1.a. City TOD Report

Bogota D.C. (Capital District), Capital of Colombia, is located in the center of Colombia, on the Bogotá Savanna, a plateau of the mountains of Los Andes, at an average 2,600 meters above sea level.

City population as percentage of Country's population: 16, 3%

Population: 7’966,832 Inhabitants

Administrative division 20 localities:

Table 1. Main factors

<table>
<thead>
<tr>
<th></th>
<th>Hectares</th>
<th>Square Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface</td>
<td>163,663</td>
<td>632</td>
</tr>
<tr>
<td>Urban area</td>
<td>38,431</td>
<td>148</td>
</tr>
<tr>
<td>Expansion area</td>
<td>2,974</td>
<td>12</td>
</tr>
<tr>
<td>Rural area</td>
<td>122,258</td>
<td>472</td>
</tr>
</tbody>
</table>

Table 2. Urban area. Localities and blocks areas. Source: SDP

<table>
<thead>
<tr>
<th>Localidad</th>
<th>Área total (ha)</th>
<th>Área suelo urbano (ha)</th>
<th>Manzanas suelo urbano</th>
<th>Área manzanas suelo urbano (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Usoaquén</td>
<td>6,531,6</td>
<td>3,525,1</td>
<td>2,417</td>
<td>2,525,2</td>
</tr>
<tr>
<td>2 Chapinero</td>
<td>3,815,6</td>
<td>1,307,9</td>
<td>1,078</td>
<td>954,8</td>
</tr>
<tr>
<td>3 Santa Fe</td>
<td>4,517,1</td>
<td>606,4</td>
<td>778</td>
<td>506,9</td>
</tr>
<tr>
<td>4 San Cristóbal</td>
<td>4,908,9</td>
<td>1,649,0</td>
<td>2,951</td>
<td>1,231,5</td>
</tr>
<tr>
<td>5 Usme</td>
<td>21,206,7</td>
<td>2,120,7</td>
<td>3482</td>
<td>1,738,4</td>
</tr>
<tr>
<td>6 Tunjunto</td>
<td>59,9</td>
<td>991,1</td>
<td>848</td>
<td>651,5</td>
</tr>
<tr>
<td>7 Boiso</td>
<td>2,393,3</td>
<td>1,832,6</td>
<td>3258</td>
<td>1,375,5</td>
</tr>
<tr>
<td>8 Kennedy</td>
<td>3,859,0</td>
<td>3,006,4</td>
<td>4801</td>
<td>2,006,6</td>
</tr>
<tr>
<td>9 Fontibón</td>
<td>3,328,1</td>
<td>3,052,8</td>
<td>1,643</td>
<td>2,475,4</td>
</tr>
<tr>
<td>10 Engativá</td>
<td>3,588,1</td>
<td>3,439,2</td>
<td>4,044</td>
<td>2,555,5</td>
</tr>
<tr>
<td>11 Suba</td>
<td>10,050,9</td>
<td>5,600,7</td>
<td>4,882</td>
<td>4,473,8</td>
</tr>
<tr>
<td>12 Barrios Unidos</td>
<td>1,190,3</td>
<td>1,190,3</td>
<td>1,224</td>
<td>802,6</td>
</tr>
<tr>
<td>13 Teusaquillo</td>
<td>1,419,3</td>
<td>1,419,3</td>
<td>1,029</td>
<td>991,2</td>
</tr>
<tr>
<td>14 Los Mártires</td>
<td>65,1</td>
<td>651,4</td>
<td>707</td>
<td>433,2</td>
</tr>
<tr>
<td>15 Antonio Nariño</td>
<td>488,0</td>
<td>488,0</td>
<td>601</td>
<td>326,9</td>
</tr>
<tr>
<td>16 Puente Aranda</td>
<td>1,731,1</td>
<td>1,731,1</td>
<td>1,089</td>
<td>1,156,6</td>
</tr>
<tr>
<td>17 La Candelaria</td>
<td>208,9</td>
<td>208,9</td>
<td>185</td>
<td>162,9</td>
</tr>
<tr>
<td>18 Rafael Uribe</td>
<td>1,383,4</td>
<td>1,383,4</td>
<td>2,880</td>
<td>911,7</td>
</tr>
<tr>
<td>19 Ciudad Bolívar</td>
<td>13,000,3</td>
<td>3,213,8</td>
<td>5,593</td>
<td>2,525,5</td>
</tr>
<tr>
<td>20 Sucre</td>
<td>78,096,9</td>
<td>78,096,9</td>
<td>78,096,9</td>
<td>32,848,4</td>
</tr>
</tbody>
</table>

Bogotá D.C. is city in Colombia with the largest number of universities, most of them are located at downtown area, the city has important cultural offer, represented in many museums, theaters and libraries. Bogotá city have 52th place in the Global Cities Index 2014 and, considered a global city type "Beta" by GaWC.
Transport

Bogotá’s Mobility System has three subsystems:

- First, Pathways subsystem: Arterial, Intermediate, Local, Rural and, Intersections
- Second, Transport subsystem: Integrated Public Transport System (sITP); Non-motorized Transport; Transport by private vehicle; Freight and Cargo, Public Parking; Modal Interchanges and, Equipment Support SITP
- Third, Traffic Regulation and Control subsystem: Traffic Control Centers; Traffic Light Network; Set of special devices and, Toll network

Bogota Mobility is characterized by congestion. Most of the vehicles on the way are private and taxis.

However, the main transport system involves buses, Public Integrated Transport System (SITP), has a of coverage 12.5 %; travels/ day: 1’730,000 and, speed BRT : 26.06 -11.92 km/h

Main streets and avenues along the city support a BRT (Bus Rapid Transit) system, named TransMilenio, with articulated and bi-articulated buses that ride on exclusive ways.
Other buses, with different types and capacity, arrive from residential neighborhoods in order to feed the main system.

Bogota moving average is 67 minutes, according to the study *DNP warns that mobility looming collapse in major capitals* (*Planning National Department*)

**Table 3. Bogotá’s transportation cost. Source: ERU**

<table>
<thead>
<tr>
<th>Cost of Transportation</th>
<th>Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-way Ticket (Local Transport)</td>
<td>0,76 USD$</td>
</tr>
<tr>
<td>Monthly Pass (Regular Price)</td>
<td>30,4 USD$</td>
</tr>
<tr>
<td>Taxi Start (Normal Tariff)</td>
<td>1,3 USD$</td>
</tr>
<tr>
<td>Taxi 1km (Normal Tariff)</td>
<td>1,3 USD$</td>
</tr>
<tr>
<td>Taxi 1hour Waiting (Normal Tariff)</td>
<td>6 USD$</td>
</tr>
<tr>
<td>Gasoline (1 liter)</td>
<td>0,9 USD$</td>
</tr>
</tbody>
</table>

**BIKE PATHS**

Non-motorized transportation is Transport systems based on the bike, the improvement of public space and the integration and intermodal bicycle and pedestrian with other means of transport. Bike travels/ day: 450,000 that mean coverage of 3.8 % with average speed of 19.7 km/h

Facing automotive vehicular congestion, the city has established a considerable network of bicycle paths and exclusive lanes, around 376 km (234 miles).

Every Sunday and holydays, nearby 121 kilometers (75 miles) of urban roads became in bikeways instead of particular streetcar tracks.
ELDORADO INTERNATIONAL AIRPORT

**Eldorado International Airport** is located on the west side of the city. Its central location in Colombia and in Latin America, turn it as a services hub for a number of national and international airlines.

**Eldorado** International Airport has the largest volume of cargo transported in Latin America, and is second in number of people.

Travels demand is approximately **27 Million passengers per year.**

LAND USE AND ACTIVITIES

Bogota is the center of **political, economic, administrative, industrial, artistic, cultural, sports and tourist destination** of the country.

Among other important national and local agencies, there is the Office of the President, Congress, Supreme Court of Justice, Office of the Principal Mayor and City Council.

Bogota is also a city of services: **Universities, headquarters of banks and financial institutions, museums, hotels, hospitals, etc.**

As well, Bogota is the largest business platform of Colombia where most high-impact projects take place.

ECONOMY

Bogotá is the main market of Colombia and the Andean natural region, and the leading destination for new projects of foreign direct investment coming into Latin America and Colombia.

It has the highest nominal GDP\(^1\) in the country, contributing most to the national total (24.7%), and it is the seventh largest city by size of GDP in Latin America (about USD 159,850 million).

Global companies are attracted by its economic strength associated financial maturity, with facilities to create companies and do business and the quality of its human capital.

Table 4. GDP growth

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\(^1\) [http://colombiareports.com/bogota-economy-statistics/]
NATIONAL FRAMEWORK

Colombia is going on demobilization of paramilitary and rebels groups, Justice and Peace Law, Victims’ Law, and peace talks with the FARC; Colombia continues to endure the longest internal armed conflict in the Western hemisphere. The conflict involves many actors and interests, and is a product of political issues, social and economic tensions, and competition for resources.

This phenomenon affects the displacement of populations to the cities and the need for development of residential areas and jobs. Vice-president of the republic supports the development of housing projects in Bogota and nearby towns.

2. TOD overview

Bogota makes its TOD methodology through the development of studies and documents focused on a contribution to climate change as much as building infrastructure and transport environmentally sustainable.

TOD progresses from diagnostic documents, bounding opportunity areas associated to interventions of road infrastructure and transport.

Therefore, TOD lines for intervention are based on the mobility components, urban territory, social, environmental and economics.

Lately Urban Planning settled by those six documents:

2. TOD Methodology
3. Study cases: TOD diagnostics for 11 priority urban areas.
4. Study cases: TOD Formulation of proposals for 5 priority urban areas.
5. TOD social management strategy.

Vision

Bogota is going to leader application of TOD methodologies in some projects of urban renewal, in order to bind the development of infrastructure and transport to the design of quality urban environments that promote alternative transportation means.

Objectives

- Evaluate directions to public transport projects that contribute to urban development.
- Evaluate projects in the planning and design phases to identify areas of opportunity.
- Guide policy and relevant advices to urban planning, transport, land use, urban design and parking regulations.
Ongoing TOD projects

Urban Renewal Enterprise (ERU) is trying out TOD application in some urban renewal areas:

Figure 3. San Victorino project TOD application

TOD TRANSIT ORIENTED DEVELOPMENT
SAN VICTORINO MALL TOD APPLICATION

SAN VICTORINO INTERNATIONAL TRADE MALL.
Comprehensive project that seeks to strengthen business center with real estate and commercial alternatives for economic groups in the sector.

Figure 4 Central Station project TOD application

TOD TRANSIT ORIENTED DEVELOPMENT
CENTRAL STATION TOD APPLICATION

CENTRAL STATION links the construction of a transfer station that integrates three (3) Transmilenio Lanes (Av Caracas, Calle 26 and Carrera 10.) And connection to the First Metro Line Station; it uses a real estate development with housing, commerce and services.
Name of City: BOGOTA, COLOMBIA

| Name: EDUARDO AGUIRRE MONROY  
| Organization or Department: Urban Renovation Company (ERU) of Bogota  
| Title: TODS BOGOTA  
| (brief introduction)  
| Road Infrastructure, Transport and Urban Renewal Projects:  
| An approach from TOD methodology developed in Bogota and applied in two projects or Urban Renewal. |
Attachment III

DOCUMENT/VIDEO RELEASE AGREEMENT

<table>
<thead>
<tr>
<th>Title of the Program:</th>
<th>TOD Deep Dive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person responsible for the materials:</td>
<td>The World Bank Tokyo Development Learning Center</td>
</tr>
<tr>
<td>Date:</td>
<td>16-21 May 2016</td>
</tr>
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</table>

I hereby grant permission to the World Bank to reuse documents submitted for the TOD Deep Dive mission, interviews or any other knowledge capture to be created during the mission, for the CoP TOD portal and other related activities.

<table>
<thead>
<tr>
<th>Participant Name in Print</th>
<th>EDUARDO AGUIRRE MONROY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Signature:</td>
<td></td>
</tr>
<tr>
<td>Signed Date</td>
<td>April 18, 2016</td>
</tr>
</tbody>
</table>

Background papers:

- City Case Presentation (7 slides)
City Transit Oriented Development (TOD) Report and Background Papers

CAPE TOWN
1. CAPE TOWN: AN OVERVIEW

Cape Town’s urban form and structure is characterized by a dispersed development patterns and inequitable access costs for many of its users. In part, this can be attributed to segregated apartheid planning, but more recently has become a trend exacerbated by socio-economic reality. Population and residential densities in many of the formally developed areas of the City remain extremely low by international standards and access is further constrained by mountain and sea. This has led to the development of poorer residential communities in locations far away from employment and opportunities, making the cost of providing and using a high quality public transport unsustainable (for the City and households).

The contributing factors to this dilemma include:
• A radial transport network
• Historical spatial planning and socio economic engineering which has resulted in;
  • The majority of the urban poor residing in remote areas
  • Dispersed communities with no economic base and with little development between them.
  • The separation of land uses and long distances between places of work and residence.

The City of Cape Town has attempted to address many of these factors through sound development policy and key projects targeted at achieving a sustainable form of development and address past injustices through improved urban, environmental and socio-economic efficiencies.

1.1. Transport Profile

**Commuting Patterns**

40 percent of the population rely on public transport:

- 40% by Rail
- 37% by Taxis
- 22.7 by Bus
Cape Town Transport Network: Radial Pattern

Legend
- - - - IRT Trunk Network
----- IRT Feeder Network
--- Railway Network
- Freeway
- Expressway
- Primary Arterial
- Secondary Arterial
- Local Roads & Streets
- Central Business District
- Cape Town International Airport
- Cape Town Municipal Area

Cape Town Transport Network
August 2013
Cape Town: Overview

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metropolitan area:</td>
<td>2,455km$^2$</td>
</tr>
<tr>
<td>Resident population (2014):</td>
<td>3,918,830</td>
</tr>
<tr>
<td>Estimated percentage of population who rely on public transport:</td>
<td>52%</td>
</tr>
<tr>
<td>Total passengers across all modes:</td>
<td>2,528,000 per day</td>
</tr>
<tr>
<td>Total length of passenger rail network:</td>
<td>610km</td>
</tr>
<tr>
<td>Total length of dedicated BMT and bus lanes:</td>
<td>58km</td>
</tr>
<tr>
<td>Total length of dedicated BRT median busways:</td>
<td>32km complete, 27.3km operational</td>
</tr>
<tr>
<td>Rail stations:</td>
<td>118</td>
</tr>
<tr>
<td>BRT stations (enclosed):</td>
<td>42</td>
</tr>
<tr>
<td>Signalised intersections:</td>
<td>1180</td>
</tr>
<tr>
<td>Signalised pedestrian crossings:</td>
<td>288</td>
</tr>
<tr>
<td>Population growth:</td>
<td>Rising by about 22.6% between 2002 and 2014</td>
</tr>
<tr>
<td>Number of informal dwellings:</td>
<td>142,964</td>
</tr>
<tr>
<td>Unemployment rate:</td>
<td>Rising at an average of 24.9% per annum for the period 2012 to 2014, practically in the age group 15 - 24 years</td>
</tr>
<tr>
<td>Total length of City roads:</td>
<td>9836 km (2008) (estimated 2015 - 11,700km)</td>
</tr>
<tr>
<td>Total length of City stormwater network:</td>
<td>9,836km (2008) (estimated 2015 - 11,700km)</td>
</tr>
<tr>
<td>Cost of upgrading/rehabilitating all &quot;poor&quot; and &quot;very poor&quot; residential roads:</td>
<td>R12.2 billion over 15 years</td>
</tr>
<tr>
<td>Funding allocated to congestion alleviation:</td>
<td>R750 million over 5 years</td>
</tr>
<tr>
<td>Current estimated value of road network:</td>
<td>R98.1 billion</td>
</tr>
<tr>
<td>Increase in estimated value of roads required due to growth of Cape Town:</td>
<td>R900 million every three years</td>
</tr>
<tr>
<td>TCT Website:</td>
<td><a href="http://www.tct.gov.za">http://www.tct.gov.za</a></td>
</tr>
</tbody>
</table>
The statistics as they relate to transport are graphically depicted in the Cape Town Infographic – Cape Town’s Transport Picture 2015

1.2. Population Profile

Population compared with provincial and national level

<table>
<thead>
<tr>
<th>Location</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Cape Town</td>
<td>3.74m</td>
</tr>
<tr>
<td>Western Cape Province</td>
<td>5.82m</td>
</tr>
<tr>
<td>South Africa</td>
<td>51.8m</td>
</tr>
</tbody>
</table>

Population Density

- Low population density - Average population density: 14 du/ha
- Raising densities remains a key challenge
1.3. Land Use Profile

Historical separation of residential and economic opportunities with long travel distances between work and residence.

Economic opportunities

Residential Opportunities
1.4 Socio Economic Profile

Transport Costs

95 per cent of public transport users are in the low and low to medium income groups. 45 % of the monthly household income is spent on transport. Average travel distance to work opportunities is between 45-70 km. Average Travel time: 30-45 minutes and 31-60 minutes

- Requires exploration on reorientation of policy to subsidize the commuter rather than service provider...

2. Transit Oriented Development (TOD) Strategy for the City of Cape Town

Transit Oriented Development (TOD) is a planning, design and implementation approach that can be employed to reverse previous anomalies in the urban form of the City, so as to achieve urban operational efficiencies. TOD does not solely belong to one discipline but rather is seen as a key transversal development and management premise to addressing urbanisation, urban growth and service delivery with transport being the catalyst to achieving operational efficiencies in the urban environment for both the City and its citizens. It is an approach that enables a change in the
principles of the space economy, forcing long term efficiencies through integrated implementation and service delivery.

TOD is the intricate relationship between “Transit” (the operational/access imperative of an urban environment) and “Development” (the spatial manifestation of those that are within the urban economy). Further the “Oriented” of TOD consists of the tools and mechanisms that should be employed by all role-players (public, private and community) to achieve the needed intricate relationships required between Transit and Development.

WORKING TOWARDS A COMPREHENSIVE TOD STRATEGY

The logic for Investing into the Comprehensive TOD Methodology through

1. Multidimensional Approach to the City Development
2. Long Term 2032 Perspective – makes planning for the expansion of the City in advance much easier and cheaper to lay out infrastructure before development whether formal or informal is established rather than afterwards.…


The TOD Strategy for the City of Cape Town plots an approach to achieving optimum land development and travel demand in the long term and identify tools and mechanisms to be employed by various role players who have a collective impact in on development. Ultimately the TOD Strategy must result in a paradigm shift through direct public and private investment into the built form that is efficient and effective.
2.2.1 Vision

To progressively move toward a compact, well connect, efficient, resilient urban form and movement system that is conducive to economic and social efficiency and equity while providing cost effective access and mobility, with minimum impacts on the environment.

2.2.2 Objectives

Contribute to the spatial consolidation of city’s footprint through the application of TOD will:

- Enhance the efficiency of public transport network
- People locating closer to economic opportunities
- Promoting efficiencies in basic service provision

The objectives of TOD in Cape Town are defined as follows:

1) Maximize “location efficiency” so that people can walk, cycle and use public transport. This can be achieved through a comprehensive approach to land use density, mix and intensity, as well as a focus on prioritized public transport at a metro, corridor, nodal and precinct scale.
2) Boost ridership and minimize congestion thereby ensuring that the public transport system becomes more viable
3) Provide a rich mix of housing, shopping, recreational and transportation choices
4) Enable cost and operational efficiencies in the provision and design of urban infrastructure
5) Drive down the cost of the User Access Priority for both new and existing Residents
6) Create a sense of place

2.2.3. TOD principles from a transport perspective

1) Affordability – reduce the cost of public transport to commuters and the cost of providing public transport to the City.

2) Accessibility – facilitate equal access to social and economic activity through strategic urban development and the provision of safe public transport.
3) **Efficiency** - provide an environment and level of service that reduces trip lengths and dependence on private vehicles.

4) **Intensification** & 5) **Densification** - manage the desired form, composition and location of urban development to make affordable, accessible and efficient public transport viable.

### 2.2.4. Implementation Strategy

1. **TOD Toolkit**

It is acknowledged that TOD means different things at different scales. Understanding this difference helps to identify the appropriate tools and mechanisms to implement TOD and the scale of planning at which they should be applied.

2. **Integration Zones**

   Two priority integration zones have been identified:
   1) Voortrekker Corridor
   2) Metro South east Corridor
   3) Station precinct

   Prioritization framework has been developed

Source: City of Cape Town

*Voortrekker Road Corridor Strategy and Investment Plan*
3. Transit Corridors

Bus Rapid Transit and Rail Network

A PACKAGE OF PLANS

APPROVED IPTN 2032

The City’s Integrated Public Transport Network was approved by Council on 25 June 2014 along with the decision for the City to implement Transit Oriented Development where Rail and BRT are the trunks.

