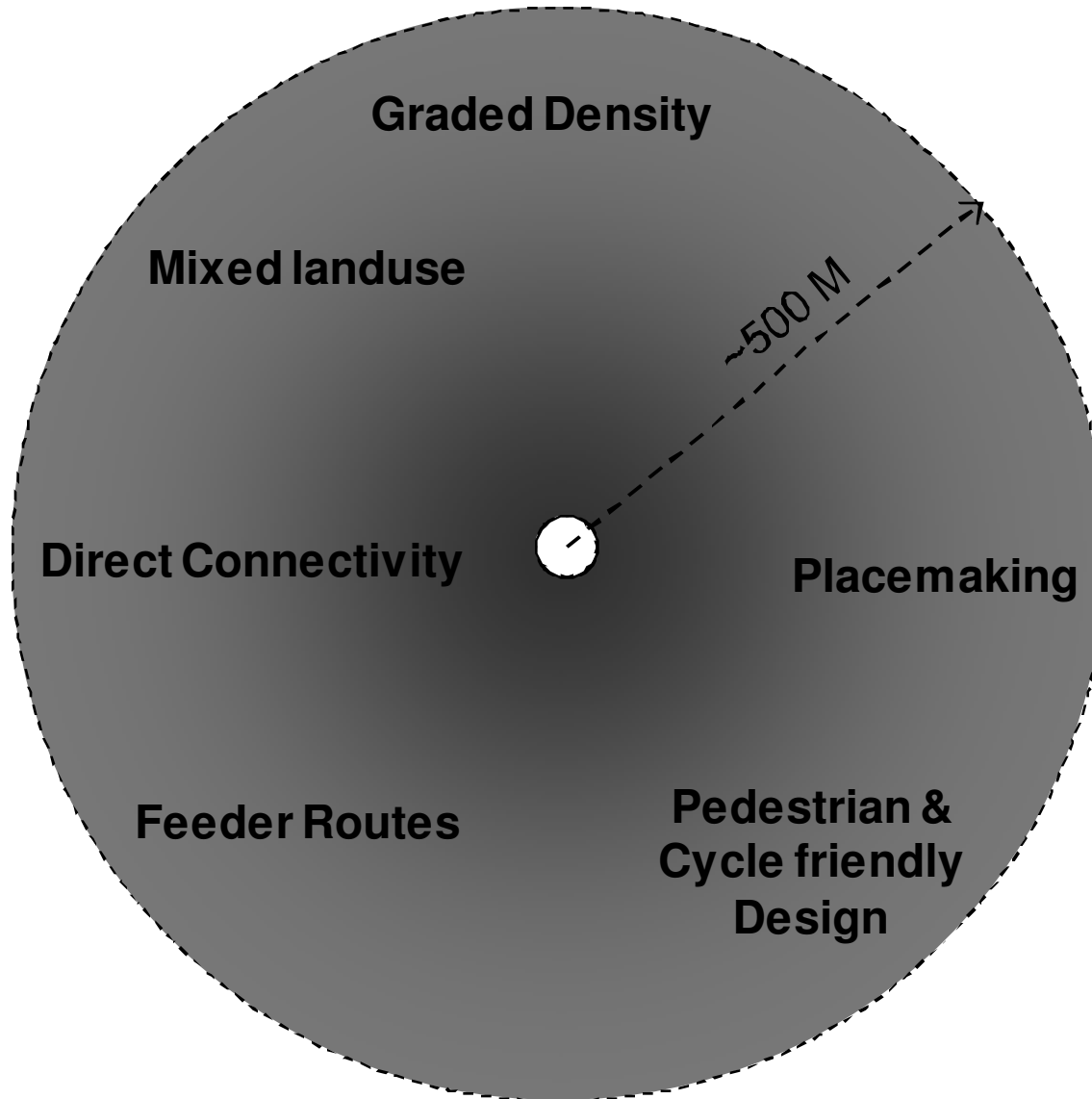


Nanjing Lu, Shanghai



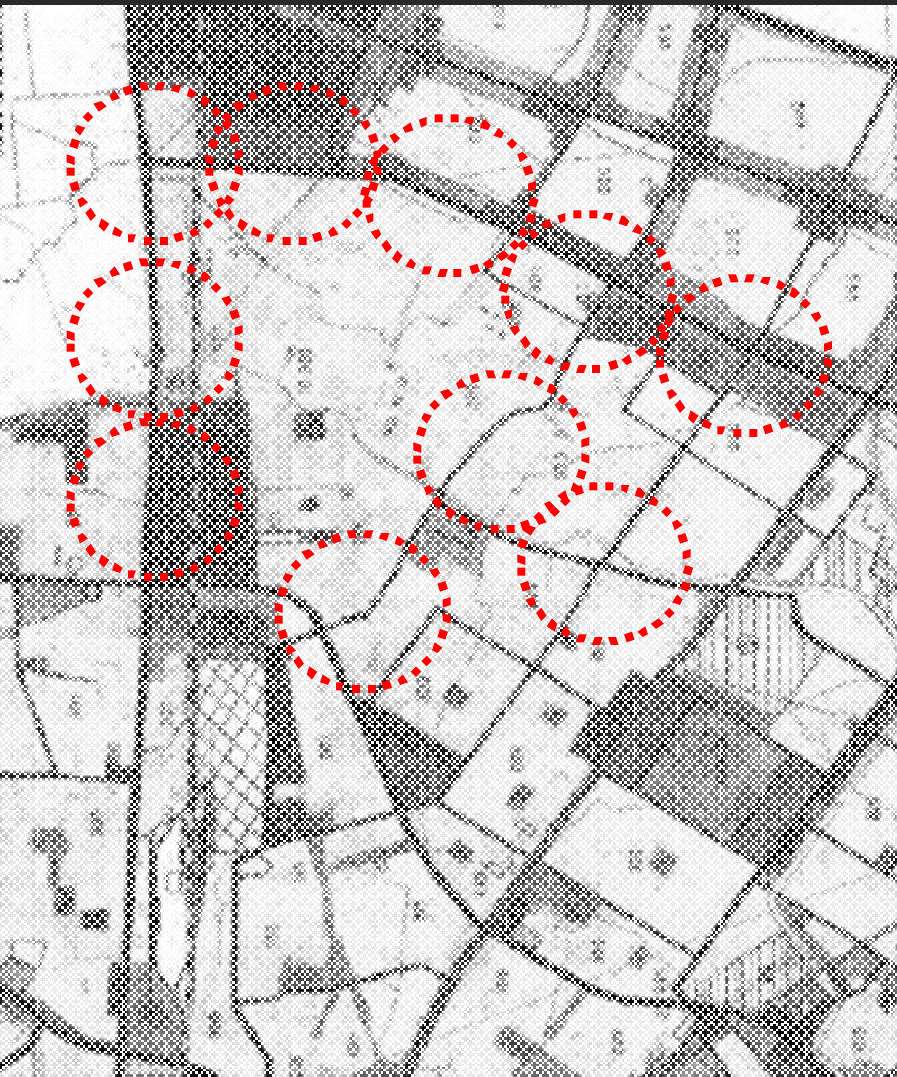
Mizner Park, Florida

The TOD checklist:

