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TOD

Global Platform for Sustainable Cities

WORLD BANK GROUP

TRANSIT-ORIENTED DEVELOPMENT IMPLEMENTATION RESOURCES & TOOLS

SUPPORTED BY THE GLOBAL PLATFORM FOR SUSTAINABLE CITIES (GPSC)



TOD IMPLEMENTATION RESOURCES & TOOLS

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by IBI Group

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Bogota, Colombia

ABBREVIATIONS

ADB	Asian Development Bank
AICTSL	Atal Indore City Transport Services Limited
APTMS	Automatic Public Transport Management System
ARDSS	Augmented Reality Decision Support Systems
ARR	Accounting Rate of Return
ASI	Avoid–Shift–Improve
BER	Break-Even Ratio
BID	Business Improvement District
BMC	Bombay Municipal Corporation (now known as Municipal Corporation of Greater Mumbai)
BMS	Bus Management System
BMTC	Bangalore Metropolitan Transport Corporation
BOT	Build-Operate-Transfer
BRT	Bus Rapid Transit
BRTS	Bus Rapid Transit System
BTOD	Bus Transit Oriented Development
CAP	Capital
CAPEX	Capital Expenditure
CBD	Central Business District
CDM	Clean Development Mechanism
CET	Traffic Engineering Company
CFAT	Cash Flow After Tax
CFBT	Cash Flow Before Tax
CISA	Certified Information System Auditor
CNU	Congress for the New Urbanism
COC	Cash On Cash Return
COP	Community of Practice
CPRE	Campaign to Protect Rural England's
CPTED	Crime Prevention through Environmental Design
CPTM	São Paulo Metropolitan Trains Company
CTOD	Centre for Transit Oriented Development
CTS	Centre of Sustainable Transport
DBF	Design-Build-Finance
DBFM	Design-Build-Finance-Maintain
DBLVC	Development-Based Land Value Capture
DBO	Design-Build-Operate
DCR	Debt Coverage Ratio
DCRs	Development Control Regulations
DDA	Delhi Development Authority
DMDP	DSM Metropolitan Development Project
DMRC	Delhi Metro Rail Corporation
DOTS	Digital Observation Technology Skills
DPR	Detail Project Report
DRC	Development Rights Certificate
DULT	Directorate of Urban Land Transport
EDC	External Development Charges
EMTU	Metropolitan Urban Transportation Company
EPA	Environmental Protection Agency
FAO	Food and Agriculture Organization
FAR	Floor Area Ratio
FIFA	International Federation of Association Football

FSI	Floor Space Index
FV	Future Value
GDP	Gross Domestic Product
GEMI	Gujarat Environment Management Institute
GHG	Greenhouse Gas
GHMC	Greater Hyderabad Municipal Corporation
GIS	Geographic Information System
GISPTN	Gauteng Intermodal Strategic Public Transport Network
GIZ	The Deutsche Gesellschaft Für Internationale Zusammenarbeit
GLAAS	The UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water
GOI	Gross Operating Income
GPS	Global Positioning System
GPSC	Global Platform for Sustainable Cities
GRHS	Global Report of Human Settlements
GRM	Gross Rent Multiplier
GSI	Gross Scheduled Income
GTIDR	Global Training Institute Development & Research
GVM	Gross Vehicle Mass
GVMC	Greater Vishakhapatnam Municipal Corporation
HCMC	Ho Chi Minh City
HDI	Human Development Index
HMDA	Hyderabad Metropolitan Development Area
HMR	Hyderabad Metro Rail Limited
IBGE	Brazilian Institute of Geography and Statistics
ICT	Information and Communication Technologies
IDB	Inter-American Development Bank
IPT	Intermediate Public Transport
IRR	Internal Rate of Return
ITDP	Institute for Transportation and Development Policy
ITP	Integrated Transport Plan
ITS	Intelligent Transportation Systems
ITU	International Telecommunications Union
JICA	Japan International Cooperation Agency
KPI	Key Performance Indicator
LAC	Latin American and Caribbean
LCR	London and Continent Railways
LEED	Leadership in Energy and Environmental Design
LOS	Level of Service
LPA	Locally Preferred Alternative
LRT	Light Rail Transit
LSE	London School of Economics
LTA	Land Transport Authority
LTV	Loan to Value
LVC	Land Value Capture
MCGM	Municipal Corporation of Greater Mumbai
MDGS	Millennium Development Goals
MIDC	Maharashtra Industrial Development Corporation
MIT	Massachusetts Institute of Technology

MLD	Millions of Liters Per Day
MMTS	Multi-Modal Transport System
MPD	Master Plan Development
MRT	Mass Rapid Transit
MRTS	Mass Rapid Transport System
MRVC	Mumbai Railway Vikas Corporation Ltd.
MTR	Mass Transit Railway
NACTO	National Association of City Transportation Officials
NAMA	Nationally Appropriate Mitigation Actions
NCT	National Capital Territory
NCTD	National Capital Territory of Delhi
NGO	Non-Governmental Organizations
NMG	Nanchang Municipal Government
NMT	Non-Motorized Transportation
NOI	Net Operating Income
NPPF	National Planning Policy Framework
NPV	Net Present Value
NRTG	Nanchang Railway Transit Group
OECD	Organization for Economic Co-operation and Development
OER	Operating Expense Ratio
OODC	Outorga Onerosa do Direito de Construir
OPEX	Operating Expense
OVE	Evaluation and Oversights
PBS	Public Bicycle Sharing
PDG	Palmer Development Group
PERT	Program Evaluation Review Technique
PIC	Public Information Center
POC	Postal Operations Council
PPIP	Policy-Program-Implementation Process
PPP	Public-Private Partnerships
PPUDO	Pick Up and Drop Off
PRC	People's Republic of China
PTUS	Urban Transportation Plan for Santiago
PUI	Proyecto Urbano Integral
PV	Present Value
PWC	PricewaterhouseCoopers
REA	Real Estate Analysis
ROI	Return on Investment
ROW	Right-of-Way
RTA	Road and Transportation Authority
RTAAP	Rapid Transit Alternative Analysis Process
RTC	Road Transport Corporation
RTOD	Rapid Transit Oriented Development
SAP	Station Accessibility Plans
SAR	Special Administrative Region
SBC	Sustainable Buildings and Construction
SDI	Seoul Development Institute
SEFORALL	Sustainable Energy for All
SEZ	Special Economic Zone
SSEZ	Shenzhen Special Economic Zone
STEM	Science, Technology, Engineering and Mathematics
STM	Secretariat of Metropolitan Transport
SUTMP	Sustainable Urban Transport Master Plan

SWOT	Strengths, Weaknesses, Opportunities and Threats
SZMC	Shenzhen Metro Group Co.
TAD	Transit Adjacent Development
TDLC	Tokyo Development Learning Centre
TDM	Transportation Demand Management
TDR	Transferable Development Rights
TIF	Tax Increment Financing
TNO	The Netherlands Organization Business
TOD	Transit-Oriented Development
TOR	Terms of Reference
TRX	Tun Razak Exchange
TSD	Transit Supportive Development
UAE	United Arab Emirates
UHI	Urban Heat Island
ULB	Urban Local Body
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UN-HABITAT	United Nations Human Settlements Programme
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
UPU	Universal Postal Union
USAID	United States Agency for International Development
UTF	Urban Transport Fund
UT-DAT	Urban Transport Data Analysis Tool
UTTIPEC	Unified Traffic and Transportation Infrastructure Planning and Engineering Centre
VCF	Value Capture Financing
VGF	Viability Gap Funding
WB	World Bank
WHO	World Health Organization
WRI	World Resources Institute

DOCUMENT ORGANIZATION

1 Overview

The Overview chapter introduces the Knowledge Products and the principles, barriers and existing resources related to transit-oriented development that will act as the foundation for the tools provided. This overview will also introduce the five steps of TOD and tools for each.

TOD Framework

2 

Assess

The Assess chapter provides an overview of the steps required to examine a city's preparedness for undertaking TOD initiatives, including defining scale and scope of the planning of the area and identifying stakeholders for undertaking TOD projects.

3 

Enable

The Enable chapter provides the steps necessary to create an enabling environment for implementing successful TODs, prior to embarking on detailed TOD planning initiatives.

4 

Plan + Design

The Plan + Design chapter contains a series of detailed planning principles and design components to formulate TOD plans at various scales of intervention [city, corridor, station area and site scales].

5 

Finance

The Finance chapter provides an overview of the financing tools that can be used by a city to achieve the TOD planning policies, projects and initiatives identified in the previous steps.

6 

Implement

Implementation provides an overview of the tasks and sub-tasks required to implement TOD plans, including the institutional framework and supportive public policies.

Additional Resources with this publication include: Case Studies from Global TOD Experiments; Existing Examples of Reports and Terms of Reference in reference to the Knowledge Product Types; an Image Bank; and a Glossary. These Knowledge Products are also available online on the GPSC's TOD website and the World Bank's TOD CoP website.

TOD KP

TOD KNOWLEDGE PRODUCTS



OVERVIEW

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OVERVIEW

Transit-oriented development, commonly known as TOD, is a planning and design strategy that focuses on creating urban development patterns which facilitate the use of public transit, walking and cycling, as primary modes of transport and which supports vibrant, diverse and livable communities. This is achieved by concentrating urban densities, communities and activities within a 5-10 minute walking distance from mass rapid transit stations (both bus and rail-based), developing quality urban space and providing convenient and efficient access to a diverse mix of land uses.

TOD brings together elements of land use and transport planning, urban design, urban regeneration, real estate development, financing, land value capture, and infrastructure implementation to achieve more sustainable urban development. Since TOD implementation can be complex, it is essential that cities understand the dynamics at play related to all city systems- real estate economics, transit routing, infrastructure design, land use planning and zoning, the development of the local economy through urban regeneration, and urban design- to achieve the concept's full potential. TOD, as a tool, enables city actors to negotiate through varying urban priorities to ultimately prioritize inclusion and resilience in an optimized environment. The World Bank considers these priorities as the bedrock of successful TODs.

Eight principles of inclusive and resilient TOD

1. Align human/economic densities, mass transit capacity and network characteristics for greater accessibility
2. Create compact regions with short commutes
3. Ensure resilience of areas connected by mass transit
4. Plan and zone for mixed-income neighborhoods at corridor level
5. Create vibrant, people-centric public spaces around stations
6. Develop neighborhoods that foster walking and biking
7. Develop good quality, accessible, and integrated public transit
8. Manage private vehicle demand

The TOD Knowledge Products bring together knowledge resources from multiple sources and countries that help in breaking down the concept of TOD for application in cities from World Bank client countries. The World Bank, through its Community of Practice (CoP), and the Global Platform for Sustainable Cities (GPSC), identified the need for such a resource through their work with over 30 cities on TOD at all scales across all geographic regions. The CoP focuses on supporting TOD assessment and implementation, expanding the available TOD knowledge base and leveraging partnerships with other global think-tanks and agencies.

These new Knowledge Resources are the first comprehensive attempt by the World Bank CoP to provide an implementation-focused guide to plan and implement successful TODs. With increased investment in mass rapid transit systems, the time is opportune to prepare a compendium of resources that help TOD stakeholders address how integrated land use and transit can serve as a tool to initiate a paradigm shift in transforming the future of the growing number of cities in World Bank client countries.

TOD CHALLENGES IN WORLD BANK CLIENT COUNTRIES

TOD implementation in some major cities in high-income countries is characterized by the intent to increase population densities and transit ridership, driven by a robust appetite for market risk and development, well-defined regulatory and policy frameworks and strong institutional capacities. Some of the most successful TOD examples are cited in Hong Kong SAR China, Singapore, and the city of Arlington, Virginia in the USA. These successes were driven by high-quality transit investments supported with comparable investments in public infrastructure, timely revisions in development regulations, with due enforcement, and finally active participation of the private sector.

Rapidly growing cities in World Bank client countries are more often than not, densely populated even before the introduction of public transit. Some of the densest cities globally, including Manila, Dhaka, Mumbai and Mexico City, are characterized by either insufficient or overburdened transit infrastructure. In response to the resulting deterioration of living conditions in urban cores, suburbanization is rapidly becoming the preferred method of development. In the case of many cities, suburbanization is mandated through restrictive policies, such as low-density maximums and high parking minimums. This is compounded by reduced land prices in suburban locations with little or no land organization. Examples of such growth are widely seen in the outskirts of Beijing, Shanghai, Gurgaon and Lagos, among others.

The need for a transit-oriented approach to urban growth is an essential means to reverse this trend and return to compact development patterns supported by high-quality transit systems. The whole notion of urban sustainability – Smart Growth, Complete Streets and location efficiency – is viewed as the roadmap to successfully solving the problems of the 21st Century and to develop urban mobility and a high quality of city living globally. Following coordinated capacity building efforts in the last decade from global think-tanks and agencies such as World Bank, UNDP, GIZ, WRI, ITDP, new transit systems have begun in Delhi, Ahmedabad, Guangzhou, Shanghai, Beijing, Dar es Salaam, Lahore, Bogota, Curitiba, and many others, in the last two decades.

While the existing global TOD guidance has helped these cities in conceptualizing and reinterpreting the concept for local application, the examples of successful implementation are few and far between. Borrowing from their high-income country counterparts, cities such as Ahmedabad and Curitiba have focused TOD mostly as a tool for densification by both public and private sectors and are generally viewed in terms of increased floor area ratios (FARs) or floor-space index (FSI). Other cities such as Guangzhou and Bogota have been successful in linking transit improvements with pedestrian and cycling networks, but have not been able to influence development patterns. The fundamental premise of TOD, the application of context-sensitive and inter-dependent design standards, including building densities based on variables surrounding the station area such as transit capacity, plot sizes, street widths and infrastructure capacities, innovative real estate negotiations, affordable housing near transit stations, or public space design with high-quality public realm, are often ignored and compromised.

Some of the key barriers to TOD in World Bank client countries were summarized in the World Bank Group publication: Transforming Cities with Transit (Suzuki, Cervero and Iuchi, 2013):

- Lack of regional coordination at the metropolitan level;
- Sector silo behavior and practices at the city level;
- Inadequate policies and regulations for strategically creating "articulated densities" (densities that are strategically distributed across parts of a metropolitan area) that match the level of accessibility and connectivity offered by public transit;
- Restrictive national regulations and administrative constraints;
- Inconsistencies in the planning instruments and deficiencies in their implementation;
- Inadequate policies, regulations, and supporting mechanisms for redeveloping built-up areas, particularly brownfields or distressed and blighted districts;
- Neglected urban design at the neighborhood and street level; and
- Financial constraints.

The implementation and management of TOD risks is complex, as it requires multi-sector implementation over extended periods, political buy-in, and institutional capacity. The trade-offs that TOD concepts are expected to navigate through, reflecting the local economic conditions and infrastructure needs, present numerous challenges for TOD implementation. For example, as evidenced through many cases, the concept of TOD-led land value capture contradicts with the need to maintain housing affordability; the concept of higher densities around transit challenges infrastructural carrying capacities; or very often the real estate market demand around transit does not support TOD principles.

There is an urgent need to address these challenges faced by TOD stakeholders to increase the success rate of projects and enhance their ability to achieve quality of life aspirations. The experiences from cities such as Hong Kong SAR China, Delhi, Mexico City, and Seoul have helped in identifying key barriers to
TOD implementation and lead the way to develop strategies to overcome some of these challenges and assist in finding innovative solutions.

MOVING FORWARD - LEVERAGING EXISTING RESOURCES

Many existing resources, World Bank published and others, focus on selected aspects of TOD themes citing a strong link between transport planning, land-use planning, real estate development, land management, infrastructure delivery, financing, and institutional frameworks. Based on an extensive review of published reports, online articles, websites, and course modules, the following "core documents" are identified as the most influential resources for multiple aspects of the TOD implementation process:

Transforming Cities with Transit: Transit and Land Use Integration for Sustainable Urban Development (Suzuki, Cervero and Iuchi 2013): Link

The document explores the complex process of transit and land-use integration in rapidly growing cities in developing countries. It identifies barriers, opportunities, recommends a set of policies and implementation measures for the effective coordination of transit infrastructure and urban development, including relevant government policies.

Financing Transit-Oriented Development with Land Values; The World Bank Group, 2015 (Suzuki, Murukami, et al. 2015): Link

This comprehensive examination of LVC techniques by Hiroaki Suzuki covers examples of development-based land value capture, primarily as it is handled in East Asia (Hong Kong SAR, China, and Japan). The book talks about how these principles could be implemented in fast-growing developing cities to help finance needed transport investments.

Transforming the Urban Space through Transit- Oriented Development The 3V approach (Salat and Ollivier 2017): Link

This (3V) Framework, which considers the node, place and market potential values of each station identifies key arguments for measuring the viability and potential of each station which is derived through the study of the transit network, urban design quality, and demand and supply in market analysis studies. This analytical tool can help cities plan for TOD at city and corridor levels, develop a TOD typology, understand opportunities for different TOD types and prioritize TOD investments.

TOD Standard v.3.0, (Institute of Transportation and Development Policy 2017): Link

TOD Standard is an assessment tool to evaluate and score the plans and products of urban development according to their adherence to the TOD principles: Walk, Cycle, Connect, Transit, Mix, Densify Compact, Shift. A simple scoring system distributes 100 points across 25 quantitative metrics that are designed to measure the implementation of the eight principles and their 14 specific objectives. The metrics are supported by details, measurement method, data sources and marking criteria.

TOD Corridor Course (World Bank Group and World Resource Institute 2015): Link 1 Link 2

The Transit-Oriented Development (TOD) at a Corridor Scale Course introduces the concept of TOD and the potential benefits it can bring to a city. This course provides a summary of concepts and multi-scale planning tools (illustrations, case studies and processes) that are useful to elected leaders, practitioners, and citizens as they may employ such tools to initiate successful multi-scale TOD planning processes.

Regenerating Urban Land: A Practitioner's Guide to Leveraging Private Investment (Amirtahmasebi, et al. 2016): Link

This World Bank publication provides city managers and planning officials with guidance including a wide variety of options from conceiving and implementing an urban regeneration project. To help identify the sequence of actions needed for a regeneration process, this report identifies four distinct phases: scoping, planning, financing, and implementation, with a set of unique tools for each phase.

TOD Guidance Document (Ministry of Urban Development, India 2016): Link

The TOD Guidance document presents a compendium of analytical tools, communication tools, design principles elaborated with standards, design processes, applicable policies that can be integrated with the regulatory documents, and implementation practices for the Indian context. It suggests a 5-step TOD Planning Framework: Assess, Enable, Plan+Design, Invest, Implement. The framework incorporates an additional step of "Enable" specifically addressing institutional challenges in low and middle-income country considerations.

TOD Implementation Guide for Projects and Policies - Towards Low Emission Cities (ITDP 2015): Link

The TOD Implementation Guide is a toolkit for local governments to help them mobilize and implement policies and pilot projects related to TOD in the Mexican context. The toolkit focuses on climate resilience as a key objective of TOD projects.

TOD Guide for Urban Communities (CTS-EMBARQ Mexico, 2014): Link

The TOD Guide for Urban Communities is a part of the DOTS Kit of tools developed to guide TOD practitioners in Mexico. The tools contain design concepts, indicators, GIS analysis, engagement tools, and planning methodologies.

Steps to Avoid Stalled Equitable TOD Projects (Carlton & Fleissig, April 2014): Link

This Report within the context of TOD experiments in US cities presents the typical causes of failure of TODs and potential strategies to enable successful implementation.

Performance-Based Transit-Oriented Development Typology Guidebook (C-TOD, 2010): Link

This guidebook offers a tool to communities to define TOD typologies based on performance across different factors. It provides baseline guidance for long-term strategies addressing TOD goals.

TOD KNOWLEDGE RESOURCE NEEDS

These core documents present an expansive base of knowledge for TOD stakeholders in World Bank client countries. There is a need, however, to adapt the tools and findings into a user-friendly comprehensive suite of TOD related tools, guides and resources, specifically as it relates to overcoming challenges of TOD implementation in World Bank client countries.

The TOD Knowledge Products consolidates and complements the existing TOD resources from different authors, including theoretical, academic, analytical, and best practice tools, leveraging existing research and knowledge on critical subjects and building a comprehensive and integrated TOD resource base. These are not intended to create new definitions or measures for TOD, merely to smoothen out areas of overlap and gaps in the current literature. Subsequently, the Knowledge Products are largely framed to address the following areas related to successful TOD implementation:

- **STRATEGIC AND COMPREHENSIVE PLANNING:** The lack of long-term, strategic, and coordinated planning is ubiquitous in many countries, where resources are limited and immediate solutions are in higher demand. There is a need for a flexible, phased and multi-scalar approach to TOD that allows for quick wins, as well as long-term continued benefits.

  To address this need, the TOD Knowledge Products provide guidance and resources on simplified assessment techniques, comprehensive and coordinated planning methodologies, allowing for effective adaptation to various scales and contexts.

- **IMPROVING FINANCING MECHANISMS:** The lack of readily available finance in World Bank client countries demonstrates a clear need to firstly demarcate finance needs based on efficient costing models; and secondly to create short and long-term financing opportunities from available resources. The presence of informal market players also limits the ability of stakeholders to foresee and plan investments with strong financial backing.

  To address this need, the TOD Knowledge Products provide guidance on planning know-how and analytical processes that help read market trends, unlock TOD-based land value capture and development opportunities.

- **IMPROVING GOVERNANCE AND IMPLEMENTATION:** Ineffective regulatory and policy frameworks in many cities are largely governed by traditional planning paradigms, supported by ineffective monitoring and evaluation mechanisms that limit the ability of agencies to learn from their own experiences. There is an urgent need to improve governance structures and regulations to align with a new planning paradigm that focuses highly on communication with the public and the private sector and ensures acceptance and compliance of TOD fundamentals.

  To address this need, the TOD Knowledge Products provide guidance on policy frameworks, phasing strategies, regulatory mechanisms with sample templates, effective governance and coordination, and procurement practices.

OBJECTIVES OF THE TOD KNOWLEDGE RESOURCES

The purpose of the TOD Knowledge Resources is to provide a one-stop resource for practitioners, city leaders, stakeholders, and academics to support TOD implementation. The TOD Knowledge Resources are a self-contained, in-depth resource base that includes information on the objectives to be achieved in each topic area, case studies of a range of solutions and best practices from around the world, with a focus on World Bank client countries. This project provides an important opportunity to familiarize local practitioners with widely recognized approaches in dealing with these problems through the lens of a TOD-driven approach, while adapting and enhancing the solutions for development context in World Bank client countries.

The main objectives of the toolkit include:

- Creating a comprehensive TOD Knowledge Resource that reiterates the basic arguments for TOD, with a stronger emphasis on detailed design requirements and implementation mechanisms.
- Combining policy best practices with design and financial case studies, with a focus on low and middle-income countries.
- Creating a set of new tools and checklists to assist city leaders, practitioners, private developers and citizen representatives in understanding the implementation mechanisms, trade-offs and 'pros and cons' of TOD projects.

Based on the lessons learned from TOD experiences in World Bank Client cities and gaps identified in existing TOD resources, key **Knowledge Topics** are defined. These knowledge topics are anticipated to be of particular use to practitioners and leaders from cities with insufficient planning capacities and planning know-how. The TOD Knowledge Resources are largely structured around these knowledge topics, covering the life cycle of TOD projects from inception to implementation:

A: PRE-IMPLEMENTATION TOD FEASIBILITY

1. Economic Baseline, Real Estate Assessment and Revitalization
2. Travel Demand Projections, Alternatives Analysis & Infrastructure Design

B: BEST PRACTICE PLANNING & DESIGN TODS

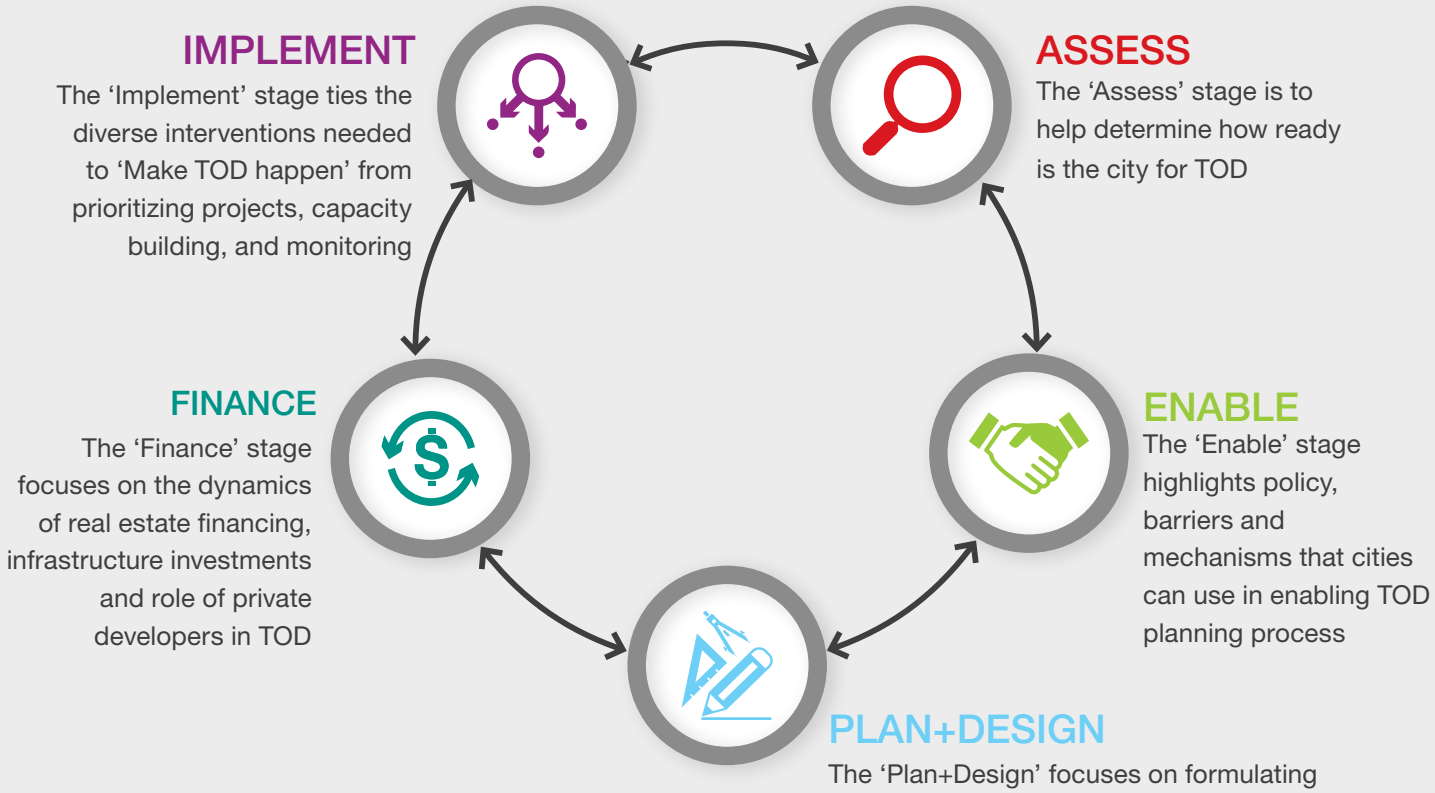
3. Regional Strategic Planning and Intergovernmental Coordination
4. Urban Design, Parking Standards and Zoning Regulations

C: TOOLS & MECHANISMS FOR TOD IMPLEMENTATION

5. Land Value Capture and Other Financing Mechanisms
6. Supporting Infrastructure, Physical Implications and Cost Estimates
7. Making the Case for TOD to the Public

TOD FRAMEWORK

The TOD Framework aims to organize the tools and resources to ensure a robust process for initiation, design and evaluation of TODs at multiple scales. The TOD framework consists of 5 steps: (1) Assess, (2) Enable, (3) Plan+Design, (4) Finance, and (5) Implement. This should not be considered a linear process, but rather a loop or cyclical process that continues. The Framework is adapted from the TOD Guidance Document for India (Ministry of Urban Development, India 2016) and Regenerating Urban Land (Amirtahmasebi, et al. 2016). It focuses on providing decision-makers with a step-by-step approach required to make informed decisions for developing a realistic TOD plan that is implementable and flexible, adaptable to local conditions, capacities and resources available.



FIVE STEP PROCESS - KNOWLEDGE PRODUCT

The following TOD Knowledge Resources were developed to supplement existing resources in the 5 step TOD Framework. For each step, the types of learning resources that were identified to be most useful are identified as per the Framework Step and Knowledge Topic.

STEP	KNOWLEDGE PRODUCT TOPIC	TYPE OF RESOURCES NEEDED
01 ASSESS	**A1 | Economic Baseline, Real Estate Assessment & Revitalization.** Intended to inform planners about the underlying demand for new real estate space for different types of development projects.	How-To Guidance, Analytical tool to evaluate Real Estate Demand Best Practices
	A2 | Travel Demand Projections, Alternatives Analysis & Infrastructure Design. The other essential prerequisite to developing TOD projects is ensuring that the transport investment makes economic sense on its own and is the best alternative, given projected levels of travel flows along the new corridor.	Analytical tool for mode selection How-To Guidance
02 ENABLE	**B3 | Regional / Strategic Planning & Intergovernmental Coordination.** Because development on a regional/metropolitan scale often operates under many jurisdictions, it is essential that practitioners understand the motives of each stakeholder, and possible trade-offs.	How to Guidance on enabling inter-departmental collaboration Roles & Responsibilities Of Stakeholders
	C7 | Making the Case for TOD to the Public. Addressing misconceptions and legitimate concerns like potential displacement must be corrected before successful implementation.	Communication strategy Stakeholder Game template
03 PLAN + DESIGN	**B4 | Urban Design, Parking Standards & Land Use Zoning Regulations.** Most planning efforts happen at interrelated scales. TOD principles and best practices that need to be considered throughout this multi-scalar planning approach are important to be known and explained.	Commonly held TOD Planning Principles & Design Guidelines TOD Zoning Code Template How-to Guidance for Planning at difference Scales and for different outcomes Best Practices

STEP	KNOWLEDGE PRODUCT TOPIC	TYPE OF RESOURCES NEEDED
04 FINANCE	**C5 | Land Value Capture & Other Financing Mechanisms.** Suggest the value uplift in the concentrated TOD districts can be partly captured by public agencies through special taxes or other mechanisms to fund the transit infrastructure investment or other social services.	How to Guidance on structuring different financing arrangements Compendium of Tools and Incentives Best Practices
	C6 | Supporting Infrastructure, Physical Implications & Cost Estimates. Help TOD practitioners know the full suite of infrastructure requirements that may be required when developing/densifying an urban district.	Cost Analytical Tool
05 IMPLEMENT	**B3 | Regional / Strategic Planning & Intergovernmental Coordination.** Because development on a regional/metropolitan scale often operates under many jurisdictions, it is essential that practitioners understand how interests can be better aligned for successful implementation.	Key Performance Indicators How to Guidance on phasing and capacity building

KNOWLEDGE RESOURCE TYPES

Based on the types of resources identified across the 5-step TOD Framework, new Knowledge Products have been categorized into different types. The new Knowledge Products intentionally go beyond discussing TOD theory, but rather focus on actionable tools for implementation and decision-making. The resources are supported by references for accessing standards, case studies and templates such as development control norms (zoning codes) and template terms of references for hiring consultants as implementation agencies.

ANALYTICAL



The Products under this category build on the available facts or information to make critical evaluations

SPREADSHEETS | REFERENCE DOCUMENT | CHECKLIST

COMMUNICATION



This category of Products impart or exchange information with the purpose of conveying a message or expecting better results

INTERACTIVE GAMES | REFERENCE DOCUMENT

'HOW-TO'GUIDES



Products created as a step-by-step approach for evaluating the multitude of information to reach a conclusion

STEP-BY-STEP GUIDE

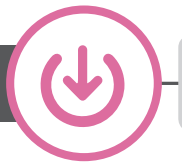
RESOURCES



Products include details of external sources that can be referred for informed assessment

CHEAT-SHEETS | SPREADSHEETS | WEBLIOGRAPHY | GLOSSARY OF TERMS

PROCUREMENT



The Products help in acquiring services/works from an external source to accomplish a task/attain the objectives

REFERENCE DOCUMENT | TOR TEMPLATE

ADAPTING TO CONTEXT-SPECIFIC NEEDS

The TOD Knowledge Products are designed to provide direction to cities in addressing barriers to TOD at all stages of planning, create realistic financing plans, and direct investment to transit stations with the best development opportunities. However, as the context in low and middle-income countries vary from city to city, the application of the TOD Knowledge Products must be adapted to local needs and priorities. The features of the urban context that influence TOD processes and outcomes are described in some detail.

SCALE OF TOD PLANNING

While TOD projects are operationalized on individual parcels or streets within station areas, planning needs to be conceptualized at multiple interrelated scales:

- **City-region** – comprises of a contiguous extent of urbanized land, largely bounded by administrative jurisdictions.
- **Corridor** – refers to a finite public transit line within a transit network and the immediate area that benefits from the transit line.
- **Station Area** – refers to the area around a public transit station that is within a 10-minute walking distance. The combination of all the station areas along a single transit line forms the corridor.
- **Site** – refers to a development parcel within a corridor or station area. The closer a parcel of land is to the transit station and platform the higher its TOD potential would be.

The interrelationship between a city-wide TOD Plan must be supported by market acceptance at the station or site level, and a site-specific TOD Plan must be supported by a larger TOD Regulatory Framework. TOD planning can start at a smaller scale and move up the spectrum, or at a larger scale and move down. The following table provides an overview of the focus and intended outcomes of TOD intervention at the identified TOD scales.

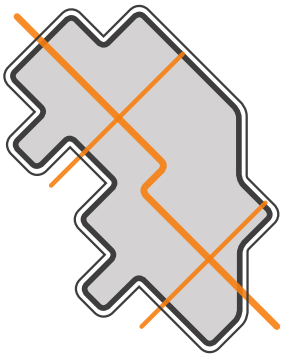
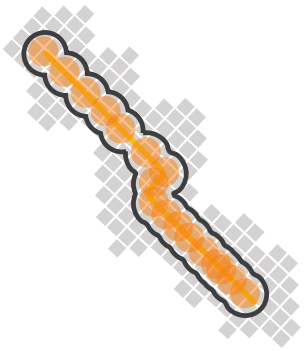
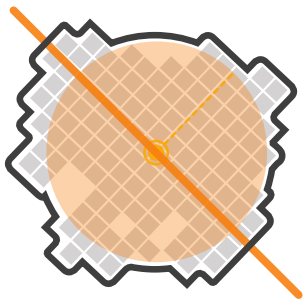
URBAN DEVELOPMENT CONTEXT

Cities in World Bank client countries are at different stages of development. The urban development context plays an important role in influencing the feasibility and success of TOD. The three overarching types of development context considered include:

- **Greenfield** – refers to land that currently has little or no urban development. Such sites may either lie in the outskirts of existing cities or within newly planned cities.
- **Suburban** – refers to land that is sparsely developed along the outer edges of city limits. Suburban sites are characterized by low residential densities and low transit reach.
- **Urban** – refers to locations within populated cities that are characterized by densely developed or brownfield sites with poor access to open spaces and civic amenities, and dense, aging, or blighted developments.

Some new cities or suburban/growing areas of existing cities offer significant greenfield opportunities for development. Metro cities, for example Mexico City, Mumbai, New Delhi, Cape Town etc. which are already developed, offer mainly redevelopment opportunities. While greenfield sites are favorable for larger developments and allow for an integrated design of the public and private realm, they are vulnerable to higher market risks. Redevelopment sites may have limited flexibility in parcel sizing and accessibility. In some cases, they may be highly dependent on land assemblage, which increases planning complexities and consequently impacts feasibility.

SCALES OF TOD

		BOUNDARY/ZONE	KEY OUTCOMES	FOCUS
	CITY-REGION	Administrative Boundaries/ Transit Systems. *TOD Implementation Program, Addis Ababa, Ethiopia*	Involves integration of land uses with transit system planning to support analysis and decision making related to citywide growth management. Provides a point of intervention for TOD as a policy in statutory documents (Master Plan/ Development Plan).	• TOD Policies • Generic DCR Modifications • Institutional Framework for Implementation • Metropolitan/City TOD Plan • Accessibility Guidelines
	CORRIDOR	10-minute (800m-2km) walking/cycling distance on both sides of existing/ planned transit corridor. *BRTS Urban Design Strategy, Hubli- Dharwad, India*	Ensures that development at one station complements development at other stations, resulting in a network of transit-oriented places. Specific transit ridership goals can be evaluated at this scale against development potential around transit stations.	• TOD Policies • Generic DCR Modifications • Real Estate/Land Value Capture Potential • Institutional Framework for Implementation
	STATION AREA	5-10 minute (400m-1km) walking distance from station facilities. *TRX financial district, Kuala Lumpur*	Focuses on areas surrounding transit stations within a 5-10 minute walking distance focusing on land use, transit station accessibility, multimodal integration and connectivity.	• Detailed Station Area Plan • Urban Design Guidelines (Built Form) • Accessibility/ Streetscape Proposals • Real Estate/Land Value Capture Potential • Investment Strategy • Implementation Plan
	SITE LEVEL	Individual parcel within 5-10 minute (800m-1km) walking distance from the station facility. *Metro Mansion Station, Nanchang, China*	Focuses on individual developments within a station area. Includes targets for net intensity and density for development, internal circulation, building design, and parking.	• Site Plan • Detailed Development Program • Urban Design Plan • Accessibility/ Streetscape Design • Financial Strategy • Implementation Plan

DEVELOPMENT CONTEXT

		OPPORTUNITIES	CHALLENGES
	GREENFIELD	• Single ownership • High percentage of government lands • Opportunity to master plan new communities around transit • Lower land costs • More financial resources appropriated • Opportunity for constructing higher capacity infrastructure systems • Strong political support • Minimal regulatory barriers	• Long timeline for new cities to take shape • Unknown population composition • Limited opportunities initially to achieve jobs-housing balance • Often sprawl-inducing as public transport connectivity to city centers is not strong. • Developer may not have the appetite for risk-taking
	SUBURBAN	• Higher percentage of sites available for transformation • Opportunity to improve transit access to lower density neighborhoods • Lower land costs	• Low density • Sprawled pattern of development • Singular land uses • Poor mobility connections • Prioritization of automobiles over pedestrians
	URBAN	• Often located near major transportation corridors and established employment centers • Active transportation modal share is higher, specifically in low and middle-income areas • Opportunity to improve transit access • Opportunities for redeveloping aging building stock	• Multiple ownership requiring land assemblage • Irregular property sizes and configurations • Existing land uses typically not transit supportive • Large block sizes inhibiting walkability • Constrained right-of-ways

ACTORS IN TOD PLANNING

City Leaders – including mayors, bureaucrats, elected officials or leading influencers. As city leaders, their involvement is most essential during the enabling and implementing phase, and can benefit from the Communication and Monitoring and Evaluation Tools.

Policymakers – including national, regional, or local elected officials, bureaucrats, and technical leaders. Policymakers are important to engage during the entire TOD process. They are the ones who can benefit most from Best Practices, Resources, Procurement and Communication Tools.

Urban Planners – including planners involved in the city, metropolitan, or regional planning organizations. Urban planners define the development framework for a city. As such their involvement is key during the entire TOD Planning process. Urban Planners can benefit from How-to Guides that help in master planning and public engagement, best practices for development patterns, urban design requirements for walkability in TOD districts, infrastructure upgrades needed for higher density, zoning reform for mixed use, etc.

Transit Planners – including transit agency officials, and transit operators. Transit planners need to be involved during the entire planning process as well. They can benefit from the Analytical Tools and How-to Guides that help in incorporating denser development projections into travel demand projections, connecting new corridors to the existing network through TOD, identifying appropriate station locations along new corridors, multi-modal design for pedestrians and cyclists, parking policy review, exploring joint development to construct transit infrastructure, etc.

Economic Development Stakeholders – including economic planners, developers and staff of development financial institutions. Economic Development Specialists can benefit from Analytical Tools and How-to Guides that help in the analysis of economic clusters and growing sectors, available land inventory, land amalgamation processes, branding for area/change when TOD is implemented, identification of hurdles for real estate developers, potential public-private projects, etc.

TOD Stakeholders and Community Specialist – including academics, civil society organizations, community groups, local business groups, etc. Community specialists can benefit from the Best Practice Resources, Communication Tools, and Analytical Tools that help them in ensuring transparency and engagement is maintained throughout the TOD implementation process.

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TOD KNOWLEDGE PRODUCTS BY STEP

ASSESS AS

The 'Assess' stage is used to help assess the city's readiness in terms of technical capacities, real estate conditions, and transit service quality, as well as the appropriate scale and context for TOD in the city.

ANALYTICAL - A -

AS-A 01 - TOD Readiness Assessment - *Also Refer to* IM-H01

A checklist and spreadsheet aimed to help **city leaders** and **policymakers** *define the city's readiness across various aspects. Applicable at all scales and contexts.*

AS-A 02 - TOD Scale & Context Assessment - *Also Refer to* PD-H01/02/03/04/05

A checklist aimed to help **urban planners** *define the scale of TOD interventions and context-specific typologies. Applicable at all scales and contexts*

AS-A 03 - Thresholds for TOD Real Estate Demand - *Also Refer to* AS-H01

A spreadsheet aimed to help **urban planners** *identify real estate demand. Applicable at corridor and station area scales in urban and suburban context.*

AS-A 04 - Threshold for Rapid Transit Mode - *Also Refer to* AS-H02

A spreadsheet aimed to help **transport planners** *identify appropriate mode for transit-oriented densities. Applicable at city and corridor scales in urban and suburban context.*

'HOW-TO' GUIDE - H -

AS-H 01 - How to Undertake Real Estate Market Analysis - *Also Refer to* AS-H03 / AS-R01 / AS-P01 / FI-A02

A step-by-step guide process to help **economists** *to determine the full development potential of the TOD corridors and sites, as well as the financial viability of such projects. Applicable at the corridor, station and site scales and all contexts.*

AS-H 02 - How to Undertake Rapid Transit Alternatives Assessment - *Also Refer to* AS-H04 / AS-P02 / FI-A01

A step-by-step guide to help **transport planners** *evaluate the mode, cost-effectiveness and alignment alternatives for rapid transit. Applicable at the city and corridor scales.*

AS-H 03 - Infrastructure Carrying Capacity Assessment - *Also Refer to* AS-P03 / FI-A01

A step-by-step guide to help **urban and transport planners** *evaluate the infrastructure needs of the city and the carrying capacity required by transit-oriented developments. Applicable at all scales and contexts.*

ASSESS
AS

RESOURCE - R -

AS-R 01 - Real Estate Analysis Best Practices - *Also Refer to* AS-H01

Case study examples of real estate analysis for **economists** *undertaking TOD projects in low and middle-income countries. Applicable at all scales and contexts.*

PROCUREMENT - P -

AS-P 01 - Real Estate Analysis Terms of Reference- *Also Refer to* AS-H01

Template terms of reference for **city leaders** *to hire a real estate consultant to perform targeted demand analyses along a TOD corridor. Applicable at the corridor, station and site scales and all contexts.*

AS-P 02 - Transit Alternatives Analysis Terms of Reference- *Also Refer to* AS-H02

Template for **city leaders** *to hire a transport planning consultant to perform a transit alternatives study. Applicable at all scales and contexts.*

AS-P 03 - Infrastructure Analysis Terms of Reference - *Also Refer to* AS-H03

Template terms of reference for **city leaders** *to hire a consultant to conduct an infrastructure analysis for a TOD project. Applicable at all scales and contexts.*



ENABLE
EN

The ‘Enable’ stage highlights policy barriers, communication mechanisms and governance suggestions that cities can use in enabling the TOD planning process.

COMMUNICATION - C -

EN-C 01 - Making a Case for TOD to the Public-Communication Strategy- *Also Refer to* EN-C02

A creative guide to help **urban planners** *disseminate information to public and regional bodies and express the importance and benefits of TOD. Applicable at all scales and contexts.*

EN-C 02 - TOD Role Out - Stakeholder Engagement Game- *Also Refer to* EN-C01 / EN-P01

An interactive game, format and templates for cross-agency coordination and visioning with all stakeholders, including **city leaders, urban and transport planners, policymakers, economists** *and* **community members.** *Applicable at all scales and contexts.*

‘HOW-TO’ GUIDE - H -

EN-H 01 - How to Build Institutions and Enable Intergovernmental Coordination- *Also Refer to* IM-H01 / IM-P01

A step-by-step guide for **city leaders** *and* **policymakers** *to define an institutional structure and coordination framework that can make TOD happen within the existing planning and development framework. Applicable at all scales and contexts.*

RESOURCE - R -

EN-R 01 - Roles & Responsibilities of Stakeholders- *Also Refer to* EN-C01 / EN-P01

A resource to help TOD **urban and transport planners** *identify the stakeholders to be involved in planning and implementing TOD and the roles and responsibilities of each stakeholder. Applicable at all scales and contexts.*

PROCUREMENT - P -

EN-P 01 - Communications Strategy Terms Of Reference- *Also Refer to* EN-C01 / IM-H01

Template for hiring a Public Relations agency to analyze potential risks, plan and implement a TOD communications strategy within a community. Applicable at all scales and contexts

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PLAN+DESIGN
PD

The 'Plan+Design' stage focuses on formulating context specific planning and design solutions and priorities

'HOW-TO' GUIDE - H -

PD-H 01 - How To Prepare A City-Wide TOD Plan- *Also Refer to* PD-H05 /PD-R01

A step-by-step process guided by a series of task-based actions that will assist **urban and transport planners** *in planning and implementing TOD at the city-wide level. Applicable at the city-wide scale and across all contexts.*

PD-H 02 - How To Prepare A Corridor TOD Plan- *Also Refer to* PD-H05 / PD-R01

A step-by-step process guided by a series of task-based actions that will assist **urban and transport planners** *in planning and implementing TOD at the corridor level. Applicable at the corridor scale and across all contexts.*

PD-H 03 - How To Prepare A Station Area Plan- *Also Refer to* PD-H06 / PD-R01

A step-by-step process guided by a series of task-based actions that will assist **urban and transport planners** *in planning and implementing TOD at the station level. Applicable at the station area and across all contexts.*

PD-H 04 - How To Prepare A Site Level TOD Plan- *Also Refer to* PD-R01

A step-by-step process guided by a series of task-based actions that will assist **urban and transport planners** *in planning and implementing TOD at the site level. Applicable at the site level scale and across all contexts.*

PD-H 05 - How To Develop TOD Supportive Zoning Framework - *Also Refer to* PD-H01

A guideline for **city leaders** *and* **policymakers** *to prepare/revise TOD-supportive zoning ordinances, including revisions for pedestrian activities, urban design and parking restrictions. Applicable at all scales and contexts.*

PD-H 06 - Land Amalgamation Framework- *Also Refer to* IM-H01

A step-by-step process that details the process of land amalgamation for **urban and transport planners** *and* **policymakers.** *Applicable at all scales and contexts.*

RESOURCE - R -

PD-R 01 - TOD Planning Principles & Design Guidelines- *Also Refer to* PD-H01/02/03/04/05

A series of detailed planning principles and design components to help **urban and transport planners** *formulate TOD plans at various scales and contexts of intervention. Applicable at all scales and contexts.*

INTRODUCTION | 31

PLAN+DESIGN
PD

PD-R 02 - TOD Zoning Code Template- *Also Refer to* PD-H05

Template zoning ordinance/guidelines for **policymakers** *to use, including provisions on pedestrian pathways, activity generating uses, porous urban design, parking restrictions, shared parking provision, etc. Applicable at citywide and corridor scales and all contexts.*

PD-R 03 - Land Use And Transportation Integration Best Practices- *Also Refer to* AS-H02 / PD-H01 / PD-R01

Case study examples of land use and transportation integration for **urban and transport planners** *that influenced significant improvements and found great success in cities globally. Applicable at corridor and station area scales and all contexts.*

PD-R 04 - Pedestrian Friendly Design Best Practices- *Also Refer to* PD-R01

Small-scale, iterative, pedestrian-friendly examples in low-middle income countries for **urban and transport planners** *that depict significant improvements in an area brought forth by pedestrian-oriented and walkable design. Applicable at corridor and station area scales and all contexts.*

PROCUREMENT - P -

PD-P 01 - TOD Plans Terms of Reference- *Also Refer to* PD-H01/02/03/04 / PD-R01

Template for **city leaders** *to hire a consultant to prepare TOD plans at the required scale and context. Applicable at all scales and contexts.*

FINANCE
FI

The 'Finance' stage focuses on the dynamics of real estate financing, infrastructure investments and the role of private developers in TOD.

ANALYTICAL - A -

FI-A 01 - Infrastructure Capital & Operating Cost Estimates/Ranges- *Also Refer to* AS-H03 / AS-P03

An interactive Excel spreadsheet available online to **urban and transport planners** *to help estimate the capital and operating costs of TOD projects, based on examples in low and middle-income countries. Applicable at all scales and contexts.*

FI-A 02 - Real Estate Development Pro-Forma- *Also Refer to* AS-H01 / AS-R01 / AS-P01

A working spreadsheet to help **economists** *gauge the potential return on investment (ROI) based on certain basic development parameters for a given TOD project. Applicable at all scales and contexts.*

'HOW-TO' GUIDE - H -

FI-H 01 - Land Value Capture Framework- *Also Refer to* FI-R02

A step-by-step process for **economists, urban and transport planners** *and* **city leaders** *with a variety of alternative approaches to adopting Land Value Capture (LVC) in TOD projects of varying scale and context. Applicable at all scales and contexts.*

FI-H 02 - Private Sector Participation Framework- *Also Refer to* FI-R03

A project structuring process for **economists** *to plan financial resources to meet the project cost using a PPP financing framework. Applicable at all scales and contexts.*

RESOURCE - R -

FI-R 01 - Development Incentives- *Also Refer to* FI-R03

A guide of the potential financial tools **urban planners** *and* **economists** *can use to finance a TOD project. Applicable at all scales and contexts.*

FI-R 02 - Land Value Capture Mechanisms Best Practices- *Also Refer to* FI-H01

Examples of land value capture tools employed in low and middle-income countries to help **economists** *and* **urban planners** *fund major transit projects globally. Applicable at all scales and contexts.*

FI-R 03 - Municipal Finance Tools - *Also Refer to* FI-R01 / FI-H02

Collection of the most commonly used tools for TOD and urban development financing around the world to guide **economists** *and* **urban planners** *in their TOD financing. Applicable at all scales and contexts.*



IMPLEMENT
IM

The ‘Implement’ stage ties the diverse interventions needed to ‘Make TOD happen’ from prioritizing projects, to capacity building, and monitoring.

ANALYTICAL - A -

IM-A 01 - Monitoring and Evaluation - *Also Refer to* IM-A02

Methodology for **city leaders** *and* **urban and transport planners** *to define the appropriate monitoring and evaluation framework for a TOD project or program to track project success. Applicable at all scales and contexts.*

IM-A 02 - Key Performance Indicators for TOD - *Also Refer to* IM-A01

A framework for **city leaders** *and* **urban and transport planners** *to measure TOD plans or practices in individual cities against global performance indicators. Applicable at all scales and contexts.*

‘HOW-TO’ GUIDE - H -

IM-H 01 - How To Undertake Capacity Building - *Also Refer to* IM-P01

A guide for **city leaders** *and* **policymakers** *to build the institutional arrangement for TOD project or programs. Applicable at all scales and contexts.*

IM-H 02 - How To Develop A TOD Phasing Strategy - *Also Refer to* PD-R01

Methodology for **urban and transport planners** *to help develop phasing strategies for a TOD project or program. Applicable at all scales and contexts.*

PROCUREMENT - P -

IM-P 01 - Capacity Development Strategy Terms of Reference- *Also Refer to* IM-H01

Template to help **city leaders** *outsource capacity building and training exercises to spread awareness about TOD. Applicable at all scales and contexts.*

TOD KNOWLEDGE PRODUCTS BY TYPE

ANALYTICAL -A-

AS-A01 - TOD Readiness Assessment

AS-A02 - TOD Scale & Context Assessment

AS-A03 - Thresholds for TOD Real Estate Demand

AS-A04 - Threshold for Rapid Transit Mode

FI -A01 - Real Estate Development Pro-Forma

FI -A02 - Infrastructure Capital & Operating Cost Estimates/Ranges

IM-A01 - Monitoring and Evaluation

IM-A02 - Key Performance Indicators for TOD

COMMUNICATION-C-

EN-C01 - Making a Case for TOD to the Public- Communication Strategy-

EN-C02 - TOD Role Out - Stakeholder Engagement Game

RESOURCES -R-

AS-R01 - Real Estate Analysis Best Practices

EN-R01 - Roles & Responsibilities of Stakeholders

PD-R01 - TOD Planning Principles & Design Guidelines

PD-R02 - TOD Zoning Code Template

PD-R03 - Land Use And Transportation Integration Best Practices

PD-R04 - Pedestrian Friendly Design Best Practices

FI- R01 - Development Incentives

FI- R02 - Land Value Capture Mechanisms Best Practices

FI- R03 - Municipal Finance Tools

'HOW-TO'GUIDES -H-

AS-H01 - How to Undertake Real Estate Market Analysis

AS-H02 - How to Undertake Rapid Transit Alternatives Assessment

AS-H03 - Infrastructure Carrying Capacity Assessment

EN-H01 - How to Build Institutions and Enable Intergovernmental Coordination

PD-H01 - How To Prepare A City-Wide TOD Plan

PD-H02 - How To Prepare A Corridor TOD Plan

PD-H03 - How To Prepare A Station Area Plan

PD-H04 - How To Prepare A Site Level TOD Plan

PD-H05 - How To Develop TOD Supportive Zoning Framework

PD-H06 - Land Amalgamation Framework

FI -H01 - Land Value Capture Framework

FI -H02 - Private Sector Participation Framework

IM-H01 - How To Undertake Capacity Building

IM-H02 - How To Develop A TOD Phasing Strategy

PROCUREMENT -P-

AS-P01 - Real Estate Analysis Terms of Reference

AS-P02 - Transit Alternatives Analysis Terms of Reference

AS-P03 - Infrastructure Analysis Terms of Reference

EN-P01 - Communications Strategy Terms Of Reference

PD-P01 - TOD Plans Terms of Reference

IM -P01 - Capacity Development Strategy Terms of Reference



Bogota, Colombia

TOD KP

ASSESS

INTRODUCTION



The ‘Assess’ step of the TOD Framework is developed to determine how “ready” a city is for TOD, based on analysis of a complementary set of economic, geographic, demographic, economic, urban form, and institutional factors.

TOD
Global Platform for Sustainable Cities
WORLD BANK GROUP
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TOD KP

ABOUT ASSESS

The 'Assess' step of the TOD Framework is developed to determine how "ready" a city is for TOD, based on analysis of a complementary set of economic, geographic, demographic, economic, urban form, and institutional factors. TODs do not simply consist of one project or site located in close proximity to the transit station; they consist of a series of projects encompassing various scales of development. There is no single solution for TODs and not all sites that are accessible from a station exhibit all factors necessary for creating successful TODs. Determining the appropriate scale and scope of work is one of the crucial steps in determining the preparation of a realistic TOD Plan.

For TOD to trigger successful large-scale transformations, conditions such as high levels of transit ridership, rapid population growth, rising incomes, high densities are all pre-existing in many cities in World Bank client countries. On the other hand, infrastructure capacities are grossly inadequate and real estate markets continue to remain unregulated, resulting in a diffusion of the intended positive benefits of TODs.

Determining the scale of TOD intervention in terms of timing of transit and investment, as well as the place value of the transit corridor-whether suburban, urban or intense urban- helps determine the type of strategies that may be adopted for future investments. Once the scale is determined, identifying TOD opportunities and roadblocks is key to understanding whether a city, corridor or station areas is "ready" for TOD, and develop strategies to increase the readiness for TOD at individual station areas. Before any TOD/ transit corridor project is commenced, it is essential that urban planners and economic development experts know the underlying demand for new real estate space in the region, and the projected growth for different types of development products. Smart infrastructure planning and public policy can encourage urban economic growth and increased market interest in certain areas of the city.

Conducting pre-feasibility studies of TOD interventions is the starting point for a city to balance the development potential and public benefits of transit. Transit and land planners often determine transit corridors and station locations based on decision parameters that do not take into consideration the real estate potential required. Furthermore, the time differential between transit implementation and development projects often discourage the private sector to invest in longer-term opportunities and often leads to land speculation that leads to an increase in land values. Planners also need to ensure that the transport investment makes economic sense on its own and is the best alternative, given projected levels of travel flows along the new corridor. When combined with information on existing and future transport capacity, transportation planners can determine which capacity investments should have the highest priority.

In this respect, it is imperative to consider the demand for and the impact of disruptive technologies such as ride-sharing applications. These technologies offer dynamic data that can be used to analyze mobility patterns in real time to better inform TOD decisions. For example, Uber provides a data sharing platform known as Movement (https://movement.uber.com/), which helps cities understand travel patterns spatially as well as temporally. This could help assess and compare locations most appropriate for TOD interventions.

Applying the concept of integrated economic, transport, and land use planning is often complex, because of divergent perspectives of multiple agencies. Pre-feasibility assessments help to determine the technical and economic viability of proposed TOD projects and mitigate any risks for investments early-on in the planning process.

This section builds on the previous research related to TOD, undertaken by World Bank's TOD Community of Practice, GPSC, WRI, ITDP, and other agencies such as Reconnecting America and Florida Department of Transportation (USA). While research in these resources often use case studies and best practices from higher-income countries, some tools, processes and theories are relevant even in the World Bank client countries' context. The Knowledge Products for the 'Assess' Framework, presented in this section, are repurposed to be applied in the context of World Bank client countries, with an emphasis on highlighting the challenges faced from a political, regulatory, enforcement, financing, and other factors in implementing successful TOD projects.

KNOWLEDGE PRODUCTS



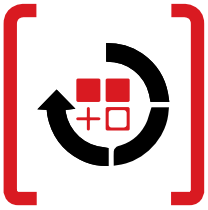
ANALYTICAL

AS-A01 **TOD Readiness Assessment** *(Spreadsheet + User Guide)*

AS-A02 **TOD Scale & Context Assessment** *(Checklist)*

AS-A03 **Thresholds for TOD Real Estate Demand** *(Spreadsheet + User Guide)*

AS-A04 **Thresholds for Rapid Transit Mode** *(Spreadsheet + User Guide)*



'HOW-TO' GUIDES

AS-H01 **How to Undertake Real Estate Market Analysis** *(Step-by-Step Guide)*

AS-H02 **How to Undertake Rapid Transit Alternatives Assessment** *(Step-by-Step Guide)*

AS-H03 **Infrastructure Carrying Capacity Assessment** *(Step-by-Step Guide)*



RESOURCES

AS-R01 **Real Estate Analysis Best Practices** *(Ref Doc.)*



PROCUREMENT

AS-P01 **Real Estate Analysis Terms of Reference** *(TOR Template)*

AS-P02 **Transit Alternatives Analysis Terms of Reference** *(TOR Template)*

AS-P03 **Infrastructure Analysis Terms of Reference** *(TOR Template)*

TOD KP

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AS-A01

TOD READINESS ASSESSMENT TOOL



This Knowledge Product is intended to be used as a checklist along with interactive excel spreadsheet. These tools are available online on the GPSC's TOD website and the World Bank's TOD CoP website. The reader should first review the summary presented below before using the spreadsheet tool

Type: Spreadsheet + User Guide



TOD
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INTRODUCTION

As cities in World Bank client countries continue experiencing rapid urbanization and population growth, plans on developing urban rapid transit systems are gaining much-needed acceptance. From Tanzania (Dar-es-Salaam), Brazil (20+ cities) and South Africa (6 cities) to China (40+ cities), India (15+ cities) and Indonesia (10 + cities) have launched rapid mass transit systems within the last decade. These investments also act as catalysts to reveal untapped opportunities for developing lands surrounding the transit stations in an economically viable, socially equitable, and environmentally sensitive manner. In order to identify these opportunities early-on in the process is critical in maximizing the benefits of transit-oriented developments (TOD).

Government agencies in World Bank client countries have minimal planning and engineering resources in-house to undertake TOD studies, especially in medium-sized cities. Often, the current resources are not well-equipped to understand the nuances and intricacies of TODs or require a lot of hand-holding in understanding, applying and finally implementing TOD concepts during the development phase. Furthermore, access to data is often a daunting task and restricts informed decision-making. The TOD Readiness Assessment helps cities conduct a rapid assessment of TOD readiness with relatively accessible datasets that are often available at local levels.

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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PURPOSE

The TOD Readiness Assessment Tool is designed to assess the existing TOD potential for three (3) primary scales of intervention:

- **Initial TOD Readiness Assessment:** A checklist designed to conduct a rapid assessment of external factors that are vital for planning and implementing TOD in any city regardless of the context. These factors include: i) existing policy and regulatory framework; ii) technical capacities available in-house; and iii) existing data availability to conduct detailed studies. This checklist is designed only to develop a better understanding of the factors that indicate the level of political support for TOD and are primarily public sector driven. This tool builds on the WB/WRI TOD Corridor Course on "Building Blocks for TOD" and National-level Guidance Document for India (World Resource Institute and World Bank Group 2015; MoUD, World Bank, India 2016).

  The City-level TOD Readiness Assessment may be used to inform the Enable, Plan + Design and Implement Knowledge Products (EN-P03 & EN-P05; PD-H01; IM-P03).

- **Detailed Station Area Level Readiness Assessment:** This interactive, spreadsheet-based tool, helps urban planners and decision-makers evaluate the TOD readiness at the station area scale. When planning for TOD, the network of stations in a mass transit network form a corridor; however, each station exhibits characteristics that are often unique but also show some similarities. This spreadsheet is designed to assist urban planners and policy-makers identify the station area attributes to develop context-sensitive strategies to increase readiness for TOD and understand the value of each station within the larger corridor network. This tool can be used by government agencies to build a case for retaining a consultant for further studies and/or prioritizing investments in station area and/or drafting the terms of reference for retaining consultants to conduct planning studies. Existing literature, specifically the 3V metrics in World Bank's "Transforming the Urban Space through Transit-Oriented Development: The 3V approach" formed the basis to develop this tool (Salat and Ollivier 2017).

  The Station Area Level TOD Readiness Assessment may be used to inform the Knowledge Products under the Plan + Design (PD-H03, PD-H04 and PD-H05); and Implement (IM-A01)

- **Detailed Corridor-level Readiness Assessment:** This tool overlays the node, place and market potential value for all the stations to show the mosaic of conditions throughout the corridor. All the individual metrics are added, giving each station a total score ranging from 16 points (if it scored "Low" on all 16 metrics) to 48 points (if it scored "High" on all 16). This composite score helps in categorizing stations into three levels: Long-Term, Emerging and Arrived that would require different investment tools and strategies, as well as different phasing of investments will be needed in different locations.

  The Corridor-level TOD Readiness Assessment may be used to inform the Knowledge Products under the Plan + Design (PD-H01, PD-H02, and PD-H03)

ASSUMPTIONS AND LIMITATIONS

- The tool is applicable for city, corridor and station scales. It is not intended to be applied on individual TOD projects at the site level.
- The tool is applicable in multiple contexts- greenfield, urban infill, suburban and redevelopment.
- The tool is not intended to compare different station areas along a corridor but highlight each station area's TOD potential.
- The tool is a relative measure of a station compared to other stations, and of imbalances in terms of connectivity, urban space and market potential. It is used for planning purposes, not design purposes.
- This tool is applicable for municipalities, development agencies, transit agencies, private developers or any agency interested in getting their city ready for TOD.

DATA SOURCES

- High-definition aerials/ satellite photography/ Google Earth/ Open Street
- Census information
- Local government GIS data
- Site Survey; Photos
- Local government transport data
- Secondary documents- applicable zoning codes; adopted master plans
- Field surveys
- Third-party reports
- Community mapping participatory planning exercises
- Open Source data
- Crowdsourced data
- Google Street view or other similar applications

INTENDED OUTCOMES

- Develop a preliminary checklist to identify potential pitfalls early-on in the process that prioritizes interventions needed to enable and implement TOD.
- Create an inventory of data availability.
- Gauge existing strengths and weaknesses of station areas to understand its full TOD potential and opportunities for improvement.
- Prepare a specific scope of work and terms of references for retaining external consultants, based on a preliminary understanding of data availability.
- Utilize spreadsheet tool results to refer other TOD Knowledge Products for additional technical guidance.

HOW TO USE THE TOD READINESS ASSESSMENT TOOL?

First, the user should read the User Guide Tab before using the spreadsheet. The application of the TOD Readiness Assessment tool consists of four basic steps:

01 INITIAL ASSESSMENT TAB

Populate the Initial Assessment tab as a checklist of the citywide policy, regulatory, and institutional framework; and evaluating technical data availability for detailed assessment.

