Planning and designing for sustainable urban transportation systems - An overview

EFFECTIVE URBAN PLANNING - A Key to Ensure Sustainable Development
PART I

CONTEXT
Our Concerns

- The world is increasingly becoming urban. Today (2014) as per UN Report, today more people live in urban areas than in rural areas, (54%). By 2050, 66% of the world’s population is projected to be urban.
- Urbanization and Economic Growth are Synchronous. Economic Growth leads to increased Mobility Demand
- Personalized vehicle markets are providing attractive incentives resulting high motorization
- Urban areas are sprawling –
- Increasing concerns about safety, security, inequality
- Energy security, environmental impacts
Existing Perspective

- How are the cities approaching these problems?

  - Junction Management
  - Flyovers / New roads / widening of roads
  - Traffic Management
  - Rapid Transit Systems

  Short-term  Reactive  Piece-meal  Unsustainable
PART II

PLANNING PROCESS
Land Use Transport Plans

Land Use Plan / Master Plan
- Guides and regulates urban development
- Addresses planning issues

City Development Strategy
- Identify, prioritize & implement infrastructure projects
- Financing strategies for projects

Transportation Plans (CTTS/CMP)
- Long term Transportation plan
- Focuses on identifying projects/programmes related to mobility needs and reducing congestion levels
Issues arising as a result of Multiple organisations

Land use planning and zoning
(Under respective T&CP Acts)

- Development Authorities
- Municipalities
- Town & Country Planning Agency

Transportation planning

Multiple agencies (Urban Roads, Public Transport, Railways, Metro, Traffic Management)
- National, State level, Local level

Lack of coordination
Sustainability - Two Key Questions

- How to structure the growth?
  - Land use Planning
  - A Statutory Process
  - Town Planning & Urban Development Act

- How to organise mobility? Build Connections between activities and people?
  - Transport /Mobility Plans
  - Not Statutory/Adhoc basis

- Planned as two separate systems!!
Integrated Land Use Transport

- **Land Use Planning Framework - Statutory**
  - Land Use Plans with an objective to protect environmentally sensitive lands provides for a spatial framework for future urban expansion (to create livable communities)

- **Plan Elements**
  - Location & Intensity of Land Use – Plan/Map
  - A set of DC Regulations – FSI, Zoning, Setbacks,…

- **Issues**
  - Takes a long time to prepare; Revisions – once in 10 years ?
  - Lack integration – economic development, environment, urban poor/Informal activities & of course transport also gets missed out
  - Focus on New Developments – Not on Renewal
  - Road Networks form a part
  - Levels ? Regional – Urban – Local/Rural
  - Practice – Stagnant; Norms/standards - basis ; Not Strategic

MORE OFTEN PLANNING – NOT MORE DETAILED PLANNING
Integrated Land Use Transport

Urban Transport Planning Framework – Not statutory

- Content
  - PREDICT & PROVIDE & NOT Strategic
  - Future is uncertain but process is:
    - Data Hungry – ‘Technical – Deterministic’
    - Vehicle Centric - Capacity Focus - PCU & PHPDT !!!!
    - Speeds - Mobility Focus
  - Focus on Vehicles & not on people & Goods
  - Inputs & Outputs – Not Outcomes
  - Projects & Not Strategies
  - Investment Focus – Not Management
  - Big Ticket Projects - Mode bias – Affordability?
  - Driven by Funding /Donor /Technology Provider
  - Takes Land Use as Given – Generated Traffic – Ignored
  - Usually unrealistic

From CTTS → CMP → IULUT

What we need is Access; Mobility of People & Goods
LAND USE & TRANSPORT INTER RELATIONSHIPS

Transport

Land use

Environment

Public transport
IPT
NMT
Multi-modes
Modal Integration

Density
Mixed use
Urban Form
Streets
Public spaces

Air
Water
Land
What are the key elements of integration?

- **Enabling Urban Structure**
- **Complete Networks and Complete Streets**
- **Strategic Alignments**
- **Transit Oriented Development & Value Capture**
- **Integrated Multimodal Transit & Interchange Facilities**
- **Accessibility Improvements - Local Area Plans**
- **Re-development and Re-vitalization**
Impact on Environment

CO₂ emissions (in tons)

Base Year 2011

Future Projection

Proactive Scenario               BAU                                Unmanaged Scenario

30027                           43829

28576                           71941
Plans and Process – London,

**London Plan**
- Long term plan (20 years)
- Lead Agency: GLA

**Transport Strategic Goals**
- Support economic and population growth.
- Enhance quality of life of Londoners.
- Reduce transport contribution to Climate.
- Improve transport opportunities to all Londoners

**Spatial Strategic Plan:**
- Challenges of economic and population growth.
- Accessible neighborhood.
- World leader in improving the environment.
- Easy, safe and convenient access of jobs and opportunities.