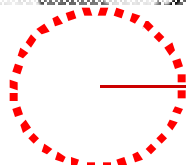


Change Morphology from AutoCity to a Transit City

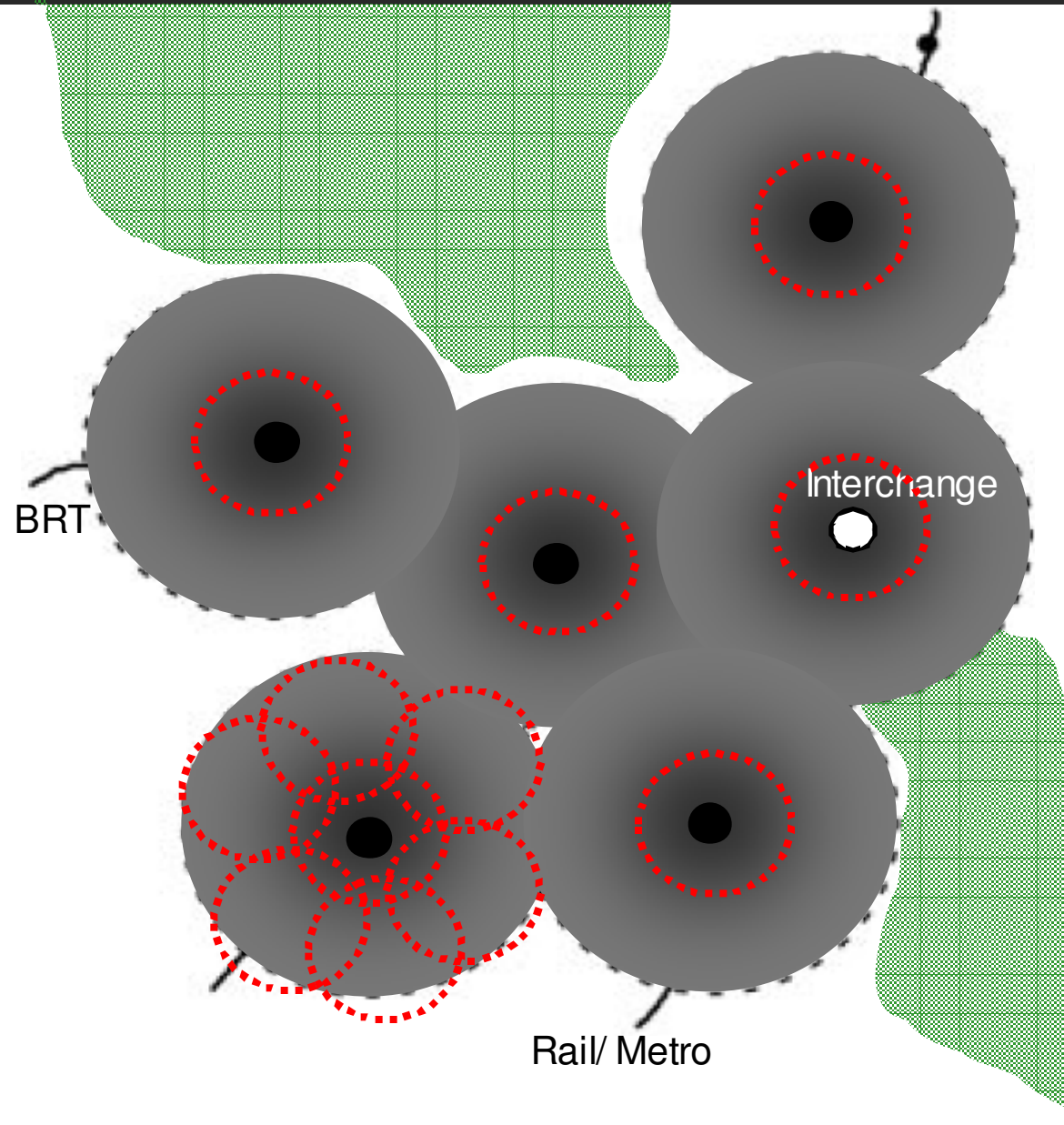
To reduce car-dependence & increase transit use.



0.5 0 1 2



7 min walk



MPD VISION

- Global
- World Class
- Quality of life
- Sustainable

SOCIAL

- Equity of access to amenities, transit, infrastructure.
- Safety
- Affordability
- Civic Pride
- Heritage
- Democracy & Transparency

ECONOMIC

- Prosperity
- Affordability
- Employment
- Attracting investment
- Flourishing entrepreneurship
- Equity of access
- Lifestyle Choices

Sustainable DELHI

- Air Quality
- Water Quality
- Water & Energy Supply
- Climatic Comfort
- Cleanliness & Hygiene

ENVIRONMENTAL

Potential TOD Benefits to Delhi:

- Less energy consumption
- Less pollution
- Less congestion
- Less accidents
- Less parking demand
- Better quality living environment
- Better safety and security

Potential Benefits of TOD for Delhi

Benefits to Society, to the City:

- **Opportunity to walk/ cycle** to a fast, convenient, safe and affordable Public Transport mode.
- **Equity** of access to Transit and other amenities to all sections of society.
- Reduced dependency of private car **reduces air pollution**.
- Opportunity to meet the **housing deficit/ needs** with minimal public investment.
- Opportunity to utilize **private investment** for funding of public facilities/ infrastructure/ affordable housing.
- Potential to generate **long term funding** for participating public transport agency.
- Opportunity to conserve environmentally sensitive/ virgin lands through compact development.

Benefits to Transit Owning Agency:

- **Increased ridership** due to more population living/working within walking distance.
- **Value Capture** for long term funding & maintaining public transportation system.

Benefits to Land, Road & Service Owning Agencies:

- Potentially **increased revenue** from land within TOD “influence zone”.
- Potential for long term funding/ maintenance of **streets, parks, public spaces**.
- City level **reduced infrastructure costs** (reduced length of roads, pipes, cables, tunnels, etc.)
- Increased feasibility for sustainable **decentralized physical infrastructure**.

Spirit of MPD 2021

MPD Highlights (p3):

-need to explore **alternate methods** of land assembly, private sector participation, and flexible land use and development norms.
- The success of Master Plan depends on conversion of the policies and strategies outlined in it into time bound **development and action plans**, periodic reviews and close monitoring.
- **The Plan contemplates a mechanism for the restructuring of the city based on mass transport.**

Achieving MPD Goals for Delhi.....

- **Population & Employment** Targets
- Optimum Utilization of **Land**
- Efficient & prioritized **Public Transportation**
- Reduce air & noise **Pollution**
- Meeting the **Housing Deficit & Demand** in a time bound manner
- Provide adequate and Equitable access to **Infrastructure**
- Better **safety & security**, & **Quality of Life**.
- Public Participation and time bound **implementation**.