[Refer following pages for details]

02 CREATE A CITY OR CORRIDOR BASE MAP

Identify station nodes along a transit network or transit corridor. Collect base data for each station, including ridership, land use conditions and other important data needs as specified in the Detailed Assessment Tab

03 DETAILED ASSESSMENT TAB

Enter data requirements in the Detailed Evaluation tab. The spreadsheet tool has measures developed that make use of readily available data and in some cases GIS-based analysis.

[Refer following pages for details]

04 SUMMARY TAB

Fill the template under the Summary tab to identify the station area's strengths and weaknesses, based on the readiness score calculated automatically through the tool.

INITIAL ASSESSMENT TOOL

The Initial Assessment tool is applicable at **any scale**. It measures the technical and regulatory readiness of the city agency to take up TOD planning and implementation. It includes three categories of measures –

01 Technical Capacities

02 Data Availability

03 Policy & Regulatory Environment

- Check each applicable measure listed in the spreadsheet.
- 1 point is assigned per item checked; 0 points are assigned if the item is not checked.
- Sub-scores for the three categories are derived from a group of individual metrics. A total of 30 individual metrics are used and reclassified as “Low, “Medium”, “High”.

The total score is converted to the following outputs:

TECHNICAL CAPACITIES

Review of existing technical and professional staff available to manage, implement and monitor TOD planning activities

		Score		Knowledge Product Reference
A	Low	0–3	HIGHER INDICATES BETTER READINESS	If high, refer to **EN-H01.** If medium or low, refer to the following KPs for capacity building: **IM-H01**, **IM-P01,** refer to the following KPs for retaining external consultants: **PD-P01.** If low, external consultants should be hired to undertake TOD planning and activities. Refer to Procurement tools.
B	Medium	4–6		
C	High	7–10		

DATA AVAILABILITY

A comprehensive database as a resource to help document baseline conditions and analyze constraints based on the GIS/ AutoCAD database for the last 5 years.

		Score		Knowledge Product Reference
A	Low	0–5	HIGHER INDICATES BETTER READINESS	If high, refer Plan + Design KPs: **PD-H01 to H04** If medium or low, refer following KPs for retaining external consultants: **PD-P01.**
B	Medium	6–10		
C	High	11–15		

POLICY & REGULATORY FRAMEWORK

To evaluate the TOD readiness of the city with respect to the institutional support, plans, policies, and development market.

		Score		Knowledge Product Reference
A	Low	0–3	HIGHER INDICATES BETTER READINESS	If high, refer Plan + Design KPs: **EN-C01 to C02; EN-P01; PD-H05.** If medium or low, refer following KPs for retaining external consultants: **PD-H01 to H02**
B	Medium	4–6		
C	High	7–10		

DETAILED ASSESSMENT TOOL

The Detailed Readiness Assessment tool is applicable at the **corridor and station scales**. It is a relative measure of a station compared to other stations as well as evaluation of the station itself. It includes three categories of measures –

01 Node Value

02 Place Value

03 Market Potential Value

These categories rely on the "3V Framework", developed by World Bank (Salat and Ollivier 2017). The three values are defined as:

A. NODE VALUE

Node value describes the importance of a station in the public transit network based on its passenger traffic volume, intermodality, and centrality within the network.

B. PLACE VALUE

Place or placemaking value describes the urban quality of a place and its attractiveness in terms of amenities including schools, plazas/open spaces representing the urban fabric around the station.

C. MARKET POTENTIAL VALUE

Market potential value refers to the unrealized market value of station areas. It is derived through market analysis measured analyzing major drivers of demand including current and future human densities (residential plus employment).

Understanding where, when and how potential economic value can be created requires tools that help differentiate the opportunities offered by the diverse stations in a mass transit network. The Detailed Readiness Assessment tool assessment is designed to highlight the interdependencies of economics, land use, urban design and mass transit networks and stations. The results of this tool may be used to direct the city for drafting a TOD vision and subsequently prepare detailed plans that enhance the value and economic potential of a station area.

- Input data into each of the metrics listed in the Detailed Assessment spreadsheet.
- Each metric is evaluated and simplified into a 1 to 5 score, where 5 indicates high readiness, 3 indicates medium readiness and 1 indicates low readiness
- The total score reveals several key strengths and opportunities. Based on the identified strengths, weaknesses, and opportunities, the city can develop targeted strategies to increase the area's readiness for TOD.

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WHAT IS THE 3 VALUE FRAMEWORK?

The 3V Framework is a methodology for identifying economic opportunities in areas around mass transit stations and optimizing them through the interplay between the node, place, and market potential values. It provides a typology to cluster stations based on the three values. It equips policy and decision makers with quantified indicators to better understand the interplay between the economic vision for the city, its land use, its mass transit network, and its stations' urban qualities and market vibrancy. It outlines planning and implementation measures for the different clusters of stations that can help prioritize limited public resources and create value through coordinated interagency measures.



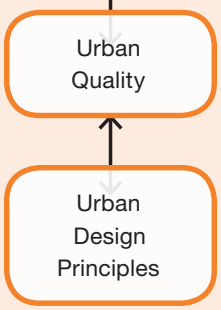
B. PLACEMAKING VALUE



Placemaking value describes the urban quality of a place and its attractiveness in terms of amenities, schools, and healthcare; the type of urban development; local accessibility to daily needs by walking and cycling; the quality of the urban fabric around the station, in particular its pedestrian accessibility, the small sizing of urban blocks, and the fine mesh of connected streets that create vibrant neighborhoods; and the mixed pattern of land use.

Value is calculated through the following indicators:

- Density of street intersections
- Local pedestrian accessibility
- Diversity of uses
- Density of social infrastructure within 800 meters of the station

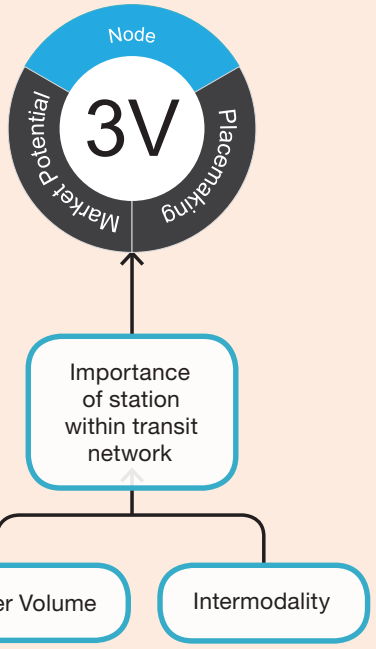


A. NODE VALUE

Node value describes the importance of a station in the public transit network based on its passenger traffic volume, inter-modality, and centrality within the network.

Value is calculated through the following indicators:

- Degree centrality
- Closeness centrality
- Betweenness centrality
- Daily ridership
- Inter-modal Diversity



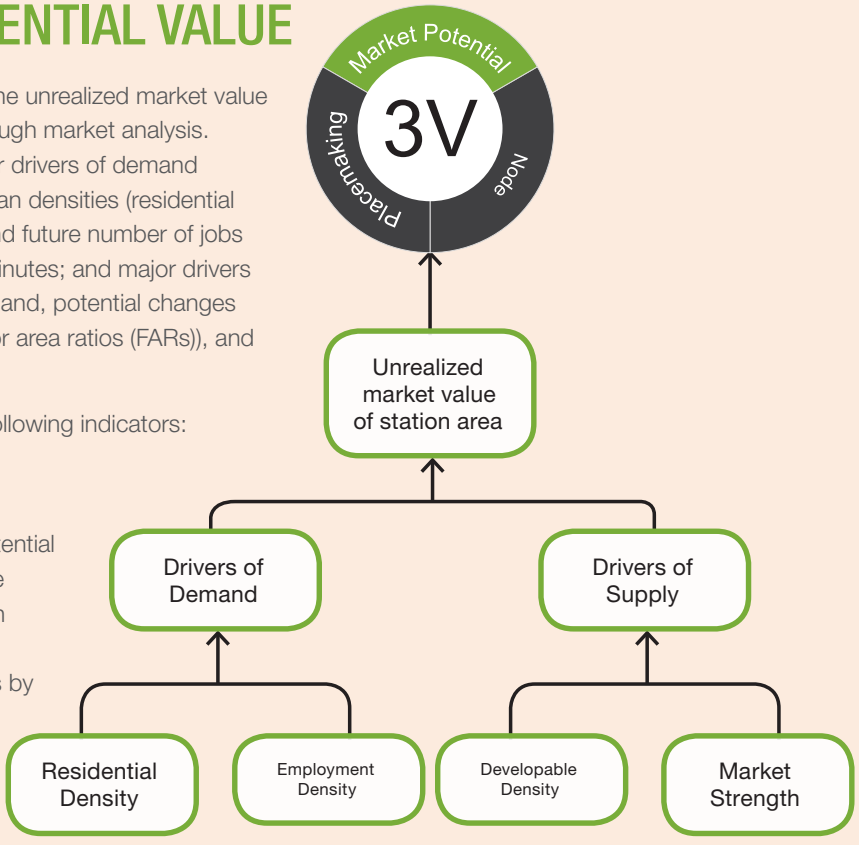


C. MARKET POTENTIAL VALUE

Market potential value refers to the unrealized market value of station areas. It is derived through market analysis. It is measured by analyzing major drivers of demand including current and future human densities (residential plus employment); the current and future number of jobs accessible by transit within 30 minutes; and major drivers of supply, including developable land, potential changes in zoning (such as increasing floor area ratios (FARs)), and market vibrancy.

Value is calculated through the following indicators:

- Human density
- Jobs/residents ratio
- Human density growth potential
- Average or median income
- Percentage of managers in labor force
- Number of accessible jobs by transit
- Real estate opportunities
- Dynamics of real estate development





Hong Kong SAR, China

TOD KP

AS-A02

TOD SCALE ASSESSMENT



Checklist to determine the appropriate scale for TOD planning

Type: Checklist + User Guide



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INTRODUCTION

Existing literature, both in high income and low to middle-income countries, emphasizes the need for planning TODs at the metropolitan/city level, network/corridor level, local/neighborhood/station area level, and finally the station/site level (Salat and Ollivier 2017; WB/WRI TOD Corridor Module 2015; Ministry of Urban Development, India 2016; Center for Transit Oriented Development 2010). Some progressive cities in World Bank client countries such as Delhi, Hubli-Dharwad in India, Capetown and Johannesburg in South Africa are adopting this multi-level TOD planning approach for their development master plans and mass transit system plans. However, the majority of cities in World Bank client countries have taken an inconsistent approach in aligning transit, land use, infrastructure, and economic planning at macro and micro scales.

From an implementation perspective, station area level planning is the most important because most projects are formulated at this scale and could be aligned with transit investments. Often planning at the city and corridor scales are synchronous with each other, while TOD real estate development projects face the issue of addressing the time lag between transit station construction and real estate project viability. In Bogota, for example, research has indicated that a lengthy plan approval and development permit application process (usually 4-5 years), attributed to the lack of coordination between the Territorial Ordinance Plan (POT) and development plans (Suzuki, Cervero and Iuchi 2013), resulted in opportunity losses for attracting TODs in the first phases of the BRT implementation.

The nature of development context - whether a greenfield, suburban, urban intense or redevelopment areas - has a strong correlation to the value creation potential of TOD projects. In World Bank client countries, developing new towns, cities and developments on former agricultural lands has been a growing trend over the last 20 years. These developments, such as Dodoma, Tanzania's new capital city and Naya Raipur, Chattisgarh state in India's new capital, provide unique opportunities to design cities with TOD concepts embedded in all aspects from the initial stages.

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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Salat, Serge, and Gerald Ollivier. 2017. Transforming Urban Space through Transit Oriented Development - The 3V Approach. Washington DC: World Bank Group.

Suzuki, Hiroaki, Robert Cervero, and Kanako Iuchi. 2013. Transforming Cities with Transit - Transit and Land Use Integration for Sustainable Urban Development. Washington DC: The World Bank Group.

World Resource Institute and World Bank Group. 2015. Corridor Level Transit-Oriented Development Course. Washington, DC

PURPOSE

The TOD Scale Assessment tool is developed as a checklist to help cities in understanding the inter-relationships between these various scales of planning and their impact on TOD implementation. On the other hand, the Context Assessment tool is designed to determine the typology of a station area's context, based on its current and planned urban form, its relationship to transit and its market strength in attracting TOD-related investments. Combined, these two tools help interested cities gauge the points of intervention for planning TODs, as well as understand the need for context-sensitive designing in urban regeneration projects.

Both tools are designed as user-friendly checklists, taking into consideration development trends. These tools are available online on the GPSC's TOD website and the World Bank's TOD CoP website. The reader should first review the summary presented below before using the spreadsheet tool.

ASSUMPTIONS AND LIMITATIONS

- These tools are intended to solely guide users in initial assessments and need to be followed by detailed analyses, where feasible.
- The tools are designed to ensure that they can be used at multiple stages during the TOD implementation process, and not necessarily followed in a sequential manner.

DATA SOURCES

- Secondary sources- applicable zoning codes; adopted master plans; policies
- Third-party reports
- Google maps / other high-quality aerial/ satellite imagery

HOW TO USE THE TOOL?

01 FILL IN THE CHECKLIST

Read through the applicable sections and insert a check mark for each feature listed in the tool. In the Context Checklist, which is primarily applicable at the station area or site scale, the checkboxes correspond to typical conditions that help define the context of the station area. The context can be used to define the station area typology. In the Scale Checklist, the checkboxes refer to parallel planning activities and land ownership considerations that can help planners determine the most effective scale for planning TOD.

[Refer following pages for details]

02 OUTPUT

The city can undertake TOD planning at any scale or context provided there is one check against a feature in the selected option.

Add up all the checks to identify the priority scale and/or context if more than one is selected

TOD KP

DETERMINE THE CONTEXT OF A TOD PLAN

GREENFIELD



- ☐ PLANNED LAND CONVERSION FROM AGRICULTURAL TO HIGH-INTENSE USES
- OR
- ☐ HIGH PERCENTAGE OF GOVERNMENT OWNED LANDS
- OR
- ☐ EXTREMELY LOW OR NO EXISTING POPULATION
- OR
- ☐ WITHIN CLOSE PROXIMITY TO EXISTING URBAN CENTRES, GENERALLY ACCESSIBLE BY AUTOMOBILES
- OR
- ☐ HIGH-QUALITY PUBLIC INFRASTRUCTURE INVESTMENT AS THE KEY ECONOMIC DRIVER

SUBURBAN



- ☐ NON-TRANSIT SERVICE OR LOW-FREQUENCY TRANSIT SERVICE
- OR
- ☐ LOW TO MODERATELY POPULATED
- OR
- ☐ LACKS A COMBINATION OF STREET CONNECTIVITY, PEDESTRIAN AND BICYCLE FACILITIES, AND URBAN AMENITIES
- OR
- ☐ SINGLE-USE DEVELOPMENTS ON LARGE AREAS OF LAND

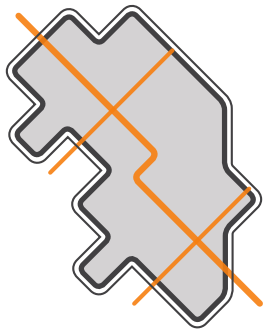
URBAN (INFILL AND REDEVELOPMENT)



- ☐ INTENSELY POPULATED AREAS
- OR
- ☐ GOOD OR IMPROVING PEDESTRIAN/BICYCLE NETWORK
- OR
- ☐ MIX OF NEIGHBORHOOD SUPPORTIVE RETAIL AND SERVICE AMENITIES
- OR
- ☐ HIGH MIX OF SUPPORTING JOBS

DETERMINE THE SCALE OF A TOD PLAN

CITY-REGION LEVEL



- ☐ REGIONAL PLAN | CITY DEVELOPMENT PLAN | MASTER PLAN
  (Under preparation | Update underway/ongoing/planned)

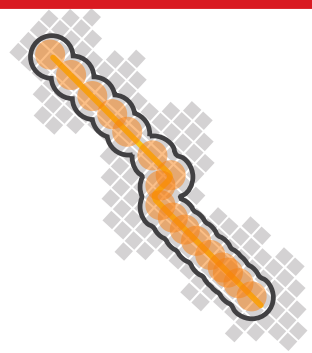
OR

- ☐ TRANSPORTATION PLAN | MOBILITY PLAN
  (Under preparation | Update underway/ongoing/planned)

OR

- ☐ BRT/METRO RAIL SYSTEM PROJECT PLAN
  (Under preparation | Planned)

CORRIDOR LEVEL



- ☐ MODIFICATIONS IN LAND DEVELOPMENT REGULATIONS
  (Under preparation | Update underway/ongoing/planned)

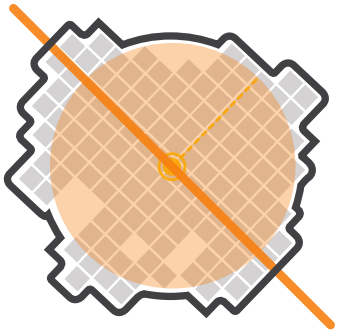
OR

- ☐ TRANSPORTATION PLAN | MOBILITY PLAN
  (Under preparation | Update underway/ongoing/planned)

OR

- ☐ BRT/METRO RAIL SYSTEM PROJECT PLAN
  (Under preparation | Planned)

STATION AREA



- ☐ TRANSIT OPERATIONAL/UNDER CONSTRUCTION

OR

- ☐ PUBLIC OWNED VACANT LANDS/ REDEVELOPMENT OPPORTUNITIES EXISTING NEAR TRANSIT

OR

- ☐ LAND BANKING/ POOLING STRATEGY UNDERWAY

OR

- ☐ MODIFICATIONS IN LAND DEVELOPMENT REGULATIONS
  (Under preparation | Update underway/ongoing/planned)

OR

- ☐ MARKET INTEREST (RAPID CHANGE IN PROPERTY VALUES)

SITE LEVEL



- ☐ REDEVELOPMENT OPPORTUNITIES NEAR TRANSIT

OR

- ☐ MARKET INTEREST IN GREENFIELD, LAND AUCTIONING OR DEVELOPMENT

OR

- ☐ PUBLIC OWNED VACANT LANDS/ REDEVELOPMENT OPPORTUNITIES EXISTING NEAR TRANSIT



BRT Corridor, Pune, India

TOD KP

AS-A03

THRESHOLDS FOR TOD REAL ESTATE DEMAND

This Knowledge Product is intended to be used as an interactive Excel spreadsheet. These tools are available online on the GPSC's TOD website and the World Bank's TOD CoP website. The reader should first review the summary presented below before using the spreadsheet tool.

Type: Spreadsheet + User Guide

TOD
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INTRODUCTION

Real estate developments are broadly classified into residential, retail, commercial (offices) and hospitality. In the case of TOD, however, mixed-use developments are highly recommended as they promote 24/7 use of transit-accessible locations and also promote walkability. The success of revenue earnings in such a mixed-use project is dependent on several factors, out of which appropriate sizing and program development are key factors.

Typically, in low-density markets, residential development is assumed to be the market driver dictating demand for all other components of real estate. However, in many TOD projects, the micro-market is governed by commercial and retail developments. Therefore, the proportion of uses within a mixed-use development is dependent on the optimization of different development components in terms of cross-financing requirements.

The demand for real estate is demonstrated through two principal indicators, namely, **price** and **occupancy**. The price is a direct variable of demand and supply scenarios in the real estate micro-market. The occupancy ratio provides the vacancy (supply– demand) status of the market and therefore rationalizes any scenario of overpricing by a seller.

The property yield is an indicator that helps measure future income or the earning potential of a real estate investment. Based on the earning potential of each component, the development components may be ranked as shown below.

To determine the real estate demand of a property, it should be measured across the price and occupancy spectrum as shown in the chart on the next page. Within each possibility, the potential land use mix must be evaluated to best balance the revenue risk with the revenue potential as illustrated below.

For example, in highly priced locations with high revenue risk, development components with moderate property yields are preferred so that the potential return can moderately balance capital investment. In highly priced locations with low risk, on the other hand, high yield investments are preferred so that maximum profitability can be gained. Similarly, in lower-priced locations, low to moderate yield investments are preferred depending on the risk involved.

This chart can be used in setting the initial sketch program for a proposed development. Based on the initial sketch, a detailed financial due diligence is highly recommended before proceeding further on project structuring and financing.

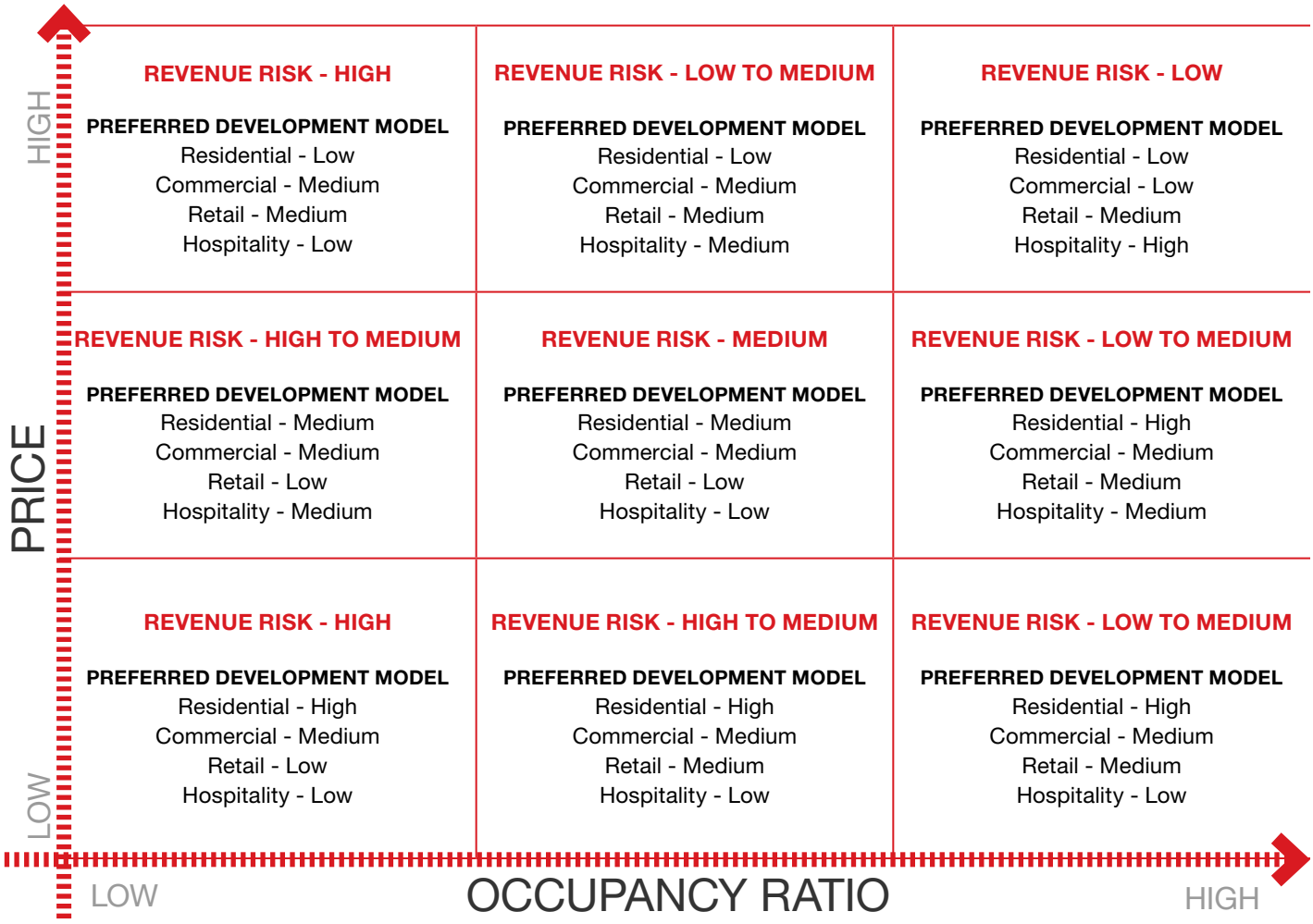
Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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S.No	Development Component	Measurement Indices	Property Yield* (Annual Rental Income / Capital Value)	Ranking based on revenue potential
1	Hospitality	Revenue per Available Room, Average Room Rate	Highest	1
2	Retail	Capital and Rental Values	Moderate to High	2
3	Commercial (Office)	Capital and Rental Values	Moderate to High	3
4	Residential	Capital and Rental Values	Lowest	4

* the Property Yield descriptions shown here are for comparison between different development components. Yield rates are usually governed by factors such as location and micro-market conditions. in 2018, the commercial yield rates ranged from 9% in Sao Paulo to 5% in Beijing (JLL Global Research 2018), whereas residential yield rates ranged from was 4% in Sao Paulo and 1.5% in Beijing (www.numbeo.com).

ASSUMPTIONS



PROPORTION OF THE COMPONENTS IN OVERALL LAND USE MIX

Low	10 - 15 %
Medium	25 - 30%
High	40 - 50% or more

A graphical representation of a typical spectrum on real estate conditions varying from highest to lowest prices and highest to lowest occupancy ratios.

PURPOSE

This tool has been designed to provide assistance in analyzing the potential for real estate development and structuring of different mixed-use development components for optimized revenue generation. The tool identifies the TOD projects under four basic categories viz.

a. Site-based,

b. Station-based,

c. Corridor-based and

d. City-based.

Also, it classifies the region/location of the project planned for development to arrive at suggestive strategies for structuring real estate components. In addition, it also provides a detailed analysis for individual component i.e **Residential, Retail, Commercial** and **Hospitality** based on the market scenario and grade of existing supply. This tool aims to assess the Market Value of the TOD project planned for development

DATA SOURCES

- Population Density - population per sq. km
  - City Region
  - Micro-market Area
- Infrastructure Cost Ratio - pure ratio (total investment planned for the transit infrastructure per square meter divided by the land cost per square meter)
- Realty Price Ratio - pure ratio (average price of the property per square meter divided by the land cost per square meter)
  - Residential
  - Retail
  - Commercial
  - Hospitality
- Premium Supply Ratio - pure ratio (total supply in square meters of grade A property in the micro-market divided by total supply in square meters of grade B property in the micro-market)
  - Residential
  - Retail
  - Commercial
  - Hospitality
- Occupancy Ratio - pure ratio (total rate of occupied units by total units)
  - Residential
  - Retail
  - Commercial
  - Hospitality

HOW TO USE THE REAL ESTATE DEMAND TOOL

First, the user should read the User Guide Tab before using the spreadsheet. The application of the Real Estate Demand tool consists of these basic tabs:

THE TOOL INCLUDES:

- USER GUIDE
- DASHBOARD
- ASSESSMENT
- RESIDENTIAL
- RETAIL
- COMMERCIAL
- HOSPITALITY
- REFERENCE MATRIX
- REFERENCE CASE CITIES

01 SELECTING SCALE AND CONTEXT

- **TOD PROJECT SCALE:** Select the scale of the TOD project to highlight hte appropriate cells on the Dashboard.
- **PLACE VALUE**: Select the development context of the TOD project.
- **NODE VALUE**: Select the context of transit nodes.

Based on the above selection, the reference to development strategy and structuring of real estate components is provided in “Dashboard” sheet. The portion highlighted in yellow is the suggested initial strategy to proceed for further analysis.

02 DATA INPUTS IN ASSESSMENT

Select the value in the orange box, after reading the instructions carefully.

ORANGE
Input Selection Box

03 VIEW THE DETAILED STRATEGY RECOMMENDATIONS

Within each land use, see the specific strategy recommendations on structuring development of real estate components in the project.



Mexico City, Mexico

TOD KP

AS-A04

THRESHOLDS FOR RAPID TRANSIT MODE SELECTION

This Knowledge Product is intended to be used as an interactive Excel spreadsheet. These tools are available online on the GPSC's TOD website and the World Bank's TOD CoP website. The reader should first review the summary presented below before using the spreadsheet tool.

Type: Checklist + User Guide



TOD

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INTRODUCTION

As urban economic growth in World Bank client countries outstrips rural economies, cities continue to see a rapid influx of population and jobs. These new jobs require accessibility through public transit means that are faster and more reliable. Public transit demands have necessitated a change from unregulated and local bus systems to more robust and high-quality rapid mass transit systems. Several cities have launched new rapid transit systems in the last 2 decades including cities in Tanzania (Dar-es-Salaam), Brazil (20+ cities) and South Africa (6 cities) to China (40+ cities), India (15+ cities) and Indonesia (10+ cities). Most cities face difficulties in timing transit investments and changes in land use regulations for more integrated TOD outcomes. Rapid transit investments are more appropriately located along corridors with high population densities and employment access. However, a city may choose to proactively invest in rapid transit systems at the same time as land use regulations are relaxed. This will increase choices for the non-driving population in terms of real estate and mobility.

The increasing choices in rapid transit modes in recent years offer developing countries the option of selecting a transit mode that best addresses mobility needs and economic constraints. While rail rapid transit systems have been around longer, they are more expensive to build and offer little flexibility in adjusting for demand variations. Bus rapid transit systems, on the other hand, offer more flexibility in adjusting to varying demand, but the “Rapid” version is comparatively new and is difficult to enforce in many cities with poor traffic behavior.

Transit planners in World Bank client countries, are often ill-equipped to make the decision without considerable data collection and modeling studies. Furthermore, access to data is often a daunting task and restricts informed decision-making. The Rapid Transit Mode Selection Tool helps cities conduct a rapid selection for bus or rail rapid transit modes with relatively accessible data points that are often available at local levels.

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.* © 2018 International Bank for Reconstruction and Development/ The World Bank

PURPOSE

This Rapid Transit Mode Selection Tool is intended to provide assistance on rapid transit mode selection to cities who are either (1) considering the introduction of a new rapid transit mode for an intended network at the city scale; or (2) in the process of evaluating rapid transit modes for operations along a corridor:

- **Initial Assessment:** This tab is intended to help cities make an initial assessment among a set of modes that should be considered for the Alternative Analysis. The tool is designed to use data that are readily available to assess potential rapid transit modes that differ by technology and right-of-way.

  The Initial Assessment may be used to inform the Assess Rapid Transit Tool (AS-H02)

- **Detailed Evaluation:** This tab is intended to help cities determine the most appropriate mode alternatives for a specific corridor. The tool is designed to use data that represent an informed opinion as to the extent of demand in the corridor with rapid transit in place. Please copy the tab for use for every different corridor. The final selection of Mode Alternative should be based on context-specific criteria, which can be more important than a small numerical difference in the Evaluation Score.

ASSUMPTIONS AND LIMITATIONS



BRT Rapid: E.g: Harmoni Central Busway Transjakarta

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BRT Semi-Rapid 1: E.g: Lanzhou BRT

Photo © ITDP China and made available under a Attribution-3.0 Unported license



BRT Semi-Rapid 2: E.g: Ahmedabad BRT

Photo © Enthusiast and made available under a Attribution-Sharealike 3.0 Unported license

1. The tool classifies the modes broadly under rail and bus and further classifies them based on the achievable speed and person-capacity. The classification based on speed is broadly defined by the degree of “separateness” from other traffic movement and conflict points. This degree is classified as ROW (right-of-way) Class A, B, or C, where ROW Class A denotes full separation either through grade separation or continuous barriers; Class B denotes partial separation either through discontinuous lane or grade separation, and Class C denotes mixed traffic movement (Vuchic 1981). Several physical and technological mechanisms can be used to achieve the ROW variations, including actual physical separation, but also including technological measures such as signal priority.
2. The rapid transit modes considered in this selection Tool include:
   a. Bus Rapid Transit (BRT) - is a high-quality bus-based rapid transit system, characterized by better quality and fuel-efficient buses, dedicated right-of-ways, and pre-boarding fare collection. Three types of BRT choices are available in this tool, differentiated mainly by the mode capacity and operating conditions:
      - BRT Rapid – is a BRT system using standard, articulated or double-articulated buses, designed to operate on a fully segregated corridor; either on an elevated or isolated busway or along physically separated bus lanes with continuous passing lanes delivering highly reliable, fast and comfortable services equivalent to Metro systems.
      - BRT Semi-Rapid 1 – is a BRT system using standard, articulated or double-articulated buses, designed to operate with high speeds and reliability on a dedicated bus lane with passing lanes at stations and physical segregation or signal prioritization techniques at junctions for faster movement of buses.
      - BRT Semi-Rapid 2 – is a BRT system using standard or articulated buses and designed to operate at higher than average speeds along a dedicated bus lane with general traffic turns allowed at signals.

ASSUMPTIONS AND LIMITATIONS



LRT-Semi-Rapid: E.g. Manila LRT

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Metro: E.g. Delhi Metro

Photo © Ashish ITCT and made available under a Attribution-ShareAlike 4.0 International license

b. Light Rail Transit (LRT) - Light Rail Transit is an electric powered rail based transit system which is lighter than the conventional heavy rail system and characterized by its ability to operate short trains along dedicated lanes. LRTs exist in many forms, including streetcars, trams, and the more modern LRT systems. This tool only includes the option of the modern LRT with dedicated ROW features as described:
   - » LRT Semi-Rapid – is an LRT system using up to 4 train cars, with a physically segregated right-of-way and dedicated tracks at grade, allowing occasional traffic turns at junctions.

c. Metro /Rail Rapid Transit – Metro / Rail Rapid Transit is an electric powered rail-based transit system which is designed to operate in fully grade-separated corridors with closer station spacing than heavy commuter rail.

3. The following transit modes are not included in this tool
   a. Local Bus – because it serves a local connector and feeder connection only and cannot be classified as “rapid”;
   b. Streetcar or Mixed Traffic LRT – because it operates in mixed traffic more often and cannot be classified as “rapid”;
   c. Commuter Rail – because it serves the regional transit function, not urban ‘rapid’; and
   d. Monorail / Skytrain (suspension rail) / gondola cars – because it does not adapt itself to forming a network, an essential requirement for urban transit, but could be used as feeder lines in atypical topographies as deemed necessary.
4. The tool uses a higher and lower case assumption for computing potential travel demand for the given conditions. These higher and lower cases represent density variations within a city or along a city corridor. For a city or corridor where both extreme conditions are observed, a mode must be favorable under both conditions to be viable.
   a. **THE HIGHER CASE** may be interpreted as the computed conditions for the denser core of the city.
   b. **THE LOWER CASE** may be interpreted as the computed conditions for the sparsely developed suburban areas in the city.

ASSUMPTIONS AND LIMITATIONS

5. The tool assumes capacities based on vehicle dimensions per TCQSM methods, using 6 persons per m2 of standee space and load diversity factors depending on train length. (Reilly and Levinson 2011). A load diversity factor is applied to derive optimum capacities, where peak capacities are defined as the maximum number of people that can be carried past a given location during a given time period under specified operating conditions, without unacceptable delay, hazard, or restriction, and with reasonable certainty. It is assumed that a system that operates at peak capacities at all times is over capacity. Typical frequencies for BRT are based on observed actual frequencies. (Global BRT Data n.d.)
6. The tool uses a cost per passenger-km unit to determine cost efficiencies as explained in the optimization model for technology selection developed by L. Moccia. (Moccia, Allen and Bruun 2018). The model uses a synthetic representation of the temporal and spatial variability of demand, and of several operational and design aspects. The model is adjusted to show that planning for a faster technology can be more important than the choice between bus and rail per se, except at very low demand density, and that cost differences between technologies are small in a wide demand range. The social discount rate assumed in running this model is 7%.
7. The tool does not consider contextual parameters such as political preferences, costs of land acquisition and construction of supporting infrastructure.
8. The tool is applicable in multiple contexts- greenfield, urban infill, suburban and redevelopment.
9. The tool is not intended to compare different corridor alignment alternatives, or service planning alternatives. It only provides guidance on the rapid transit mode based on modal characteristics.
10. This tool is applicable for municipalities, development agencies, transit agencies, private developers or any agency interested in proposing a transit system for the city.

DATA SOURCES

- For Initial Assessment
  - Census information – area and population
  - Local bus usage data – in annual terms (multiple daily numbers by 300) and in spatial terms to identify the highest ridership observed at the peak hour at the peak loading point.
- For Detailed Assessment
  - Census information – population
  - Planned Corridor details – corridor length, projected ridership
- Use or add data to the Urban Transport Data Analysis Tool (Agarwal, et al. 2014)

HOW TO USE THE RAPID TRANSIT MODE SELECTION TOOL?

First, the user should read the User Guide Tab before using the spreadsheet. The application of the Rapid Transit Mode Selection tool consists of three basic steps:

THE TOOL INCLUDES:

- USER GUIDE
- INITIAL ASSESSMENT
- DETAILED EVALUATION
- ASSUMPTIONS & THRESHOLDS
- GLOSSARY

01 SELECTING THE APPROPRIATE TAB FOR YOUR NEEDS

- **INITIAL ASSESSMENT:** This tab is intended to help cities make an initial assessment among a set of modes that should be considered for the Alternative Analysis.
- **DETAILED EVALUATION**: This tool is intended to help cities determine the most appropriate mode alternatives for a specific corridor. Please copy the tab for use for every different corridor.

02 DATA INPUTS

Populate the Input Cells using readily available data

ORANGE
Input Selection Box

YELLOW
Input Entry Box

03 STEP 3: READ AND INTERPRET THE RESULTS

HOW TO INTERPRET THE RESULTS?

Initial Assessment: In this tool, the results are expressed as the degree to which a mode is favorable or competitive or unfavorable in terms of (1) the ability of the mode to manage peak passenger demand at higher and lower ranges of demand; and (2) the cost efficiency of the mode technology at higher and lower ranges of demand.

A city that is home to a high variation of population and employment densities, would need to consider the results for both higher and lower cases. On the other hand, a city that is characteristically closer to either the higher or lower end of the density range may use the results from the most applicable scenario. The results of the tool should be used not as direct recommendations but as preliminary guidance on appropriate mode(s) for the city, given prevailing conditions of population density and travel habits. For instance, if the INITIAL ASSESSMENT tool suggests that rail is COMPETITIVE for the whole network whereas bus is FAVORABLE, it may well be that part of the network would be better off as rail. Mixed results could be interpreted in some instances to indicate a mixed-mode solution warranting at least DETAILED consideration by corridor.

Detailed Evaluation: If passenger is known by segment/ corridor, the DETAILED EVALUATION tool could be used to explore the particular segment that works better as rail. In effect, both tools together could be used to assign segments of a large notional network to either rapid (BRT or Metro) or semirapid (BRT or LRT).

In this tool, the results are expressed in terms of an Evaluation Score. The evaluation considers the following parameters:

a. Provides Adequate Capacity (Scored out of 3)
b. ROW Availability (Need vs. availability of dedicated corridors) (Scored out of 3)
c. Potential to Integrate Pedestrian Needs (Such as safe crossings) (Scored out of 2)
d. Potential to Improve Living Conditions in surrounding Development (Scored out of 2)
e. High Estimate of TAC per PKT (High Cost = Low Score) (Scored out of 3)
f. Low Estimate of TAC per PKT (High Cost = Low Score) (Scored out of 3)
g. Ease of Implementation with respect to: Familiarity with Technology (Scored out of 2)

REFERENCES

Agarwal, O. P., Gouthami Padam, Aroha Bahuguna, and Salvador Pena. 2014. Urban Transport Data Analysis Tool (UT-DAT) : user's manual (English). Energy Sector Management Assistance Program (ESMAP). Washington, DC: World Bank Group. http://documents.worldbank.org/curated/en/395261468147569317/Urban-Transport-Data-Analysis-Tool-UT-DAT-users-manual.

n.d. Global BRT Data. Accessed 08 20, 2018. https://brtdata.org/.

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Reilly, Jack, and Herbert Levinson. 2011. Public Transport Capacity Analysis Procedures for Developing Cities. Washington DC: The International Bank for Reconstruction and Development / The World Bank.

Vuchic, Vukan R. 1981. Urban Public Transportation Systems and Technology. Englewood Cliffs, NJ.

GLOSSARY

CAPACITY

The maximum number of people that can be carried past a given location during a given time period under specified operating conditions, without unacceptable delay, hazard, or restriction, and with reasonable certainty.

HISTORICAL DAILY PEAK HOUR FACTOR

The ratio of Peak Hour Peak Direction Passenger Demand for a typical route (i.e. representative of the system as a whole) to its total daily boardings in both directions. His factor helps to convert daily passenger flows into peak hour passenger flows. It should be ideally be determined by looking at historical data. Please note that this factor is usually higher for public transport as compared to total traffic.

LOCAL TRANSIT

Public transport operating on fixed routes with frequent stops (100-400 m apart), generally in mixed traffic on surface roadways, relying heavily on walk access and egress.

LOCAL TRANSIT BOARDINGS

The annual number of passengers boarding local transit vehicles, counting separately each boarding made in the course of single journey or trip between origin and destination. Also known as unlinked passenger trips (UPT). Boardings on regional services should not be included in city totals when using this tool.

LOCAL TRANSIT SERVICE AREA

The reasonably contiguous area served by the local transit network, not including regional services. Indicative extent would be the area within 1 km of regularly served local stops. This area does not include portions of the metropolis connected to the local service area solely by regional services.

MEAN LOCAL TRANSIT TRIP LENGTH

The average distance traveled by one public transit boarding passenger, calculated by dividing total local transit person-km by total local transit boardings.

NETWORK EXTENT

The number of kilometers of a route in a public transport network, without double-counting kilometers where routes share the same path.

PASSENGER TRAFFIC DENSITY (PTD)

The total number annual transit passengers passing the average point along a system or route in both directions combined, formed by dividing system PKT by network extent (for a system) or route PKT by route length (for a single route).

PASSENGER-KILOMETERS TRAVELLED (PKT)

The total distance traveled by passengers on transit vehicles (for a single route or a system), which may be determined by multiplying the number of unlinked passenger trips by the average length of such trips.

PEAK HOUR PEAK DIRECTION PASSENGER DEMAND (PHPD)

The number of transit passengers carried in the peak hour in the peak direction. This occurs almost universally on weekdays and is measured for a single route at its maximum load point.

PROJECTED ANNUAL RAPID TRANSIT PASSENGER BOARDINGS IN A CORRIDOR/ ANNUAL CORRIDOR RIDERSHIP

The estimated or projected annual passenger boardings for a specific rapid transit corridor of known length. The estimate should be consistent with operating characteristics (such as average speed) for the available ROW

RAPID TRANSIT

Public transport operating on fixed routes at a significantly higher average speed than local service, usually in exclusive rights-of-way and/or completely separated from surface traffic. Access depends on both walking and local public transport service. Stations are typically 800m-2km apart.

REGIONAL TRANSIT

Public transport operating on fixed routes within and outside the local service area, offering higher average speeds than even rapid transit, with average station spacings usually longer than 2 km. A large share of access may be by motorized transport.

RIGHT-OF-WAY

Land that is used for moving vehicles carrying passengers or goods, such as railways or highways. Rights-of-way may be identified, purchased, or reserved in advance for future transportation use, and may be required to construct elevated or underground rapid transit.

ROW CLASS

Classification of the type of operating environment of the RoW. ROW Class A = fully grade-separated ROW, Class B = at-grade lane separation, Class C = mixed traffic.

TOTAL ANNUALIZED COST

Total annualized cost is the annualized value of the total net present cost expressed in per PKT.

VEHICLE CAPACITY

The average number of people that a vehicle can be scheduled to carry at capacity (as defined herein).



Indore, India

TOD K P

AS-H01



HOW TO UNDERTAKE REAL ESTATE MARKET ANALYSIS

This tool aids in establishing the real estate knowledge required to carry out a successful TOD development. Through the use of the tool, the market area with the appropriate demand can be determined. It can also be better understood what development is most in demand, based on demographic, geographic and economic trends.

Type: Step-by-Step Guide)



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01 UNDERSTAND THE REGIONAL OR CITY-WIDE SETTING

To understand and compare the regional or city-wide economic trends with conditions along the TOD corridor or station area where the project is proposed.

- DEMOGRAPHIC TRENDS: POPULATION | DENSITY | HOUSEHOLDS
- EMPLOYMENT TRENDS: TOTAL NUMBER OF JOBS | UNEMPLOYMENT RATE | TOTAL NUMBER OF ESTABLISHMENTS
- LARGEST AREA EMPLOYERS
- CONSTRUCTION ACTIVITY: RESIDENTIAL AND NON-RESIDENTIAL

DATA SOURCES

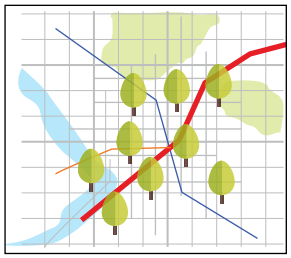
- City-level Census Information
- World Bank Open Data (https://datacatalog.worldbank.org/)
- Municipalities (Building Permit/ Plan Approval Departments)
- Local Real Estate Industry Associations
- Interviews with local property brokers

02 DELINEATE THE TOD MARKET AREA BOUNDARY

To define the two boundaries of the TOD Market Area: Primary (3 mile/5 km) and Secondary Trade Area (5 mile/8 km) to understand the market's potential size, catchment and expenditure potential. Factors that affect the size and shape include:

NATURAL FEATURES

Lakes/ Rivers/ Mountains

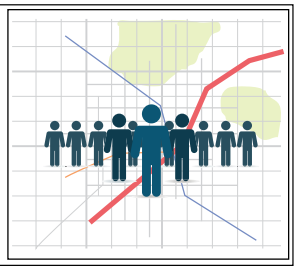


DATA SOURCES

- Satellite Imagery | Google Earth
- GIS data

JURISDICTIONS

Political boundaries | Neighborhood boundaries



DATA SOURCES

- GIS data
- Community Mapping

BUILT INFRASTRUCTURE

Railroad tracks | Highways | Airports | Large-scale Industrial

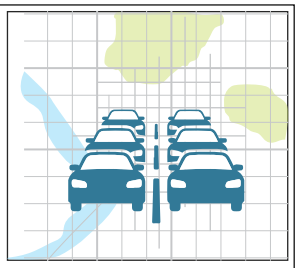


DATA SOURCES

- Satellite Imagery
- GIS data

TRAFFIC

Traffic Volume | Congestion Data



DATA SOURCES

- Google Real-Time Traffic Data | General Transit Feed Specification | Commercial Ride sharing Application
- Mobility/ Transport Studies
- As per approved Master Plan/ Development Plan

TOD KP

03 CONDUCT A DEMAND & SUPPLY ANALYSIS

To understand the demand and supply within the TOD Market Area with respect to different development components. Create an economic profile to understand the purchasing power and prepare a competition analysis to understand the risk and revenue potential for different types of development components.

ECONOMIC INDICATORS/ SOCIOECONOMIC PROFILE

- Demographic trends: Age | Household Composition | Migration
- Economic trends: Household Income | Disposable Income (Retail)
- Tourism Data (Hospitality)
- Employment Trends: Job Growth (Office)

COMPETITION ANALYSIS

- Number of residential units and square feet of housing types
- Commercial built space supply
- Number of hotel rooms
- Land Values (Market & Assessed)
- Rental Yield Rates
- Approved & Planned Projects
- Absorption Rates / Occupancy Rates

DATA SOURCES

- Interviews with local city staff
- Building permit data
- Meetings with local real estate brokers
- City tourist traffic data
- Online property websites
- Crowdsourcing Apps
- Mail/Internet Surveys

04 DEFINE POTENTIAL AND DESIRED DEVELOPMENT MIX

Define the most appropriate development mix based on location, investment risk and revenue potential. Some other criteria to be considered in defining the development mix include:

- Zoning and Planning Regulations
- Local Political Willingness
- Land Ownership and Land Control Options
- Environmental & Infrastructure Conditions
- Size/Program Area
- Potential Synergies with surrounding land uses

Refer to AS-A03

DATA SOURCES

- Stakeholder meetings
- Community Workshops
- Collaboration with planning & design team

05 PREPARE A DEVELOPMENT PROFORMA

Prepare a Development Proforma that includes Development Costs, Potential Income and Cash Flow over the project timeline, presenting finally the Net Present Value (NPV) and Internal Rate of Return (IRR):

COSTS

- Land Acquisition | Site Improvements | Planning, Engineering & Design | Marketing | Property Taxes | General Overhead | Financing Costs

REVENUES

- Sales Revenue | Sales Percentage | Lease Revenue | Lease Percentage | User Fees | Grants & Loans

PROJECT TIMELINE

- Pre-Development | Construction Phase | Stabilization | Asset Management/Sale | Operations

Refer to FI-A02

Also Refer to SAMPLE MIXED-USE DEVELOPMENT PROFORMA

Source: Economic Research Associates, Washington DC shared via ULI Resources.

Also Refer to COMMERCIAL MIXED USE PROFORMA

Source: HUD Exchange Resources, US Department of Housing and Urban Development, Washington DC.

ASSESS KNOWLEDGE PRODUCT | 41

06 PREPARE A REAL ESTATE MARKET ANALYSIS REPORT

Prepare a Real Estate Market Analysis Report summarizing the key findings through the process. The proposed report structure is shown.

1. Real Estate Market Performance Trends.
2. Worker Travel Characteristics.
3. Competitive Advantage and Industry Cluster Analysis.
4. Long-term Residential and Employment Demand Analysis.
5. Recommended Development and Redevelopment Opportunities.
6. Profitability & Revenue Potential in NPV and IRR.
7. Recommended set of Incentives and Possible Finance Structures.

TOD KP

AS-H02



HOW TO UNDERTAKE RAPID TRANSIT ALTERNATIVES ASSESSMENT

An overall framework for identifying, evaluating and selecting the appropriate rapid transit alternative including alignment, mode and operating environment.

Type: Step-by-Step Guide)



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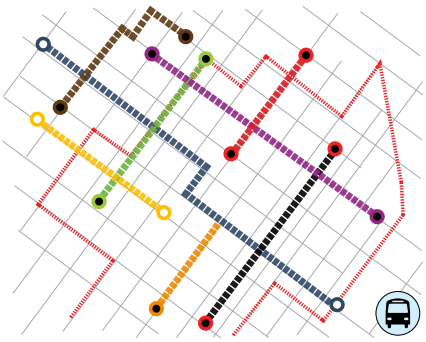
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01 DEVELOP INITIAL RANGE OF ROUTE & MODE OPTIONS

Use (A) **PRELIMINARY REFERENCE CRITERIA** to map initial corridors and collect feedback on it from political stakeholders, municipal & transit agencies and the public.

- People and Jobs Density
- Destinations and Land Uses
- Potential and Desired Connections
- Existing Recommendations
- Viable Modes



DATA SOURCES

- Satellite Imagery
- Statutory Policy and Plan Documents
- Existing Transport Studies
- Field Surveys
- Stakeholder Workshops

STAKEHOLDERS

Primary:

- Transit Planning/ Urban Planning Agency

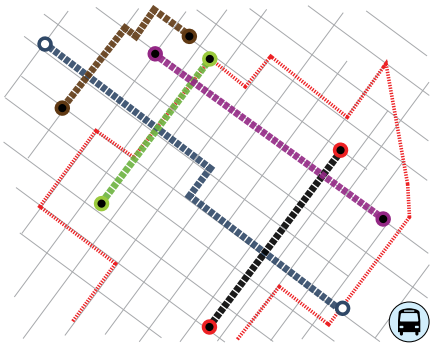
Secondary:

- Formal and Informal Transit Operators
- Land Use Planners, Environmental Planners
- Housing, Infrastructure, and Transportation Departments
- Neighborhood/ Community Organizations

02 UNDERTAKE INITIAL SCREENING

Use (B) **CORRIDOR SCREENING CRITERIA** to perform initial screening of the corridors identified in step 1

- City Vision and Goals
- Transportation Demand
- Ease of Implementation
- Community Building



DATA SOURCES

- Satellite Imagery
- Existing Census Data
- Population /Employment Projections
- Statutory Policy and Plan Documents
- Land uses and nodes along corridor

STAKEHOLDERS

Primary:

- Transit Planning Agency

Secondary:

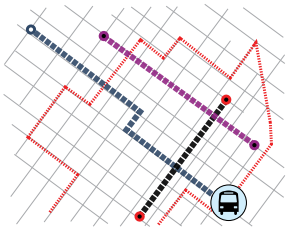
- Formal and Informal Transit Operators
- Land Use Planners, Environmental Planners
- Housing, Infrastructure, and Transportation Departments
- Neighborhood/ Community Organizations

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03-A UNDERTAKE DETAILED CORRIDOR SCREENING

Use B **CORRIDOR SCREENING CRITERIA** to undertake detailed screening of the corridors shortlisted in step 2.

- City Vision and Goals
- Transportation Demand
- Ease of Implementation
- Community Building

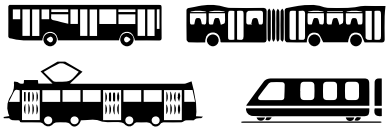


03-B UNDERTAKE TECHNOLOGY/ MODE REVIEW

Evaluate transit technology based on:

- Potential Ridership
- Mode Capacity
- Cost Comparison

Refer to AS-A04



DATA SOURCES

- Transit Ridership Projections
- Statutory Policy and Plan Documents
- Land uses and nodes along corridor
- Environmental Assessment Reports
- Capital and Operating Costs
- Stakeholder Workshops

STAKEHOLDERS

Primary:

- Transit Planning Agency

Secondary:

- Political Leadership / Appointed Executives
- State or Federal Departments
- Funding Agencies
- Formal and Informal Transit Operators
- Urban Planning Agencies
- Land Owners and Potential Real Estate Developers
- Academic Institutions, Advocacy Groups

04 UNDERTAKE BUSINESS CASE

Undertake C **DETAILED COSTING COMPARISON** and develop a detailed Cost-Benefit Analysis

I	Establish base and projected case	Based on current and future demand
II	List Benefits	Including productivity savings, healthcare cost savings, regional economic and environmental benefits
III	List Costs	Including transit capital and operating costs, costs of changing institutional procedures and negative externalities
IV	Monetize Benefits and Costs	Assign $ value to as many benefits and costs as possible. Where needed, use an equivalence factor to assign $ value
V	Calculate Net Present Value	Annual net costs and benefits in each year to be discounted to current day dollars value; derive Benefit-Cost Ratio

DATA SOURCES

- Capital and Operating Costs
- Ridership and Total Trip Data
- Emissions and Fuel Data
- Public Expenditure Data

STAKEHOLDERS

Primary:

- Transit Planning Agency

Secondary:

- Political Leadership / Appointed Executives
- State or Federal Departments
- Funding Agencies

A PRELIMINARY REFERENCE CRITERIA

Develop a long list of alternatives, building upon the work previously undertaken by the city and incorporate additional consultation with various stakeholder groups. The following Criteria must be considered in defining the long list of alternatives.

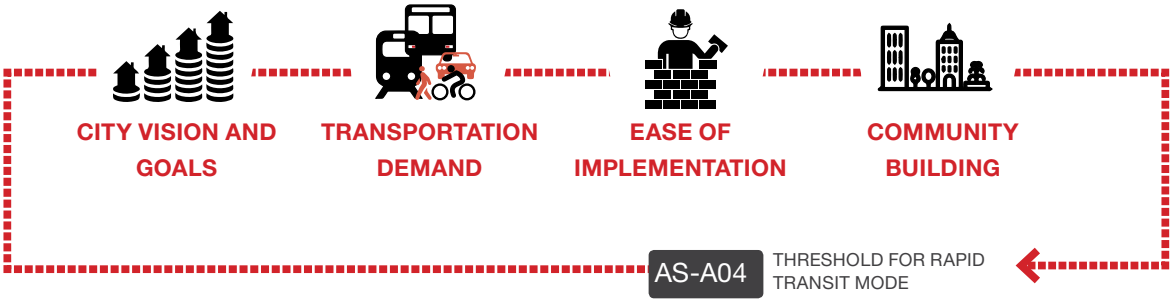
CRITERIA	MEASURE	IMPORTANCE
PEOPLE AND JOB DENSITY	**Density** of housing units and jobs identified through Census data and other surveys.	Areas with high population densities need Rapid Transit services to equitably fulfill mobility needs of all people.
DESTINATIONS AND LAND USE	**Major trip generators** within the city (weekdays & weekends) identified through destination mapping and land use maps.	Serving public destinations and high activity centers with Rapid Transit alleviates the potential for congestion and ensures optimum ridership.
POTENTIAL AND DESIRED CONNECTIONS	Identification of **existing and potential desired connections** measured from travel data and people's perception	Determine travel patterns using data from existing transit services or cab aggregators or congestion mapping.
EXISTING RECOMMENDATIONS	Review **recommendations from existing Plans and Policy Documents** and ensure they are still relevant & valid	Ensure that existing (and relevant) studies are reviewed and recommendations are considered in transit planning e.g. Transportation Master Plan, Master Plan, etc.
	Shortlist Viable Modes based on density thresholds AS-A04 THRESHOLD FOR RAPID TRANSIT MODE	Carry out a quick assessment of the most viable transit technologies and operating environment options for the city

DATA SOURCES

- Google Earth, Satellite Images, GIS Data, Worldwind, Marble, Virtual Ocean, Ossimplanet, GeoMappApp, OpenStreeetMap
- Statutory policy documents and relevant studies– Master Plan/ Development Plans/Transportation Master Plan
- Data from existing transit/busways/ private transit operators
- Field surveys
- Best practices
- Stakeholder workshops
- Public workshops

B CORRIDOR SCREENING CRITERIA

The intent of corridor-level screening is to evaluate the long list and short list of the corridor segment alternatives and advance those that demonstrate suitability for Rapid Transit. Corridor alignment alternatives need to be evaluated in parallel with mode and technology alternatives. The screening process described here is a two-step process, where initial screening criteria are suggested for evaluation of a long list of alternatives, followed by a detailed screening at a later stage of the shortlist of selected alternatives. Where required, cities may skip one level of screening depending on the availability of data and resources.



CITY VISION AND GOALS

CRITERIA	INITIAL SCREENING MEASURE	DETAILED SCREENING MEASURE
Growth Potential	Projected growth (10 year) within 500m in population density (person /ha) and employment density (jobs/ha). HIGHER IS BETTER	Supports growth management to focus high-intensity, mixed-use development in strategic locations; Supports transit-oriented development (Transit Villages), compatible with incentives for development along Rapid Transit corridors and at transit stations.
Economic Development	Connectivity to major growth centers, existing or proposed, within 500m of the corridor. HIGHER IS BETTER	Ability to attract and retain talent and influence long-term employment goals, improve business viability and attractiveness.
Mixed Use Development Potential	Areas that have a mix (2 or more) of land uses within a 500m buffer along the corridor. HIGHER IS BETTER	Land availability and market acceptance for new mixed-use development or redevelopment opportunities.
Land Value Capture Potential		Property value uplift along the corridor, increased attractiveness to live along the corridors, changes to parking and access.

DATA SOURCES

- Google Earth, Satellite Images, GIS Data, Worldwind, Marble, Virtual Ocean, Ossimplanet, GeoMappApp, OpenStreeetMap
- Census Data Existing
- Population /Employment Projections from Statutory Policy Documents & Relevant Studies
- Statutory Policy Documents & Relevant Studies – Master Plan / Development Plans / Transportation Master Plan
- Land Uses along corridor
- Key Nodes and Destinations
- Infrastructure Construction and Operating Costs
- Land Ownership Data

B CORRIDOR SCREENING CRITERIA

TRANSPORTATION DEMAND

CRITERIA	INITIAL SCREENING MEASURE	DETAILED SCREENING MEASURE
Transit ridership potential	Existing and projected population and job densities; existing transit ridership on existing services. HIGHER IS BETTER	Opening day and longer-term forecast of transit ridership projections compared to transit system capacity (persons/hour) of all modes on the mobility network.
Travel time improvement potential	Route length; average auto delay; maximum V/C Ratio; travel time (Auto vs Existing Transit). LOWER PERFORMING ROADWAY IS PREFERRED	Forecasted travel times to major trip generators, balancing transit and auto should show substantive improvements in travel time by transit compared to auto.
Existing transit network integration	Transfer points with existing transit network. HIGHER IS BETTER	Possibilities of integrating with local, rapid and regional transit systems, existing and planned, focusing on the highest potential for network reach and future expansion.
Transit service reliability		Right-of-way characteristics affecting reliability, frequency, quality, and flexibility of Rapid Transit service, including: o Availability of width for dedicated lanes/tracks o Intersections, restricted turning movements, and signalization
Support active transportation		Urban form characteristics that support active mobility choices such as walking, cycling and transit that are accessible and accommodate people of all abilities, including: o Block sizes and street connectivity o Availability of walking and cycling facilities
Safety of all corridor users		Road characteristics that allow for improvement to intersections, crossing locations and emergency vehicle access.

DATA SOURCES

- Statutory Policy Documents & Relevant Studies – Master Plan / Development Plans / Transportation Master Plan
- Existing Transit Ridership data - Boarding & Alighting Data
- Street Network in CAD, GIS, or any Transport Demand Modelling Software formats including ROW, Intersections, and Signalization Information
- Corridor Performance and/or Traffic Volume Data
- Data from Existing transit / busways / Private Transit Operators
- Accident Data

B CORRIDOR SCREENING CRITERIA

EASE OF IMPLEMENTATION AND OPERATIONAL VIABILITY

CRITERIA	INITIAL SCREENING MEASURE	DETAILED SCREENING MEASURE
Ability to Implement	Coordinated jurisdictional control under a single or few coordinated agencies. FEWER COORDINATION CHALLENGES ARE BETTER	Relative flexibility to implement the Rapid Transit network in stages.
Ease of Construction	Availability of Right-of-Way (ROW) and minimal immovable barriers. MORE SPACE IS BETTER	Number and complexity of construction challenges, including rail crossings, waterway crossings, sensitive or historical areas, sharp turns, right-of-way issues, utilities, or other construction challenges.
Financial Viability	Approximate annualized costs per person-km based on the type of operating environment and mode.	Rapid Cost-Benefit Analysis (CBA) comparing the cost of implementation and operations against revenue potential and quality of life benefits.
Property Impacts		Minimize the need for land acquisition or major land readjustment; undue negative impact on property ownership or property values.
Environmental Impact		Minimize impacts to designated environmentally significant areas, wetlands and provincially significant wetlands, fish habitat, woodlands and significant woodlands, significant valley lands, or environmentally sensitive areas, the habitat of endangered and threatened species and designated areas of natural and scientific interest

DATA SOURCES

- Statutory Policy Documents & Relevant Studies – Regional Plans, Environmental Studies
- Google Earth, Satellite Images, GIS Data, Worldwind, Marble, Virtual Ocean, Ossimplanet, GeoMappApp, OpenStreeetMap for Natural Features
- Infrastructure Alignment Data and Future Plans in CAD, GIS or other such format allowing for overlay analysis and identification of overlaps, interferences
- Land Ownership Data
- Property Valuation Data
- Capital and Operating Costs

B CORRIDOR SCREENING CRITERIA

COMMUNITY BUILDING AND REVITALIZATION

CRITERIA	INITIAL SCREENING MEASURE	DETAILED SCREENING MEASURE
Supports Inclusive Growth Objectives	Low/ middle-income neighborhoods who can benefit from affordable mobility choices to access key nodes and destinations HIGHER IS BETTER	Appropriate development potential with high affordability compared to planned growth, infill and intensification.
Connectivity to Neighborhoods and Business Areas	Higher neighborhood penetration and accessibility choices through a denser street network. HIGHER IS BETTER	Improved access to community amenities (schools, libraries, hospitals etc.), while maintaining vehicular access to residential and commercial properties and minimize vehicular infiltration of adjacent neighborhoods.
Intensification Potential	Corridors designated for growth and intensification are preferable, as they have the potential to intensify over time (TOD) and support ridership potential. HIGHER NO OF UNDERUTILIZED LOTS ARE PREFERRED	Availability of land for intensification within a 500m buffer of the corridor, including: o Parking lots, o Underutilized spaced o Dilapidated/end of life-cycle buildings o Transitional land uses, e.g. former industrial uses, etc.
Public Space and Amenities		Allow greater use of the public realm and improved aesthetics, enhance community connections, support safety and security through design and minimize impacts on existing public and private trees.
Cultural Heritage Impacts		Minimize impacts to built cultural heritage features and archaeological resources.
Climate Resilience		Resiliency to global warming trends (e.g. floods, droughts) following urban densification principles; impacts on air pollution and greenhouse gas (GHG) emissions.

DATA SOURCES

- Development Potential
- Property Valuation and Affordability Dats
- Population /Employment Projections from Statutory Policy Documents & Relevant Studies
- Statutory Policy Documents & Relevant Studies – Master Plan / Development Plans / Public Realm Plan
- Community nodes and destinations
- Heritage or Archaeological Data
- Air Quality Data
- Stakeholder Workshops

C DETAILED COSTING COMPARISON

PROJECT CAPITAL COST

Capital costs are those required to install and launch each phase of the system and include equipment purchase, infrastructure cost and engineering and support costs.

