Transit Oriented Development
the roadmap

UTTIPEC April ’09
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.
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)
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)
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...
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 *IS* TOD?
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.

Definition Source: APTA
http://www.apta.com/research/info/briefings/briefing_8.cfm
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

[Map showing 5 min walk and 5 min bike areas around metro stations]
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:
Within 10 min walk of Station (1000 M)...

Recommended:

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

Principle A) Density & Diversity & Design:
- Minimized Walking & Biking Distance / Environment from MRTS & Amenities.
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- 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)

Beyond 500m
- Pedestrians
- Cycles, NMVs

~ 500m

Rapid Transit
Most of Delhi within 5 min walking/cycling/rickshaw distance of proposed MRTS. Therefore...
Most valuable real estate should not be used for cars parked all day for 8-15% of population.

- Car Parking beyond 500 M
- Only at terminal park-n-ride Stns.
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
  - e.g. Dadar Station, Mumbai

![Diagram of TOD vs. TAD](source: PB PlaceMaking)
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

Concentrated traffic: Fewer, wider streets

Distributed traffic: More & narrower streets
Pedestrian experience around a Mall near a Metro Stop.

Remove Setbacks!

Build Sidewalks!!

Principle D)

Public Realm Design:
- Pedestrian/disabled friendly, safe, pollution free

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

Regulate Maximum Block Widths, Minimum Frontages

Design Street Guidelines for pedestrians, not cars!

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

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

Sidewalks, Bio-swales

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:

- Direct Connectivity
- Graded Density
- Mixed landuse
- Feeder Routes
- Pedestrian & Cycle friendly Design
- Placemaking

500 M
Change Morphology from AutoCity to a Transit City

To reduce car-dependence & increase transit use.
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

- New Infrastructure Costs
  - Vision Scenario: 3.6
  - Base Case: 7.1

- Annual Vehicle Hours Traveled
  - Vision Scenario: 394
  - Base Case: 443

- Annual Transit Trips
  - Vision Scenario: 432
  - Base Case: 96
<table>
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<tr>
<th>MPD Goal:</th>
<th>SHELTER</th>
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**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
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.

Study Source: Housing and Land Rights Network, Habitat International Coalition
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.
Uniform densification? Or Transit Oriented Densification?
Uniform densification?  Or Transit Oriented Densification?
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.

*Source: Spatial Inclusion and Sustainable Design of low-income communities*
Commercial Hierarchy: Transit based vs. Freeway based

- Hospitals
- Warehousing
- Wholesale
- Freight Industries
- CBD
- Universities
- Large Schools
- Regional Retail
- Stadia/Large Sports Facilities
- Airports
- Multimodal Stations

- Metro
- MM Transit Interchange Comm. Centres
- High Density Residential/ MU
- HD Affordable Housing
- Supporting Social/ Physical Infrastructure
Benefits: Cross Subsidization of Social & Physical Infrastructure.

Private Investment

Incentives

Bonuses

Taxes

Requisites

Designated Neighborhood level
Open Space Provision and Maintenance.

In-situ Upgradation/
Redevelopment of slums and/ or provision of low-income housing near stations.

Provision of schools and civic facilities.

Maintenance of public realm.
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

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

Two parallel exercises that inform each other
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

Vision

Issues

Goals

Targets

DRAFT Policy Guidelines

DRAFT Urban Design Guidelines

TOD Principles

Pilot Project: Type 1

Pilot Project: Type 2

Pilot Project: Type 3

Action Plan + Implementation (LAP) + Monitoring

Review / Feedback Loop
Transit Oriented Development: The ROADMAP

1. Landuse-Transportation Synergy:

2. Public Transit System: Provision & Funding

3. Discourage Private Car

4. Equitably distribute Public realm