- Opportunities on roll out of Trunk Corridors - current planning in progress for BRT Routes and Blue Downs Rail Corridor

4. Alignment of Integrated Public Transport Network (IPTN 2032) & Land Use Parameters for the TOD Comprehensive Land Use Scenario – Urban Efficiencies

<table>
<thead>
<tr>
<th>TRANSPORT</th>
<th>LAND USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reduce Travel Distances to reducing the cost of commuter travel and improve operational viability of public transport.</td>
<td>Intensify and diversify urban development in close proximity to public transport stations.</td>
</tr>
<tr>
<td>2. Optimise bi-directional flows</td>
<td>Promote an appropriate mix and form of residential, social and economic activity between urban nodes along higher-order public transport corridors.</td>
</tr>
<tr>
<td>3. Generate a greater level of seat renewal (balancing trip attractions and productions)</td>
<td>Promote an appropriate mix and form of residential, social and economic activity between district and local nodes along higher-order public transport corridors.</td>
</tr>
</tbody>
</table>
5. **Alignment of Integrated Public Transport Network 2032 & Integrated Human Settlement Framework 2032**

- Assessment of transport operational costs has been completed
- Key routes/Corridors and nodes a basis for densification
- Reconfiguration of housing policy to support increase in densities and reduce the cost of bulk services
- Building integrated city transport systems will do far more to improve the lives of the urban poor

3. **TOD Activities and Programs**

1. TOD Principles approved together with the Integrated Public Transport Network 2032 in June 2014
2. Alignment of IPTN 2032 with Land use through transport and land use analysis, assessments and modelling in order to produce a Comprehensive Land Use Scenario
3. TOD Strategic Framework (Strategy) for the City of Cape Town approved in March 2016
4. Alignment of the TOD Agenda/IPTN and Integrated Human Settlement Framework 2032
5. Integration Zones - Voortrekker Corridor and Metro South East Corridor
6. Multi-Portfolio Political TOD Working in place, supported by transversal TOD Technical Working Group + inter-governmental working group on TOD aligned property development pipeline; Investment promotion
7. Partnerships with the Private Sector in priority CBD’s, City Improvement Districts in priority urban nodes

4. **Key Challenges**

1. High operational cost of public transport
2. Sprawling urban footprint
3. Rising social inequality
4. Environmental degradation
   - Energy Consumption and Greenhouse Gas Emissions
5. Fragmented Governance due to Lack of Institutional Alignment, Lack of integrated financial resources, relationship with the private sector
6. Raising densities
7. Reorientation and reconfiguration of existing policies (e.g. housing, financial etc.

5. **Top 5 Priorities in the 12 Months**
   - Development of Portfolio & Business Case, & Costing of TOD Related Projects and Programmes
   - Development of TOD Manual
   - Implementation of Council Resolutions taken on the Approval of the City’s TOD Strategic Framework

6. **Expected Areas of learning from the TOD Deep Dive**
   - Best Practice in implementation of TOD Projects
   - TOD Financing Mechanisms.
   - Land Value Capture
   - Cross subsidisation from LVC to transit operational costs mechanisms
   - How can a City stimulate private sector development of specific land use type and locations to achieve Transit Oriented Development?

7. **Background Documents**
   2. City of Cape Transit Oriented Development Spatial Framework 2016 -
      [http://www.tct.gov.za/docs/categories/1788/Approved%20City%20of%20Cape%20T
      own%20TOD%20Strategic%20Framework%20V1.0.pdf](http://www.tct.gov.za/docs/categories/1788/Approved%20City%20of%20Cape%20T
      own%20TOD%20Strategic%20Framework%20V1.0.pdf)
   5. City of Cape Town Voortrekker Road Corridor Strategy and Investment Plan 2015/2016
Pre-Documents for TOD Deep Dive program

Danang City is situated at the centre of Vietnam, 759 km from Hanoi and 960 km from Ho Chi Minh City and is one of the five largest city of the country. Danang borders Thua Thien Hue Province in the north, Quang Nam Province in the south and the west, and the Eastern Sea in the east. The city is divided into 08 administrative units including 06 urban districts, 01 rural district and 01 archipelago district with the population of more than 900,000 people in 2010.

Danang has a very strategic location which is in the center of ASEAN and GMS with the distance to many growth centers from 1000-1500 km. It plays a crucial role as the growth center of the Key Economic zone in Central Vietnam, and giving the impetus to the socio-economic growth of the Central Region and the Central Highlands. Danang is located in the center of the 1500km World Heritage Road stretching along the coastline of Central Vietnam. Traveled along Highway 1A, Danang is a short drive to the four UNESCO-Designated Natural and Cultural World Heritages including Hoi An Ancient Town 30km from Danang to the south east, My Son Sanctuary 70km from Danang to the south west, Hue Imperial City 100km from Danang to the north and Phong Nha - Ke Bang National Park 300km from Danang to the north.

Lying on the north-south communications axis of land route (National Road 1A), rail, sea and air routes, Danang City is an important transportation hub of the Central Region, Western Highlands and Vietnam.

- It has an international airport (The Airport has two runways (3,048 m x 45 m each) that allow large aircraft, such as A320s, to land in any weather condition. Danang International Airport is expanded, with a new terminal having the capacity to receive 4 million passenger arrivals by the year 2015);
- Deep-water seaport (Tien Sa port has 22 ha, accommodate 4,5 million/year, Son Tra port has 23ha, Han River port accommodate 50,000DWT ships, Lien Chieu port accommodate 50,000DWT ships,
- North-south land routes NH1A, 37,2Km (Road network in Danang City is composed of national highways, provincial roads, urban roads, rural roads and others with a total length of about 848 km (in 2010). NH1A and NH14B are the interprovincial/city linkage to and from Danang City. The urban road network in the city center, particularly Hai Chau and Thanh Khe districts, is very dense. The rate of land for transportation of the city is about 9.27%.
- Railways (is about 42km and consists of 05 stations in which Danang Station is the biggest and most important as it is where train coaches are switched. It is located in the center of the city and surrounded by residential and commercial areas. Therefore in future the government has a plan to move Danang Station out of the city center) to support economic activities, investment and tourism.

About Land Use: Da Nang City covers 1,256 sq km (950 sq km if excluding islands). Most land in the west of the city is covered by mountainous rural areas, while urbanised areas have been developed on the eastern side along the East China Sea. Potential development area is 341 sq km (excluding rivers, lakes, forests, airports, ports, army land, cemeteries). Da Nang City’s mountainous and forest areas account for about 60 percent of the city limits and lie north-west of the city. The long beautiful sandy beach followed by the South China Sea is vast, making its eastern part an important tourism resource. Lakes and rivers connect the mountains and sea. Open space comprises 28 percent of the total land use. Land classified for urbanised land use is limited to 10 percent, but the city is composed of compact urban areas with high population density and scattered rural areas. The urbanisation trend has rapidly spread to suburban areas, especially towards the south and southwest. In the north of the city, industrial zones have been developed, where many Japanese-affiliated firms have located. Along the sea are many exclusive resort development areas under foreign or Vietnamese investment.

Danang has made significant advances in urban transportation recent years. Since the start of its urban renewal efforts, many old roads have been widened and extended. Some newly constructed roads have a role in adjusting transportation services and changing the urban appearance. In the period of 2006-2010, the DOT has been assigned to be the employer of 126 projects including 124 projects from state budget and 02 ODA ones. After five years, we finish 84 projects and built more than 50 km new roads, 03 new bridges with total length of 2.4 km and improve 46.5 km old roads. The investment budget for transportation construction increase year by year, especially in the period of 2008-2010.

These are images, locations and information of some remarkable constructed transportation infrastructures of Danang city. We built 02 coastal roads which are Hoang Sa - Truong Sa street, Nguyen Tat Thanh Street; several horizontal main axes; vertical main axes; and 04 large bridges as well as
beautiful and symbolic landscapes of Danang city: Song Han bridge and Thuan Phuoc bridge. We are also constructing 02 large and modern bridges which are Dragon Bridge and Nguyen Van Troi - Tran Thi Ly Bridge. Both these bridges are invested from state budget and will be finished in 2013.

Traffic management is also one of the main tasks of our department and much concerned recent years. More than 90% of Danang households own motorcycles, with 58% owning more than two motorcycles. This extremely high level of motorcycle ownership helps people to move and access necessary services and destinations easily. However when the number of private vehicle increases rapidly, local traffic congestion happens in some intersections during rush hours. In order to prevent the traffic congestion and ensure traffic safety, we control the intersections with signal, roundabout and build grade intersection. There are 2,700 road intersections in Danang. Of this number, 26 are controlled by traffic lights, 24 are controlled by yellow flickering lights, 45 are operated as roundabouts, 04 are grade intersections. Signalized intersections are mainly the major roads in the city center which include the main east–west roads of Hung Vuong, Le Duan, and Dien Bien Phu, as well as the main north–south roads of Ong Ich Khiem, Le Loi, etc. Roundabouts are mainly installed at intersections with wide widths.

We also operate 02 pairs of one-way routes including 05 roads in the center to make the traffic flow smooth. Truck ban is implemented in Danang City to avoid traffic conflict between truck traffic and other traffic in the city center. In principle, it bans trucks from plying the urban roads and stipulates the roads where trucks are allowed to run but still under certain conditions. In addition, trucks with a capacity of 3.5 tons are permitted to run on 04 roads except during rush hours.

In general, traffic conditions in Danang City are relatively good because there is less traffic here compared with other large cities such as Hanoi and Ho Chi Minh City.

Mid-nineteenth century, the traffic situation in Europe is similar in Viet Nam now. To overcome the problem of traffic congestion, many countries have resolved towards building new cities satellite cities. However the method of land gradually expanding outside the city will make the management of dispersed and difficult to control. In America they solve this problem in a different way, which is to expand the communication network by building more
roads from the center to the outskirts of the city populated stretch the suburbs, so that was reducing the urban population density. However, due to the use of many individual vehicles and the overlap of roads, did affect traffic safety, economic interests and quality of life of people.

Then, one urban construction planning has been formed as the TOD. It was taken oriented traffic system development as the basis for planning and urban development. Solving problems of population density by diffusion out of the city residents, has opened up a wide area, and create conditions for upgrading and developing public transport systems areas such as system bus, metro system and tram overhead ... There are many cities after world war II has developed in this direction as cities in Japan, Sweden, France and the Netherlands, Denmark ...

TOD is taking traffic-oriented development as the basis for development, urban planning, traffic hubs do get concentrated residential point from which to form traffic dispersal system, and this is one of best solution for transportation improvement for Da Nang city. In other words, the urban development is based on the theory TOD development oriented public transport system. TOD as an approach, to address issues related to traffic congestion and environmental protection. Traffic congestion, an increase in demand for walking and demand for urban quality of life, support policies of the State ... all these factors have an impact on the development trend of the TOD. When no one sets the basic framework for transport-oriented development, we will have to always deal with the problems that arise unintended, uncontrolled in the process of urban development Urban development .. TOD strategy is based on functional urban mixed use between residential areas and the financial district, it is designed to take a maximum of public transport, to promote the development of the city, while balancing the interests of the community. The heart of these areas often have: station, bus station ... and the system of commercial services, industry, offices ... will be set up around the spot called TOD. This is an advanced infrastructure systems, complete, meet the needs of human life. This area has a radius of 0,4km-0,8km to suit walkers. The closer to the center of the greater population density and economic benefits but more low-density rental housing. Conversely, the more outlying population density decreases based on the basic principles of traffic near and far, in this area, the economic benefits reduced but increased density rental housing.

In order to develop a harmonized and improved quality of life for the people in Da Nang city, by increasing the number of journeys on foot, bicycle,
car bus, ferry ... to reduce the number of personal vehicles. The goal of TOD is to achieve so convenient for pedestrians, daily commuters, tourists ... With this in mind, to get to a station, people can walk, motor bike or use the bus facilities. When leaving the train, they can walk, ride a bike, even if there is by boat. That is the important ramifications of TOD. When designing and building the station, parking and support facilities TOD, should establish management programs, transportation needs, determine the sales system, the amount of the cost of those who benefit from TOD. The other important thing is the design TOD must meet the following basic elements: system design for pedestrian priority must be the most, point TOD is a combination of office functions, sales services, residential; station are features of the regional center, designed to ensure the system easy to transport traffic support, mitigation and management of parking system in a 10-minute walk cycle at district center, train station

Benefits TOD has brought obvious, TOD designed complex of offices, sales systems or entertainment, it gives people more opportunity to choose walking over to the final destination their increase between people friendly to the natural environment. Moreover it reduce traffic congestion, minimize the consumption of large amounts of gasoline personal transport. Also, TOD also works to improve the health of communities, by walking more to reduce stress, increase flexibility and comfort of the people on the go, increase quality of life. Another benefit that TOD will make it improve the competitiveness of the economy and trade, increase the number of pedestrians and customers in the area of trade, business, restaurants ... from there enhanced and more balanced real estate values.

For years TOD has become the new direction of thinking in urban planning design of the architect in developing countries. For our country, the application of the principle of TOD in the design process renovation, expansion and construction of urban planning not only bring benefits and efficiency but also convince clearance above the hot spot traffic, is causing much annoyance in society. It contributes to a habit of modern transport operators for each individual and the community, meet the needs of the citizens in the industrialization and modernization.

Recently, Da Nang Committee added that focus will be on strengthening the links between Da Nang and other cities in the region and the sub-Mekong region; encouraging the transit-oriented development model (TOD) based on building major traffic axes and strategic infrastructure including a North-South key mass transport system with Light Rail Transit (LRT) and Bus Rapid Transit
(BRT); developing the Da Nang port system, most notably Tien Sa Port and Lien Chieu Port; and facilitating Da Nang’s private businesses to invest in local technical infrastructure construction projects.

Da Nang Urban Transport Master Plan In 2012, the Department of Transport of Da Nang drafted the Urban Transport Master Plan in 2020 with a Vision Towards 2030, with support from the World Bank. This comprehensive transport management plan covered the development of road networks, bridges, parking, public transport networks, signal and traffic management, etc. It was approved in April 2014.

Public Bus Transport Plan In November 2013, the Master Plan for Public Passenger Transport by Bus in Da Nang City for the period 2013-2020 and Vision for 2030 was issued. Its objectives are as follows: Overall Goal: To develop public passenger transport by bus for the period 2013 - 2020 and reduce traffic congestion and road traffic accidents in Da Nang City.

Specific Objectives:

• Occupancy of public passenger transport sector up to 2020 shall be 20 percent of all travel demand, of which public passenger transport by bus accounts for 9 percent while that by BRT bus shall be 3 percent.

• Control road traffic accidents and improve traffic safety in urban areas and neighbourhoods.

• Reduce energy consumption and emissions from the transport sector in general and from public passenger transport in particular so as to protect the urban environment.

• Promote the economic development of Da Nang City and provinces in Central Viet Nam.

Route Network:

• Period of 2013 - 2015: Network of public buses consists of 11 routes of ordinary buses.

• 2015 - 2020: Network of public buses will have 20 routes: two BRT routes, three BRT standard routes, and 15 routes for normal buses.

• 2020 - 2025: Network of public buses consists of 26 routes: four BRT routes, three BRT standard routes, and 19 routes for normal buses.
2025 - 2030: Network of public buses consists of 28 routes: four BRT routes, three BRT standard routes, and 21 routes for normal buses. Ongoing BRT Project After the Priority Infrastructure Investment Project (PIIP) was completed in June 2008, the five-year Sustainable Development Project was commenced in June 2013.
1.0 WB Project code P123134

2.0 Introduction (Country profile)

Tanzania is an East African country situated on the Indian Ocean just south of the Equator.

It borders eight other nations: Kenya, Uganda, Rwanda, Burundi, the Democratic Republic of Congo, Zambia, Malawi, and Mozambique. The country extends about 1,040 km from north to south and 1,080 km from east to west comprising a territory of 945,100 km2.

Urban Transportation in Tanzania
Urban transport in Tanzania is predominantly a road based, motorized and non-motorized. Other modes include rail and water based, which is not yet developed. Tanzania has a national transport policy since (2003) regulated by different authorities (Ministry of communication and transport, the ministry of finance controlling motor vehicle registration, regional road administration and planning commission), although little attention is given to urban transport issues.

The policy manages the urban roads and other infrastructure, road services, traffic flow and management, and land- use planning and transport for disadvantaged groups. However, pedestrians and non-motorized are not considered during the implementation of policies.

2.1 Brief description of Dar es Salaam

Dar es Salaam is the largest City in Tanzania. It is one of the World fastest growing cities. It’s also the largest city in eastern Africa by population, as well as a regionally important economic centre. It is Tanzania's most prominent city in arts, fashion, media, music, film and television. It is Tanzania's leading financial centre with the Dar es Salaam Stock Exchange (DSE) being the country's first and most important stock exchange market.

Dar es Salaam is located at Longitudes 37010” to 39030” E and Latitudes 06015” to 07040”S (Faldi, G., 2011) while bounded by the Indian Ocean on the east and by the Coast Region on the other sides, covering an area of 1800 Sq. kms. (Land = 1350 Sq. kms) (Fig.1)

Administratively, the Dar es Salaam region is divided into three districts: Ilala, Kinondoni, and Temeke. All three are governed as municipal councils, and so all of the city's suburbs or wards are affiliated with them under the coordination of Dar es Salaam City Council.
The city is the leading arrival and departure point for most tourists who visit tourism areas in Tanzania like the national parks for safaris and the islands of Zanzibar. The population has doubled over the last twenty years and now stands 4,364,541 as of the official 2012 census growing at 5.6% per annum.

Dar es Salaam is located at 6°48' South, 39°17' East (~6.8000, 39.2833), on a natural harbour on the eastern coast of Africa, with sandy beaches in some areas.

**Economy and infrastructure**

Dar es Salaam is Tanzania's most important city for both business and government. The city contains high concentrations of trade and other services and manufacturing compared to other parts of Tanzania, which has about 80 percent of its population in rural areas. Downtown includes small businesses, many of which are run by traders and proprietors whose families originated from the Middle East and Indian sub-continent—areas of the world with which the settlements of the Tanzanian coast have had long-standing trading relations.

The informal settlements that occupy the majority of land (Over 70%) in Dar es Salaam are characterised by poor infrastructure and a lack of basic municipal services. Existing settlements are under pressure; they are growing in size and density because of urban migration. The growth of new informal settlements and expansion of existing ones has resulted in encroachments onto environmentally sensitive land e.g. floodplains and hillsides, increasing the vulnerability of these city residents. Existing infrastructure, particularly in unplanned or poor areas of the city, is deteriorating under population pressure. The informal nature of much of the residence of Dar es Salaam affects city revenue (through property rates and land tax, for example) and thus the ability of the city administration to maintain or expand infrastructure and basic services. Under official land planning policy (Government of Tanzania, 1997), the state aims to tackle informal settlement by building new areas for settlement on the periphery of cities, to designate low-income housing areas with affordable services and to ensure all upgrading plans are designed and implemented by local authorities in collaboration with residents and community organisations. Upgrading plans are expected to take cost recovery into account.

Due to the major development and population growth in Dar es Salaam city, the traffic congestion has become one of the major issues for citizen in the city. Nowadays it is approximated that more than 120,000 private vehicles move on the city’s roads daily, and the traffic jams are becoming even more acute as they can also be noticed during weekends. The Centre for Economic Prosperity (CEP) recent study indicates that a motor vehicle often spends up to two hours to cover a 16-kilometer trip, a distance which could have spent only 15 minutes, if there was no traffic congestion.
3.0 TOD vision and objectives for Dar es Salaam city

The Government of the United Republic of Tanzania has received a $300 million credit from the International Development Association (IDA) of the World Bank towards the cost of the Dar es Salaam Metropolitan Development Project (DMDP). It intends to use part of the proceeds of the credit to prepare an integrated land use and transport plan (hereafter called the “Corridor Development Strategy”) to guide the detailed development, connectivity and densification of real estate around the first line and stations of the Dar es Salaam Bus Rapid Transit (BRT) Corridor.

DMDP was designed in response to the critical problems facing Dar es Salaam’s future arising rapid urbanization and economic growth. Specifically, the project intends to support the benefits of urban agglomeration, such as jobs creation and connectivity to social services, while reducing negative outcomes, such as sprawl, informal settlements, traffic, and environmental degradation. These efforts will improve city efficiency and global competitiveness of Dar es Salaam, which already accounts for more than 83 percent of all national government domestic revenues and 40 percent of the national GDP.
The Project Development Objective of the Dar es Salaam Metropolitan Project (DMDP) is to improve urban services and institutional capacity in the Dar es Salaam Metropolitan Area, and to facilitate potential emergency response. The $300 million loan facility has four (4) components:

(i) Component 1 - Priority Infrastructure will finance improvements and constructions of priority roads and primary and secondary drainage systems;

(ii) Component 2 - Upgrading in Low-Income Communities will improve basic services in selected low-income communities and strengthen communities’ capacity in undertaking such developments works;

(iii) Component 3 - Institutional Strengthening, Capacity Building, and Urban Analytics will support (a) development of metropolitan governance arrangements and systems; (b) municipal finances and technical capacity through own source revenue collection and development and integration of GIS; (c) improving the integration of transport and land-use planning; (d) operations and maintenance systems; (e) urban analytics and (f) urban planning system;

(iv) Component 4 - Implementation Support and Monitoring & Evaluation will provide support for Project management and supervision functions.