HARD INFRASTRUCTURE COSTS	CURRENCY
Property Acquisition	
Civil Works	
Staging/Enabling Works	
Maintenance Facility/Yard	
Parking Facilities/Park & Ride Lots	
Structures	
Utility Relocation	
Streetscape Improvements/Placemaking	
Stations	
Electrical Power, Lines & Substation(s)	
Water Supply	
Signaling	
Operations & Control Centre	
SUB TOTAL A	
CONTINGENCY A1	**~10%**

SOFT INFRASTRUCTURE COSTS	CURRENCY
Engineering Design	
Construction Management	
Design Support (Construction Administration)	
Operating Agency Costs	
Program Management	
SUB TOTAL B	
CONTINGENCY B1	**~5%**

VEHICLE COSTS	CURRENCY
Capital Vehicle Costs	
SUB TOTAL C	
CONTINGENCY C1	**~5%**

TOTAL COST	CURRENCY
GRAND TOTAL (A+B+C)	
CONTINGENCY GRAND TOTAL (A1+B1+C1)	

FORECAST OPERATING COST & REVENUES

Operating costs are the cost to operate and maintain the system. These include hiring employees for operational tasks, as well as maintenance costs including purchasing tools and spare parts, upkeep of software, etc.

HARD INFRASTRUCTURE COSTS	OPENING YEAR	LIFECYCLE YEAR
Daily Ridership		
Annual Revenues		
Annual Operations & Maintenance		



Copacabana Beach, Rio de Janeiro, Brazil

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AS-H03



INFRASTRUCTURE CARRYING CAPACITY ASSESSMENT

An overall framework for evaluating the infrastructure needs of the city

Type: Step-by-Step Guide)



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ABOUT THE ASSESSMENT TOOL

PURPOSE

Infrastructure serves as the foundation for planning sustainable and resilient cities (Pollalis 2016). The viability and sustainability of any TOD development must, therefore, include an assessment of infrastructure to ensure the current provision is adequate and has the capacity to support growth in the future.

In World Bank client countries, infrastructure capacities are often mismatched with current needs, largely due to unanticipated rapid urban growth. A TOD development without infrastructure carrying capacity considerations may further deteriorate living conditions. Such an assessment is essential before density changes are proposed.

As transit-oriented development requires major built form and transportation development, this tool assesses the capability of regions to support infrastructure needs. Based on current municipal deficits, strategies to offset the necessary capital investment required by additional or upgraded infrastructure are explored through the creation of a capital investment needs plan.

THIS TOOL INCLUDES:

- OVERALL INFRASTRUCTURE ASSESSMENT PROCESS
- INFRASTRUCTURE GOALS
- DETAILED INFRASTRUCTURE PLANNING PROCESSES

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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VARIATION IN INFRASTRUCTURE ASSESSMENT PROCESSES FOR DEVELOPMENT CONTEXTS

GREENFIELD

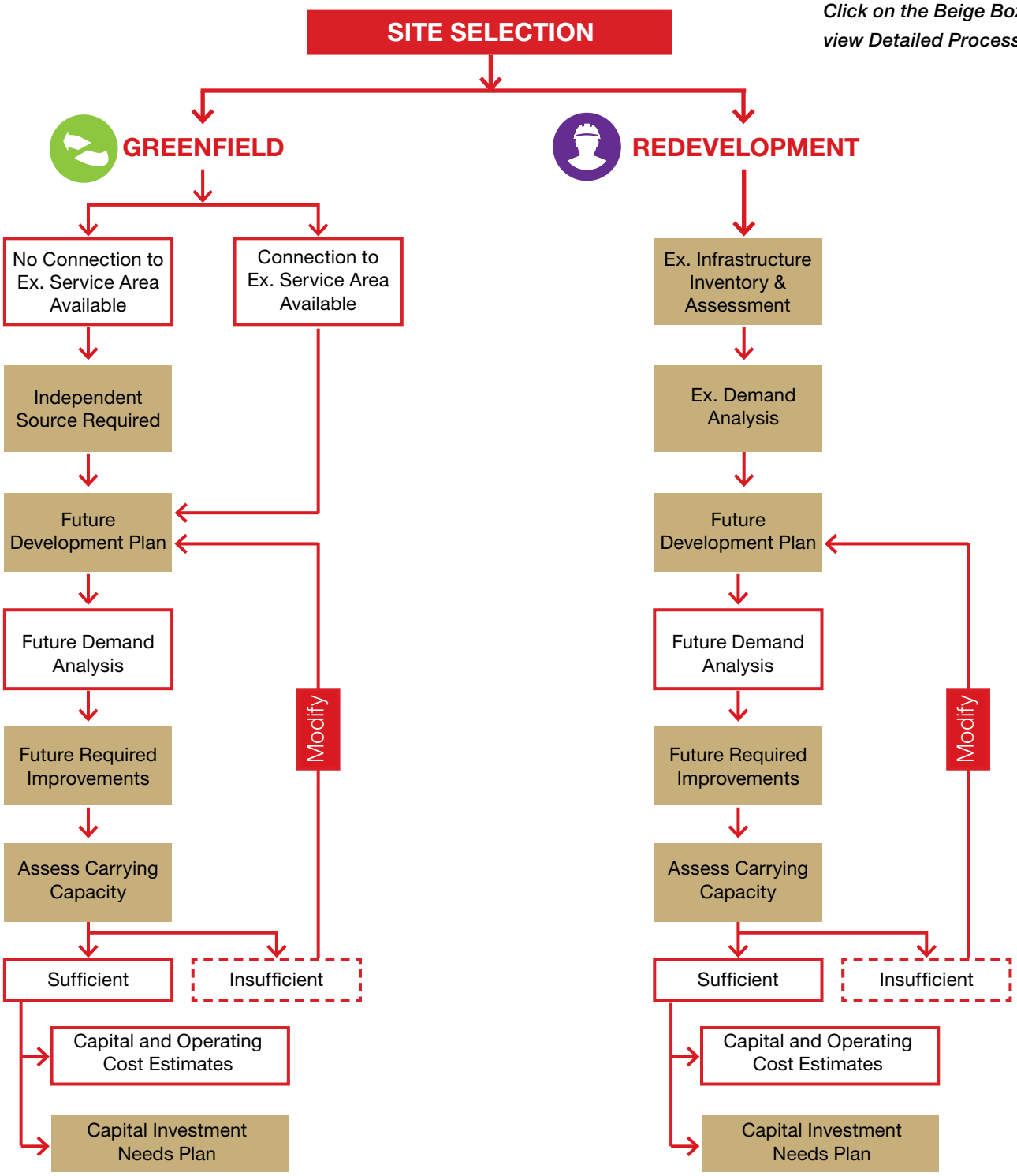
A greenfield project is one which is not constrained by prior work. It is constructing on unused land, where there is no need to remodel or demolish an existing structure.

URBAN/ SUBURBAN

Urban and suburban projects refer to site parcels within previously built areas. These areas are already served by public infrastructure and other utilities. It may also include converting an existing built property into another use.

THE INFRASTRUCTURE ASSESSMENT PROCESS

Click on the Beige Boxes to view Detailed Processes



INFRASTRUCTURE ASSESSMENT GOALS

PHYSICAL INFRASTRUCTURE

Physical Infrastructure includes basic service delivery systems, such as water supply, sewage, solid waste management, energy, and landscape. Pedestrian and cycling infrastructure are also integral to physical infrastructure. These systems are high-cost investments and are vital to a city's development (Pollalis 2016).

WATER SUPPLY

- To determine capital investment needs
- To identify the existing designed capacity and capability of serving additional densities.



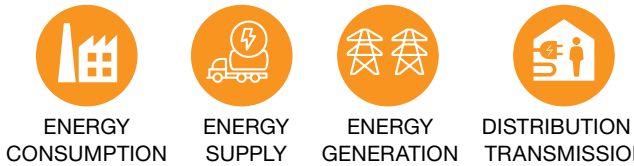
SEWERAGE

- To determine capital investment needs.
- To determine the network capacity required to serve additional densities.



ENERGY

- To determine capital investment and secure energy supply.
- To assess and manage existing grid capacity.



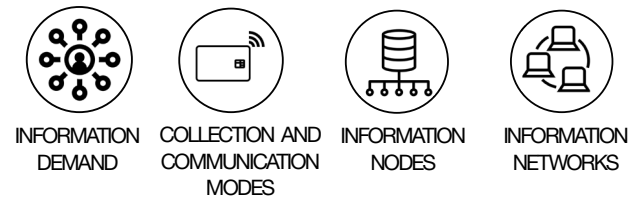
SOLID WASTE

- To determine capital investment to treat, collect and transfer waste.
- To determine excess solid waste generation for additional densities



INFORMATION

- To determine capital investment and secure information needs.
- To determine information need increases for additional densities



LANDSCAPE

- To understand vulnerabilities and planning opportunities.
- To identify the ability of the landscape to provide functional requirements.



INFRASTRUCTURE ASSESSMENT GOALS

SOCIAL INFRASTRUCTURE

Social infrastructure is a subset of the infrastructure sector that typically includes assets that accommodate social services. It includes schools, colleges, universities, hospitals, prisons, police, fire stations, markets, etc. The quality of life in any urban center depends upon the availability of and accessibility to quality social infrastructure.

HEALTHCARE

- To determine zoning reservations and capital investment needs.
- To ensure the adequacy of medical facilities to serve the additional population.

ADEQUACY ACCESSIBILITY AFFORDABILITY QUALITY

EDUCATION

- To determine zoning reservations and capital investment needs.
- To ensure adequacy of educational facilities to serve the additional population.

ADEQUACY ACCESSIBILITY AFFORDABILITY QUALITY

RECREATION

- To determine zoning reservations and capital investment needs.
- To ensure sufficient recreational zones to serve the additional needs.

ADEQUACY ACCESSIBILITY AFFORDABILITY QUALITY

POLICE/ FIRE/ OTHERS

- To determine zoning reservations and capital investment needs.
- To ensure adequate emergency response services to serve the additional densities.

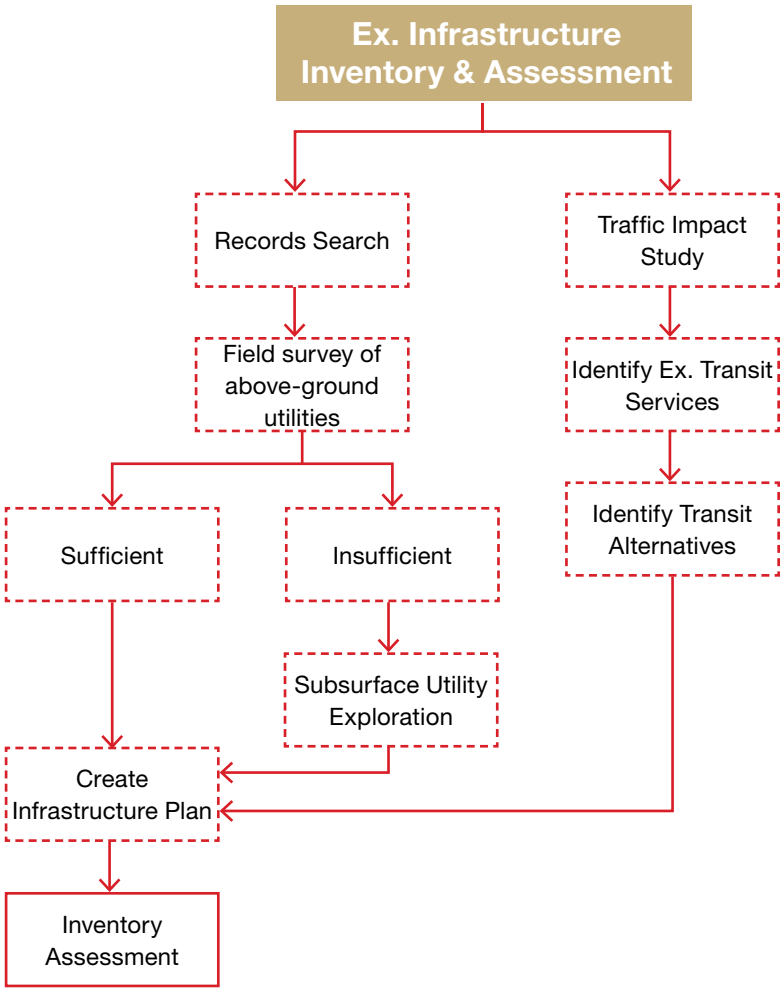
ADEQUACY ACCESSIBILITY QUALITY

**Applicable at all scales*

Greenfield Urban/ Suburban

EXISTING INFRASTRUCTURE INVENTORY

In distributing infrastructure, planned densities and population play the guiding role. Therefore, indications of population and densities served by a facility or service are considered when estimating the infrastructure needs.

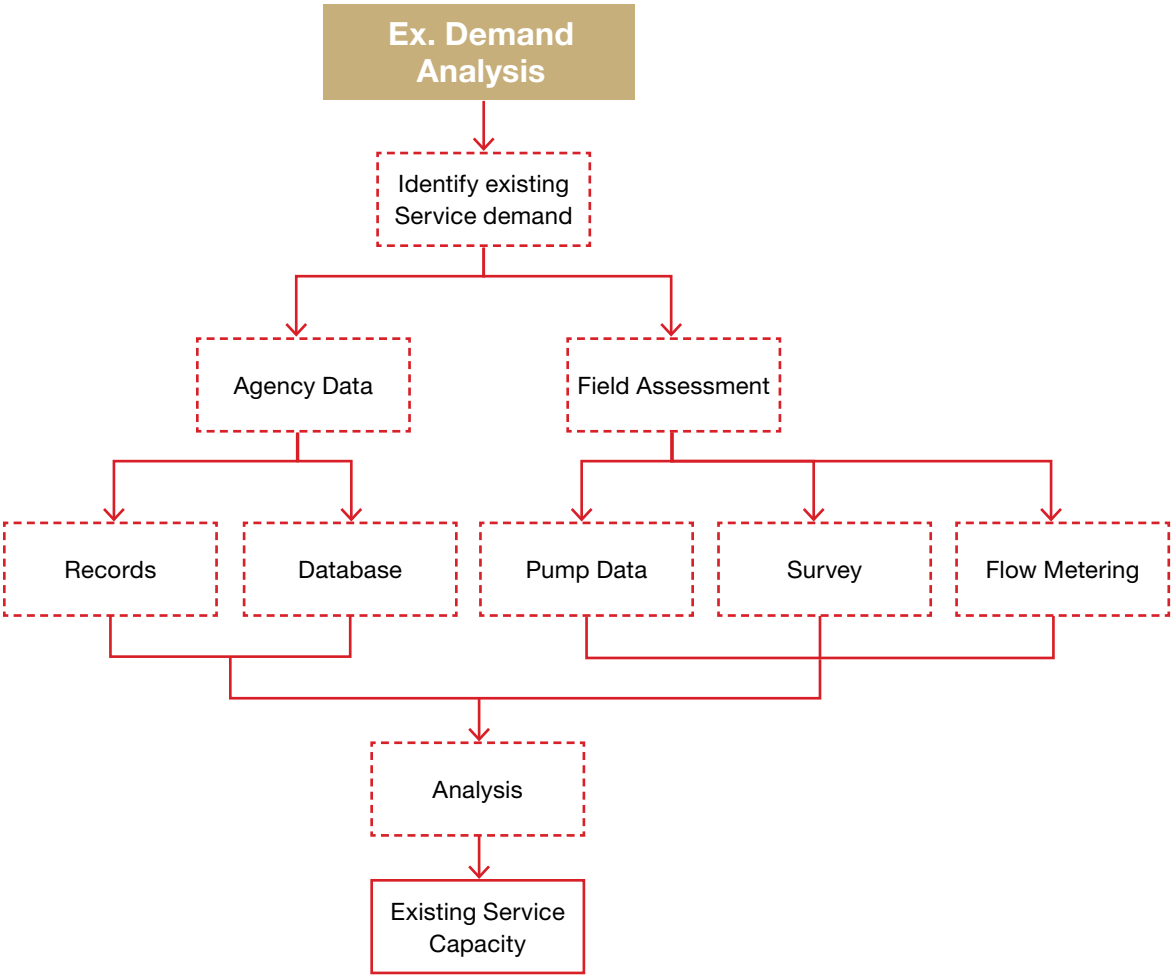


INFRASTRUCTURE CAPACITY MEASURES

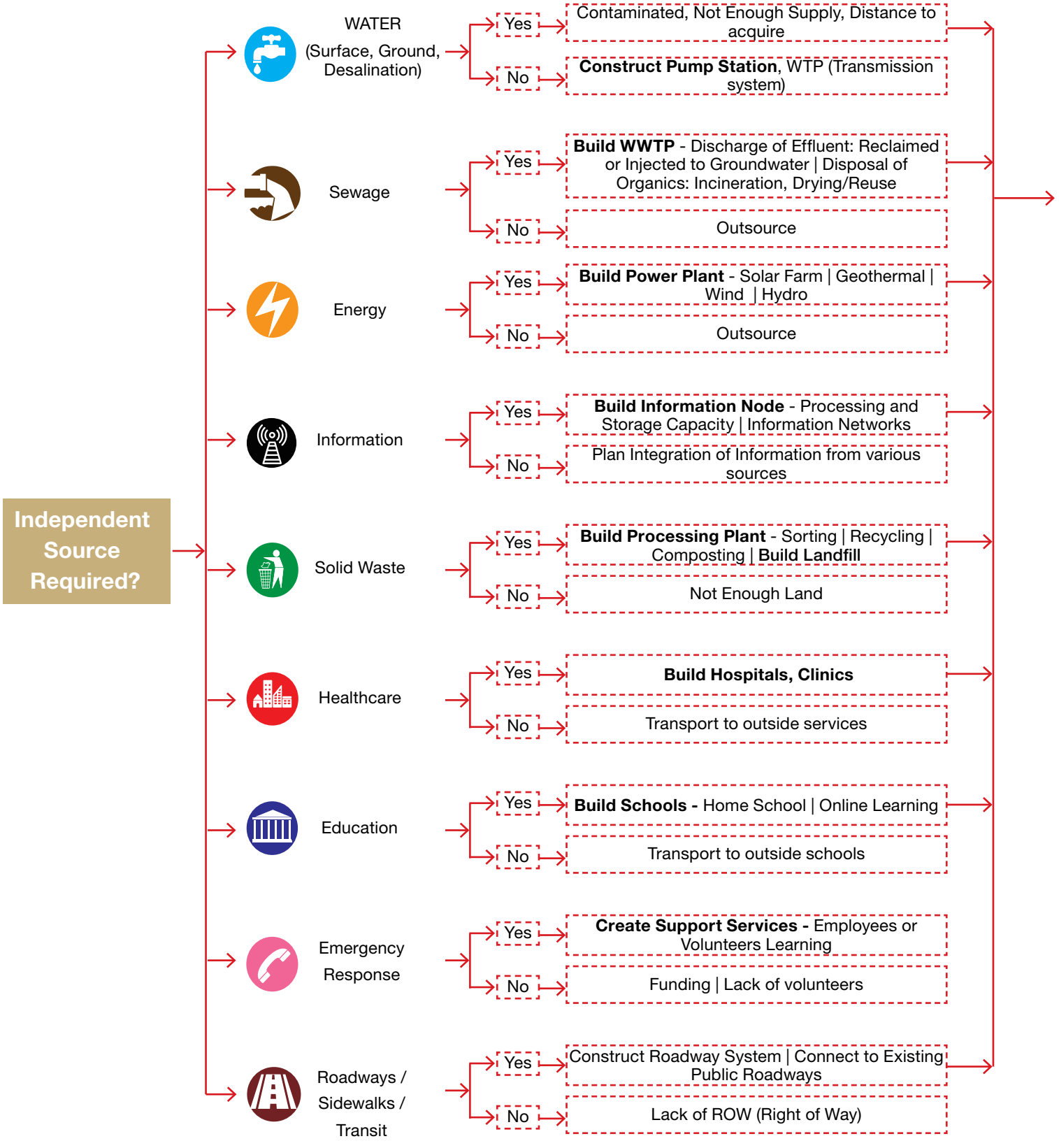
Water availability	- Installed capacity (MLD)
Source of water supply	- Within city limits or no
Water coverage	- Area served by supply network - Per capita supply (LPCD) - Supply duration
Wastewater disposal	- Wastewater generated daily - Disposal capacity (MLD) - Present Operating Capacity (MLD)
Solid waste	- Waste generated daily (tonnes/day) - Collection daily (tonnes/day)

EXISTING DEMAND ANALYSIS

Infrastructure demand is expected to increase with an anticipated increase in densities in TOD areas. This step is intended to quantify the needs of the respective city, corridor, station area or site.

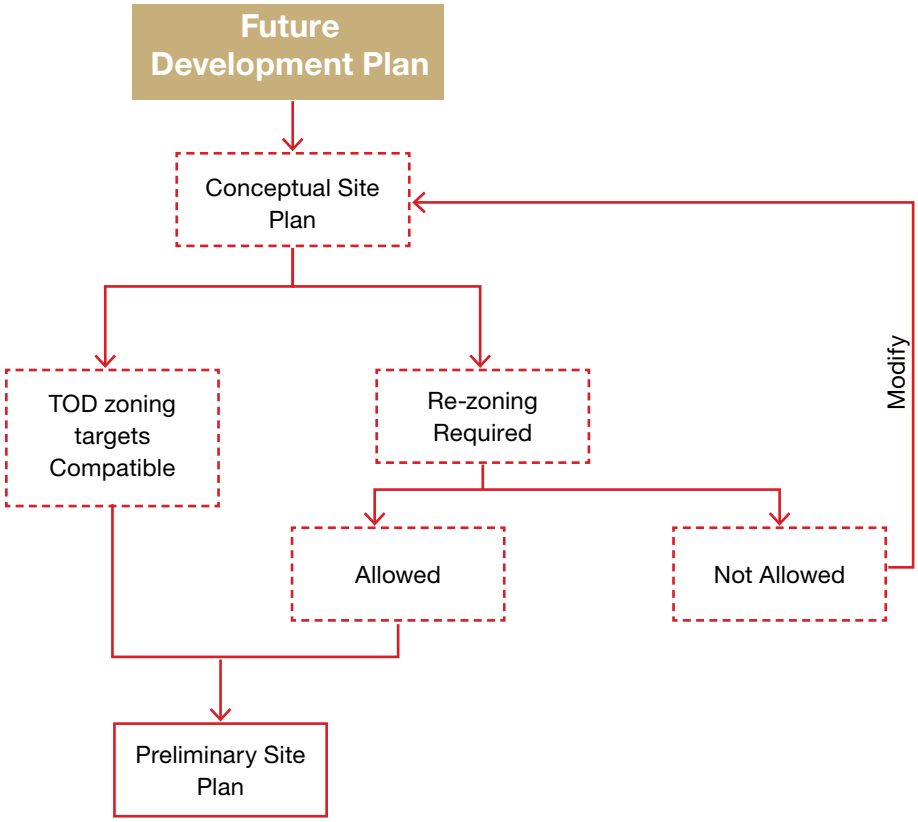


NEW INFRASTRUCTURE SOURCE REQUIRED



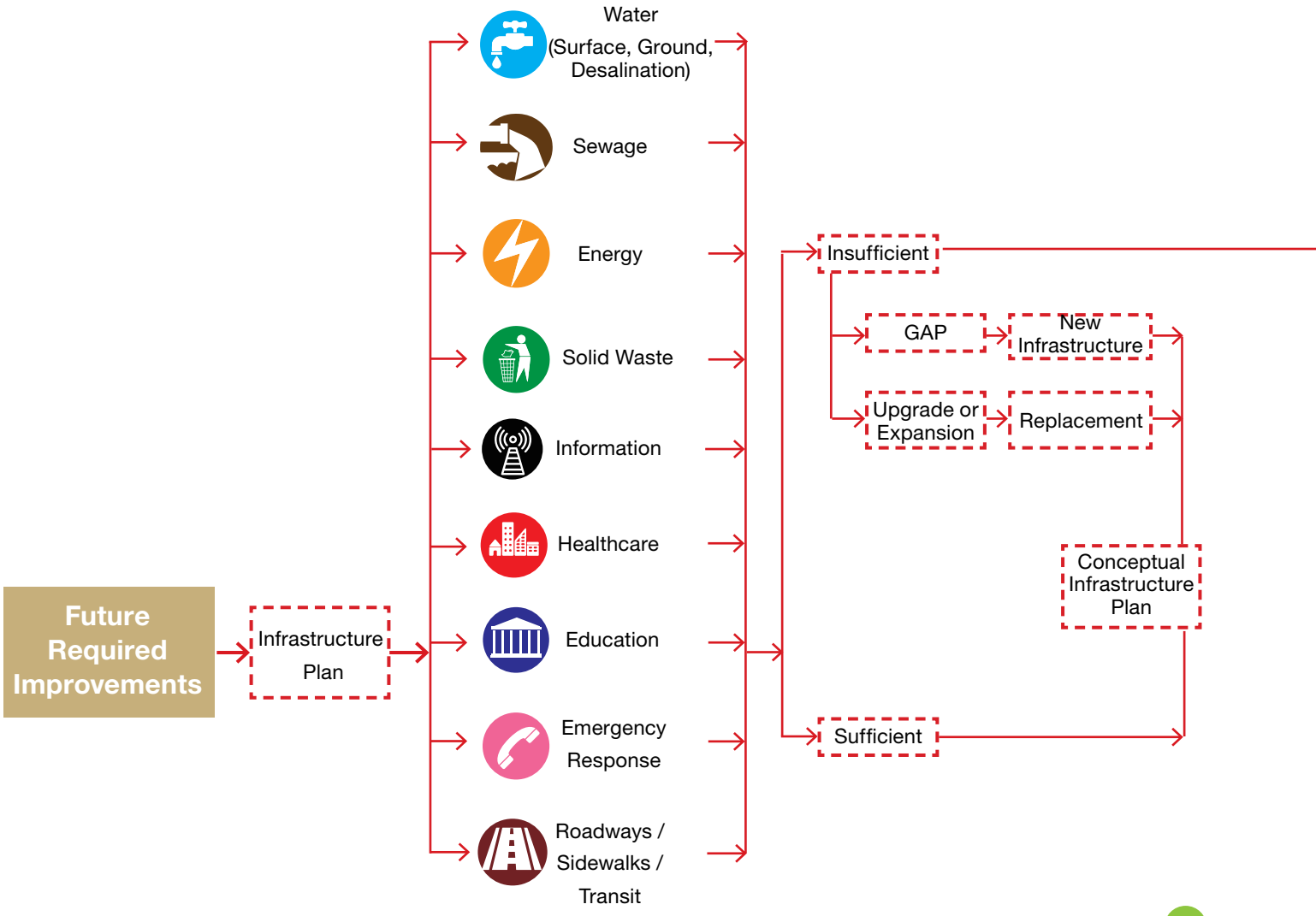
FUTURE DEVELOPMENT PLAN

Validate the Future Infrastructure Development Plan with the Conceptual Site Plan by assessing if zoning needs and TOD targets are met. If TOD requirements are not met by the infrastructure plan, trade-offs must be decided that can allow for transit-supportive development while fulfilling infrastructure needs.



FUTURE INFRASTRUCTURE REQUIREMENT

After calculating the infrastructure deficit, the infrastructure needs of the area must be defined with regards to new infrastructure, infrastructure upgrades and network expansion.



NEW INFRASTRUCTURE

In any greenfield project, new infrastructure has to be provided as per planned development. This requires heavy capital investment.

INFRASTRUCTURE UPGRADES

Upgrading infrastructure systems is required where the current capacity of the infrastructure is not sufficient enough for serving the estimated infrastructure needs. This can be undertaken where the expansion of the physical asset is costly or prohibitive due to broader physical constraints.

NETWORK EXPANSION

In any greenfield or redevelopment project that lacks the basic infrastructure, but is within the proximity of the existing infrastructure network, a network expansion should be proposed.

DETERMINE STRATEGIES TO OFFSET CAPITAL INVESTMENT (LOCAL/DECENTRALIZED FACILITIES)

When planning for future infrastructure needs for a TOD site area, it is necessary to consider facilities that are local or decentralized. These facilities not only reduce the pressure on the central distribution system/nodal facility, allow for higher densities and also offset/relax the heavy capital investment required for these critical infrastructure systems. The infrastructure demand can be effectively managed through the optimal use of resources and preventing/controlling any waste of resources.

DETERMINE STRATEGIES TO OFFSET CAPITAL INVESTMENT NEEDS?

01 Identify the critical infrastructure needs and shortage

02 Develop strategies for decentralization of facilities

- Water Supply: Strategies that help reduce the consumption pattern, and produce more water resources
- Wastewater: Strategies that help reduce wastewater generation and promote use of recycled wastewater
- Energy: Strategies that help reduce energy consumption patterns and produce clean and renewable sources of energy
- Solid Waste: Strategies that help reduce waste generation and help reuse/recycle it
- Landscape: Strategies that minimize disruption of the natural landscape
- Information: Strategies that serve as the foundation for the use of integrated information technologies
- Social Infrastructure: Strategies that allow for multiplicity of functions in already built areas

Strategies that allow for reservation of land/BUA for social amenities in new developments

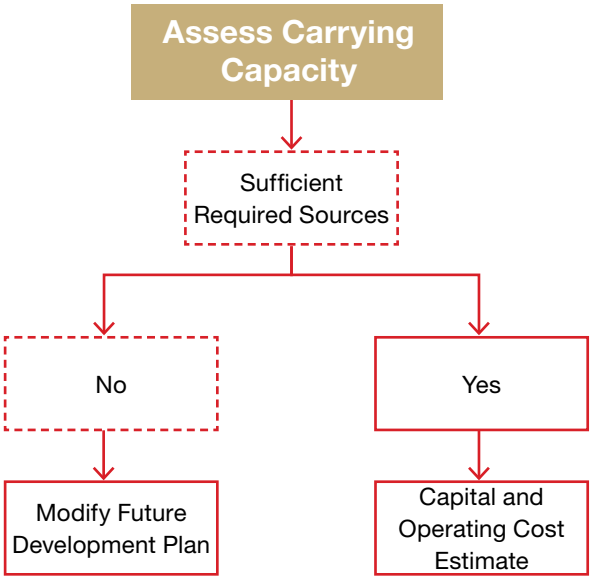
03 Estimate a realistic quantity that can be offset through decentralization

04 Create policy or zoning guidelines to mandate requirements for decentralized facilities by private developers

05 Create incentives for additional green building compliance (LEED or equivalent)

ASSESS CARRYING CAPACITY

Physical and social infrastructure provisions such as water treatment plants, sewage treatment plants, transformer stations, universities, hospitals, fire stations, etc. require a large portion of land. At times, land may be available, but resources may be scarce. Therefore, it is necessary to assess the land and resource capability of the region to support the city's infrastructure needs. Identification of land for infrastructure development is an essential parameter. It is necessary to earmark land for critical infrastructural facilities in a city's statutory plan.



ASSESS CARRYING CAPACITY

LAND

Is there enough land available within the study area, or in close proximity, to meet the infrastructure needs?

RESOURCES

Does the region fare sufficient in natural and human resources?

1. What are the available sources of water supply in the region?

2. Does the region receive sufficient rainfall?

3. Does the region have soil with high percolation capacity?

4. Does the region have a high water table?

5. Is the groundwater contaminated/not fit for use?

5. Is there a provision for wastewater recycling or water supply mix in the region?

4. Does the climate of the region support composting of generated solid waste?

5. Does the region have any other alternate method of disposing waste?

6. Does the region have enough sources for energy production such as crude oil, petroleum, coal, natural gas, nuclear, wind, solar, geothermal, hydro, tidal energy, biomass, waste, etc.?

7. Does the region have natural and biodiversity reserves?

8. Is the region vulnerable to natural disasters?

9. Does the region have sufficient green spaces?

10. Does the region have sufficient professionals, such as doctors, teachers, etc.?

CAPITAL INVESTMENT NEEDS PLAN

Capital investment planning is an evolving area of public management. A local government (LG) takes care of assets only if they are needed to provide municipal services to constituencies or to perform other mandatory obligations of the LG. Since the financial resources available to an LG for capital projects are limited, a process should be established to evaluate the competing needs of various municipal services to maximize the use of the financial resources in the areas of highest priority. Local financial policy needs to be formulated and enacted to define which assets to invest in, capital investment priorities and finance sources. The approach should be multi-year. Capital investment should be considered within the frameworks of life cycle costing and assessment of alternatives (for example, reducing demand for the service/facility, engaging the private sector).



SECTOR	PROJECT	CAPITAL INVESTMENTS					
		YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	TOTAL
WATER							
SEWAGE							
ENERGY							
SOLID WASTE							
HEALTHCARE							
INFORMATION							
EDUCATION							
EMERGENCY RESPONSE SERVICES							
ROADWAYS/ TRANSIT/ SIDEWALKS							

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TOD KP

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REAL ESTATE ANALYSIS BEST PRACTICES



Examples of real estate analysis for a TOD project in World Bank client countries

Type: Reference Document



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INTRODUCTION

Real estate development presents a real opportunity for transit agencies and operators to monetize real estate assets as a means to increase their revenue streams. It breaks away from the traditional notion of separating transit and land use and different city functions. TOD allows for an effective synergy where transit investments increase the value of land and, on the other hand, denser development in close proximity to transit improves transit ridership. The case studies presented here demonstrate such attempts by transit authorities and redevelopment agencies in seeking this synergy to create new avenues for urban financing. Three cases are presented here:

- Revenue Maximising Study for the Mumbai Suburban Rail - This study is an attempt by the railway authority to identify real-estate assets across the network as a means to increase non-farebox revenue and subsidize transport fares.
- TOD of Dwarka Bus Station - this feasibility study is an attempt by the Visakhapatnam Municipal Corporation to utilize the existing bus station for a mixed-use development as a means to create more space for administrative needs and create a sustainable revenue stream.
- REALIS - A real estate market information tool. This tool provides information for the private sector to learn about the market opportunities and participate in potential transit-oriented developments.

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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REVENUE MAXIMIZING STUDY IN PARTICULAR FOR NON-FARE BOX REVENUES WITH AFFORDABILITY STUDIES

AUTHOR:	PWC, India
CLIENT:	Mumbai Railway Vikas Corporation Ltd. (MRVC)
LOCATION:	Mumbai
YEAR OF STUDY:	2014

CONTEXT

The suburban railway system of the city is one of the most complex, densely loaded and intensively utilized systems in the world. It is the cheapest and fastest mode of transport in Mumbai. To sustain this service in the long-term, it is proposed that other sources of revenue, particularly in the non-fare box areas, are explored. The non-fare box revenues can be categorized in four broad categories- Advertisement, Station Rental, Indirect benefits and Real Estate Development. This section focuses on the concept plan of four stations to demonstrate enhancing of revenue potential through real estate development.

OBJECTIVE OF THE STUDY

- To identify ways to increase the revenue of the suburban train system, focusing on non-fare box revenue.
- To study and review the socio-economic profile of customers and examine the justification for financial cross-support from other economic agents, as well as the potential for fare adjustment in relation to affordability and service quality.
- To help strengthen knowledge in assessing non-fare box revenue through the study to MRVC and other agencies as appropriate (such as Mumbai Metropolitan Regional Development Authority, Ministry of Railways, Government of Maharashtra, Western & Central Railways).

APPROACH

In real estate, railway owned properties can be broadly classified into: Stations, operational assets (tracks), Operational plots (Workshops, car shed, store depot, parcel depot, open/ vacant plots, etc), residential colonies, offices. The approach developed for potential estimation of different asset classes can be explained as follows:

01 DEVELOP FILTER CRITERIA

Filter criteria were developed to arrive at a list of assets which are commercially more viable. The factors considered for developing the criteria are listed below:

- Regulations
- Market conditions
- Inferences drawn from literature review
- Overall City Development Plan

02 SELECT SITES BASED ON THE FILTER CRITERIA

1. Favorable market conditions.
2. In and around the identified development nodes.
3. Stations with high ridership and strategic importance and possibility of TOD.
4. Existing Usage/trends and interference between operations and commercial development.
5. Age of assets/condition of the buildings in case of residential quarters
6. Site characteristics (Shape, size and accessibility)

03 ASSESS MARKET CONDITIONS AND REGULATIONS

The factors considered are:

- Market factors
- Absorption level
- Rental rates
- DCR regulations
- Permissible FSIs
- RLDA guidelines

04 ESTIMATE SITE POTENTIAL

Impact of densification considered on revenue potential through real estate development.

4 ESTIMATION OF REVENUE POTENTIAL BY REAL ESTATE DEVELOPMENT

The study includes an estimation of potential revenue that can be generated through real estate development of plots owned by the railways. It estimates the revenue that 25 stations, under prevailing conditions, would theoretically generate in the 5th year from the start of construction on an annuity basis. However, the study notes that the revenue potentials could be generated only if all the identified 25 stations were brought to the market simultaneously, which is not practically implementable.

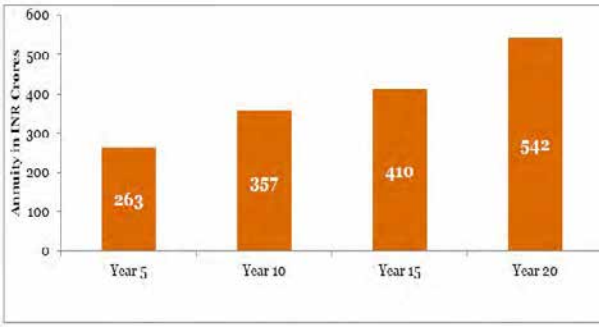


Figure 1: Annuity* at prevailing FSI

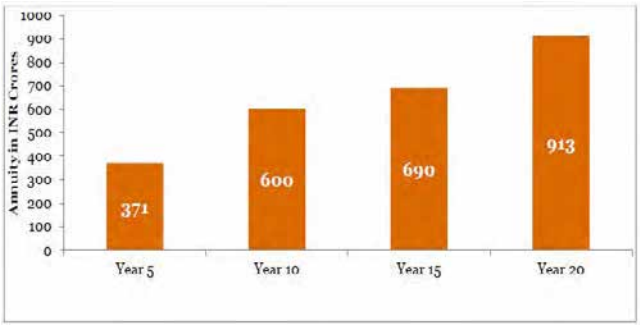


Figure 2: Annuity at enhancing FSI

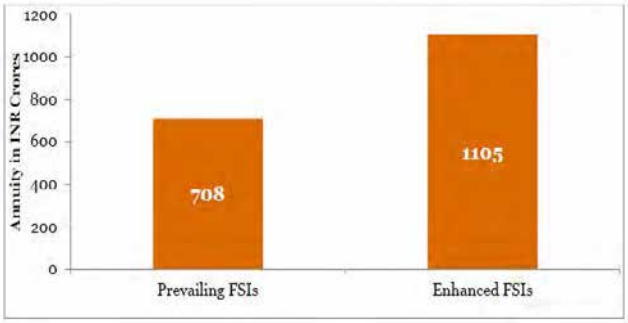


Figure 3: Upfront Revenue;

Reproduced from

The study identifies barriers to monetization of real estate assets, including DCR regulations, existing site conditions and institutional arrangements. In order to maximize value capture through real estate development, the study suggests enhancements to site conditions to ease the implementation process and timely phased release based on market conditions. The study recommends engaging with the municipal authorities for favorable regulations and enhancing institutional arrangements to make them more conducive for property development.

*Annuity- The payment received at regular interval after making a lumpsum investment.

TRANSIT-ORIENTED REDEVELOPMENT OF THE DWARAKA BUS STATION— FEASIBILITY STUDY FINAL REPORT

AUTHOR:	AECOM, India
CLIENT:	Greater Vishakapatnam Municipal Corporation (GVMC)
LOCATION:	Visakhapatnam
YEAR OF STUDY:	2017

OBJECTIVE

The purpose of this project is to study the feasibility of redeveloping Visakhapatnam's Dwaraka Bus Station (RTC Complex), and the adjacent administrative offices of GVMC into an improved bus station, new GVMC administrative offices, and new mixed-use transit-oriented development.

PROCESS FOR ASSESSING THE FEASIBILITY OF THE PROJECT

01 ASSESSMENT OF EXISTING CONDITION

The existing conditions are assessed with regard to:

- Existing situation and land use regulation
- Future Transit Access
- Climatic Analysis

02 DEVELOPMENT OF TECHNICAL OPTIONS

- Different variables were created adhering to TOD principles
- Review of micro-market rates for residential (sale), commercial-office (both sale and rental), commercial-retail (both sale and rental), hospitality and recreation, around the RTC Complex to understand the expected return of the project.

03 ESTIMATION OF PROJECT COST

The anticipated rough order of magnitude construction costs for the redevelopment of the RTC Complex and GVMC site were listed down. The unit costs for construction in India were informed by verified sources.

04 PRELIMINARY FINANCIAL AND ECONOMIC ANALYSIS

The preliminary cash flow analysis is based on average revenue assumptions based on land use, a 3 year construction period, and a debt repayment period of 12 years.

05 BUSINESS MODEL AND PROJECT FINANCING

The project is financed through private capital through a Private-Public-Partnership model.

06 INSTITUTIONAL ARRANGEMENT FOR PROJECT IMPLEMENTATION

07 ANTICIPATED SOCIAL IMPACT

08 ANTICIPATED ENVIRONMENTAL IMPACT

PROJECT COST ESTIMATION AND ECONOMIC ANALYSIS

3 ESTIMATION OF PROJECT COST

The study included a detailed assessment of market condition across various asset classes -residential, office, retail, hospitality and recreational.

ASSET CLASS - RESIDENTIAL

Traditionally, Visakhapatnam's residential activity was concentrated around the CBD areas of the city, comprised of micro-markets such as Siripuram, Beach Road, Lawson's Bay, Waltair Uplands, etc. However, due to an increasing population, escalating land values in established residential hubs, growth of IT/ITeS segment in the Madhurawada, Pendurthi and Gajuwaka regions, the real estate development activity in the residential segment is witnessing a gradual transition from central areas to suburban areas, and subsequently to the peripheral areas of the city. Most of the residential developments are 20 – 50 dwelling units (DU) in size; however, the city has seen several large-scale developments (in excess of 100 DUs) in recent years.

The increase in larger proposed developments is likely to gain momentum in the coming years, due to an influx of larger/ national developers to the region. About 60% of the total residential supply has been introduced in the past 2 years— Madhurwada and Yendada micro-markets have been major contributors.

Micro-Market Overview

The average price for residential apartments in the micro-market around RTC complex ranges from Rs 3,000 – Rs 5,800 per sqft ($USD44- $USD84), as illustrated in the table below:

S. No.	Locality	Average Sale Price (Rs per sqft)
1	CBM Compound Road	5,600
2	Seethammapetha Road, Dwaraka Nagar	5,000
3	Ramatakies Road	5,100
4	Ram Nagar	3,000
5	Jaganadhapuram	3,500
6	Lalitha Nagar	5,800

Source: www.makaan.com & www.magicbricks.com

ASSET CLASS - COMMERCIAL (OFFICE)

Most of the organized activity in the commercial segment in the city is concentrated in the IT/ITeS segment. The city is home to prominent IT/ITeS companies such as Wipro, Tech Mahindra, etc. Two of the more prominent commercial markets in the city are Asilmetta – Waltair Uplands and the IT hub of Madhurawada – Rushikonda. Non-IT building supply mainly driven by BFSI, Telecom, and Technology Segment in Visakhapatnam. Increase in IT/ITeS activity is expected to have a spillover effect on non-IT activity as well. Limited land availability has led to high capital values for land in the region.

Micro-Market Overview

The Micro-market around RTC complex is one of the prominent markets of the city in terms of Grade-A developments for Office spaces. Asilmetta houses about 52% of the city's Grade-A developments while the rest is spread through NAD Road, Waltair Uplands and Ramnagar. Limited land availability in this region has led to higher capital values of land which in turn has resulted in higher sale and rental prices. The current supply of Grade-A Office spaces is very low in the micro-market around the RTC omplex. (Source: Discussion with CBRE Representative) The available inventories of Grade-A Office spaces in the micro-market around the RTC complex have average sale price ranging from Rs 6,500 – Rs 8,200 per sqft as illustrated in the table:

S. No.	Locality	Average Sale Price (Rs per sqft)
1	Dwaraka Nagar	8,200
2	Asilmeta	6,500
3	Daba Garden Road	7,600
4	Siripuram	7,000

Source: www.magicbricks.com

The average rental pricing for the available inventories of Grade-A office spaces in the micro-market around RTC complex ranges between Rs 50-55 per sqft per month as illustrated in the table below:

S. No.	Locality	Average Rental Price (Rs per sqft per month)
1	Dwaraka Nagar	55
2	Asilmeta	50
3	CBM Compound Road	55
4	Siripuram	50

ASSET CLASS - COMMERCIAL (RETAIL)

Retail developments in Visakhapatnam are typically part of larger mixed-use developments. Organized retail activity has seen a marginal increase in the last few years, however, the same is still in its nascent stages in this market. Two retail malls (Visakhapatnam Central and Chitralaya Mall) have recently been added to the Daba Gardens-Jagdamba junction micro-market.

Micro-Market Overview

Dwaraka Nagar and Waltair Uplands micro-market which includes regions such as Asilmetta, Ramnagar, Telugu Talli Flyover Road, VIP Road, etc are predominately characterized by organized retail/big box retail. The stretch near RTC complex (between Asilmetta Junction and Telugu Talli Flyover) is regarded as a prominent commercial and retail hubs, owing to its strategic location at the center of the city. This high street retail hub is characterized by the presence of a mix of local, national and international brands. CMR Central, the biggest retail mall in Visakhapatnam lies within the micro-market. The current supply of retail spaces is almost negligible in the micro-market around the RTC complex. The average rental pricing for the available inventories of retail spaces in the micro-market around RTC complex ranges between Rs 60-65 per sqft per month as illustrated in the table below:

S. No.	Locality	Average Rental Price (Rs per sqft per month)
1	Dwaraka Nagar	65
2	Akkayapalem	60
3	Siripuram	65

Source: www.quikr.com & www.magicbricks.com

4 PRELIMINARY FINANCIAL AND ECONOMIC ANALYSIS

The preliminary cash flow analysis is determined with average revenue assumptions, based on land-use, a 3 year construction period, and a debt repayment period of 12 years.

Project IRR	5%	Y1					Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y7
Project cash flows		(3,033)	(3,450)	(7,256)	407	596	689	719	566	799	840	880	884	705	861
Add : Debt		1,820	2,070	4,353	-	-	-	-	-	-	-	-	-	-	-
Less : Debt Repayment		-	-	-	687	687	687	687	687	687	687	687	687	687	687
Less : Interest on debt		127	590	989	1,106	1,010	914	817	721	625	529	433	337	240	144
Cashflow to Equity (Post Tax)		(1,340)	(1,780)	(3,752)	(1,386)	(1,101)	(911)	(786)	(842)	(513)	(376)	(240)	(139)	(223)	30
Equity NPV	(7,512) Rs Million														
Equity IRR	3%														

Accuracy of costs estimates is +/- 50%

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REALIS—A REAL ESTATE INFORMATION SYSTEM FOR TRANSPARENT MARKET DATA

SOURCE:	Urban Redevelopment Authority
LOCATION:	Singapore
YEAR OF STUDY:	2006

CONTEXT

To keep track of the rapidly changing real estate market in the country of Singapore, the Urban Development Authority released a database of real estate information to private developers and other interested stakeholders and citizens. The tool, REALIS, provides data on price, availability, market conditions, and stock of residential, commercial and industrial properties in Singapore.

OBJECTIVE OF THE STUDY

- To encourage private investors to participate in the real estate market, with an improved awareness of market conditions and trends.
- To study and review the trends in the real estate market to predict future trends and inform sustainable development.
- To ensure the real estate market is transparent and inclusive, with a simplified tool for receiving up-to-date information on market conditions.

APPROACH

REALIS is a subscription-based web tool for private developers and citizens to engage with live and daily updated real estate market data.

01 DEVELOP AN OPEN SOURCE REAL ESTATE INFORMATION SYSTEM

Create an easily accessible tool that provides citizens and private developers with an intuitive way to track real estate market conditions. The tool should be:

- Open Source, Intuitive and Transparent
- Easy to Access via the Internet
- Regularly Updated

02 ALLOW CITIZENS AND PRIVATE DEVELOPERS TO SUBSCRIBE AND RECEIVE UPDATES ON MARKET TRENDS

03 REGULARLY UPDATE AND SHARE CHANGES IN MARKET CONDITIONS WITH PRIVATE DEVELOPERS AND INVESTORS TO ENCOURAGE THEIR PARTICIPATION IN THE MARKET

TOD K P

AS-P01

REAL ESTATE ANALYSIS TERMS OF REFERENCE



Template for a city to hire a real estate consultant to perform targeted demand analysis along a specific corridor

Type: TOR Template



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BACKGROUND

The Terms of Reference for a Real Estate Market Study should provide the following background material:

A. **Study Area**: The TOR must define the approximate area for which the Real Estate Analysis (REA) is to be developed. The study area must coincide as far as possible with jurisdictional boundaries for which population and employment data is readily available. The Background should also summarize the factors that have historically influenced real estate demand in the study area.
B. **Existing Plans and Proposals**: The Background section should also provide information on previous or ongoing studies that are expected to influence the REA Study.
C. Bibliography of Reference Plans, Polices and Studies
D. List of Project Stakeholders

OBJECTIVE OF THE ASSIGNMENT

The overall objectives of the TOD REA Study are to better understand the economic environment in which the City/ Urban Areas can plan for TOD, and to develop specific strategies related to the types and intensities of uses that are appropriate for the specified scale and context. Specifically, TOD Strategies provides preliminary actions for the areas with the highest potential, including:

- Design and use themes
- Market niches
- Potential development programs (e.g. activity type, amount, mix).

The Market Study must support the desired outcomes of TOD, including:

- Create transit-supportive densities that provide an optimal ridership base for the City
- Create a variety of mixed use, mixed-income neighbourhoods and greater employment opportunities within easy access of stations
- Provide supporting infrastructure as needed
- Create opportunities for non-fare revenue generation through land value capture and available public financing mechanisms.

SCOPE OF ACTIVITIES

The scope of activities for the Real Estate Market Study primarily consists of the tasks described below. The proposer is encouraged to provide suggested refinements to the work plan and schedule based upon experience with similar economic and market studies, and in compliance with national and state policies, where applicable.

1. **Project Initiation and Identification of Market Area Parameters:** The selected Consultant will schedule a kick-off meeting with the Client's project management team to present the regional context setting and identification of TOD Market Area Delineation parameters. The regional context should be defined for the corresponding geographic or jurisdictional areas. It should include the entire transit catchment area. The Consultant will define market selection parameters using historic observations of how socio-economic and physical factors influence travel patterns

in the region. The Consultant will review all existing documents and plans before the kick-off meeting, synthesize the findings and propose potential refinements to the work plan so as to mitigate any anticipated challenges to the project. The Consultant will also review and refine the initial problem statement, goals, and objectives of the study.

a. Client responsibility: Identify key stakeholders and assist in coordinating schedules for kick-off meeting.
b. Deliverables: Inception Report including Existing Issues and Goals, Objectives and Study Parameters.

2. **Market Area Definition:** The Consultant will delineate the TOD Market Area based on the parameters selected in the kick-off stage. Some of these parameters that may be considered include: natural features, physical infrastructure, travel patterns, population densities, jurisdictions, development types and scales. In many cities, the type and fabric of development and nature of the real estate market varies considerably even in adjoining neighbourhoods. For e.g., some areas may demonstrate higher walkability and/or higher rent sensitivity compared to others. Where micro levels of detail is available, the Consultant should break up the study area into different “zones” or blocks to allow for a finer grained study. Preferably, the break-up of zones or blocks should correspond with population census data collection blocks.
   a. Client responsibility: Provide data at macro and micro scales.
   b. Deliverables: Market Area Definition Report including delineation of TOD market area and break up of zones with primary characteristics.
3. **Market Demand and Supply Analysis:** The Consultant will prepare an inventory of existing real estate development types, businesses and summary of characteristics and performance metrics for housing, retail, office, and other commercial (e.g. type, class, square footage, typical rents, vacancy rates, lease terms, location, business size with respect to number of housing units and employees, and their relationship to economic clusters in the greater area). The Consultant will synthesize the information to develop a current and forecasted demand and supply assessment for various types of real estate development within and directly adjacent to the study area. The Consultant may conduct surveys, interviews or use existing data to prepare the assessment. Some types of data include: socio-economic indicators that influence demand such as income; historical trends of real estate project launches and sale transactions from land registration agencies or real estate agents; types of upcoming development projects and their absorption rates or sales/year through developer interviews.
   a. Client responsibility: Facilitate access to land transaction records and organize discussions with private developers and real estate agents.
   b. Deliverables: Market Area Demand and Supply Assessment Report including description of different types of real estate products, their supply and demand numbers, including historic trends.
4. **Identification of Market Opportunities:** The Consultant will prepare a fiscal analysis of project area zones/blocks, including prevalent conditions of the real estate market and their economic relationship to the possible transit project. It is also important to understand how the economy of the transit nodes or corridors is, or could be, linked to commercial clusters of retail and office in the larger study area. The market opportunities shall also determine the potential for multi-family residential at various densities, retail, mixed use, office, institutional, and other land uses and land use mixes that support transit ridership and/or benefit from transit proximity. It should also identify

opportunities for redevelopment or urban infill that can help fill existing gaps in key industries, types of services, amenities, and/or leasing space that is lacking in area to service demographic profile. This should address the status of neighborhoods or areas serving retail, businesses, and emerging or shrinking employment sectors. The Consultant should also identify and describe opportunities and barriers to developing, leasing, or opening businesses in the TOD market area.

a. Client responsibility: Provide inputs.
b. Deliverables: Market Opportunities Report including potential for different types of real estate products, gaps in existing land use mix, and challenges in real estate development.

5. **Preparation of Financial Feasibility Assessment:** The Consultant will prepare a financial feasibility assessment for many of the opportunities identified in Task 4. The feasibility assessment should map the local investment climate and evaluate access to financial capital before carrying out the feasibility analysis. The Consultant should compare and select the best project funding structure in collaboration with the Client. A typical real estate proforma (as provided in the sample World Bank knowledge products) should be developed to determine the total return on investment.
   c. Client responsibility: Provide inputs.
   d. Deliverables: Real Estate Financial Proformas.
6. **Community, neighborhood and stakeholder outreach:** A comprehensive approach should be developed to engage relevant agencies, corridor neighborhoods and businesses, key stakeholders, and the general public throughout the process. The outreach program will include policy and technical advisory committees, public meetings, presentations at neighborhood and business associations, websites and social media, a variety of communication tools, and direct outreach to non-traditional populations and organizations. Stakeholder workshops and/or public open houses will be held at key points in the study process including, at a minimum: (1) the discussion of problems, goals, objectives, study findings and opportunities; (2) definition of project proposals and financial feasibility assessments; and (3) proposed development mix and catalyst projects. Project information should be translated, as appropriate, to allow for effective outreach. At a minimum, the Consultant will:
   - Prepare a stakeholder engagement plan.
   - Prepare presentation materials for advisory committee meetings, public meetings, and other stakeholder presentations.
   - Prepare and provide logistical support including organizing, scheduling, notifying and participating in all meetings and preparing summary notes for all meetings.
   - Track public comments and response and provide to Client upon project completion.
   - Prepare content for the project website, to be maintained by Client upon project completion.
   - Prepare a draft and final report summarizing the stakeholder engagement process and stakeholder feedback.

   a. Deliverable: Stakeholder engagement plan; stakeholder engagement summary report; newsletters, website content, presentation materials, public meetings, advisory committee meetings, meeting notes, translation services, and other engagement tools identified in stakeholder engagement plan.
7. **Preparation of Desired Development Mix in TOD Area:** The Consultant will create a desirable product mix in the TOD Area, along with a phased plan of implementation based on the financial

feasibility assessment. The phased plan of implementation should include identification of catalyst projects and project structuring for the same. A Capital Investment Plan should also be prepared to support the phased development plan.

a. Client responsibility: Provide inputs.
b. Deliverables: TOD Area Proposed Development Mix.

DELIVERABLES

TASK	DELIVERABLE	TIMELINE
1	Memo #1: Inception Report	M + 2 weeks
2	Memo #2: Market Area Definition Report	M + 1 month
3	Memo #3: Market Area Demand and Supply Assessment Report	M + 3 months
4	Memo #4: Market Opportunities Report	M + 4 months
5	Memo #5: Real Estate Financial Proformas	M + 5 months
6	Memo #6: Stakeholder Engagement Summary Report	M + 6 months
7	Memo #7: TOD Area Proposed Development Mix	M + 7 months

QUALIFICATION OF CONSULTANTS

The Consultant Team must have experience in at least

A. One similar Real Estate Analysis Study for a TOD project

OR

B. At least two studies, which included a real estate market assessment and development proforma for a mixed use development

The Consultant Team must include the following key expertise:

	Key Experts	Years of Experience
1	Project Manager and Real Estate Expert	15 years
2	Real Estate Analyst	5-10 years
3	Urban Planner/ Designer	5-10 years
4	Infrastructure Specialist	5-10 years
5	Affordable Housing Specialist	5-10 years

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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Sao Paulo, Brazil

TOD KP

AS-P02



TRANSIT ALTERNATIVES ANALYSIS TERMS OF REFERENCE

Template (with estimated consultant time required) for a city to perform a major transit investments alternatives analysis

Type: TOR Template



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BACKGROUND

The Terms of Reference for a Rapid Transit Alternative Analysis Process (RTAAP) should provide the following background material:

A. **Study Area**: The TOR must define the approximate area for which the RTAAP is to be developed. The study area must coincide as far as possible with jurisdictional boundaries for which population and employment data is readily available. The Background should also summarize the envisioned corridors and populations that Rapid Transit will intend to serve.

B. **Existing Transit Services**: The Background section should provide a summarized description of current transit services, including any information on current ridership and expected ridership for the new service. Existing challenges and opportunities should also be discussed.

C. **Other Studies and Initiatives**: The Background section should also provide information on previous or ongoing studies that are expected to influence the RTAAP. Other transportation initiatives, such as construction of highways or pedestrian and bicycle facilities should be discussed.

D. **Bibliography of Reference Plans, Polices and Studies**

E. **List of Project Stakeholders**

OBJECTIVE OF THE ASSIGNMENT

The goals and objectives of the study must be defined clearly. These objectives may be considered further in the study as the basis of development of evaluation criteria. A sample is as follows:

The purpose of the Rapid Transit Alternative Analysis Process (RTAAP) is to evaluate the comparative benefits, costs and impacts of implementing a transit network among a list of alternative routes and corridors and among a choice of rapid transit technologies. The Study must recommend a locally preferred alternative (LPA) for transit services in the City.

The desired outcomes of the Rapid Transit Service, if implemented, are to:

- Increase ridership through high-quality, frequent and reliable transit service
- Enhance connections with the region's existing transport system and regular route bus service
- Improve mobility by offering more attractive transportation choices in the most viable corridor
- Catalyze transit-oriented development along key corridors.

SCOPE OF ACTIVITIES

The scope of activities for the RTAAP is described in this section. The proposer is encouraged to provide suggested refinements to the work plan and schedule based upon experience with similar transit planning studies, and in compliance with national and state policies, where applicable.

1. **Project Initiation and Development of Evaluation Criteria:** The selected Consultant will schedule a kick-off meeting with the Client's project management team and identify relevant issues for the RTAAP process based upon a review of existing documents and existing conditions. A tour of the possible corridors may also be included in the initial or follow-up meeting. The proposer will synthesize relevant issues and identify how these issues are to be addressed in the RTAAP work plan, including potential refinements to the work plan.

The Consultant will also review and refine the initial problem statement, goals, and objectives and define evaluation criteria based upon the RTAAP Framework. The evaluation criteria may be single-step or multi-step as appropriate and corresponding to the stage of the Rapid Transit Planning Process. The Consultant will present and further refine this information during the kickoff meeting. The problem statement, goals, objectives and evaluation criteria will create the framework for the development and evaluation of alternatives and the content of the Alternatives Analysis.

a. Client responsibility: Identify key stakeholders and assist in coordinating schedules for kick-off meeting.

b. Deliverables: Inception Report including Existing Issues and Goals, Objectives and Evaluation Criteria.

2. **Develop Initial Range of Route and Mode Options:** The Consultant will be required to review and summarize the findings of all relevant policy and plan studies, and existing data to understand travel patterns and identify potential transit route alternatives. In addition, the Consultant will review other transportation and land use resources from the area to estimate potential demand for the proposed transit system. The Consultant will identify transit alternatives, including at a minimum a no build alternative, an enhanced transit service alternative, and two or more rapid transit mode and route alternatives. The enhanced transit service alternative will include the considerations for changes to routing, service frequencies, or integration of ITS upgrades such as transit signal priority or real-time arrival prediction systems that can lead to marginal improvements in transit performance. The new route and mode alternatives should be conceptualized to enough detail to include proposed route alignments, and basic choice of modes.

   a. Client responsibility: Provide access to previous plans, policies and studies.

   b. Deliverables: Technical memorandum summarizing conceptual network of initial route options.

3. **Community, neighborhood and stakeholder outreach:** The consultant team shall engage relevant agencies, corridor neighborhoods and businesses, key stakeholders, and the general public throughout the process. The outreach program will include policy and technical advisory committees, public meetings, presentations at neighborhood and business associations, websites and social media, a variety of communication tools, and direct outreach to non-traditional populations and organizations. Stakeholder workshops and/or public open houses should be held at key points in the RTAAP process including: (1) discussion of problems, goals, objectives, evaluation criteria and alternatives, and data gathering (2) evaluation of alternatives, (3) presentation of the draft AA, and (4) selection of the locally preferred alternative. Project information should be translated, as appropriate, to allow for effective outreach. At a minimum, the Consultant will:

   - Prepare a stakeholder engagement plan.
   - Prepare presentation materials for advisory committee meetings, public meetings, and other stakeholder presentations.
   - Prepare and provide logistical support including organizing, scheduling, notifying and participating in all meetings and preparing summary notes for all meetings.
   - Track public comments and response and provide to Client upon project completion.
   - Prepare content for the project website, to be maintained by Client upon project completion.
   - Prepare a draft and final report summarizing the stakeholder engagement process and stakeholder feedback.

a. Client responsibility: Facilitation of Public involvement process.

b. Deliverable: Stakeholder engagement plan; stakeholder engagement summary report; newsletters, website content, presentation materials, public meetings, advisory committee meetings, meeting notes, translation services, and other engagement tools identified in stakeholder engagement plan.

4. **Undertake Initial Corridor Screening:** The Consultant will evaluate the initial set of transit route and mode options based on Intensification Capacity, Transportation Capacity and Mobility, Ease of Implementation and Operational Viability, and the potential for Community Building. The development and definition of project alternatives is expected to be an iterative process. The initial set of corridor alternatives developed will most likely include a broad range of options defined in very conceptual terms. Initial activities under this task will focus on narrowing this set of alternatives based on the evaluation criteria. The goal will be to evaluate and refine the alternatives as needed to identify those options that have a high feasibility for implementation.

   a. Client responsibility: Input and guidance.

   b. Deliverable: Technical memorandum defining the evaluation of initial alternatives, including assessment of barriers and opportunities.

5. **Conduct Detailed Corridor Assessment:** It is expected that several cycles of analysis and review will take place during this task as the stakeholders build consensus on the assessment results. At this stage, the Consultant should develop preliminary operating plans and ridership estimations for each alternative. The operating plans will define the frequency and span of service, stop locations (spacing), fare collection system, traffic operations (such as queue jumping and signal priority), and other factors that would impact operating speed, boarding and dwell times, service reliability, and overall service quality. Initial forecasting will be completed using any existing travel demand model for forecasting.

   a. Client responsibility: Provide information on existing transit operating conditions and existing ridership figures for existing transit services.

   b. Deliverable: Technical memorandum describing operation plans and ridership estimations for each alternative.

6. **Undertake Technology/Mode Review:** Concurrent with Task 5, the Consultant will evaluate the transit technologies, including vehicle type, size, and operating environment, that will most likely fit the needs of the corridor. The transit technologies should be evaluated based on capacity, quality of service, impact on the surroundings and cost. The best mode for each alternative should be selected for a more detailed costing and environmental assessment in the future steps. This will be an iterative process with Task 5. As mode preferences are known, they will need to be fed into the operational plans and ridership forecasts under preparation for Task 5.

   a. Client responsibility: Provide input on preferences.

   b. Deliverable: Technical memorandum describing mode and technology review and reasons for selected the final mode.