....through **Transit Oriented Development?**

MPD Goal: MODAL SPLIT

Current: **60-40**

OR: **55-45?**

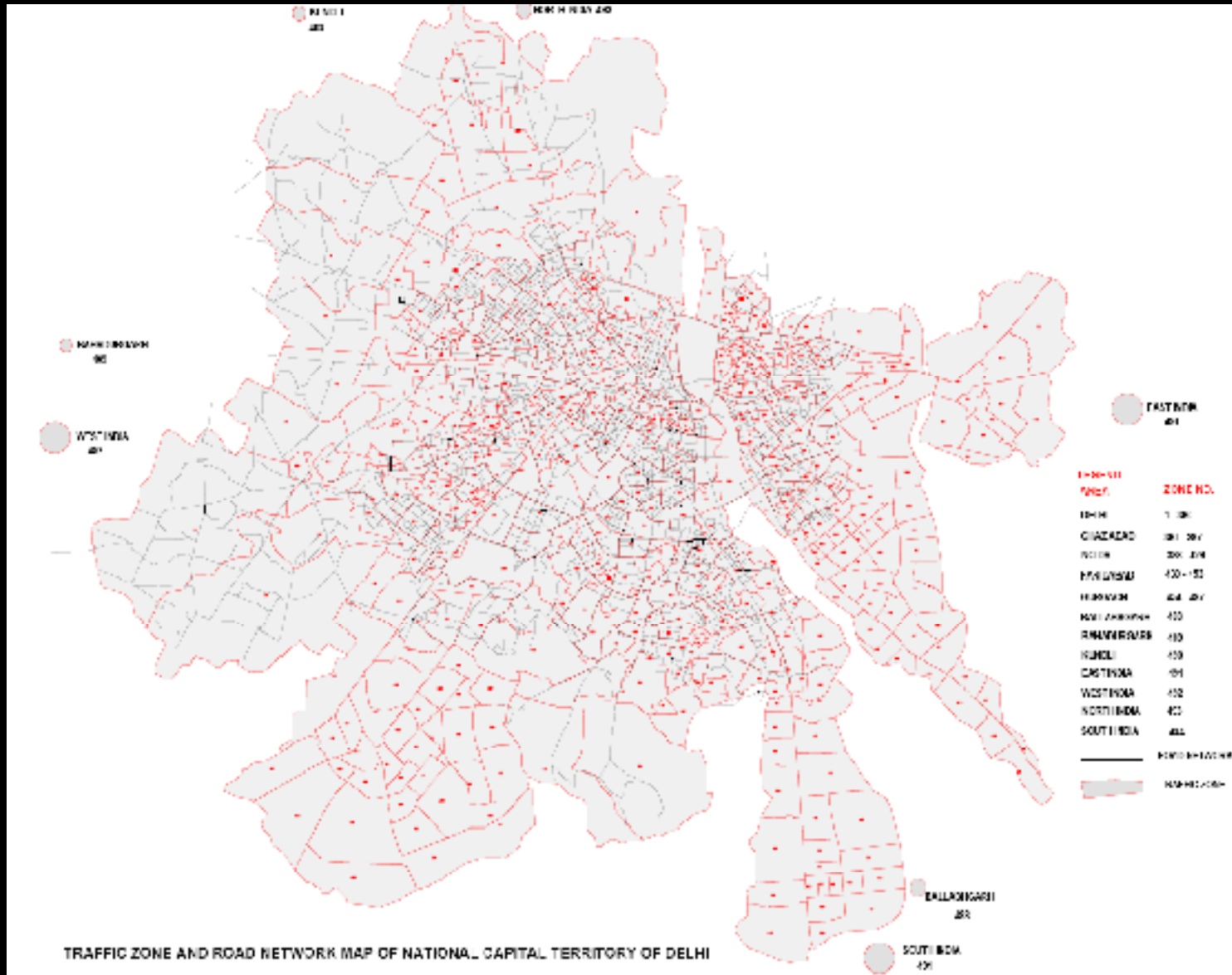
INDICATOR: **70-30 Modal Split** **by 2011**

80-20 Modal Split **by 2021**

Goal: **Reduce 70% air pollution source:
i.e. primarily private vehicles**

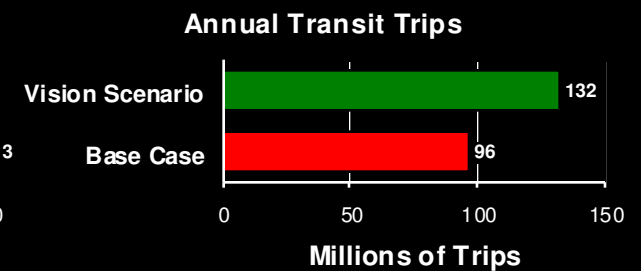
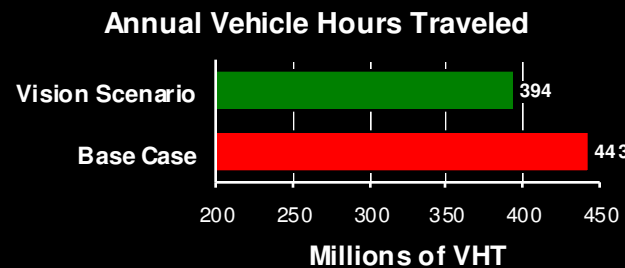
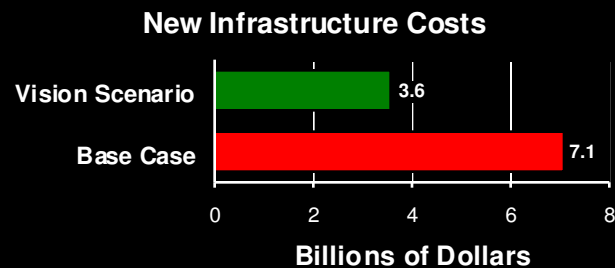
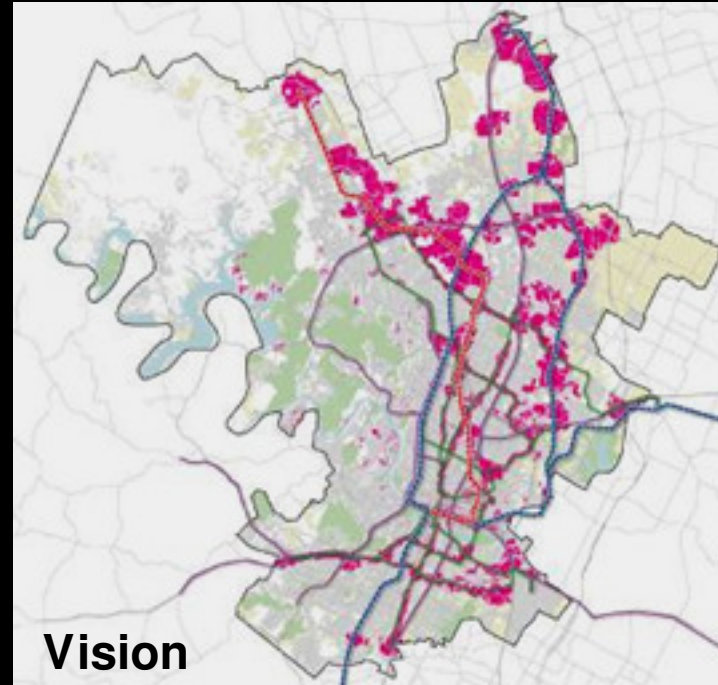
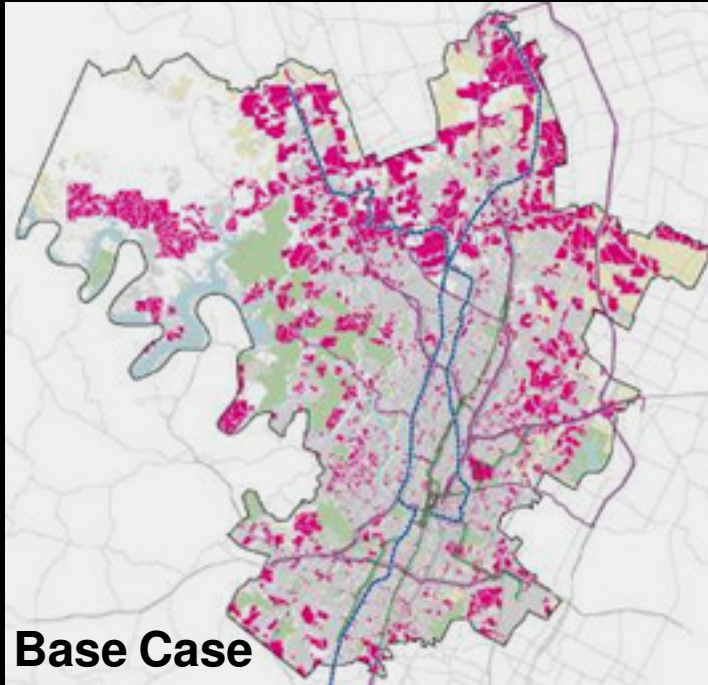
Transport Model already being built!