**Mayor’s Transport Strategy**
- Long term plan (20 years)
- Lead Agency: GLA and TfL

**Economic Development Strategy**
- Long term plan (20 years)
- Lead Agency: GLA

**Transport Strategic Goals**
- Support economic and population growth.
- Enhance quality of life of Londoners.
- Reduce transport contribution to Climate.
- Improve transport opportunities to all Londoners

**Economic Strategic Plan:**
- Promote London as a world capital business centre
- Most competitive business environment.
- World’s leading low carbon capital
- Investment in infrastructure and transport.
**MTS Assessment Process – London,**

**Mayor’s Transport Strategy**

**Mayor's Transport Strategy Integrated Impact Assessment**

**Key Areas of Assessment:**
1. Strategic Environmental Assessment (SEA)
2. Health Impact Assessment (HIA)
3. Equity Impact Assessment (EqIA)
4. Assessment of Economic Impacts (AEI)
5. Habitats Regulation Assessment screening exercise (HRA screening).

- **Overview of MTS**
- **Review of Plans, Strategies and literatures**
- **Base line Evidence**
- **Identification of Key Issues**
- **Stakeholder Consultation**
- **Assessment of MTS by forming Objectives against key issues**
Plans and Process - Singapore

Concept plan

- Long term plan (30 - 40 years)
- Lead Agency: URA (Urban Redevelopment Authority),
- Supporting Agency: HAD (Housing Development Dept), JTC (Industry & Developers), National Environment Agency

Land Transport Master Plan

- Medium term plan (10 -15 years)
- Lead Agency: LTA (Land Transport Authority),
- Supporting Agency: PTC (Public Transport Council)

Strategic thrust:
- Making public transport a mode choice.
- Managing Road usage
- Meeting the diverse needs of the people

Physical development
- Economic development opportunities
- Physical connectivity
### Plans and Process - Ahmedabad

**Gujarat Town Planning & Development Act 1976**
- Guideline document for planning and development
- Spatial Framework

**Development plan**
- Long term plan (20 years)
- Lead Agency: AUDA (Ahmedabad Urban Development Authority),
- Supporting Agency: AMC, Roads & Building department,
- Land use & Economic development centres (CBD, TOD etc.)
- Housing (EWS, Affordable housing etc.)
- Public transportation & TOD
- Social infrastructure development
- Local area access plan & Green Network

**Town Planning Scheme (TPS)**
- Land use management at micro level
- Road network hierarchy & good quality balanced built form.
- Control on development through FAR & regular shapes of the plots.

**Integrated Mobility Plan**
- Medium term plan (20 years)
- Lead Agency: AUDA (Ahmedabad Urban Development Authority),
- Supporting Agency: AMC, R&B, GIDB, AMTS, AJL, Western railway
- Integrated land use – transport infrastructure
- Efficient movement of people & goods
- Sustainable & safer transport focussing on NMT & PT.
PART - II

DECISION AREAS
Key Decision Areas

1. Our cities are growing cities. How do we organize growth over space?
   - Compact Cities are Resource Conservation Cities
2. How do we organise distribution of land uses?
   - Mixed land use, strategically aligned with transit
3. How do we connect activities distributed over space?
   - Complete network, complete streets
4. How do we shift focus from moving of vehicles to people and goods?
   - Mode focus to system focus, Rail focus to hierarchical continuum focus
   - Also on overcoming the last/first mile?
Population and employment projections -