7. **Prepare capital cost and operating and maintenance cost estimates:** The Consultant will prepare capital cost estimates and operating and maintenance costs based on the operating plans prepared previously for the alternatives. For all alternatives, the Consultant will complete a condition assessment to determine if complete street/track reconstruction is required in any segments. The assessment will also identify any physical constraints or special needs that would have a significant impact on capital cost, as well as any needed right-of-way acquisition. Cost estimates will be prepared utilizing up-to-date unit costs. Unit costs will be adjusted to the targeted year-of-opening based on anticipated annual inflation rates. Costs will include track work, roadway/paving, infrastructure modifications, signals and communications, stations and shelters, equipment, utilities, structures, vehicles, maintenance facility, modifications to existing facilities (for example, intersections), project development/design, project administration, and all other items necessary for design and construction of each alternative.

    a. Client responsibility: Share knowledge of existing vehicle costs and operating costs.

    b. Deliverable: Technical memorandum documenting capital and operating and maintenance cost estimates and methodology.

8. **Assess environmental, historic and community issues:** An initial assessment of potential environmental impacts will be undertaken for the corridor including air quality, noise, vibrations, traffic, energy consumption, cultural and historic resources, native plants and animals, parklands, floodplains, wetlands, lakes, water resources, stormwater management, environmental justice, land use, TOD potential and other significant environmental, social and/or economic impacts. Key impacts that should be studied include: traffic/parking impacts and potential impacts to bicycle and pedestrian mobility.

    a. Client responsibility: Input and guidance.

    b. Deliverable: Documentation of these elements and a concept mitigation plan, including an examination of the impacts that each alternative would have to key socio-cultural and environmental characteristics.

9. **Evaluation of alternatives:** The Consultant will evaluate the alternatives based on the evaluation criteria defined in Task 1, utilizing the technical and cost data developed in the previously described work tasks. The comparison of alternatives will be vetted through the public involvement process described in Task 4.

    a. Client responsibility: Input and guidance.

    b. Deliverable: Memorandum documenting evaluation of alternatives methodology and results.

10. **Prepare final Transit Business Case Report:** The Consultant will prepare draft and final Business Case Report documenting the business case for final selection of the rapid transit alternative. The Business Case will be communicated to the public and stakeholders along the finally selected corridor. The Final Report will incorporate the feedback received from stakeholders, advisory committees and the public.

    a. Deliverable: Final RTAAP Business Case Report

DELIVERABLES

TASK	DELIVERABLE	TIMELINE
1	Memo #1: : Inception Report including Existing Issues and Goals, Objectives and Evaluation Criteria	M + 2 weeks
2	Memo #2: Technical memorandum summarizing conceptual network of initial route options	M + 1 months
3	Memo #3: Stakeholder engagement plan	M + 1 months
4	Memo #4: Shortlist of alternatives, including assessment of barriers and opportunities.	M + 2 months
5	Memo #5: Detailed Corridor Assessment with operation plans and ridership estimations for each alternative	M + 4 months
6	Memo #6: Mode and Technology Review	M + 4 months
7	Memo #7: Capital and Operating and Maintenance cost estimates and methodology	M + 5 months
8	Memo #8: Summary of environmental, historic and community issues with concept mitigation plan	M + 5 months
8	Memo #9: Evaluation of alternatives results and methodology, including stakeholder engagement summary report	M + 5 months
9	Draft RTAAP Business Case Report	M + 6 months
10	Final RTAAP Business Case Report	M + 7 months

QUALIFICATION OF CONSULTANTS

The Consultant Team must have experience in at least:

A. One similar Rapid Transit Alternative Analysis Study

OR

B. At least two studies or project reports which included at least two of the following components: Transit Corridor Concept Plans, Transit Operating Plans, and Transit Ridership Estimates

OR

C. At least two Transit Feasibility Studies

The Consultant Team must include the following key expertise:

	Key Experts	Years of Experience
1	Project Manager and Senior Transportation Planner	15 years
2	Public Transport Specialist	5-10 years
2	Transport Modeller	5-10 years
3	GIS expert	5-10 years
4	Land Use Planner	5-10 years
5	Environmental Planner	5-10 years
6	Transportation Engineer	5-10 years
7	Social Safeguards Expert	5-10 years

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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Muscat, Oman

TOD K P

AS-P03



INFRASTRUCTURE ASSESSMENT TERMS OF REFERENCE

Template terms of reference (with estimated consultant time required) to conduct infrastructure analysis

Type: TOR Template



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Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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BACKGROUND

The Terms of Reference for a Physical and Social Infrastructure Assessment should provide the following background material:

A. **Study Area**: The TOR must define the approximate area for which the Assessment is to be developed. The study area must coincide as far as possible with jurisdictional boundaries for which population and employment data is readily available. The Background should also summarize the transportation and transit services and other details of the TOD Plan.

B. **Existing Development**: The Background section should provide a summarized description of existing development and ongoing activities, including any information on critical infrastructure shortages.

C. **Benchmarks and Guidelines**: The Background section should also provide information on resources that a consultant is expected to refer to while preparing the assessment, specifically including Global or National Benchmarks or Guidelines.

D. **Bibliography of Reference Plans, Polices and Studies**

E. **List of Project Stakeholders**

OBJECTIVE OF THE ASSIGNMENT

The objective of this assignment is to undertake a capacity and needs assessment for various Infrastructure services including but not limited to physical infrastructure such as water supply, electricity provision, solid waste management, sewerage treatment, sidewalks, bike lanes, landscape infrastructure and information systems; and social infrastructure such as education facilities, healthcare facilities, recreational and community facilities. The intended outcome of the assignment is a Feasibility Report that recommends a clear plan for construction, management, rehabilitation, or augmentation of infrastructure services as per the Client's requirements in a clear and predictable manner with a view to ensuring:

(i) efficient, economical, and integrated systems or schemes;

(ii) reliability and security of services to all of the population equitably;

(iii) efficient operation and maintenance of the systems/schemes;

(iv) minimal adverse impact on the local population and environment;

(v) minimal additional acquisition of land;

(vi) improving the financial viability of the TOD Project consistent with the need to minimize disruptions to services provided to existing populations and to eliminate constraints in a cost effective manner; and

(vii) phased development of the Project on techno-economic considerations, till the final year of TOD implementation

SCOPE OF ACTIVITIES

The scope of activities for the infrastructure assessment is described in this section. The proposer is encouraged to provide suggested refinements to the work plan and schedule based upon experience with similar studies, and in compliance with national and state policies, where applicable.

1. **Project Initiation and Development of Methodology:** The selected Consultant will schedule a kick-off meeting with the Client's project management team and identify relevant issues for the capacity and needs assessment process based upon a review of existing documents and existing conditions. A tour of the project area may also be included in the initial or follow-up meeting. The proposer will synthesize relevant issues and critical needs and identify how these issues are to be addressed in the work plan, including potential refinements to the work plan. The Consultant will also review and refine the initial problem statement, goals, and objectives and define key infrastructure services for which the study will be carried out. The Consultant will prepare a basic assessment of study needs for each of the infrastructure service defined, and propose factors to be used for each of the study methodologies, including population forecasts or similar. The methodologies should consider factors in a manner that they capture the demographics in different distribution and collection zones, as the case may be, of the Project Area. The problem statement, goals, objectives, study needs and methods should be submitted as part of the Inception Report.

    a. Client responsibility: Identify key stakeholders and assist in coordinating schedules for kick-off meeting.

    b. Deliverables: Inception Report including problem statement, goals, objectives, study needs and methods.

2. **Develop population forecast and assessment of demand:** The horizon years for the population forecast should be set at approximately 10 and 20 years from the year of study, aligned as far as possible to parallel Master Plans or Development Plans. The Consultant shall determine the extent of the area for which new infrastructure or augmentation needs to be planned. For the present and prospective area to be served by the infrastructure systems, the Consultant shall also review the past records of population growth to forecast the population by using the methodologies and factors determined under Task 1. These population forecasts shall be compared with any other study(s) conducted by any other agency with a view to recommending the population forecast for adoption in the two planning horizons. The Consultant shall also assign suitable population densities for different zones/ sections/ areas as per the TOD Plan for assessing the infrastructure demand. The Consultant shall calculate the demand using national standards for per capita or per household needs. If such data does not exist, the Consultant may use global standards from countries of comparative economies and validate it through a small sample survey of actual consumption or production and demand for different purposes. Based on the forecasts of aggregate demand for physical infrastructure such as water, electricity and waste management, and social infrastructure such as education and healthcare, and the topographical and existing developmental features of the Project Area, the Consultant shall recommend suitable sub-divisions to formulate distribution/collection zones for each infrastructure need.

    a. Client responsibility: Provide access to population data, previous plans, policies and studies.

    b. Deliverables: Technical memorandum summarizing existing and projected infrastructure demands.

3. **Assessment on the sufficiency of existing physical infrastructure capacities (not required for greenfield context):** The Consultant shall review the existing reports prepared by the relevant public infrastructure departments with the intent to evaluate the existing infrastructure capacities. The Consultant will be expected to meet stakeholders from relevant agencies to identify if the current infrastructural capacities are sufficient for the projected needs, and if not, how much of the excess need can be fulfilled through pre-existing augmentation plans.

    a. Client responsibility: Sharing existing reports and facilitation of stakeholder meetings.

    b. Deliverable: Technical memorandum summarizing sufficiency of capacity of existing and planned systems.

4. **Identify Land and Resource Capability of the Project Area:** The Consultant will evaluate area-specific land and resource constraints that are a barrier in meeting the projected demand, primarily related to availability of land and resources. Examples of critical constraints include:

    a. Water Supply: Water shortage, if any, due to insufficient rainfall or depleting ground water reserves.

    b. Electricity: Shortage of renewable sources to harness for power, or shortage of land to establish distribution centers.

    c. Sewerage or Solid Waste Management: Shortage of land to establish treatment centers or landfills.

    d. Landscape Infrastructure: Shortage of land or soil fertility to develop landscape infrastructure

    e. Information Infrastructure: Lack of means to distribute information and real-time data efficiently.

    f. Social infrastructure such as schools or hospitals or police centers: Shortage of public land to build necessary developments.

    In areas of constraint, the Consultant will evaluate potential strategies to increase resource availability where possible. For example, the Consultant may identify land amalgamation or acquisition needs to fulfill land demands, or identify water recharge strategies to augment ground water reserves. If the constraints are too large and cannot be overcome through any means, the Consultant may be required to suggest changes to suggested population forecasts or planned densities.

    a. Client responsibility: Input and guidance.

    b. Deliverable: Technical memorandum summarizing the current land and resource constraints and potential strategies to overcome them.

5. **Identify Strategies and Mechanisms to Reduce Consumption:** The Consultant will also define strategies for reducing consumption where possible. In cases where larger developments of high density are proposed, it is possible to leverage the potential of resource sharing and thereby reducing overall demand. For example, larger developments may be able to accommodate grey water recycling plants to meet all non-domestic needs, or they may be able to install smart meters to monitor and reduce electricity consumption. The Consultant will recommend statutory and regulatory mechanisms or financial incentives that can be implemented to reduce consumption.

    a. Client responsibility: Input and guidance.

    b. Deliverable: Technical memorandum describing statutory, regulatory, or financial incentives to reduce consumption.

6. **Prepare indicative designs and layout plans for development or rehabilitation of physical infrastructure:** The Consultant will prepare conceptual layouts for any new infrastructure proposed, including central facilities and distribution systems. The Consultant should also prepare conceptual designs for the rehabilitation of facilities of augmentation of networks where applicable. In addition, the Consultant will also be required to prepare design guidelines for decentralized physical infrastructure systems, where appropriate (e.g. recycled water system, waste segregation and composting center, minor solar installations). National standards or global best practices must be followed in design preparation.

    a. Client responsibility: Input and guidance.

    b. Deliverable: Technical memorandum describing indicative designs and layout plans and guidelines.

7. **Conduct Social and Environmental Impact Assessment (including impacts of land acquisitions, etc):** The Consultant will prepare a social and environmental impact assessment to document the possible impact of building or enhancing infrastructure systems on the local population and environment in the short, mid and long term. In particular, social impact of any displacement due to land acquisition, and environmental impact of building large facilities or landfills shall be studied. The Consultant should work alongside the Client to propose strategies to mitigate impacts as far as possible.

    a. Client responsibility: Input and guidance.

    b. Deliverable: Social and Environmental Impact Assessment Reports, including summaries of Tasks 2 to 6.

8. **Prepare capital cost and operating and maintenance cost estimates:** The Consultant will prepare capital cost estimates and operating and maintenance costs based on the layout plans and designs proposed in Task 6. Cost estimates will be prepared utilizing up-to-date unit costs. Unit costs will be adjusted to the targeted year-of-opening based on anticipated annual inflation rates. Costs will include land acquisition costs, land clearing costs, facility construction costs, laying of pipelines or conduits along roadways, vehicles, maintenance facility construction, modifications to existing facilities, project development/design, and project administration. Costs of financial incentives will also be included in the estimates.

    a. Client responsibility: Share knowledge of existing infrastructure and utility construction costs.

    b. Deliverable: Technical memorandum documenting capital and operating and maintenance cost estimates and methodology.

9. **Prepare Final Infrastructure Assessment and Feasibility Report:** The Consultant will summarize the entire assessment and cost estimation process in the Final Infrastructure Assessment and Feasibility Report.

    a. Deliverable: Final Infrastructure Assessment and Feasibility Report

DELIVERABLES

TASK	DELIVERABLE	TIMELINE
1	**Inception Report** including problem statement, goals, objectives, study needs and methods	M + 2 weeks
2	Memo #1: Existing and projected infrastructure demands	M + 1 months
3	Memo #2: Sufficiency of capacity of existing and planned systems	M + 1 months
4	Memo #3: Current land and resource constraints and potential strategies to overcome them.	M + 2 months
5	Memo #4: Recommended statutory, regulatory, or financial incentives to reduce consumption	M + 4 months
6	Memo #5: Indicative designs and layout plans and guidelines	M + 4 months
7	Social and Environmental Impact Assessment Report	M + 5 months
8	Memo #6: Summary of capital and operating and maintenance cost estimates and methodology	M + 6 months
9	Draft Infrastructure Assessment and Feasibility Report	M + 7 months
10	Final Infrastructure Assessment and Feasibility Report	M + 8 months

QUALIFICATION OF CONSULTANTS

The Consultant Team must have experience in at least:

A. One similar Infrastructure Assessment Study

OR

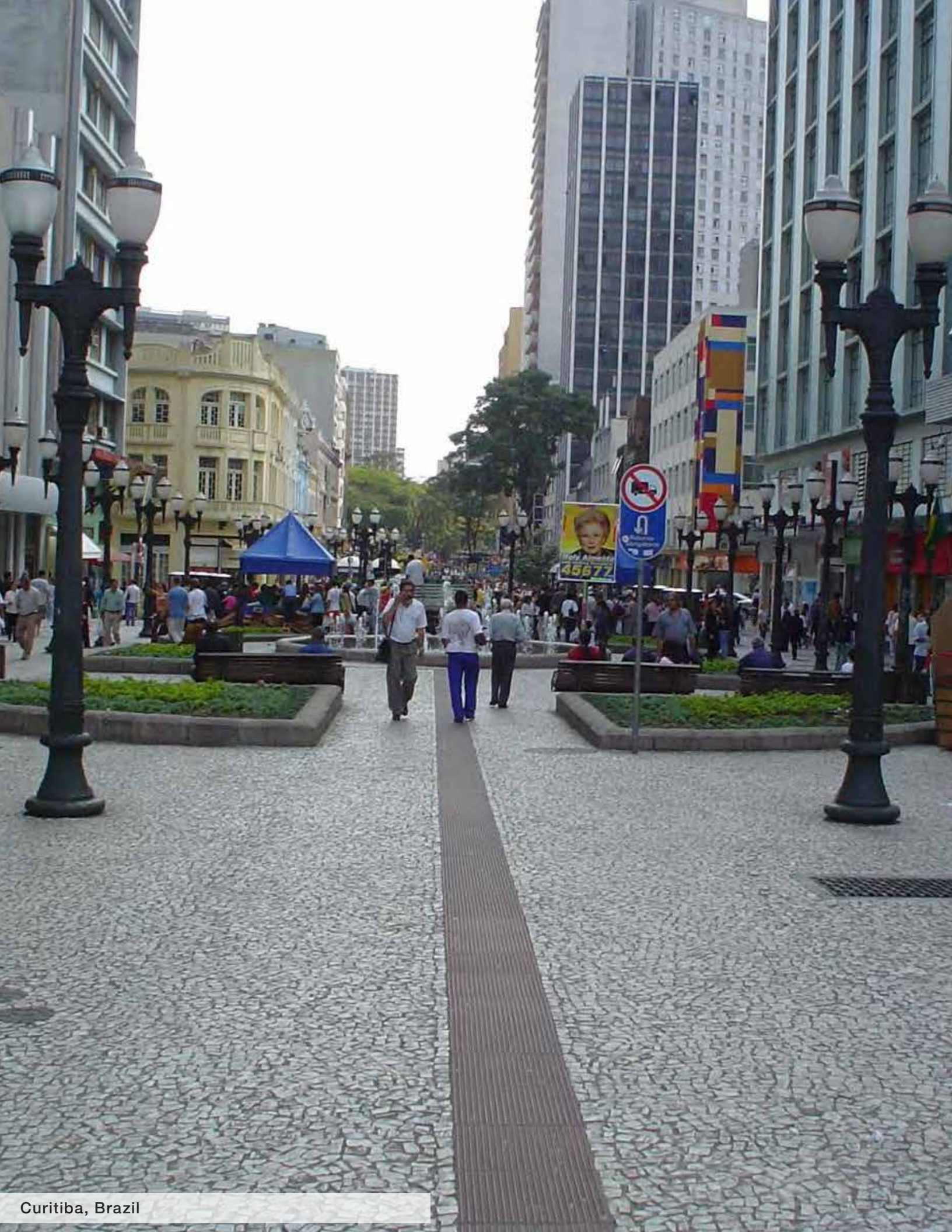
B. At least two studies or project reports which included at least two of the following components: Infrastructure Demand Assessment, Resource Capability Assessment, Social and Environmental Impact Assessment of Infrastructure Plans

OR

C. At least two Infrastructure Feasibility Studies

The Consultant Team must include the following key expertise:

	Key Experts	Year of Experience
1	Project Manager and Senior Infrastructure Planner	15 years
2	Physical Infrastructure Specialist	5-10 years
2	Urban Planner	5-10 years
3	Municipal Infrastructure Engineer	5-10 years
4	Environmental Planner	5-10 years
5	Social Safeguard Specialist	5-10 years
6	Municipal Finance Specialist	5-10 years



Curitiba, Brazil

TOD K P

ENABLE

INTRODUCTION



Highlights policy, barriers and mechanisms that can enable the TOD planning process.

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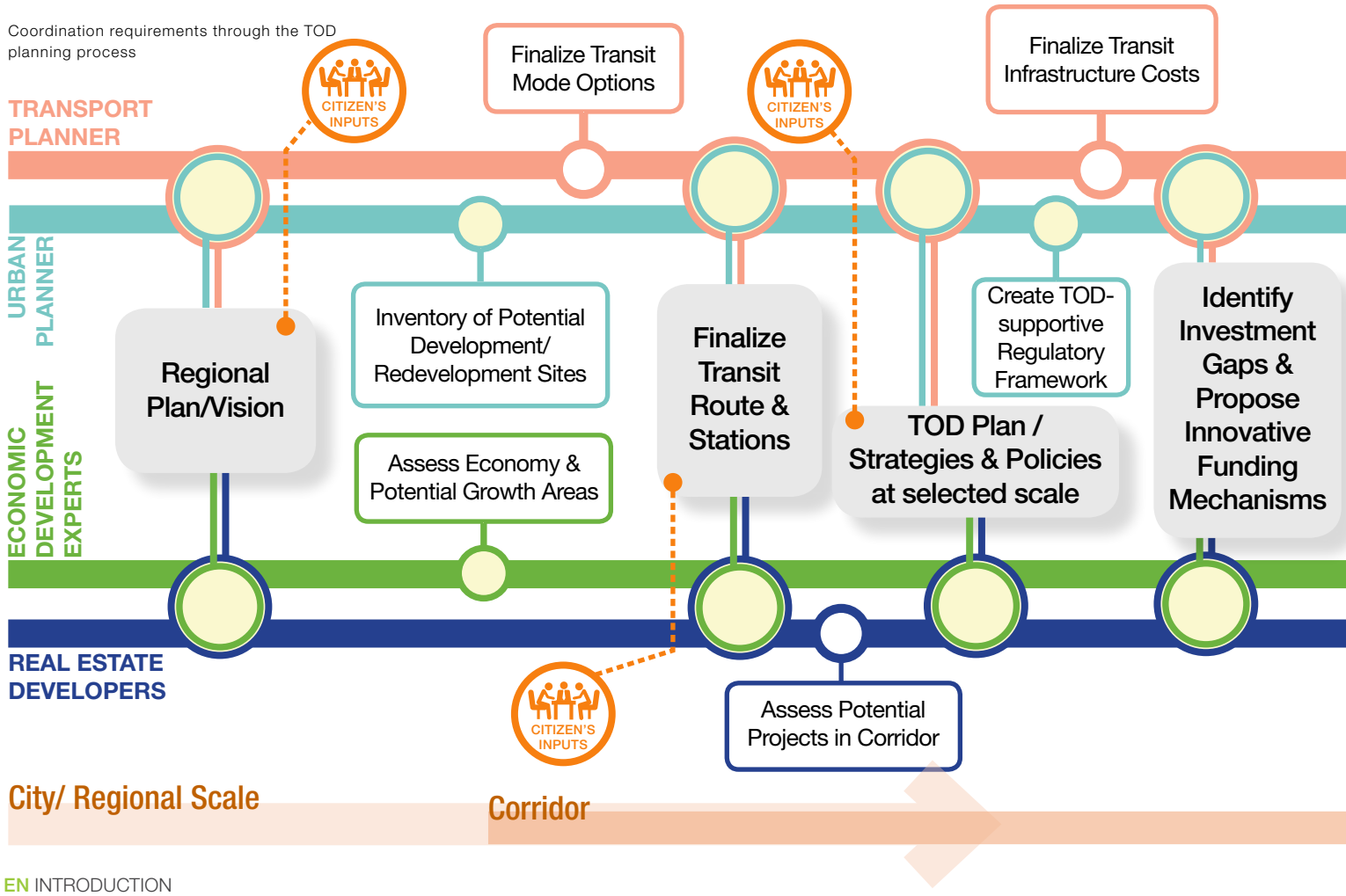
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ABOUT ENABLE

The 'Enable' step of the TOD Framework is developed to focus on setting up an enabling environment that allows successful implementation of TOD projects. The two most commonly held TOD hurdles in World Bank client cities are (1) the lack of an empowered institution that is able to work across various scales, levels of government, and planning sectors towards a TOD solution; and (2) the lack of a TOD-supportive policy framework, including pedestrian-friendly laws, efficient and inclusive regulations and market-friendly financial tools. Some of the key barriers for successful TOD in World Bank client cities are identified in the Transforming Cities with Transit –World Bank publication (Suzuki, Cervero and Iuchi 2013). Primarily these include factors related to Governance, Regulatory support and Coordination across sectors and jurisdictions.

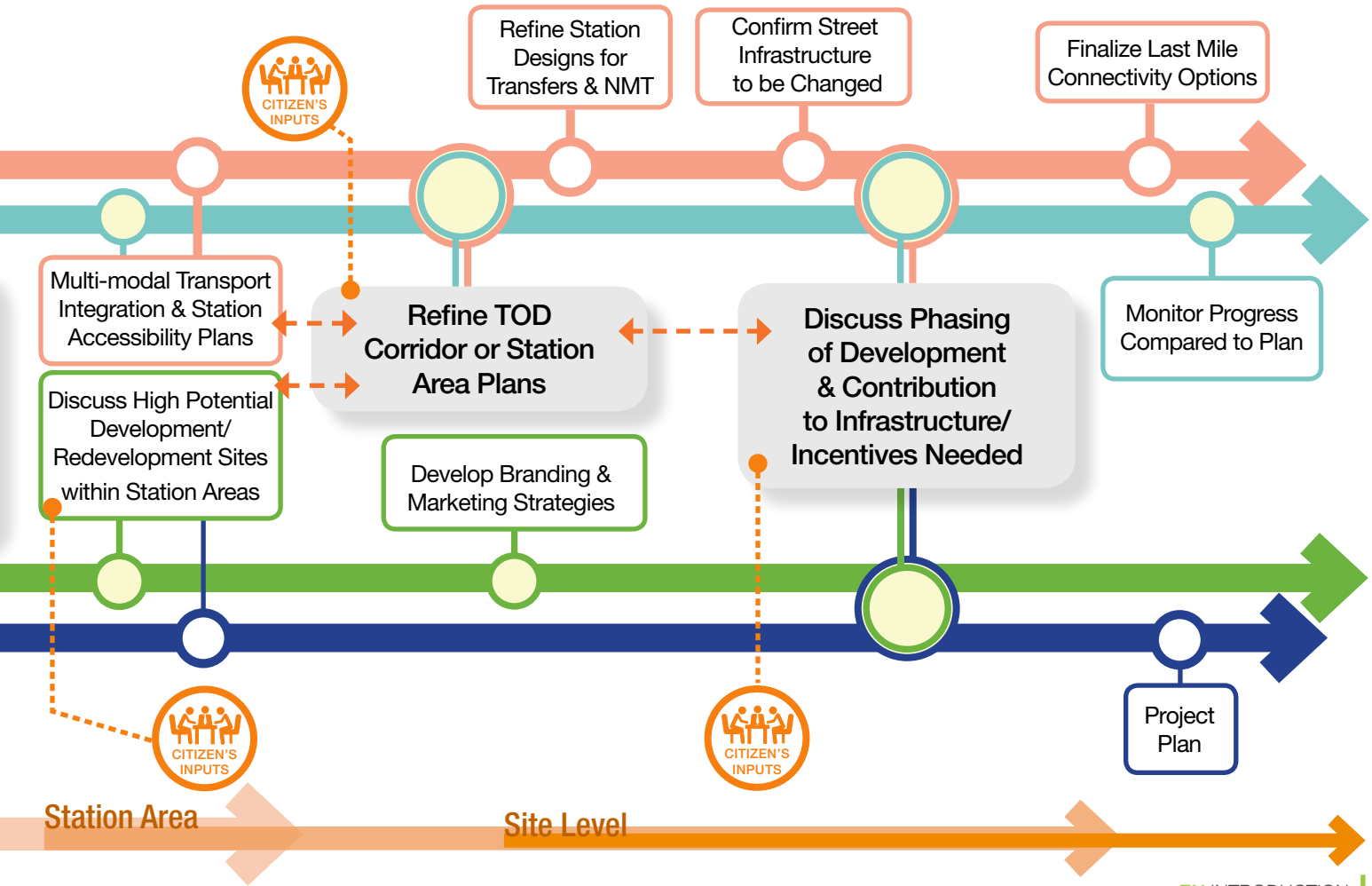
Most of these challenges deal with coordinated and institutionalized planning behavior. The Enable step largely focuses on addressing these challenges. The ultimate goal of this step is to build local capacity (human resources and processes) to plan, finance, and implement sustainable and inclusive TOD. This capacity can be institutional (public officials, civil servants, etc.), within the private sector, or at the civil society level. The knowledge resources within this step, will provide techniques and tools to decision makers at various levels to better engage. These tools can to be used throughout the course of the project but must be ideally considered for use during project initiation itself.

The sustainability of a TOD strategy, as for any other long-term planning strategy, is contingent upon the institutionalization of



the process and objectives. The WB/WRI TOD Corridor Course (World Bank; WRI (World Resource Institute) 2015) suggests key building blocks to set up and institutionalize an enabling environment for TOD. These building blocks are introduced here along with key barriers faced by World Bank client countries:

1. **Leadership and Vision:** Since TOD is a long-term, transformative process, one of the most essential enabling factors is a strong leadership and vision. Leadership involves developing a strong-long term vision, creating empowered, inclusive, and transparent institutions and planning processes, setting priorities in allocating resources, and promoting the vision to the public. However, many cities in World Bank client countries depending on their governance framework, suffer from challenges related to temporal continuity of leadership and lack of a consistent vision across scales because of jurisdictional priorities. Singapore, with its advantage of being a city-nation, offers one of the most successful examples of leadership and vision-setting. Their transformation into a transit-friendly city over the last decade is evidence of such successful leadership. Other similar transformations in cities such as Bogota and Curitiba were experienced during the period when TOD-supportive mayors were in office, but have suffered periodically from a change in city leadership. In Indian cities on the other hand, where power is largely concentrated at the federal and state levels, TOD is difficult to implement by city governments.



2. **Robust Institutional Structure:** In addition to a strong leadership, successful TOD needs a robust institutional structure that has representation from all the essential sectors, and has the required powers to influence a transformation. A robust institutional structure ensures that an enabling environment for TOD is maintained even through leadership changes. The institutional structure should be contextually relevant to the socio-political and legal setting. Some of the most widely used TOD implementation institutions include collaborations between Development and Transport Authorities, or TOD Steering Committees formed with public sector and civil society organizations, or Public-Private Partnerships (PPP). Who should be involved within the institutional structure depends on the level of influence of the public, private and civil society organizations in terms of political structure, land ownership structure, financial capabilities and legal mandates that can influence large-scale land amalgamation and redevelopment projects. Defining the appropriate institutional structure that complements a strong leadership and allows for high levels of coordination and investing it with the appropriate degree of powers, is the biggest challenge witnessed in many cities in World Bank client countries.
3. **Effective Coordination between Governmental and Participating Agencies:** The Transforming Cities with Transit publication (Suzuki, Cervero and Iuchi 2013) notes lack of coordination as one of the foremost challenges to TOD implementation. Vertical coordination between different levels of government is a key challenge in large countries such as India, Brazil, and China, where regulatory and financial power is largely concentrated at the top of the jurisdictional hierarchy. At the same time challenges in horizontal coordination between the different sectors of planning and city building is common across all cities. Development and transportation decisions are taken in isolation, often in retrospect as a measure to address specific challenges such as lack of affordable housing or severe traffic congestion. Such decisions are rarely informed by plans created for other sectors and rarely made in compliance with a long-term vision. The tool EN-H01 provides guidance on influencing leaders, identifying the appropriate institutional structure, bringing agencies from all sectors together, developing coordination mechanisms and aligning the vision across different scales and planning sectors. EN-R01 provides the typical roles and the responsibilities of different stakeholders in the TOD planning process.
4. **Inclusive and Effective Community Engagement:** Finally the most important enabling factor is an inclusive and effective community engagement process. Community engagement should not only aim to inform, but also educate the community about the benefits of a TOD-based vision. It should be able to build human capacity needs to promote the goals of TOD. The example of the failure of the TOD Plan in Mumbai in 2016 after a massive backlash from residents who felt slighted and excluded from the planning process, demonstrates the importance of an effective engagement exercise in building successful TOD. The tools EN-C01 and EN-C02 provide tools that will aid the community engagement process.

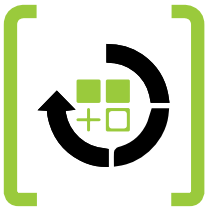
KNOWLEDGE PRODUCTS



COMMUNICATION

EN-C01 **Making a Case for TOD to the Public-Communication Strategy** *(Ref Doc.)*

EN-C02 **The TOD Role-Out - A Stakeholder Engagement Game** *(Ref Doc.)*



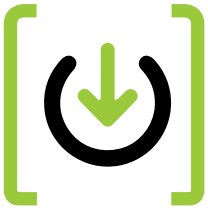
'HOW-TO' GUIDES

EN-H01 **"How-to" Build Institutions and Enable Intergovernmental Coordination** *(Step-by-Step Guide)*



RESOURCES

EN-R01 **Roles & Responsibilities Of Stakeholders** *(Ref Doc.)*



PROCUREMENT

EN-P01 **Communications Strategy Terms Of Reference** *(TOR Template)*

REFERENCES

Carlton, Ian, and William Fleissig. April 2014. Steps to Avoid Stalled Equitable TOD Projects. Living Cities.

MOUD (Ministry of Urban Development, India). 2016. Transit Oriented Development Guidance Document. Consultant Report, IBI Group, New Delhi: Global Environment Facility, UNDP and World Bank.

Suzuki, Hiroaki; Cervero, Robert; and Iuchi, Kanako. 2013. Transforming Cities with Transit: Transit and Land Use Integration for Sustainable Urban Development. Washington DC:World Bank.

World Bank; WRI (World Resource Institute). 2015. Transit Oriented Development at a Corridor Scale Course. Washington, DC.

TOD K P

EN-C01



MAKING A CASE FOR TOD TO THE PUBLIC– COMMUNICATION STRATEGY

A creative guide to disseminate information to public and regional bodies and express the importance and benefits of TOD

Type: Reference Document



TOD

Global Platform for Sustainable Cities

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ABOUT THE ENABLE TOOL

One key enabling issue around TOD is the difficulty of cross-sectoral integration; without it, transport, housing and land-use policies are developed in isolation and when aggregated in an attempt at TOD, the nuances of the trade-offs between sectors are lost. As TOD happens at different scales under many jurisdictions, it is essential that practitioners understand the motives of each stakeholder, possible trade-offs, and how interests can be better aligned for successful implementation.

In addition, much of TOD planning and implementation relies on public and private institutions with little public participation, beyond the election of public officials in developing countries. In practice, building ownership and developing buy-in from the general public, with a strong sense of commitment from the political leadership, makes the difference between the success and failure of TOD initiatives. Before embarking upon the public participation process, it is important to identify project champions who can influence public opinion. Ineffective and untimely engagement of influencers can lead to the breakdown of the TOD planning process, as was seen in Mumbai during the public review and consultation of the TOD-based Development Plan.

Participatory planning mechanisms offer opportunities to citizens (such as voting, public hearings, etc.) to have a role in the governing and decision-making processes in their neighborhood, their city and beyond. The improvement of the quality of life of current and future residents is a core value of Inclusive TOD. However, there is a need for public participation and stakeholder engagement to increase the inclusiveness of TOD and ensure that the beneficiaries' concerns are addressed and they are convinced of the personal and city-wide benefits TOD brings. (WB/WRI 2015)

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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PURPOSE OF THE TOOL

In order to achieve publicly supportable goals and objectives for any project or program, municipalities must engage members of the community. This includes residents, business owners and any organization that represents various segments of the population. Achieving the greatest possible participation in public workshops requires outreach strategies that are relevant and inclusive. **This tool guides the City with suggestive marketing promotion and outreach programmes to publicize the benefits of transit-oriented developments as a lifestyle choice.**

FINDING PROJECT CHAMPIONS

Project champions can be found not just in local politics, but also in the local community. Finding champions helps to ensure that your TOD project is perceived as a civic project that is aligned with community interests, rather than being imposed from the top-down. It also encourages a project's longevity, particularly in light of the inevitable changes in political leadership or project management over the life of a project. Project champions can be local civic workers, landowners, leaders of community groups, academic institutions, media representatives or other well-known public figures in a particular community. Project champions should be someone that:

- Is known for bringing people together, rather than dividing a community
- Has strong relationships within the community that, ideally, span socio-economic classes, professions, and political beliefs
- Is able to speak articulately about the issues that have inspired the project and that may arise during the TOD process

To be successful advocates, project champions must be personally convinced of the benefits of TOD initiatives before they can speak on behalf of the project. Project champions should be involved throughout the entirety of the planning process to ensure complete ownership and commitment to the TOD outcomes.

Project champions play an important role in the TOD process by bringing community members together in support of TOD through participation in community events, social networking and partnership creation. As highly involved and connected members of the community, they can address public grievances early on and rally support and community buy-in. For example, if a project champion observes that community members are very concerned about project-induced traffic, they can relay this information to your TOD team and simultaneously provide concerned citizens with one-on-one attention and dialogue, before the issue impedes with the project. Empower your project champion with the project understanding, facts and figures that support the plan, and provide them with the support required to successfully communicate with the public. Strong project champions can drive the success of a TOD project and ensure the inevitable concerns of the public are managed throughout. Making strategic use of these valuable stakeholders is, therefore, essential to a successful project.

METHODOLOGIES

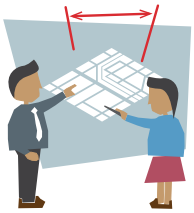
“Good TOD plans are 50% professional best practices and 50% local knowledge.

You can only access local knowledge through concerted public outreach.”



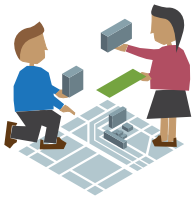
1. IDENTIFY THE STAKEHOLDERS

From internal to external, from directly related to merely interested, it’s key to know who’s who.



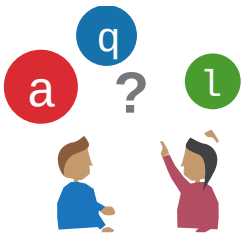
2. HAVE A PLAN TO ENGAGE THEM

Public engagement needs to be orchestrated carefully while allowing for flexibility. All stakeholders need not be engaged together. They can be divided into target groups to bring about better collaboration



3. USE THE BEST COMMUNICATIONS TOOLS

Use the right tools at the right moment for the right target group.



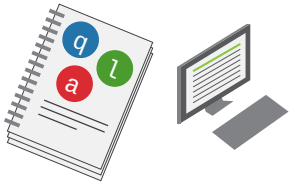
4. ASK THE RIGHT QUESTIONS

Different project stages – issues, ideas, concepts, solutions – need different feedback.



5. NOT EVERYBODY WANTS TO ENGAGE THE SAME WAY

Interest, time availability and issue relevancy varies from person to person.



6. MOST PEOPLE ONLY WANT TO BE INFORMED

A broad information campaign should reach people through different channels.



7. A FEW PEOPLE WANT TO ENGAGE DIRECTLY

Curated direct participation events are necessary too, even in a digital world.



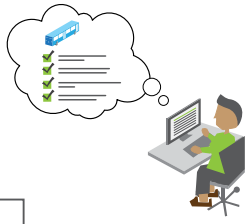
8. COMBINE PLANNING AND OUTREACH

Specially designed formats such as charrettes shorten timelines and increase buy-in.



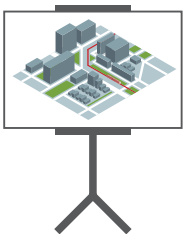
9. INCLUDE FUN EXERCISES

Custom-tailored activities and games make it fun and meaningful for stakeholders to interact.



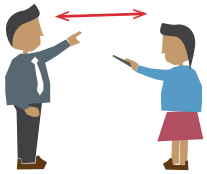
10. SOME PEOPLE DO NOT HAVE TIME TO ENGAGE

An online/social media engagement strategy can capture their (otherwise lost) input.



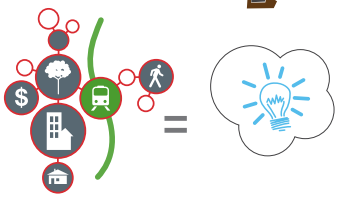
11. MAKE IT VISUAL

In a time-starved and attention-limited world, visually appealing, intuitive content is a must.



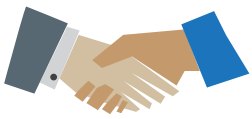
12. ENSURE TWO-WAY COMMUNICATION

Stakeholder outreach is as much about listening as it is about talking.



13. MAKE SENSE OF THE FEEDBACK

Stakeholder engagement is useless unless you connect the dots in a systematic way.



14. DON'T OVERDO IT – BE STRATEGIC

Outreach needs to be effective, cost-efficient and relevant for all participants.

TOOLS-CHARRETTE

A charrette is a creative burst of energy that builds momentum for a project and sets it on a course to meet project goals. It can transform a project from a static, complex problem into a successful, buildable plan. Usually, it is an intensely focused, multiday session that uses a collaborative approach to create realistic and achievable designs that work."

(Source: Lindsay, G., J. A. Todd, S. J. Hayter, and P. G. Ellis. "Handbook for Planning and Conducting Charrettes for High-Performance Projects: Second Edition." National Renewable Energy Laboratory, 2009. doi:10.2172/965523.)

Planning / Design Charrette: A multiple-day, collaborative workshop lead by the core planning team that brings together residents, developers, and policymakers to create a feasible and "85% ready" TOD Community Concept Plan based on four feedback loops: VISIONING, IDEAS, CONCEPTS, AND SOLUTIONS.



TOD Board Game



"What we Heard" Playback & Voting

(Source: © IBI Group)

FIRST DAY

- Team introductions; "Gains & Pains" word exercise (a more up-to-date and participatory take on "SWOT" analysis);

SECOND DAY

- Fundamentals of TOD (both design and economic); playing of the "TOD Board Game", a hands-on exercise in which community residents layout a series of land use icons – streetscape improvements, lanes, transit service, etc. (the "T" of TOD); parks and plaza, public art, etc., and other "Open Space" attributes (the "O" in TOD; and townhouses, apartment buildings, retail shops, and schools (the "D" of TOD), into a series of competing alternative plans.

THIRD DAY

- A playback of "What We Heard" at the TOD board game, complete with real-time electronic voting for preferred options of the TOD component plans.

FOURTH DAY

- The unveiling of the TOD Community Concept Plan, the result of a marathon production run of 36 hours, normally culminating in a 100-slide presentation, shored up by twenty-to-thirty full size presentation boards and, always a community favorite, a time-lapse photo visualization of a select street/area within the TOD plan that illustrates the evolution of the "now" to the "next".



(Source: © IBI Group)

TOOLS-
INTERACTIVE ACTIVITIES

How do you liven up discussions around TOD, get participants thinking outside the box & get people to take a holistic & inclusive approach to community planning around stations?

Why not try a game?

TOD projects frequently involve the cooperation of multiple stakeholders with varying objectives and preferences for an optimized solution. Finding a mutually agreeable solution is of paramount importance in order to assure the successful completion of these projects; particularly when different stakeholders are splitting the costs because none can afford to finance the transit/land use development projects on their own.

Games are emerging as a useful platform for fostering meaningful dialogue on today's most pressing urban development issues. Through simulations, role-playing and even the use of LEGO blocks, interactive urban development and planning games can provide a fun and engaging way of bringing disparate groups of stakeholders to the table. These games remove the threatening atmosphere often felt in more formal meetings, and allow participants to casually communicate with one another while collectively evaluating different paths of development.

Games can help simplify complex and seemingly insurmountable problems by detangling components and breaking them down into smaller, more comprehensible pieces. Furthermore, games that require role-playing can force participants out of their comfort zone helping them to begin to understand and view problems from a different perspective, such as through the eyes and experiences of a bicyclist, thus bringing light to issues they may normally overlook.



Interactive Board Games, Station Area Planning, City of Calgary

(Source: © IBI Group)

Some of the examples of Interactive games that force public and private sector stakeholders (including public) in planning and implementing TOD, role-playing, priority setting and balancing trade-offs, develop solutions and align interests in a non-threatening environment are outlined below. These games are used as Global best practices and have been used by the project team for TOD projects developed and developing countries alike.

Most of these games are organized as sessions/downtime activities as a part of TOD Charrettes (typically organized as a one/two-day activity). An overview of the TOD charrette process is also presented at the end to identify where these gaming sessions can be accommodated in the charrette agenda.

Activity 1: Card Game - Play your best Hand

Activity 2: Ideas/Projects cost Money

Activity 3: Speed Networking – Hear & Share your stakeholders/your Issue under 5 minutes, & jointly devise a solution

Activity 4: Issues & Ideas Wall

Activity 5: Preference Boards

Activity 6: TOD Interactive Board-game

Other Virtual Games

ACTIVITY 1: CARD GAME - PLAY YOUR BEST HAND

INTENT:

Identification of key priorities/issues.

WHO ARE THE PLAYERS:

- Typically limited to Public Sector/Agency Stakeholders.
- Can be extended to select Private stakeholders such as NGO's/Developers/ Business Improvement Groups.
- Mayors and political decision-making stakeholders often participate in developing countries.

FORMAT:

Workshop/Charrette Setting. Stakeholders are sitting around a table in random groups of 6 to 8 people.

Ideal Engagement Size:

Maximum 50-75 Stakeholders. Gathering feedback and reporting becomes time-consuming beyond this size of stakeholders.

TYPICAL TIME:

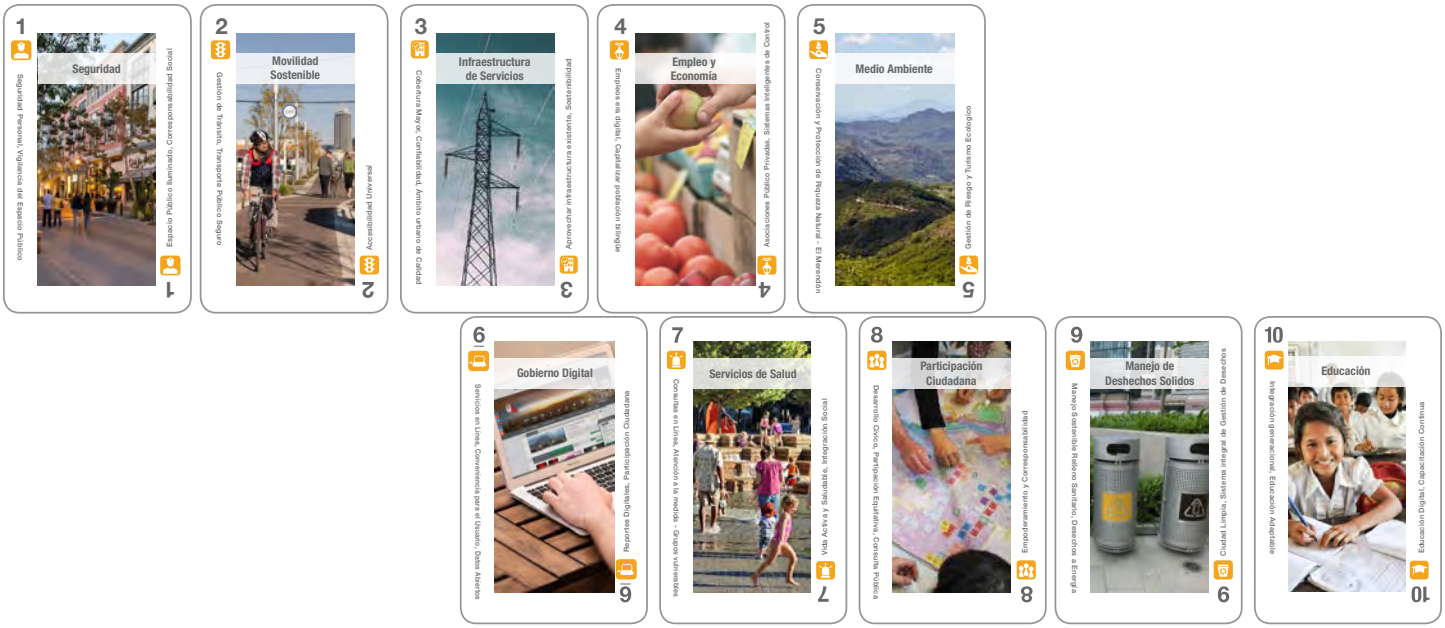
30 minutes (10 minutes to play the game and 20minutes to discuss reporting).

DESCRIPTION:

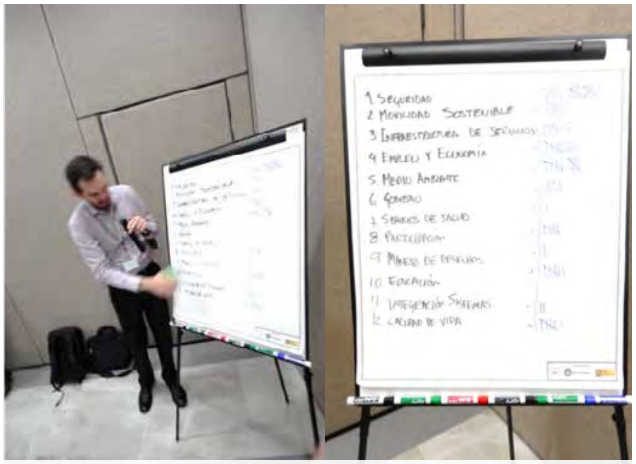
- A suit of cards (similar to a suit from a deck of cards) 12 cards with an additional Wild Card (similar to the Joker from a deck of cards) is pre-prepared with each card representing one key issue facing the community.
- The list of priorities/issues is pre-curated with the assistance of the Client prior to the workshop.
- Each stakeholder is asked to "play their best hand" i.e. lay 3 cards on the table which represent their three priority issues.
- The stakeholders also have the option of writing their own issue on the wild card in case the 12 cards don't represent priority issues.
- The cards form each stakeholder are collected and the scores are tallied (while other components of the workshop/ charrette are in process) by the Project team.
- A member of the project team then reports back on the ranking of the priorities.

OTHER SUGGESTIONS

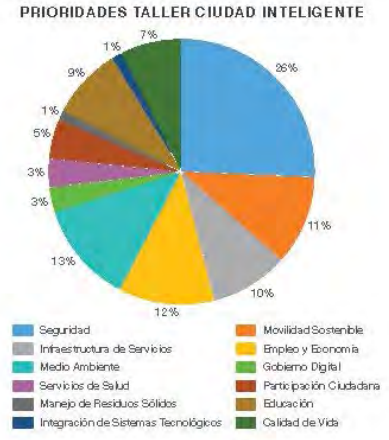
- The Wild Card may carry the photo of the Project Champion/Political leader of the Community/City.
- The rest of the 9 cards are carried back by the Stakeholders as workshop souvenirs. Information related to the project, key contacts etc. can be provided on the back of the card.







Workshop Reporting on Priorities identified by Stakeholders



Ranking of Priorities

(Source: © IBI Group)

ACTIVITY 2: IDEAS/PROJECTS COST MONEY

INTENT:

Prioritizing projects based on the availability of municipal funds. Prioritizing Projects/Ideas

Who are the Players:

- Typically limited to Public Sector/Agency Stakeholders.
- Can be extended to select Private stakeholders such as NGO's/Developers/Business Improvement Groups.
- Mayors and political decision-making stakeholders often participate in developing countries.

FORMAT:

Workshop/Charrette Setting. Stakeholders engage in this activity during break/downtime of a charrette.

IDEAL ENGAGEMENT SIZE:

Maximum 50-75 Stakeholders. Gathering feedback and reporting becomes time-consuming beyond this size of stakeholders.

TYPICAL TIME:

30 minutes (10 minutes to play the game and 20 minutes to discuss reporting).

DESCRIPTION:

- Multiple Boxes or jars representing Capital projects/projects ideas are provided on a table as a part of the workshop. Short description in the form of a sentence or two of each idea/Capital projects is also written on the box/jar.



Coin Game Activity for Transportation Master Plan project, York Region, Ontario focusing on identifying project priorities *(Source: © IBI Group)*

- Cost of each project/idea is also written on the jar. Costs for projects may vary depending on the nature of projects. Cost figures are kept arbitrary but relative to each other. E.g. LRT Transit Project Value may be assigned 3$ while BRT Transit Value may be assigned 2$ while existing bus fleet upgrade may be assigned 1$ only.
- Each Stakeholder is handed mock money (say 10 coins/ paper currency/ 10$) representing limited municipal funds available to spend on capital projects.
- Each stakeholder is asked to spend the funds (say 10$) on the projects that they see fit and how they see fit.
- The amounts are tallied in each box (while other components of the workshop/charrette are in process) by the Project team.
- A member of the project team then reports back on the ranking of projects/ideas.

OTHER SUGGESTIONS:

- List of projects/ideas should not be overwhelming and represent relevant solutions for the community. Generally, this game is played well into the project process when a basic idea of the solutions/projects/ideas are known.
- The list of projects/ideas is pre-curated with the assistance of the Client prior to the workshop.
- The game can also be employed to set project goals/ priorities.

ACTIVITY 3: SPEED NETWORKING | HEAR & SHAPE YOUR STAKEHOLDER'S / YOUR ISSUE UNDER 5 MINUTES, & JOINTLY DEVISE A SOLUTION

INTENT:

Break the ice. Meet multiple Stakeholders attending a charrette in a one on one setting. Hear and share concerns jointly devise solutions for issues.

WHO ARE THE PLAYERS:

- Typically limited to Public Sector/Agency Stakeholders.
- Can be extended to select Private stakeholders such as NGO's/Developers/Business Improvement Groups.
- Mayors and political decision-making stakeholders often participate in developing countries.

FORMAT:

Workshop/Charrette Setting. Stakeholders engage in this activity in a one on one setting.

IDEAL ENGAGEMENT SIZE:

Maximum 50-75 Stakeholders. Gathering feedback and reporting becomes time-consuming beyond this size of stakeholders.

TYPICAL TIME:

45 minutes.

DESCRIPTION:

- Rather than/in addition to each stakeholder introducing themselves at the start of the charrette, Speed networking is an ice-breaking activity between various stakeholders.
- In addition, this also ensures that charrette is dominated by a few individuals, preventing the 'softer' voices to be heard.
- This timed game is played much similar to a speed dating format, where during a seven-minute period, stakeholders have the chance to meet a fellow stakeholder/charrette attendee and exchange information on who they are, what work they do, and their key issues they face (related to the project). The intent is also to jointly devise a solution to the issues.
- After the seven-minute period, a bell will ring to signal the start of a new round. Stakeholders then move seats and begin again, for a total of say six rounds (45 mins).



Speed Networking at Cité Internationale Universitaire de Paris

(Source: © Copyleft. Reproduced under Creative Commons License BY-SA 3.0)

ACTIVITY 4: ISSUES & IDEAS WALL

INTENT:

To understand the values, concerns and aspirations of the public/ stakeholders related to the specific project.

WHO ARE THE PLAYERS:

- Open to Public/Public Sector/Agency Stakeholders.
- Mayors and political decision-making stakeholders often participate in developing countries.

FORMAT:

Open house Setting.

IDEAL ENGAGEMENT SIZE:

Open to public activities generates broad interest. Generally, 100 to 150 people atypically attend these.

TYPICAL TIME:

45 minutes.

DESCRIPTION:

- Members of the public/stakeholders use post-it notes on the walls/boards in the room.
- The public/stakeholders can use any number of post-its to identify multiple issues and solutions.
- The input is then reported as a part of workshop documentation “what we heard” report as a part of the project.
- Reoccurring key issues/ideas are taken forward as input to the project.



Issues & Ideas Activity for Green Line Transit-Oriented Development planning project, Calgary, Canada
(Source: © IBI Group)

ACTIVITY 5: PREFERENCE BOARDS

INTENT:

An interactive preference selection exercise of the different concepts for key sectors within the station area using precedent images.

WHO ARE THE PLAYERS:

- Open to Public/Public Sector/Agency Stakeholders.
- Mayors and political decision-making stakeholders often participate in developing countries.

FORMAT:

Open house Setting. Public/Stakeholders engage in this activity during break/downtime of the charrette.

IDEAL ENGAGEMENT SIZE:

Open to public activities generates broad interest. Generally, 100 to 150 people atypically attend these.

TYPICAL TIME:

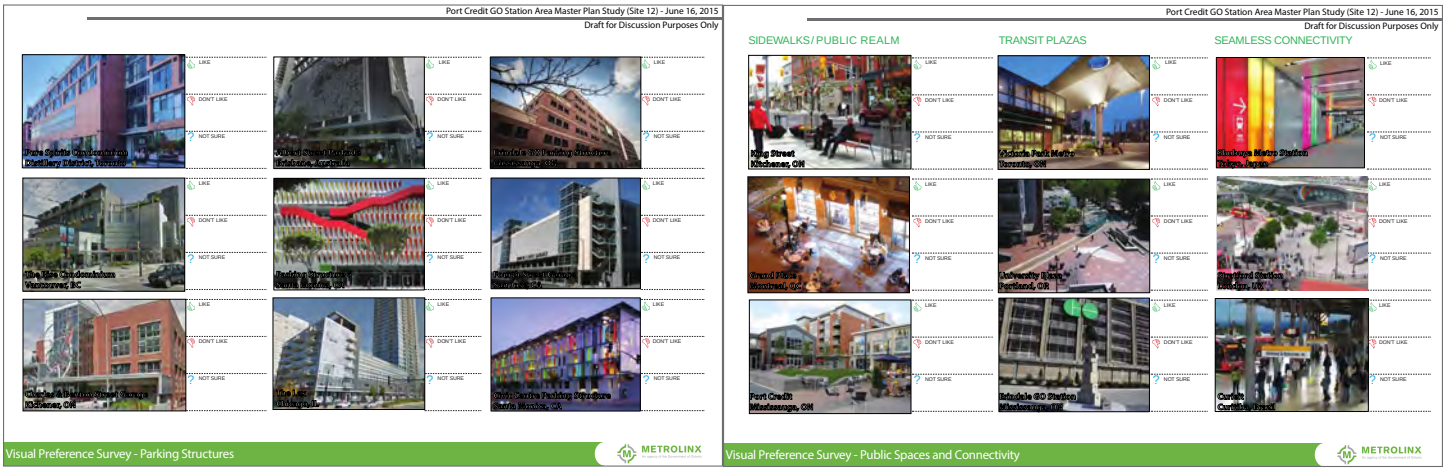
30 minutes.

DESCRIPTION:

- Members of the public/stakeholders use red (not preferred)/ green (highly-preferred)/yellow (somewhat preferred) dot stickers on boards with precedent images grouped under various categories.
- Categories could range from types of open spaces, furniture preferences, types of streetscape treatments, building facades, types of parking solutions etc.
- Highly preferred precedent images then set the tone for Station Area Concepts/Plans and are used as preferred precedent images to explain ideas for the project.
- The boards with stickers are included as a part of workshop documentation “what we heard” report as a part of the project.

OTHER SUGGESTIONS:

- This game is played well into the project process when a basic idea of the solutions/projects/ideas is known.
- The precedent images are pre-curated with the assistance of the Client prior to the workshop.
- The game can also be employed to set project goals/ priorities.



Visual Preference Survey, Port Credit TOD Study, Ontario
(Source: © IBI Group)

ACTIVITY 6: TOD INTERACTIVE BOARD-GAME

INTENT:

Use Lego/Foam boards to develop a concept for the Station Area/TOD.

WHO ARE THE PLAYERS:

- Typically limited to Public Sector/Agency Stakeholders.
- Can be extended to select Private stakeholders such as NGO's/Developers/Business Improvement Groups.
- Mayors and political decision-making stakeholders often participate in developing countries.

FORMAT:

Workshop/Charrette Setting. Stakeholders engage in this activity in a one on one setting.

IDEAL ENGAGEMENT SIZE:

Maximum 50-75 Stakeholders. Gathering feedback and reporting becomes time-consuming beyond this size of stakeholders.

TYPICAL TIME:

90 minutes.



TOD Interactive Board Game Activity for Green Line Transit-Oriented Development planning project, Calgary, Canada

DESCRIPTION:

- One potential risk of a charrette is that the process is dominated by a few individuals, preventing the 'softer' voices to be heard. To overcome this constraint, the exercises of each of the charrette rounds were designed so that this was minimized.
- The board game uses pieces of foamboard representing land uses over a base map to overcome the effect of one individual taking over the verbal conversation and the effect of only the people who can draw being able to contribute to the design ideas.
- Stakeholders are divided into groups of 8 - 10 ensuring that all disciplines are represented at each table and are provided with the foam board and the base maps as building blocks of the concepts.
- Station Area concepts developed are then presented at the end by each group to the rest of the audience.
- These concepts become the basis for preliminary concepts that are refined and presented back to the community.



(Source: © IBI Group)

LEGO AND LEGO-BASED INTERACTIVE BOARD GAMES

Lego sets, a set of interlocking plastic blocks, are a staple of children's toys around the world. They are extremely minimal, flexible, and non-sequential, allowing them to represent the shape or form as desired by its user. They have been found to be effective tools to encourage creative thinking, freeform expression, and logical problem-solving. The blocks are found in vivid ranges of primary colors, with a range of function-specific symbolic blocks (street lamps, a patch of lawn, etc.) and extensions. While they have been primarily used to help children build shapes and forms (established and freeform), they have also been adapted to foster creativity through product lines such as Lego Mindstorms (with hardware and software to create programmable units). Increasingly, these qualities have been sought by planners and architects, as well. CTS-EMBARQ Mexico has developed a DOTS Kit to use these qualities, in conjunction with its TOD manuals, in capacity building. More broadly, the Massachusetts Institute of Technology (MIT) and its partners are exploring how Legos can be used to create a collaborative planning platform. Planning processes, set up to bring in an active participation from its various stakeholders, benefit from bringing in Lego blocks to the table. Blocks are indicative, and might not provide representative models built to scale. However, visualized spaces (buildings or neighborhoods) might initiate conversations among stakeholders. In a participatory planning activity, this outcome is desired. As Lego blocks are small and adaptable, they allow for a number of people to use them at once. This feature makes them useful to designers of a participatory planning activity. They also allow planners to immediately test their many proposals real time in space and gauge stakeholder reactions to them. Such simple scenario visualizations tools can be used to simulate design problems pertaining to several aspects of creating a TOD neighborhood such as the makeup of a street with respect to pedestrians or vendors, built-up area around a transit node, access to transit nodes and other services, or use patterns of a neighborhood.



Lego-based Workshop - Fantasize your City
(Source: © Lamiot. Reproduced under Creative Commons Attribution 4.0 International license BY 4.0)

OTHER VIRTUAL GAMES

Virtual techniques increasingly are being applied both in traditional and lifelong learning environments. Using virtual gameplay allows participants to explore new ideas and solutions in different situations. These video-based city planning games can be general, like SimCity—considered the first video game in this area—or explore a specific aspect, such as the Lincoln Institute's Exploring Density. This section gathers some of these games and explores how they can be used in capacity-building and the exploration of the application of TOD concepts.

MIT CITY SCOPE

http://cp.media.mit.edu/city-simulation

MIT City Scope defines its scope of work as developing "... augmented reality decision support systems (ARDSS) that facilitate non-expert stakeholder collaboration within complex urban environments." They have been able to create a range of decision-making tools used to simulate, prototype, and abstract real-time data, spatial data, and user feedback to provide observable results for alternative scenarios of design problems. Their approach uses a combination of data visualization, analysis, and scenario building to inform stakeholders' possible consequences of their particular decisions. An example of the decision-making potential of such simulation models can be found below. The larger goal of such an exercise was to make the planning process less "technocratic," and introduce an element of participation, and "co-creation." Researchers at MIT, in collaboration with the Barr Foundation, created a model replica of Dudley Square, a neighborhood in the greater Boston area, with Lego blocks. The blocks were used to build the physical components of the neighborhood as well as to represent its inhabitants. It was created to understand the impacts of introducing bus rapid transit (BRT) services in the area. It was accompanied by a Lego-built 3-D model of a Boston street, and a touchscreen interface to present the possible impacts of specific planning decisions made by stakeholders. These simulations, in the form of an exhibition, were open to the public. The touchscreen interface offered various parameters, such as access to transit routes, cost of provision, access to jobs in the city, or the mode of public transit. These parameters were gathered together from publicly available data. By changing a specific parameter, any user could understand how those decisions could impact their specific commuting routes and habits for any given location. They were also able to influence the quality of the service by interacting with specific Lego blocks representing bus stops for said services and observe the impacts to the cost and quality of the service provided to them.

CITY GAME

http://fieldsofview.in/projects/cg

In planning environments where data is not readily available, it becomes difficult to use simulation models to initiate a conversation about broader planning policies or their consequences. In such conditions, it is crucial to devise a method to simulate a proximate representation of scenarios under consideration. The city game, originally developed by Dr. Juval Portugali of Tel Aviv University, was later adapted at the Next Generation Infrastructure Laboratory in Bangalore. It was designed to explore urban form and gather either an individual's or a community of people's response to design decisions and preferences for the direction of the city's growth. This active game asks its participants to take turns and provide the city with a service/amenity, often as a reaction to another player's decision. This game, while simple and devoid of complex analytical prowess, introduces an element of interactivity and dynamic growth that is often found missing in orthodox means of participatory planning methods. The game provides different frameworks to teams to create their realities of preferred development alternatives. The game also accommodates the introduction of policies and development regulations, and help organizers observe and compare the effects of such policies on different development patterns.

Similarly, there are many games that help stakeholders visualize and consider the trade-offs between different elements of TOD. Some of these are recommended here:

URBAN LAND INSTITUTE'S URBAN PLAN BUILDING BLOCKS: A DENSITY GAME

Source: http://www.lincolninst.edu/subcenters/visualizing-density/blockgame/index.aspx

EXTREME EVENT GAME

Source: https://toolkit.climate.gov/tool/extreme-event-game

WHAT IS ZONING?

Source: http://welcometocup.org/Store?product_id=62

CITIES IN MOTION

Source: http://www.citiesinmotion.com/

SIM CITY 4

Source :https://toolkit.climate.gov/tool/extreme-event-game

CARDS AGAINST URBANITY

Source: https://drive.google.com/file/d/0B8xJW6TNI4DySzlqeDFaZlcwUXM/view?pli=1

WHAT IS AFFORDABLE HOUSING?