Dynamic landuse-transport modeling would help us make decisions that would achieve the desired Modal Split for Delhi



Scenario Building: Already being done by RITES... needs to be coordinated and taken further....

Evaluate Pros and Cons through Technical Evaluation



MPD Goal: **SHELTER**

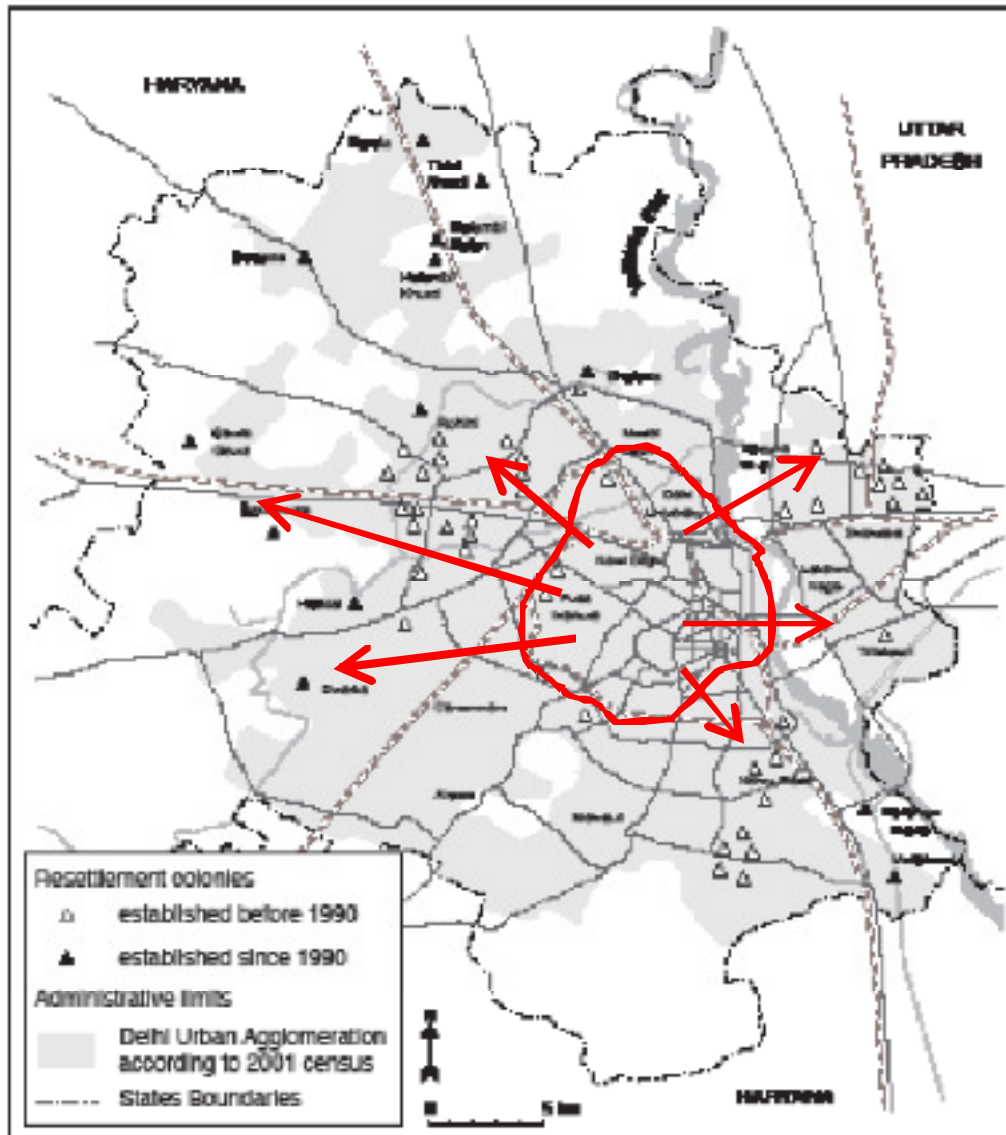
**Accommodating: 230 Lakh people
83.82 Lakh jobs by 2021.**

**Providing: 3.5 lakh Redev. DUs
3.5 lakh New DUs by 2011**

**10 lakh Redev. DUs
14 lakh New DUs by 2021**

SHELTER: Spatial and social integration of 'urban poor' into larger urban community.

Map 2: Location of Resettlement Colonies in the National Capital Territory of Delhi (2007)



Source: Shanti Pragati Bhawan Department, Municipal Corporation of Delhi.
Sabir Ali Slum within Slums: A Study of Resettlement Colonies in Delhi, Council for Social Development, New Delhi, 1996.

Delhi has a long history of forced eviction of 'illegal' squatter or slum communities, and an equally long history of immigration into the city.