As part of Component 3, DMDP intends to prepare a Corridor Development Strategy. This plan will respond to traffic congestion and affordability challenges faced by the commuters and residents along the city’s four main arterial roads—Morogoro Rd, Kilwa Rd, Neyrere Rd, and Bagamoyo Rd—while leveraging the prior and future investments made by the Government of Tanzania in the bus rapid transit network, otherwise known as DART. The plan will be prepared by an international consulting firm to be contracted by PO-RALG. The selected firm will have extensive experience working with cities facing similar circumstances, and that have successfully implemented land use and transport solutions.

4.0 Indicators to measure success in TOD

The Corridor Development Strategy will provide recommendations and suggest regulatory reforms to: (i) develop high-density corridors, (ii) traffic management measures at key junctions—such as lights, turning lanes, and flyovers or underpasses where appropriate; (iii) ensure widespread access to a network of seamless feeder routes and parking areas; (iv) introduce transit oriented and pedestrian friendly urban designs in land development; (v) streamline and coordinate the responsibilities and funding streams of institutions with mandates for transport, land development and upgrading of public spaces; (vi) attract private sector investment; and (vii) enable the use of innovative financial mechanisms to provide dedicated funding streams to support the sustainable operations of transit systems and enhancement of public services.
5.0 Description of TOD activities

The Corridor Development Strategy will include, at a minimum:

(i) Redevelopment or General Planning Scheme specifically for the Phase 1 BRT Corridor;

(ii) Detailed Planning Scheme for two TOD pilot project sites, locations to be determined, along the Phase BRT Corridor; and

(iii) Specialized Planning Scheme, for all current and future BRT corridors, that provides a baseline set of urban design guidelines and financial strategies to promote and implement compact mixed-use land development and transit investment. The Specialized Planning Scheme will function like an Overlay District Ordinance, and the provisions will be varied and grouped based on common station area typologies found within the comprehensive transit network.

This Phase 1 BRT Corridor runs along Morogoro and Kawawa Roads; one of the major commercial and residential corridors of the city that also serves many low-income communities. With the development of the BRT, an increase in the intensity of economic activities, land development, and land value is expected along the Morogoro corridor. Accordingly, the corridor provides a significant opportunity for the public and private sectors to co-invest in urban development and improve the utilization of land along the corridor and competitiveness of the city. However, the type of development needs to be carefully controlled and context and culturally appropriate. Otherwise it could sacrifice the economic and social benefits available to the lower income communities, the disadvantaged, and the disabled. In that regard the land-use approach will need to be multi-faceted; supporting (i) larger scale real estate development and special development districts where large plots exist, and (ii) smaller scale or grassroots revitalization efforts to upgrade the quality and density of building stock in the crowded small plot zones—while avoiding the risks of mass resettlement or loss or access to livelihoods.

In order to ensure that the plan is prepared using a consultative process, PORALG will be establishing a (i) Stakeholder Commission and multiple (ii) Technical Working Groups. The Stakeholder Commission will be the lead entity to oversee and provide feedback on the key deliverables from the consulting firm. They will also participate in key decision-making workshops on a quarterly basis. The Stakeholder Commission will comprise of officials from the local government, national ministries, national enterprises and utilities, trade organizations and professional associations and civil society organizations. The Technical Working Groups will work with the consulting firm on a monthly basis in small groups to provide subject-matter inputs into the key deliverables. They Technical Working Groups will comprise of local subject-matter experts, technicians and administrators, in a broad set of disciplines from real estate, economy, housing, and social services to infrastructure, the environment, and more.
6.0 Key challenges to our city
Institutional arrangements for implementation of urban development plans in Dar es Salaam have been inadequate and often lack coordination. For instance, uncoordinated financing of urban development persists as most public agencies mandated to provide specific services in the city, plan, implement and maintain projects independent of one another. The lack of coordination has led to duplication of efforts, dispersal of scarce resources and little accountability.

One of the major observations in the existing land use is the fact that the city is monocentric. This leads to traffic congestion due to:-

- Road network that forces the traffic to unnecessarily pass through the city center when heading to other parts of the city.
- Poor distribution of social services such as schools, health facilities and markets generates unnecessary long distance traffic (i.e. no hierarchical organization of services),
- Poor public bus/rail transport, which encourages the use of private transport,
- Rapid increase of private car ownership without corresponding expansion of city road network capacity, and
- Poor transport infrastructure in terms of roads, water sewerage and associated infrastructure.

7.0 Key solutions
Many studies on the urban transportation problem have not managed to capture the multifaceted nature, and the challenges occur in the urban transport. Some studies have tried to stipulate the wide range of urban transport problems but the extent, and their scopes have neglected its relation to other transport challenges. The challenges of urban transport cannot be solved as a piecemeal; combined and inseparable interrelationship exists between transport, and geographic locations have shown success when applied. Therefore, any realistic method intending to alleviate the existing problems must take into considerations the interdependence between the form of a city and the transport system.

In Dar es Salaam, a major cause of the transport problems has been contributed by the design of the city that favors the dominance of the automobile, the structural pattern of the roads, especially the traditional area of the city and the unplanned growth; uneven distribution of the land use imposes constraints on movement and to the facilities provided (JICA, 2007). The need to understand the design of the urban areas and the traffic carrying capability of the roads in order to tackle challenges facing urban transport is important. In order to reduce urban transport problems in Dar es Salaam city, it is suggested that traffic management, transport stakeholders and planners must coordinate, identify and address the possible
solutions to improve traffic circulation in the cities. This can be achieved after understanding the design of the city, their route forms and transport needs.

Urban transportation remains to be a challenging phenomena recurs in many urban centers, combined efforts should be to adopt “Best Practices” which has shown to be effective in tackling the transportation problems in developing countries like Tanzania. It is suggested that approaches that are efficient and flexible is one needed in Dar es Salaam in order to alleviate the transportation problems occurring in the city, and the finest way is for every city to develop its own version and models to examine the challenges facing transportation systems.

Among the few best practices we have achieved so far are:-

1. Existence of Dar es Salaam Transport Policy and System Development Master Plan
2. Preparation of Dar es Salaam Land use Master plan 2012-2032 (Under way)
3. Under construction of Dar es Salaam bus rapid transit BRT. Construction began in April 2012, now in final stages ready for operations

8.0 Top five priorities for the forthcoming 12 months

The planning process is tentatively scheduled to begin in June of 2016, and will be completed within 12-16 months. It will be produced in four (4) main stages:

(i) Preparation of the Diagnosis of the Existing Situation and Establishment of the Vision for the Phase 1 Corridor – Roughly 3-4 months

(ii) Preparation of Specialized Planning Scheme also known at the Transit-Oriented Development Guidelines – Roughly 1-2 months

(iii) Preparation of Spatial and Physical Elements of the Corridor Development Strategy including the Redevelopment or General Planning Scheme and the Detailed Planning Scheme – Roughly 4-5 months

(iv) Preparation of Implementation Program for the Corridor Development Strategy – Roughly 4-5 months

9.0 Expected areas for learning from TOD Deep -Drive

The whole idea of TOD is very new most developing countries, without exclusion of Tanzania. To this end would like to learn the following:-

☐ How TOD is being formulated?
☐ What are challenges associated with TOD?
☐ How to build a compact, mixed-use urban hub and expand transit connectivity across the region?
☐ Examples of a complete TOD in developing countries and in Japan (Live).
☐ Who is responsible in decision-making, advancing strong plans, and implementation?
CITY TOD REPORT

I. Introduction (Background)

1. General Information about Peru and Lima Metropolitan Area

   a) Estimated Population (2015)\(^1\)
      - Peru: 31,151,643 people
      - Lima Region: 9,838,251 people
      - Lima Province: 8,894,412 people
      - Callao Constitutional Province: 1,010,315 people
      - Lima Metropolitan Area / Lima and Callao City: 9,886,647 people

   b) Estimated Density (2015)\(^2\)
      - Peru: 24 people per km\(^2\)
      - Lima Metropolitan Area: 3,516 people per km\(^2\)

   c) Gross Domestic Product – GDP per capita (2014)\(^3\)
      - Peru: US$ 6,229.15 per inhabitant
      - Lima Region: US$ 8,047.57 per inhabitant

II. Description of your city (land use/transport/economy/and if available percentage of income spent on transport and average commuting time from latest household surveys, etc.) and national framework affecting TOD;

    Peruvian cities have grown fast in recent years as a consequence of immigration in the 80s and 90s. Metropolitan Lima accounts for about one third of the total population of Peru. Lima is the country’s main economic development hub and houses the main study and health facilities.

    Growth of Lima has been uneven, without a homogeneous pattern. On the contrary, the city’s central areas have grown harmoniously and have more and better transportation means while the periphery is poor and lacks basic services and transport systems.

    With over nine million peoples, Lima faces the consequences of unplanned city sprawl, including serious congestion and pollution. Residents and visitors spend between two and three hours daily on transport. Low income people who rely exclusively on public transport services face an even more serious situation.

    Lima Metropolitan Area current public transport system is characterized by the following:

      i) Insufficient public transport alternatives, and a very limited mass transit network: One Bus Rapid Transit (Metropolitan BRT) and one metro line are available.
      ii) Low capacity bus units: more than 70% of the public transport daily trips are made in

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\(^2\) Ib idem.
\(^3\) Source: National Bureau of Statistics – Peru (INEI) and Bank, Insurance and Pension Funds Superintendence – Peru (Superintendencia de Banca, Seguros y AFPs – SBS).
minibuses and panel vans. There are approximately 31,000 buses, microbuses and vans operating in Lima and Callao, most of them between 15 and 20 years old.

iii) Overlapping bus routes: In 2014, 590 bus routes partially overlapped along 38,000 km.

iv) No authorized stop.

v) Poor service quality: due to unfettered competition in the transport market, low profit margins result in poor or no bus maintenance. The resulting service standards are very low, affecting passengers’ health and safety.

vi) No bus schedules.

vii) Growing number of unofficial taxi cabs and tuc-tucs results in low service quality. Further still, in 2012, 55% of formal taxis were 11 years-old or more.

viii) Congestion and low travel speed reduce productive time and increase operating costs, while pollution harms productivity and living conditions.

ix) Numerous traffic accidents.

x) Weak network of combined commuting transport modes.

Since 2010 efforts are underway to create a planned mass transport system. Supreme Decree 059-2010-MTC envisages creating the Lima and Callao mass transport system with five metro lines. A sixth line was added in 2013.4

The first step has been to build Line 1 of the Lima Metro. Originally construction started in the early 1980s but did not start operating until 2011. Line one runs for approximately 30 km along an elevated viaduct. Present demand has already exceeded planned demand. This line carries about 320,000 passengers daily.

Line 2 was granted in March 2014. It includes the Av. Faucett – Av. Gambetta branch to start serving the population in Lima’s north side (Ventanilla) as soon as possible. Line 2 runs along a total 27 km with the Faucett-Gambetta branch adding another 8 km. A total 35 planned stations should serve over 60,000 passengers daily. Connections with other transport systems are planned. Since a connection with Line one is planned, an interconnection station must be built at the intersection of 28 de Julio and Aviacion avenues while future Line 3 will need to connect with the Rapid Bus System operated by the Lima Metropolitan Municipality at the Grau Metropolitan Rapid Bus Station.

About four-fifths of public transport users in the LMR are in the bottom 40% of the region’s income distribution. These poorer households on average spend more than 20% of their income on transportation (while the overall average for the region is about 13%) and make 30% fewer trips overall than do the rest of the population because of long travel times or high costs. More than 60% of the estimated ridership for Metro Line 2 will come from other modes of transportation, making modal integration a key objective. By linking Line 1 and Metropolitano BRT and the future Line 4 and urban feeder services, the Line 2 Project could increase the number of jobs available within a 60-minute commute by as much as 25%.

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4 Lima’s Basic Metro Network was approved by Supreme Decree N° 059-2010-MTC, published December 24, 2010. It originally included five metro lines though their design was only provided as reference. Supreme Decree 009-2013-MTC published August 10, 29013 added the sixth line.
Land use and management

Because of fast city growth, the state must meet the general needs and interests of the public. Regulating underground construction is no minor detail since the space underground is adequate to build, among other works, mass passenger transport systems, namely a large scale mass public transport platform.

Peruvian regulations have been gradually changed to include the legal instruments needed to speed up acquisition, expropriation processes and generally lifting of impediments. However, mechanisms to reserve areas or land properties for highly complex future projects like a metro line, are still lacking. Government agencies still fail to release properties within schedule for building projects, as was recently shown in the concession of the Lima Callao Metro’s Line 2.

Contrary to innovative experiences in Asian countries, our scheme does not foresee efficient land management mechanisms to identify opportunities created by the building of infrastructure (such as the metro system) and capture the value of soil properties resulting from new urban, economic and environmental conditions, as well as those resulting from future conditions emerging from eventual regulations to increase the density of soil use.

For instance, a one floor property could benefit from proximity to a metro station and be used for a higher (two, three or more floors) building, resulting in added value for owners and the state that could eventually recoup the project’s costs for reinvestment in future projects, through well designed tax and revenue collection instruments.

III. TOD vision and objectives for your city (city wide, a specific corridor/selected station area levels)

The city’s main road corridors are not adequately connected to other lower capacity systems. Few local municipal governments effectively design their cities transport systems.

Lima has grown haphazardly without paying attention to the important relation of transport for the city’s development. Existing mass transport systems set a priority on meeting growing demand without regard in their original design to ways they would integrate with the city or how they would connect with other lower capacity transport systems to enhance mobility and reduce people’s travel time.

Lima’s proposed mass transport network includes ways to connect various transport systems and thereby create connection opportunities to improve mobility within the city.

The metro would increase the value of property. This impact has been partially included in the projects’ social evaluation during their design phase. However, no consideration was given to the large benefits a transport line could create for neighboring areas through emerging mixed use areas and urban projects to ensure future demand, creating thereby revenues that could contribute to finance the city’s future transport facilities.

The main areas with potential to introduce TOD concepts are the interconnection stations for two or more mass transport systems, and heavily frequented stations (large stations) where

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5 Legislative Decree 1192
better access paths could be built, including for bicycles and pedestrian walkways, that could also contribute to improve the local surroundings and incentivize better land use.

Including these elements would citizens benefit from an orderly and well planned city, optimize travel times and enhance well-being generally by reducing pollution and traffic chaos.

New Metro Lines projects are under design and one of the main concerns is lack or scarcity of recourses to finance the investment, therefore it is necessary to complement the metro construction with the development of other activities that can give financial support, such as the development of real estate business or tax policies. For Line 3 and Line 4 studies it is an important issue that is taking in consideration.

IV. Indicators to measure success in TOD, policy, legal and regulatory basis (or absence of it) at national level and city level, and institutional arrangements (in particular between districts and the city)

Despite our efforts to create mass transport systems in the city, we are impeded from launching initiatives to promote the development of transport from a comprehensive approach. That should be our next challenge. The indicators to measure success in developing transport should focus on the following elements:

- Updating of urban development plans every five years; monitoring indicators.
- Change urban planning to include mobility as a guiding principle.
- Change national housing policy to include location criteria.
- Redirect public financing to public non-motorized transport.

V. Description of TOD activities including ongoing programs or projects, and indication on whether they include social inclusion aspects in TOD, whether they include natural resilience aspects in TOD

With support from the World Bank Proinversion is evaluating opportunities to undertake a study that would allow the Peruvian state to harmonize transport lines and their environment. This evaluation would enhance the projects’ social evaluation and identify elements that could increase project revenues, so co-funding by the state could be reduced and ensure future sources of financing for future operation and eventual growth of the transportation network.

(1) Developing Transit Oriented Development (TOD) via Public-Private Partnership (PPP) in Lima, Peru: Evaluation of potential and Pilot Project Development for Lima Metro’s Line 2 Project

The objectives of the project are: (1) review and adapt a general framework to use LVC mechanisms to finance TOD, including public infrastructure projects associated with the metro network through PPPs; and (2) evaluate the potential to use LVC mechanisms, in the form of TOD pilot projects implemented through PPPs, to help finance complementary investments to Metro Line 2 and inform future PPP structuring processes of the Lima Metro network.

Now that the Line 2 project has been awarded and is underway, the need for complementary investments in urban development has been identified. These investments have the potential to be developed through PPPs complementary to the metro concessions and can be structured and promoted by Proinversion. Focusing on the Line 2 project, already awarded, will ensure
that the pilot will have a fertile ground for implementation and allow for improvements to be introduced to increase demand and tap into additional sources of funding for this megaproject

Since real estate development is not part of the original project, the TOD demonstration project would have to be done outside of the scope of the Line 2 PPP. The project would consist of potential joint development schemes under the initiative of the public sector and in partnership with a private real estate developer. Even though focused on demonstration projects, the study should aim at establishing the basic framework to implement PPP-TOD projects more broadly in the Lima Metro network. The study should also look at institutional options that will be developed in parallel to this study, with another Trust Fund administered by the World Bank, involving options such as quasi-autonomous governmental entities or commercially oriented public companies. Therefore, the study aims to identify a potential set of new PPP projects involving the real estate sector to be structured by Proinversion in connection with the Metro Line 2, and in coordination with other national and local entities.

This study will inform future Metro financial structuring processes in Peru that could be replicated in other countries.

(2) Assessment of urban transformation potential through enhancement of integration and local accessibility standards for the Lima Metro Line 2 Project

Although the concessionaire is required to design and build stations according to international standards of quality and universal accessibility, the multimodal integration infrastructure facilities, the accessibility of stations’ surroundings, the supportive public space and the potential urban renewal is beyond the current scope of the Line 2 concession. It is likely that stakeholders in local government, civil society, local community and users will identify gaps in non-motorized accessibility and multi-modal integration, as well as opportunities for improving public spaces and other social amenities around future stations.

Additional investments will be needed for ancillary civil works and goods around key Metro stations and corridors feeding Line 2 to ensure appropriate multi-modal integration and local accessibility improvements. These may include elements of an integrated fare collection system, facilities for buses, pedestrians and bicycling, including safe and convenient crossings and signage, and TOD-related interventions with high-quality public spaces.

The study has as objectives: 1) Examine the direct area of influence where future Metro Line 2 stations will have the potential for urban (re)development to improve the living conditions of the poor and bottom 40%; and 2) Inform the national and local governments about the potential transformation of the built environment of surrounding neighborhoods if complementary investments are carried out, with particular emphasis on the easternmost corridor segment of Line 2, from Santa Clara (an eastern neighborhood of Ate District), thorough Ate end station, and to Santa Anita intermediate station at the east end of Line 2.

The goal of the proposed work is to conduct an alternative analysis, and assess and evaluate possible urban transformation projects associated to the arrival of mass transit service in the area. Generally, low-income neighborhoods in the periphery districts, such as Ate and Santa Anita, are not characterized by mixed-use development and have a low job-housing balance. They also lack adequate local access to other urban amenities associated to liveable and vibrant neighborhoods, such as high-quality public open (green) spaces and facilities for education, health and commerce. This pilot project of TOD for Metro Line 2 should also inform a broader proposal for an Integration and Accessibility Plan for Metro Line 2 that should
include infrastructure works, goods and services that go beyond the scope of the Metro Line 2 concession contract.

The location of Metro Line 2 stations is already defined in the concession contract, and there are already some detailed engineering designs for the stations of segment 1A of Line 2. The focus of this study will be on the built environment and surroundings of the stations, as well as possible extensions or solutions to integrate the intermodal terminal facility with L2, fostering quality public open spaces and enhancing the living conditions. The study will propose different alternatives around a connectivity (multimodal) solution, and the different factors to evaluate a set of alternatives, for the easternmost corridor segment of Line 2.

VI. Key challenges you face (institutional, legal/regulatory, land issues, financing/PPP, capacities, etc.);

A sound and sustainable transport and mobility policy requires the intervention of central government in support of local governments as it would have a direct impact on reducing poverty and inequality among the people through well designed and planned transport systems that can meet present and future long term demand.

For Lima to build a quality, multimodal, integrated, environmentally-sustainable transport system that prioritizes pedestrians, cyclists and public transport, we must take up the following challenges.

Institutional challenges

- Support the development of quality public transport systems and sustainable mobility strategies in cities (including metro, RBT, trams, bicycle lanes, taxis and others).
- Establishing a single transport and mobility authority to manage transport in urban and metropolitan areas, in particular for Lima and Callao.
- Create a single payment scheme for all city public transports.

Financing challenges

- Create a financing fund for transport projects in all Peruvian cities.

Legal challenges

- Strengthen the service quality and operator compliance watchdog agency, to protect users’ rights.
- Design the laws and regulations that will make it possible to capture rising property values and roll out transport-driven development.