Source: http://welcometocup.org/Store?product_id=20

MINI METRO

Source: http://dinopoloclub.com/minimetro/

NEW TECHNOLOGIES IN THE OUTREACH PROCESS

In addition to traditional methods of outreach, including workshops, community meetings, and hearings, utilizing emerging and digital technologies, such as mobile apps, virtual open-houses, live chat sessions, and community comment forums should be strongly considered in your project engagement strategy. Technological methods can help to extend the reach of the transit-oriented engagement, connecting with people that are traditionally overlooked in the consultation process, for reasons varying from an inability to attend public meetings to being uncomfortable providing their opinion in large engagement sessions. Online and virtual mediums of outreach allow for information to be disseminated more broadly and ultimately improves the reach of public information and consultation opportunities. This section contains references to applications and websites that serve as examples of the many technology-based engagement mediums available today. A variety of examples are included to provide the ability to explore the many engagement options currently available and find an option that best suits your community and consultation strategy.

Browsing websites like **NextDoor (https://nextdoor.com/)**, allow neighbors to connect and share ideas, monitoring the satisfaction around transit project areas. Websites like **Neighborly (https://neighborly.com) and Citizen Investor (http://www.citizinvestor.com),** simplify the often daunting task of budgeting and investing for transit-oriented projects and provide citizens with the opportunity to have a say in financial choices. Some of these engagement options consult with constituencies during the decision-making process, while others gauge the overall values of the community related to budgeting and apply those priorities afterward. Several map-based tools make it possible for people to leave comments on a map, for example, **CrowdMap (https://crowdmap.com/welcome) or Community Remarks (http://www.communityremarks.com).** The mapping component of these platforms is especially useful for a transit area-level planning project to provide citizens with a visual understanding of TOD-related changes. Applications like T**extizen (https://www.textizen.com)** allow you to send, receive, and analyze citizen questions through SMS text messages. Moreover, web-oriented platforms like **Crowdbrite (http://www.crowdbrite.com, Neighborland (https://neighborland.com), and MindMixer (http://app.mysidewalk.com)** help your community craft websites and portals for community engagement, including online surveys, forums and feedback, while also providing detailed project information in one online location. **Poll Everywhere (https://www.polleverywhere.com)**, allows you to create polls on mobile devices that encourage citizens to engage as they experience transit-oriented development firsthand (while riding transit, for example).

TOD K P

EN-C02

THE TOD ‘ROLE-OUT’ - A STAKEHOLDER ENGAGEMENT GAME



An interactive game for cross-agency coordination and visioning

Type: Reference Document



TOD

Global Platform for Sustainable Cities

WORLD BANK GROUP

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INTRODUCTION

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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OBJECTIVE:

The TOD 'Role-Out' is a stakeholder engagement tool, to be conducted in the form of a game. The game allows for collaborative decision-making with various stakeholders to make them understand each other's motives, possible trade-offs and how individual interests can be better aligned for successful implementation.

FORMAT: WORKSHOP

TYPICAL TIME: Two hours for a quick process or a half-day session for a thorough discussion.



SESSIONS:

The game includes two sessions:

» Conduct SWOT Analysis

» Develop Station Area Programming Alternatives and Concept Plan



AUDIENCE(S):

Invite participants from across the project's organizational spectrum to ensure thorough stakeholder mapping.

» Primarily involves public sector/ agency stakeholders

» Can be extended to select private stakeholders such as NGO's and developers, as well as mayors and political decision-making stakeholders



IDEAL ENGAGEMENT SIZE:

Maximum 40-50 stakeholders. Participants are sitting around a table in groups of 8-10 people. Groups can be created by randomly picking up participants, however, a diverse team is recommended to broaden the view and understand the tradeoffs more accurately. Provide 1 facilitator to guide the discussion.

MATERIAL REQUIRED

1

Print the pre-prepared suit of cards on 4.1 x 5.8 in

The cards are organized similarly to a suit from a deck of cards)– **9 cards,** with each card presenting a stakeholder responsible in a coordinated TOD implementation programme.

Each card includes a list of **priorities** (differing motives of various stakeholders), **trade-offs** (to understand the motives of each stakeholder) and **incentives** (how interests can better be aligned for successful implementation).

DOWNLOAD HERE



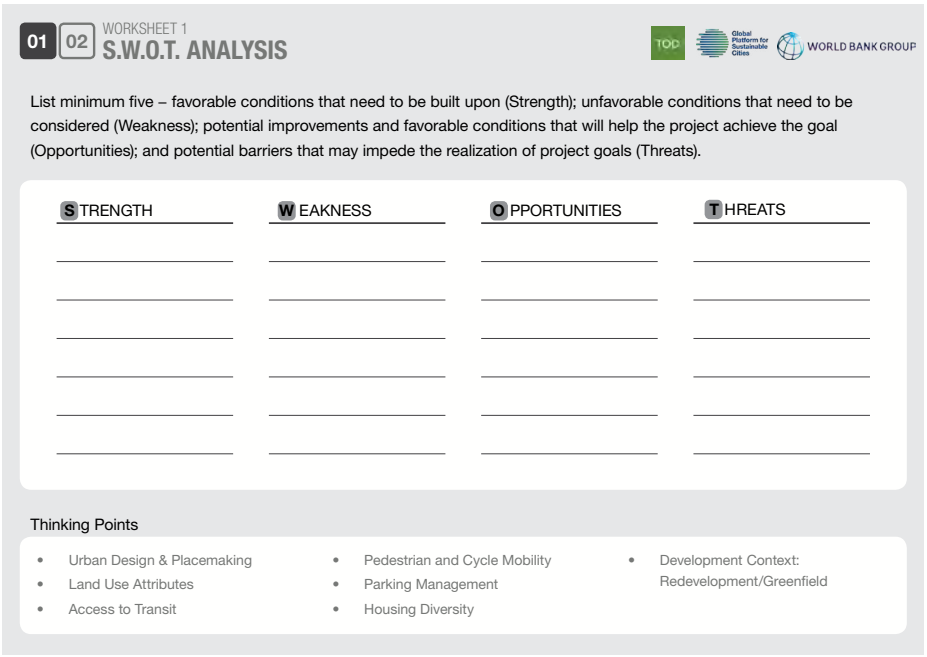
MATERIAL REQUIRED

2

Print the pre-prepared worksheets preferably on 8.5x11 inches or 11x17 inches

The game includes two worksheets in a standardized format. The first worksheet summarizes the Strengths, Weaknesses, Opportunities and Threats (SWOT) from the perspective of all the stakeholder roles being played out. The second worksheet is to be used to develop the programming for the Station Area.

DOWNLOAD HERE



01 02 WORKSHEET 1
S.W.O.T. ANALYSIS

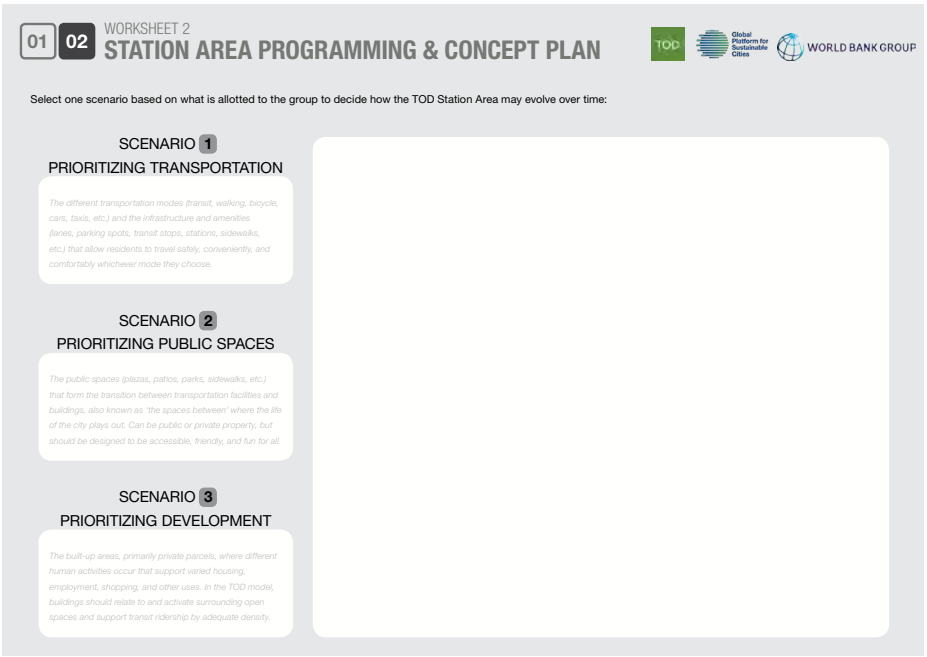
TOD · Global Platform for Sustainable Cities · WORLD BANK GROUP

List minimum five – favorable conditions that need to be built upon (Strength); unfavorable conditions that need to be considered (Weakness); potential improvements and favorable conditions that will help the project achieve the goal (Opportunities); and potential barriers that may impede the realization of project goals (Threats).

STRENGTH	WEAKNESS	OPPORTUNITIES	THREATS

Thinking Points

- Urban Design & Placemaking
- Land Use Attributes
- Access to Transit
- Pedestrian and Cycle Mobility
- Parking Management
- Housing Diversity
- Development Context: Redevelopment/Greenfield



01 02 WORKSHEET 2
STATION AREA PROGRAMMING & CONCEPT PLAN

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Select one scenario based on what is allotted to the group to decide how the TOD Station Area may evolve over time:

SCENARIO 1
PRIORITIZING TRANSPORTATION

The different transportation modes (transit, walking, bicycle, cars, taxis, etc.) and the infrastructure and amenities (lanes, parking spots, transit stops, stations, sidewalks, etc.) that allow residents to travel safely, conveniently, and comfortably whichever mode they choose.

SCENARIO 2
PRIORITIZING PUBLIC SPACES

The public spaces (plazas, patios, parks, sidewalks, etc.) that form the transition between transportation facilities and buildings, also known as "the spaces between" where the life of the city plays out. Can be public or private property, but should be designed to be accessible, friendly, and fun for all.

SCENARIO 3
PRIORITIZING DEVELOPMENT

The built-up areas, primarily private parcels, where different human activities occur that support varied housing, employment, shopping, and other uses. In the TOD model, buildings should relate to and activate surrounding open spaces and support transit ridership by adequate density.

MATERIAL REQUIRED

3

A large base map (preferably 33.1x46.8 inches or 23.4 x 33.1 inches) that includes:

- » Transit station location with 400m (5min walk) and 800m (10min walk) radial circle centered on the station
- » Existing road network
- » Natural environment systems including greenways, waterways and open spaces
- » Existing building footprints, including developments and destinations



Reference Base Map

MATERIAL REQUIRED

MATERIAL REQUIRED:

4

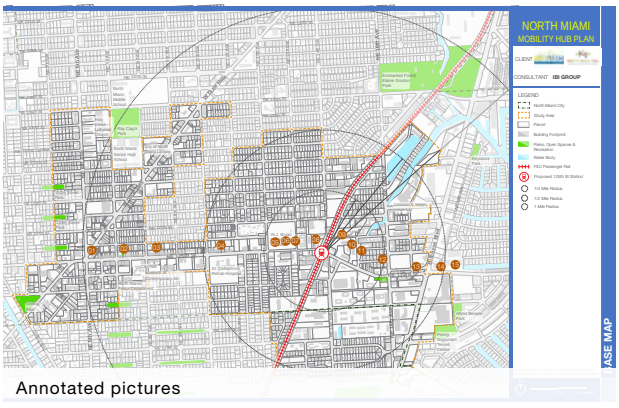
Visual Aids:

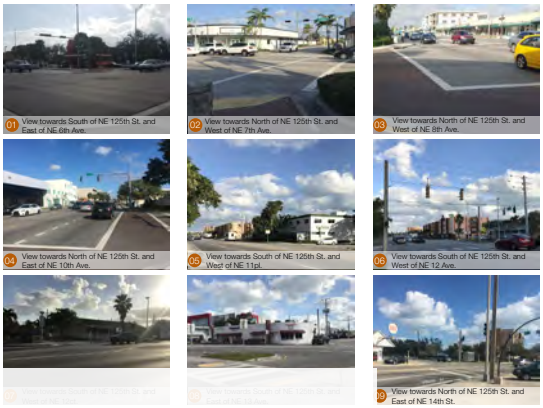
A visual library of examples to describe TOD scenarios to be considered during the game:

- Presentations
- Annotated pictures to orient people to the TOD area
- Videos
- Printouts

Documentation:

- Flipchart paper for listing audience's priorities
- Sticky notes of different colors, markers and pens for working on the base map
- Camera to capture the results

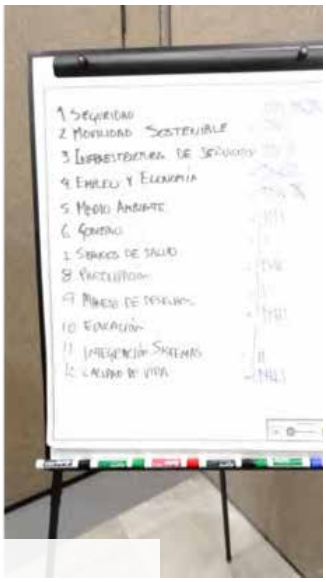




Annotated pictures







Workshop reporting on priorities identified by stakeholders

HOW TO PLAY



Begin the game with a clear definition of the study area. Write both the tasks boldly on the flipchart, making it easy for the audience to time themselves and orient with the agenda.



Start team introductions and ask each participant to draw a pre-prepared card from the deck, with each card presenting a different role. The participant from then till the final discussion needs to play the role on the card and act according to the unique requirements and rules mentioned. For example, an environmental activist and a real estate investor can make different decisions, due to their different roles in the game.



Participants are then divided into groups of 8-10, ensuring that all disciplines are represented at each table and are provided with the sticky notes, worksheets and base maps.

ACTIVITY 1: SWOT ANALYSIS

» Each group is given five minutes to describe and characterize the core elements or unique abilities of the station area. The players can use the working sheets to write their ideas and sticky notes to mark the ideas spatially on the map. Repeat the process for all four headings (S.W.O.T).

» After 20 minutes, initiate a group discussion with the goal to **create a summary of SWOT and identify top 10 under each heading.**

ACTIVITY 2: STATION AREA PROGRAMMING & CONCEPT PLAN

» With a strong understanding of the strengths and problems of the area, each group is handed over a scenario to decide how the TOD Station Area may evolve over time.

» Each group is given 1.5 hrs of time to come up with the programming and to sketch a concept plan on the base map.

» A member of the project team then reports back on the ranking of projects/ideas based on their scenarios.

» At the end of the activity, project goals and priorities are summarized for all three scenarios. **Reoccurring key issues/ideas are taken forward to guide the project.**

8 Ave SE
9 Ave SE
10 Ave SE
11 St SE
10 St SE
SHOPS
PUBLIC ART/
LANDMARK
CORNER STORE
OFFICE
APARTMENT
HERITAGE
LIVE WORK
PARKING

TOD KP

THE TOD ‘ROLE-OUT’



Supporting tools- Cards

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01



City Transportation Planner

TOD Brainstorming Game

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01

02



Chief Town Planner

TOD Brainstorming Game

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02

03



Real Estate Consultant (City)

TOD Brainstorming Game

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03

PRIORITIES

- Ensure highest and best use of city owned properties within the TOD area
- Economic benefits resulting from development through land value capture
- Land monetization through redevelopment of vacant/underdeveloped parcels in close proximity to transit station
- Destination creation and enhancing market value of the TOD area

TRADE-OFFS

- Higher property values vs. mixed-income housing
- Owner-occupied housing vs renter-occupied housing
- Short-term returns vs long-term market creation

INCENTIVES

- Increased opportunities in attracting development interests within TOD areas
- Access to a more robust market and upgraded building stock for future investments
- Opportunities to build long-term government contracts to realize TOD visions

03

PRIORITIES

- Enforce existing planning & development regulations
- Increase formal supply of mixed-income housing stock
- Promote enhanced accessibility
- Placemaking through urban design interventions
- Encourage mix of uses & equitable development

TRADE-OFFS

- Permitting development in greenfield vs. redevelopment of gov't sites in TOD area
- High-value market-rate housing vs. affordable housing
- Blanket FAR vs. differential FAR along the transit corridor
- Increased congestion at concentrated areas vs. balanced distribution of jobs and residents regionally
- High-rise building vs. context-specific design

INCENTIVES

- Discounted infrastructure charges by managing development growth
- Private sector contribution in improving access to public realm improvements
- Streamlined development approvals

02

PRIORITIES

- Minimize impacts of traffic congestion
- Boost transit ridership
- Promote walkability and cycling
- Create a seamless integration between transit modes

TRADE-OFFS

- Utilize the right-of-way for movement of traffic vs. movement of people
- Reduced parking vs. alternative transportation modes transportation
- Increase transit coverage vs. provide an efficient, coordinated transit service

INCENTIVES

- Funding for transit and street improvements
- Private sector investment in the public realm
- Preserve the environment

01

01



Private Developer

TOD Brainstorming Game

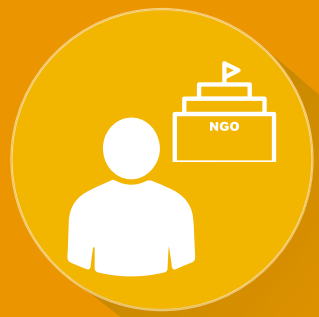
02



Resident

TOD Brainstorming Game

03



Non-Profit Activist

TOD Brainstorming Game

PRIORITIES

- Ensure social equity in neighborhoods
- Preserve the environment
- Minimize impacts of traffic congestion
- Promote walkability and cycling
- Limit sprawl & related costs of infra.
- Ensure mixed-income housing

TRADE-OFFS

- Preserve environment vs. economic growth
- Income equality vs. increased investment
- Integrate marginalized sections vs. improve investment image
- Maintain affordability near transit vs. higher land values

INCENTIVES

- Community participation in decision-making
- Integration of social infrastructure and services in TOD projects
- Mandatory affordable housing provisions in market-rate housing
- Provision of open space

03

PRIORITIES

- Preserve neighborhood character & identity
- Improve the overall quality of life with environmental, social and cultural investments
- Reduce resident commuting times
- Maintain affordability in the area
- Ensure safety and security in the neighborhoood

TRADE-OFFS

- Remove blight and deterioration vs. resistance to change through redevelopment
- Invest in public realm infrastructure upgrades vs. resistance to increased user costs for better services

INCENTIVES

- Community participation in decision-making
- Integration of community facilities
- Inclusion of public spaces
- Promotion of local businesses

02

PRIORITIES

- Receive financial return on investment
- Availability of land in close proximity to transit
- Public realm infrastructure in place

TRADE-OFFS

- Long-term investment in TOD projects vs. short-term returns on automobile-oriented uses
- High-value market-rate housing vs. affordable housing
- Open Space

INCENTIVES

- Increased FARs allowed by right
- Site assemblage and land banking
- Impact fees and tax waivers and long-term tax subsidies
- Expedited development approval in TOD areas
- Discounted infrastructure charges
- Relaxation of development controls

01

01



Representative: National/ State-level Transport Agency

TOD Brainstorming Game

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01

02



Engineer: State-level Public Works/Infrastructure

TOD Brainstorming Game

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02

03



Elected Official (Mayor)

TOD Brainstorming Game

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03

PRIORITIES

- Create more jobs
- Reduce transportation costs for constituents
- Increase municipality's tax base and property values
- Distribution of benefits across society
- Improvements to public realm
- Ease of doing business

TRADE-OFFS

- High-density development vs. infrastructure capacity
- Attractive development vs. affordable housing
- Environment quality vs. intense development
- Displacement of informal settlements vs. in-situ redevelopment

INCENTIVES

- Land monetization tools
- Increased private sector investment
- Private sector contribution in improving access to public realm improvements
- Streamlined development approval

03

PRIORITIES

- Reduce peak period traffic congestion
- Encourage transit and non-motorized travel
- Reduce per capita vehicle travel
- Improve access & reduce need for travel
- Upgrade aging infrastructure, especially in urban infill/redevelopment areas

TRADE-OFFS

- Right-of-way dedicated for additional lanes vs. public transit
- Reduction in regional vehicle miles traveled (long-term) vs. traffic congestion in areas with concentrated densities (short-term)
- Investment in aging infrastructure vs. new infrastructure in greenfield/semi-urban TOD areas

INCENTIVES

- Impact fees or value capture mechanisms to fund infrastructure improvements
- Cross-sector coordination to avoid duplication of projects

02

PRIORITIES

- Increase transit ridership
- Maximize land value capture opportunities
- Maintain flexibility in station standards and multi-modal integration
- Increase revenues from non-fare box sources

TRADE-OFFS

- Maximize coverage vs. high ridership
- Reduced parking vs. park-and-ride
- Fare-box revenues vs. affordable transit

INCENTIVES

- Joint Development with private sector
- Permissible development above stations (air rights)
- Increased densities allowed based on transit ridership

01

WORKSHEET 1

S.W.O.T. ANALYSIS

List a minimum of five– favorable conditions that need to be built upon (Strengths); unfavorable conditions that need to be considered (Weaknesses); potential improvements and favorable conditions that will help achieve project goals (Opportunities); and potential barriers that may impede the realization of project goals (Threats).

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS

Thinking Points

- Urban Design & Placemaking
- Land Use Attributes
- Access to Transit
- Pedestrian and Cycle Mobility
- Parking Management
- Housing Diversity
- Development Context: Redevelopment/Greenfield

01 02

WORKSHEET 2

STATION AREA PROGRAMMING & CONCEPT PLAN

Select one scenario, based on what is allotted to the group, to decide how the TOD station area may evolve over time:

SCENARIO 1
PRIORITIZING TRANSPORTATION

The different transportation modes (transit, walking, cycling, cars, taxis, etc.) and the infrastructure and amenities (lanes, parking spots, transit stops, stations, sidewalks, etc.) that allow residents to travel safely, conveniently and comfortably, whichever mode they choose.

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PRIORITIZING DEVELOPMENT

The built-up areas, primarily private parcels, where different human activities occur that support varied housing, employment, shopping and other uses. In the TOD model, buildings should relate to and activate surrounding open spaces and support transit ridership by adequate density.



Pune, India

TOD KP

EN-H01



HOW TO BUILD INSTITUTIONS AND ENABLE INTERGOVERNMENTAL COORDINATION

A step-by-step guide to identify project champions that can make TOD happen within existing planning and development framework

Type: Step-by-Step Guide



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INTRODUCTION

The success of TOD depends entirely on the abilities of the agency involved to create change. To enable these agencies to work towards TOD goals, it is imperative to consider defining a complete framework that will support their work and enable greater coordination and more effective TOD interventions. This tool will help define the key requirements for an enabling framework, largely from the point of view on institutions and how they can work together for better results. The TOD Corridor Course (WB/WRI 2015) and Transforming Cities with Transit (Suzuki, Cervero, Iuchi 2013) formed the basis for identification of the key enabling factors that are covered in the tool:

- Influencing Leaders - This involves educating leaders about the benefits of TOD to ensure political support
- Build an Effective TOD Organization - This may be at the scale of a city or a station area. An organization with a well-defined structure will allow better coordination and buy-in for TOD goals across all city departments and the public.
- Aligning the Vision across scales - This is needed to ensure that TOD plans at one scale are not hindered by policy barriers at other scales. The planning process must allow for TOD to be possible at any scale.

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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MOUD (Ministry of Urban Development, India). 2016. Transit Oriented Development Guidance Document. Consultant Report, IBI Group, New Delhi: Global Environment Facility, UNDP and World Bank.

Suzuki, Hiroaki; Cervero, Robert; and Iuchi, Kanako. 2013. Transforming Cities with Transit: Transit and Land Use Integration for Sustainable Urban Development. Washington DC:World Bank.

World Bank; WRI (World Resource Institute). 2015. Transit Oriented Development at a Corridor Scale Course. Washington, DC.

INFLUENCING LEADERS WITH THE BENEFITS OF TOD

Successful TOD relies heavily on the political capital of the city or jurisdiction's leadership. Irrespective of the type of leadership structure within a city, it is evident now that a well-informed and committed leader can help push the concept of TOD in order to improve the everyday lives and experiences of citizens, while also building resilience. For a TOD planner, the very first step to building an enabling environment is to convince the leadership of the benefits TOD can bring to the citizenry, environment, and public sector finances.

Ultimately, TOD can be contextualized to focus more on the specific needs of a city. For example, for a city with a flooding problem, TOD benefits may be focused more towards creating climate resilience through the strategic distribution of density and transport investments, such that least possible number of people are at risk during flood events. As a starting point, some benefits are listed here, adapted from the TOD Guidance Document (MOUD, India 2016).

SOCIAL BENEFITS

Increased mobility choices for all: Compact, walkable communities linked by transit. TOD provides much-needed mobility options, including options for young people, the elderly, the poor, and people who do not own cars or prefer not to use a car;

Improved economic accessibility: Increasing the reach of transit systems through TOD will enable more people to access economic opportunities that were inaccessible before;

Increased disposable household income: TOD can effectively increase disposable income by reducing the need for one or more car and reducing commuting costs;

Increased health benefits: TOD promotes a healthy lifestyle by making it convenient to walk and by providing the infrastructure that supports walking and bicycling;

Increased public safety and security: TOD encourages "24-hour" activity in a mixed-use environment and provides "eyes-on-the-street" that increases one's overall sense of security and safety in an area; and

Increased housing choices for all: Encouraging high-quality diverse housing products (mixed income, owner-occupied, rental and workforce housing) within TODs is an important goal. TOD can contribute to the affordable housing supply by offering incentives to the private sector such as density bonuses and location efficient loans in transit-served sites in exchange for lower cost housing products.

ECONOMIC AND FISCAL BENEFITS

Improve economic efficiency: A city developed based on TOD principles enhances interactions between people and firms leading to agglomeration benefits.

Increased land values and property tax revenues: Access to transit results in a significant increase in the property values of nearby properties, provided the transit system has good regional connectivity and frequency of service;

Increased transit ridership: Placement of more people close to transit and providing mixed-use amenities justifies higher service frequencies and promotes high ridership levels (including attracting new riders that may otherwise choose to drive), enabling transit to be more competitive with the automobile;

Increased opportunities to cross-subsidize transit: Monetization of land parcels in close proximity to transit for income-earning activities such as real estate development, retail lease, and/or paid parking, can create an additional revenue stream for transit operators;

Reduced costs on road infrastructure: TOD can effectively reduce the need for major road projects such as flyovers and expressways, which have low person/road km usage but very high construction and maintenance costs; and

Reduced costs on municipal infrastructure: TOD can help reduce the need for new infrastructure costs (such as water, sanitary, sewer and roads) for local governments and property owners by limiting the extent of sprawl that needs to be serviced. While initial infrastructure improvements may be necessary to support additional density in resource-constrained locations, utilizing decentralized infrastructure services in higher density areas will lead to self-sufficiency in the long term.

ENVIRONMENTAL BENEFITS

Conservation of resource lands and reduced urban sprawl: Provision of more compact patterns of growth at urban infill sites conserves agricultural and natural lands that would otherwise be consumed by sprawling development;

Climate Resilience: Compact development patterns will allow the city to avoid developments in climate-affected areas and enable the city to concentrate on climate mitigation measures within a smaller area;

Reduced rates of vehicle kilometers traveled (VKT): Savings in travel times and unit vehicular operating and maintenance costs;

Space efficiency: Less land is required to move a small number of transit vehicles relative to a large number of automobiles carrying the same number of people;

Energy efficiency: Less energy is needed to move one person by transit than by automobile, assuming normal transit vehicle loading conditions; and

Better air quality: Since less energy is required to move people, fossil fuel-based transit vehicles emit smaller amounts of smog-forming and climate change-inducing pollutants, thereby reducing air pollution rates.

HOW TO STRUCTURE A TOD ORGANIZATION

Cities that decide to commit to large TOD projects should enact, through law or other appropriate official decision, the creation of a special body (task force, committee or agency) that, from inception, has deep ties to the TOD Plan. This organization must be held accountable to the public and operate with a very clear transparency and mission. The organization will promote the development of planning research, design master plans and regulations, oversee implementation and continued adaption of systems and coordinate with planning guidelines and professionals from different levels of government and the private sector. It is crucial that this agency exists outside of the political sphere to ensure long-term ownership, management, and security of singular vision. To further ensure legitimacy, the organization should receive its budget from a percentage of the revenue garnered from the TOD. This motivates continued dedication to creating and maintaining the effectiveness of the system. A funding mechanism built into the TOD revenue streams will also ensure its exemption from political budgetary issues and protect the government from further economic stress.

PURPOSE

Establish clear roles and responsibilities for the TOD Organization to facilitate partnerships and coordinate implementation activities in a structured manner. This tool provides a step-by-step guide for identifying project champions at the individual and organizational levels, preferably city staff, representatives from NGOs or local advocacy groups, that will remain engaged throughout the planning process.

01 IDENTIFY MANDATE OF TOD ORGANIZATION DEPENDING ON SCALE

MANDATE AT DIFFERENT SCALES

CITY/ REGIONAL SCALE TOD

POLICY AND REGULATORY ORGANIZATIONS

- Engage with political leaders and other decision-makers in goal setting and vision building for establishing transit supportive development policies
- Collaborate with other agencies to take an active role in addressing policy-level barriers to TOD

CORRIDOR/ STATION AREA SCALE

TECHNICAL PROJECT-SPECIFIC ORGANIZATION

- Define project-specific planning processes and mechanisms that can make TOD happen within the existing planning and development framework
- Provide both technical and financial assistance, as well as oversee implementation to evaluate progress and quality of work

02 IDENTIFY KEY PARTICIPANTS

CITY/ REGIONAL SCALE TOD

PRIMARY PUBLIC SECTOR PARTICIPANTS

- ☐ *Who owns and operates city/regional transit services?* Include ALL agencies

AND

- ☐ *Who creates regional growth/economic strategy?* Include ALL agencies/departments

AND

- ☐ *Who creates and enforces development control regulations?* Include ALL agencies from all local jurisdictions

AND

- ☐ Government organization(s) involved in affordable housing/ heritage preservation/ environmental protection.

SUPPORTING PARTICIPANTS/ COMMITTEES

- ☐ Non-profits involved in affordable housing/ social safeguards/ heritage preservation/ environmental protection.

AND

- ☐ Private sector associations/ trusts involved in real-estate development/ business and commerce.

CORRIDOR/ STATION AREA SCALE

PRIMARY PARTICIPANTS

- ☐ *Who owns and operates transit services?* Include primary corridor transit agency

AND

- ☐ *Who owns majority land around stations?*

Private individual landowners → Include: Non-Profit representing landowners

Private large landowners → Private landowner

Public large landowners → Public landowner

AND

- ☐ *Who creates and enforces development control regulations?* Include specific agencies

AND

- ☐ *Who provides infrastructure services?* Include all agencies, including water, energy, drainage

SUPPORTING PARTICIPANTS/ COMMITTEES

- ☐ Real estate developers (3-4 may be invited through tendering)

AND

- ☐ Transit feeder service operators (including ride-sharing services if applicable)

AND

- ☐ Experts in affordable housing/ heritage preservation/ environmental protection as needed.

03 DEFINE TYPE OF INSTITUTIONAL STRUCTURE

TYPES OF STRUCTURES

CITY/ REGIONAL SCALE TOD	CORRIDOR/ STATION AREA SCALE
• Regional/Metropolitan Policy Committee - to review and formulate policy changes • Metropolitan/City Regulations Formulation Committee - to formulate transit-supportive regulations • Public + Non-Profit Coalition - to lobby for TOD supportive policies in legal framework	• Technical TOD Task Force - to conceptualize TOD Plan, seek funds, and implement the proposals • Public + Non-Profit Coalition - to oversee TOD planning and implementation against goals and targets • Public-Private Partnership - to finance and implement TOD projects

04 DEFINE COORDINATION MECHANISM

- Decide frequency of meetings with primary participants and with supporting participants and committees.
- Define mode of documenting and recording meeting minutes and medium of communicating them to the public
- Decide timelines/ frequency of public meetings or workshops to ensure continuous communication with the public
- Define coordination needs with other agencies not participating in the TOD organization at federal or other jurisdictional scales or from other planning sectors

05 NOTIFY THE APPOINTMENT OF THE ORGANIZATION

- Follow the city's existing protocol for notifying the organization.
- Notify the mandate of the organization and the TOD-specific goals for the city or project as relevant.
- Notify the yearly budget needs of the organization and source of funding. As far as possible the source of funding should be continuous and reliable and not dependent on political factors.
- Notify the inter-agency coordination and assistance requirements from various inter-government agencies to achieve the specific goals of the organization.

ALIGNING THE TOD VISION

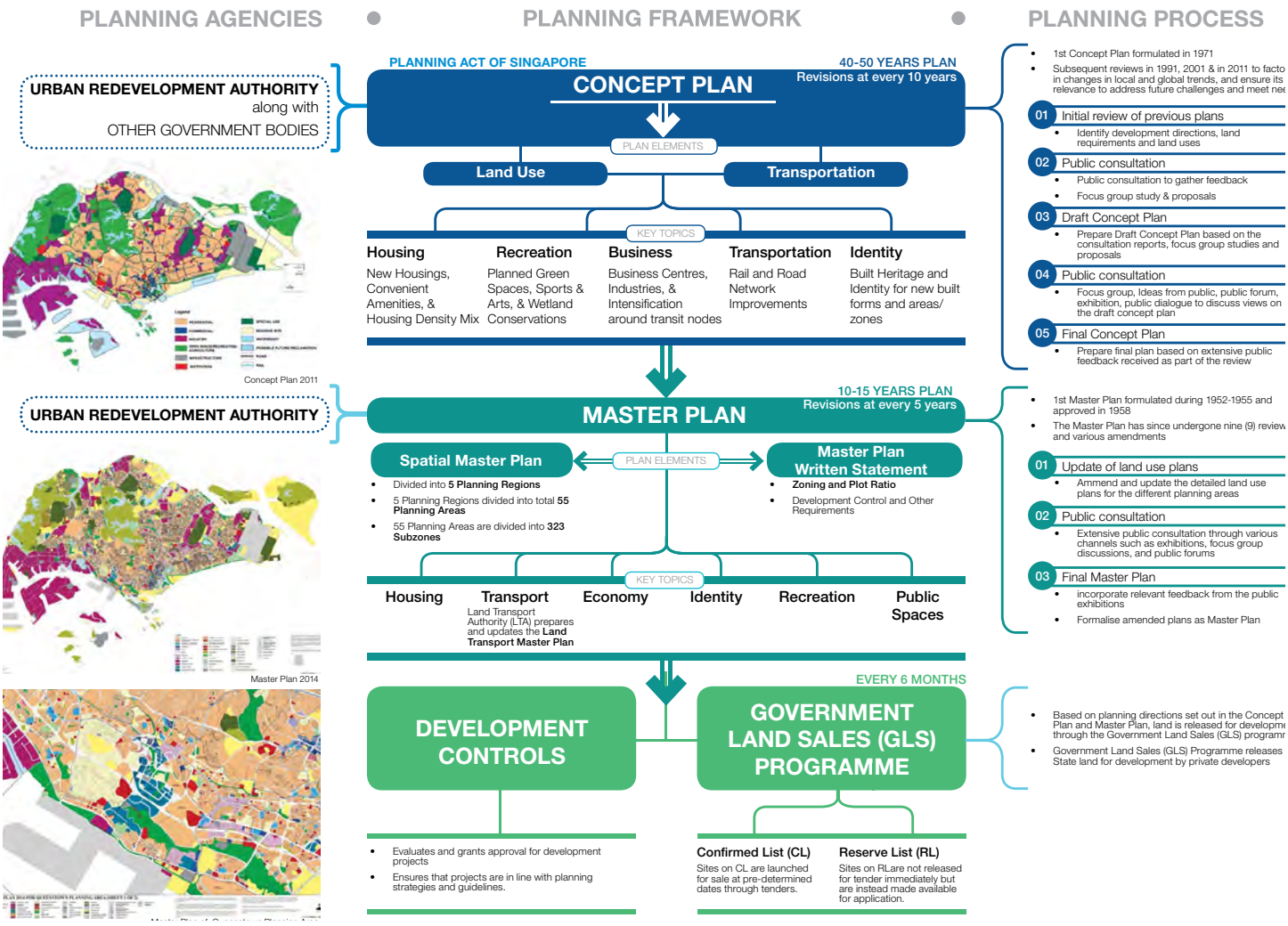
A strong long-term vision must allow the flexibility of accommodating short-term goals, without compromising the values for a long-term transformation. As cities across the globe continue to grow and encounter new challenges, they are faced with the challenge of addressing local concerns within the legal and policy framework set by federal or state authorities. TOD, a new and innovative concept in many parts of the world, challenges the traditional planning paradigm of car-oriented cities, cemented during the early 70s and 80s. To enable a TOD-supportive environment, then one must identify and target larger legal and policy barriers that impede successful TOD.

Some of the typical legal and policy barriers that should be tackled include:

- Policy encouraging car ownership - This is true of countries on the high-income scale such as the US to low-income countries such as India. Car manufacturing and sales is a huge industry and many countries incentivize car sales for the sake of national profits. Fuel is also subsidized so that car ownership and driving in incentivized over public transport. There is a need for more awareness about the ill-effects of private automobiles and non-renewable fuel at the national level and local level lobbying must aim to contribute to such awareness campaigns. While this is a long-term process, many cities such as London and Singapore levy a congestion charge, to discourage car movement in dense city areas.
- Parking is considered a free right - Parking in many countries is considered a basic right and is also supported by legal precedents. In such cities, prohibiting parking or charging a price for parking generates public conflict. This, in turn, makes it difficult to get public buy-in for TOD projects. Parking prohibition must, therefore, be tackled in a context-sensitive and phased manner, so as to maintain public interest in TOD goals.
- Land ownership and development rights are absolute - In countries such as Brazil, India, Mexico, land ownership and development rights are absolute. This makes it very difficult for public agencies to acquire land for transit or TOD investments. Such rights would need to be looked at within the legal context to identify ways of making TOD
- Public transport is not considered a public service - In many cities the high cost of fuel and tolls, along with no provision of public subsidy, make it very difficult to maintain public transport operations. There is a need to educate leaders about the social and economic benefits of subsidizing public transport.
- Urban Planning Standards at federal and state levels promote single-use sprawled planning conventions- Many regional, state or federal planning guidelines promote sprawling planning standards in terms of minimum road widths and block sizes that discourage compact development plans. There is a need to improve standards to allow for high density, compact development patterns.
- Rent Control or Land Ceiling Acts - such acts, if not revised periodically based on city-specific conditions unfairly tweak the real estate market, causing major speculation and an unaffordable real estate market. Many dense cities such as Hong Kong SAR, China and Mumbai were not able to leverage real estate opportunities at the right time due to rent-control measures.
- Planning Acts are not flexible - This is one the biggest challenge in many cities. The process followed for statutory planning must adhere to the relevant acts, which in many cases does not allow for an integrated land use and transport planning approach. This discourages the probability of land use and transit planners working together and deriving the combined benefits of TOD.

The example of the Singapore Planning Model on the next page illustrates a well-structured Planning Framework that allows for collaboration between different planning sectors and enables flexibility between long-term and short-term goals.

- The Concept Plan is a strategic land use and transportation plan that guides Singapore's development over the next 40-50 years. Reviewed every ten years, the Concept Plan outlines the strategies to provide the physical capacity to sustain a high-quality living environment
- The Master Plan is a statutory plan that guides the development over 10 to 15 years. It translates the broad, long-term strategies of the Concept Plan into detailed plans for implementation by specifying the permissible land uses and densities. It is reviewed once every five years. The planning strategies to achieve the vision for Master Plan are presented through six key focuses: Housing, Transport, Economy, Recreation, Identity, and Public Spaces. The Land Transport Authority prepares and updates the Land Transport Master Plan, which informs the Master Plan.
- The release of State land for development is carried out through the Government Land Sales (GLS) programme which releases State land for development by private developers. To facilitate timely development of new, selected large-scale areas, Urban Redevelopment Authority (URA) also works with other government agencies to ensure that basic infrastructure and utilities are provided.





Sao Paulo, Brazil

TOD K P

EN-R01



ROLES AND RESPONSIBILITIES OF STAKEHOLDERS

Standardized analysis of stakeholders involved in planning and implementing TOD

Type: Reference Document



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INTRODUCTION

Experiences show that collaboration is a key ingredient in creating an environment that enables the promotion of TOD. Identifying partnerships early-on between different levels of government, multiple transportation and planning agencies, private developers and citizen groups are essential to overcoming political and economic hurdles in creating successful TODs.

As TOD is a new concept, lower and middle-income countries typically do not have the regulatory frameworks in place that allow for flexibility in zoning regulations, incentives in exchange for infrastructure improvements, or use of financing tools such as land pooling. Ensuring an enabling environment for transit-oriented development is an attractive proposition for developers and users, requiring public-sector contributions and political will.

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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PURPOSE

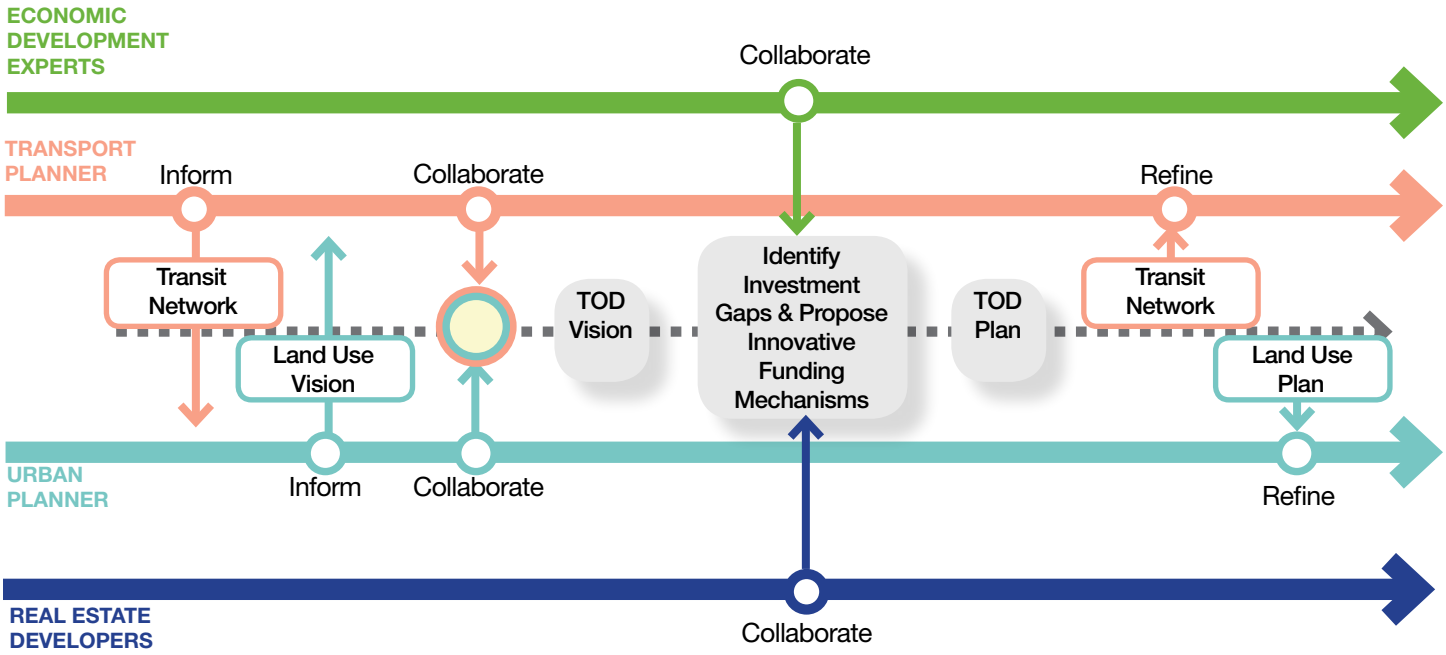
During the assessment stage, it is crucial that factors that enable local governments to initiate, plan and implement successful TOD projects be identified from the beginning. Strong leadership and support may include actions such as issuing policy directives to require transit systems to maximize land development potential, advocating for a community-driven neighborhood planning process in TODs, or bringing private sector players to undertake TOD projects in a city. This tool identifies the roles and responsibilities of the various stakeholders included in a coordinated TOD implementation programme.

RESPONSIBILITIES FOR VARIOUS STAKEHOLDERS

STAKEHOLDER	ROLES AND RESPONSIBILITIES
LOCAL GOVERNMENTS	Systems (transit and infrastructure) planning, master planning (city and corridor), local area planning (station area and neighborhood), development control regulations and building by-laws, site plan review and approvals, infrastructure upgrades, land assemblage, active marketing of TOD opportunities, developer incentives, secure financing, enforcement (traffic police) and public outreach
TRANSIT AGENCIES	Infrastructure investment, station design, systems planning, transit service, land assemblage, active marketing of TOD opportunities, secure financing and joint development of stations with the private sector
REGIONAL PLANNING AGENCIES OR METROPOLITAN AUTHORITIES	Long-range transportation planning, regional transit planning, regional growth management, technical assistance to local agencies and monitoring of urban transport funds
PRIVATE SECTOR ENTITIES	Provide financial support for TOD implementation, joint development of infrastructure in public-private partnerships, construction, investment in real estate and funding transport system operations
CITIZENS, NGOs AND ADVOCACY GROUPS	Advocacy for NMT improvements, community participation in planning and design, get educated, attend planning meetings and advocate for high-quality design
ELECTED OFFICIALS	Developer and citizen awareness about the benefits of TOD, changing regulatory climate, advocate transportation demand management policies and local economic development incentives
BUSINESSES/REAL-ESTATE DEVELOPERS	Joint development with transit agencies, public-private partnerships, affordable housing construction, private sector investment in real estate and employee incentives
STATE GOVERNMENT	Policy changes, funding assistance, capacity building, technical assistance, Land and Market Reforms
CENTRAL GOVERNMENT	Policy changes, guidelines formulation, funding assistance, and capacity building

COMMUNICATION BETWEEN STAKEHOLDERS

The government needs to facilitate TOD proposals that are intrinsically based on the urban context of the city. The transit agencies within each level of government, aside from being managers and planners, need to be leaders in preparing and implementing TOD. They also need to adapt to a new organizational hierarchy that can handle the planning and implementation, as well as the long-term management of the TOD system. Typically, responsibilities for various stakeholders in a coordinated TOD implementation programme at the city scale, for example, would include a back and forth communication as shown below. Similar communication patterns will need to be defined at the corridor, station area, and site scales for efficient collaboration between stakeholders



TOD K P

EN-P01



COMMUNICATION STRATEGY TERMS OF REFERENCE

Template for hiring a PR agency to analyze potential risks, plan and implement a TOD communications strategy for the community

Type: TOR Template

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BACKGROUND

It is believed that a good deal of the benefit of transit investment comes from effects beyond their already high value as mobility enhancements and is found in their ability to positively affect the communities in which we live. It is necessary to generate awareness among all the stakeholders about the key components of the project and how they would benefit from it.

A community outreach programme is a process by which all the stakeholders are informed of the project objectives and its utility. A comprehensive approach should be developed to engage relevant agencies, corridor neighborhoods and businesses, key stakeholders, and the general public throughout the process. The outreach program will include policy and technical advisory committees, public meetings, presentations at neighborhood and business associations, websites and social media, a variety of communication tools, and direct outreach to non-traditional populations and organizations. Stakeholder workshops and/or public open houses will be held at key points in the TOD Planning process including, at a minimum: (1) discussion of problems, goals, objectives, evaluation criteria and alternatives, and data gathering (2) evaluation of alternatives, and (3) selection of the locally preferred alternative. Project information should be translated, as appropriate, to allow for effective outreach.

OBJECTIVE OF THE ASSIGNMENT

A systematic and comprehensive community outreach programme highlighting the key components of a transit oriented development and benefits to the locals will help in disseminating the required information to people. The objectives for the Programme shall be as follows,

- To build a positive identity for the TOD project
- Create an awareness amongst the citizens about the project and it's benefits
- Educate and attract new riders for benefits of shifting to public transport and guide on how to shift
- Educate and attract people to live in the proximity of a public mode of transportation
- Induce a shift to public mode of transportation
- Inform and prepare the public regarding the difference and any difficulties they are likely to face during the implementation of the project. Also seek their co-operation, and receive their feedback to improve the proposal specific to the context.
- Identify key stakeholders and build strong partnerships with media and the society for smooth implementation of the project

The coverage for the community outreach programme would be the entire city and suburban area, and wherever the existing transport services are being operated.

SCOPE OF ACTIVITIES

The urban local body intends to outsource both Consultancy and Implementation work to an agency such that the single agency is responsible for the most effective outreach plan. The scope of work will be in two stages. During the first stage, the consultant would be required to develop a Communication and Outreach Plan (hereinafter referred to as Plan) conforming to the objectives detailed above. Subsequently, in the second stage, once the Plan is approved by the client in consultation with the World Bank (WB), the consultant would be required to implement the Plan. All the related cost of conducting

seminar/workshop, publicity material, advertisement in the newspaper, etc. to be published on behalf of the client but are to be borne by the consultant. Consultant would be required to station a team within two weeks from the date of final acceptance of the Plan and for a period of four months at the respective city. The consultant will also be required to attend meetings as and when required. The publicity material and advertisements length, size, words, etc. will depend on what has been finalized in Plan. The approximate requirement is provided under each heading for their reference. The client will help facilitate the Public involvement process.

Stage I:

1. Preparation of Plan

Develop an external analysis based on a planned study (to be conducted as part of this consultancy) to understand the perceptions of various identified stakeholders, including civil society, media, and potential users. Identify opportunities and risks, and suggest approaches to address them.

2. Communication Strategy

Prepare a customized communication strategy, including customized messaging for audiences, selection of media tools, etc. aimed at achieving the identified objectives.

3. Development of Plan

Develop a “Plan” based on the communication strategy that would broadly include the following elements:

a. Goals, desired outcomes and expected outcome of the communication strategy
b. Definition of audience
   Issues with specific focus on different user groups like elderly, woman, children, students, differently-abled etc. / theme linked audiences (these are indicative and will need to be defined as part of the Communication Strategy and Consultation Plan)
c. Assessment of current attitudes/beliefs/motivators
d. Analysis of audience’s capacity for change
e. Definition of medium to deliver the message(s) based on activity requirement including the needs of proper consultation as well as publicity at various level / target audience.
f. Consultation Plan: Formulate and discuss the consultation plan for disseminating information on the project to the civil society through focus group discussions, workshops, seminars etc. The plan should follow the following structure and reflect the needs of communication at each stage:

Table 1: Structure of the Consultation Plan

Stages of the Project/Actions	Objectives	Risks and Challenges	Audience/ Main Stakeholders	Messages (Information to be Communicated)	Means of Communication	Timeline/ Frequency	Responsibility	Resources	Indicator of achievement for respones
	1	2	3	4	5	6	7	8	9
Defining Goals and Objectives									
Planning and Design									
Evaluation of Alternatives									
Selection of Alternatives									
Implementation									

g. Branding:
A theme for land use and transportation integration and specific branding aimed at promoting TOD. The brand identity that is identifiable and popular for key segments of the population and catch phrase for population to link with the brand/ theme

h. Marketing Campaign:
Marketing campaign for transit oriented development to promote sustainable urban development. This would involve campaign through appropriate media such as:

- Print and posters
- Advertisements in the local newspapers
- Radio
- Television
- Web
- Mobile Communication SMS feeds etc.
- Knowledge management activities such as workshops/ seminars

- Exposure/ competitions etc.
- Campaigns like car free day, bike day, bus day etc.
- Street and Station Signage

i. Media and Civil Society Relationship Management
   - Close engagement with media (print and electronic) assigned to cover the sector / project with information and perspectives
   - Close engagement with relevant civil society organizations (CSOs) to keep

j. Events:
   - Planning for various public events, workshops, seminars, competitions and awareness programmes etc.
   - Participation in national / regional level events including national/ international study tours
   - Events should allow focus on engaging in TOD related discussions and learning from best practices as a way to educate decision makers and people, thereby creating awareness and buy-in to the TOD concept.

k. Communication System:
   Definition of communication system within all stakeholder agencies in terms of who communicates and structure of the communication cell.

l. Feedback Mechanism:
   The Plan should propose setting up of Public Information Centers and must formulate a suitable communication mechanism to facilitate receipt of feedback and grievances from the general public.

m. Impact / Outcome Monitoring:
   Mechanisms to measure Impact / Outcome monitoring including behavioral changes with regard to proposed actions. This would include methodologies and protocol to assess impact of various actions on the user in terms of relevance and satisfaction with regard to the interventions.

n. Documentation:
   Suggest a documentation process including recording for capturing important events, media reports etc.

o. Timeframe:
   Definition of timeframe of communication.

4. Process to be followed while finalizing the "Plan"

The consultant would prepare a draft Communications and Outreach Plan in consultation with the client. A workshop would be organized by the client to which the concerned stakeholders, etc. would be invited for deliberations. The consultant would be required to modify the "Plan" after the inputs received in the workshop.

Stage II

This stage would involve implementation of the components of the approved Plan. In consultation with the client, the team of consultants shall implement the Plan. The various activities to be carried out in the implementation stage are broadly discussed as under, but not limited to:

1. **Advertising and promotions campaign for TOD:**

A marketing campaign strategy and implementation plan, aimed at achieving the identified objectives needs to be devised. The consultant shall suggest the preferred mix of the various advertising and promotional components as part of the strategy, which should cover:

- Preparation of advertisements, slogans, hoardings and other
- Encourage use of sustainable transport modes among the commuters of the city
- Special outreach strategies to capture the attention and understand the needs of special groups such as health and emergency service providers, women & children, students, etc.

2. **Design of Tools / materials and launch of campaign in relation to the requirements of the consultation plan as well as publicity requirements.**

The consultant team shall design 'Tools of Communication' in relation to the priorities, communication focus and need of consultation as identified earlier. And based on the design guidelines as outlined below, the consultant would prepare the materials and initiate launch of various activities outlined in the strategy. The consultant will also launch the campaign, and build consensus through consultation. This would include information dissemination through the web and newsletters etc.

3. **Preparation of design guidelines, Graphics and Templates:**

This would involve design of the Brand, make graphic standards (such as logo) for various facilities, organize posters & painting competitions, etc. The consultant will have to create a brand identity for the project which would include but not limited to evolving:

- Tag line / slogan
- Posters showing nearest rapid transport station
- Organizing competition programmes leading to finalization of a brand logo for the project.

4. **Media and Civil Society Management:**

Production of press releases, blogs, brochures, and organization of press briefings, media visits, along with placement of media articles, daily media monitoring and monthly analysis.

- Organize meetings, launch events, awareness programs, and targeted outreach with key opinion leaders in the city. After each consultation, the team is expected to submit a report outlining the key recommendations, relevance of these recommendations and means and methods of converting recommendation into action points on the Communication Strategy.
- Digital Media – Facebook/ Instagram/ Twitter/ Whatsapp – Design and content management
- Improvement to website and sms facility

5. Advertising

- Develop the print campaign
- Design and production of Radio campaign
- Design SMS message campaign

6. Short presentations and videos (one 3-5 min video)

Videos for schools, offices, etc. to deliver identified messages

7. Public Events:

Planning various public events like car free day, bus day etc. in consultation with communication cell of the client. Planning and organizing focus group discussions to familiarize residents about TOD concept, brain storming sessions, etc.

8. Public Information Centres and Feedback Mechanism:

The consultant must help the client to set up Public Information Centers (PICs) and assisting in training of the staff. It must also help the client to set up mechanisms to receive user/ public feedback as recommended in the Plan.

9. Impact / Outcome Monitoring:

Measuring & Evaluating effectiveness of Outreach Program

10. Documentation of Processes and Events:

- Prepare documents and video clips to present the processes and activities involved in planning and design of TOD, including public views and perception at each stage of the project. After each stage of consultation, prepare a summary outcome report as well response to each of the comments / suggestions received from the stakeholders.
- Develop quarterly plans for information dissemination, perspective sharing and risk management. Prepare monthly newsletter to be published on the client's website and prepare quarterly report indicating various activities undertaken.

11. Measuring & Evaluating Effectiveness of Outreach Program

The public outreach efforts for promoting TOD must be continuously evaluated to find the most effective approaches. The task must include:

- Evaluation at the end of each outreach effort to gather information that can be used in future outreach efforts.
- The program must have a built-in component which provides a way of finding out what works and what does not.

The consultant must:

- Keep track of how stakeholders heard about TOD and their response for a sample size of 500 commuters / influencers / households; to better understand the effectiveness of various initiatives. This can be undertaken in two phases - one post the initial activities and close to end of the outreach programme.
- Track the number of people attending the outreach efforts and their suggestions and feedback.
- Record Minutes of Meetings / Programs by Audio Visual
- Track media response
- Create a Summary Report of Observations and Recommendations

DELIVERABLES AND TIMELINE FOR SUBMISSION

The consultant shall commence work within a week of signing of the contract and shall submit a Draft Plan within 4 weeks of commencement of work. All deliverables are due within 4 months of commencement of work. During the rollout stage, consultant shall submit monthly progress report. The firm should submit the PERT Chart for the Planning and implementation schedule proposed by them.

Stakeholder engagement plan; stakeholder engagement summary report; newsletters, website content, presentation materials, public meetings, advisory committee meetings, meeting notes, translation services, and other engagement tools identified in stakeholder engagement plan.

TASK	DELIVERABLE	TIMELINE (from date of signing the contract)
Stage I		
1	Memo #1: : Inception Report (including Understanding of priorities, key themes and proposed work plan)	P + 2 weeks
2	Memo #2: Preparation of Draft Communication and Outreach Plan	P + 4 weeks
3	Memo #3: Final Communication and Outreach Plan	P + 10 weeks
Stage II		From week 10
4	Memo #4: Documentation of processes, events, audio and video	Ongoing
5	Memo #5: Three News Letters	Monthly
6	Memo #6: Two Quarterly Reports	Quarterly

*where P is the date of award of the contract

QUALIFICATION OF CONSULTANTS

The Consultant Team must have experience in at least

A. One similar Communication and Outreach Program for TOD Projects

OR

B. At least two studies, which included communication and outreach for a transit project or a large mixed use high density development project

The Consultant Team must include the following key expertise:

	Key Experts	Years of Experience
1	Project Manager and Public Relations Expert	15 years
2	Branding and Wayfinding Specialist	5-10 years
3	Urban Planner / Designer	5-10 years
4	Graphic Designer	5-10 years
5	Public Relations Expert / Social Worker	5-10 years
6	Expert in Communicating Real Estate Development Opportunities	10-15 years

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Bogota, Colombia

TOD KP

PLAN+DESIGN

INTRODUCTION



The ‘Plan+Design’ step of the Framework contains a series of detailed planning principles and design components to formulate TOD plans at various scales of intervention [city, corridor, station area and site scales] and in varying contexts.

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ABOUT PLAN+DESIGN

The 'Plan+Design' step of this framework focuses on providing guidance on design values that underpin TOD as well as the planning process. It also presents action strategies and tools to create a more compact land development pattern hinged upon prioritization of pedestrians and cyclists.

TOD is the integration of transportation and land use planning, combined with an emphasis on the 'spaces between' – quality open space, multi-uses and streetscape interventions that contribute to urban placemaking. Critical to the success of an efficient and effective TOD strategy is a common vocabulary for different stakeholders that from the outset focuses on walking, cycling and public transit as primary modes of movement and not personal vehicles. It also takes into consideration the generally ignored inter-dependent impacts of land use, transportation and infrastructure networks and real estate economics at multiple levels.

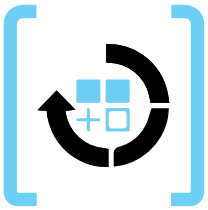
Many existing resources address this need for a common TOD design vocabulary. Leading among them are the TOD Standard (Institute of Transportation and Development Policy 2017) and the TOD Corridor Course (World Bank Group and World Resource Institute 2015), which are global publications. In addition, many low and middle-income countries have also developed preliminary TOD design guidelines, such as the TOD Guidance Document (Ministry of Urban Development, India 2016), TOD Guide for Urban Communities (CTS-EMBARQ Mexico, 2014), and Design Manual for Low Carbon Development (The Energy Foundation, China Sustainable Cities Program, Calthorpe Associates, 2012).

To stitch these principles together, it is important to integrate them with design standards, development review processes, and regulatory mechanisms. The Plan + Design Knowledge Products include a TOD Zoning Code template (PD-R01) and TOD Planning Principles and Design Guidelines (PD-R02) as ready resources as a starting point for cities that are interested in applying the TOD design values into standards and regulations.

The Plan + Design Knowledge Products also provide "how-to" guides for TOD planning at various scales that integrate clear processes and mechanisms by which the public, private, and community sectors can shape TODs with the changing landscape of cities. The planning guides allow for developing actionable tasks that can be adjusted based on various context, transit mode and local factors such as development typology (Greenfields, urban infill or redevelopment). However, at times there are challenges when it becomes difficult to reconcile the design standards with one another and entails some complicated choices at the expense of other users. Striking the right balance to achieve well-planned TOD would require certain priorities and trade-offs. The Plan + Design Knowledge Products are not presented as standards but as suggestions with corresponding references to allow cities the space to achieve the right balance.

Finally, the Knowledge Products presented here must be read in conjunction with the monitoring and evaluation framework and key performance criteria suggested in the Implementation step of the TOD Framework. Design considerations and standards should ideally be adjusted based on the feedback received from the monitoring and evaluation exercise in a given context.

KNOWLEDGE PRODUCTS



'HOW-TO' GUIDES

- **PD-H01** **How To Prepare A City-Wide TOD Plan** *(Step-by-Step Guide)*
- **PD-H02** **How To Prepare A Corridor TOD Plan** *(Step-by-Step Guide)*
- **PD-H03** **How To Prepare A Station Area Plan** *(Step-by-Step Guide)*
- **PD-H04** **How To Prepare A Site Level TOD Plan** *(Step-by-Step Guide)*
- **PD-H05** **How To Develop TOD Supportive Zoning Framework** *(Step-by-Step Guide)*
- **PD-H06** **Land Amalgamation Framework** *(Step-by-Step Guide)*



RESOURCES

- **PD-R01** **TOD Planning Principles & Design Guidelines** *(Ref Doc.)*
- **PD-R02** **TOD Zoning Code Template** *(Ref Doc.)*
- **PD-R03** **Land Use And Transportation Integration Best Practices** *(Ref Doc.)*
- **PD-R04** **Pedestrian Friendly Design Best Practices** *(Ref Doc.)*



PROCUREMENT

- **PD-P01** **TOD Plans Terms Of Reference** *(TOR Template)*

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TOD KP

PD-H01

HOW TO PREPARE A CITY-WIDE TOD PLAN



The city-wide planning tool aims to provide the foundation for subsequent scales of TOD implementation by analyzing the existing transit corridors at the city-level and establishing goals for their TOD development. By identifying land use, current activity, transit demand and influence zones, goals and priorities can be established to draft a city-wide TOD plan. Establishing the statutory relevance of this plan will then guide development at the corridor, station area and site contexts.

Type: Step-by-Step Guide



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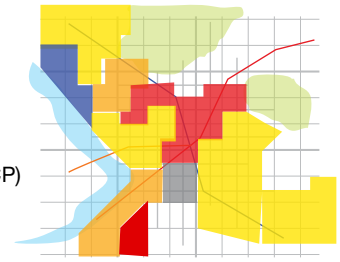
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01 MAP LAND USES AND KEY DEVELOPMENTS

CITIZEN'S INPUT

To understand the distribution of residential, employment and institutional uses in the city.



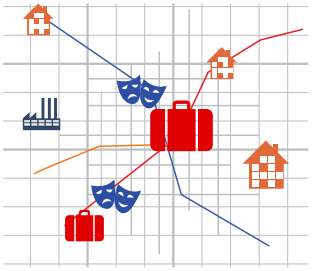
DATA SOURCES

- Satellite Image/GIS Data
- As per the approved Master Plan (MP)/Development Plan (DP)/Comprehensive Plan (CP)
- Field Surveys along major transit corridors
- Stakeholder Workshop

02 IDENTIFY ACTIVITY GENERATORS

CITIZEN'S INPUT

To help identify routes of high commuter traffic and origin-destination travel patterns. [**Housing, Employment and Recreational Centres**]

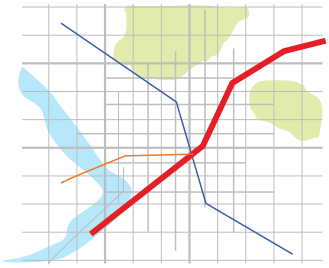


DATA SOURCES

- As per approved MP/DP/CP
- Field Surveys along major transit corridors
- List of Approved Developments
- Stakeholder Workshop

03 IDENTIFY PRIORITY TRANSIT DEMAND CORRIDORS

Based on population distribution, land use plans, location of activity centers and travel demand forecasting (if available) for the transit type proposed.