- The low-income population was originally living in "illegal" squatter settlements or slums or JJC – because there was not adequate affordable housing supply for them in the centre city – when they originally arrived in the city to work and aid in its economic growth.
- Displaced low-income population is most often located at the outskirts of the city. This puts tremendous pressure on the transport infrastructure of the city, as well as the finances of the low income families – as they have to now commute every day to their place of work in the city. Moreover, secondary sources of family income (women working locally, etc.) are often severed, thus making the family poorer. Children are disconnected from schools and new social and physical infrastructure is not provided. Shared amenities originally available in the city centre are also out of reach after relocation.
- The above situation often forces the poor to move back into the city and live as squatters or slums in dilapidated conditions again, just to be close to jobs & amenities.

Source: *Housing and Land Rights Network, Habitat International Coalition*

Need:

It is therefore essential that low income groups are located near their sources of employment and within walking distance of informal sources of employment like higher income households and other amenities within the city. Low income groups need to be "mixed" with other income groups in order to reduce social segregation and stigma and build civic pride.

“Shelter” Current large concentrations of low-income social ‘ghettos’ creating Social Stigma



Low income communities have generally been located in large concentrations (from 50,000 to 1 lakh population) at a single location, **without adequate provision of social amenities and infrastructure services.**

- Due to **lack of investment in civic amenities** and basic social infrastructure – these areas often perpetuate unemployment, crime and very unsanitary living conditions.
- **Mono-cultural concentration** & Isolation leads to **social stigma**, & severe lack of civic pride.



Image Source: The Tribune, India, 2006

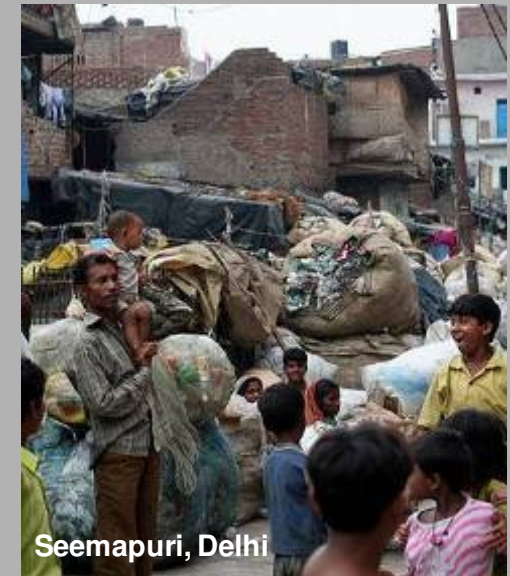
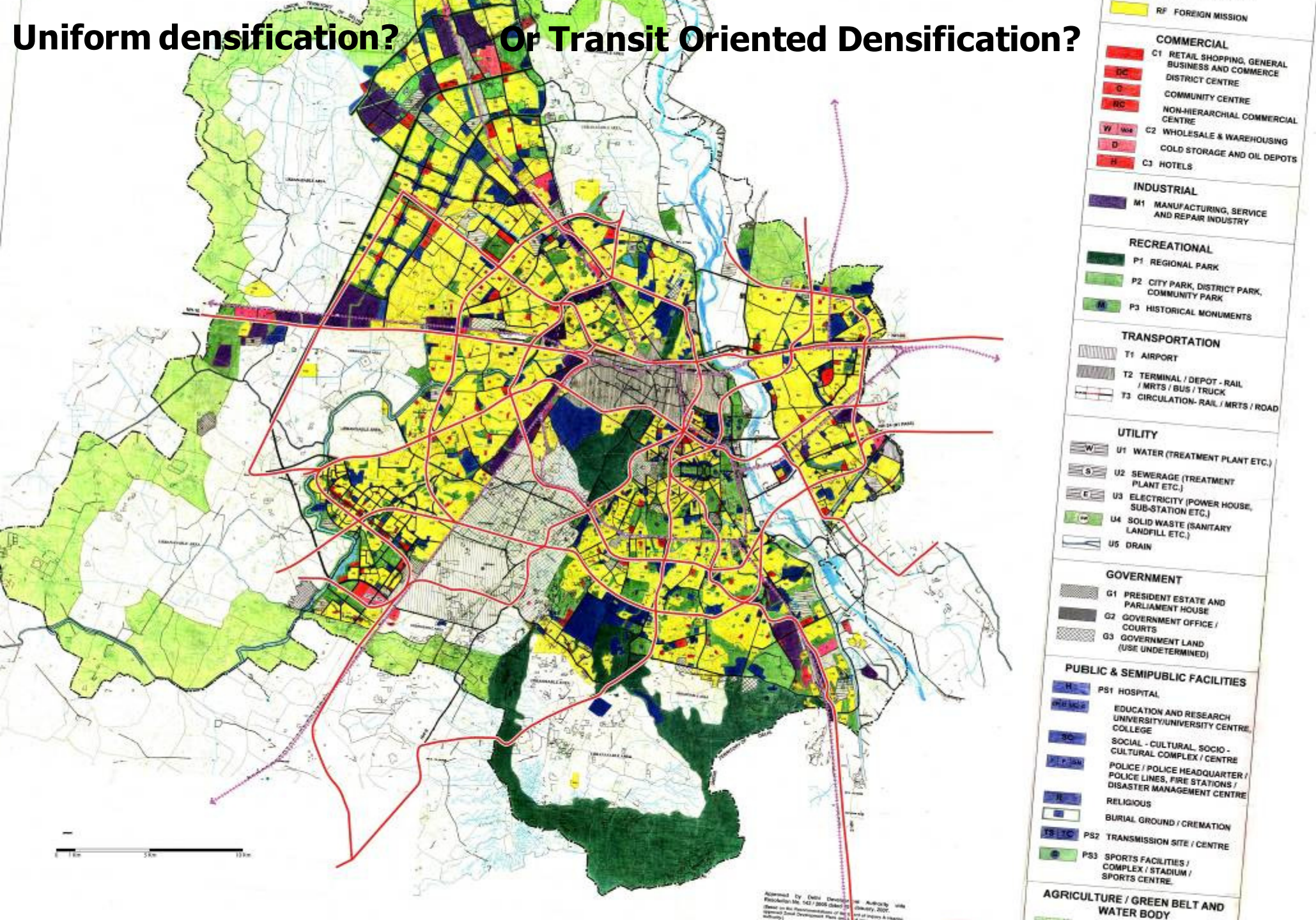
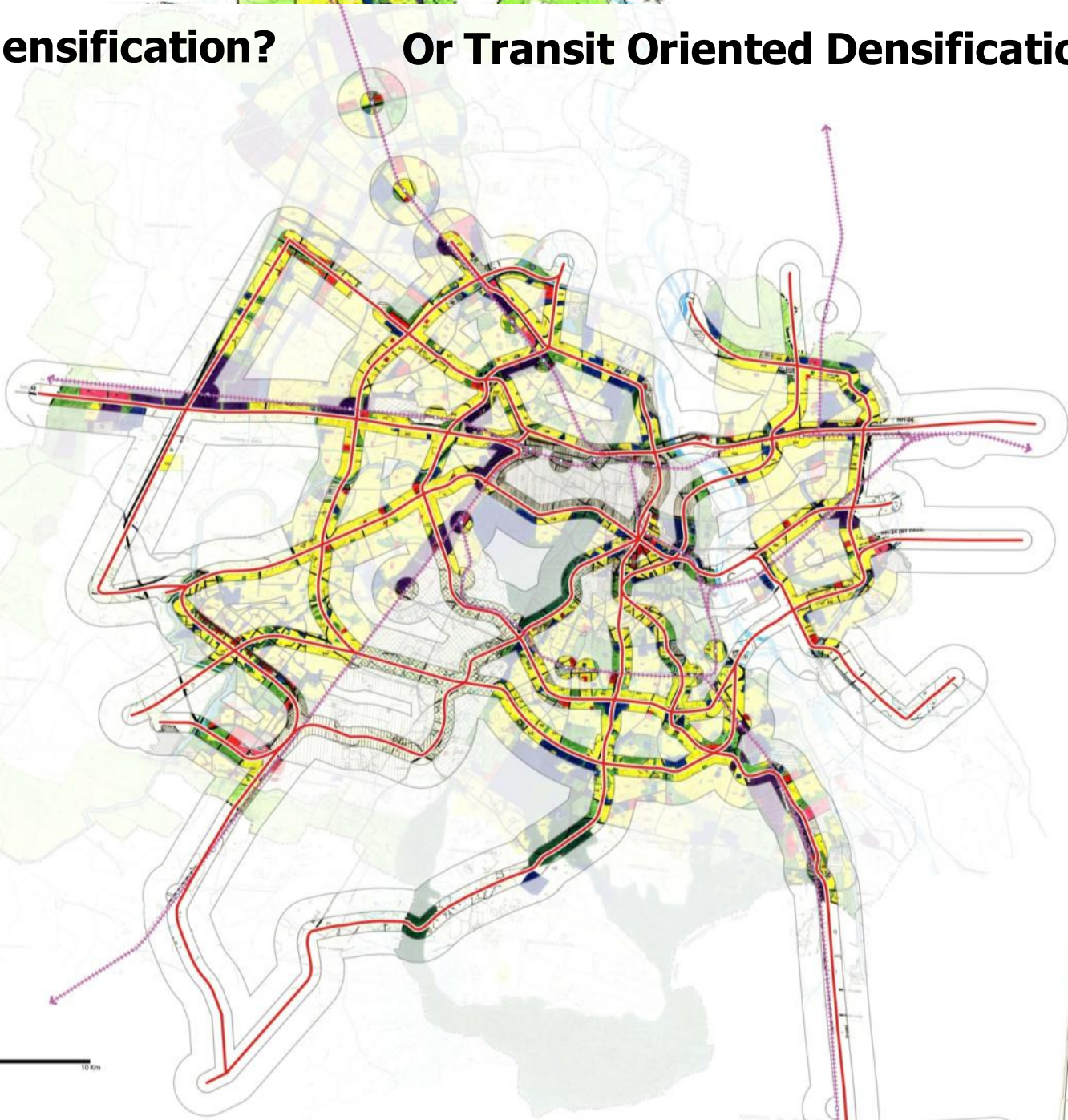