Capacity building challenges

- Prepare a citizen education and communications strategy focusing on the citizens’ traffic rights and duties, and sustainable urban mobility to incentivize the use of urban public transport.
- Foster training and education of transport professional experts, technicians and specialists to create a new generation of mobility, transportation and traffic issues’ practitioners.

VII. Key solutions you are pursuing and good practices you have achieved so far

- Close coordination among central and municipal government agencies, to reach mutually beneficial solutions.
• Include property revaluation in the projects’ social evaluations, and including such considerations in the multi-criteria evaluation of alternative routes.

VIII. Top five priorities in TOD for the forthcoming 12 months

• Creating a central transportation authority to plan the city’s mobility.
• Approving the studies for Lima Metro’s Lines 3 and 4.
• Identifying in the studies for Lima Metro’s Lines 3 and 4 potential urban development areas that could contribute to better intermodal transport.
• Including TOD criteria and strategies in the Lima Metro Line 3 PPP model to enhance private and public revenues and reducing the need for government co-financing.

IX. Expected areas for learning from TOD Deep-Dive

• Various types of institutional set up.
• Basic tools to plan transportation corridors.
• Learn about best international TOD practices.
MEXICO CITY – CITY PAPER
TRANSPORT ORIENTED DEVELOPMENT CONTEXT

[Image of bicycles parked in front of a wall with the text "CDMX" and "CUIDAD DE MÉXICO"]
- FAST FACTS

• The Mexico City Metropolitan Area (MCMA) had a population of about 20 million in 2010 people of which 8,851,080 lived in Mexico City.

• The MCMA generates roughly a quarter of Mexico’s GDP and receives a fifth of the national budget.

• Economic activity in Mexico City (MC) contributes 16.6% of Mexico’s GDP. In 2011 the GDP exceeded US$150 billion, with the tertiary sector (mainly trade and real estate services) accounting for 84.7% of that figure.

• 18.2% of Mexico’s population lives within the MCMA (2010).

• Density in MC is 5,920 people/km², as opposed to 160.1 people/hectare in the MCMA.

• The city’s annual CO2 (eq.) emissions in 2012 were 30.7 million tons. (Mexico City Secretary of the Environment).

• In MCMA, 2.6 million people live in areas with high risk of exposure to PM10 (ProAire 2011-2020).

• As a consequence of urban growth and subsequent changes in land use, temperatures in the MCM have risen 4 °C in the last century, of these, 2 °C rise occurred since the 1970’s.

• 5.5 million vehicles are estimated to circulate in MCMA.

• Commute average trip has risen from 53 Minutes in 2007 to 1 hour 21 minutes today.

• The average speed rate has dropped 55% in three decades to 17 km / h.

• An estimated 4,000 premature deaths from poor air quality are produced and 2.5 million days are lost diseases related to it.

• 2012 recorded approximately 13,000 road incidents.

• The majority of users of public transport are low-income families, who spend on average 18% of their income to move. There are no tariff schemes that consider travel distances, transshipment costs or other considerations that allow social policy to balance operational efficiency and service quality.

• During 2010, MC had 22.87 deaths and injuries in road accidents per day on average.

• Travel mode share in MCMA consist of 70% of trips on public transport, walking and cycling, and only the remaining 30% are held by private car.

• Total trips/day in MCMA: 22 Million.

• Transit stations: 195 (Subway), 122 (Metrobus), 13 (light rail), 422 (trolley), (http://www.semovi.cdmx.gob.mx/wb/stv/estadisticas.html)
I. DESCRIPTION OF THE METROPOLITAN AREA OF MEXICO CITY

The Metropolitan Area of Mexico is formed by Mexico City with its 16 boroughs and 60 suburban municipalities. According to UN data, in 2012 it is the third most populous in the world human agglomeration. The disparity between the urban land growth rate (6.57%) and the population (1.78%) between 1980 and 2010 has exceeded the capacity of management bodies at the urban and regional planning levels. This has generated a disorderly development reflected in a scattered, distant and disconnected city.

The road network of the city does not have, or will have, the ability to absorb the huge existing and projected vehicle fleet. Today’s huge problems of traffic jams, long travel times, pollution, loss of man hours, stress and health problems might worsen if stronger measures are not take. It is estimated that these negative externalities cost about 4.6% of GDP in the MCMA.

Planning the metropolitan scale

To plan an area of almost 8,000 square kilometers between 76 local jurisdictions, 3 states and the federal government has been complex and delivered isolated results. The main coordination mechanism to promote regional development is that of metropolitan commissions like the Metropolitan Transportation and Highways Commission (COMETRAVI), the Metropolitan Commission on Human Settlements (COMETAH), the Metropolitan Water and Drainage Commission (CADAM), the Metropolitan Public Safety and Law Enforcement Commission (CMSPyPJ), Metropolitan Civil Protection Commission (COMEPROC) and the Metropolitan Environmental Commission (CAM).

Most commissions have seen an unstable operation and limited ability to make decisions. CAM has been one of the most relevant by controlling and improving air quality through the 2011-2020 Proaire Program that made Mexico City win the 2013 Siemens C40 & Climate Leadership Awards’ Air Quality category. Over the last two decades ProAire have recorded reductions in the local air pollution, as well as CO2 Emissions. The program's...
elements range from automobile and industrial emissions reduction to urban sprawl containment and public awareness campaigns. Meanwhile, the COMETAH, approved in 2012 the Land Use Management Program of the MCMA (POZMVM). The program proposes a regional vision to encourage investment that promotes sustainable, economic development and mobility however, this program has not been implemented.

Land use

Mexico City has a 2003 General Urban Development Program that is under an update process scheduled to be completed by 2018. Additionally, it has 16 Borough Programs and 45 master or community plans that determine land use.

Real estate pressures, a complicated regulatory framework to meet this demand and strong social demands in housing and services, have created an atmosphere of friction between the vision of a compact city, dynamic, polycentric, equitable, and sustainable raised by the city government and self-managed real estate developments leading to unhappy citizens.

Increasing urban land prices and lack of affordable housing contributed to expel more than 200,000 people per year in recent decades, particularly from the core area of Mexico City. Today new housing units that are close to employment and services are insufficient, as only 50% of the 40,000 housing units’ demand is met per year and only half of this number are social housing. The location of the of new units is driven by land prices and not by a TOD strategy resulting in a scattered housing supply where 90% of population growth is located either in faraway – low income suburban developments in the neighboring municipalities or in the conservation land around Mexico City through informal settlements.

Transport

Every day 1.3 million metropolitan workers commute to central Mexico City. The city has concentrated employment in corridors like Reforma and Insurgentes. Mexico City has become a more dynamic capital, more efficient mobility and more transport options environmentally friendly. To advance the
consolidation of the backbone of mobility City. Line 12 Metro Public Transport System 24 km was built, which provides service to more than 255,000 people daily and features avant-garde design stations. Also, in recent years it has changed the face of mobility in the city with the construction of six Metrobus lines; they total more than 130 km of exclusive lanes.

In order to improve air quality and almost 6000 buses over 88,000 taxis were replaced; the ultra-low sulfur diesel was introduced; They joined the Metrobus network of 578 buses with EPA 04 Euro III, IV and V, and improved Euro V diesel-electric hybrid technologies; units operating on compressed natural gas to RTP system also joined. Of the 7.7 million pollutant emissions were reduced by the previous administration, 62% corresponds to public transport, radically transforming the quality of life of our city.

With the implementation of ECOCICL, the city set a precedent in the region as the first city to have a public bicycle system automated and, from the third phase of expansion, reached 3,000 bicycles, making it the eighth world’s largest system. Bicycle mobility programs include installing thousand bike park racks; the implementation of the Sunday program “Move by Bike” and “Ciclotón monthly; the construction of bus-bike lanes; pedestrianizing and recovery of emblematic public spaces; and the implementation of actions for managing street parking as installing parking meters with the EcoParq program.

In January 2013 the city was awarded for his leadership and vision to implement projects that improve the quality of urban life with the 2013 Sustainable Transport Award (Sustainable Transport Award 2013).

Economy

The MCMA is ranked the 20th richest city in the world. It has an annual GDP of 2.6 trillion pesos equivalent to 202 million dollars with an annual per capita GDP of $22,668 dollars, twice the average of the whole country. Compared to other Latin American economies, MC would be the sixth largest in the region. Its economy is outsourced, business-oriented. Financial and real estate services contribute 22% to the GDP of the City, 17% trade, transport media 16% and corporate and business support services 11%.

Mexico City has positioned itself as a brand (CDMX) becoming one of the most important tourist destination in the country with more than 500,000 university students, 12 million domestic and foreign visitors, more than a hundred of museums and a hotel occupancy of 81.08%. Coupled with a governance structure that concentrates the federal and local authorities in its territory.

This has had an impact on economic activity, especially in real estate development. There are more than 400 housing or mixed-use developments larger than 5,000m² approved for construction during this administrative term, with approximately 9,500 million dollars in investment according to the Real Estate Developers Association of Mexico.

**National Framework Transport Oriented Development**

The main instrument of the National Urban Policy and Housing is the 2014-2018 National Urban and Housing Program, with its strategy 3 focused on mobility. The national government finally recognizes the challenge of integrating urban development policies with mobility. Among the program’s goals are:

- Promote sustainable mobility in cities in coordination with urban development policy.
- Design programs to discourage car use.
- Promote the use of mass transit.
- Replicate successful strategies to promote non-motorized transport: bike sharing systems and pedestrianizing.
- Prioritize investment in sustainable mass transit and non-motorized transport over investment in major roadworks (urban highways or roads distributors).
- Promote public transport solutions adapted to the reality and needs of each city.
Unfortunately, the National Urban and Housing Program has failed to broadly channel Federal funding for mobility and transport. So far, its implementation agency, SEDATU, promotes with local governments the design and implementation of a Sustainable Mobility Program but the lack of funds has restricted them to become mainstream. So, local governments are left with a package larger than their technical, economic and institutional capacity.

**TOD vision and objectives for your city (city wide, a specific corridor/selected station area levels);**

Mexico City has one of Latin America’s largest and more feasible TOD large platforms due to its transit system. In a 2015 study TOD, ITDP Identified the following assets:

- In an 800-meter radius around the 195 subway stations and 208 BRT stations there are 3,548 hectares occupied by low density uses.
- 163,355 vacant homes are located around these transport stations, a housing solution for approximately 588,078 people.
- Within a radius of 400 meters around the metro stations, the average building height is 4.8 levels, compared with 9.3 levels in other areas of the city.
- 3320.2 hectares could increase height in 4 or 5 levels by changing two zoning codes, H (housing) and HC (housing and commerce), to a residential use and office (HO).

The Mayor’s Plan to lead the city’s future is called the General Development Program for Mexico City 2013-2018. This Plan aims for a safe, dynamic, compact, polycentric, competitive and sustainable city. The vision wants to create a city of knowledge where productivity enhances and encourages investment coupled by a responsible, intelligent, professional government and an effective, transparent, participatory, honest framework.
To achieve this vision, the plan has a clear TOD objective at the city level based on the development of transit transfer centers and corridors. Strategy 4 named Habitability, services, public space and infrastructure in the Mayor’s Plan links TOD policies to actions to reduce single motorized trips and charging of externalities. The Plan defines two actions:

- **Density, mix use and TOD strategies to be incorporated in urban planning at all levels.**
- **Intensify the use of information technologies to promote teleworking and other actions to reduce trips.**

There are other components in the Mayor’s TOD Plan related to housing, public space, mass transit can be used to support a broader strategy TOD. Supporting the Mayor’s plan, the Mexico City Mobility Law, in article 37, calls for TOD related programs and projects to be done by the City and its boroughs. Derived from this law, the first Mexico City Mobility Plan 2014-2018 is the main planning document today, intended to align polices towards Transport Oriented Development. The plan defines specific corridors and selected stations, particularly at the transit transfer center to be developed as TODs.

Regarding housing, the review of the standard for intra-urban social housing production and the update of Mexico City Urban Development Program along with the formation of the new statutes of the City, can mean an advantage for the government of Mexico City to address the metropolitan scale, align sectoral policies to a systemic vision of the territory and introduce management and financing mechanisms to make TOD feasible at the city scale.

**II. INDICATORS TO MEASURE SUCCESS IN TOD**

The city has yet to reach this level in its TOD policy. Initially, the Mexico City Mobility Plan establishes one TOD indicator: the percentage of the urban area covered by public transport busway (square kilometers within the...
radius of 800 meters from all stops of public transport system exclusively via located in the territory of the DF / total square kilometers of urban surface DF) x 100 and sets two horizons:

- 39% in 2014
- 45% in 2018

Other TOD indicators under current discussion in the update process of Mexico City Urban Development Program are:

- Compactness Index (ratio population growth / territorial growth)
- Transformation of car dominated neighborhoods into walkable neighborhoods
- Concentration of development or urban renewal projects close to public transport (in 2016, 52% of development over 5,000 m2 is in 800 meters of transit)
- Metropolitan, city and neighborhood travel modal share.
- Average transfer time
- Growth rate of vehicle fleet
- Reduced parking spaces in developments near public transportation
- Social and mixed housing close to public transport (In 2016 only 2% of new developments include social housing)
- M2 of public space per capita

III. DESCRIPTION OF TOD ACTIVITIES

Today, the key TOD programs and projects are included in the Mexico City Mobility Plan. Relevant TOD programs are expected to be a structural par

The most relevant TOD programs are:

1. Transit Transfer Centers (CETRAM)

There are 45 CETRAMs in Mexico City. Some of the most relevant are Indios Verdes in the north, Constitution of 1917, southeast, and Pantitlán in the east with 850,000, 807,000 and 700,000 passengers per day, respectively. The plan aims to redesign these and others CETRAMs and their environment, ensuring intermodality, safety and accessibility for pedestrians, cyclists and people with disabilities. Guidelines and design criteria for the upgrade and renewal of CETRAMs are under development.

Renewal strategies include: a deep physical transformation and a new management of CETRAMs by considering the development of the urban, commercial and service areas around them. The cultural and social character of the area is to be considered. A concession scheme for the use, development and exploitation of the land occupied by CETRAM is the key driver. Changes to the legal framework are in progress. The Guidelines and Criteria for Proposals for the Reorganization of Transit Transfer Centers were published in April last year; while a new standard for social housing, to promote access to housing in the immediate surroundings of the areas served by mass transit is under discussion at the City Council.

2. System for Cooperative Action (SAC)

A planning tool currently under testing that aims for the recovery, transformation and revitalization of traditional neighborhoods towards TOD communities. It is a new participatory mechanism that creates a Neighborhood Advisory Council with the participation of residents, non-residents, the borough authority, the private sector and Mexico City Government agencies that will determine the actions of the SAC.

3. Social and Economic Development Zones (ZODES)

The ZODES are strategic development areas at the metropolitan level. They are developed by strategic partnerships whose terms of location, land use, equipment and other intangible assets of government are defined by the
the Mexico City Government. The ZODES aim to stimulate productivity and generate investment towards social infrastructure to recover, develop, densify and to increase the asset value of the area in benefit of its inhabitants.


The Government of the Federal District through a public company created specifically to develop ZODES has legal tool called the Program of Temporary Incorporation of Public Goods for Development (PITB) addressed to all sectors of the population that have property (land, infrastructure, patents, royalties, utility models) which with the support of City Government, can be enhanced for the development of ZODES (land uses, densities, utilities, marketing rights, future acquisition of patents, utility models to generate utilities).

Social inclusion aspects in these TOD programs is a relevant topic. Natural resilience aspects in TOD are not yet fully discussed. Mexico City is part of the 100 Resilient Cities program. In June the City will launch it resiliency strategy where TOD will play a major role.

IV. KEY CHALLENGES YOU FACE

Mexico City has an outdate planning system to meet today’s and future challenges. The current development pattern is private development occurring at the building level on isolated plots without a comprehensive strategy. Density has been enhanced but the lack of design guidelines and proper planning instruments have delivered density in a scattered pattern that does not take advantage of Mexico City broad TOD opportunities.

Abundant policy contradictions between the law, policies, planning instruments and construction codes limit the production of housing resulting in widespread density of 1 dwelling each 70m2 as the average property. Zoning criteria does not consider access to transport or actual provision of basic services (water, public space, health, education).
Challenges at the corridor level

Mexico City already has a number of tools that facilitate DOT intervention at corridor level. It has the Mobility Plan that defines corridors to be develop, and a norm that allows the transfer of development rights. Nevertheless, it is urgent to update the Mexico City Urban Development Program to obtain a comprehensive view of the system.

Challenges at the station level

It is at this level where the main challenge is found towards high quality DOT. The current approach has not yet reached the design level. However, the rapid pace of construction makes it urgent to reach this level of detail and at the same time allowing the development processes to continue. Mexico City does not have a one-stop shop where all its norms and criteria meet for an orderly process. Today the existence of different regulations complicates the route for a DOT project.

It is important that Mexico City refines the terms of public-private partnership to ensure that the private sector does a good job. The public sector must break down the barriers of rapprochement with the private sector and can open a positive dialogue with developers about the impact of their projects in the city to ensure the public interest in every project.

V. KEY SOLUTIONS AND GOOD PRACTICES

1. Mexico City Airport Urban Transformation

One of the largest and most fascinating urban transformations in Mexico City is being planned with the opportunity of renovating the use of the existing airport and the associated urban regeneration. The Mexico City Government is receiving ideas and promoting digital citizen engagement through a portal (http://laopiniondelaciudad.mx/) for alternatives to the terrain of the future old airport and the surrounding areas. This is a space for all citizens to participate in a democratic exercise following five principles to guide this process: 1. Equity and social cohesion; 2. Transparency and participation; 3. Environmental sustainability; 4. Employment opportunities; and 5. Economic development. The size and characteristics of the existing area airport area is an opportunity to rethink development and social cohesion of the entire city:

- 710 hectares
- 1.9 million jobs around a 6 km radius
- 2.2 times the size of Central Park
- USD 4.4 billion of value added generated by activities at the airport area

2. Masterplan Granadas

The Agency of Urban Development and Housing (SEDUVI) has applied a SAC in this area that includes 12 communities of the Miguel Hidalgo borough, in the northwest of the City. The project includes the construction of a new subway station on Line 7 that will give access to a new 4-hectare public park. The Master Plan was carried out through an agreement with companies such as Carso, Model, Giant, and BBVA-Bancomer. To improve the mobility of the area there will be at least eight parking lots and a mass transit lines such as Metrobus or a tram.

3. CETRAM Chapultepec

A private investment of 3,440 million pesos meant as a deep “surgery” in the area whose story started six years ago. Spanish companies won the contest to provide all the material, human and financial resources for the implementation of Cetram Chapultepec. There will be a circular esplanade to connect Avenida Chapultepec to the Chapultepec Park. Expected to be completed in 2018 and attract 22,000 jobs.

Works include road adjustment, flyovers, vehicular tunnels, removal of informal vendors and public space. A new shopping mall, convenience stores, and office complex and a clinic, all in a tower of 41 levels. The shopping
complex will integrate the building of the Federal Ministry of Health and the new Richard Rogers signed BBVA-Bancomer Tower, opened this year with 7,000 employees. 27 public transport routes will depart from this point.

4. SAC Colonia Doctores redevelopment

The Ministry of Urban Development and Housing (SEDUVI) has launched a SAC in the Doctores-Buenos Aires area, a centrally located low to middle income sector known for its urban fabric degradation. The SAC aims for the recovery, transformation and revitalization of these traditional neighborhoods who surprisingly have very dynamic economic activity propelled by government offices such as the Ministry of Finance, the High Court of Justice and the General Attorney Office.

5. SAC Tacubaya

Another SAC area in the Miguel Hidalgo borough that was recently publicly announced in the Official Gazette of the City, constituted and coordinated by the Ministry of Urban Development and Housing (Seduvi), although they participate various units of local government and individuals, which must obtain the appropriate licenses and permits, without being exempt from payments, fees and contributions to project development. The objectives include the reordering of public space, works to improve the operation of the Center for Modal Transfer, projects that encourage housing development without expelling the inhabitants. It is also contemplated to restore and preserve buildings of artistic or heritage value, as well as works to improve hydraulic, sanitary, electrical communication network. The program will consider bikeways and pedestrian corridors, sustainable housing, mechanisms for savings in water consumption and pedestrian accessibility.

6. Metro Expansion

A 43.5 kilometer Metro Expansion Plan for the next three years has been recently announced by the Mexico City Government. Five projects for the extension of lines 7, 9, 12, A and B. Line 9 will add 1 kilometer from Tacubaya to Observatorio. Line 12 will add 4.5 kilometers and 3 new stations also connecting to Observatorio, thus making of this station a large regional hub on...
the west since the Mexico City-Toluca intercity train will have here its terminal. Line A, in the neighboring State of Mexico, will add 13 kilometers and 7 new stations reaching far west to the low income municipality of Chalco. The construction of the new Mexico City International Airport (NAICDMX) will require the expansion of 5 kilometers from the B Line to the new airport and creating an Express Line 20 kilometers long connecting the Auditorio station of Line 7 located in the business district of Polanco to the NAICDMX.