- **High**,
- **Low growth Scenarios**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>GUJARAT POPULATION (Million)</th>
<th>Moderate Growth Scenario GREATER AHMEDABAD (Million)</th>
<th>High Growth Scenario GREATER AHMEDABAD (Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>50.67*</td>
<td>6.47</td>
<td>6.56</td>
</tr>
<tr>
<td>2006</td>
<td>54.98</td>
<td>7.28</td>
<td>7.53</td>
</tr>
<tr>
<td>2011</td>
<td>59.02</td>
<td>8.09</td>
<td>8.64</td>
</tr>
<tr>
<td>2016</td>
<td>62.83</td>
<td>8.93</td>
<td>9.80</td>
</tr>
<tr>
<td>2021</td>
<td>66.14</td>
<td>9.74</td>
<td>10.96</td>
</tr>
<tr>
<td>2026</td>
<td>69.26</td>
<td>10.38</td>
<td>11.77</td>
</tr>
<tr>
<td>2031</td>
<td>72.18</td>
<td>11.02</td>
<td>12.59</td>
</tr>
</tbody>
</table>

*Source: Census 2001, Projections CoE-UT Cept University*
Ideal Density ??

- It is now accepted that higher densities are more efficient and sustainable than very low densities.
- However, the desirable density is contextual – cultural, social, economic, climatic, ecological.
- Density in different parts of the city can and should be different.
How much to densify: Density Versus Investment

Projected Population of 1.25 Cr for greater Ahmedabad Region by 2031

Case of Ahmedabad

INR 2000 Crores/yr
Density - 150 persons/ha
Area - 666 sqkm

INR 3000 Crores/yr
Density - 125 persons/ha
Area - 800 sqkm

INR 4500 Crores/yr
Density - 100 persons/ha
Area - 1000 sqkm

INR 6075 Crores/yr
Density - 75 persons/ha
Area - 1333 sqkm
How big will the city grow in future?

Densities around the world

Low
- Atlanta 6
- Houston 11
- Portland (Oregon) 14
- Chicago 16
- San Franc. Bay 16
- San Francisco 19
- Washington metro 21
- Los Angeles 22
- Capetown 32
- Stockholm 36
- Berlin 36
- Toulouse 38
- New York 40
- Liubliana 46

Moderate
- Abidjan (Jac. Metro) 51
- Johannesburg 53
- Marseille 53
- Curitiba 54
- Brasilia 55
- Bangkok 58
- London 62
- Budapest 63
- Riga 64
- Cracow 65
- Buenos Aires 66
- Warsaw 67
- Prague 71
- Paris 88
- Sofia 94
- Mexico City 96
- Rio de Janeiro 101
- Tunis 102
- Singapore 107
- St Petersburg 121
- Jakarta Municip. 127
- Ahmedabad 134
- Abidjan 143
- Beijing 145
- Teheran 146
- Yerevan 168

High
- Barcelona metro 171
- Moscow 182
- Bangalore 207
- Hyderabad 223
- Tianjin 230
- Seoul +new towns 282
- Shanghai 286
- Seoul 322
- Guangzhou 367
- Hong Kong 365
- Mumbay (Bombay) 389

Very High

Population Density (people/hectare)

Source: "Order Without Design" Alain Bertaud, 2003
1. Our cities are growing cities. How do we organize growth over space?

<table>
<thead>
<tr>
<th>Decision Areas</th>
<th>Impact of density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth Scenarios- Projections</td>
<td>City Size and structure</td>
</tr>
<tr>
<td>Ideal Density</td>
<td>Trip length &amp; Mode</td>
</tr>
<tr>
<td>Density Vs Investment</td>
<td>Infrastructure lengths &amp; Cap &amp; Operating costs</td>
</tr>
<tr>
<td>Land assessment</td>
<td>Environmental implications</td>
</tr>
</tbody>
</table>

- **Compact Cities are Resource Conservation Cities**
- **Compact cities less expensive to build and operate**
Decision Making Process

1. How big will the city grow in future?

2. How do we organise distribution of land uses?
   - Mixed land use, strategically aligned with transit
   - Enabling Urban Structure
   - Strategic Alignment

- CITIES – CITY REGIONS
- CITY STRUCTURE
Where do we organise forecasted growth?

**URBAN LEVEL PLANNING - Case of Small cities and Parent city**

**Step 1:** Identification of existing and potential activity nodes as sub-centres to encourage *polycentric development*

**Step 2:** Strengthening the identified sub-centres by:
- Increasing density, FSI etc
- Enhancing activity and mixed use

Hence *activities redistributed* across the sub-centres will enable reduction in travel demand, trip lengths etc
Where do we organise forecasted growth?