Image Source: Mackenzie Berg, 2008

Uniform densification? Or Transit Oriented Densification?



Uniform densification? Or Transit Oriented Densification?



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B	BURIAL GROUND / CREMATION
TS / TC	PS2 TRANSMISSION SITE / CENTRE
SP	PS3 SPORTS FACILITIES / COMPLEX / STADIUM / SPORTS CENTRE.
AGRICULTURE / GREEN BELT AND WATER BODY	

There are several possible options for delivering low-income housing near public rapid transit (i.e. Metro, BRT) and near other middle to high income homes and employment centres:

Option 1:

- **Mandatory Reservation for % of low-income housing in private developments near public transit.**

According to the Delhi Masterplan, all private developments are to provide and maintain 15% of the total FSI for low-income groups. Other states are likely to adopt this mandate under the JNURM guidelines. This would be a mandatory requirement for projects to obtain planning approvals.

Option 2:

- **FSI-density bonuses for market-rate developments to pay for, or construct nearby low-income communities.**

- **Density bonuses for providing and maintaining shared public parks, facilities and social infrastructure.**

Option 3:

- **Government built low income housing within 800 M walking distance from a rapid transit stations, limiting the size of each community to a maximum of 250 families.**

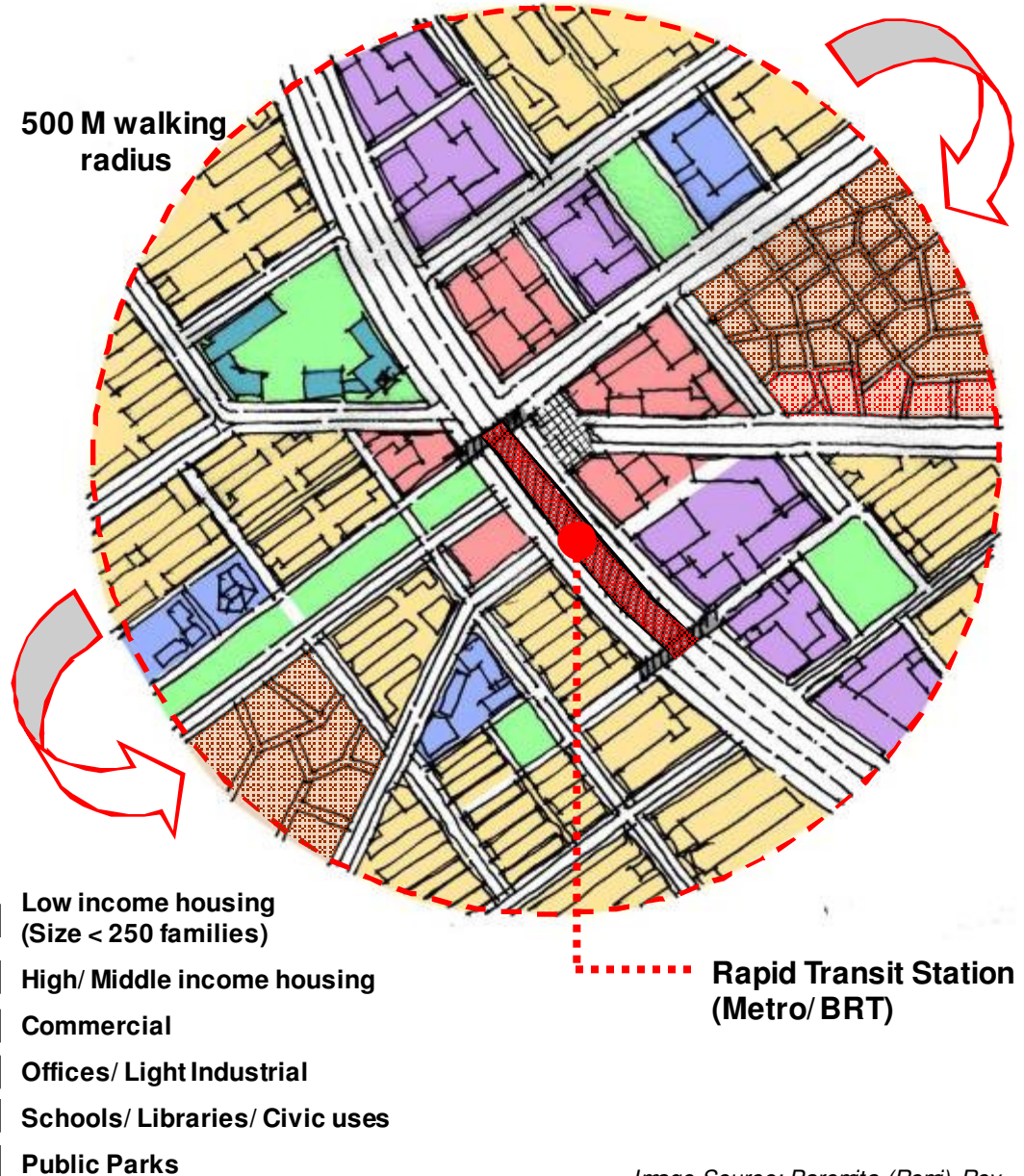
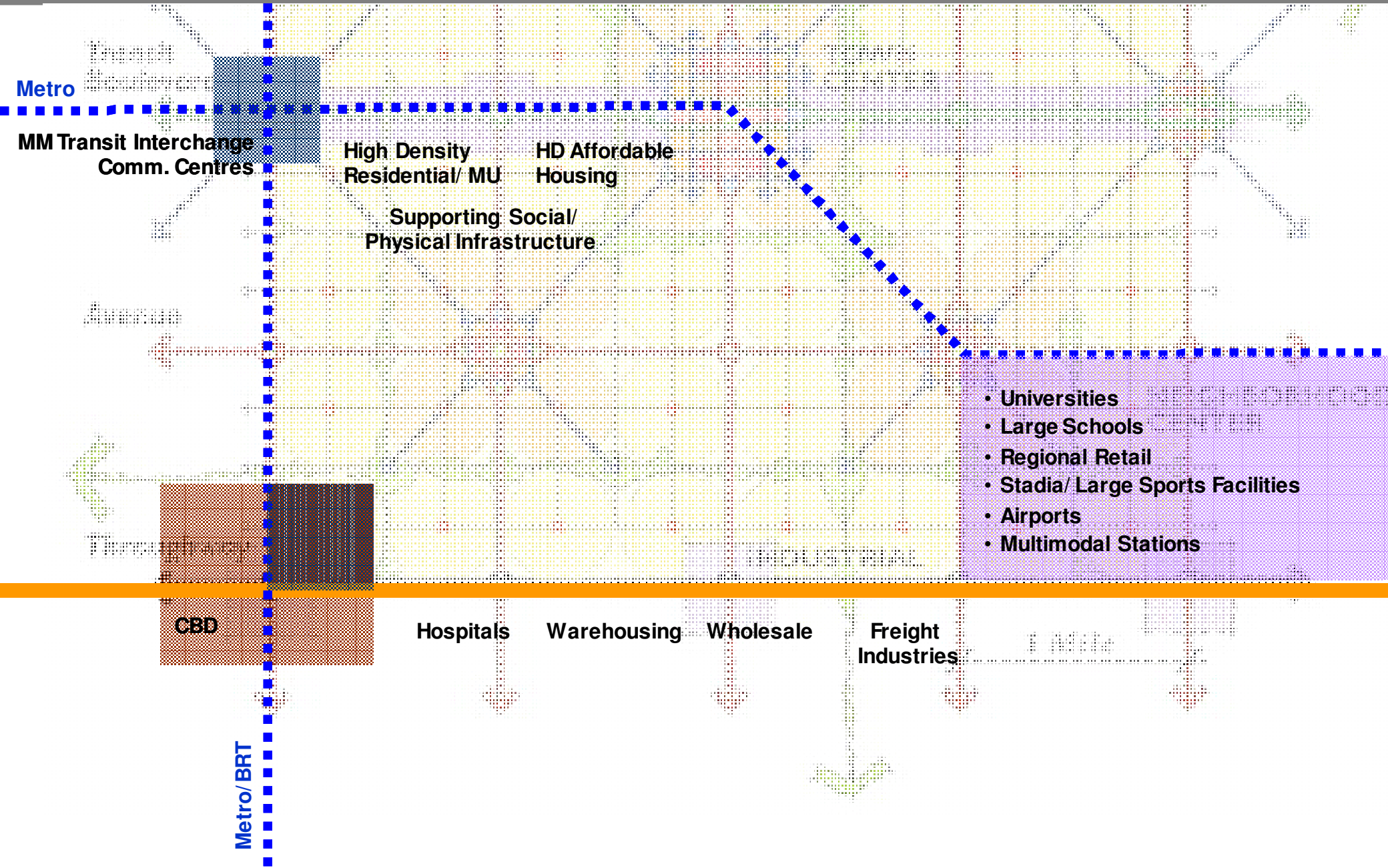
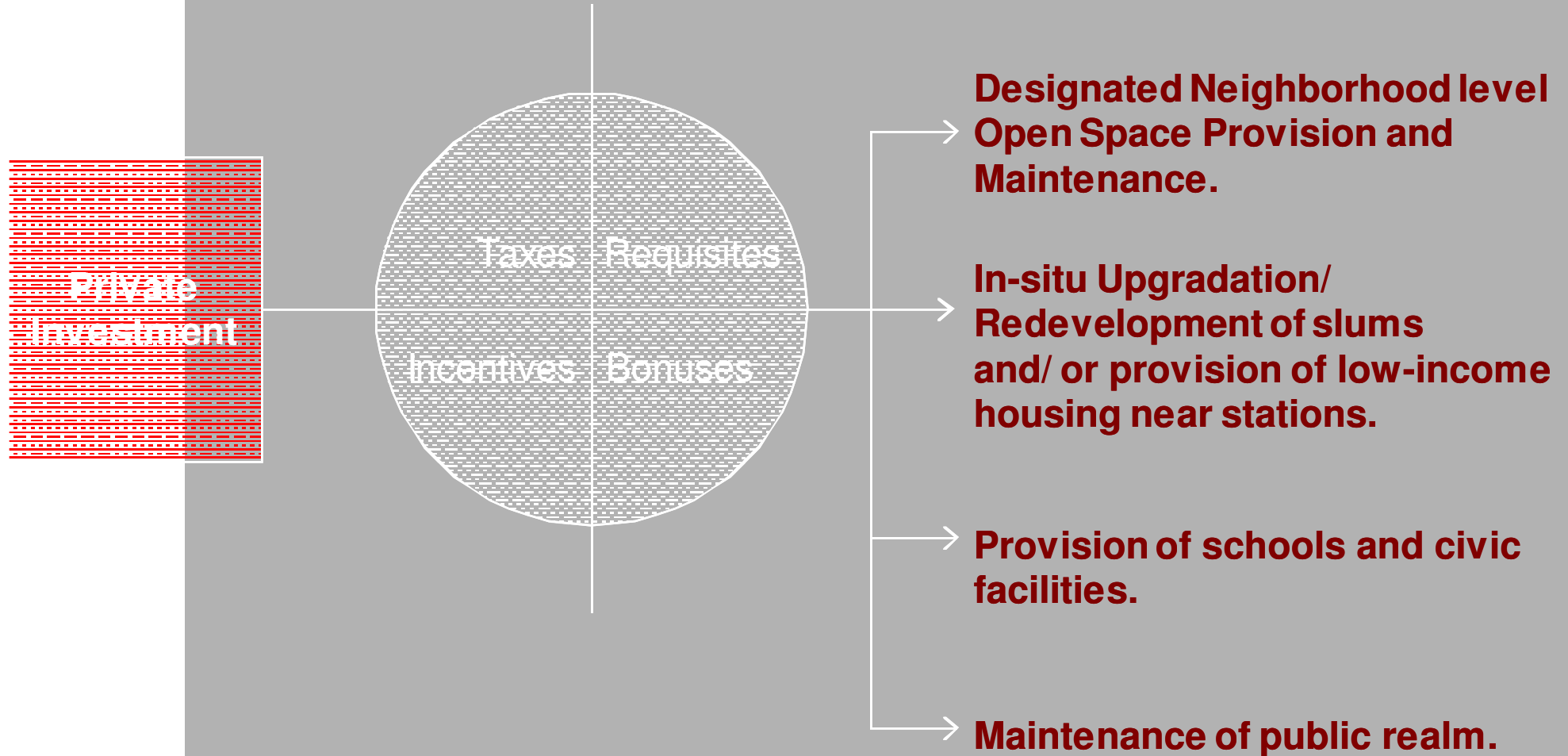