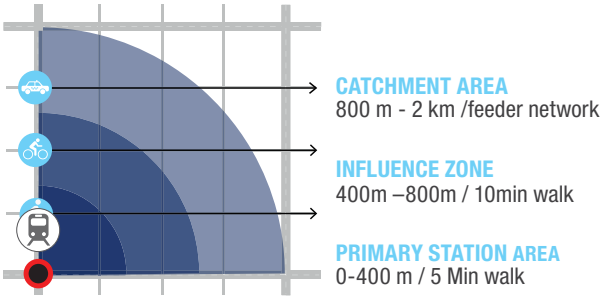
DATA SOURCES

- As per approved MP/ DP/ CP
- Mobility Plan/Transportation Plan
- Transit System Detailed Report
- Latest Census Population and Projected Estimates as per MP/DP/CP
- Right-of-way widths: Google earth/satellite images/field surveys/street views

[Refer to **AS-H02** *How to undertake Rapid Transit Alternatives Assessment]*

04 DELINEATE INFLUENCE ZONE OF TRANSIT

To determine the catchment area around transit routes where transit-supportive development needs to be prioritized.

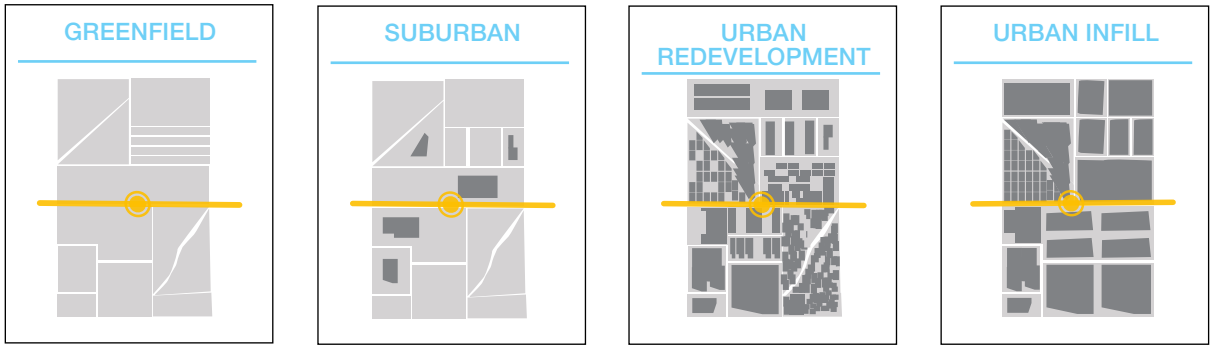


DATA SOURCES

- Existing Station Locations
- Satellite Imagery/Google Street View
- GIS Database for land parcels, road network and natural features
- Master Plan/Development Plan/Comprehensive Plan
- Mobility Plan/Transport Plan
- Field Survey

05 DETERMINE DEVELOPMENT CONTEXT

To determine the real estate market dynamics, land availability and ROW constraints.



[Refer to **AS-A02** *TOD Scale & Context Assessment]*

06 IDENTIFY GOALS AND TARGETS

CITIZEN'S INPUT

For different areas within the TOD influence zone, based on city vision, growth scenarios and multi-stakeholder participation.

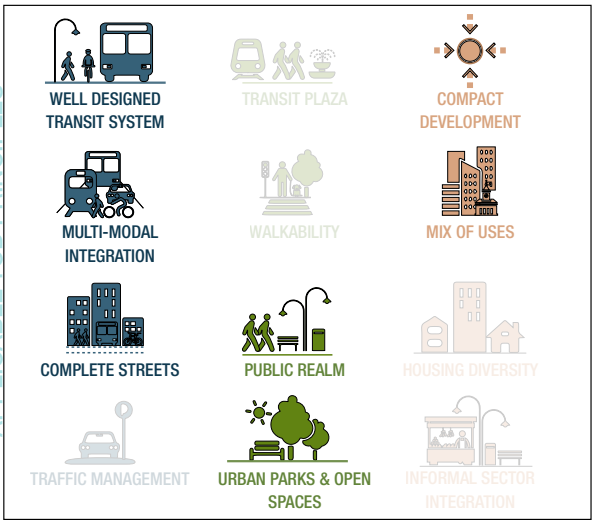
[Refer to **AS-A01** *TOD Readiness Assessment]*

07 DRAFT CITY-WIDE TOD PLAN

Implementing TOD at a city-wide level includes policy recommendations and actions related to various TOD principles across various TOD implementing agencies, identified below:

COMPONENTS OF A CITY LEVEL PLAN

- City-wide Policy recommendations
- Master Plan Integration
- Typology of corridors and stations (AS-A03)
- Zoning Codes



08 ESTABLISH STATUTORY RELEVANCE

Options to establish statutory relevance for TOD principles include:

OPTION 1	OPTION 2	OPTION 3
Include a TOD chapter in Master Plan/ Development Plan/Comprehensive Plan as an amendment	Create a TOD policy as a special law that supersedes the existing regulations	Establish a TOD overlay district as a special area in existing development regulations



Pune, India

TOD KP

PD-H02

HOW TO PREPARE A CORRIDOR TOD PLAN



Corridor planning is essential to ensuring inter-modal connectivity between stations areas, as well as the creation of complementary stations along each transit corridor. Stations must be integrated and accessible to allow for a network of transit-oriented places, which exist within the framework of an overarching city-wide TOD plan.

Type: Step-by-Step Guide



TOD
Global Platform for Sustainable Cities
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01 MAP TRANSIT ALIGNMENT AND STATION LOCATIONS

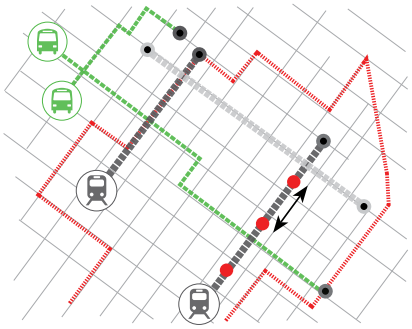
To understand transit system features and station characteristics.

TRANSIT TYPE
BRTS | MRTS | Commuter Rail

PHASING
Priority Corridor(s)

ALIGNMENT
System Coverage

STATION SPACING
Average distance between stations



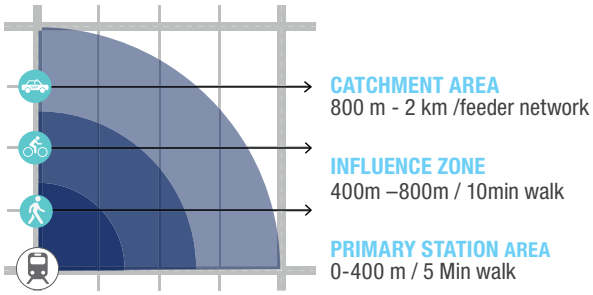
DATA SOURCES

- Transit System Detailed Report
- Mobility Plan/Transport Plan
- Master Plan/Development Plan/Comprehensive Plan

[Refer to **AS-H02** *How to undertake Rapid Transit Alternative Analysis]*

02 DELINEATE INFLUENCE ZONE ALONG CORRIDOR

To determine the catchment area around transit routes where transit-supportive development needs to be prioritized.



DATA SOURCES

- Existing Station Locations
- Satellite Imagery
- Google Street View
- GIS Database for land parcels, road network and natural features
- Master Plan/Development Plan/Comprehensive Plan
- Mobility Plan/Transport Plan
- Field Survey

03 ANALYZE DEVELOPMENT OPPORTUNITIES

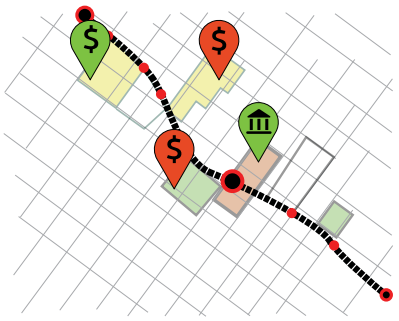
CITIZEN'S INPUTS

To understand development context and capacity for intensification along transit corridor(s).

DEVELOPMENT PATTERN
Plot Sizes | Land Use Changes | Distribution of Employment & Residential Uses

LAND OWNERSHIP AND VACANT LANDS

REAL ESTATE MARKET POTENTIAL
Property Values | Undeveloped Lands | FAR Utilization



DATA SOURCES

- Real Estate Market Assessment Reports
- Land Values from Real Estate Developers
- GIS Database
- Field Survey
- Stakeholder Engagement
- Existing/Proposed Land Uses
- Flood and Vulnerability Maps (to avoid areas at risk)
- Refer to AS-A03

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.* © 2018 International Bank for Reconstruction and Development / The World Bank

04 ASSESS INFRASTRUCTURE CARRYING CAPACITIES

To understand the maximum number of people that can be supported along the corridor through optimum utilization of the available resources.

POPULATION ANALYSIS
Growth Trends

PEDESTRIAN AND BICYCLE INFRASTRUCTURE + TRAFFIC
Level of Service Benchmarks

UTILITIES
Water | Waste | Energy | Drainage

TRANSIT
Service Coverage | Ridership | Estimates

DATA SOURCES

- Transit System Detailed Report
- Master Plan/Development Plan/ Comprehensive Plan
- Mobility Plan/Transport Plan
- Traffic Impact Studies
- Infrastructure Detailed report

[Refer to **AS-H03** *How to undertake Infrastructure Carrying Capacity Assessment]*

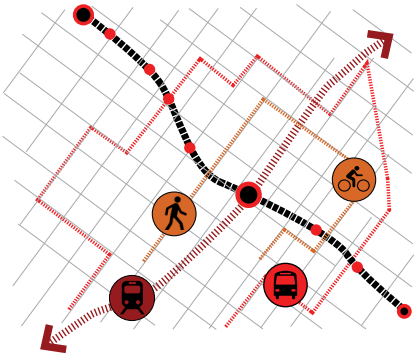
05 EVALUATE CONNECTIVITY ALTERNATIVES

To provide seamless linkages between priority corridor(s) and the city's other transportation network.

CONNECTIONS TO LOCAL BUS FEEDER ROUTES

CONNECTIONS TO PEDESTRIAN & BICYCLE NETWORK

CONNECTIONS TO OTHER PREMIUM TRANSIT CORRIDORS



DATA SOURCES

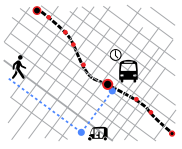
- Bus System Detailed Report
- Route Rationalization Studies
- Mobility Plan/Transport Plan
- Field Surveys
- Google Street Map

[Refer to **AS-H02** *How to undertake Rapid Transit Alternative Analysis]*

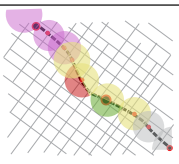
06 PREPARE CORRIDOR TOD STRATEGIC PLAN

To create a phased implementation plan for prioritizing station areas and level of intervention needed to maximize TOD potential.

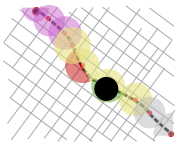
NETWORK LEVEL IMPROVEMENTS



STATION AREA TYPOLOGIES



PRIORITY STATION AREAS



STREET HIERARCHY



CATALYST PROJECTS



TOD ZONING CODE

[Refer to **PD 07** *TOD Zoning Code Template]*



Greenfield BRT Corridor, Rio, Brazil

TOD KP

PD-H03

HOW-TO PREPARE A STATION AREA PLAN



Plans at the station-level are more detailed and design-oriented. This tool aims to assist with the implementation of specific designs and urban design guidelines, as well as streetscape and smaller scale real estate investment.

Type: Step-by-Step Guide



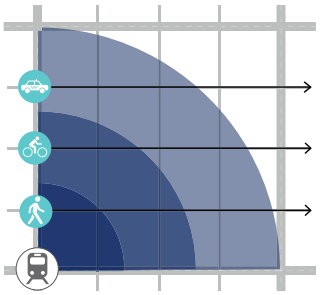
TOD Global Platform for Sustainable Cities WORLD BANK GROUP IBI

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01 DELINEATE AND REFINE STATION AREA BOUNDARY

Station area boundaries are defined by the distance people walk in a set duration of time.

An effective strategy will work to increase the size of station area planning boundaries for transit stations by providing alternative mobility choices.



CATCHMENT AREA
800 m - 2 km /feeder network

INFLUENCE ZONE
400m –800m / 10min walk

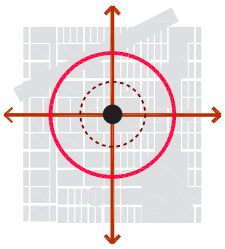
PRIMARY STATION AREA
0-400 m / 5 Min walk

DATA SOURCES

- Satellite Imagery
- Google Street View
- GIS Database for land parcels, road network and natural features
- Master Plan (MP)/ Development Plan (DP)/ Comprehensive Plan (CP)
- Transportation/Mobility Plan
- Field Survey

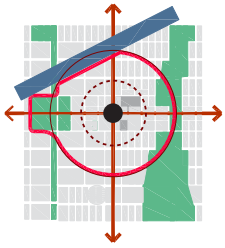
WALKING DISTANCE FROM TRANSIT STATION

Willingness to walk up to 10 minutes to a given station at 5km/hr, is defined by 800m radial circle boundary centered on the station.



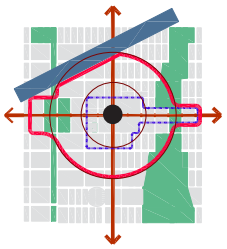
NATURAL ENVIRONMENT FEATURES

The boundary is remapped to include natural systems, greenways, waterways, opens space and barriers, such as major roadways and rail corridors.



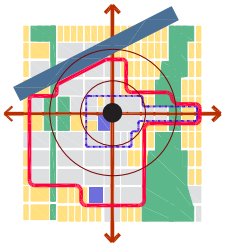
PED-SHED ANALYSIS

Ped shed is short for pedestrian shed. Ped sheds have irregular shapes because they cover the actual distance walked, not the linear (aerial) distance.



EXISTING BUILT ENVIRONMENT

Existing large-scale developments, destinations and community features beyond a 10-minute walking distance.



02 CREATE INVENTORY AND ANALYZE EXISTING CONDITIONS

CITIZEN'S INPUT

ACCESSIBILITY

Position within Public Transport Network | Pedestrian & Cycle Network | Street Grid | Intersections

Continuity of Road Network | Traffic Volume Count

Multi-modal Integration: Station Entry | Parking Management | Bus Stops

INFRASTRUCTURE

Physical: Drainage | Sewer | Water | Waste | Telecommunication

Social: Parks | Public Amenities | Street Vendors | Road Safety | Community Centers

Environmental Features: Natural Drainage | Topography

Heritage: Tangible (Built) | Intangible (Culture/Arts)

DEVELOPMENT

Land Attributes: Existing & Proposed (Use + Ownership + Plot Sizes

Development: Population Densities + FAR Utilization

Job Densities

DATA SOURCES

- Development and real estate market trends from stakeholder workshop/ focus group discussion
- MP/DP/CP
- Transportation/Mobility Plan
- Infrastructure Plans
- Field Survey

03 CONDUCT S.W.O.T. ANALYSIS

CITIZEN'S INPUT

STRENGTHS are favorable conditions to be built upon. **WEAKNESSES** are unfavorable conditions to be considered. **OPPORTUNITIES** are potential improvements and favorable conditions that will help achieve project goals. **THREATS** are the potential barriers to the realization of project goals.
Categorize SWOT based on:

- Urban Design & Placemaking
- Land Use Attributes
- Access to Transit
- Pedestrian and Cycle Mobility
- Parking Management
- Context: Development/ Redevelopment/Greenfield



04 DEVELOP STATION AREA PROGRAMMING ALTERNATIVES

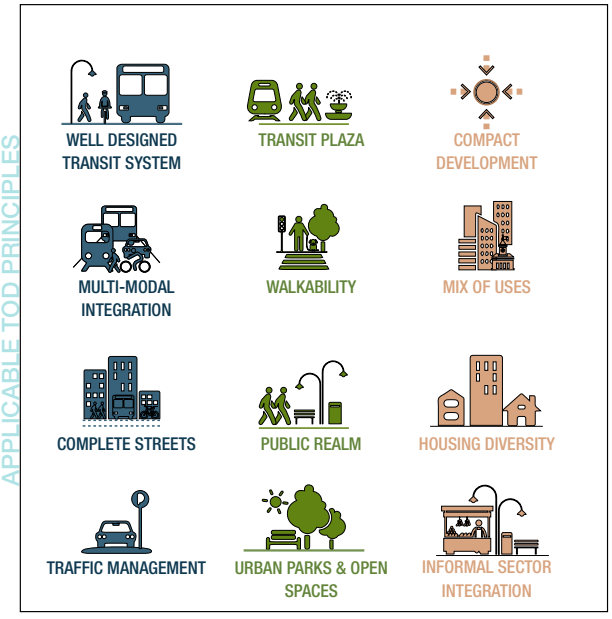
Programming alternatives may include scenarios on how the TOD station area may evolve over time:

- Accessibility Scenario
- Housing Development Scenario
- Employment Development Scenario

05 PREPARE STATION AREA CONCEPT PLAN

COMPONENTS OF A STATION AREA PLAN

- Spatial Layout Plan illustrating connectivity, land use mix, and building densities
- Circulation & Multimodal Integration Plan
- Area-wide Parking Plan
- Physical Infrastructure Plan
- Landscape and Open Space Plan
- Architectural and Urban Design Guidelines
- Real Estate Market Potential Strategy
- Catalyst Redevelopment Projects
- Capital Improvements Program
- Phasing Strategy
- Branding and Communication Strategy





Curitiba, Brazil

TOD KP

PD-H04

HOW-TO PREPARE A SITE LEVEL TOD PLAN



A step-by-step process guided by a series of task-based actions that will assist cities to plan and implement TOD at the site level

Type: Step-by-Step Guide



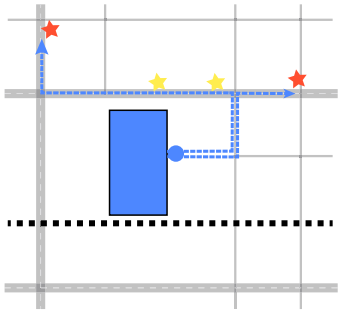
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01 IDENTIFY SITE CONTEXT

To understand the development opportunities and constraints.



ASSESS THE SITE CONTEXT BASED ON

- Location
- Connectivity
- Surrounding Development

02 REVIEW OF PLANNING DOCUMENTS

To apply development norms within the transit influence zone.

DATA SOURCES

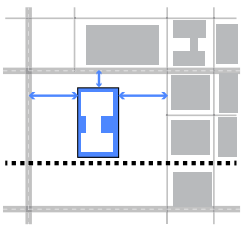
- Land Use as per Master Plan/Development Plan/Comprehensive plan/Overlays if applicable
- Building Regulations
- Relevant Policies and Codes

03 CONDUCT EXISTING CONDITIONS BASELINE ASSESSMENT

To gain an understanding of the existing or desired level of activity to develop TOD projects. Elements shall include:

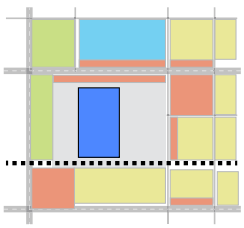
STATION AREA CHARACTER

Site History | Population | City-wide Context



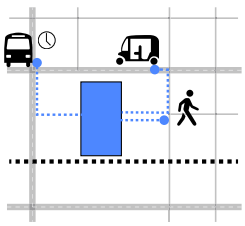
DEVELOPMENT

Existing/Proposed Land Use | Surrounding Buildings | Land Ownership



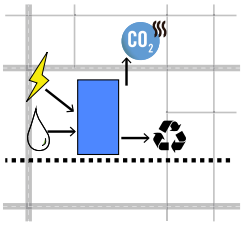
ACCESSIBILITY

Pedestrian and Bicycle Network | Transit Access | Feeder Transport



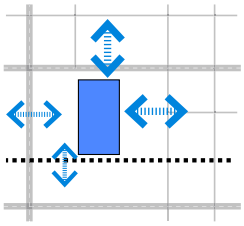
EXISTING INFRASTRUCTURE

Roadways | Utilities | Public Facilities



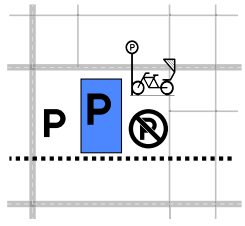
URBAN DESIGN

Street Grid | Setbacks | Heights | Building Forms | Open Spaces



PARKING

On-Street | Off-Street | Legal and Illegal Spaces | Park and Ride



04 CONDUCT AN OPPORTUNITIES AND CONSTRAINTS ANALYSIS

To gauge the level of interventions needed to make the site TOD compatible.

COMPONENTS TO BE EVALUATED

- Real Estate Potential
- Mobility & Circulation
- Mix of Land Uses
- Urban Design

05 PREPARE SITE DEVELOPMENT PROGRAM ALTERNATIVES

To determine the highest and best use for the site and select a preferred alternative.

EXAMPLE	EXAMPLE	EXAMPLE
Improving Connectivity	Optimizing mix of uses	Creating Destination

06 DEVELOP CONCEPTUAL SITE MASTER PLAN AND URBAN DESIGN SCHEME

To translate the site development program into a physical layout plan with supporting street design and built form.

COMPONENTS OF A SITE LEVEL PLAN

- Physical Site Plan
- Building Architecture
- Circulation Plan
- Parking Plan
- Landscape Plan
- Site Infrastructure Plan
- Phasing Strategy



07 FINANCIAL AND IMPLEMENTATION STRATEGY

COMPONENTS:

- Project costs and revenues
- Phasing Plan
- Institutional Framework



Muscat, Oman

TOD KP

PD-H05



HOW TO DEVELOP A TOD SUPPORTIVE ZONING FRAMEWORK

Guideline for the government to prepare/revise TOD supportive zoning ordinances, including revisions for pedestrian activities, urban design and parking restrictions.

Type: Step-by-Step Guide



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01 REVIEW & ASSESS EXISTING REGULATIONS

- Identify existing regulations that do not work, are obsolete, are not developer friendly and/or are being constantly superseded during site plan approval stage.
- Evaluate whether existing FAR's are being utilized– this also provides an indication of market demand and absorption potential.
- Assess if the regulations include urban design and pedestrian access.

DATA SOURCES

- Land Use as per Master Plan/ Development Plan/Comprehensive plan/ Overlays if applicable
- Building Regulations
- Relevant Policies and Codes

02 ENGAGE DEVELOPERS IN MODIFYING DEVELOPMENT NORMS

Organize a workshop with multiple developers to identify:

- Shortcomings of existing regulations
- Which regulation's work and what needs to change
- Which regulation's need to be included

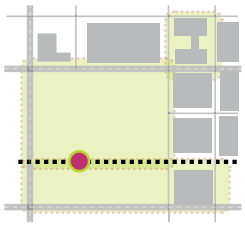


03 ASSESS & DOCUMENT EXISTING GROUND CONDITIONS

Based on the various scales of intended interventions, to gain an understanding of the existing or desired nature of development, parameters to be studied shall include:

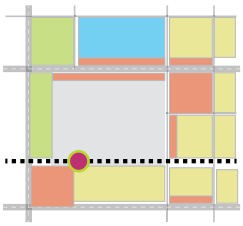
TOD AREA CHARACTER

Site History | Population | City-wide Context



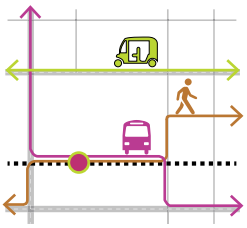
DEVELOPMENT

Existing/Proposed Land Use | Surrounding Buildings | Land Ownership



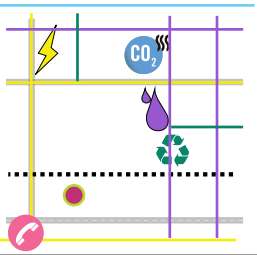
ACCESSIBILITY

Pedestrian and Bicycle Network | Transit Access | Feeder Transport



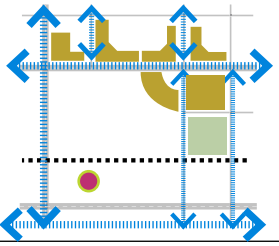
EXISTING INFRASTRUCTURE

Roadways | Utilities | Public Facilities



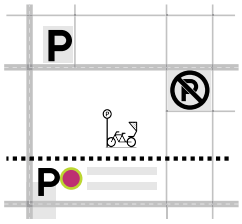
URBAN DESIGN

Street Grid | Setbacks | Heights | Building Forms | Open Spaces



PARKING

On-Street | Off-Street | Legal and Illegal Spaces | Park and Ride



04 ESTABLISH TOD ZONING VARIATIONS

TOD Zones	Built Form	Transport	Special Area	Miscellaneous
• Core Area	• Building Use	• Road Width	• TOD Typologies	• Topography
• Primary Zone	• Plot Size	• Travel Lanes	• Heritage Area	• Natural Features
• Influence Zone	• Building Height	• Road Types	• Others	• Physical Barriers
	• FAR			

05 UPDATE/AMEND CITY DEVELOPMENT REGULATIONS/ORDINANCE (DCRS)

Replace existing regulations where possible or create new transit supportive regulations related to (at minimum):

PD-R02 TOD ZONING CODE TEMPLATE

- Setbacks
- Block Width
- Complete Streets Standard
- Pedestrian & Bicycle Standards
- Suggested Land Use Mix
- Density Matrix
- Street Frontage
- Parking

To establish statutory relevance, one of the following options could be utilized:

OPTION 01:

Include a TOD chapter in Master Plan/Development Plan/ Comprehensive Plan as an amendment

OPTION 02:

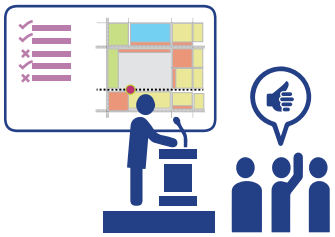
Create a TOD policy as a special law that supersedes the existing regulations

OPTION 03:

Establish a TOD overlay district as a special area in existing development regulations

06 INITIATE DEVELOPMENT REVIEW PROCESS

- Incorporate updated regulations in draft form to:
  - Existing Master Plan
  - Master Plan Update (if underway)
- Follow the city's existing protocol for the development review process, including:
  - Public consultations
  - Presentations to stakeholder,
  - Objections & suggestions phase to seek inputs from the community



07 NOTIFY TOD ZONING AMENDMENTS

Follow the city's existing protocol for amendments to regulations notification



Bogota, Colombia

TOD KP

PD-H06

LAND AMALGAMATION FRAMEWORK



A step-by-step planning process to guide the restructuring of land for large-scale TOD interventions

Type: Step-by-Step Guide



TOD
Global Platform for Sustainable Cities
WORLD BANK GROUP
IBI

ABOUT THE PLAN+DESIGN TOOL

PURPOSE

Land amalgamation is required for the purpose of assembling land for urban expansion, infill development, or redevelopment. In this process, the original landowners or occupants voluntarily contribute a certain percentage of their land to the government or other project initiators and, in return, receive compensation in the form of money, serviced land, or any other form of incentive.

CONTEXT

The land amalgamation process can be carried out in three different contexts, namely greenfield, infill, or redevelopment projects.

FOR GREENFIELD PROJECTS

Land amalgamation in greenfield projects can be undertaken in areas where there is land available. These can be farmlands, unused land in the outskirts, etc.

FOR URBAN INFILL PROJECTS

Underutilized and vacant lands have huge potential for urban infill near TOD areas. These lands should be amalgamated to be developed as high-density and serviced area.

FOR REDEVELOPMENT PROJECTS

Redevelopment projects can be undertaken by amalgamating lands that have blighted, unused structures, or in decayed inner city areas.

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.* © 2018 International Bank for Reconstruction and Development/ The World Bank

01 PREPARATION OF LAND

CITIZEN'S INPUT

1 DEFINE TOD AREA

Define the TOD station area within 5-10 minutes walking distance of the transit station.



2 IDENTIFY PROPERTIES FOR LAND AMALGAMATION

Identify properties that can be incorporated for an Amalgamation Plan.

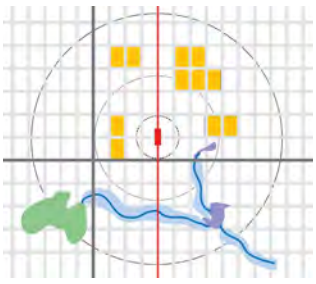
GREENFIELD

- Exclude natural features
- Rationalize boundaries based on physical barriers, such as bridges, flyovers, etc., that act as a barrier



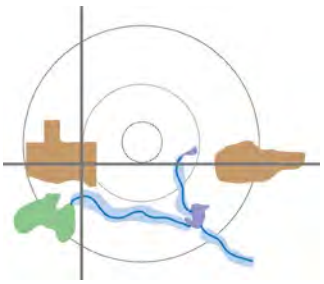
URBAN INFILL

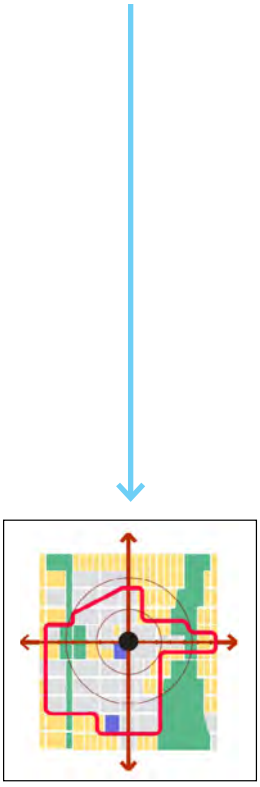
- Exclude natural features
- Include underutilized, vacant and government-owned lands



REDEVELOPMENT

- Exclude natural features
- Include blighted and unused structures
- Include decayed inner-city areas





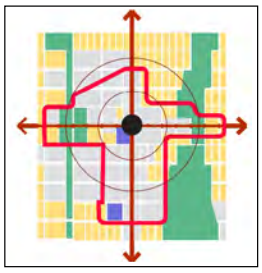
3 REFINE LAND AMALGAMATION BOUNDARY

Refine the final project area boundary based on the following parameters:

- Clarity on ownership of land
- Whether the land falls under "No Development Zone" as specified by the State/Region/Nation
- Owner's consensus
- Check with Zonal Regulations

The following instruments can be followed to assemble land that is more viable for development:

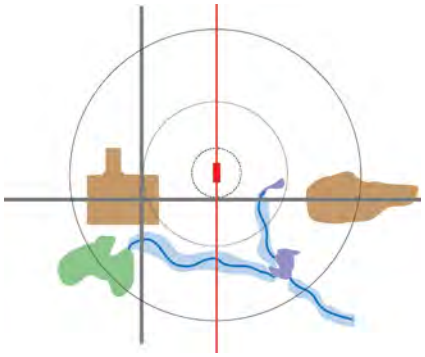
- LAND SWAPPING
- LAND SHARING
- LAND ACQUISITION
- LAND READJUSTMENT
- TRANSFER OF DEVELOPMENT RIGHTS



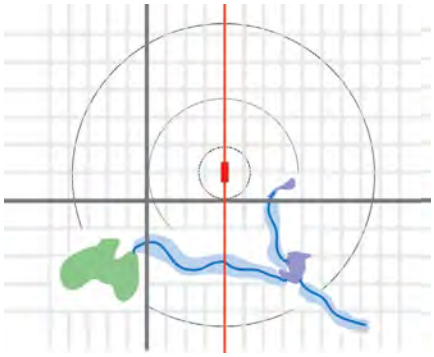
02 PREPARING A LAND ASSEMBLY PLAN

CITIZEN'S INPUT

Create a Land Assembly Plan within the amalgamated area through a layered consideration of all the TOD requirements. The TOD requirements to be considered are listed below.



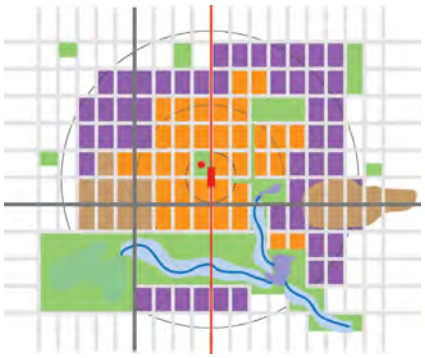
1 TRANSIT STATION



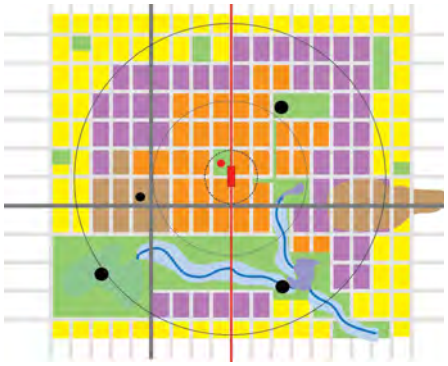
2 STREET GRIDS



3 TRANSIT PLAZA AND URBAN PLACES



4 HIGH TO LOW DENSITIES



5 AMENITIES AND INFRASTRUCTURE



6 RETAIL AND COMMERCIAL



7 INTERMODAL CONNECTIONS



8 PARKING



9 BUILT FORM

03 IDENTIFY DELIVERY MODE

Identify the appropriate delivery mode for implementing the project. A combination of public and private modes of delivery may also be considered for separate components of the project.

PUBLIC

For delivering the project through a public mode, the following steps will be considered:

- Phased costing needs for the development
- Identification of sources for financing the project, including public funding for public works improvements, public housing and capital markets for financing development work

PRIVATE

For delivering the project through a private mode, the following shall be considered:

- Structuring of PPP/other partnerships
- If the project is undertaken by a private party or a community organization, then regulations must be prepared to ensure TOD-compliant development
- Cost estimation of public works necessary for the development

04 PREPARE PROJECT DELIVERY PLAN

CITIZEN'S INPUT

Prepare a Project Delivery Plan, including a phased implementation plan and supporting institutional and regulatory formations, as required.

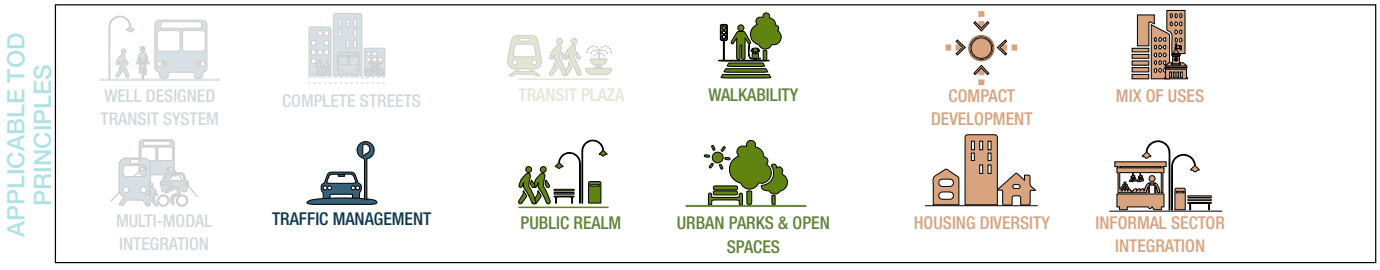
1 PHASING AND IMPLEMENTATION

It shall consist of different stages, such as a pre-planning stage, planning and design stage, implementation stage, and monitoring and evaluation stage. These stages may be modified as per different project requirements.

[Refer to IM-H02 *How to Develop TOD Phasing Strategy]*

2 NOTIFY REGULATIONS

To allow development in accordance with the regulations, they must be notified. The TOD principles that must be incorporated in regulations include:



3 CREATE AN INSTITUTIONAL AUTHORITY OR BODY FOR IMPLEMENTATION

Based on the delivery mode selected, a specific implementation body must be formed with sufficient accountability mechanisms to ensure equitable development and minimal displacement of original residents.



Pune, India

TOD KP

PD-R01

TOD ZONING CODE TEMPLATE



Template zoning ordinance/guideline for governments to use, including provisions on pedestrian pathways, activity generating uses, porous urban design, parking restrictions, shared parking provision, etc.

Type: Reference Document



TOD Global Platform for Sustainable Cities WORLD BANK GROUP IBI

ABOUT THE PLAN+DESIGN TOOL

PURPOSE

Establishing an appropriate zoning framework for TOD projects is essential to achieving good design and upholding best practices in transit-oriented development. An effective zoning framework allows for easy and unambiguous enforcement. The approach to writing zoning codes must depend on the planning framework applicable to the city. Most cities in low and middle-income countries, where zoning codes are used, follow the conventional Euclidean or Single-use Zoning format. This format relies on a land use-based definition of development of building standards.

Traditionally, Euclidean Zoning formats have been based on automobile-oriented planning practices and regulations are catered towards managing the impacts of specific land uses by segregating them spatially. This has led to sprawled development patterns, with limited connectivity. Poorer communities, in particular, have suffered from lack of access to jobs and opportunities because of such segregation. The TOD planning paradigm is fundamentally based on reversing segregation and allowing for compact, mixed-use developments within close proximity to transit. Consequently, zoning codes need revision to ensure the success of your city's TOD.

This Knowledge Product provides the resources listed below. The resources are based on industry-led best practices, but should be tailored to the context-specific conditions and considerations of your city.

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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RESOURCES:

I SAMPLE ZONING CODES

As a reference, Case studies have been assembled to highlight zoning efforts in the few cities in low and middle-income countries where TOD is implemented statutorily that may serve as references for future efforts globally.

II MODEL ZONING CODE KEY ELEMENTS

TOD elements that are found to be most commonly used in zoning codes from the case studies are listed and explained here. These elements form the basis of a TOD zoning code. To understand how to incorporate these elements into your city's zoning code, refer to the detailed templates.

III MODEL ZONING TEMPLATES

These templates can be used by city authorities as a base to develop zoning codes and ordinances for their respective cities. Two types of zoning templates are provided here:

IIIA. The Model TOD Overlay Zoning Ordinance:

This model template is adapted from the Model Transit-Oriented District Overlay Zoning Ordinance resource by Reconnecting America (Valley Connections 2001). It provides a city the opportunity to create a "TOD Overlay Zone" over an existing base zoning framework. All the development parcels that lie within the TOD Overlay Zone are either required to or have the option to follow the regulations of the overlay zone. When the model template is applied to a city, the TOD Overlay Zone must be clearly defined to avoid ambiguity in property selection.

IIIB. The Model TOD Form-Based Code:

This model template is adapted from the Smart Code Version 9.2 (Center for Applied Transect Studies; 2008). This template is based on the innovative form-based code paradigm, where building standards will be defined based on the station area typology rather than land use.

These Codes may be used as a replacement or as an overlay to the existing base zoning framework. All the development parcels that lie within a specific station area typology would need to adhere to form-based regulations for that specific typology. When the model template is applied to a city, the TOD Station Area Typologies and their boundary delineation must be clearly defined to avoid ambiguity in property selection.

A form-based code is a land development regulation that fosters predictable built results and a high-quality public realm by using physical form (rather than separation of uses) as the organizing principle for the code. A form-based code is a regulation, not a mere guideline, adopted into city, town, or county law. A form-based code offers a powerful alternative to conventional zoning regulation. (Form-Based Codes Institute n.d.)

A TOD station area typology is a powerful tool to prioritize where and when to make investments, determine the types of investments that are appropriate in varying transit communities, and guide the timing and scale of those investments. A TOD typology provides a means of classifying and differentiating the many transit communities throughout a city by grouping them based on key shared characteristics. (Salat and Ollivier 2016)

REFERENCES

Center for Applied Transect Studies;. 2008. SmartCode Version 9.2. USA.

City of Johannesburg: Department of Development Planning. 2016. "Spatial Development Framework 2040 City of Johannesburg Metropolitan Municipality." Johannesburg.

n.d. Form Based Codes Institute. Accessed 8 18, 2018. https://formbasedcodes.org/definition/.

ITDP (Institute for Transportation and Development Policy) . 2008. "TOD Standard v9.3."

NRDA (Naya Raipur Development Authority). 2013. "Naya Raipur Transit Oriented Development Study." Naya Raipur. Consultant Report: IBI Group

Salat, Serge, and Gerald Ollivier. 2017. *Transforming Urban Space through Transit Oriented Development - The 3V Approach*. Washington DC: World Bank Group.

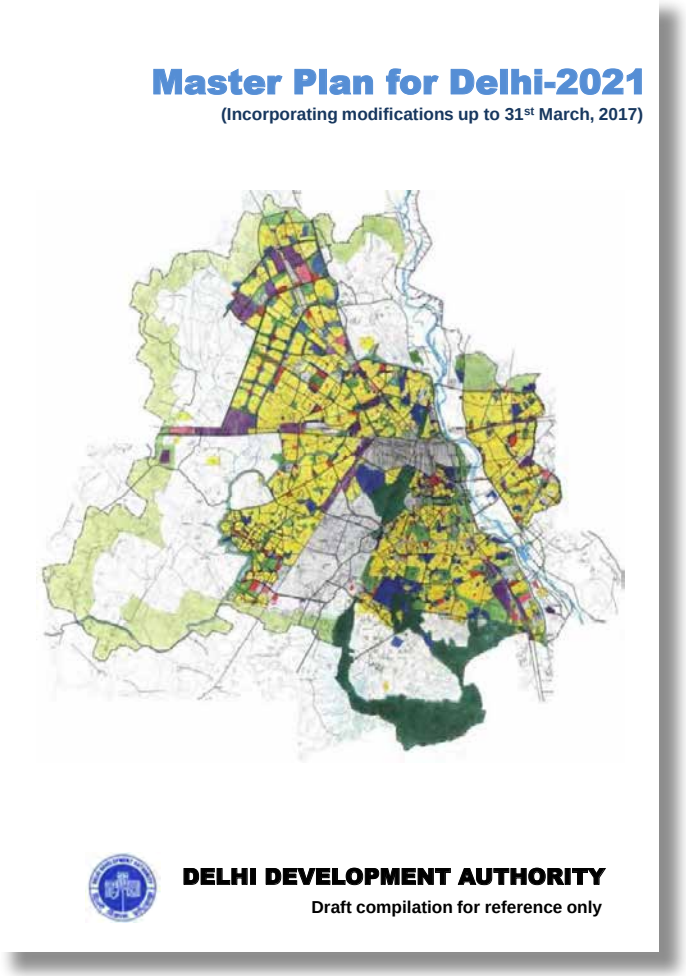
UD&UHD (Urban Development and Urban Housing Department). 2017. "Comprehensive General Development Control Regulation - 2017." Gandhinagar.

UTTIPEC (Unified Traffic and Transportation Infrastructure (Planning & Engineering) Centre), WRI India. 2014. Transit Oriented Development Manual – Delhi TOD Policy and Regulations Interpretation. New Delhi.

Valley Connections. 2001. Model Transit-Oriented District Overlay Zoning Ordinance. http://www.reconnectingamerica.org/assets/Uploads/bestpractice230.pdf, California: Community Design + Architecture, Inc.

SAMPLE ZONING CODE

DELHI TOD POLICY AND MASTER PLAN 2021, INDIA



KEY ELEMENTS

1 TOD Zone

The TOD Policy in Delhi was framed within the Influence Zone along MRTS corridor, designated as the Transit Oriented Development (TOD) Zone in the Master Plan for Delhi 2021, modified with the latest revisions in 2017. This zone comprises of all the areas lying within 500m of the metro transit corridor on either sides. This area is expected to be delineated in the Zonal Development Plans to avoid ambiguity. The Master Plan incorporates TOD as a redevelopment strategy, encouraging private landowners to assemble and redevelop lands that have high TOD potential. (WRI (World Resource Institute) 2007)



Figure 1: TOD Influence Zone Delineation, Delhi TOD Policy Manual
Source: Reproduced from UTTIPEC, WRI India (2014)

2 FAR and Density:

Higher densities are allowed for all developments that are planned on individual or amalgamated land parcels of a size of 1Ha or more. A minimum mandatory Floor Area Ratio (FAR) is imposed for housing for the economically weaker section. This norm is intended to encourage land pooling as a redevelopment strategy in the TOD influence zones. Larger land parcels allow Delhi Development Authority (DDA) to extract land for public use including open spaces and transit plazas.

3 Mix of Uses:

Minimum 30% residential use, 10% commercial use, and 10% public amenities are compulsorily required on all land parcels irrespective of their dominant land use as per the Master Plan. Within the minimum residential area requirement, the Master Plan mandates housing units to be of smaller sizes. This is intended to encourage economic diversity within transit influence zones. Smaller unit sizes allow buyers the flexibility of purchasing small units in case of budget limitations and purchasing multiple units and combining them in case of larger family sizes. However, in practice, this requirement has been the most difficult to meet, because it increases the planned density of the development substantially. This, in turn, increases the infrastructural and parking requirement for the development.

4 Road Network:

A minimum 20% of the land is required to be reserved for roads, adhering to the principles of 250m center-to-center road density of vehicular roads and 100m center-to-center density of the pedestrian network. These roads will be handed over to the Government as public roads, but will be maintained and kept encroachment free by the Developer Entity.

5 Open Spaces:

A minimum of 20% of the land is required to be reserved for green open spaces for public use, adhering to principles of inclusion and another 10% green space for private use. In parcels smaller than 1 HA, private open space is allowable in the form of common terraces, rooftops or podiums.

6 Public Facilities:

Public facilities like schools and health facilities are required to be provided as part of the development.

7 Green Buildings:

The built form of the development is required to achieve a minimum of 3 stars or gold rating as per the Indian Green Building Standards.

8 Traffic Impact:

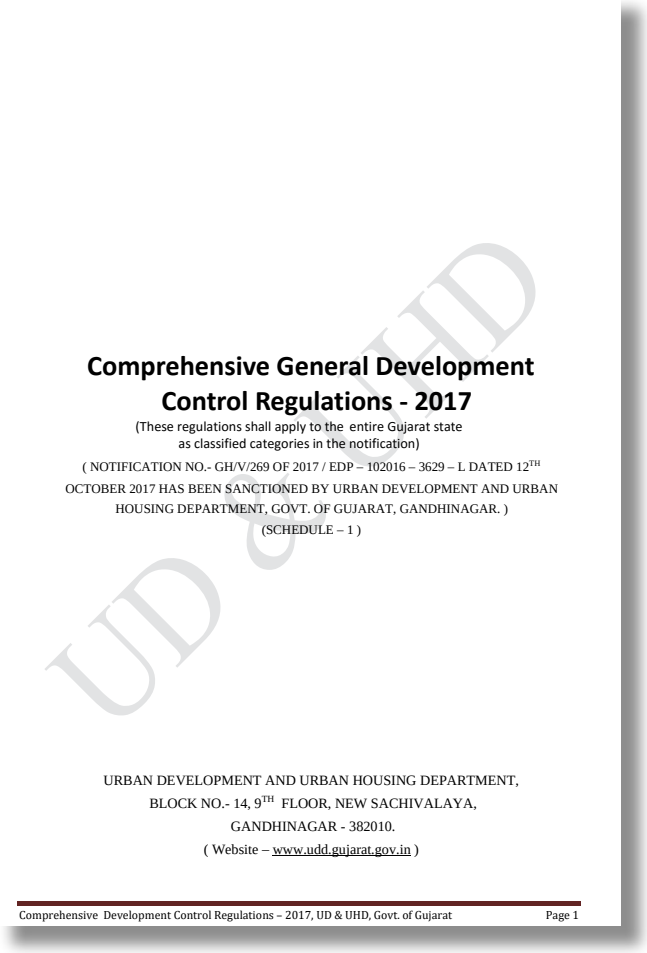
It is expected to be assessed and mitigated through traffic management measures.

In addition to the above norms, the Master Plan also prescribed Street Design Regulations to be followed within the streets planned in a development under the TOD scheme. The street design elements are intended:

- Promote Preferable Public Transport Use
- For Safety of All Road Uses by Design
- For Pedestrian Safety, Comfort and Convenience on All Streets
- For climatic comfort for all Road Users
- To ensure universal accessibility and amenities for all street users
- To reduce Urban Heat Island Effect and Aid Natural Storm Water Management

SAMPLE ZONING CODE

COMPREHENSIVE GENERAL DCR - 2017 GANDHINAGAR, AND AHMEDABAD URBAN DEVELOPMENT AUTHORITY (AUDA) DEVELOPMENT PLAN, INDIA



Comprehensive General Development Control Regulations - 2017

(These regulations shall apply to the entire Gujarat state as classified categories in the notification)

(NOTIFICATION NO.- GH/V/269 OF 2017 / EDP – 102016 – 3629 – L DATED 12TH OCTOBER 2017 HAS BEEN SANCTIONED BY URBAN DEVELOPMENT AND URBAN HOUSING DEPARTMENT, GOVT. OF GUJARAT, GANDHINAGAR.)

(SCHEDULE – 1)

URBAN DEVELOPMENT AND URBAN HOUSING DEPARTMENT,
BLOCK NO.- 14, 9TH FLOOR, NEW SACHIVALAYA,
GANDHINAGAR - 382010.
(Website – www.udd.gujarat.gov.in)

Comprehensive Development Control Regulations – 2017, UD & UHD, Govt. of Gujarat Page 1

UD & UHD

KEY ELEMENTS

1 Smart City and TOZ

TOZ is an overlay zone which provides opportunities for mixed-use and high-density development along the Bus Rapid Transit (BRT) corridor and Metro Rail Transit (MRT) corridor except in Core Walled City, Industrial Zone – General, Industrial Zone – Special, SPD-2 Science Park and on GIDC Estates. High-density development permissible in areas falling within 200m on both sides on transit corridor in case of AUDA and RUDA and in case of smart city node.

[Refer to Section 7.1.11 Smart City & TOZ (SPD-5)]

Sr. No	Use Zone / Use as per Development Plan of Competent Authority	As mentioned	
		Conceptulised Use Zone	Code
(1)	(2)	(3)	(4)
38	Transport Oriented Zone, Smart City Node/ Transport Node, Highdensity zone available in both the sides of 200 mtr. from the edge of the road.	Smart City & TOZ	SPD5

Source: Reproduced from UD&UHD (2017)

2 Use Zone and Permissible Uses

The comprehensive Development Control Regulation permits mixed-use development on Smart City & TOZ zone with permissible uses of Residence, Commercial and Green Institutional Zone.

[Refer to Table 7.3.1: USE ZONE AND PERMISSIBLE USES]

Sr. No.	Conceptulized Use Zone	Code	Permissible Uses
(1)	(2)	(3)	(4)
33	Special Plan Development Zone – 1	SPD1	As per GIFT Master Plan.
34	Special Plan Development Zone - 2	SPD2	As per SRFDCL Master Plan.
35	Special Plan Development Zone - 3	SPD3	Those permissible in R1.
36	Special Plan Development Zone - 4	SPD4	Those permissible in R1.
37	Smart City & TOZ	SPD5	Those permissible in R1,C1,REZ.

Source: Reproduced from UD&UHD (2017)

3 Permissible FAR

Smart City & TOZ allow a Base FAR of 1.8 on a building unit and a chargeable FAR of 2.2. Maximum FAR of 4.0 is permissible.

[Refer to Section 7.7 Floor Space Index (F.S.I) for different categories, Table 7.7.6 Use Zone and F.S.I.: Category D1 RUDA.]

Sr.No.	Zone	Code	Base F.S.I	Chargeable F.S.I	Maximum Permissible F.S.I
(1)	(2)	(3)	(5)	(6)	(7)
1	City Area - A	GM	2.25	-	2.25
2	City Area - B	GM	2.00	0.5	2.5
3	Gamtal	GM	2.25	-	2.25
4	Gamtal Extension	GME	1.5	-	1.5
5	TOZ	SPD5	1.8	2.2	4.0

Source: Reproduced from UD&UHD (2017)

Uses as per Knowledge and Industrial Zone (KZ) and Residential Affordable Housing (RAH) with respective permissible FSI specified as under:

No.	Proposed Use	BaseFSI	Additional Chargeable FSI @ 40% Of Jantry Rate	
			Within TOZ	Out Side TOZ
1	Knowledge Zone (KZ) & Residential Affordable Housing (RAH)	1.8	2	0.9

Source: Reproduced from UD&UHD (2017)

An Additional Chargeable FAR of 2.0 is permissible at a 40% Jantry Rate within TOZ zone.

[Refer to 20.1.2: Permissible Uses & FSI in Closed Textile Mill Zone (CZ)]

4 Permissible Ground Coverage

Entire Area available after providing for the required margins, Common plot and other Regulations may be utilized for construction of the superstructure.

5 Parking

For Building- Units within the Transit-Oriented Zone with Commercial Use (Mercantile -1), The minimum parking requirement shall be 35% of Total Utilized FAR and 20% of the required parking shall be provided as Visitor Parking.

[Refer Section 13.2.1 Relaxation in Parking]

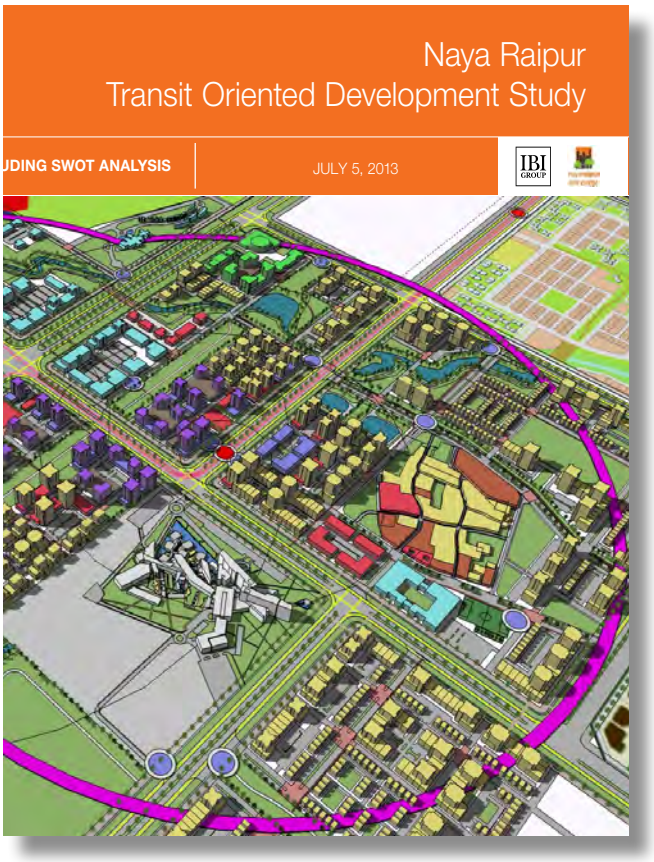
Type of Use	Minimum Parking Required	Visitor's Parking and Remarks
Mercantile-1	35% of Total Utilised FSI	20% of the required parking shall b provided as visitors parking
Note: In case the maximum permissible FSI is not utilised, for any extension/additions in the future, additional parking shall have to be provided as required for this additional utilised FSI.		

Source: Reproduced from UD&UHD (2017)

[Note: good TOD practice in TOD shifts the parking approach to maximum parking requirements instead of minimum ones]

In case of Metro Rail Transit (MRT) corridor the regulations of the Transit Oriented Zone shall be applicable only after finalization and notification of the MRT corridors by the Comprehensive Development Control Regulations – 2017, UD & UHD, Govt. of Gujarat.

NAYA RAIPUR TRANSIT-ORIENTED DEVELOPMENT STUDY



KEY ELEMENTS

1 Multimodal Transit Station

Rapid Transit Stations Local feeder bus stops must be located within 50m of rapid transit stations. Bus stops may be located within station premises or along the street right-of-way. IPT stands must be located within 150m of rapid transit stations. Parking shall be provided for 2-wheelers and cycles within 400m of all rapid transit stations. A parking space for the differently-abled must be provided within close proximity of a rapid transit station. Car drop-off bays must be provided within 150m of rapid transit stations.

Intermediate Public Transport IPT stands should be spread throughout the city, such that an IPT stand should be within 300m walking distance from anywhere in the city. IPT stands should be located such that the resulting passenger queues do not block pedestrian or NMV movement. Clear directions for forming queues at IPT stands shall be placed at all IPT stands.

2 Interconnected Street Pattern

An interconnected street pattern is a traditional urban design technique that reduces congestion, encourages travel choice and supports mixed-use development. Block lengths should not exceed 200m.

	Total ROW Min & Max	Maximum C/C Intervals between Street Intersections
City Arterial Roads		
Major	30m - 48m (excluding green buffer)	200m
Minor	24m - 36m (excluding green buffer)	200m
Intra-Sectoral Roads		
Local Collector Streets	15m - 24m	100m
Neighbourhood Streets	12m - 18m	100m
Shared Village Streets	12m - 20m	
Service Lane	5m - 6m	N/A

Source: Reproduced from NRDA (2013)

3 Mixed Used Development

A mix of diverse and complementary land uses in a compact pattern allows residents and workers to walk to work or to shop rather than driving for all daily needs. All projects and sites within the Mixed Use (MU) zones may have a mix of uses. A variety of shared parks and multi-use public spaces shall be provided, which can be active round-the-clock and open for use by users of a variety of age groups, income groups and gender, and also reduce number and length of trips. Selective plots within the MU Zone shall be applied with vertical mixed-use requirements incorporating 2 or more uses. A minimum of 50% of total street frontage length of any TOD project should have an active frontage with a mix of at least two types of uses with different peak hours of activity stacked vertically, to provide round-the-clock 'eyes on the street'. A minimum of 20% of FAR for all Residential Group Housing projects to be allocated to rental or for-sale housing with unit sizes no larger than 40 sq.m.

4 Walkability

Pedestrian-friendly environments allow walking to be a pleasant, safe, and efficient alternative to (or extension of) the automobile. This includes design features such as safe crossing points near transit stations, shaded pedestrian routes, and continuous sidewalks and paths.

Table 1: Table: Pedestrian Mobility

Table 3: Pedestrian Mobility Standards	
Pedestrian clearance requirements	Minimum clear width = 1.8M
	Minimum clear height = 2.4M
Pedestrian path	Minimum width on residential street = 2M
	Minimum width on commercial/mixed use street = 2.5M
Kerb height	Maximum height = 150MM
Pedestrian crossings	Minimum width = 3M
	Preferred C/C spacing = 100M
Accessibility	Maximum ramp gradient = 1:12
	Minimum ramp width = 1.2M
Pedestrian refuge islands	Minimum width = 2.5M
Bollards	Minimum spacing = 1.2M

Source: Reproduced from NRDA (2013)

Road design standards should be pedestrian-friendly:

Lane widths: narrower lanes encourage slower travel by vehicles. Lane widths on urban streets should not exceed 3M.

Turning radii: tightening turning radii require vehicles to slow down while making turns. Turning radii should not exceed 4.5M for urban streets and 7.5M for arterial streets. Channelized left turn lanes must be avoided.

Kerb extensions: commonly used traffic calming measure at intersections to reduce travel speed.

5 Compact Development

The scale of transit-oriented development approximates the scale of the pedestrian. The extent of these neighborhoods is based on a comfortable walking distance from the edge to center (approximately 400 to 800m in radius).

Table 2: Table: Ground Coverage, FAR, Height and Other Controls

Use Premise (Plot Sizes)	Minimum Ground Coverage (%)	Maximum Ground Coverage (%)	Minimum FAR	Maximum FAR	Maximum Height (m)	Other Controls
A. RESIDENTIAL						
All types in MU - 5	65	85	4		70m (for group housing min 400sqm)	The maximum standard for net density permissible for any TOD project within the SAP is 300 du /ha.
All types in MU - 10	65	85	2		70m (for group housing min 400sqm)	Minimum standard for net density permissible for any TOD project within the SAP is 250 pph.
B. INDUSTRIAL						
Large Flatted Group Industry > 2.25HA not permissible in MU Zones						
C. SPECIAL INDUSTRY						
All types in MU - 5	65	85	4		50m	
All types in MU - 10	65	85	2		50m	
D. COMMERCIAL - RETAIL						
All types in MU - 5	65	85	4		70m	
All types in MU - 10	65	85	2		70m	
E. COMMERCIAL - WHOLESALE						
Wholesale Trade / Warehousing (Integrated development) > 2.25HA not permissible in MU Zones						
F. PUBLIC / SEMI-PUBLIC						
All types in MU - 5	65	85	4		70m	
All types in MU - 10	65	85	2		70m	

Table 3: Table: Minimum Frontage Standards

Street ROW	Minimum Frontage
> 24M	70%
18 - 24M	60%
< 18M	0%

Source: Reproduced from NRDA (2013)

Table 4: Table: Active Frontage Standards

TOD Zone	Minimum Active Frontage for Commercial/ Mixed-use buildings	Minimum Active Frontage for Residential buildings
MU-5	70%	50%
MU-10	50%	30%
Rest of the City	30%	10%

Source: Reproduced from NRDA (2013)

Intermediate Public Transport IPT stands should be spread throughout the city, such that an IPT stand should be within 300m walking distance from anywhere in the city. IPT stands should be located such that the resulting passenger queues do not block pedestrian or NMV movement. Clear directions for forming queues at IPT stands shall be placed at all IPT stands.

6 Street Facing Building

Buildings should be placed near streets, not behind parking areas, to better define the street. Street front retail should be provided to humanize the building wall and activate the sidewalk. Building entrances should be close to transit entrances.

S. No.	Plot Size (in sqm.)	Minimum Setbacks in MU Zones			
		Front	Rear	Side (1)	Side (2)
1	40-60	0	5	0	0
2	Above 60 & upto 120	0	5	0	0
3	Above 120 & upto 250	0	5	0	0
4	Above 250 & upto 500	0	5	0	5
5	Above 500 & upto 1000	0	5	0	5
6	Above 1000 & upto 2000	1	5	3	3
7	Above 2000 & upto 4000	1	5	6	6
8	Above 4000 & upto 10,000	1	5	6	6
9	Above 10,000	1	5	6	6

Source: Reproduced from NRDA (2013)

Within MU zones, maximum front setbacks will be maintained as defined below

S. No.	Use	Maximum Setbacks	
		Public ROW >24m	Public ROW <24m
1	Commercial, retail, offices and non residential Uses	3m	3m
2	Institutional / industrial etc.	3m	5m
3	Residential	5m	5m

Source: Reproduced from NRDA (2013)

7 Bicycle Friendly Streets/Parking

Bicycles are efficient ways to expand the service area of the station without relying on automobiles or bus service. Bike lanes, bike routes, and secure parking make the bicycle an easy option.

Table 9: NMT Standards

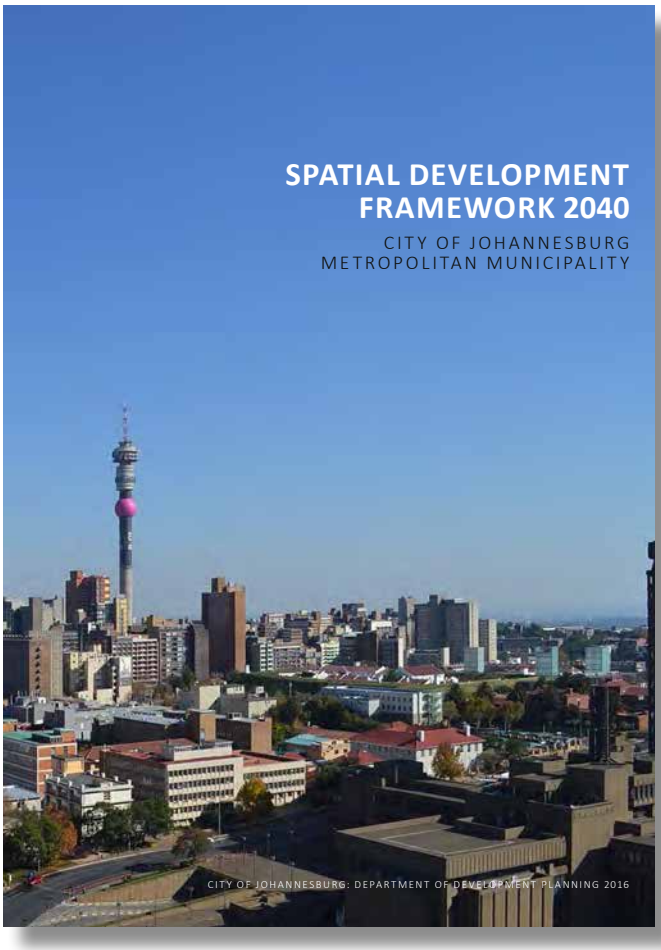
Segregated NMT paths/ trails	Minimum width = 2.5M
	Minimum buffer between NMT path and MV lanes = 1M
Marked NMT lanes	Minimum width = 2M
Vertical clearance	Minimum vertical clearance = 2.5M
Minimum horizontal radius	Minimum horizontal curve radius = 10m
Gradients	Maximum gradient = 1: 30 for length not exceeding 90m.
	Steeper gradients may be allowed for very short distances
	Maximum gradient = 1:70 for length not exceeding 500m.