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MUMBAI CITY TOD REPORT

By

PARAMJEET SINGH
Introduction

The 2011 Census report indicates a population of over 12 million people living in Mumbai city over an area of 427sq km. The Comprehensive Transportation Study of 2008 for the city and its region revealed that 51% of all trips (vehicular and non-motorised) are made by walk and 78.2% of purely vehicular trips are made by public transportation. This high usage of public transportation and walking modes are a result of dense, mixed use neighbourhoods that traditionally agglomerated around suburban railway stations.

Mass transportation system planning, implementation and operations however, are handled by agencies other than the city municipal corporation that plans land use and its regulation. Coordination between these agencies is typically a challenge, resulting in poor integration of transport and land use.

High transit dependency and ridership has prompted city stakeholders to presume that Mumbai has naturally, over the years, adapted to transit stations; while this is probably true; current realities indicate a worrying trend. Regulations set in the existing development plan greatly incentivise ownership of private vehicles with excessive shops available to build parking structures, even close to railway stations. Suburbs are incentivised to proliferate in a bid to decongest the old city areas. Metro and mono rail alignments are under construction without considerations to integrate land use.

Mumbai Transit Context

Mumbai city, the financial capital of India sits within the Mumbai Metropolitan Region (MMR), which is one of the fastest growing metropolitan regions in India. The city consists of three districts, the island city (or main city), the western suburbs and the eastern suburbs. Mumbai is a linear city (refer Figure 1) surrounded by water on three sides with an expanding suburban region to its North and East. The current island city was formed by seven successive reclamations. The city is connected across the north-south axes, through a system of rails along the western, central and eastern arterial corridors that continue into the mega-region across Greater Mumbai (GM) boundaries into the region.

The suburban railway transports up to 7 million people every day, of which most people travel from the MMR to the City for work, education and other purposes. Figure 1 illustrates the city’s unique context while presenting key findings from the Comprehensive Transportation Study (CTS), conducted by the Mumbai Metropolitan Region Development Authority (MMRDA), for the MMR. The report indicates walking as the main mode of mobility across the region. For trips made partly on motorized modes, 78% of the trips are conducted on public transit (i.e. Suburban Railway and BEST bus services) as the main mode, which is extremely efficient in terms of energy consumption, environmental costs and per capita space requirements. As for the 51% trips made on foot, the economically weaker sections (EWS) constitute 60% of those trips.

The CTS report states that a large percentage of people using public transit and walking modes live in high density and low-income housing types, with a low quality of life. Hence these are more captive choices and not habitual, based on several aspects such as low incomes, lack of affordable housing within the main city and low levels of service in public transit facilities. Increasing numbers of vehicle ownership within middle class households can therefore be perceived as a threat to existing mode shares, because as incomes rise, dependency on public transit has a possibility of dropping.
Opportunities and Challenges in a Growing City

Increasing levels of congestion on Mumbai roads has created the need and aspiration for newer Mass Rapid Transit Systems (MRTS) to supplement existing modes and improve east-west connectivity. Currently, Mumbai city is in the process of developing two new rail-based modes, a Metro Rail and a Mono Rail, (see alignment in Figure 1). The Metro line 1 will connect Versova (a western suburb) to Ghatkopar (an eastern suburb), and the Mono rail, which is expected to connect Wadala (an upcoming residential area along the eastern water front) to Lower Parel (a largely commercial district in central Mumbai). These stations are expected to intersect with the existing suburban railways at key stations that would serve as interchange points from north-south to east-west. This presents new opportunities to look at inter-modal connectivity, and integrating these routes into the existing transport network of the city.

The CTS report states that population densities in GM are extremely high, (45,900 persons/ sq.km in the Island city and more than 20,000 persons/ sq.km in the suburbs). Additionally, across the city we have a well distributed and diverse mix of land uses. The high mode share of walking trips can be clearly attributed to the diversity of uses within the city, making distances smaller with interspersed activities allowing for trip-chaining. Due to the restrictive geography of the city, there is little possibility for lateral expansion; hence the island city and the suburbs have a dense and compact built environment, concentrated close to suburban railway stations and major arterial roads. Owing to this high density is a resultant lack of space. The city has a total of 262.20 sq.km of open spaces, i.e. approximately 46,000 persons/ sq.km of open space, which is significantly low.

Private vehicle ownership in Mumbai has grown by 47% over a decade (from 1996 to 2005). Accident data for the Greater Mumbai region shows that in 2009 alone, 607 people suffered fatal accidents and 628 people were killed on the spot. An average of victims of fatal accidents in Mumbai from 2008-2012, by mode, shows that 58% of the victims were pedestrians and 29% were motorcyclists. Comparing the existing mode shares to vehicular ownership, the CTS report states that even though vehicle ownership has increased, a majority of the population still uses public transit or walks for most trips, and 30% of people owning vehicles continue to use public transport. However, due to the increase in fatalities and congestion levels in the city, some share of pedestrians, NMT and public transport users who own vehicles have shifted to private modes.

Pedestrian safety across the city is greatly compromised right from a lack of infrastructure to poor traffic behaviour, management and enforcement. With new transit modes planned in the city there is a huge opportunity to retain existing mode shares and promote a modal shift, addressing issues of appropriate design for pedestrian access to transit nodes and key destinations as an immediate priority.

The redevelopment of old dilapidated buildings within the inner city or the mill lands in central Mumbai, has been used as a tool to provide high end housing and office buildings to match prevalent land values, bringing populations of car users close to transit, while replacing some existing typologies of compact, affordable housing. The Island city, as mentioned earlier, has no scope for lateral expansion, although the demand for housing, amenities and services is extremely high. Using FAR [Floor Area Ratio: defined as a ratio of the total built up area of a building to the plot area the building is located on] as a tool to incentivize redevelopment, there is a huge opportunity to provide some of the most necessary amenities to the city. However, FAR is essentially used to intensify built-up area producing
disproportionately tall and wide structures by amalgamating small plots (in the inner city) and privatizing large parcels of the Mill lands, without addressing the need for amenities.

Additionally, skewed parking policies applied as blanket norms across the city are resulting in buildings with very high FAR consumptions and liberal parking provisions, encouraging private vehicle ownership and use. The introduction section of the paper presents a detailed statistical account of Greater Mumbai, which constitutes a dense, compact built environment with a diverse mix of land uses. Extensive access to transit and subsequent efforts to supply multiple-modes present an advance and mature transit network in the city as a great opportunity to address some of the pressing challenges faced by the city today. The next section of the paper takes a closer look at the Development Control Regulations (DCRs) to show that blanket parking norms liberally applied across the city may, not only incentivize car ownership within transit rich precincts, but also decrease the city’s transit dependency. Further, the paper argues that based on dominant income groups in a given area or plot, the neighbourhood layout, building typologies and importantly proximity to a transit node, the amount and type of parking provided should be regulated.

CURRENT REGULATORY FRAMEWORKS

Current Parking Regulations as per the existing Mumbai DP (1993 to 2013)

Current parking norms for different land uses in Mumbai are laid out as a blanket policy applicable across the city. As per the DP 1991 (currently in effect) parking norms prevalent in the city include:

1. For plots reserved as parking lots, a built up area equivalent to the zonal permissible FAR for the area under reservation will be available for free for the Corporation (MCGM) or any other appropriate authority; the area handed over as parking lot will be free of FAR. The authority or owner may be allowed to develop the parking lot for the public, utilizing the full built-up area equivalent to the FAR available. The parking lot may be provided as a basement, on an open space, under stilts or even upper floors.

2. Based on the cluster redevelopment policy DCR 33/ [9], an urban renewal scheme can be proposed for an area of minimum 4000 sq.mt with an incentive FAR of 55%. If a parking lot is proposed in the scheme, it can consume a built up area equivalent to the zonal permissible FAR for the area under reservation. The maximum permissible FAR for the plot (existing FAR + additional incentive FAR) should not be more than 4 (or 3 based on zonal codes). The Built up area consumed by the parking lot is free of FAR.

3. Additionally, for the sale component of either Cess building or slum redevelopment schemes, a minimum of one parking space per dwelling unit has to be provided. This adds to the overall parking provision and FAR consumed on any given plot within the Island city.

4. Developers or a public authority or organization proposing a multi-storeyed parking lot close to a transit node, follow the same norms as described above. Additionally, they are given a 50% incentive FAR. Within the Island city the total consumable FAR (not including built-up area consumed by parking) is capped at 4 and within Greater Mumbai it is 3.

5. Among these regulations, the BEST bus depot, station or Terminus redevelopment norms present a good example. For sites redeveloped to provide for proposed reservations for commercial or amenity use, only 30% of existing permissible FAR will be allowed, out of which 50% of built up area is proposed on the ground and the remaining on floors above. A Traffic Impact Assessment (TIA) study is expected to be conducted to ensure that the new
development does not interfere with the existing functions of the BEST services, and does not negatively impact existing traffic volumes on the roads abutting it. If the TIA shows negative impacts, the Commissioner has the right to restrict the development to a justifiable extent. The development has to include the required parking and other services and utilities as per norms within the permissible FAR.

Outcomes of the Current Parking Regulations in Mumbai

Current parking norms as listed in the previous section present a worrisome future towards city growth and urban renewal in Mumbai, especially within the Island City. Using intensification of built-up area (or additional FAR) as a key tool to incentivise redevelopment and planning within the city has resulted in segregated, unsafe and unliveable conditions of housing. Several streets are lined with inactive and empty parking lots often 20 storeys high with no commercial edge or activity to relate to the pedestrian scale and sight lines.

This condition of over provision has most drastically affected neighbourhoods in the inner city of Mumbai that fall under the cess building regulations. Based on the 2008 assessment of inner city precincts, there are 16,104 buildings under cess in Mumbai. Based on these regulations developers not only get an equivalent FAR as that consumed by the plot to build a parking lot, but also an incentive 50% for accommodating a parking lot within the building, allowing them to build up to 4 FAR. This model is being widely adopted by developers building in the inner city as a means to go higher and consume more FAR in some of the most valuable areas of the city. These areas however, are also traditional and historic bazaar (market) precincts of the Island city. These neighbourhoods grew around transit stations, with a rich and diverse mix of land uses, affordable housing and compact living environments. The images (figures 2 and 3) are of buildings located in Girgaum; about 500 meters from Marine Lines railway station, and has buildings more than 100 years old.

The sequence of photographs (figure 4) show a commercial complex built as the redevelopment of Mill land, close to Elphinstone Railway station. The image below shows the experience of a pedestrian walking to Elphinstone station from the main road. This used to be a traditional pedestrian route taken by the mill workers and other employees working in the precinct and opened out directly into the station area.

What is striking in the above case examples is the proximity of transit to the buildings or complexes identified. Inappropriately high parking supply around transit nodes is resulting in an increase in ‘car density’ close to transit nodes. Due to a lack of regulations guiding urban form decisions, the most unsafe environments are proliferating. The Development Plan of Mumbai which will be in force for the next 20 years is currently under revision and presents an opportunity to integrate TOD regulations for the city to be transit and people oriented.

Background of the Mumbai Development Plan

The Development Plan of Mumbai follows the directives laid down in the State Town and Country Planning Act. Unfortunately for a plan that determines important parameters of growth of the city such as land use and its development control regulations, it is comprehensively to be revised once in twenty years. Added to that are long drawn delays in its sanctioning process which led to the
existing plan which was published in the mid-80s to get sanction only in 1993. This particular plan which was formulated in the pre-liberalisation period had to last about twenty years after it.

Setting out growth directions for the financial capital of the country for an inconceivable twenty to thirty years ahead has had several drawbacks and failures and a meagre rate of success. The entire island city which houses the main CBD of the city for example was allocated a flat 1.33 FAR at a time when several buildings had already consumed an FAR of 3 and above. Without changes to the overall master plan itself the regulations underwent several piece meal modifications to be able to accommodate post liberalisation macroeconomic market oriented trends. Transfers of development rights and ‘bonus FAR’ redevelopment norms have caused several sporadic high-rise structures and augmented FAR trends to proliferate around the city and its suburbs. The impacts of these changes were not fathomed in terms of adequacy in areas such as infrastructure, amenities, open spaces and parking.

The Mumbai DP is a statutory document that can set planning priorities at the city level to ensure that the city, through its phases of redevelopment, is consciously oriented towards transit and pedestrian priority. However, the concept of a ‘transit oriented development’ is highly misunderstood in the context of Mumbai (in particular), and is driven by a discourse merely around intensification of built-up area without addressing amenity provision. In a city that is as transit dependent as Mumbai, Development Control regulations (DCRs) must stipulate transit oriented norms rather than ones that are private automobile-oriented.

**TRANSIT-ORIENTED VS TRANSIT-ADJACENT DEVELOPMENTS**

**What is TOD?**

Transit-oriented Developments or TOD can be defined as a planning paradigm that results in the creation of compact, walkable and liveable communities with access to amenities, built around high quality mass transit stations.

A TOD is planned within the ‘influence zone’ of a mass-transit system. The ‘influence zone’ is delineated based on access to the transit station by walk or non-motorized transit modes. It can be defined by an indicator called the ‘ped-shed analysis’ which correlates the distance walked/ cycled to the time taken to reach the station area. The influence zone of a transit station can be identified as a “TOD Zone” for a particular transit node, and may vary based on people’s willingness to walk-to-transit in different city contexts. Additionally, the commuter capacity of a system and the proximity between stations may impact the extent of the TOD zone. TOD for a BRTS is often planned as a corridor like in Curitiba, Brazil, and that for a Metro Rail as in Delhi, is planned as nodes around key stations.

Ewing and Cervero developed a framework of 6-D variables, widely used as a method to moderate travel demand by changing the built environment; these variables include: Density, Diversity, Design, Destination Accessibility, Distance to Transit, and Demand Management. For the context of Mumbai these can be adopted as key principles towards developing a comprehensive approach to TOD in the revision of the Mumbai Development Plan. Key objectives could thus be defined local to the Mumbai context as, a need to manage people densities, while ensuring a diversity of land uses,
allowing well designed access to destinations, transit nodes and feeder networks, and rationalizing private vehicle usage through comprehensive demand management strategies.

**TOD and TAD—Similar Concepts, Very Different Cities**

A city that incorporates the 6-D variables into a comprehensive planning process for TOD enables a healthy, lively and attractive city life, that is ‘people-oriented’ and safe for all. However, only capitalizing on land values and accessibility advantages around station areas, to increase built-up density without addressing all the other D-variables, results in what is termed as Transit-adjacent Development (or TAD). TAD signifies development that is in close proximity to transit stations but promotes auto-oriented planning such as sparse people densities, luxurious living environments, single or segregated land uses and ample provision of parking. Hence, a TAD is similar to TOD as both paradigms prioritize and propagate development close to transit; however TAD as an approach is just limited to that. Adjacency to transit thus does not ensure a liveable, walkable and healthy neighbourhood with increased quality of life; it merely ensures proximity to transit by capitalizing on high land values. This form of planning is not people-oriented and in the context of Mumbai is often even auto-oriented.

Daily commuters of the suburban railways in Mumbai have to not only overcome peak hour crowding within the train compartments but must also suffer poor last mile connectivity to their work and home destinations. Most suburban railway stations provide inadequate to no infrastructure for intermodal connectivity to intermediate public transit (IPT) like auto-rickshaws and taxis, and feeder bus services. Station areas are characteristic of vibrant markets, active streets and high land values that prompt high densities. High footfalls of commuters, businesses and residents within the stations influence zones leads to congested station areas with low services provision.

Once new systems like the Metro or Mono rail begin operations in the city, it will be important to develop these TOD precincts with adequate provision of open spaces, housing, amenities like schools, hospitals and mixed uses that promote walking trips. However, it is not only a lack of accessibility, but a general disregard for all other TOD principles, which often result in station areas being the most undesirable spaces for work or living. Integrating the above objectives into the vision for the Development Plan of Mumbai will enable planning and building a city that is transit and people-oriented.

**STAKEHOLDER ASPIRATIONS AND APPREHENSIONS**

Recently revised development plans of other metropolitan cities such as Delhi and Ahmedabad indicate a trend of intensification of built up areas rather than addressing the comprehensive principles of TOD. When the on-ground effects of the current regulations were presented to MCGM it evoked concerns towards developing comprehensive strategies for parking within TOD zones. A realization that there is a need to shift the TOD discourse from intensification of built-up area to a management of people densities, providing access to amenities and a better quality of life, was brought to the table. This section facilitates a review of the current TOD discourse in India followed by a shift in the discourse.

**The Current TOD Discourse in India**
The current TOD discourse in India focuses on densification. Ahmedabad City has incorporated a TOD framework into their Development Plan (DP). However, the framework is geared towards building high density ‘transit corridors’ across the BRTS corridor, with purchasable FAR. Land use regulations are addressed as an ‘overlay zone’ to allow for transit supportive land uses along the TOD corridor. In terms of parking the DP reduces parking by 10% for commercial uses; however there is no cap or reduction in parking norms for residential uses. Additionally, the DP seems to present high level visions for TOD, but regulations enforcing better design norms and encouraging a modal shift, remain unaddressed.

The Delhi Master Plan has also incorporated a TOD strategy along their Mass Rapid Transit System (MRTS) corridors. Here, land use regulations are addressed as a special use called the ‘White Zone’. All areas that fall under the White Zone follow specific land use regulations. Unlike Ahmedabad, the Delhi plan incorporates detailed strategies with an extremely holistic approach. However, due to an existing auto-centric plan, the TOD strategy for Delhi is geared towards increasing densities along the MRTS corridor and around stations within a 1km radius (i.e. within the ‘white zone’). The plan also prescribes ‘mixed land uses’ as a special category and prioritizes mixed use developments within the TOD influence zone.

As the Development Plan for Mumbai (1993 to 2013) has reached its terminal year the Municipal Corporation of Greater Mumbai (MCGM) had floated a request for proposal to invite consultants to assist in the plan’s revision. Transit Oriented Development (TOD) was a stated requirement in the scope of work. However the stakeholder aspiration is reflected in terms of built up area densification only, as stated “FAR pattern should respond to accessibility variation on account of transport infrastructure and should not be lower than already consumed FAR that can prevent redevelopment. If TDRs are proposed ‘originating’ and ‘receiving’ areas may be carefully defined.” While acknowledging that the previous pattern of uniform blanket FAR could now vary, it suggests varying patterns could be addressed with respect to transit and a few other parameters such as water features and conservation areas.

**Shifting the TOD Discourse:**

As part of EMBARQ India’s efforts to influence the revision of the Development Plan to incorporate a more comprehensive TOD framework rather than just address FAR, it was met with some reservations from city stakeholders. The sheer numbers of people who use public transport and the high densities of the city (as discussed earlier) prompted stakeholders to comment that TOD was not a requirement in Mumbai as all of Mumbai was anyway TOD. With important challenges such as housing, redevelopment, higher FAR consumption and transfer of development rights taking priority in the stakeholders’ minds, the on-ground cumulative effects of such policies have not been assessed. The vision for the city may not be very far from one that prioritizes transit as an important spine for the city; it however fails to support it with adequate regulations and guidelines to enforce a people-oriented plan, and is instead incentivising vehicle oriented regulations.

An argument presented by the city stakeholders against a comprehensive TOD framework was that a development plan which addresses the city at an aggregate scale does not address the ‘nitty-gritties’ of street design and accessibility but rather deals with land utilisation and its related regulations within plots. This is often a challenge in the Indian context wherein the use of private land has city level regulations and restrictions but regulations for the public realm however are
neither comprehensive nor binding on any particular government agency. This is a scenario when more than 45% of the city’s land is publically owned such as highways, urban roads, street networks, parks, water bodies, beaches etc. Also since a plethora of agencies act in this public realm no single agency can be assigned the onus of its design and upkeep.

Picking on the aspect of parking regulations being an integral part of the plan and by highlighting the drawbacks and cumulative effects the current regulations has had on the city, immediately struck a chord with the stakeholders. This angle of parking became a key entry point for EMBARQ India to engage more deeply in the TOD conversation within the Development Plan. A comprehensive approach to manage vehicles and prioritise people is a pressing need, and EMBARQ India is engaging with key stakeholders as an effort to develop an approach contextual to Mumbai.

CONCLUSIONS

In most countries across the world trying to move from auto-oriented to people-oriented planning, parking is part of a larger umbrella of Travel Demand Management (TDM) strategies. The Victoria Transport Policy Institute (VTPI) refers to Travel Demand Management as, “a variety of strategies that change travel behaviour (how, when, and where people travel) in order to improve transportation system efficiency and achieve key regional objectives, such as reduced traffic congestion, increased safety and mobility, energy conservation and emission reductions.” TDM strategies are two pronged: they provide guidelines for the built environment, and enable a shift in travel behaviour towards more sustainable mode choices.