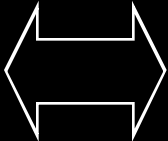
Image Source: Paromita (Romi) Roy

Commercial Hierarchy: Transit based vs. Freeway based



Benefits: Cross Subsidization of Social & Physical Infrastructure.




Vision MPD  **Vision TOD**

2: Proposed Work Programme For TOD Implementation

MPD Goal: IMPLEMENTATION & MONITORING & REVIEW OF PLAN POLICIES (p128)

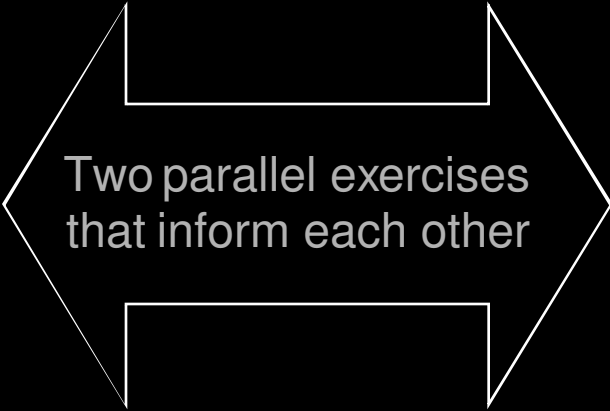
Transit Oriented Development
– Implementation



Overall TOD Vision Document + Draft Policy Framework
+ 3 months

Prepared in consultation with TOD Core Team (DDA Depts. MCD Plg. & DIMTS)

**Part 1: TOD Pilot
Projects**



Two parallel exercises
that inform each other

**Part 2: TOD Combined
Modeling Scenario**
– Multimodal Transportation
- Landuse Coordination

TOD 'Test Sites' for implementation:

- Infill TOD
- Greenfield TOD
- Redevelopment TOD

VARYING BY:

- Locational Context
- Public Need
- Ownership
- Implementation model

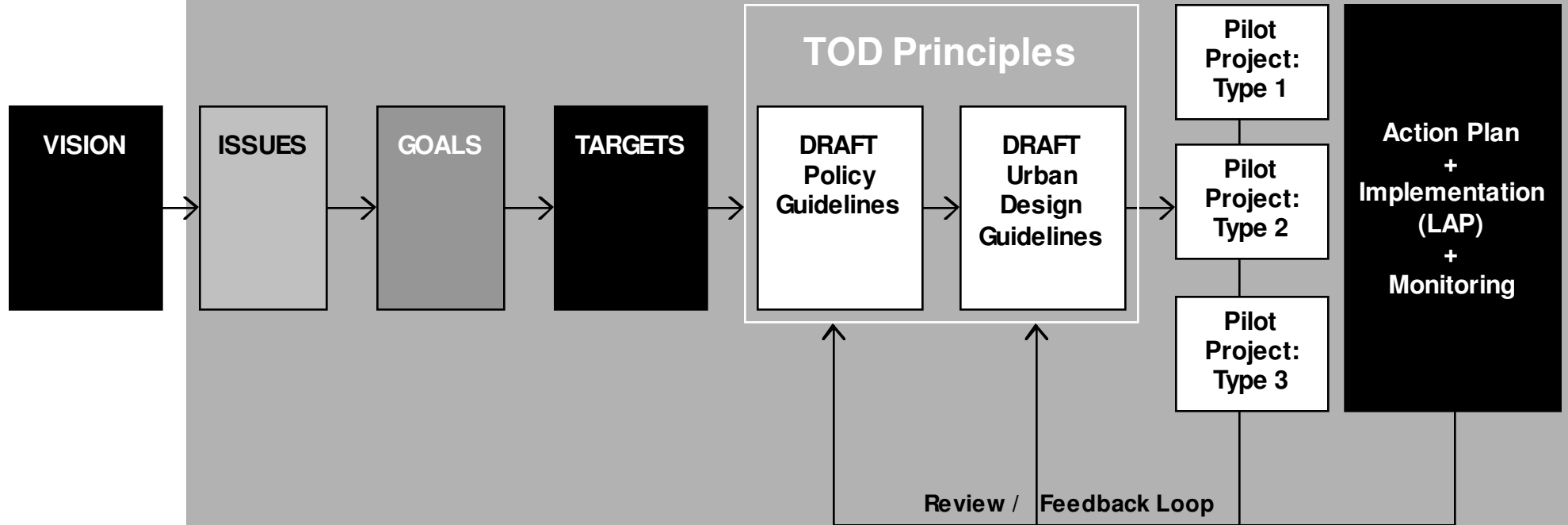
Stage 1:

**Based on Travel
Demand Modeling**

Stage 2:

**Based on Overall
Sustainability Parameters**

TOD in Delhi: Vision & Policy Framework Diagram



Transit Oriented Development : **The ROADMAP**

1

Landuse-Transportation
Synergy:



2

Public Transit System:
Provision & Funding



3

Discourage Private Car



4

Equitably distribute
Public realm