Source: Reproduced from NRDA (2013)

- Bicycle markings on the roadway shall be clear. NMT paths and lanes should be colored in a distinct color to avoid confusion. NMT conflict zones shall be identified and marked with a different color to alert drivers of impending conflicts with NMVs.
- NMT crossing infrastructure design shall ensure a barrier-free environment for all including, raised crossings and additional traffic calming interventions, audible signals, curb ramps, etc.
- Bicycle boxes may be used at major signalized intersections to provide cyclist priority and safety.
- NMT paths or lanes should never be terminated abruptly due to a sudden change in ROW width or at a T-junction. Ramps should be provided where necessary to enable novice cyclists to shift to pedestrian paths.
- Cyclists should have a clear view of at least 25m straight ahead and 60m ahead on slopes.
- On-street NMT parking should be provided throughout the city, such that at least one NMT parking would be within a 300m radius from anywhere in the city.
- Private commercial developments should be encouraged to accommodate bicycle amenities such as showers, change rooms, and lockers. Incentives should be offered to developers or employers who install such facilities in their premises.

SAMPLE ZONING CODE

SPATIAL DEVELOPMENT FRAMEWORK 2040, CITY OF JOHANNESBURG METROPOLITAN MUNICIPALITY



1 Form-Based codes to supplement zoning in transformation Zone

Introducing Form-Based Codes as spatial policy on a local or regional scale in Johannesburg has the following goals:

- To supplement, not replace, traditional zoning tools to allow for a more desirable built form.
- To define what form the built environment should take, and what land uses should be in place.
- To offer design requirements to be applied in specific areas.
- To deal with context-specific aspects such as interaction with the street (shops and commercial activities, and permeability on the ground floor), height, interaction of building facades, parking location (on street, underground, or in a manner that does not create a parking 'buffer' between the street and the building), pedestrian accessibility and contribution to shared visions for the built environment.

2 Land Value Capture

The infrastructure needed to support new development can be financed, based on the projected returns. It is important in this case, that:

- Rates increases are considered thoroughly, and in consultation with finance experts and lenders to ensure realistic predictions;
- Rates increases from the specific developments are ring-fenced to service the specific infrastructure loans;
- That risk on the infrastructure loans is shared by private developers and the city, to ensure mutual commitment to realizing the goals of such a project;
- Inclusive social return (such as inclusionary housing and a percentage of public space) is set out as a requirement for this type of infrastructure funding.

3 Transit Oriented Development (TOD) Nodes

- TOD is identified as a priority programme, with the objective to encourage the optimal development of transit hubs across the city, that provide access to affordable accommodation, intense economic activities, transport, high-quality spaces, amenities and social services.
- TOD nodes are a key aspect of the compact polycentric vision for Johannesburg. Stations, in this regard, act not only as

points for accessing public transit, but as catalysts for growth. Stations should act as points of departure and arrival and are thus promoted as areas of intensification of high-density, mixed land uses.

- TOD nodes are those that are specifically linked to transit facilities. These nodes should ideally offer a range of mixed uses relating to the function and scale of the transit node. TOD areas have great potential for offering good quality of life through the creation of intense mixed-use precincts that can accommodate a range of economic opportunities within walking distance from public transport.
- These nodes vary in size and function. The largest TOD nodes are anchored by multi-modal stations. A large number of TOD precincts are anchored by PRASA rail stations, however, generally speaking, the development potential around these stations has not been realized. At a more localized scale, BRT stations will contribute significantly to the achievement of TOD precincts in the city. As a matter of principle, low density, single-storey, single-use developments are not acceptable within TOD nodes.

4 Density

The goal of the density regulations is to assist the city in curbing urban sprawl and locating the bulk of the city's residents across all income groups close to urban amenities, specifically public transportation infrastructure, jobs, economic opportunities and social infrastructure.

Higher residential densities will be allowed where developers show that they will deliver inclusionary housing. To qualify, the inclusionary housing proportion of the development must cater to households earning less than R7000 a month, equivalent to USD95 (10/2018), with a total monthly housing cost of 30% of household income per month (for rental or purchase). Density bonuses will be awarded proportionally to the percentage of inclusionary units per development (i.e. 30% inclusionary units would result in a 30% density bonus in du/ha), up to a maximum density bonus of 50%. To qualify, at least 20% of the total units applied for should be for inclusionary housing. The Transit Development Node within 500m walking distance of Rea Vaya/BRT bus station would have a minimum density of 60du/ha.

5 Land readjustment

With land readjustment, a group of neighboring landowners come together in a partnership and pool their land to jointly plan and service their adjoining plots. Part of the land can also be sold to offset development costs. The resulting costs and benefits of the project are equitably shared among public bodies, landowners and developers. During the readjustment, part of the land will often be used for infrastructure or public space. The public sector can stimulate this process by devising incentives that promote collective action.

Land readjustment involves a change in people's legal relationships in the same way that it alters their physical ones. This means that there are three fundamental considerations:

(1) To provide the framework within which relationships can be changed in a clear and predictable manner that results in mutual (public and private) benefit.

(2) To ensure that the framework is fair and will treat individuals and groups equitably, particularly the poor, women and the vulnerable, including private landowners and the wider citizenry of the city.

(3) To provide the vehicle for the implementation of government policy on the ground, legal mechanisms are needed to address issues such as site selection, the level of land contributions, the land valuation mechanism, sales and transfers of land after the project has been announced, handling disputes, combatting speculation, the classification of land in the plan, the types of formal land rights to be allocated, and financial arrangements.

6 Housing

The Spatial Development Framework 2040 provides a housing vision and approach and locational principles for housing, including housing for the poor, state delivered housing, informal settlements, backyard homes and inclusionary housing. The Inner City is targeted to accommodate a large number of new low income and affordable housing opportunities, including public rental housing, mainly through conversion of buildings. The development of inclusionary housing is a key priority to ensure that the City's residents are housed adequately, in close proximity to job opportunities, public transport as well as social amenities.

MODEL ZONING CODE KEY ELEMENTS

FAR AND DENSITY

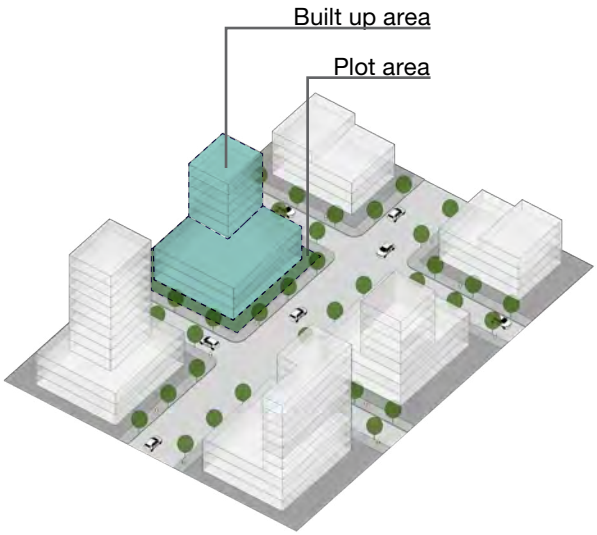
Floor area ratio (FAR) and Density norms are needed to ensure densities are strategically distributed across the urban area as a means to create compact city forms near transit proximities. The FAR is representative of the intensity of built form. It is a function of the total floor area of the building as a fraction of the total area of the development parcel. It is used as an instrument to control the density of a place by imposing maximum permissible FAR norms. In TOD zones, FAR norms need relaxation to allow for higher density buildings.

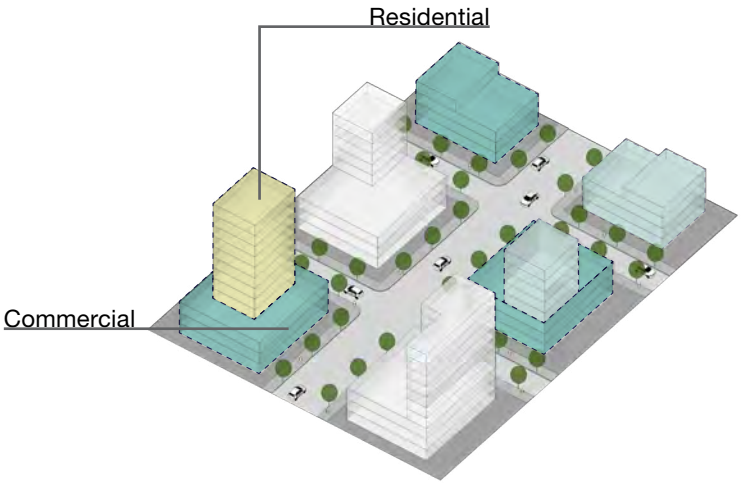
Alternatively, other measures to control residential density are also used, for example, Persons Per Hectare (PPH) or Dwelling Unit Per Hectare (DU/HA) thresholds. The density may also be influenced by norms for building heights, podium heights and step-backs and lot coverage.

MIXED USE

Mixed land use promotes more efficient land use patterns by increasing options for residents to access retail, commercial and civic services, employment and recreational facilities within walking distance. Mixed use is codified in the zoning code through Permissible Land Uses or Building Functions, and Non-Permissible Land Uses or Building Functions. Permissible Land Use/ Building Function Regulations must allow for complementary uses to be mixed, ensuring optimal and shared use of resources such as streets and parking. Non-Permissible Uses must discourage automobile-oriented uses such as large industries, car showrooms, cemeteries, etc.

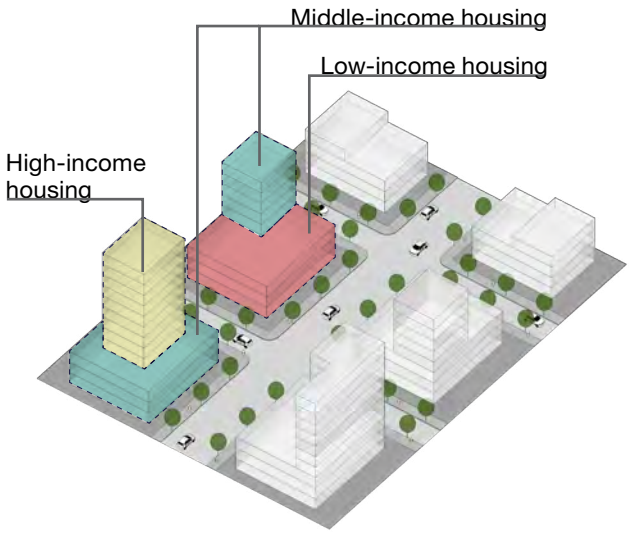
Other Design Guidelines for Mixed Use are suggested in PD-R01 TOD Planning Principles.





HOUSING DIVERSITY

A mix of housing types based on sizes and residential types may be provided within the TOD Zone or Station Area. This will allow for means to ensure that housing affordability is maintained within walking distance of transit. The mix of housing units and types within a corridor or station area can be dictated through minimum standards for inclusionary housing provision or affordable housing incentives. An inclusionary housing provision is operationalized by requiring a percentage of housing units to be within a specific range of unit sizes. The affordable housing incentive provision is operationalized by offering development incentives such as density bonuses or transfer of development rights. Other incentives are suggested in FI-R01 Development Incentives.

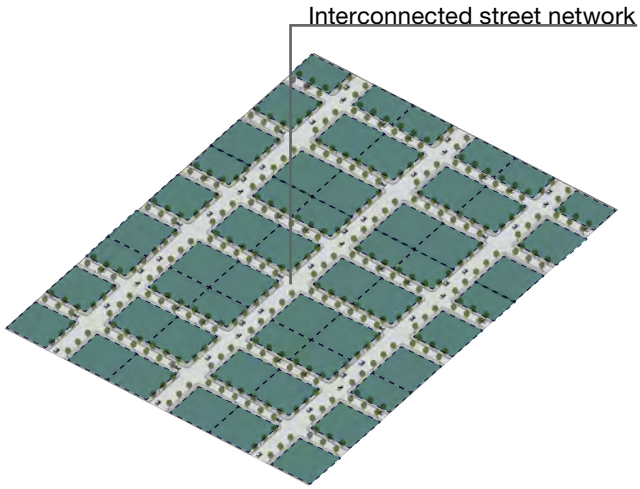


STREET NETWORK

The street network is controlled through block width and street design standards. Landforms, topography, natural features (waterbodies, forests) and physical barriers (railway lines, roads, existing developments) may influence street network standards.

Block widths are intended to increase the intersection density per sq. unit within the station area. Intersection density is the number of intersections in an area. It corresponds closely to block size– the greater the intersection density, the smaller the blocks. Small blocks make a neighborhood walkable.. Additionally, street standards can be provided for public streets within private developments or accessing private sites. These standards depend on the type of roadway and the level of service required and may be codified in the form of minimum widths for pedestrian sidewalks, cycle lanes, and traffic calming requirements.

Other Design Guidelines for Street Network are suggested in PD-R01 TOD Planning Principles.



MODEL ZONING CODE KEY ELEMENTS

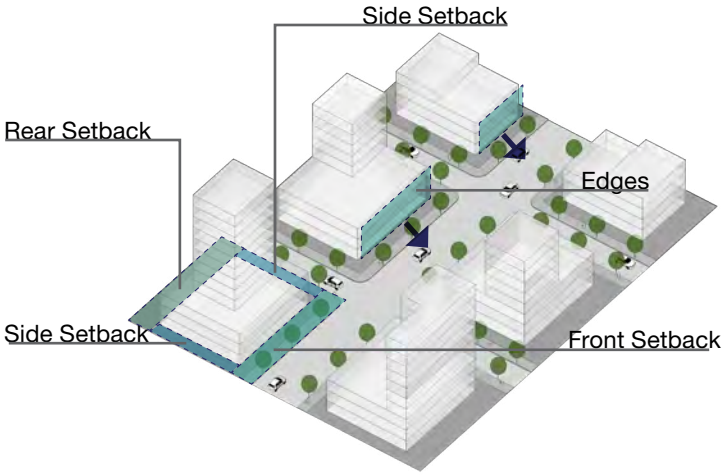
EDGES

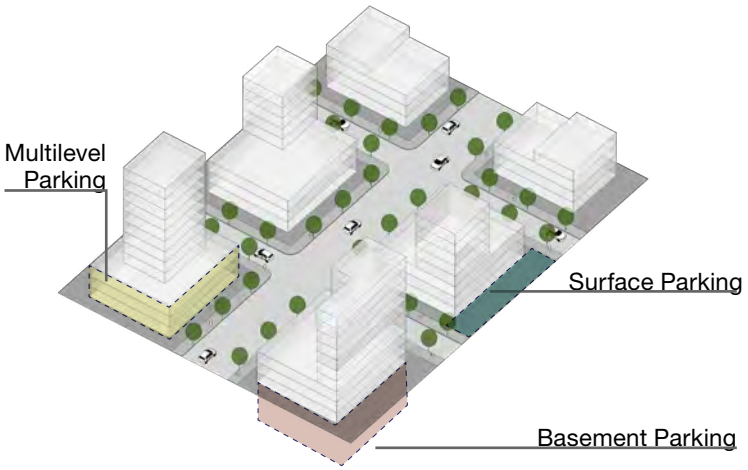
The transition zone between the building and the street is defined by the building setback and street frontage. Building setbacks should be reduced either to zero or shallow setbacks in the TOD Zone or station area to allow for a legible street edge. Buildings should be oriented towards the pedestrian, with active uses located along the sidewalk and not located behind parking lots or blank walls. Optimum setback needs are usually dictated by state/federal firefighting requirements and light and ventilation needs.

Street frontage requirements address the orientation of a building in relation to the street. They typically require a minimum percentage of a building facade to occupy a primary street frontage. Some portion of the frontage may be required to be transparent or interact with the street through shop fronts. Mandatory shop line requirements may be proposed along key streets to ensure active uses are oriented towards the street.

PARKING

Parking needs need to be rationalized in TOD Zones or station areas. Allow for flexibility in parking provisions, based on the specific development and transportation contexts. The trend is to move from minimum parking requirements to maximum parking requirements. Develop adjustment factors that can be applied when evaluating parking supply, while ensuring parking caps and maximums are respected. Shared parking standards and unbundled parking norms may be used to make the most out of parking provisions. The quantity of parking per built-up area impacts maximum development densities. Thus it is extremely important to reduce parking requirements or apply maximum caps if higher densities are proposed.





MODEL TRANSIT-ORIENTED DEVELOPMENT OVERLAY ZONING ORDINANCE

This model template is adapted from the Model Transit-Oriented District Overlay Zoning Ordinance resource by Reconnecting America (Valley Connections 2001). It provides a city the opportunity to create a "TOD Overlay Zone" over an existing base zoning framework. All the development parcels that lie within the TOD Overlay Zone are either required to or have the option to follow the regulations of the overlay zone. When the model template is applied to a city, the TOD Overlay Zone must be clearly defined to avoid ambiguity in property selection.

The original model zoning ordinance is available here: http://www.reconnectingamerica.org/assets/Uploads/bestpractice230.pdf

1. PURPOSE AND INTENT

The purpose of the Transit-Oriented District is to encourage an appropriate mixture and density of activity around transit stations to increase ridership along the transport corridor and promote alternative modes of transportation to the automobile. The consequent intent is to decrease auto-dependency and mitigate the effects of congestion and pollution. These regulations seek to achieve this by providing a pedestrian-, bicycle-, and transit-supportive environment configured in a compact pattern and a complementary mix of land uses all within a comfortable walking and bicycling distance from stations.

Transit-Oriented Development often occurs as infill and reuse within areas of existing development. The regulations within this ordinance vary in some cases from other ordinances related to infill development in the City, because of the additional need to support transit ridership.

OBJECTIVES

The specific objectives of this district are to:

- Encourage people to walk, ride a bicycle or use transit;
- Allow for a mix of uses to create an environment that engages people at the pedestrian scale;
- Achieve a compact pattern of development that is more conducive to walking and bicycling;
- Provide a high level of amenities that create a comfortable environment for pedestrians, bicyclists, and other users;
- Maintain an adequate level of parking and access for automobiles;
- Create fine-grained detail in architectural and urban form that provides interest and complexity at the level of the pedestrian and bicyclist;
- Encourage uses that allow round-the-clock activity around transit stations;
- Provide sufficient density of employees, residents and recreational users to support transit;
- Generate a relatively high percentage of trips serviceable by transit.

INTRODUCING THE OVERLAY ZONE

This is an overlay zone established in Transit-Oriented Development (TOD) principles, which provides the opportunity for mixed-use and higher density development along the transport corridor. This zone takes precedence over all underlying zones, except conservation areas and special areas, by encouraging compact, mixed-use development. Sustainable transit-oriented densification could be achieved through incentivizing the development of additional floor space along the transit corridors and station areas. The concept of Transit Oriented Development shall be adopted for development within this zone, such that the maximum number of people can live, work or find means of recreation within walking/ cycling distance of the transit corridors. This overlay Zone shall establish separate densities and development regulations applicable to any development in the TOD Zone. The TOD Zones will establish high-density environments in the city where bus feeder connectivity is optimum. This zone can benefit from more transit-friendly urban design.

DEFINITIONS

These definitions shall apply only to the Transit-Oriented District Overlay District.

Accessory Dwelling

units that are “secondary” or subordinate to the primary residence and situated on the same lot as the primary residence.

Access way

a formalized path, walkway, or other physical connection that allows pedestrians to efficiently reach destinations.

Clear Window

the amount of glass surface of a window that allows 100% visual permeability.

Commercial Parking Facility

a parking structure or a surface parking lot operated for profit that has parking spaces that are not accessory to a primary use. This term does not include a park-and-ride lot.

Compact Development

the planning concept of using site design and urban design techniques to decrease the amount of land needed to develop a given amount of land use. In the case of TOD, this is done with the goal of improving transit access.

Density

a unit of measurement that divides persons, floor area, or dwelling units per the gross or net measurement of a discreet area e.g., acres, square feet, square miles. Density requirements in this document are expressed as gross densities with the land area including the area of the parcel, specific to the use including its yard and any parking provided, plus the area of one-half of the street right-of-way upon which the parcel fronts.

Drive-Through Facility

facilities allowing transactions for goods or services without leaving a motor vehicle.

Finished Floor

the ultimate grade at which a structural floor will be constructed including added decorative and finished surfaces.

Floor Area Ratio (FAR)

the amount of enclosed gross floor area in relation to the amount of site area. For example, a floor area ratio of 0.5 is equal to one square foot of floor area for every two square feet of site area.

Frontage

the linear edge of a property adjacent to the property line abutting a street, public right-of-way.

Gradient

the change in density, height, and/or land use occurring in stages, degrees, or even and continuous change.

Greenway

a singular or a series of vegetative, linear corridors, natural or man-made, which may contain active or passive recreational uses or which may prohibit human activity altogether in order to preserve sensitive areas. These are usually associated with riparian systems, but may also include transportation corridors.

Human Scale

the size and proportion of a physical element that closely relates to the human body e.g., a 16-foot lamp post vs. a 30-foot lamp post, and a façade with vertically oriented framed windows vs. a façade with a continuous and unarticulated window wall.

Interior of Lot

the area within a parcel that does not contain a side which is adjacent to a public or private right-of-way for an access way or street.

Live-Work

a residential unit that is also used for commercial purposes for a time, with a minimum of 50% of the total building area given to the commercial use within the same structure as the residential component.

Major Pedestrian Route

the primary route or space used by “Pedestrians” as defined in this section.

Mixed-Use

Development contained within a single-parcel (horizontally or vertically) or adjacent parcels that contains different uses that are complementary to each other and provide activity throughout the day.

Open Space

a private or public open land area that is currently undeveloped; it may be maintained as open space into the future or it could be developed.

Parking Structure

a parking garage located above ground or underground consisting of one or more levels, not surface parking.

Park-and-Ride Lot

A parking structure or surface parking lot intended primarily for use by persons riding transit or carpooling, and that is owned or operated either by a transit agency or by another entity with the concurrence of the transit agency.

Parking, Off-Street

formal or informal parking located within a parcel and outside a private or public right-of-way.

Parking, On-Street

formal or informal parking located within a private or public right-of-way and outside of a parcel.

Pedestrian

a pedestrian means people who walk, sit, stand, or use a wheelchair in public spaces, be they children, teens, adults, elderly, people with disabilities, workers, residents, shoppers or people watchers, etc.

Pedestrian Activity

the congregation of persons in an area whose primary means of transportation is by foot.

Pedestrian-oriented Design (PeD)

The design of communities, neighborhoods, streetscapes, sites, and buildings that emphasizes pedestrian access, comfort, and visual interest. Transit-Oriented Design is a particular type of PeD that includes design and intensity of land use to support transit in addition to pedestrians.

Pedestrian Way

a linear space or an area where the primary users are pedestrians and that may also accommodate bicyclists.

Pergola

an arbor or passageway with a roof or trellis on which climbing plants can grow.

Portico

a porch or walkway with a roof supported by columns, often leading to the entrance of a building.

Porch

an open or enclosed gallery or room attached to the outside of a building, typically serving as a semi-public space prior to a building entry.

Primary Front Façade

the façade of a building that is meant to take importance over the remaining façades of a building, typically fronting onto a public or private street or pedestrian access way.

Setback

the distance between the building façade and the property line of the parcel in which the building is located.

Shared Parking

parking that is utilized by two or more uses taking into account the variable peak demand times of each use; the uses can be located on more than one parcel.

Station Area

the core area of the TOD within closest proximity of the transit platform e.g., within 300 to 500 feet of the platform.

Street-Facing

the façade of a building that is adjacent to a public or private right-of-way.

Transit-Oriented Development (TOD)

a development pattern characterized by a mix of uses surrounding a transit platform where streets have a high level of connectivity, blocks are small, and streetscape, buildings, and uses cater to the pedestrian.

Transit Platform

A designated transit loading and waiting area as assigned by the public transit agency.

Transit Station

the area including the platform which supports transit usage and that is owned by the transit authority.

Transit Street

a street that contains s transit line.

Transparent

a surface which allows objects on the other side to be easily seen.

Visual Permeability

the ability of vertical surfaces to allow viewers to see through to the other side e.g., windows and open fencing.

Walking Radius

the distance beyond a central point from which a person is willing to walk. This distance will vary depending on existing barriers, the walking environment, and the availability of destinations.

2. APPLICABILITY AND GENERAL PROVISIONS

The City of _____'s Transit-Oriented Development Overlay District(s) (TOD) shall apply to lands delineated on the City's official zoning map as adopted on _____ and generally within an 800m walking radius (or distance) of a transit platform. All land uses and development including, but not limited to buildings, drives, parking areas, landscaping, streets, alleys, greenways, and pedestrian/bicycle ways designated to be within this district, shall be located and developed in accordance with the following provisions. The standards of the TOD shall not apply to development for which approval was granted prior to the adoption of these regulations and for development for which the city has issued building permits.

3. INCONSISTENCIES OF UNDERLYING DISTRICTS

In the event that the underlying zoning district standards or other ordinance or regulations are inconsistent with these Overlay Zoning Ordinance standards or any other provisions herein, the TOD standards shall control within the specific TOD district.

4. PERMITTED USES

For properties within the Transit-Oriented Development Overlay District the following uses are permitted:

	Retail	Office	Industrial	Mixed-Use	Res>7du/ac	Res<7da/ac
Retail/Commercial						
Convenience Retail						
Retail and Service Uses						
Hotel or Motel Lodging						
Mixed Use						
Live-Work						
Mixed-Use						
Office						
Professional Offices						
Other Offices						
Civic						
Day Care Facilities						
Post Offices						
Schools & Community Buildings						
Government Offices						
Hospitals/Clinics						
Sports Facilities						
Residential						
Single-Family Detached						
Single-Family Attached						
Apartments						
Accessory Units						

5. PROHIBITED USES

For property within the Transit-Oriented Development Overlay District the following uses are prohibited:

- Boat dealers, resellers, repair, and leasing
- Bulk retail and wholesale uses including building materials, food and beverage sales, restaurant suppliers, etc.
- Car washes
- Cemeteries
- Cold Storage Plants
- Commercial Equipment and Construction Equipment, Sales, Service and Rental
- Drive-in Businesses
- Exterior Display of Goods and Exterior Storage
- Funeral Homes and Mortuaries
- Gas Station accessory uses such as mini-marts, convenience food and sundries sales
- Golf Courses including miniature golf courses
- Grocery stores with building footprints over 50,000 square feet
- Heavy Commercial Services
- Heating Fuel Sales
- Junk Yards and Motor Vehicle Wrecking Yards
- Kennels, excluding those accessory to veterinary clinics
- Manufactured Home sale
- Motorized vehicles dealers, resellers, repair, leasing, service stations, including oil and lubrication services, tire and muffler installation and service, body shops, or other motor vehicle services, but excluding retail or wholesale outlets selling motor vehicle parts and accessories without provision for on-site installation
- Nurseries or Greenhouses
- RV Parks or Mobile Home Parks and campgrounds
- Solid waste transfer stations
- “Telecom Hotels”
- Towing services
- Truck stops and Uses Related to Trucking excluding loading and unloading for permitted commercial uses
- Uses that require building footprints over [insert building footprint maximum area desired by jurisdiction, could vary by distance from transit platform and existing station area context, authors of this Model Overlay Ordinance recommend 30,000] sq. ft.10 with the exception of Civic Uses and Sports Facilities.
- Warehouses, Mini-Warehouses, Storage Facilities, and Mini-Storage Facilities (Indoor and Outdoor)

6. DEVELOPMENT STANDARDS FOR PERMITTED USES

SETBACKS AND BUILT-TO-LINE

Setbacks and Build-to Lines for Non-Residential and Mixed-Uses

The following standards shall apply to new non-residential and mixed-use development within the TOD Overlay District.

Table 5: Non-Residential & Mixed-Use Setbacks and Build-to Lines

Distance from Station	Max. Building Setback
0-150m	
150-400m	
400-800m	

Features such as overhangs, porticos, balconies, loggias, arcades, covered (non-enclosed) bicycle parking, pergolas, and similar architectural features placed on the front (street-facing) side of the building are allowed within the setback.

Setbacks and Build-to Lines for Residential Uses

The following standards shall apply to new residential development within the TOD Overlay District.

Table 6: Residential Setbacks and Build-to Lines

Distance from Station	Max. Building Setback
0-150m	
150-400m	
400-800m	

DENSITY, AREA, BUILDING AND REGULATIONS

DENSITY

Densities for Non-Residential and Mixed–Uses:

New non-residential and mixed-use development within the TOD Overlay District shall achieve minimum FARs as stated in the table below and a maximum of 125% of the FAR given in the underlying zone.

Table 7: Non-Residential & Mixed-Use Densities

Distance from Station	Minimum FAR
0-150m	
150-400m	
400-800m	

Densities for Residential Uses:

New residential uses within the TOD Overlay District shall achieve densities according to the following table and a maximum of 150% of the average density given in the underlying zone.

Table 8: Residential Densities

Distance from Station	Min. Residential Density
0-150m	
150-400m	
400-800m	

BUILDING HEIGHTS

For all new development and the vertical alteration of existing development, building heights within the TOD Overlay District shall conform to the following table.

Table 9: Building Heights

Distance from Station	Max. Building Heights
0-150m	
150-400m	
400-800m	

BUILDING ENTRY

If a building is adjacent to the transit platform, transit station, a transit street, or a major pedestrian access way, at least one main building entry shall be oriented to the adjacent transit platform, transit station, transit street and/or major pedestrian access way. A pedestrian way shall be provided from the building entry to the transit platform, transit station, transit street or major pedestrian access way.

To allow for their use, residential porches shall have a minimum clear depth of 2 m and shall be a minimum of 4.6 square meters.

GROUND COVERAGE

New development within the TOD Overlay District shall achieve ground coverage according to the following table or the underlying zoning designation's maximum lot coverage, whichever is higher.

Table 10: Ground Coverage

Distance from Station	Max. Ground Coverage
0-150m	
150-400m	
400-800m	

BUILDING FRONTAGE AND FACADES

In order to support the pedestrian-oriented environment within the TOD station area, building frontages onto streets and open spaces shall be maximized. Building frontage within the TOD Overlay District shall achieve the requirements as outlined in the following table:

Table 11: Building frontage

Distance from Station	Min. Building Frontage as a Percentage of Lot Frontage
0-150m	
150-400m	
400-800m	

Clear windows shall encompass, at a minimum, 50% of the building façade length fronting onto a street within the area from 1 m to 2 m above adjacent interior finished floor and adjacent sidewalk grade. Blank walls shall not occupy over 30% of the principal frontage for non-residential buildings and 50% for residential buildings, and a section of blank wall shall not exceed 6 m feet without being interrupted by a window or entry.

7. STREET AND SIDEWALK REGULATIONS

Minimum Width

Sidewalks within the TOD Overlay District shall have a minimum 75cm clear space for circulation with the exception of residential areas with a density of less than 12 units per acre where the width may be reduced to 1.8 m.

Private Use of Sidewalks

Exterior storage on sidewalks is prohibited. Outdoor seating for food and drink establishments and pedestrian-oriented accessory uses, such as sales display for flowers, small shops, food, or drink stands, are exempt from this requirement. Outdoor service of alcoholic beverages shall be clearly demarcated from public spaces. In all cases, a minimum 8-foot clear pedestrian circulation path shall be maintained along the sidewalk.

Sign Regulations

New signage within the TOD Overlay District shall conform to the standards stated herein and Section.

Signage shall not reduce clear sidewalk width to less than 2.5 m. Opaque signage shall not reduce the visual permeability of street-fronting windows to less than the minimum clear window requirement.

8. PARKING AND LOADING REGULATIONS

Automobile Parking Requirements Per Floor Area or Unit Size and Land Use Type

For new development within the TOD Overlay District, the number of required parking spaces (on-street and off-street) shall be based upon the following table which summarizes the maximum number of parking spaces required for permitted uses:

Table 12: Automobile Parking “Maximums” for Permitted Uses

RETAIL/COMMERCIAL	
Bank	1.0 space for each __ square meters of gross floor area
Bars/Nightclubs	1.0 space for each __square meters of gross floor area
Bed & Breakfast	1.0 space per room or suite of rooms
Bookstores	1.0 space for each __square meters of gross floor area
Convenience Retail	1.0 space for each __square meters of gross floor area
Dry Cleaners	1.0 space for each __square meters of gross floor area
Eating and Drinking Establishments	1.0 space for each __square meters of gross floor area
Hotel or Motel Lodging	1.0 spaces per room or suite of rooms
Live-Work	1.25 spaces per dwelling unit and 1 space for each employee not residing in the dwelling unit
Lodging limited Bed and Breakfast Inn	1.0 space for each room or suite of rooms
MIXED USE	
Mixed-Use	1.0 space for each __square meters of gross floor area
Retail and Service Uses	1.0 space for each __square meters of gross floor area
OFFICE	
Professional Offices	1.0 space for each __square meters of gross floor area
Other Offices	1.0 space for each __square meters of gross floor area

CIVIC	
Day Care Facilities	__ spaces per employee
Gov't Offices	1.0 space for each __square meters of gross floor area
Lodges/Clubs	1.0 space for each __square meters of gross floor area
Hospitals/Clinics	1.0 space for each __square meters of gross floor area
Museums	1.0 space for each __square meters of gross floor area
Post Offices	1.0 space for each __square meters of gross floor area
Schools-Elementary/Jr. High	10 spaces + __ per classroom
Schools-High/College	__ spaces per student and staff
Sports Facilities	1.0 space for each __square meters of gross floor area
Theaters	__ spaces per seat
Worship	__ spaces per seat
RESIDENTIAL	
Studios and Efficiencies	__spaces per dwelling unit
1 Bedroom	__spaces per dwelling unit
2 Bedroom	__spaces per dwelling unit
3 Bedroom	__spaces per dwelling unit
Accessory Units	__space per accessory dwelling unit
AUTOMOBILE PARKING "MAXIMUMS" FOR PERMITTED USES	
Boarding Houses	__space per bedroom
Nursing Home	__space per bed
Elderly Housing	__space per bed
INDUSTRIAL	
Manufacturing/Light Industry	1.0 spaces per__square meter of gross floor area

9. ON-STREET PARKING

For new development occurring within the TOD Overlay District, on-street parking along the use's lot frontage shall count towards the parking requirements for uses on the lot set forth within the regulations of this Overlay District.

10. BICYCLE PARKING

Convenient bicycle facilities should also be provided within the TOD district. The following bicycle parking requirements shall be applied within the TOD district. Bicycle parking shall be provided at 1 space per 186 square meter feet of commercial floor area.

11. OFF-STREET PARKING LOCATION

Non-Residential and Multi-Family Uses

Surface Parking Lots

Off-street parking location for new development within the TOD Overlay District shall conform to the following requirements:

Off-street parking shall be located to the rear and/or interior of a lot such that its visibility from a street shall be minimized. At-grade, above-, or below-ground parking structures shall be permitted. At-grade parking structures shall have a minimum frontage. Surface parking lots shall be placed between the structure and a side or rear lot line. Where a lot fronts onto two or more streets, parking shall be located accordingly:

- Along the street with the least amount of commercial activity
- Along the street with the least amount of pedestrian activity if the lot is located along two or more commercial streets with equal amounts of commercial activity.

A maximum 2 m high wall or fence shall separate parking lots from abutting residential uses with a minimum 1.2m landscaped buffer. Walls and fences shall take on the character of residential uses.

12. SINGLE-FAMILY RESIDENTIAL USES

Garages, whether attached or detached, shall be set back at least 3 m behind the primary front façade of the buildings they serve. The primary front façade shall comprise at least 50% of the overall width of the primary residence and the 3 m setback shall not be measured from projections such as bay windows and porches, but from the façade of the wall which encloses the building.

13. LOCATION OF VEHICLE ACCESS

Conflicts between pedestrians and vehicles entering and exiting parking lots shall be minimized. Access from pedestrian-oriented streets shall be avoided unless no other reasonable access is available, such as in lots with a single street frontage and no alley. Where alleys are present, driveways leading to parking lots, and loading and service areas shall be accessed from the alley. Lots with more than one street frontage and no alley shall locate vehicular access along the street with the least amount of pedestrian activity. All loading and service drives shall be of a depth that prevents loading and service vehicles from obstructing the sidewalk and roadway.

Entrances to loading and service areas shall be screened from view. Access driveways shall not dominate the street frontage. Driveway widths shall be minimized to reduce their presence along the street. Where feasible, driveways shall be consolidated within the single lot and shared with adjacent properties to minimize their encroachment upon sidewalks. Shared driveway agreements shall be utilized where possible for shared parking, and loading and service areas. To avoid encroaching upon sidewalks and creating uneven pedestrian surfaces, driveway slopes shall be located between the roadside edge of the sidewalk and the curb.

14. LOADING AND SERVICE AREA LOCATION

Loading, service, and refuse areas shall be located at the interior of the lot and screened from view with walls, trellises, planting, berms, or by integration into the design of the building. Walls shall not exceed 2 m in height. Solid walls shall be landscaped to soften their appearance and shall be made of finished materials to match the primary building. Decorative elements, variation in materials, and articulation shall be used.

MODEL TOD FORM-BASED CODE

This model template is adapted from the Smart Code Version 9.2 (Center for Applied Transect Studies; 2008). This template is based on the innovative form-based code paradigm, where building standards will be defined based on the station area typology rather than land use.

These Codes may be used as a replacement or as an overlay to the existing base zoning framework. All the development parcels that lie within a specific station area typology would need to adhere to form-based regulations for that specific typology. When the model template is applied to a city, the TOD Station Area Typologies and their boundary delineation must be clearly defined to avoid ambiguity in property selection.

The Original Code is available here: https://transect.org/codes.html

Station areas along corridors are set in different urban contexts, play different roles in the transportation network and present unique challenges and opportunities. Successful approaches to built form around a Station Area that acts as a main interface into the rapid transit network may not be appropriate for a station area that serves as a key transfer point between different modes. Similarly, appropriate intensification strategies at a very urbanized hub may be very different from a regional destination or a greenfield low-density area. Every station area, whether existing or proposed, faces unique challenges and will require specially tailored strategies to develop high-performing TOD projects.

This Form-based Code is prepared for seven key station area typologies that depict typical planning considerations. Station area typologies are typically established based on:

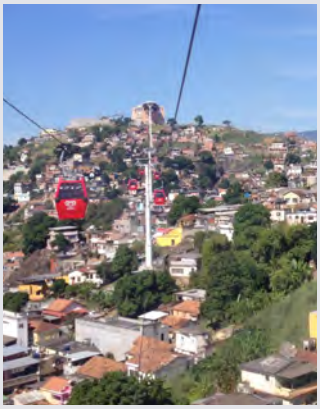
- Existing land use character
- Transport functions including right-of-way, availability of multiple modes, and connectivity to the citywide network
- Land availability for future development
- Susceptibility to change - for example, age of buildings
- Mobility network (including block size and mobility barriers)
- Infrastructure carrying capacity

In the context of low and middle-income countries, typical station area typologies may include:

- Intermodal Gateways
- Employment Centres
- Destination Nodes
- Transit Neighborhoods
- Urban Core(CBD)
- Infill Neighborhoods
- New Residential Area

STATION AREA TYPOLOGIES

	Intermodal Gateways	Employment Centres	Destination Nodes
	 *Milwaukee Intermodal Station*	 *Raffles Place, Singapore*	 *Mahalaxmi, Bangalore*
What are the characteristics of the Station Area?	Significant hubs of transport activity with supporting commercial and informal activities	Significant center of economic and community activity. Stations serve the main public/semi public-amenities & offices of the city.	Stations which provide access to unique destinations.
What is the Character of Land Use Mix & Density?	Moderate- to high-density mix of industrial, commercial, employment, public - semi public / cultural and residential uses.	Moderate to high-density mix of employment, public-semi public / cultural uses. Some residential and local- retail also supported.	Moderate to low-density mix of public-semi public and cultural uses. Some residential and local-retail also supported.
What are the major planning & development challenges?	Integrating dense mix of housing and employment uses while maintaining ease of access to transit stations. Illegal parking and hawker encroachment can create a false sense of congestion.	Introducing housing into predominantly employment/ public-semi-public uses and improving connections/ access to transit.	Creating sustainable off-peak uses and accommodating peak travel demand.
What are land development opportunities?	Moderate chance of land availability	Less possibility of land availability	Less possibility of land availability

Transit Neighborhoods	Urban Core (CBD)	Infill Neighborhoods	New Residential Areas
 *Teleferico Do Alemao, Riode Janeiro*	 *Church Gate, Mumbai*	 *Koh-e-fiza, Bhopal*	 *Guatemala City*
Predominantly residential district with good access to regional and subregional centres	Significant center of economic, community and cultural activity with regional-scale retail destinations.	Predominantly residential districts located just outside the core/old city	Predominantly residential district outside the core/old city area with good access to the core city
Potential for community and regional-serving retail but need to balance demands and conflict with surrounding destination retail.	High-density with commercial uses (>75%) + a moderate mix of other uses such as institutions, and residential within a 5 min (400m) walking radius.	Moderate-to high-density with predominantly residential and moderate mix of Commercial, public semi public & community facilities	Moderate-to high-density mix with predominantly residential supported with commercial & community facilities
Integrating affordable housing in the product mix to increase transit ridership. Provide greater opportunities for commercial activities and informal markets to support household needs.	Integrating high-density housing into existing mix of housing and employment to support local-serving retail and improving connections/ access to transit	Integrating new housing and supporting local-serving retail Improving connections/ access to transit”	Expanding local-serving retail opportunities and high-density housing opportunities
Less possibility of land availability	Mostly infill developments & retrofitting uses	Very less chance of land availability	Moderate chance of land availability

	Note: All requirements in this Table are subject to calibration for local context.	INTERMODAL GATEWAY	EMPLOYMENT NODE	DESTINATION NODE	TRANSIT NEIGHBORHOODS
a.	BASE RESIDENTIAL DENSITY				
	Dwelling units per hectare				
b.	BLOCK SIZE				
	Block perimeter				
c.	THOROUGHFARES				
	Arterial				
	Sub-arterial				
	Collector				
	Neighborhood streets				
	Bike facilities				
	Pedestrian priority streets				
	Shared street				
d.	CIVIC SPACES				
	Park				
	Green				
	Square				
	Plaza				
	Playground				
e.	LOT OCCUPATION				
	Lot Width				
	Lot Coverage				
f.	DEVELOPMENT STANDARDS				
	Minimum height				
	Maximum height				
	Maximum podium height				
	Minimum podium stepback				
g.	SETBACKS - PRINCIPAL BUILDING				
	Front Setback Principal				

URBAN CORE	INFILL NEIGHBORHOODS	NEW RESIDENTIAL AREAS	BASELINE STANDARDS		
			High	Medium	Low
			Highest density should be within 500m catchment	Medium density should be within 1000m catchment	Lower density should be beyond the 1000m catchment
			150m	130m	110m



Dubai, UAE

TOD KP

PD-R02

TOD PLANNING PRINCIPLES



A series of detailed planning principles and design components to formulate TOD plans at various scales of intervention

Type: Reference Document



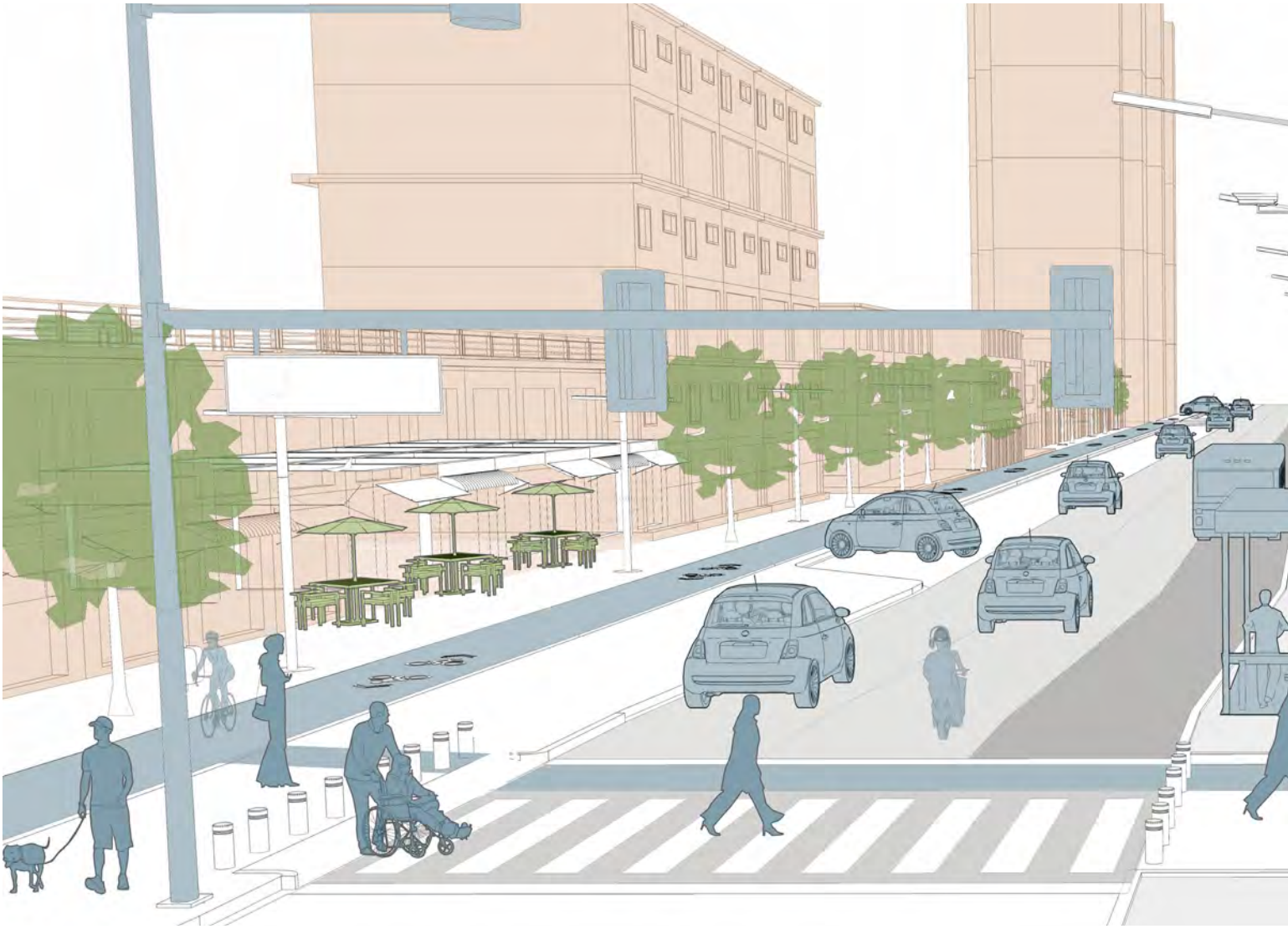
TOD

Global Platform for Sustainable Cities

WORLD BANK GROUP

IBI

TOD DESIGN PRINCIPLES



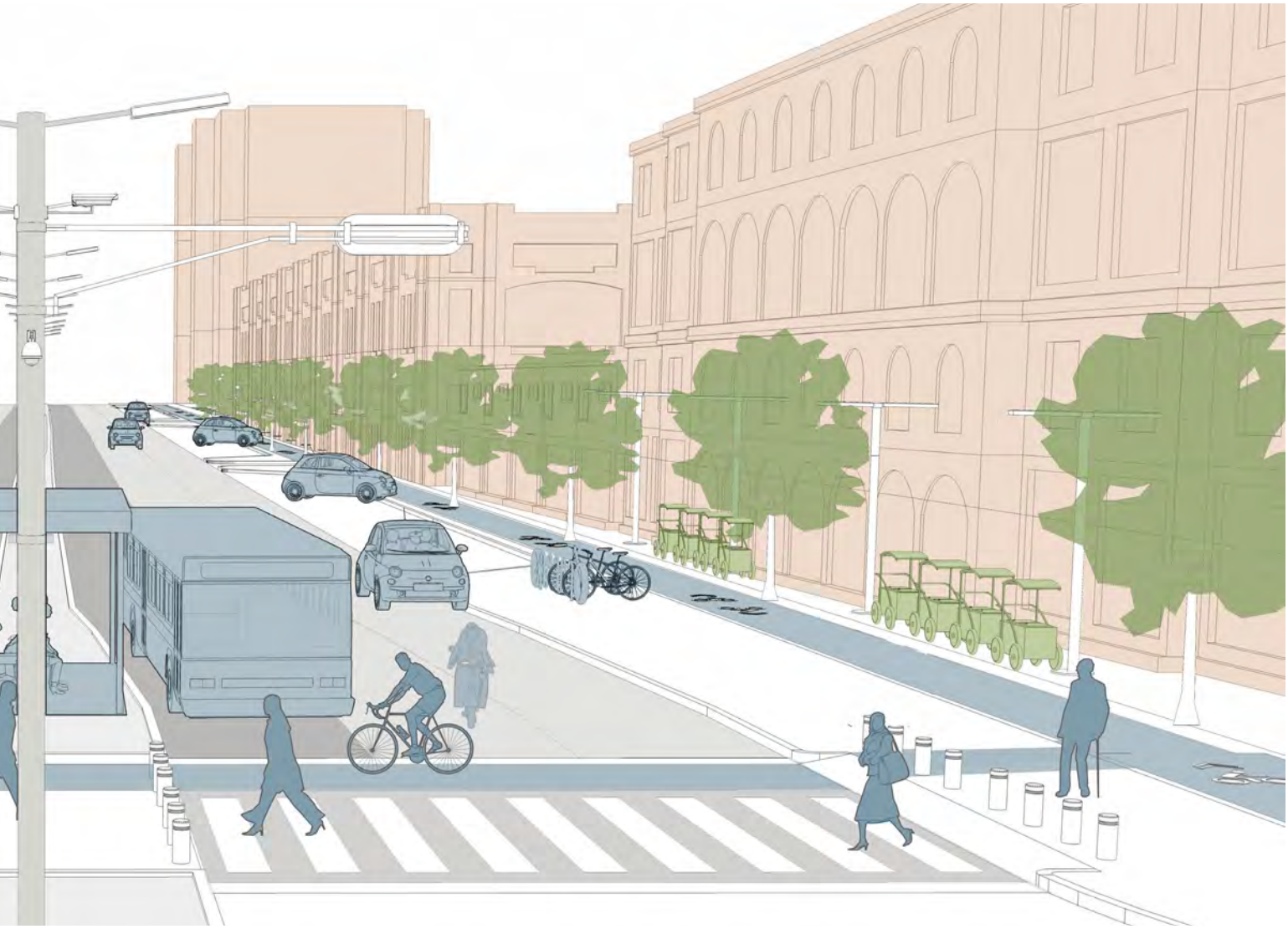
TRANSIT (TRANSPORTATION)

The different transportation modes (transit, walking, bicycle, cars, taxis, etc.) and the infrastructure and amenities (lanes, parking spots, transit stops, stations, sidewalks, etc.) that allow residents to travel safely, conveniently, and comfortably, whichever mode they choose.

ORIENTED (OPEN SPACE)

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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DEVELOPMENT (BUILT ENVIRONMENT)

The public spaces (plazas, patios, parks, sidewalks, etc.) that form the transition between transportation facilities and buildings, also known as 'the spaces between' where the life of the city plays out. Can be public or private property, but should be designed to be accessible, friendly, and fun for all.

The built-up areas, primarily private parcels, where different human activities occur that support varied housing, employment, shipping, and other uses. In the TOD model, buildings should relate to and activate surrounding open spaces and support transit ridership by adequate density.

TRANSIT (TRANSPORTATION) COMPONENTS



WELL DESIGNED TRANSIT SYSTEM

T1

Encourage high-quality station architecture and public realm that is sensitive to the surrounding built context and must provide amenities, including retail, to ensure a comfortable and seamless commuter experience.



MULTI-MODAL INTEGRATION

T2

Seamless integration of transit modes, systems, and routes must be ensured, while considering efficient links to all modes of access, users and abilities, to and from the station.



COMPLETE STREETS

T3

Enable street design that ensures safe access for all users, including pedestrians, cyclists, motorists and transit riders, by providing equitable distribution of road space.



TRAFFIC MANAGEMENT

T4

Incorporate safe speed strategies for traffic around transit stops along with measures on traffic demand management and reduced parking demand to promote sustainable mobility choices.

ORIENTED (OPEN SPACE) COMPONENTS



TRANSIT PLAZA

O1

Promote congregational activities through inclusive and context-sensitive variety in architecture and landscaping around transit stations.



WALKABILITY

O2

Focus on providing an attractive pedestrian environment that is continuous, forms a network and offers an array of experiences and amenities.



PUBLIC REALM

O3

Provide visual interest at the pedestrian scale through thoughtful landscaping and building design, which will encourage people to use the public realm and help contribute to an active street life.

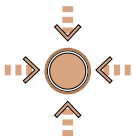


URBAN PARKS & OPEN SPACES

O4

Create open areas such as amenity spaces, green spaces, playgrounds, parks and natural areas, plazas, civic squares, etc. within a five-minute walking radius of residents.

DEVELOPMENT (BUILT ENVIRONMENT) COMPONENTS



COMPACT DEVELOPMENT

D1

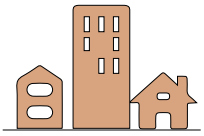
Optimize employment and residential densities along a transit corridor or station area, based on the carrying capacities of transit and NMT infrastructure, to promote walking and transit use.



MIX OF USES

D2

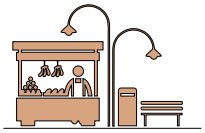
Promote more efficient land use patterns by providing residents with access to retail, commercial and civic services, employment and recreational facilities without needing to travel by automobile.



HOUSING DIVERSITY

D3

Provide a diversity of housing choices, which includes a mixture of types, styles, price ranges and tenure, within a 10-minute walking distance from a transit station, to foster the creation of equitable TODs.



INFORMAL SECTOR INTEGRATION

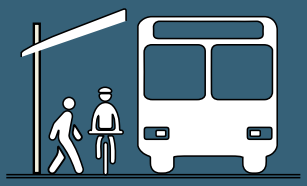
D4

Strive to achieve inclusive development in TODs by addressing the needs of the informal sector in all aspects of policy, planning and design for street vendors, settlements and transportation services

TOD SUPPORTIVE PRINCIPLES

CLIMATE RESILIENCE	S1	Identify high-risk areas to design TOD projects in consideration with the anticipated hazards and failures associated with climate change & environmental variations. ***Reference: Climate resilient development index: theoretical framework, selection criteria & fit-for-purpose indicators, European Commission*** *(https://ec.europa.eu/jrc/sites/jrcsh/files/ReqNo_JRC94771_lb-na-27126-en-n.pdf)*
INCLUSIVENESS	S2	Adopt inclusive development of TOD areas at all stages & scales by means of incorporating the needs of diverse user groups including gender, age, abilities & socio-economic segments. ***Reference: Towards an Inclusive and Low Carbon Transit Oriented development in Indian Cities, Shakti Foundation*** *(http://shaktifoundation.in/wp-content/uploads/2017/11/TOD-India.pdf)*
LAND VALUE CAPTURE	S3	Adopt development based land value capture as a financial mechanism for upgrading infrastructure along TOD corridors and station areas. ***Reference: Financing Transit Oriented Development with Land Values, World Bank Group, 2015*** *(https://openknowledge.worldbank.org/handle/10986/21286)*
UNIVERSAL ACCESSIBILITY	S4	Meet and exceed the requirements of accessibility guidelines and standards of all users with different abilities in building or retrofitting pedestrian environments. ***Reference: Environment for Disabled and Elderley Persons, CPWD (1998)*** *(http://cpwd.gov.in/Publication/aged&disabled.PDF)*
SUSTAINABLE INFRASTRUCTURE	S5	Prioritize and implement innovative green building practices in all aspects of providing or upgrading infrastructure including, energy, water, landscape and waste management. ***Reference: LEED for Neighbourhood Development*** *(https://www.nrdc.org/cities/smartgrowth/files/citizens_guide_LEED-ND.pdf)*
BICYCLE FRIENDLY	S6	Expand accessibility in TOD areas by promoting bicycles as an alternate or preferred sustainable and healthy mode of choice. ***Reference: National Guidance Document on Public Bicycle Sharing, MoHUA*** *(http://mohua.gov.in/cms/sustain-sutp-PBS.php)*
TECHNOLOGY INTEGRATION	S7	Adopt smart technologies within TOD projects such as fare integration, smart parking, real-time information, to provide public transit service an edge over automobiles. ***Reference: ITS Toolkit, IUT*** *(http://www.iutindia.org/capacityBuilding/Toolkits.aspx)*

T1



WELL DESIGNED TRANSIT SYSTEM

Encourage high-quality station architecture and public realm that is sensitive to the surrounding built context and must provide amenities, including retail, to ensure a comfortable and seamless commuter experience.

RISK & MITIGATION

- Transit agencies have a strong say on where the transit infrastructure is built, and hence influence the potential of TOD. Often, the transit stops are planned in less expensive locations, far from jobs and housing areas, which diminish the outcomes early on.
  Transit station designs are many times planned by transit agencies without considering options for joint developments or other mechanisms to improve integration at the station area scale.
- Placement of transit stops has to be in concurrence with the emerging locations that foster private development.



Recreio Shopping BRT station, Rio de Janeiro, Brazil

1. DESIGN CONTEXT-SPECIFIC TRANSIT SYSTEMS

- Transit corridors must be located in proximity to a city's current or planned urban footprint. City officials must assess where enough transit demand exists to sustain public transportation, or where there is potential for future development (based on integrated land use and transportation plans), and route primary and secondary transit systems to these areas in order to accommodate and create demand.

  -Module 4: Design Components of TOD, WRI, 2015

- A TOD corridor should be designed with the goal of incorporating and connecting as many types of transit systems to one other to create a more robust transit network, but not all stations across a corridor will demand the same variety and capacity of transit options. The types of transit options will depend on various factors including proximity to the urban core, and to dense residential and economic hubs.

  -Module 4: Design Components of TOD, WRI, 2015

- When planning a TOD corridor, it is necessary to understand the existing demand at each station, based on existing and projected economic conditions. This will help to prioritize the stations that should plan for the greatest hierarchy of public transit systems.

  -Module 4: Design Components of TOD, WRI, 2015

- Consider a transit alternative analysis to determine the most effective and cost-efficient mode for the context.
  - Bus Rapid Transit System should be considered for demand greater than 2000 passengers per hour per direction.

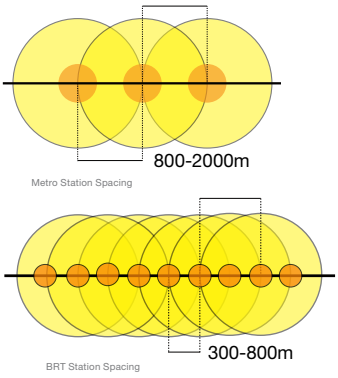
  -TOD Guidance Document, MOUD, 2016

  - Metro Rail should be considered for demand greater than 15000 passengers per hour per direction.

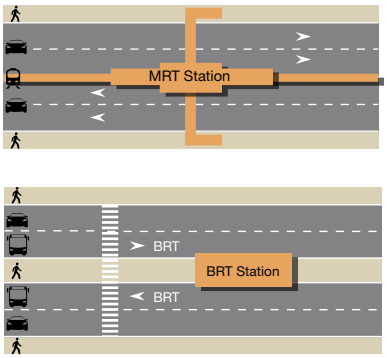
  -TOD Guidance Document, MOUD, 2016

+ REFER OTHER PRINCIPLES

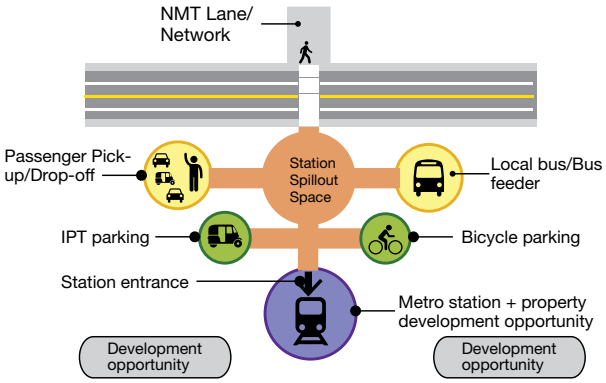
T1 T2 T3 T4 | O1 O2 O3 O4 | D1 D2 D3 D4



Station Spacing | *source: MOUD, 2016*



Station Placement | *source: MOUD, 2016*



Multi-modal integration at transit station | *source: MOUD, 2016*

2. CREATE BARRIER FREE MOVEMENT SPACES

- The maximum acceptable walking distance to the nearest rapid transit station is defined as 1,000m and 500m for a frequent local bus service that connects to a rapid transit network within less than 5 kilometers.

  -Adapted from TOD Standard, ITDP, 2017

- The transfer station should be designed for short, convenient and all-accessible connections with the rapid transit service.

  -Adapted from TOD Standard, ITDP, 2017

- In addition to variety, efforts should be made to integrate the various forms of public transit. This can be achieved through measures such as integrated fare systems across the different systems; easy access to transfer between systems, and combined operations to ensure higher quality, complementary and complete public transit system network.

  -Module 4: Design Components of TOD, WRI

3. PROVIDE CUSTOMER AMENITY TO ENHANCE COMFORT, SAFETY AND INFORMATION

- Convenience: Provide retail opportunities at transit stations to offer food, drink and services such as banks or dry cleaners.
- Comfort and Safety: Transit stations should provide comfortable and secure places to sit and wait with amenities such as washrooms and secure bike storage.
- Information: Provide a high level of customer service at stations, including staffed customer service kiosks, real-time and static information displays, wireless internet and pay telephones.

  -Adapted from Mobility Hub Guidelines, Metrolinx, 2011

+ REFER OTHER KNOWLEDGE PRODUCTS

AS A01, A02, H02, P02 | EN C01, C02, H01, R01, P01 | PD H01, H02, H03, R03, P01 | FI A01, A02, H01, H02, R01, R02, R03 | IM A01, A02, H01, H02, P01

T2



MULTI-MODAL INTEGRATION

Seamless integration of transit modes, systems, and routes must be ensured, while considering efficient links to all modes of access, users and abilities, to and from the station.

RISK & MITIGATION

- Different agencies for various modes of transit, with lack of inter-agency coordination, hinders the seamless and efficient integration of transit for users.
- A multi-agency task force could be set up to address the interdependent needs of multi-modal integration at various levels from planning routes to provision of PPUDO at transit stops.



Informal transit at MG road metro station, Delhi, India

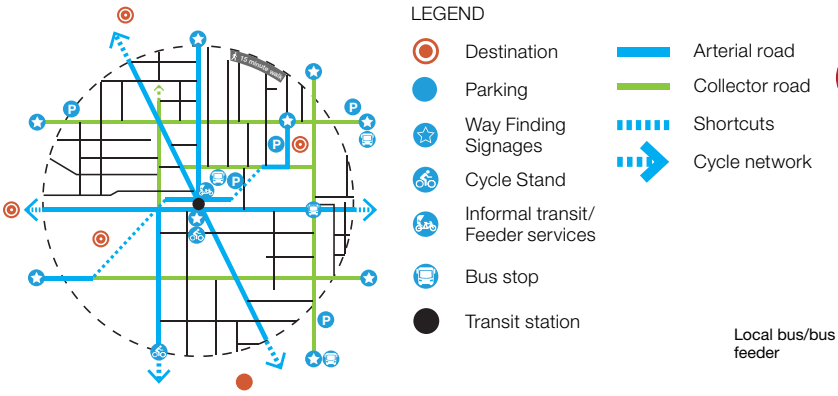
1. DESIGN FOR EFFICIENT INTER-MODAL TRANSFERS TO CREATE A SEAMLESS TRANSIT EXPERIENCE

- Coordinate local feeder transit service schedules and routes to provide seamless connectivity between local, regional, and rapid transit services by reducing waiting times.
- Adopt transit priority measures to ensure the efficient movement of surface transit to and from the station area. Intermodal integration of formal public transport, paratransit and cycle sharing should be within 200m from each other.

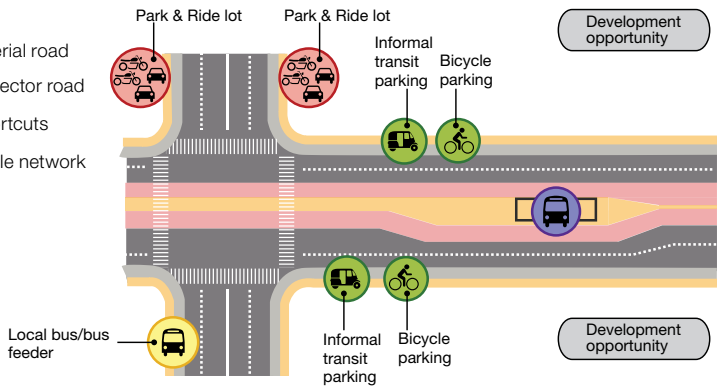
APPROX. WALKING DISTANCE FROM EXITS	FACILITY/AMENITY AND PREFERRED LOCATION:
Within 100 m	Bus stops; vendor zones; convenience shopping; cycle-rental station, high occupancy feeder stop/ stand, public toilets; pedestrian-only plazas.
Beyond 100 m	Private car/taxi “drop-off” location only; validated car parking facility for metro users (park & ride) may be provided.
Within 500m	Cycle-rickshaw stand; cycle-parking stand; informal transit and ride-sharing services/auto-rickshaw stand, improved lighting, proper signage, information for modal interchange and way-finding; interchange between any two mass rapid transit modes (Railway, Metro, RRTS, etc.)