**Enabling Urban Structure – Case of Ahmedabad**

- Corridors
- Nodes
- Hybrid
Curitiba: Strategic Alignment & TOD

Integrating transit with high density – Landuse and transport integration

The BRT corridors are zoned for 10 to 20 story buildings on either side of the BRT avenues, with 4 to 7 story buildings on adjacent blocks.
Curitiba: Strategic Alignment & TOD

- Integrating transit with land developments.

**high speed**

center - neighborhood

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central lane:
exclusive bus lanes neighborhood - center
local streets:
low speed circulation - cars
Beyond 250 m
2.75 FSI

150 m
3 FSI

100 m
4 FSI

45-60 m
BRT corridor

100 m
4 FSI

150 m
3 FSI

Beyond 250 m
2.75 FSI
Singapore: Strategic Alignment & TOD

- Integrating Transit with Housing

Source: Mohinder Singh, LTA Academy Singapore)
Decisions to be taken at City Level

- **High densities around transit stations** (Curitiba)
- **Mixed land use** (Stockholm)
- **Pedestrian friendly and walkable neighborhoods**
  - Stockholm
  - Hong Kong
- **Provides multiple transportation choices by multimodal integration** (Singapore)
- **Implement policy & strategies for land value capture**
  - (Singapore - Authority generated fund by selling development rights under the Government Land Sales (GLS))
Influence area of interchange nodes

Station area
- Station Access
  - Supporting Surrounding Activities

Primary Catchment Area
- Within walking distance to station
- Influence on landuse and densities

Secondary Catchment area
- Influence on transit ridership

Influence area for interchange nodes.

<table>
<thead>
<tr>
<th>Level</th>
<th>Core station area (sqm)</th>
<th>Primary catchment area</th>
<th>Secondary catchment area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>40,000-160,000</td>
<td>500 m radius</td>
<td>1000 m radius</td>
</tr>
<tr>
<td>Level 2</td>
<td>30,000-70,000</td>
<td>250-450 m radius</td>
<td>500-750 m radius</td>
</tr>
</tbody>
</table>
Benchmarking - SINGAPORE

- ERP is a congestion management tool
- Pay-as-you-use principle
- Review speed range at 3-month interval, adjust ERP rates

**Arterial Roads**
- Increase ERP rate: 20 kph
- Decrease ERP rate: 30 kph

**Expressways**
- Increase ERP rate: 45 kph
- Decrease ERP rate: 65 kph
Benchmarking - SINGAPORE

- Implemented in 1990
- Mechanism to regulate vehicle population
- Certificate of Entitlement (COE) – valid for 10 years
- Open tender – twice a month

---

**OCTOBER 2004 1st Open Bidding Exercise has ended on 06/10/2004 16:00 hrs**

<table>
<thead>
<tr>
<th>Category</th>
<th>Quota</th>
<th>OP($)</th>
<th>POP($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A  Car (1600cc &amp; below) &amp; Taxi</td>
<td>2,523</td>
<td>23,001</td>
<td></td>
</tr>
<tr>
<td>B  Car (Above 1600 cc)</td>
<td>1,145</td>
<td>23,001</td>
<td></td>
</tr>
<tr>
<td>C  Goods Vehicle &amp; Bus</td>
<td>678</td>
<td>6,300</td>
<td></td>
</tr>
<tr>
<td>D  Motorcycle</td>
<td>507</td>
<td>652</td>
<td></td>
</tr>
<tr>
<td>E  Open</td>
<td>1,340</td>
<td>22,000</td>
<td></td>
</tr>
</tbody>
</table>

QP: Quota Premium
PQP: Prevailing Quota Premium
Decision Making Process

1. How big will the city grow in future?
2. Where and how do we organise forecasted growth?
3. Networks
   - Complete network, complete streets
     - Complete Network & Complete Street
     - Transit Oriented Development
     - Integrated Multimodal Transit Interchange Facility
Road network – Complete Networks

Hyderabad

- Missing links in intermediate ring
- Only higher level roads proposed

33 Minutes City
Average Trip Length- 13.7 Km
Average Speed- 24 KMPH

Ahmedabad

- All rings are complete
- Radials are clearly visible
- Road network detailed till 3 levels

16 Minutes City
Average Trip Length- 8.4 Km
Speed- 31 KMPH
Decisions to be taken at City Level

CITY LEVEL PLANNING

Road Hierarchy
1. Arterial roads
2. Sub-arterials
3. Collectors
4. Distributers
5. Local

Transit Ready Streets
Higher priority to public transport and NMT

Complete Streets
- Safety
- Vending Activity
- Accessibility
- Equility
- Sensitivity to local context
Definition

In case of Ahmedabad, Level 1 roads are the roads which take care of primary traffic movement in and out of the city.