The city of Mumbai is on the anvil of planning and visioning the city’s growth path for the next twenty years through the revision of its development plan. Policies incentivizing redevelopment and an intensification of FAR coupled with overprovision of parking supply, have resulted in largely single-use, auto-oriented living environments with low standards of walkability. These policies show even worse results in the inner city precinct of Mumbai, where street widths are narrow and plot sizes are small. Easy and cheap availability of parking supply has incentivised an increase in vehicle ownership. This in turn increases the demand for auto-oriented planning, thereby reversing the trend from sustainable mode shares to private vehicular modes.

Conversely, enhancing land use planning regulations and enforcing strict parking norms will ensure a modal shift to sustainable and affordable modes, which in turn will result in increase in transit dependency. In Mumbai, parking has presented itself as one of the critical entry points towards facilitating ‘transit oriented’ neighbourhoods, and therefore the right approach towards parking provision needs to be articulated at city and local neighbourhood levels.

Defining a Parking Approach for Mumbai

In Mumbai currently, the conventional approach is what is prevalent, resulting in an extreme overprovision by projecting present and future demand and attempting to match it. A team of consultants made conversations with MCGM to develop a comprehensive approach towards parking and travel demand management in Mumbai as a framework that guides TOD strategies towards managing “people densities” rather than merely increasing built-up area. There are five distinct strategies that are being explored:

1. ‘Walkable Park-Once TOD neighbourhoods’:
TOD influence zones (and other transit efficient, walkable or sensitive areas) can be determined as ‘park-once’ precincts where parking norms are defined at area or neighbourhood level, and not for individual plots. Parking spots are commonly shared across the neighbourhood irrespective of where they are located, and can be regulated by providing residential permits or congestion pricing for different uses. These are essentially dense, walkable, mixed-use precincts where parking is either privately provided or is public. These would include:

a. Controlled Parking Zones (CPZ) where effective parking management can be carried out;
b. Restrict or abolish parking supply around transit stations to effectively decongest the area and provide better access for commuters;
c. Unbundle parking and housing, to ensure homeowners and buyers are not forced to buy parking lots and further new cars.

2. Revert to Parking Maximums within TOD zone! (Or at least much lower minimums).

Parking minimum norms are based on projecting a demand for parking and matching it to the minimum, hence result in overprovision of parking supply. Abolishing minimums, at least within TOD influence zones, and replacing them with parking maximums, will ensure that the projected demand is matched at maximum, and nothing more will be provided. This is only effective with an extremely stringent enforcement and management of on-street parking; hence a comprehensive off-street and on-street management model must be developed. Strategies would include:

a. Different parking norms for TOD zones and non TOD zones, enforcing zero minimums within TOD zones as private vehicle ridership is low in Mumbai and public transit ridership is the highest.
b. Parking toolkits or calculators can be developed to allow developers and investors to calculate the amount of parking through transparent models to minimize conflict within stakeholders.

3. Urban Form guidelines for quality Off-Street Parking

Provide Urban Design guidelines to enable developers building public parking lots within their dedicated plot areas, to make sensitive design choices that result in active streets, safe for pedestrians at all times. Most examples of poor built form typologies seen in the previous section are a failure of non-descriptive urban form guidelines that could help deliver better street interfaces and human conditions of living. These would include:

a. Building plan approval procedures must include a section on urban form guidelines for better street interface;
b. Parking provided whether stilt or surface level should be strictly set to the rear of the building and not at the street edge; building frontage must incorporate an active street edge with pedestrian friendly uses such as shops, restaurants, amenities and other diverse land uses.
c. Instead of making all allowable parking to be free of FAR, only a percentage, say 25%, of parking above ground can be considered free of FAR while anything above and beyond that is counted in FAR.
d. If public parking is provided within a new building, every square feet of parking until the maximum is to be counted within FAR.

Ensuring a certain amount of flexibility in special areas, like TOD influence zones, heritage precincts, inner city areas, or Central Business Districts, to meet required parking norms.

a. Authorizing shared parking norms, thereby allowing developers to meet parking requirements within a 100-200 meter distance of his plot through purchased parking spaces;
b. Applying Deficiency charges (or parking-in-lieu fees) to allow parking deficiency in some areas. Heritage areas could apply deficiency charges;
c. Local stakeholders and community groups could participate in pricing models thereby being allowed to use a portion of the revenues generated towards the maintenance of the neighbourhood.

5. Lower parking norms for small sites/ developments (and exempt smallest altogether)

Most cities have a tendency of developing unfeasible regulations and then running them into fiscal tools, which can be very harmful in the long run. Relating parking maximums to plot areas and FAR consumption rather than number of tenements and tenement sizes, helps regulate the amount of provision.

a. Exempt plots smaller than 500 sq. mt from providing parking, while encouraging large plot buildings to accommodate for more parking; this will help retain smaller plot sizes and walkable block-sizes.

Housing is a Right, Parking is not!

In Mumbai, there is a large majority of people who live in sub-standard living conditions. The CTS report states that 50% of people in Greater Mumbai and 27% of the people in the MMR region live in some form of informal housing that is poorly serviced by basic infrastructure. That is, from the total population of people living in informal settlements in the region, 75% live in Greater Mumbai. A total of 1,959 slum settlements have been identified in GM, with a population of 6.5million people. The report also shows that slum households have 8% more people working than apartment households, and modal splits by housing types show that almost 60% of the people who walk to work, live in slums (in the MMR).

There is an acute shortage of housing in the city that demands even working class families to live in sub-standard living conditions. In a city where housing is a scarce commodity and quality of life is marginalized, giving free FAR to parking spaces will further exacerbate the housing crisis and housing costs. In residential high rises, monthly maintenance and rent increases with increase in building height, which may lead to an eventual suburbanization of the poor currently concentrated within Greater Mumbai.

Trends of development in Mumbai today are directed towards increasing FAR without engaging in a more relevant practice of managing “people densities”. Based on the incredible mode shares recorded in the city it would be unfortunate to merely use densification as a tool to address development and redevelopment within TOD zones. This approach is seen to incentivise larger dwelling unit sizes, land price escalation, and the suburbanization of poverty. With an unfavourable trend towards increased private vehicle ownership in the city as incomes rise, and demand for parking exceeds supply during
most periods of the day, increasing the number of public parking places by order of magnitude, is essential. A blanket ‘one size fits all’ parking policy however, has become a means to promote car ownership and therefore shift modes towards private car use.

Vehicle ownership within the city is still fairly low. In emerging economies, where vehicular ownership is gradually increasing but is still not an indispensable mode or habit, planning methods and regulations need to protect the existing modal splits and make sustainable transport modes an attractive and easily accessed option. Setting the city on a sustainable growth path should also be prioritised, despite other pressing problems, by orienting urban development around transit.
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1. Map of Mumbai City, showing the suburban rail network for regional connectivity, and two newer proposed modes—mono and metro rail

2. Rehabilitation building in the centre with parking lots towering up to 7 stories on all three sides, Girgaum, Mumbai

3. Multi-level car parking lot towering up to seven stories, Girgaum, Mumbai

4. One India Bulls Commercial Complex (extreme right) and Elphinstone Road railway station access (left and centre) road, Elphinstone Road, Mumbai
Fig. 1: Map of Mumbai City, showing the suburban rail network for regional connectivity, and two newer proposed modes—mono and metro rail.
Fig. 2: Rehabilitation building in the centre with parking lots towering up to 7 stories on all three sides. Girgaum, Mumbai
FIGURE 3 Inner City Redevelopment, Girgaum, Mumbai

Fig. 3: Multi-level car parking lot towering up to seven stories, Girgaum, Mumbai
Fig. 4: One India Bulls Commercial Complex (extreme right) and Elphinstone Road railway station access (left and centre) road, Elphinstone Road, Mumbai.

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TOD Implementation of Nanchang, CHINA

Background
Nanchang, the thriving capital city of Jiangxi Province with a population of 2.3 million, is being transformed by the construction of a 70 kilometers metro system to be completed by 2020.

Located in southeastern China, Nanchang’s central location relative to the Pearl River and Yangtze Delta regions as well as to the junctions of major highways makes it a major transportation hub (see Figure 5.1). In addition to being the capital city and a major transportation hub, Nanchang is also a regional center for agricultural production in Jiangxi province. The city hosts many manufacturing firms including cotton textiles and yarn, paper products, food processing, agricultural chemicals and insecticides, and Chinese medicine and other pharmaceuticals.

The GDP is 366.7 billion in 2014. Growth rate is 9.8 percent compared with last year, indicating Nanchang’s rapid economic growth. Nanchang’s strong economic growth has also triggered a rapid rate of urbanization. According to the United Nations Department of Economic and Social Affairs, Population Division (2011), the population in Nanchang’s core city areas (330 square kilometers) increased from 1.6 to 2.3 million people from 2000 to 2010, or by 44 percent. It also projects that population in the core urban area will continue to grow, reaching 2.8 million by 2015, and then 3.5 million by 2025 (see Figure 5.3). Due to rapid population growth at the city center, proper land use and transportation planning becomes crucial.

Urban Planning In 1995, a new strategic plan was established to extend city development across the river to its left bend. Industrial and residential development started to occur on the northern part of Nanchang’s city center. The goal at that time was to balance urban development on both sides of the Gan River and to extend residential areas to the surrounding seven districts.
This 1995 strategy has remained unchanged till present day. According to the 2005 Urban Comprehensive Development Plan, Northern and Southern Nanchang will form the future city’s urban core, with new developments radiating out to surrounding districts and towns. In Southern Nanchang, NMG plans to decrease the population of the historic core, lower its development densities, lessen traffic congestion, and preserve historic buildings.

In Northern Nanchang, NMG has promoted new property development with higher construction standards, environmentally friendly features, and fully serviced by public infrastructure. As the 2020 populations of Northern and Southern Nanchang are projected to be 1.1 and 2 million, respectively, the objective is to incentivize and redirect industrial and housing investment from the old center to the newly planned areas.

To achieve this urban development plan, NMG has designed an extensive public transportation system with fully integrated bus service and MTR networks to facilitate travel between the newly planned areas and between the left and right bends of the Gan River.

**Transportation Planning** The existing road system in Nanchang follows the traditional approach of relying on ring roads connected by major highways to form a network. As shown in Figure 4.5, a spider web-like network that comprises three rings roads and eleven highways serves the urban area, covering a total area of 350 square kilometers.

Like many rapidly urbanized Chinese cities, traffic congestion in Nanchang is one of the major challenges of urbanization. While car ownership in Nanchang (at 120 per 1,000 people in 2012, according ChinaAutoweb June 25, 2013) is lower than most provincial capitals in China, and 67 percent of trips are still by bicycle or walking, the share of motorized road trips (including public transport) grew from 22 percent in 2002 to 30.5 percent in 2010, according to traffic surveys (2013 World Bank report). The average distance travelled per motorized trip was 9.4 kilometers. Public transport accounted for only 13.5 percent of total daily trips--relatively low compared to cities.
with similar sizes and GDP such as Changsha (24.5 percent) or Wuhan (23.4 percent), where the share of walking and biking is lower” (World Bank 2013, 12).

Roads in Southern Nanchang as well as the four bridges across the river routinely experience congestion with average driving speed down to 11 kilometers/hour during rush hour. Roads built in the newly developed part of Northern Nanchang are wide, which favor car usage.

**Metro Project** In response to the growing congestion, NMG plans to encourage alternative means of transportation by building an integrated public transportation system, using MTR as the backbone. The plan is to build five subway lines, two of which are currently under construction. Once complete, the MTR network will have a total length of about 160-170 kilometers with 128 stations.

With a targeted completion date of 2020, lines 1, 2 and 3 – totaling 60-70 kilometers – will form the basic structure of the MTR system. This network will connect major business centers, the financial district, recreational areas, sport facilities, two industrial parks, and three universities.

The construction of Line 1 began in 2012 and will be completed in December 2015 (represented by the red line in right picture). This will connect the old city center to the new development areas in the left bend of the Gan River, helping to redirect economic and residential investments from Southern to Northern Nanchang. Upon the completion, Line 1 will be 28.7 kilometers with 24 stations, one depot, and one parking yard. The average distance between stations will be about 1,200 meters.

The construction of Line 2 started in July 2013, and is partially financed by the World Bank (represented by the blue line ). This line goes from the Zhan Qian Nan Da Dao Station to Xin Jia An Station, and will be 23.8 kilometers with 21 stations and one depot. NMG expects construction of Line 2 to be completed by 2016. Plans to build Line 3, 4, and 5, and Phase II of Line 1 and 2, are pending further approval by the National Development and Reform Commission.

To better feed the MTR system, bus services will also be reorganized. In 2011, the Nanchang Bus Company (a state-owned enterprise operating all bus services in the city) conducted a study on providing seamless transfers from rail to bus services for passengers. The results have helped transit planners better serve transit passengers. For example, several interchange
locations between bus and rail have been designed for Line 2. More importantly, these interchanges are coordinated with better land use planning to allow retail stores and supermarkets to establish at these locations for the convenience of passengers.

These are interesting outcomes because TOD is a strategy that promotes mixed land use. A typical design of a TOD scheme will have offices buildings clustered with residential properties and retail stores around a transit station. This design can, on one hand, increase ridership and on the other, cross-subsidize the transit development costs by capturing the increased land value generated by commercial and residential development. An upward trend of land prices for mixed use can be viewed as a favorable condition for adopting the LVC method in Nanchang.

Land Value Capture Method Value Capture Method NRTG plans to fully utilize land value increments to partially fund MTR investment via three procedures. The first is to build up a land resource by land acquisition. With assistance from the Land Resource Center, NRTG can access land that is needed for MTR development. After the announcement of the City Master Plan and Land Use Plan by the Urban Planning Bureau, the Land Resource Center will use its eminent domain (or compulsory purchasing) power to take land for NRTG from private individuals with just compensation, and NRTG will pay for all acquisition costs.

NMG will increase the density of the acquired sites to allow NRTG to either invest directly in land redevelopment or transfer the development rights to another private investor to raise funds to finance construction. All land parcels located within a 500-meter radius from a subway station will be qualified for up-zoning. Presently, the 500-meter criterion is fixed. However, some flexibility should be incorporated to accommodate varying market conditions, especially because NRTG has priority for accumulating land parcels that are deemed to be strategic for the project. More importantly, the Urban Planning Bureau will also convert the land use of these sites to mixed use, so as to allow NRTG to maximize the value-increment potential of the land due to regulatory changes and public transportation investment.

If other needed land sites are still under NMG’s control, the second procedure is for NRTG to obtain these parcels by participating in public auctions. The Land Resource Center is in charge of leasing public land in Nanchang. In general, it leases development rights of public land to all interested investors through public auction or tenders. Through a bidding process, the developer who offers the highest bid will obtain the development rights. NRTG can also participate in these public land auctions. At present, less than 1 percent of the total land resource (16,426 mu) obtained by NRTG was obtained from public auctions.

With the land resource in hand, the third procedure is to generate land revenue to defray the development costs of the MTR system. NRTG could, through the Land Resource Center, re-auction some of the land sites to private developers at market value that reflects: (i) the increase in the development density and land use change; and (ii) the improvement in the
accessibility and amenity of the sites due to the investment undertaken by the company. The successful bidder will pay the bidding price (or the transfer fee) to the Municipal Finance Bureau, which will in turn deduct fees for six development funds related to education, agriculture, and other public services. These charges in aggregate are about 20 percent of the transfer fee. NRTG will receive the remaining balance from the Finance Bureau and use the funds to finance the construction of the subway lines and stations.

Alternatively, NRTG could develop the land on the top of the subway stations. It could build offices, recreational facilities, retail spaces, and residential units all within the physical space of a MTR station. Revenue generated from renting or selling residential and commercial properties will be used to partially finance the MTR investment or to cover its operating costs.

To ensure that the projected land benefits will materialize, NRTG has planned its MTR development carefully according to TOD principles. It combines the development of the MRT stations with improvements to the surrounding neighborhoods. It also designs the MRT stations using one-stop-shop ideas, and finances their construction with revenue generated from mixed development on the top of all subway stations. Figure 5.1 illustrates the development sequence of Line 1.

NRTG’s strategy is to develop areas that are close to the inner city first and then extend the development to more remote areas. Development of the areas surrounding the MRT stations according to the variety of land uses to avoid competition comes next. Finally, NRTG will extend residential developments to two new districts, the Honggutan and Chengdong Districts.

Direct Property Development
Between 2012 and 2015, NRTG plans to undertake the construction of 28 stations along Lines 1 and 2 that can be divided into two types. The first is mixed development on the ground
above the MRT stations; there will be 23 projects of this type. NRTG will invest directly in five of these projects and develop the other 18 stations in partnership with interested private investors.

The second type is underground development at selected MTR stations. There will be five projects of this type. NRTG will be the sole investor for three of these projects, with the remaining two co-financed and developed by other private investors.

These investment projects will cover a total land area of 1,700 mu (1.1 square kilometers), with an estimated total capital investment of 8.3 billion RMB (US$1.4 billion). NRTG is expected to raise 6.8 billion (US$1.1 billion) of the capital requirements between 2013 and 2015, mainly from commercial loans and bonds or the sale of leasehold rights.

**Case Studies**

This section presents two specific MTR station construction projects that adopt the LVC method.

1. **NRTG’s Metro Mansion Station**

   NRTG plans to establish its headquarters (including the control center) at the Metro Mansion Station of Line 1, located at the financial center of Nanchang. The total area of the site is 20.7 mu (13,838 square meters) with an anticipated built-up area of 137,000 square meters. Construction began in 2012 with a target completion date of 2015.

   NRTG is constructing a 45-story office tower (193 meters high) on the top of the Metro Mansion Station with a FAR of 7.04. There will also be three levels of underground parking below the tower. NRTG’s headquarters and control center will occupy the first five floors, with the remaining office space rented to other tenants.

   The total investment in land and construction for this project is 1.3 billion RMB (US$213 million). There are two ways of financing the project. First, the Real Estate Subsidiary will develop the site and pay for the total cost. Out from the payment for the land, NRTG will receive 80 percent of the land sales revenue that is approximately 160 million RM (US$25.8 million) to support metro construction. The Real Estate Subsidiary will rent 70,000 square meters of office space to outside corporations. And about 22,000 square meters of office space is offered to Real Estate Subsidiary and its NRTG’s control center. The projected annual rental income is about 70 million RMB. The Real Estate Subsidiary can also sell the
rental units in the future for approximately 1.1 billion RMB, valued at the time of project completion. Both scenarios appear to generate enough income to cover the initial investment cost of the project.

2. **Metro Time Square**

Another example of MTR station development is the Bayi Bridge West Station of Line 1, also known as Metro Time Square. Metro Time Square has a development area of 125.8 mu (83,867 square meters) with an expected built-up area of 369,233 square meters with a FAR of 3.5 (see Figure 5.14).

![Figure 5.14. Architectural Design and Site Plan for Time Square Station](image)

Station construction began in 2012 with an expected date of completion in December 2016. The total investment cost for the project is 2.8 billion RMB (US$459 million). Project financing is through a joint venture between NRTG and a private developer. The joint company paid 1.1 billion RMB (US$180 million) for the land at cost. Eighty percent of the
land sales revenue (880 million RMB) has already been allocated to NRTG to support construction of the MTR.

The joint company will develop the land with high-end residential apartments, retail stores, recreational facilities, and offices, and then sell some of the properties with an estimated net profit of 240 million RMB (US$39 million). NRTG will receive half of the profit.

In addition, 40,000 square meters of office space – worth 640 million RMB (US$105 million) valued at the time of completion – will be available for lease to private companies. The projected average annual rental income is 23 million RMB (US$3.8 million), and again 50 percent of the annual rental income will go to NRTG.

Conclusions

The city has experienced rapid economic and population growth coupled with fast urbanization. Not only will increases in income and population generate a sufficient ridership for the mass railway system, they can also facilitate the development of a buoyant real estate market. This is essential, because there will be no value to capture if land prices do not increase due to the lack of demand. And revenue generated can be allocated towards developing social housing to ensure that all residents are able to reap the benefits. Put differently, economic fundamentals are paramount when implementing the TOD.

Second, good urban planning helps, and Nanchang has done this well. The land market will behave erratically if land use regulations and planning are unpredictable. Public and private investors need to know with some degree of certainty when and where urban expansion will take place to make their investment. A well-designed master plan that allows for development flexibility will serve this purpose. Nanchang’s Urban Planning Bureau reviews its master plan every ten years and makes additions and modifications to the plan according to varying urban conditions. Through this iterative process, NMG has established a clear vision for the future development of Nanchang that guides public and private investments.

Third, well-integrated urban planning and public transportation strategies are a favorable characteristic. NMG has established a clear directive to use the MTR system as the backbone of urban transportation. The design of the MTR system is based on the objective of facilitating the implementation of the master plan. The numbers of subway lines and stations along with their locations and surrounding land uses are clearly specified for both long-term and short-term development.