- **4 rings** (SP ring road, 132’ ring road, University road ring, walled city and CG road ring)
- **2 Orbital roads** running North - South on the west and east side of the city namely SG highway and Narol-Naroda highway,
- **14 Urban radials** which consist of sections of the 14 Regional Radials as it enters the urban developable boundary and connects to the city core,
- 5 other Radial roads within the city which does not continue as Regional radials, but has a strong radial alignment within the developable boundary and acts as an efficient urban arterial, functionally.

<table>
<thead>
<tr>
<th>Category - Level 1</th>
<th>Road network Lengths (km) in delineated area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>417 Km</td>
</tr>
</tbody>
</table>
Road Network Classification - Ahmedabad

**Definition**

- All radials and rings that are 50% complete
- Radials which are having length less than half of the city (in case of Ahmedabad, radials not originating from walled city connecting straight to SP ring road)
- Long roads (roads having lengths of approximately half or three quarter length to the city size)
- Major district roads & Other district roads
- Roads, which are further dissecting level 1 roads and form grids or pattern

**OR**

Roads that have right of way
- Category I cities: >24m - 36m
- Category II cities: >15m-18m

### Road network Lengths (km) in delineated area

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 roads</td>
<td>417</td>
</tr>
<tr>
<td>Level 2 roads</td>
<td>335</td>
</tr>
<tr>
<td>Total</td>
<td>752</td>
</tr>
</tbody>
</table>
### Road Network Classification - Ahmedabad

#### Definition

<table>
<thead>
<tr>
<th>Level 3</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Roads that connect level 1 and level 2 roads</td>
<td></td>
</tr>
<tr>
<td>• Roads that further create smaller grids</td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>• Roads that have right of way</td>
<td></td>
</tr>
<tr>
<td>• Category I &amp; II cities: &gt; 9m</td>
<td></td>
</tr>
</tbody>
</table>

### Lengths of the road network within delineated area (km)

<table>
<thead>
<tr>
<th>Type</th>
<th>Length (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 roads</td>
<td>417</td>
</tr>
<tr>
<td>Level 2 roads</td>
<td>335</td>
</tr>
<tr>
<td>Level 3 roads</td>
<td>485</td>
</tr>
<tr>
<td>Total</td>
<td>1237</td>
</tr>
</tbody>
</table>
Road Network Classification- Ahmedabad

**Description**
- Roads that connect to residential units.
- Roads that have right of way < 9m

<table>
<thead>
<tr>
<th>Category</th>
<th>Road network Lengths (km) in delineated area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>417</td>
</tr>
<tr>
<td>Level 2</td>
<td>335</td>
</tr>
<tr>
<td>Level 3</td>
<td>485</td>
</tr>
<tr>
<td>Level 4</td>
<td>1374</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2612</strong></td>
</tr>
</tbody>
</table>
Decision Making Process

1. How big will the city grow in future?
2. Where and how do we organise forecasted growth?
3. Networks
4. How do we shift focus from moving of vehicles to people and goods?
   - Single Mode focus to system focus,
   - Rail focus to hierarchical continuum focus
   - Also on overcoming the last/first mile?
     - Revitalization of city centre/Accessiblity improvement
Transit Investment Paradox!!!!!!
London: Transport Time Line

- **1830**: Horse drawn buses started.
- **1854**: Metropolitan Railway granted powers to construct U.G. rail.
- **1855**: LGOC was founded to operate buses on road.
- **1871**: Brill Tramway open between Quainton' road and wood siding.
- **1879**: Zonal fare and travel card launched.
- **1900**: First time motororised bus started operating.
- **1929**: Griffith Act receives Royal Assent.
- **1951**: Milton Friedman brings the idea of congestion pricing.
- **1975**: 1st section of Piccadilly Line extension to Heathrow opens.
- **1981**: GLC introduces fares fair policy to subsidies local rates.
- **1984**: London Regional Transport Act receives Royal Assent.
- **1994**: Croydon Tramlink Act receives Royal Assent.
- **2000**: Local councils allowed to bring in Congestion Charge
- **2001**: Tram network extended
- **2002**: LRT Board approves PPPs. Dec. PPP contract signed with Tube Lines
- **2003**: London Underground Ltd transfers to TfL. Started Oyster Card (Smart card) through PPP
- **2004**: Construction of cross rail started to give connectivity through city centre
- **2008**: Piccadilly line extends to Heathrow airport
- **2009**: Construction of cross rail started to give connectivity through city centre
- **2010**: East London Line 1 & 2 started as part segregated BRTS by replacing Bus routes.
- **2010**: East London Line 1 & 2 started as part segregated BRTS by replacing Bus routes.
- **2011**: Tram network extended
- **2012**: London: Transport Time Line