Fourth, both NMG and private investors understand the importance of mixed land use to make the idea of TOD and LVC work. NRTG’s station designs provide strong evidence of this underlying principle. This is also reflected by the continuous increases in prices for land designated for mixed use, showing that the market has also caught on to the idea.
Last, but not least, key government agencies under the leadership of the Mayor and the Vice Mayors are providing their full support to NRTG to achieve its financial goals set forth by the LVC approach. This type of institutional backing is crucial for lowering the transaction costs of land acquisition and regulatory changes. Cooperation from all government agencies can also help engender the necessary synergies between the public and private sectors to undertake the technically and financially complicated MTR investments.

Despite the fact that Nanchang seems to possess the preconditions for applying the TOD strategy, there are potential risks. These include: (i) overreliance on land financing that exposes NMG to excessive real estate market risks; (ii) decreases in housing affordability to the less affluent segments of the population; (iii) displacement of existing communities in the old neighborhoods; and (iv) resistance from residents towards changing their car-dependent travel behaviors due to transport investments favoring car use and public perception of car ownership as a status symbol. However, adopting the various measures discussed in this chapter can help mitigate these risks.

Integrating the metro system with land use and incorporating “Development-based” LVC as a strategic financing tool will play the most important role in ensuring urbanization success by offering an attractive alternative transport mode. If done well, Nanchang’s approach combining TOD and LVC will certainly increase the vibrancy and livability of the city, becoming a model for other Chinese cities to deal with their unprecedented pace of urbanization.
Recife is located in the Brazilian Northeast Region, in the state of Pernambuco. The Metropolitan Region of Recife (RMR) is the largest urban agglomeration in the North-Northeast, the fifth largest in Brazil, with a population of 3.9 million inhabitants (IBGE Estimative 2015), and the third metropolis of the country in housing density, surpassed only by São Paulo and Rio de Janeiro, and fourth largest urban population in Brazil network.

Recife has the highest GDP per capita in the Brazilian North-Northeast and is the political, financial, commercial, educational and cultural center of Pernambuco. Concentrating 65% of GDP Pernambuco, its area of influence covers the states of Pernambuco, Alagoas, Sergipe, Paraíba, part of Rio Grande do Norte, the northeastern part of Bahia and the interior of Piauí and Maranhão.

Has a large international airport (Guararapes / Gilberto Freyre), two ports (Port of Suape and Recife Port), universities, museums, hospitals, industrial centers, commercial centers and resorts and hotels. The Metropolitan Area spans 14 municipalities: Jaboatão Guararapes, Olinda, Paulista, Igarassu, Abreu e Lima, Camaragibe, Cabo de Santo Agostinho, São Lourenço da Mata, Araçoiaba Itamaracá, Ipojuca, Moreno, Itapissuma and Recife. The city of Recife was elected by research commissioned by MasterCardWorldwide as one of 65 cities with more developed economies of the emerging markets in the world. Only five Brazilian cities made the list, having received Recife fourth, after São Paulo, Rio de Janeiro and Brasilia and in front of Curitiba. According to British consultancy PricewaterhouseCoopers, Recife will be one of the 100 richest cities in the world in 2020. However, like other Brazilian cities, economic growth is not directly reflected in urban infrastructure. Recife is a city that suffers from uncontrolled growth, social inequality and a chaotic urban mobility due to the high number of private cars, a result of increased purchasing power of the population and a public transport that did not follow the growth of the population.
Land Use

Recife is the central core of a complex metropolis and its historical development, combined with the natural conditions of the site where it has developed, points out aspects that clearly translate its identity: diversity and contrasts. The landscape of the coastal plain, surrounded by hills and cut by a network of numerous waterways, is marked by the different expressions in the morphology of its built environment. It houses a population of 1.6 million inhabitants and receives daily a considerable portion of the 3.7 million inhabitants of the metropolitan area, who commute due to its attractiveness in terms of service provision and job opportunities.

The serious social contrasts are reflected in the disparities of the urban network configuration in land use patterns, in the form and quality of the buildings, and in the spatial distribution of the supply of urban infrastructure and services. The last two decades have shown that the speed of change and the deterioration of social and managerial conflicts in the daily challenge of urban management are increasing.

The increase of Floor Area Ratios (FAR) in the urban regulations introduced in the 1990s resulted in one of the highest building potentials among Brazilian cities and reflected visible changes in the city's morphology and in its patterns of constructive density. Technological advances and the present state of affairs in the real estate market have contributed to the improvement of building standards and have changed the skyline in the urban landscape of Recife – albeit in a proportionally concentrated way, in limited areas, when compared to the entire urbanized area.

On the other hand, the intense urbanization process has been: (i) occupying environmentally fragile areas, such as mangroves, what causes ecological imbalance and the gradual increase of pollution of natural resources; (ii) compromising the rich historical and architectural cultural heritage of the city. Consequently, this urbanization process has negatively reflected in the metropolitan populations’ quality of living standards.

Moreover, the form of isolation that has guided the architectural design of new ventures is fomenting an opposition between public and private space. Supported by a culture of panic, fostered by the proliferation of urban violence, the predominant architectural patterns in major real estate projects have promoted high walls and expanded physical and visual barriers between the lot and the street. This segregation highlights a cultural dimension of the denial of public space, which is reflected in the history of low-impact interventions within the public spaces and fragile urban control actions carried out by the government.

The economic dynamism of recent years has brought positive changes in income patterns and in the consumption capacity of the population. Nevertheless, it has also boasted a hulking increase in value of urban land, which aggravates the affordable housing shortage problems. Moreover, it has expanded the demand for better traffic conditions in the city, due to a large growth of the automobile fleet. The severe mobility crisis experienced in recent years has exposed the impossibility of maintaining the current modal patterns, and calls for public transport priority. In this sense, the relationship between urban mobility and real estate dynamics has intensified, posing new challenges for city management and for the regulation of land use and zoning.

Under the “Estatuto da Cidade”, the Master Plan, Law #17,511/2008, in its Art 216, calls for a regular revision of the plan every ten years. Moreover, part of the legal text is the acknowledgement that a change initiative is possible “whenever significant changes in urban evolution recommend it.” The current critical combination of accelerated real estate dynamics and mobility crisis represent these significant changes which justify the decision to initiate a change process before the completion of the tenth anniversary of the Master Plan’s publication.

The mobility crisis situation, although not the core theme of land use and zoning, evokes a more radical transformation on the city, on its standards for city planning, on the offer and spatial distribution of infrastructure and services, as well as on its social and economic dynamics. The frequent conflicts and heated debates about the city’s identity, its memory and its future, headed by large enterprises, have exposed a strong social unrest and have highlighted the need for an appropriate instrument for mediation, as well as the need for consideration towards alternative possibilities for growth, in processing and preserving the multiple facets of the city. A regulatory revision does not change this broader dimension of management and urban planning. On the other hand, it can support a readjustment in form and means to ensure more diverse expressions of landscape, morphology and urban atmosphere, without having any model surpass the other, but so that it is guided by the values of different identities and features for a city shaped by distinct actors and values.

The Master Plan of Recife (PD Recife), Municipal Law #17,511, was passed in 2008. Since then, the instruments provided in this Act were either regulated in scattered legislation, or were not regulated at all. Therefore, it is necessary to regulate and / or to update the following instruments:

1. Master Plan of Recife (Plano Diretor do Recife, Law #17.511 / 2008) - The current Master Plan, especially the chapter on urban zoning, is out-dated in face of the recent evolution and the dynamics of the city; a revision is necessary in order to reflect the
transformations that have taken place, and at the same time, to meet the requirements of the environmental, historical and cultural heritage protection of the city.

b) Land Subdivision Law (Lei de Parcelamento do Solo, Law #16.286 / 1997) - The Subdivision Law predates the current Master Plan, and therefore needs to be revised and updated in order to be harmonized with the instruments to be revised and regulated in this project.

c) Land Use and Zoning Law (LUOS - Lei de Ocupação e Uso do Solo– Law #16.176/1996) The current law enacted in 1996 predates the development of the Master Plan and establishes Floor Area Ratios which are incompatible with a sustainable city model. This anachronistic situation has brought many difficulties to urban management and city planning. In addition, the city planning legislation relating to land use and zoning is scattered and fragmented, which hinders its applicability by the Public Administration and its understanding by professionals and the general population. In this sense, it is essential to consider, in the revision of the law, the need for protection of the environmentally fragile sites of ecosystems and the city’s precious collection of architectural heritage.

d) Onerous Grant of Development Rights (ODIR - Outorga Onerosa do Direito de Construir) - Although expressed in the Master Plan, the Onerous Grant of Development Rights (ODIR), which allows the city government to balance out the value of urban land, still needs regulation for its application.

e) Transfer of Development Rights (TDC - Transferência do Direito de Construir) - The TDC instrument is extremely valuable for the management and planning of the city, and for the protection of the environmental and historical-cultural heritage. Although it was provided for in the Master Plan of Recife, the TDC has never been regulated. Its regulations will expand the range of urban management tools for Public Administration.

f) Compulsory Land Subdivision, Building or Land Use (PEUC – Parcelamento, Edificação e Utilização Compulsórios) and Progressive Urban Property Tax (IPTU-P – Imposto Predial e Territorial Urbano Progressivo) - These instruments, provided in the Master Plan of Recife (2008), have not been regulated up to this date. This allows city spaces to remain submitted to idleness (or underuse) generating high expenses to the local government and enabling owners to profit from real estate speculation - with negative consequences for the public management, and also the citizens.

As a result, it is necessary to revise, update, systematize, and/or regulate the instruments established in the Master Plan, as well as the Master Plan itself. Therefore, the ICPS, in conjunction with the SEPLAN, conceived the Spatial Plan of Recife (POT-Recife).

The POT-Recife consists of a technical study and Draft Bills, aiming to revise, update, and complement urban legislation which refers to the application of the relevant planning and regulatory instruments of the Master Plan, and fundamental to the democratic management of the city.

This impact on land use planning, especially on zoning and parameters, creates the opportunity to support the standards of subdivision and land use as an operating instrument closer to the principles and guidelines of the Master Plan passed in 2008. It is important that the new regulations bring emphasis on a proactive and integrated approach to the exercise of planning, avoiding merely qualifying standard norms of the use and occupation of the land. The present moment points to the need for a reflection on sustainability, which finds in urban density a key element to promote a compact city – but not necessarily vertically – balanced on the provision of public open spaces and the diverse mix of uses and activities, as well as the morphological patterns of its constructions.

Well over four years have passed since the deadline for the revision and regulation of the complementary instruments of the Master Plan; yet, the negative effects have worsened and have been put on the priority agenda as the initiative to overcome inertia. However, drafting of new rules cannot be guided by haste, and the complexity of the problems and challenges demands a technically consistent and socially legitimate construction process. The technical consistency must be focused initially on the search for a more coherent correlation between principles and guidelines and the parameters and procedures regarding subdivision and land use and occupation. The present moment points to the need for a reflection on sustainability, which finds in urban density a key element to promote a compact city – but not necessarily vertically – balanced on the provision of public open spaces and the diverse mix of uses and activities, as well as the morphological patterns of its constructions.
Transportation

The Integrated Structural System (SEI) is a public transportation network, comprising bus lines and the metro, covers the whole Metropolitan Region of Recife. It contains both radial and ring lines. At the intersections of these axes, there are terminals for connections allowing the passengers to change lines without paying a second fare.

The Recife Metro forms part of the Integrated Structural System (SEI), comprised by two lines, powered by electrified system supplied by overhanging cables. Both lines are on the ground, using former freight railways.

Work began on the Recife metro, funded by the World Bank, in 1983. The original project stretching 20.5 km from the city centre to the Western Zone of the Metropolitan Region of Recife, with 17 stations, spaced, on average, 1.2 km apart, was constructed along the line of the old Federal Railway, which transported cargo and passengers (See Map 1). An initial demand of 300,000 passengers per day was envisaged (Castelo Branco, 2004), and it was to be constructed in four stages. All four stages were finally completed in 1987.

The system currently transports an average of 180,000 passengers per day, or around 4,000,000 per month, and operates between 5 am and 11 pm seven days a week, with an interval of 5 and 7.5 minutes between trains at peak and off-peak times respectively.

The metro runs through densely-occupied urban space that has been put to a relatively wide variety of uses, including old formal residential areas, relatively densely-populated informal settlements, commercial sub-centers, underused warehouse and storage areas, and industrial areas that have fallen into disuse. In the residential areas, the typical low-income housing reflects the socio-economic conditions of the population. Productive land use is mostly restricted to small-scale commerce and services, concentrated along the main transport axes. The typical problems of these areas include the depopulation of the central areas and idleness in the larger areas, sub-standard infrastructure, particularly sanitation, a large amount of irregular occupation, lack of infrastructure and poor environmental quality.

On the basis of census data collected in the year 2000, it is estimated that, within the area of around 9 km² covered by a 500m-wide strip on either side of the railway track, there are around 25,400 permanent housing units, with a total population of around 115,000, and an average population density of 110 inhabitants per hectare. The socio-economic conditions in the area have been measured in terms of various factors. On average, heads of households earn the equivalent of 3.22 times the Brazilian minimum wage and have around 6.35 years of schooling. In the city of Recife as a whole, the average monthly income among individuals who have a regular income is equivalent to 5.37 times the minimum wage. The average Human Development Index (HDI) of the area along the metro is 0.744, lower than that of Recife as a whole (0.797). Both of these figures are considered, according to international parameters, to indicate a medium level of development.

Economy

Percentage of income spent in transportation

The Brazilian monthly minimum wage is BRL 800 (approximately USD 200). In Recife, bus fee is currently set at BRL 2.80 (USD 1.20), while subway fee is BRL 1.60 (USD 0.40).
In Brazil, however, the commuting fee is provided to workers within a social benefit program called “Vale Transporte” (something like Transportation Voucher), where the cost for the monthly commuting fee is shared with the employer. Currently, the worker has up to 6% of his/her salary deducted directly from the salary. The employer pays the rest directly to the transportation authority.

In Recife, commuting for elementary and secondary students of public schools within the Recife Metropolitan Area is entirely paid by the state government.

**Average commuting time**

According to the latest census (2010), average commuting time within Recife Metropolitan Area is approximately 122 minutes. This is equivalent to Curitiba, as a reference, which puts both cities in 4th position on the longest commuting trips in Brazil.

![Average commuting time](image)

**National framework affecting TOD**

Although the new National Policy on Urban Mobility has established a consistent environment for transportation planning focusing on non-motorized transportation (pedestrians and cyclists), the concept of Transit Oriented Development is yet to be introduced. National regulations cover mostly operation and financing of transportation systems. As municipalities are in charge of urban planning, TOD is local matter in Brazil.

**TOD Vision for Recife**

TOD vision for Recife aims the Recife 500 Years Plan, as it develops a city level strategy that shall overcome city limits to the metropolis, defining a more integrated land use pattern to mass transit infrastructure, changing Recife to a more sustainable, resilient, compact, walkable, diverse, vibrant city.

**Objectives**

The creation of the Recife 500 Years Plan and the Recife Agency for Innovation and Strategy (ARIES) provide the basis for a change in the approach for long term planning in Recife. ARIES is being conceived from the logic of a governance model that allows for the empowerment of civil society organizations in the process of proposing, monitoring, influencing and even executing public policies whose implementation and impact are critical for the sustainability of the city, and lasts for a time horizon which trespasses local government mandates. ARIES focuses on confronting two issues which are in the roots of the problem of low effectiveness of public policies: (i) lack of a city long-term project; and (ii) coordination crisis.
Recife has a tradition of urban planning. Although high-level efforts can be noted throughout the city’s history, the city that resulted from this process does not have a project unit, nor was capable of addressing central and key issues for the successful development of the city. In order to reverse this situation, ARIES is leading the development of a city strategy to Recife, having as a major milestone the year when the city will celebrate 500 years, which is 2037. The project Recife 500 Years Plan is a partnership between the municipal government and civil society.

The concept involves providing Recife with a strategy to address critical issues of the city, built around convergence points and projects, which contributes to reaching the city that “recifenses” want to have in 2037. The strategy is being anchored in a viable and comprehensive implementation plan composed of priority projects that can be quantified, qualified and monitored by society. The plan is being built across five areas: (i) Inclusion and Human Development, (ii) Economic Development, (iii) Urban Space and Mobility, (iv) Environmental Sustainability and (v) Public Services. Although the process of listening the population through public hearings, focal groups, meetings with representatives of various sectors, etc. is still underway, the Recife 500 Years already points out the central issues and challenges for the city. Some of the strategic areas for positively transforming the urban experience and the quality of life in Recife involve:

- Social inclusion through the transformation of public education;
- Generating economic opportunities through expanding the complexity of the local economy;
- Improving mobility through significant interventions in public spaces which prioritizes pedestrians;
- Promoting environmental sustainability though the recovery of the Capibaribe River, its banks and its network of channels.

The aim is that Recife will emerge as a regional center in Latin America, and will be recognised for its excellence in modern services, quality of life, and sustainability actions. Finally, there is the goal of designing a mixed governance model that amplifies and improves the efficiency of listening to the aims of the population and translating it to public policies.

One of the biggest obstacles for a city to reach a comprehensive, evidence-based integrated and sustainable planning approach is the coordination crisis which occurs within the same level of government; within the government but between different levels of government; between the government and society; and more obviously in the transition between government mandates.

In recent administrations of the State of Pernambuco and the city of Recife, its capital city, there were significant advances in the quality of public management. Many of the improvements were recognized nationally and internationally, with the government winning awards given by the World Bank, Inter-American Development Bank, United Nations, among others. However, a careful analysis shows that this improvement in public management is focused on the model of executing and monitoring the public administration in the short term, which is already significant, but still misses an integration of the public administration with a strategic plan for the city.

ARIES is being established as a private non-profit association, qualified as a Social Organization, which is governed on a mixed governance model that includes representatives of government (minority) and various representations of society. ARIES is, therefore, necessarily nonpartisan and has an adequate model to act as the guardian of the long term plan for the city, that is, the Recife 500 Years Plan, on behalf of the “recifenses”.

Moreover, the City of Recife is also working on a modern set of sustainability policies. This is especially important, since according to the Fourth Intergovernmental Panel on Climate Change report (IPCC), Recife is vulnerable to the average rise in sea levels, increased rainfall and rising the planet’s average temperature. Considering the high density of its coastline, the high percentage of soil sealing and its low altitude, the city of Recife is considered one of the world IPCC climate hotspots, with vulnerability to the effects of climate change.

The municipal administration is aware of the responsibility in mitigating the effects of climate change, and is also aware of the challenges that the city may face. As a first step, it is committed to a model of social and economic development with sustainable basis, and to promoting the strategy of a more resilient and responsive city to future generations. The adoption of innovative sustainable solutions, tools and policies are instrumental to enabling the commitment to a new paradigm for the city.

In parallel with such strategic vision for the city, transportation infrastructure have been designed and built under national finance programs aiming at the implementation of medium and high capacity systems. In Recife, two BRT (Bus Rapid Transit) lines are been implemented. Specific corridors have been selected mostly according to the availability of space. Such areas, which currently present low population densities are now considered in the MobilidadeRECIFE as potential areas for TOD measures.
The same situation is observed for the existing subway system, where stations are currently disconnected of the communities and public buildings in the surroundings. While the existing subway and BRT lines weren’t planned considering TOD concepts, changes are planned in specific zoning along these corridors and its stations in revision of the master plan as well as in the MobilidadeRECIFE, both under development.

**Indicators**

At this point, there is no set of indicators to measure success in TOD as we are implementing the strategy at a planning phase. We understand that so far the city has been developed without no clear strategy to coordinate the integration between land use and urban mobility planning.

So far, we are working with these indicators:

- % of new build area in the city along mass transit corridors
- Average commuting time
- Greater relation of population to build area along mass transit corridors compared to other city areas.
- % of job increase along mass transit corridors
- % of greenhouse gases emission in public transport

**On going TOD projects**

A TOD strategy is under development as the city is developing its Urban Mobility Plan integrated with its Master Plan, both, the set of regulations to implement TOD at the city level. Priority corridors to be developed will be results from the plans.

Another project that is being carried out is the Urban Redevelopment of Centralities of Recife, that will focuses six traditional neighborhood centralities in two different regions of the city that will be approached by TOD concepts. This project is yet to start in the next few months and is supported by the same World Bank loan.

**Key challenges**

From the Institutional perspective, a great challenge is imposed by the multi-entity configuration of urban transportation planning and operation. Traffic is managed by the municipality, the bus system is planned and managed by the metropolitan transportation authority (which is the only metropolitan body so far), while subway system is planned and operated by a national government company.

From the legal/regulatory perspective, the situation is similar, considering all three levels issuing regulations and legal binding decisions that affect each other, commonly without a broad discussion.

Land issues are increasingly taking an important role in urban and mobility planning. Recife area is 100% urban. Few are the empty places to receive new developments. In order to grow, the only way is up.

After a great economic period, Brazil is facing hard times, mostly due to corruption, which leads to a low finance capability scenario that may not chance for years. Therefore, financing is currently the most important problem when considering TOD projects. Even PPPs are now out
of range, partly due to the bankruptcy of the largest construction companies (PPPs’ best friends in Brazil) and partly due to the incipient regulatory framework, which keeps risks too high for smaller partners.

Another challenge is the lack of experienced and well-trained human power. Although the example of Curitiba have served as a model for the whole world, urban planners in Brazil are just now beginning to embrace those concepts here.

Solutions to share and good practices

Is currently under construction a custom made Integrated Model of Urban Mobility and Land Use that will be a powerful tool to create scenarios of urban land use transformations and mass transit demands. This will certainly change the way the city will be planned from now on.

Another experience is an innovative strategy to do a real low cost Origin Destination Survey using an online platform and some legal measures to assure participation from the travel generator centers.

Top five priorities for the next 12 months

1. The completion of Metropolitan Origin Destination Survey.
2. The completion of the Integrated Model of Urban Mobility and Land Use.
3. The completion of Recife’s Urban Mobility Plan.
4. The identification of the priority corridors to be developed in accordance to TOD.
5. The completion of the diagnosis and proposal phase of the Spatial Plan of Recife.

Expected areas for learning from TOD Deep-Dive

1. The Land Readjustment Instrument experience of JAPAN.
2. Land acquisition strategies along TOD corridors to be developed and how to finance it.
3. TOD strategies for a city level.
4. How much shall we keep a secret of the TOD corridors we are planning prior to land acquisition and how we deal with the planning instruments that points to it?
URBAN RESTRUCTURING OF TRANSPORT CORRIDORS

This Project is a part of:
Loan Agreement LOAN 8117-BR

Delmo Pinho
Subsecretary
Secretary of State for Transport of Rio de Janeiro
Rio de Janeiro, April 2016
1. Preamble of the Metropolitan Policy of the State of Rio de Janeiro

The main pillars of the policy of mobility of the State of Rio de Janeiro for the Metropolitan Area of Rio - RMRJ, were developed by SETRANS - Secretary of State for Transport of Rio de Janeiro, through the Metropolitan Agency for Urban Transport - AMTU, and are based on three principles: Focus on Transport Structural Corridors, Selective Restriction to Individual Transport and Focus on the Citizen (quality, efficiency, convenience and cost of transportation-tariff modes).

The instrument designed to integrate these three vectors of metropolitan transport policy was incorporated into the Single Intermunicipal Ticket (Bilhete Único Intermunicipal), introduced in the Rio de Janeiro Metropolitan Region in 2010. On these pillars, a program of restructuring and strengthening of structural transport corridors resumed, based on the expansion of the metro-rail system, the implementation of BRT (Bus Rapid Transport) systems and the readjustment of the waterway.

After the implementation of the Single Intermunicipal Ticket in the RMRJ, the results of mobility were surprising: millions of more trips took place in 2013 when compared to 2007.

(MOBILITY POLICY OF SETRANS / AMTU, 2010)

However, it is known that only those policies do not solve problems related to land use and transport, so there is a need of other tools adapted in the Master Plans, such as TOD Projects and opportunities for LVC.

2. Metropolitan Planning

In 1973 the Brazilian central government established, by federal law, the first eight metropolitan areas (Belém, Fortaleza, Recife, Salvador, Belo Horizonte, São Paulo, Curitiba and Porto Alegre), and the following year (1974-1975) was established the Rio de Janeiro Metropolitan Region, after the merge of the states of Rio de Janeiro and Guanabara.
At this time it was created FUNDREM - Foundation for the Development of the RMRJ by the state, where the leadership and direct participation of the State Governor, were of great importance. Many experiences in planning and practical initiatives were developed, until in 1979 the matter started to lose priority, and some years later the organ was formally abolished (1990). From this there were not many more combined efforts of the several areas of the state and municipalities, resulting from that point on the non-activation of the Public Common Interest Metropolitan Functions (Funções Públicas de Interesse Comum Metropolitano), widening the gap between the institutions and the spatiality, which ended up contributing to the deepening of conflicts of jurisdiction.

Despite having existed for fifteen years, FUNDREM actually was operating for about six years, after this period was restricted to promote technical assistance agreements for the preparation of master plans in all municipalities of the Metropolitan Region of Rio de Janeiro, was appointed to coordinating programs and projects of local interest, as well as making viable studies and research relative to solving the problems of the region.

In 1988, entering into force the Constitution of the State of Rio de Janeiro, a state Complementary Law was enacted which formalized the recreation of the Rio de Janeiro Metropolitan Region and established the Accounting Fund of Metropolitan Development (FDRM). As for the body until then responsible for territorial planning of the region - FUNDREM - despite the trajectory of the services rendered to the State of Rio de Janeiro, was abolished in 1990 at the initiative of the State Executive and, from then on, it was established a pause in the performance of an integrated planning that promoted interventions in Rio de Janeiro.

After consecutive state laws, the boundaries of the Metropolitan Area were altered several times, with the inclusion and exclusion of municipalities, currently including the municipalities of Belford Roxo, Cachoeira de Macacu, Duque de Caxias, Guapimirim, Itaboraí, Itaguaí, Japeri, Magé, Maricá, Mesquita, Nilópolis, Niterói, Nova Iguaçu, Paracambi, Queimados, Rio Bonito, Rio de Janeiro, Seropédica, São Gonçalo, São João de Meriti and Tanguá. With a GDP of around R $ 322.853 billion (US $ ........ billion) and an estimated population of 11.9 million inhabitants in 2012, the 21 municipalities members of RMRJ cover an area of 6.7 thousand square kilometers and contribute with 59% of revenues to the GDP of the State of Rio de Janeiro.
Despite the relations of attraction and mobility, defined by the primacy of a central core (the city of Rio de Janeiro) on the neighboring municipalities, the metropolitan dynamics present a scenario of significantly different forces and spatiality. On the one hand, the city of Rio de Janeiro shows a slowdown in its growth rate, but on the other hand, since the 1990s the evidence points to the significant demographic expansion of the peripheral municipalities.

The process of demographic shrinkage of the original core coexists with the intentional production of new centers, which requires a new spatial configuration, with a tendency to discontinuous polycentrism, however with a strong reinforcement of the central position of the city of Rio de Janeiro, regarding the installation of large private centers for technical research in the fields of oil and gas, energy, pharmaceutics and beauty products and others, as well as new equipment for activities linked to tourism. In contrast, some important initiatives have been introduced by the State Government for economic decentralization, aimed at job creation, notably by the recent inclusion of mono-functional production poles, such as the Petrochemical Complex of Rio de Janeiro (COMPERJ) and the Port of Itaguai, joined together by the Metropolitan Arch.

The Metropolitan Arch is the first crossing road vector of the Metropolis, with the main function of diverting the North/South traffic of the country, which until then crossed the RMRJ, while being an innovative factor in the dynamics of the RMRJ, is the inducing element of future spatial alternatives and new centers, especially as a consequence of the development of new industries and logistics cargo centers.

In economic terms, the RMRJ houses the second largest industrial center of the country, dominated by sectors linked to oil exploration, petrochemical, metallurgy, gas-chemical and steel. It brings together significant national and international groups, related to the shipbuilding industry and to the country's largest shipyards, holding 50% of the national production of ships and offshore equipment.

2.1. Criação da Câmara Metropolitana de Gestão Governamental
In August 2014, it was created the Metropolitan Board of Government Integration, a member body of the organizational structure of the State of Rio de Janeiro, which has been guided by the resumption of joint actions related to urban planning and metropolitan management.

This initiative expands the range of discussions, prioritizing aspects related to the public service of metropolitan common interest, the governance and shared management, the urban and metropolitan mobility, the preservation of the natural and built environment, the actions of resilience to foreseeable and recurrent risks and adverse effects arising from climate change impact in urban and metropolitan areas, the universal and equitable access to sanitation and safe drinking water and other services, related to the socio-spatial inclusion in its multiple dimensions.

It appears that the major challenge lies in the modus operandi, the practical and political viability of the Metropolitan Governments. Dividing the power is not easy, neither it is to convince sectors on the importance and necessity of articulated and integrated programs that should prevail over the interests of this or that segment. But it is necessary to enforce, with political courage and determination, the institutional arrangements, and for that there are legal and institutional instruments that implement agreed solutions of occupation and management of the metropolitan territory.

i. Actions, objectives and challenges

One of the aspects to be pursued in order to overcome the inhibitory barriers to the development of the Metropolis, refers to the valorization of the reference places in the various cities that integrate the RMRJ, enhancing the functional relationships established amongst them, their characteristic typologies, as well as their respective identities, their built and natural assets, and the legibility that associated public spaces of articulation and interaction help define.

A second aspect addresses connectivity and constitutes a necessary condition to the implementation of actions that include an agile, efficient and affordable transport, as well as the reduction of peak usage, the decentralization of traffic generating poles, the compatibility of different modes in the intermodal transport, for the integration and adaptation of the tariffs policy.
A third theme, which adds to the first two, refers to the overcome the constraints, evident in the present, through the development of sectoral diversification strategies and scale the different centers of production and services that streamline the region's economy.

The assumption behind this idea presupposes that diversity tends to boost the economy and to induce the action of the government in the pursuit of improving collective infrastructure services and equipment that qualify the land. On the other hand, the direct actions agreed with the decision-making sectors, articulated with the communities and with other bodies as may be necessary, are embodied in management policies and management arrangements, aimed at strengthening governance, involving different producing agents of the cities, which incorporate business opportunities and economic promotion to the interests of planned and participatory urban development.

The fulfillment of the social functions of the cities members of the RMRJ therefore requires the mobilization of local forces, public and private institutions with the active participation of the communities involved, in support of territorial reorganization, stimulator of the economic development. Similarly, the streamlining of the economy will also be achieved through public participation in the formulation and implementation of new forms of collaboration and partnership, taking into account the coordination of the various interests and demands of society. Given these facts, and taking into account the redemption of social liabilities historically accumulated, a new view of metropolitan planning for the Metropolitan Region of Rio de Janeiro should prioritize the structural axes as follows:

- **Accessibility and Mobility;**
- **Urban Centers;**
- **Metropolitan Equipment;**
- **Environmental Sanitation and Integrated Urbanization, Water Management and Energy Generation;**
- **Economic Restructuring;**
- **Natural Environment;**
- **Metropolitan Region Management and Planning.**

### 3. TOD Projects – Brazil

The challenge of Brazil and other countries with similar legislations, is what differentiates them from projects with TOD features in Japan. The relationship between the Private and Public Actors is closer, creating a synergy in this type of projects. For example, STP operators and Real Estate Market Businessmen, are the same Actors, in addition to having support from the Japanese Government.

3.1. Resource limitations

In addition, there are other barriers in the implementation of TOD projects in Brazil, in particular in the State of Rio de Janeiro. In 2015 it was established the Metropolitan Chamber of Government Integration, a collegiate body composed by the mayors of the municipalities in the Metropolitan Region of Rio de Janeiro, which are intended to act jointly in the definition of public policies for the Metropolitan Area, including an institutional model of governance and an integrated planning system. One giant leap for the RMRJ government, but that will depend on the state's power to make investments, as well as the economic situation, because in a worst case scenario, the private sector also diminishes its participation, entrepreneurs fail to invest, so project implementation is harder, and among others, the TOD ones.

4. Syndicated Urban Operations

One of the solutions - tools - to overcome a possible imbalance between the investment power of the actors involved are the joint urban operations. In this case, specific actions are performed according to coordination of the public sector actors with the private sector actors.

With the development of an occupation plan for certain defined areas, it is possible to channel all the efforts to transport infrastructure, focusing on collective and non-motorized public transport systems, thus allowing new density growth where the system is able to reach. Therefore, as these are the principles of TOD, it is possible to contemplate the two sides in the same project.

4.1. Administration and Distribution of Resources - Mais-Valia
Actions that can be taken by the government, that range from small investments, such as changing the Coefficient of Utilization, until even large investments in public collective transportation systems such as subway expansions, new BRT corridors, change the value of land wherever they go, then generating capital gains. However, these capital gains are not always distributed equally, returning to the transport infrastructure the part it deserves, favoring the society as a whole.

4.2. Legislation

All the processes that use new instruments, as the management of generated capital gains, should be agreed and supported by the legislation. Hence another note, the executive power, despite being able to innovate, will hardly be able to transform without the support of the legislation. Therefore, the instrument of syndicated urban operations is supported by the City Statute, which in the article 33 approves the syndicated urban operation. It is important to highlight that the operation must contain at least:

- Definition of the target area;
- Basic Program for the area occupation;
- Economic and social care program for the population directly affected by the operation;
- Purposes of the operation;
- Counterpart to be paid by the beneficiaries; and
- Operation control method.

4.3. Example 1 – Porto Maravilha – Rio de Janeiro

Rio de Janeiro, Figure 2, advances in projects financed by the sale of certificates, as São Paulo already did, Figure 1, and Curitiba.
This was due to the implementation of the urban operation, which allowed the funding of resources for infrastructure works from the commercialization of the Additional Construction Potential Certificates (CEPACS), securities that will allow the real estate companies to build developments larger than those defined on the zoning of the area.

In the case of Rio de Janeiro in 2011, the Real Estate Investment Fund Porto Maravilha, managed by Caixa Econômica Federal, acquired for R $ 3.5 billion all the CEPACS issued by the city, and was responsible for R $ 8 billion of investment in the project. The remaining R $ 4.5 billion will be achieved by the bank with the valorization of the certificates, what has already progressed. At the time of the acquisition of stock, the amount paid by the Caixa was equivalent to R $ 545 per certificate. Currently, the sale of each security by Caixa fund has hit R $ 1,280, a significant increase of 135%, about 28 months after its release.
The projects licensed with or without consumption of CEPACS in the Portuária Region between October 1 and December 31, 2015 are presented in Table 2. The Table 2 shows the extension of the infrastructure and urban networks executed, also in the same period.

Table 1: Licensed projects in the Portuária region

<table>
<thead>
<tr>
<th>Stock</th>
<th>Consumed in the previous period (until Sept/15)</th>
<th>Consumed in the quarter (Oct-Dec/15)</th>
<th>Total Consumption</th>
<th>Available Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>6,436,722</td>
<td>565,706</td>
<td>38</td>
<td>565,744</td>
<td>5,870,078</td>
</tr>
<tr>
<td>100%</td>
<td>8.79%</td>
<td>0.001%</td>
<td>8.79%</td>
<td>91.21%</td>
</tr>
</tbody>
</table>

Source: Companhia de Desenvolvimento Urbano da Região do Porto do Rio de Janeiro (Cdurp) (2016)
4.3.1. Public Collective Transport System - Project LRT

The objective of the projects related to mobility in Porto Maravilha is to implement a system that favors the collective public transport and non-motorized transport and promotes the idea of living close to work.

The Light Rail Transit (LRT) Project includes connecting the center and the Portuária region at 28 km and 32 stops, with a capacity to carry 300,000 passengers per day. Figure 3 shows a map of the project route.

Five trains were delivered and about 70% of the implementation of the civil works of the LRT system had been delivered by the end of 2015. The works at intersections along Av. Binary Port Boulevard, Av. Rio Branco and Av. Beira Mar were 95% completed, also on that date.
It is worth noting that according to the information obtained together with the World Bank (2015), instruments of the type CEPACs rarely finance the public collective transportation systems or are integrated to the TOD project.

4.4. Example 2 – Água Espraiada São Paulo

According to the World Bank publication, from 2015, São Paulo was a pioneer in Brazil in the Land Value Capture (LVC), since with no major fiscal resources it explored LVC tools to raise funds for investment in urban infrastructure.

The municipality, through the Strategic Master Plan 2002, approved land use laws that allowed the introduction of the mechanism of additional building rights fees (Outorga Onerosa do Direito de Construir - OODC). Separating the ownership right of the right to build, the created land is equal to the increase beyond the basic coefficient of utilization set by means of the law.

One example, according to the municipality of São Paulo, was the Syndicated Urban Operation Água Espraiada (Law No. 13,260 / 2001 and Law 15,416 / 2011). It was the first operation approved after the City Statute and was already born as syndicated, it can make full use of the
federal law instruments. Its main guideline is the revitalization of the area of its coverage with interventions that include the road system, collective transport, social housing and the creation of public spaces for leisure and sports.

The funds were applied to:

• Construction of the Otavio Frias Filho Bridge (Estaiada Bridge);

• Housing Projects for the population of informal settlements;

• Projects and works relative to local roads in Brooklyn, extension of the Av Jornalista Roberto Marinho to the Imigrantes Highway (Tunnel and Via Parque - local access roads to the districts of the region and a large linear park with approximately 612,000 square meters);

• Chuvisco Park and extension of the Chucri Zaidan Avenue, which extends to the João Dias Avenue;

• Construction of a bridge across the bridges of Morumbi and João Dias; and

• Investment in the Collective Transport System.

CEPAC also conducted auctions in order to raise funds to finance the interventions in addition to the municipal budget investments. Table 3 presents the data on the situation of the operation in February 2016.

Table 3: Syndicated Urban Operation Água Espraiada Lei 13.260/01

<table>
<thead>
<tr>
<th>SECTOR</th>
<th>STOCK CONTROL IN THE ADDITIONAL CONSTRUCTION AREA (ACA)</th>
<th>MAXIMUM STOCK PER SECTOR (M2)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BROOKLIN</td>
<td></td>
<td>1,500,000.00</td>
<td>400,000.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,050,000.00</td>
<td>175,000.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>661,843.12</td>
<td>141,564.74</td>
</tr>
<tr>
<td></td>
<td></td>
<td>140,000.00</td>
<td>234,884.38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>184,361.85</td>
<td>48,000.59</td>
</tr>
<tr>
<td>MARGINAL PINHEIROS</td>
<td></td>
<td>600,000.00</td>
<td>225,000.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>190,000.00</td>
<td>175,000.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>173,176.74</td>
<td>129,572.38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>249,752.38</td>
<td>21,174.77</td>
</tr>
<tr>
<td>CHUCRIZAIDAN</td>
<td></td>
<td>2,000,000.00</td>
<td>600,000.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,400,000.00</td>
<td>420,000.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>467,774.79</td>
<td>1,315,782.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,078.72</td>
<td>216,442.47</td>
</tr>
<tr>
<td>SUBTOTAL ALLOWED</td>
<td></td>
<td>3,500,000.00</td>
<td>1,050,000.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,050,000.00</td>
<td>275,000.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,050,000.00</td>
<td>1,078.72</td>
</tr>
<tr>
<td>JABAQUARA</td>
<td></td>
<td>1,500,000.00</td>
<td>150,000.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>350,000.00</td>
<td>7,709.85</td>
</tr>
<tr>
<td>TOTAL ALLOWED</td>
<td></td>
<td>3,750,000.00</td>
<td>1,050,000.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3,750,000.00</td>
<td>1,078.72</td>
</tr>
</tbody>
</table>

Source: Prefeitura de São Paulo (2016)
Despite all these instruments have some TOD indicators, i.e., elements of TOD project, they do not fully characterize the model proposed by Cervero and applied to the Collective Public Transport Stations in the United States.

5. Pilot Project – Government of the State of Rio de Janeiro

With support from the World Bank, the State of Rio de Janeiro, has made major investments in the purchase of new compositions of trains, with the goal of improving the passengers rail system in the RMRJ. However, as is known, although investments in rolling stock and other infrastructure in the train area of influence are necessary, single investments are not enough to solve problems linked to urban mobility and reorganization.

Thus, the State of Rio de Janeiro and the World Bank have chosen to invest in a TOD pilot project. Due to limited resources to develop the project, the State, along with the World Bank, with the support of the concessionaire operating system, will define a station in the Baixada Fluminense as a pilot project. The following are some of the project details.

The project includes the preparation of the Basic Design for Urban Restructuring of the Areas Surrounding the Queimados Station, in the Japeri Passenger Extension, of the Metropolitan Railway System of Rio de Janeiro, as shown in Figure 01, and has the following main objectives:

i. The development of an urban restructuring pilot Project of areas surrounding the Queimados Station, using the station as a catalyst for real estate, residential and commercial development, favoring the mixed land use; based on mobility, accessibility and modal integration; using a participatory methodology to involve all actors: social, institutional and investors; based on the guidelines of the Program TOD - Transit-Oriented Development;

ii. Subordinate the initial urban intervention to the space adjacent to the railway station, in a way such that the improved mobility and accessibility contribute to modeling the urban project, where the train appears as the privileged mode; and

iii. Make available to other municipalities a new urban requalification model that can guide metropolitan and municipal policies.
Among the main challenges, the following can be highlighted:

i. Integration of Different Plans - Transportation and Land Use Zoning;

ii. Communication amongst the different levels of Government and Secretaries, Private Sector;

iii. Features of Vocação Region - Local Market Growth - Interventions

The state is focused on progressing in the exchange of international experiences on urban mobility and tariff policies, and on monitoring the development of the transports network planned for 2021.

6. Presentation

Annex 1