Population

- 1.6m New Londener(s)
- Population (GLA): 81.73 lakhs
- Population Density: 52 ppha
- Cars/1000 pop: 163

Employment

- 0.6m New Jobs
- Metro Network: 402 km, 3.21 Million Ridership
- BRTS Network: 20 km, 0.01 Million Ridership
- Bus Network: Approx 900 Buses, 0.63 Million Ridership
Tubes (Metro) - 150Yr old
11 lines, 405 kms,

Rail
86 kms,
2 Lakh passengers

DLR
34 kms,
3Lakh Passengers

Tram
27.35 kms,
79,600 passengers

Ferry
11.26 kms

Buses
7500 buses,
60 Lakh passengers

Extensive Video
Monitored Bus Lanes

Population (City): 78 Lakh.
Pop. Density: 50 PPH
PT Share: 59%

Congestion Relief:
Congestion Charges & Public Transport Development
In February 2007, the Congestion Charging zone was extended westwards to cover a further 19 square kilometres, including most of Kensington & Chelsea and Westminster.

The extended Congestion Charging scheme operated as one zone, with the same charges, discounts and exemptions applying no matter where you drive in the zone.

This zone of influence area or 'Complementary Measures' area was determined by examining a series of major traffic junctions up to 3 miles from CC zone boundary.

TfL worked with local borough councils to ensure that the area immediately outside the Congestion Charging boundary was covered by CPZs (Controlled Parking Zone) where parking was permitted solely by local residents and businesses.

Source: Transport for London (TfL), 2014
**Bogota BRT System – FULL BRTS**

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route Length operational</td>
<td>84km</td>
</tr>
<tr>
<td>BRTS Stations</td>
<td>114</td>
</tr>
<tr>
<td>Daily Ridership</td>
<td>1,650,000</td>
</tr>
<tr>
<td>Bus Capacity</td>
<td>140 /210</td>
</tr>
<tr>
<td>System Capacity</td>
<td>45,000 pphpd currently</td>
</tr>
<tr>
<td>System Speed (avg.)</td>
<td>28.0 kmph</td>
</tr>
</tbody>
</table>
BOGOTA - PT modes

Transmilenio
- Transmilenio BRT
- Transmilenio Feeder

Integrative Public Transport system (SITP)
- Urbano
- Supplymentary
- Special

Private
- Collectivos
- Collectivos
Chonggye-cheon Restoration

Before

After
PART - III

BARRIERS
Barriers to Land use Transport Integration

Lack of Inter jurisdictional Coordination

- Biggest barrier in success of strategies
- Between organisations - conflict of interest
- Vertical conflict - Higher and lower level organisation eg. Municipal corporation and Development Authority
- Horizontal conflict - between two same level organisations e.g. two or more development authorities.
- Between different organisations - Landuse and transport authority

Legal Barriers

- Lack of powers or divided responsibilities for implementing land use transport integration strategies

Financial barriers

- Budget restrictions on total expenditure for implementing a strategy
- Limitations on the flexibility with which revenue instruments can be used to acquire land or invest in public transport infrastructure.

Political Barriers

- Public or pressure group opposition to certain policy instruments such as road pricing or land use regulations
Barriers to Land use Transport Integration

**Practical barriers/ technological**

- Lack of tools, methods and/or skills needed to deliver Integrated landuse transport strategies - i.e. moving away from ‘transport engineering’ solutions

**Plan conflicts**

- Barriers to integration can be created where land use and transport plans provide conflicting objectives, policies and implementation mechanisms.

**Professional conflict**

- Direct conflicts between land use planning and transport planning professionals or departments create another barrier to integration.
High Density

Congestion

Spread out

Free Mobility

Thank You....