+ REFER OTHER PRINCIPLES

T1 T2 T3 T4 | O1 O2 O3 O4 | D1 D2 D3 D4



Different access and mobility solutions around transit station | *source: MOUD, 2016*



Multi-modal options at transit station | *source: MOUD, 2016*

2. FOCUS ON THE NEEDS OF FIRST AND LAST MILE CONNECTIVITY

- Dedicated and physically segregated bicycle tracks with width of 2m or more, one in each direction, should be provided on all streets with total motor vehicle carriageway larger than 10m (not ROW) after providing adequately sized footpaths in each direction based on pedestrian traffic.

  -Adapted from TOD Guidance Document, MOUD, 2016

- Provide designated parking for informal transit within 150m of walking distance from the station exit.

  -Adapted from TOD Guidance Document, MOUD, 2016

- Cycle rickshaw parking and three-wheeler parking bays of 1.5m width should be provided near the junctions.

  -Adapted from TOD Guidance Document, MOUD, 2016

- Desired average waiting time for a pedestrian is not more than 45 seconds.

+ REFER OTHER KNOWLEDGE PRODUCTS

AS A01, A02, A04, H02, P02 | EN C01, C02, H01, R01, P01 | PD H01, H02, H03, R03, P01 | FI A01, A02, H01, H02, R01, R02, R03 | IM A01, A02, H01, H02, P01

T3



COMPLETE STREETS

Enable street design that ensures safe access for all users, including pedestrians, cyclists, motorists and transit riders, by providing equitable distribution of road space.

RISK & MITIGATION

- Addressing competing needs of space from diverse user groups in an existing built context deters the objective of designing complete streets due to lack of available space.
- Street upgrades within various agencies and different timelines hinders the implementation of complete streets.
- Prioritizing other initiatives that help support the complete streets objective including traffic management, promoting walking & bicycling culture to be addressed in parallel.
- Inter-agency coordination and institutional support to bring the agencies together mitigates the risks on differing timelines.



W Pender Street & Hornby Street, Vancouver, Canada

1. DESIGN THE STREETS FOR THE ENTIRE RIGHT OF WAY

- Multi-Utility Zone (MUZ) of minimum 1.8 m width should be provided on all Collector and Arterial Roads, to accommodate bus stops, street utilities, trees, street furniture, planting for stormwater management; informal transit and ride-sharing services/ NMT stands, paid idle parking, etc.

-Adapted from TOD Guidance Document, MOUD, 2016

2. CREATE A BALANCE BETWEEN NEEDS OF ALL USERS AND MODES OF TRAVEL

- No vehicular street R/W within 500m of TOD station shall be more than 30m unless already notified in the Master Plan.

-Adapted from TOD Guidance Document, MOUD, 2016

- In a slow-speed local street (below 30 km/h), the optimum width for a carriageway is 3 m for one-way movement and 4.5 m for two-way movement.

-Adapted from TOD Guidance Document, MOUD, 2016

- Create dedicated and protected bike lanes, at least 3 meters wide in each direction, on all streets except low-speed local streets.

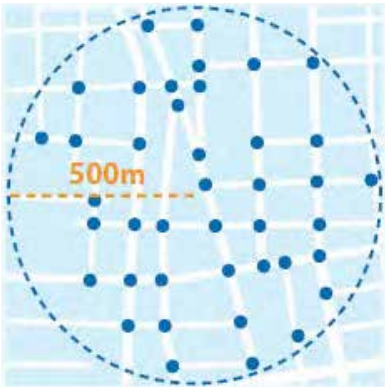
-Adapted from The Energy Foundation, 2012

+ REFER OTHER PRINCIPLES

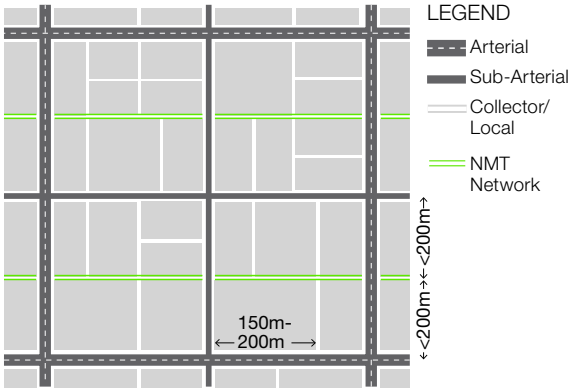
T1 T2 T3 T4 | O1 O2 O3 O4 | D1 D2 D3 D4



Building Edge-to-Edge Design | *source: MOUD, 2016*



Intersection Density | *source: MOUD, 2016*



Block Sizes & Street Hierarchy | *source: MOUD, 2016*

3. DESIGN STREETS IN CONTEXT TO ITS ABUTTING LAND USES

- A continuous unobstructed footpath on each side of all streets with ROW wider than 12m. Commercial/Mixed Use- 2.0m, Shopping frontages- 2.5m, Bus Stops- 3m, High-Intensity Commercial Areas-4m.

  -Adapted from TOD Guidance Document, MOUD, 2016

- Building edges and building frontages should be incorporated in the street design.
- Building frontages should be accessible to the public as far as possible.

4. DEVELOP AN INTERCONNECTED STREET NETWORK TO PROVIDE DIRECT CONNECTIONS TO THE TRANSIT STATION

- Block sizes should be minimized to avoid the creation of inhospitable superblocks. These types of long blocks can deter walking, as they increase the perceived distance between locations. Recommended block size: 150-200m (WRI +MOUD)

  -Adapted from TOD Guidance Document, MOUD, 2016

  -Module 4: Design Components of TOD, WRI, 2015

- Area of blocks surrounded by public access pedestrian/cyclist streets or pathways not to exceed 2 ha. In existing built-up areas, statutory planning to be done for breaking up blocks with an area of more than 2 Ha, to provide publicly accessible pedestrian thoroughfare.

  -Adapted from TOD Guidance Document, MOUD, 2016

- Preferred density of pedestrian-friendly intersections: 50 intersections per square km.

  -Adapted from TOD Guidance Document, MOUD, 2016

- Hierarchy of street network:
  - Arterial - 50m to 80m - 50km/hr
  - Sub-Arterial - 30m to 50m - 50km/hr
  - Distributor - 12m to 30m - 30km/hr
  - Access - 6m to 15m - 15km/hr

+ REFER OTHER KNOWLEDGE PRODUCTS

AS H03, P03 | EN C01, C02, H01, R01, P01 | PD H01, H02, H03, R03, P01 | FI A01, A02, H01, H02, R01, R02, R03 | IM A01, A02, H01, H02, P01

T4



TRAFFIC MANAGEMENT

Incorporate safe speed strategies for traffic around transit stops along with measures on traffic demand management and reduced parking demand to promote sustainable mobility choices.

RISK & MITIGATION

- Growing dependency on automobile coupled with the tendency to sprawled development.
- Lack of appropriate parking policies and provision of distinct parking supply to address the needs for parking.
- Sensitizing officials in charge of traffic and transportation towards the needs of transit and NMT users.
- Adequate measures on updating policies and enforcement of traffic rules to focus on NMT users and their needs.



Park and Ride facility at Chattarpur Metro Station Parking, Delhi, India

1. REDUCE VEHICULAR TRIPS IN THE STATION AREA

- Vehicle Demand Management (VDM): Adopt strategies and policies to reduce or redistribute travel demand for private vehicles. Discouraging use of private vehicles by means of congestion pricing, registration fee, alongside with provision of high-quality public transit facilities are some of the means to address VDM.

  -Module 4: Design Components of TOD, WRI, 2015

- On streets with ROW of 18m or less, if pedestrian traffic is greater than 8000 per hour in both directions together, the entire ROW should be notified for pedestrianization.

  -Adapted from TOD Guidance Document, MOUD, 2016

- Streets meant primarily for NMT movement as well as all streets of ROW 12m or below, should be limited to a maximum speed of 20km/hr by design.

  -Adapted from TOD Guidance Document, MOUD, 2016

- Narrow streets that allow one-way motor traffic, as well as bicycles and pedestrians, will significantly reduce congestion. Replace major arterials wider than 45m with efficient one-way couples (two narrower one-way couples).

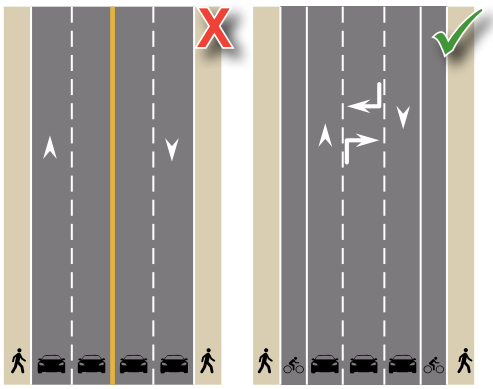
  -Adapted from The Energy Foundation, 2012

+ REFER OTHER PRINCIPLES

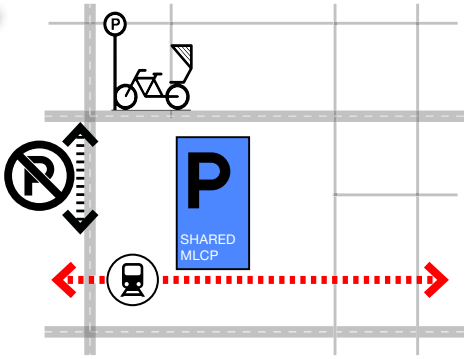
T1 T2 T3 T4 | O1 O2 O3 O4 | D1 D2 D3 D4



Traffic calming | *source: WRI, 2015*



Appropriate allocation of road space | *source: MOUD, 2016*



Station Parking | *source: MOUD, 2016*

2. OPTIMIZE TRAFFIC SPEEDS ON HEAVY TRAFFIC ROADS TO PROTECT MULTI-MODAL USERS AT TRANSIT STATIONS

- Disperse high traffic volumes over multiple parallel human-scale streets rather than concentrating traffic on fewer major arterial streets.

  -Adapted from TOD Guidance Document, MOUD, 2016

- Limit speed on urban arterial roads and sub-arterial streets to 50kmph and on collector and local streets to 30kmph.

  -Adapted from TOD Guidance Document, MOUD, 2016

- Traffic calming of all streets with ROW of 12m or less through the narrowing of driveways and meandering path with the use of trees, islands and street furniture.

  -Adapted from TOD Guidance Document, MOUD, 2016

- Mid-block crossings every 250m on average. Min: 5 safe street-level crossings/km.

3. REGULATE PARKING NEEDS AROUND THE STATION AREA

- Short-Term Parking (on-street & off-street): Approximately 70% of the total parking space/slots capacity to be kept for short-term parking near the station.

  -Adapted from TOD Guidance Document, MOUD, 2016

- Park-and-Ride Lots: Park-and-Ride facilities for private modes may be provided only at Terminal MRTS Stations or major Multimodal Interchanges.

  -Adapted from TOD Guidance Document, MOUD, 2016

- Special parking spaces should be designated on-street for differently abled, at a ratio of 1 for every 25 parking spaces. These parking spaces should have 1.2m access zones.

- At least 50% and preferably 100% of the total parking facilities (based on ECS) provided for any new/ redevelopment/retrofit project greater than 2000 sq.m. plot area, shall be provided as a Shared Parking facility.

- Minimum parking rates may be fixed but maximum rates be variable based on market forces, similar to all real estate space in the city.

- Increase fee exponentially with decreasing distance to BRTS/Metro Rail stations.

+ REFER OTHER KNOWLEDGE PRODUCTS

AS A01, A02, A04, H02, P02 | EN C01, C02, H01, R01, P01 | PD H01, H02, H03, R03, P01 | FI A01, A02, H01, H02, R01, R02, R03 | IM A01, A02, H01, H02, P01

O1

TRANSIT PLAZA

Promote congregational activities through inclusive and context-sensitive variety in architecture and landscaping around transit stations.

RISK & MITIGATION

- Transit route planning involves alignments passing through various contexts and space constraints, risking the provision of transit plazas at stops. Provision of standardized transit stop designs that lack distinguished character prohibits consideration of transit plaza Lack of sufficient land ownership by the transit agency.
- Station area plans should be made along with transit plans so that appropriate plazas are also designed. Space for transit plaza could be created through urban design guidelines or regulations over private properties.



Transit Plaza at centre square MRT, Raffles Place, Sinagapore

1. ADOPT MEASURES TO CREATE EFFICIENT AND DISTINCT CIRCULATION AREAS THAT CATER TO INTER-MODAL TRANSFER AROUND TRANSIT STOPS

- Adopt transit priority measures to ensure the efficient movement of surface transit to and from the station area.

-Adapted from Mobility Hub Guidelines, Metrolinx, 2011

- Provide clearly marked and protected access for pedestrians and cyclists at station areas to minimize conflicts, particularly at passenger pick-up and drop-offs (PPUDO), bus facilities, and parking access points.

-Adapted from Mobility Hub Guidelines, Metrolinx, 2011

- Provide secure and plentiful bicycle parking at station entrances with additional cycling amenities at high volume locations.

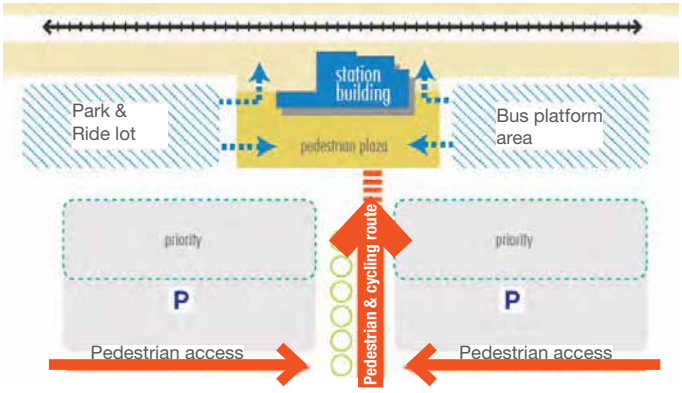
-Adapted from Mobility Hub Guidelines, Metrolinx, 2011

+ REFER OTHER PRINCIPLES

T1 T2 T3 T4 | O1 O2 O3 O4 | D1 D2 D3 D4



Protected pedestrian zone at transit station | *source: MOUD, 2016*



Transit plaza connections | *source: Metrolinx, 2011*

2. PEDESTRIAN FIRST MEASURES HAVE TO BE PRIORITIZED AROUND THE TRANSIT PLAZA

- Provide an attractive pedestrian environment with a high level of priority, safety, and amenities.

  -Adapted from Mobility Hub Guidelines, Metrolinx, 2011

- Ensure the plazas respond to local needs both functional and architectural.

  -Adapted from Mobility Hub Guidelines, Metrolinx, 2011

- Public plazas with community amenities such as gathering places, public information kiosks, public art displays and opportunities for small convenience-oriented retail uses.

  -Adapted from Mobility Hub Guidelines, Metrolinx, 2011

- In waiting areas, include a variety of comfortable seating types and locations.

  -Adapted from Mobility Hub Guidelines, Metrolinx, 2011

- Use fountains, landscaping and building elements (such as low walls) to buffer traffic noise.

  -Adapted from Mobility Hub Guidelines, Metrolinx, 2011

- Incorporate natural landscape elements and other green design features such as drought-resistant plantings, permeable surfaces and recycled/able materials.

  -Adapted from Mobility Hub Guidelines, Metrolinx, 2011

- Recommended area of pedestrian spill out space > 1.9 sqm/ped.

  -Adapted from TOD Guidance Document, MOUD, 2016

+ REFER OTHER KNOWLEDGE PRODUCTS

AS | EN C01, C02 | PD H03, H04, H05, H06, P01 | FI A02, H02, R01, R03 | IM A01, A02, H01, H02, P01

O2



WALKABILITY

Focus on providing an attractive pedestrian environment that is continuous, forms a network and offers an array of experiences and amenities.

RISK & MITIGATION

- Lack of technical capacities and sensitivity towards pedestrian needs.
  Lack of a walkable mix of uses because of discordant land use regulations.
- Consider formulation of NMT cells within at relevant levels within the local authorities to address the needs of walking.



Pedestrian Amenities, Tianjin, China

1. PROVIDE APPROPRIATE NETWORK AND WIDTH OF CONTINUOUS FOOTPATHS

- A concerted effort to create connected & contiguous networks for cycling & walking must be made at the corridor level, detailed to the level of each station area.
- Adopt sidewalks to be designed using a three-section strategy:
  - Service zone: contains space allocation for urban furniture, vegetation, stormwater management and infrastructure
  - Pedestrian flow zone: strictly dedicated to pedestrian movement, free of all obstructions. This zone must cater to all users with different abilities and age groups moving in both directions.
  - Front-of-building zone: transition zone from public to private property, could be utilized for outdoor seating, signage, porches, planting etc.
  - Additionally, a fourth zone could be added, if space permits for bicycles, as an additional section of the sidewalk of as part of the street.

+ REFER OTHER PRINCIPLES

T1 T2 T3 T4 | O1 O2 O3 O4 | D1 D2 D3 D4



Pedestrian environment | *Source: MOUD, 2016*



Active street edge | *Source: MOUD, 2016*

2. MAKE WALKING A COMFORTABLE CHOICE

- Street trees:
  - At least 125 trees per km for streets with ROW smaller than 12m.
  - At least 125 trees per km per footpath on streets with ROW greater than 12m.
- Street Lighting: Spacing should be uniform with the distance based on the minimum illumination required.
- Street Furniture: Benches, trash, receptacles, bollards, vending kiosks, signage to be provided adequately.
- Public Facilities: Provide Accessible Public Toilets at every 500-800m distance – preferably located close to bus stops for easy access by pedestrians and public transport users.

-Adapted from TOD Guidance Document, MOUD, 2016

3. MAINTAIN ACTIVE STREET EDGES TO CREATE SAFE WALKING

- Active frontages include arcades, shopfronts, entrance doorways, access points, entry/exits and transparent windows of active areas facing the primary access street.

-Adapted from TOD Guidance Document, MOUD, 2016

- Primary pedestrian access for buildings from the main street, with location as per shortest walking distance from nearest bus-stop.

-Adapted from TOD Guidance Document, MOUD, 2016

- Vehicular/service access should be from secondary street wherever access to the building is possible from multiple streets.

-Adapted from TOD Guidance Document, MOUD, 2016

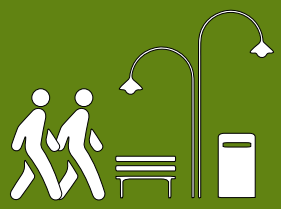
- Compound walls, if present, should be transparent above a height of 100cm. High-security government buildings may apply for an exemption.

-Adapted from TOD Guidance Document, MOUD, 2016

+ REFER OTHER KNOWLEDGE PRODUCTS

AS A01, A02, A04, P02	EN C01, C02, H01	PD H03, H04, H05, H06, P01	FI A02, H02, R01, R03	IM A01, A02, H01, H02, P01

O3



PUBLIC REALM

Provide visual interest at the pedestrian scale through thoughtful landscaping and building design, which will encourage people to use the public realm and help contribute to an active street life.

RISK & MITIGATION

- Lack of micro-planning mechanisms or allocation of budgets with public agencies hinders the investments in public realm improvement projects.
- Investments in infrastructure to support the quantum of development envisioned for a particular place is critical to TOD. The public sector needs to invest in infrastructure to alleviate the cost burden from prospective private developments.



Public Realm, Sao Paulo, Brazil

1. INCORPORATE PROVISION OF PUBLIC REALM AT ALL SCALES OF TOD PLANNING

- A neighborhood park accessible by 800m walking or bicycle trip, and a public sports venue accessible by 1,200m walking or bicycle trip.

-Module 4: Design Components of TOD, WRI

- Public spaces must be designed to integrate with existing urban space and meet the needs of local residents. To properly integrate a public space network, the public spaces within the network should connect with each other and with a neighborhood's primary leisure spaces. This network can be connected through a system of sidewalks, pedestrian paths, or cycling paths.

-Module 4: Design Components of TOD, WRI, 2015

- When streets are thought of as public spaces, opportunities for community enhancement are created. Community streets can be used for a variety of purposes, including such events as food fairs, festivals, games, and parades.

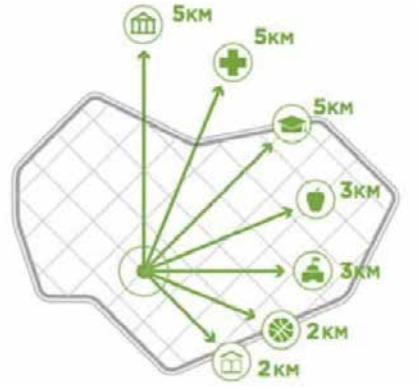
-Module 4: Design Components of TOD, WRI, 2015

- Through the establishment of mixed-use districts, encouragement of streetscapes that are created for all user experiences (not just vehicles), sidewalks that are built for multiple purposes including green space, pedestrian experience, and aesthetic transitioning to adjacent businesses and residences, zoning codes can be powerful tools.

-Module 4: Design Components of TOD, WRI, 2015

+ REFER OTHER PRINCIPLES

T1 T2 T3 T4 | O1 O2 O3 O4 | D1 D2 D3 D4



Regional facilities | *source: WRI, 2015*



Shared community streets | *source: WRI, 2015*



Place identity | *source: WRI, 2015*

2. PROVISION OF PUBLIC SPACES IMPROVES QUALITY OF LIFE

- Provision of public and green spaces can seem in direct conflict with TOD's density goals; however, the two design components must be thought of as complementary. Balancing the two design components to achieve high density and green and public space is not only possible, but necessary.

  -Module 4: Design Components of TOD, WRI, 2015

- Important local landmarks, including heritage buildings, churches, and monuments, must be preserved to keep a community's history alive. TOD design can serve to increase access to historical locations; for example, pedestrian zones can be created around important monuments and buildings, improving connectivity between important historical sites.

  -Module 4: Design Components of TOD, WRI, 2015

  -Adapted from TOD Guidance Document, MOUD, 2016

3. DESIGN OF PUBLIC SPACES MUST BE SENSITIVE TO LOCAL HERITAGE AND CONTEXT

- Preservation of local identity is key in defining unique places and creating a sense of belonging among residents, which are central for TOD projects. Effort should be made to recognize local assets when planning a TOD project. TOD design can serve to complement, enhance, and reflect local cultural, heritage/historical, and environmental features.

  -Module 4: Design Components of TOD, WRI, 2015

- The architectural features of a TOD project should take local context into consideration. Existing buildings can be used as prototypes, and properties of local architecture, including construction materials and facade colors, can influence TOD design.

  -Module 4: Design Components of TOD, WRI, 2015

- TOD projects should also take a community's cultural traditions into consideration when designing development for a neighborhood. If a community has traditional festivals, parades, or weekly markets, these customs must be accommodated through design.

  -Module 4: Design Components of TOD, WRI, 2015

+ REFER OTHER KNOWLEDGE PRODUCTS

AS | EN C01, C02 | PD H03, H04, H05, H06, P01 | FI A02, H02, R01, R03 | IM A01, A02, H01, H02, P01

O4

URBAN PARKS & OPEN SPACES

Create open areas such as amenity spaces, green spaces, playgrounds, parks and natural areas, plazas, civic squares, etc. within a five-minute walking radius of residents.

RISK & MITIGATION

- Lack of focus on open spaces in planning, along with an inappropriate allocation of funds towards upgrading facilities in parks and open spaces.
  Open spaces as potential areas for encroachments requires adequate measures on design and enforcement.



Public open space, Curitiba, Brazil

1. PROVIDE OPTIONS FOR OUTDOOR RECREATION, LEISURE AND PLAY AREAS TO PROMOTE HEALTHY COMMUNITIES WITHIN TOD AREAS

- Access to parks and playgrounds is particularly important to the urban poor, who have little access to private facilities and few opportunities to break away temporarily from urban life.

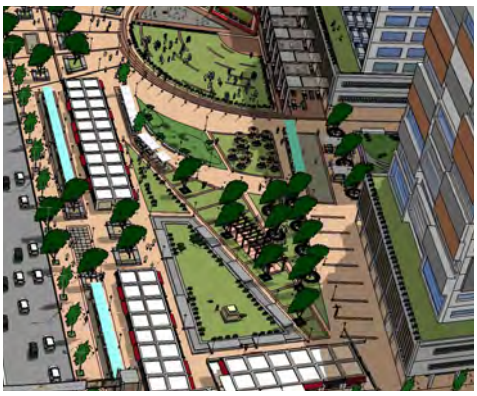
-Adapted from TOD Standard, ITDP, 2017

- A TOD project's designed green spaces should be open to the general public, and access to these areas should be prioritized for non-motorized means of transit.

-Module 4: Design Components of TOD, WRI, 2015

+ REFER OTHER PRINCIPLES

T1 T2 T3 T4 | O1 O2 O3 O4 | D1 D2 D3 D4



Open space within TOD area | *source: MOUD, 2016*



Strategic green areas | *source: WRI, 2015*



Public space networks | *source: WRI, 2015*

2. IMPROVE ECOLOGICAL FOOTPRINT OF TOD AREAS

- Public parks and playgrounds have multiple benefits—from improved air quality, to reduced heat island effects, to the increased physical and mental health and comfort of residents.

  -Adapted from TOD Standard, ITDP, 2017

- TOD design can be integrated with the local environment, including such features as rivers, cliffs, agri-cultural lands, forests, and regional fauna and floral. Natural areas should be protected from development for the capturing of CO2, aquifer replenishment, and maintenance of biodiversity.

  -Module 4: Design Components of TOD, WRI, 2015

- Public and green spaces also provide opportunities for city officials to incorporate risk and natural resource management into city planning.

  -Module 4: Design Components of TOD, WRI, 2015

- Preservation of sensitive or critical ecosystems and creation of buffers along waterways protect against habitat loss and species extinction, while at the same time improving aesthetics, access to green space, and natural resource production.

  -Module 4: Design Components of TOD, WRI, 2015

3. PROMOTE ENHANCED CONNECTIVITY TO TRANSIT THROUGH PARKS

- While retail and playgrounds should, ideally, be no further than 600 meters away from any point within a neighborhood, schools and markets should be less than a 1 km trip.

  -Module 4: Design Components of TOD, WRI, 2015

- Identify opportunities to provide 'cut-throughs' (i.e. across parking lots or through parks, where such cut-throughs shorten access routes.)

  -Adapted from TOD Guidance Document, MOUD, 2016

+ REFER OTHER KNOWLEDGE PRODUCTS

AS | EN C01, C02 | PD H03, H04, H05, H06, P01 | FI A02, H02, R01, R03 | IM A01, A02, H01, H02, P01

D1

COMPACT DEVELOPMENT

Optimize employment and residential densities along a transit corridor or station area, based on carrying capacities of transit and informal transit infrastructure, to promote walking and transit use.

RISK & MITIGATION

- Undue focus on increasing FARs and densities independent of market forces and absorprtion capacity fails the objective of achieving compact development. On the contrary, highly compact built up environments may result in deteriorating quality of life with lack of appropriate public open spaces.
- Engaging with private sector early on to create awareness and capacity building would benefit to promote TOD.



City development, Bogota, Colombia

1. ADOPT DIFFERENTIAL LAND USE DENSITIES AS PART OF STATUTORY PLANS

- Incorporate varying densities based on the development potential of different areas.

-Adapted from TOD Guidance Document, MOUD, 2016

- Distribution of FSI has to be varied depending upon the FSI already consumed, proposed land use zoning, and accessibility, particularly, areas in proximity to public transit stations, in order to ensure efficiency of use of land.

-Adapted from TOD Guidance Document, MOUD, 2016

- To establish articulated densities along transit corridors, Building codes can be changed to increase the maximum floor-area-ratio (FAR) permitted and allow for development on smaller plot sizes.

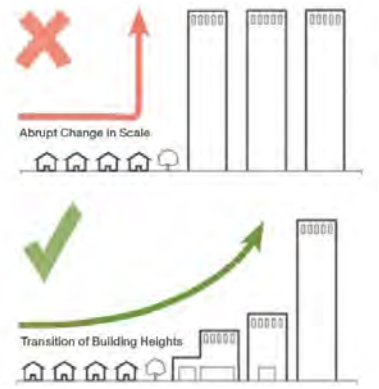
-Module 4: Design Components of TOD, WRI, 2015

- Land consolidation can be facilitated for larger developments.

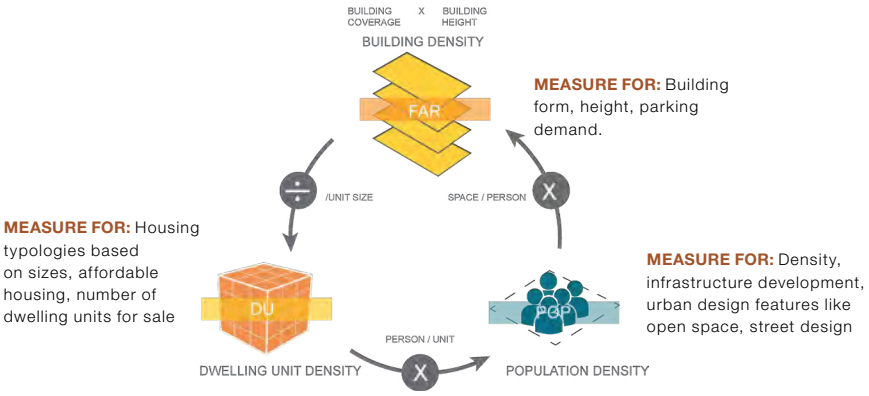
-Module 4: Design Components of TOD, WRI, 2015

+ REFER OTHER PRINCIPLES

T1 T2 T3 T4 | O1 O2 O3 O4 | D1 D2 D3 D4



Transition between built form | *source: Metrolinx, 2011*



Quantitative measurements of density | *source: MOUD, 2016*

2. CREATE HIGH-DENSITY NODES BY MEANS OF PREMIUM FARS OR BONUSING

- A typical density bonus program sets a base density that a development may achieve 'by right' and a maximum density that can be achieved by conformance to higher standards or through the provision of qualifying amenities/ benefits/premium paid.
- High-quality design, improved infrastructure, and high-quality amenities also attract and support additional density without producing the sensation of congestion.

-Module 4: Design Components of TOD, WRI, 2015

- Planning should take into account the level of connectivity of a station, to align human and economic densities, mass transit capacity and network characteristics for greater accessibility.

-Module 4: Design Components of TOD, WRI, 2015

3. ENSURE OPTIMUM POPULATION AND HOUSING DENSITIES

- Design for buildings and unit sizes can also be adopted to increase density. On smaller size properties, micro-unit apartments or offices can be introduced to increase density; their compact design can raise the number of units able to be constructed within an apartment or office building.

-Module 4: Design Components of TOD, WRI, 2015

- Minimum standards must be prescribed for urban areas that begin to be transit supportive developments.

-Adapted from TOD Guidance Document, MOUD, 2016

- New development in the peripheral zone should be allowed only if it abuts existing developed areas with prescribed minimum density and mix of uses.

-Adapted from TOD Guidance Document, MOUD, 2016

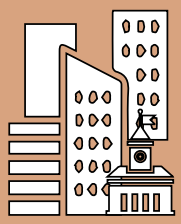
- Both residential & commercial density should be designed to match the area's peak-hour transit, walk and bike capacity.

-Adapted from The Energy Foundation, 2012

+ REFER OTHER KNOWLEDGE PRODUCTS

AS A01, A02, A03, H01, R01, P01 | EN C01, C02 | PD H01, H02, H03, H04, H05, H06, R02, R03, R04, P01 | FI A01, A02, H01, H02, R01, R02, R03 | IM A01, A02, H01, H02, P01

D2

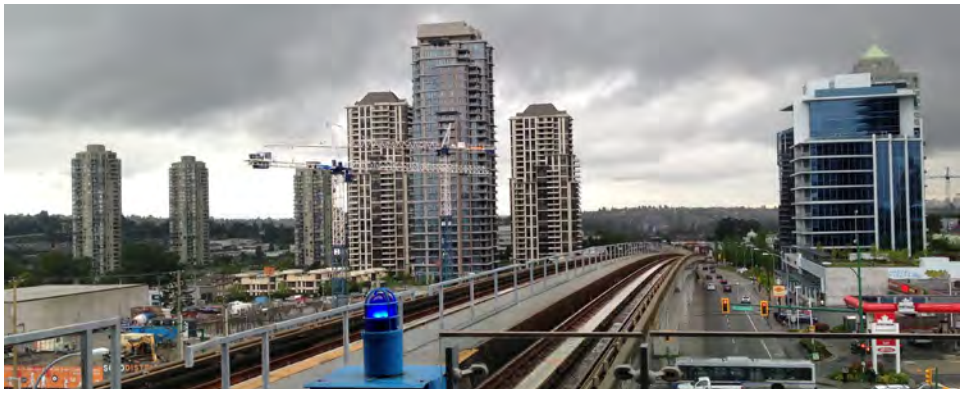


MIX OF USES

Promote more efficient land use patterns by providing residents access to retail, commercial and civic services, employment and recreational facilities without needing to travel by automobile.

RISK & MITIGATION

- Miscalculation in feasibility studies of development projects due to added risks associated by working with the public sector, specific TOD requirements of projects on providing street-facing buildings, a mix of uses or green building techniques, hamper the success rates of TOD projects.
- Lack of market acceptance for mixed-use properties.



Mix of uses at Burnaby, Vancouver, Canada

1. RESIDENTIAL AND NON-RESIDENTIAL USES COMBINED WITHIN THE SAME OR ADJACENT BLOCKS

- **Internally Complementary**: residential and nonresidential uses form a complementary mix within the development. A development is defined as internally complementary if residential uses account for no less than 15% and no more than 85% of the total developed floor area.

-Adapted from TOD Standard, ITDP, 2017

- **Contextually Complementary:** the project's predominant share of floor area is dedicated to uses complementary to the uses predominant in the surrounding station catchment area. A development is defined as contextually complementary if either: more than half of its floor area is dedicated to uses that balance the category of uses predominant in the station catchment area, or the development is internally complementary and located in a station area with a residential use balance between 40% and 60%.

-Adapted from TOD Standard, ITDP, 2017

+ REFER OTHER PRINCIPLES

T1 T2 T3 T4 | O1 O2 O3 O4 | D1 D2 D3 D4



Land ownership | *source: MOUD, 2016*



Use setbacks in some areas to create plazas



View of building maintained through transparency



Commercial or mixed-use street frontages

Various types of active building frontages | *source: MOUD, 2016*

2. ACCESS TO LOCAL SERVICES

- Entrances within a 500m walking distance of fresh food sources and a 1,000m walking distance of primary or elementary schools and a healthcare service or a pharmacy.

  -Adapted from TOD Standard, ITDP, 2017

- Provide effective basic accessibility from the residences to facilities and commerce.
  - Retail that is, at most, a 600m trip
  - A playground that is, at most, a 600m trip.
  - A pre-school and an elementary school that are, at most, a 1km trip.
  - A space destined for open or movable markets that is, at most, a 1km trip.

  -Module 4: Design Components of TOD, WRI, 2015

3. ACTIVE GROUND FLOOR

- **Boundary Walls:** In all TOD projects, boundary walls along any edge facing a public open space, pathway, road, park, etc. shall be prohibited. In case enclosure of sites is required, translucent fencing shall be used.

  -Adapted from TOD Guidance Document, MOUD, 2016

- **Active Frontage:** Active frontages include arcades, shop-fronts, entrance doorways, access points, entry/exits and transparent windows of active areas facing the primary access street. It is considered visually active if 20% or more of the length of its abutting building frontage is visually active.

  -Adapted from TOD Standard, ITDP, 2017

  -Adapted from TOD Guidance Document, MOUD, 2016

- **Setbacks:** For Integrated TOD Schemes, provide zero front setback and other setbacks no greater than 5 meters for private buildings and 10 meters for public buildings, and for any of the other façades.

  -Module 4: Design Components of TOD, WRI, 2015

  -Adapted from TOD Guidance Document, MOUD, 2016

+ REFER OTHER KNOWLEDGE PRODUCTS

AS A01, H01, R01, P01 | EN C01, C02 | PD H01, H02, H03, H04, H05, H06, R02, R03, R04, P01 | FI A01, A02, H01, H02, R01, R02, R03 | IM A01, A02, H01, H02, P01

D3

HOUSING DIVERSITY

Provide a diversity of housing choices, which includes a mixture of types, styles, price ranges and tenure, within a 10-minute walking distance from a transit station, to foster the creation of equitable TODs.

RISK & MITIGATION

- High standards of development burden the project with additional costs, coupled with hampered financial returns due to affordability, provision of services & amenities.
  Land speculation at the onset of transit infrastructure implementation burdens the affordability of housing demand.
- Incorporating opportunities for zoning code exceptions, re-scaling projects, identifying new funding sources are a few measures that could help successful provision of housing supply.



Neighborhood of Copacabana Beach, Rio de Janeiro, Brazil

1. PROVIDE FORMAL SUPPLY OF AFFORDABLE HOUSING STOCK WITHIN TOD AREAS

- All apartments/group housing private and government scheme with a plot size exceeding 2000 sqm must compulsorily reserve a minimum FAR for affordable housing units, as mandated by local acts or policies.
- Ensure all TOD projects provide for the needs of diverse income groups including Economically Weaker Sections (EWS), Lower Income Groups (LIG) & Middle-Income Groups (MIG) as an integral component of the housing units with relevant unit sizes.

+ REFER OTHER PRINCIPLES

T1 T2 T3 T4 | O1 O2 O3 O4 | D1 D2 D3 D4



Housing typologies | *source: MOUD, 2016*



Balanced mix of housing choices along transit corridor | *source: MOUD, 2016*

2. ENSURE MINIMUM SUPPLY OF AFFORDABLE HOUSING OPTIONS FOR LOW & MIDDLE-INCOME GROUPS

- Minimum percentage of FAR for all TOD projects to be allocated to rental or for sale housing or low-income families.
- Housing options should accommodate a mix of income levels and age groups. (China)
- Mix housing, shops and services within commercial districts to create 24-hour communities.

-Adapted from The Energy Foundation, 2012

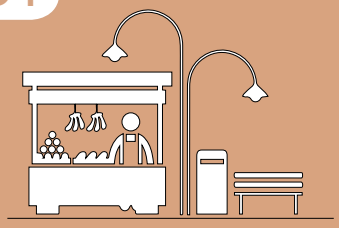
3. ADOPT INCENTIVES IN PROMOTING HOUSING FOR ALL IN TOD AREAS

- The developer may be entitled to receive additional FAR equivalent to 100% of the built-up area utilized for EWS and 50% of the built-up area utilized for LIG units.
- Projects providing affordable housing within TOD areas shall be eligible for following incentives to the extent of EWS and Housing mix by units LIG housing in terms of FAR used, over and above the mandatory reservations:
  - Fast track approval process
  - Exemption from Building Plan sanction fee

+ REFER OTHER KNOWLEDGE PRODUCTS

AS A01, A03, H01, R01, P01 | EN C01, C02 | PD H01, H02, H03, H04, H05, H06, R02, R03, R04, P01 | FI A01, A02, H01, H02, R01, R02, R03 | IM A01, A02, H01, H02, P01

D4

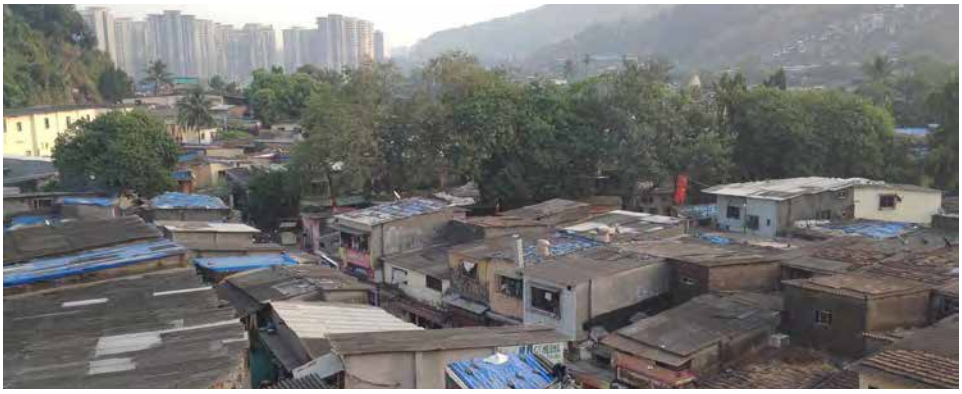


INFORMAL SECTOR INTEGRATION

Strive to achieve inclusive development in TODs by addressing the needs of the informal sector in all aspects of policy, planning and design for street vendors, settlements and transportation services

RISK & MITIGATION

- Lack of detailed inventory and dynamic variations that require continuous updates on the inventory hinders the provision of space and facilities
- Lack of a comprehensive policy for incorporating informal sector in planning processes.
- Creation of a digital inventory of the informal sector with regular updates resonates with the provision of space and amenities
- Incorporate the informal sector in all planning and infrastructure interventions to work in conjunction to with them.



Slum development at Asalpha metro station housing diversity, Mumbai, India

1. INCORPORATE STREET VENDORS AND THEIR NEEDS IN PUBLIC REALM

- Vending zones shall be provided at regular intervals (approx. 10-minute walk from every home/workplace).

  -Adapted from TOD Standard, ITDP, 2017

- Vending spaces should be marked in addition and adjacent to the walking path, especially along high pedestrian volume areas to activate the street and make it safe.

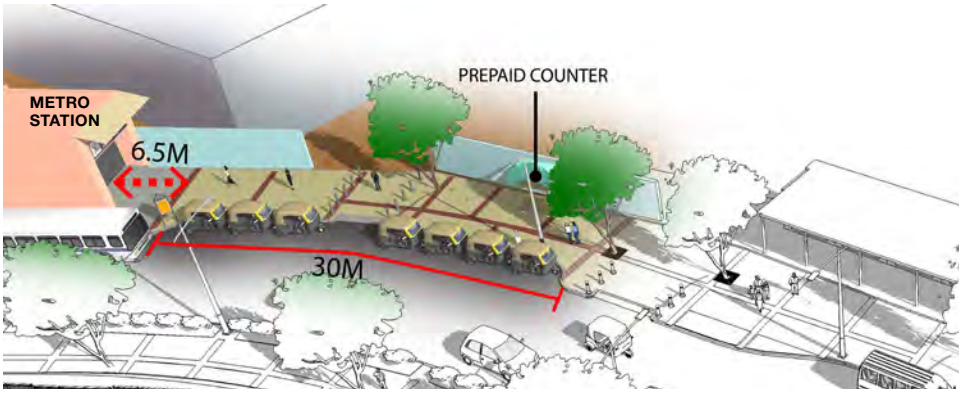
  -Adapted from TOD Guidance Document, MOUD, 2016

- Determination of vending zones as restriction-free-vending zones, restricted vending zones and no-vending zones.

  -Adapted from TOD Guidance Document, MOUD, 2016

+ REFER OTHER PRINCIPLES

T1 T2 T3 T4 | O1 O2 O3 O4 | D1 D2 D3 D4



Designated informal transit zone | *source: MOUD, 2016*



Designated vending zones | *source: MOUD, 2016*

2. DESIGN FOR INTEGRATED INFORMAL TRANSPORT SECTOR NEEDS AT TRANSIT STOPS AND STATION AREAS

- Organize informal transit and ride-sharing services within 800m from transit station facility through Dial-an-auto/rickshaw services, pre-paid booths, Passenger Pick-up & Drop-off areas or Remote Informal Transit/Taxi Parking lots.

  -Adapted from TOD Guidance Document, MOUD, 2016

- Multi-Utility Zone (MUZ) of minimum 1.8m width should be provided to accommodate bus stops, street utilities, trees, informal transit/NMT stands.

  -Adapted from TOD Guidance Document, MOUD, 2016

3. INFORMAL SETTLEMENTS HAVE TO BE CONSIDERED IN REDEVELOPMENT PROPOSALS

- Preparation of Slum Redevelopment Plan as per relevant Guidelines; or Slum Redevelopment with private sector participation; or Town Planning Schemes for land pooling and plot reconstruction in greenfield areas.

  -Adapted from TOD Guidance Document, MOUD, 2016

+ REFER OTHER KNOWLEDGE PRODUCTS

AS A01, A02, A03, H01, R01, P01 | EN C01, C02, H01 | PD H03, H04, H05, H06, P01 | FI A01, A02, H01, H02, R01, R02, R03 | IM A01, A02, H01, H02, P01



Bhubaneswar, India

TOD KP

PD-R03



LAND USE AND TRANSPORTATION INTEGRATION BEST PRACTICES

Examples of land use and transportation integration that influenced significant improvements in cities

Type: Reference Document

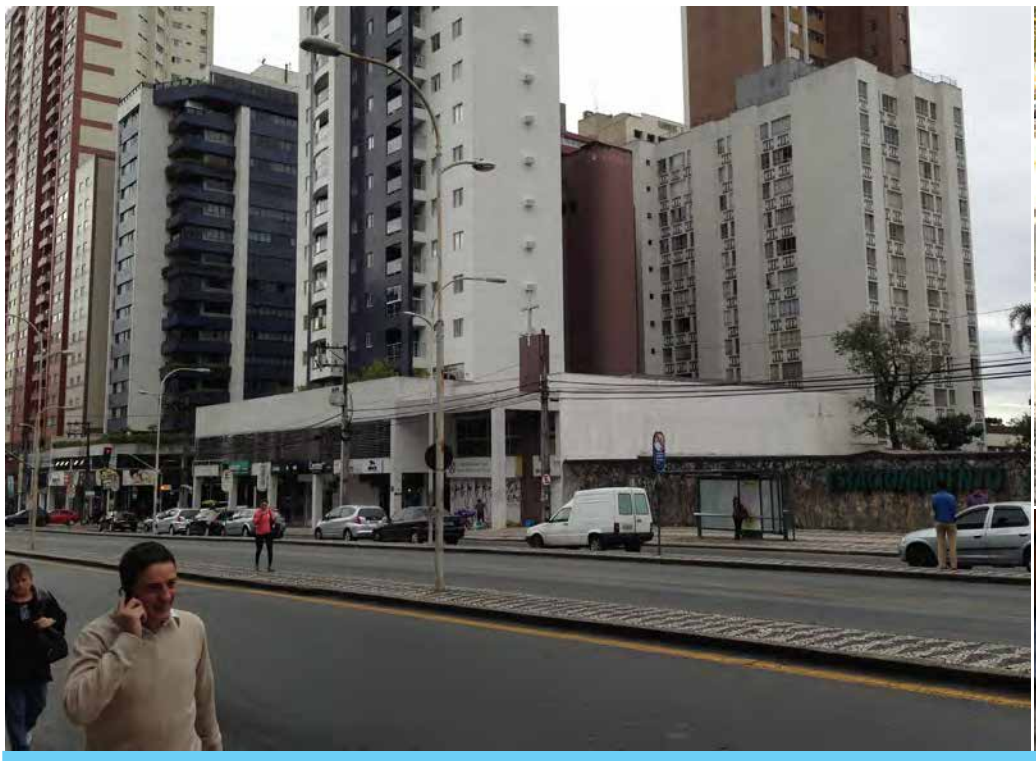


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TOD KP

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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CURITIBA, BRAZIL

+ PROJECT INFORMATION



Location: Curitiba, Parana, Brazil

Funding: URBS (Govt.)

Timeline: 40 Years

Project Settings: Mixed-use (residential/ commercial) main street

Overview:

Curitiba is home to nearly 2 million people. Between 1950-2005, Curitiba's metropolitan area witnessed a sixfold increase in its population- from 300,000 inhabitants in 1950 to 1.9 million in 2005. It is one of Brazil's wealthiest cities and has one of the highest private car-ownership rates in Brazil, yet it averages more transit trips than New York, Rio or Sao Paolo.

PROJECT STORY



The **URBS**- Urbanization of Curitiba was created in 1963 with the purpose of administering the Fund for the Urbanization of Curitiba, to develop infrastructure projects.

The **Curitiba Institute of Research and Urban Planning (IPPUC)** was created on **December 1st, 1965** to execute and develop urban plans.

The 1965 Master Plan set the stage for Curitiba's linear transit-oriented urban form by **1) limiting circular sprawl moving outward from the urban core**, thus decreasing congestion focused downtown;

2) **creating structural axes corridors, lined with high-density mixed-use development** that would taper to lower-density away from the corridors; 3) typical structural corridors in a trinary road system.



+ DESIGN DETAILS

Walkability: Streets with an existing high-level of pedestrian activity have been pedestrianized, along with streets within 400m of the bus corridor, to minimize the need for vehicles.

Flexible planning: Along the structural axes, only the first two floors can extend to property lines. Half of the ground and first floors are mandated to be dedicated to retail uses. Retail-commercial uses at the street level are exempt from FAR calculation.

Compact development: The 'structural axes' concept of high-intensity development has created corridors with high travel demand. Initially, FARs of 6.0 were permitted; later in the 1990s, maximum FARs were lowered to 5.0 for offices and 4.0 for residential. Incentives were given to developers to increase residential density close to the transit corridors.

+ APPLICABILITY

Context: Transit for urban areas with high volumes of vehicles

Scale: Corridor | Station Area | Site

Related TOD Principles:

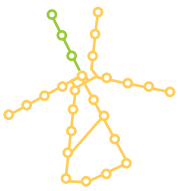
Complete streets, managed parking, bicycle-friendly, architectural diversity



1972- 1992

The first **20km were planned in 1972** and built in 1973 and the first two BRT corridors were **opened in 1974. In 1979, feeder and inter-district buses were integrated with the BRT, creating the Rede Integrada de Transporte (RIT).** Due to the success of the BRT, by 1982, all five BRT corridors were planned and fully functional.

In 1992, **the iconic circular boarding platforms were introduced** along with the **use of biarticulated buses** to increase system capacity.



1992-2009

The new **Green line BRT corridor** was opened.



Image: Jorge Láscar
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MEDELLIN, COLOMBIA

+ PROJECT INFORMATION



Location: Medellin, Antioquia, Colombia

Funding: Municipal Corporation (Govt.)

Timeline: 13 Years

Project Settings: Urban area

Overview:

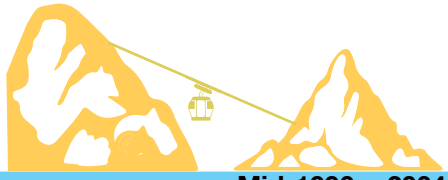
Medellin is the second largest city in Colombia and the capital of Colombia's mountainous Antioquia province. Taking into consideration the large number of commuters from the slopes towards the city, and its own topographical restrictions for development, it came up with an efficient land use and transportation integration plan for the city.

PROJECT STORY



1930s

The cable-car technology was initially used for **exporting coffee from the city of Manizales to the south of Medellin.**





Mid-1990s -2004

When Sergio Fajardo became Mayor of Medellín in 2004, the "Medellín, Commitment of all the Citizens" plan for the city was enacted. One of its fundamental axes was described as **"Social Urbanism." One of the** main guidelines was an Integrated Metropolitan Transport System that must be used as the organizing axis of mobility and projects in the city. **All projects have to be directly linked to the main transport system.**



Image: Nigel Burgher (Flickr)
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+ DESIGN DETAILS

Complete Streets: Existing streets were redesigned to widen sidewalks, reduce automobile lanes and include and strengthen bicycle infrastructure. In hilly parts of the city, walkability was enhanced through escalators.

Seamless Integration of Modes: The transit system in Medellin is comprised of heavy rail, BRT, buses and gondola systems, which are effectively integrated to ensure reach to the farthest corners of the city.

Well Designed Transit Station: The metro-cable stations created plazas underneath the station platform and created pedestrian connections with the surrounding areas to improve connectivity.

Bicycle Friendly: Medellin's bicycle infrastructure focuses on separated bike paths, located within sidewalks. There are also dedicated pelican signals at important intersections.

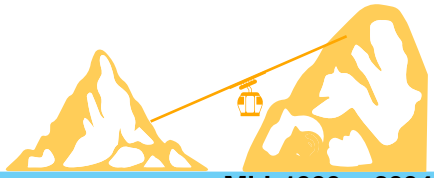
+ APPLICABILITY

Context: Transit for areas with topographical restrictions

Scale: Corridor | Station Area | Site

Related TOD Principles:

Urban parks and open spaces, public realm



Mid-1990s -2004

The Northeastern Urban Integration Project in Medellín **(Proyecto Urbano Integral, or PUI) was initiated by the City of Medellín in 2004. Working with the community to conceptualize, develop and construct new open-space networks, the designers of the PUI have sensitively integrated mobility infrastructure with the strategic goals of large and socially complex projects, by developing processes that promote ownership by the community.**

2010-2015

Line K was the initial line and was **opened in 2004 and Line J in 2008.** In **2010, Line L was introduced** and was connected to Arvi Park. It is **part of a social project** to cater to the masses. Two additional lines H and M have also been introduced.



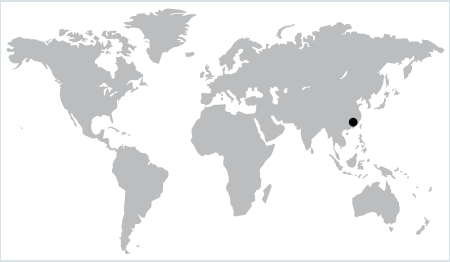
Image: AndyLeungHK
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SHENZHEN, CHINA

+ PROJECT INFORMATION



Location: Shenzhen, Guangdong, China

Funding: Municipal Corporation (Govt.)

Timeline: Ongoing

Project Settings: Urban area, suburban ares

Overview:

Shenzhen has become one of the frontier cities that is leading the economic growth of China, as the first of the nation's five Special Economic Zones SEZ (The Economist, 2010). Since the early 2000s, Shenzhen has started to design a new development strategy for the city called the Shenzhen 2030 Urban Development Strategy.

PROJECT STORY



1983

In late 1983, Party Secretary of Shenzhen Mayor Liang Xiang led a team to Singapore to study its mass transit system. Upon returning it was decided that 30 meters on each side of Shennan Avenue should be protected as a green belt and to set aside a 16-meter wide median reserved for a light rail or light metro line.

1984 -1992

In 1984, it was concluded that a light metro system would not sufficient capacity for the growing population and traffic in Shenzhen, as indicated by the Shenzhen Special Economic Zone Master Plan (1985–2000)



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+ DESIGN DETAILS

Compact development: Large-scale construction has been led by the Master Plan (1996-2010) to develop a hierarchical city network. Shenzhen allows the densities for residential and office developments around transit stations to fluctuate within a certain range. This gives Shenzhen's Planning and Land Resources Committee the discretion to change the densities based on context. For example, Bitou Station: Affordable housing—FAR 2.0, schools and residential housing—FAR 3.0, commercial and office developments—FAR 6.0.

Flexible Planning: Shenzhen expanded land development rights, issuing development rights according to land uses on different building floors. This encourages mixed-use development, as commercial, residential and underground transit building rights can be obtained separately.

+ APPLICABILITY

Context: Urban, Suburban, Greenfield

Scale: City | Corridor | Neighbourhood Station

Related TOD Principles:

Architectural variety, housing diversity, walkability

1984 -1992

Alternatively, a heavy rail subway line was proposed along Shennan Avenue. The Central Planning Department approved the Shennan Avenue line in 1992.



1994-1996

Beginning in 1994, the Shenzhen urban rail network master plan was drafted to be incorporated into the Shenzhen City Master Plan (1996–2010). Nine lines of rail defined the visions for the city urban rail network.



1998- present

Phase I (1998-2004)- Line 1 and Line 4

Phase II (2007-2011)- network expanded from 64 km to 177 km.

Phase III (2012-2020)- Lines 6, 7, 8, 9, and 11



Polanco, Mexico

TOD K P

PD-R04



PEDESTRIAN FRIENDLY DESIGN BEST PRACTICES

Small-scale iterative pedestrian friendly examples in low-middle income countries that influenced significant improvements in the area.

Type: Reference Document



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TOD KP

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MATUNGA FLYOVER, MUMBAI, INDIA

+ PROJECT FACTS



Location: Mumbai, Maharashtra, India

Project Size: 600m x 12 metres

Total Project Cost: 50 million (INR)

Funding: Municipal Corporation (Govt.)

Timeline: 5 Years

Project Settings: Mixed-Use (Residential/Commercial) Main Street

Overview:

Mumbai, the capital city of Maharashtra, is the most populous city in India and the fifth most populous city in the world. The city accounts for only 1.1 square meters of open space—gardens, parks, recreation grounds (RG) and playgrounds (PG)—per person (Open Mumbai, 2012). The site is located in one of the planned areas of Mumbai.

PROJECT STORY



2011-2013

1.5-km long and 17m wide flyover was built at a cost of 700 million(INR) from the Maheshwari Udyan to Tulpule Chowk flyover.

The space under the flyover **turned into a hangout zone for hawkers, gamblers, drug addicts** as well as encroached by illegal parking



2011-2013

Residents requested the **Municipal Corporation (BMC) for barricading the entire stretch**

About **40 people crowd-sourced funds and hired 24X7 private security** for two years.

Engaged 10-12 BMC sweepers to clean the stretch to avoid dumping and encroachment.



+ DESIGN DETAILS

Walkway: Designed 600m long pathway in blue color to resemble River Narmada with some stretches designed as Narmada ghat where people can sit.

Safety: The stretch is equipped with rotatable CCTV cameras, colorful lights and security officials.

Public Convenience: Art installation, small plants and dustbins are lined up on both sides of the space.

Events: Activities are organized on Sunday morning dividing the area below the flyover into different zones like health, live performance, traditional games, indoor games and outdoor games zone.

+ APPLICABILITY

Context: Underutilized spaces under the elevated transit corridors

Scale: Corridor | Station Area | Site

Related TOD Principles:



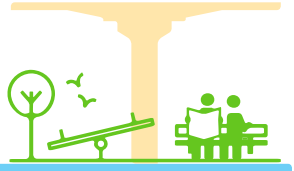
2013-2014

Residents **formed a group 'One Matunga'** and designed a **children's park with 600-meter long and 12-meter wide meandering jogging track** that is shaped like the Narmada river.

The group presented the idea to various government authorities for developing a small garden in that space.

2014-2016

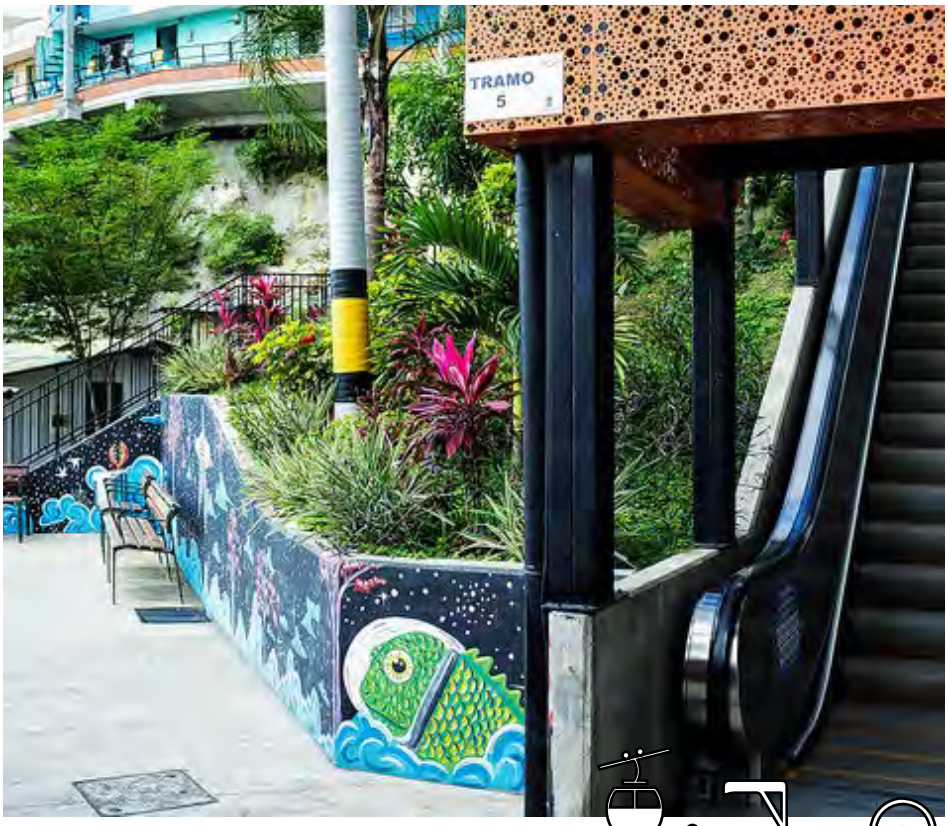
After successful petitioning, it got the **final approval and in June 2015, BMC began to redevelop the area**.



Embroiled in some political differences, the park was finally **inaugurated in June 2016**



Image: Nigel Burgher (Flickr)
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MEDELLIN, COLOMBIA, LATIN AMERICA

+ PROJECT FACTS



Location: Medellin, Colombia, Latin America

Project Size: Not Available

Total Project Cost: Approx 3.5 million USD

Funding: Government (City funding)

Timeline: 7 Years

Project Settings: Residential Neighborhood (Transit Connections - Streets & Plazas)

Overview:

Comuna 13 also known as San Javier, is one of the 16 barrios (neighborhoods) in Medellin. The neighborhood is built on steep hills outside of the main city consisting of tiny houses and cottages connected by streets, paths and stairs. Access to the barrio was a perennial challenge, making the provision of security as difficult as accessibility to schools.

PROJECT STORY



1980's-2000s

Known as one of the most violent cities in the world, Comuna 13 had an invisible territorial boundary set by a dominating group that led to strong social tensions, large class differences, and unemployment in the area.



2002

The Colombian army, police, air force and paramilitary groups launched the biggest military intervention **Operation Orion** to fight against illegal activities displacing and impacting displaced local residents



2002's

Residents **protested against the violence in the area** with white rags raised for peace and solidarity.

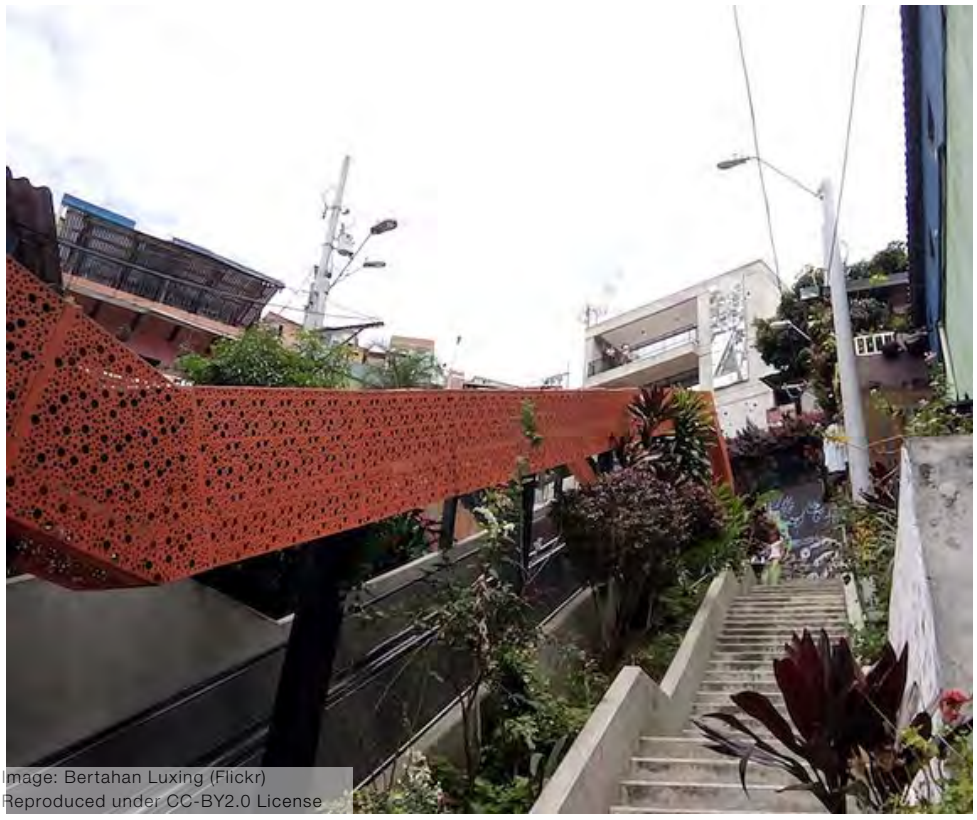




Image: Bertahan Luxing (Flickr)
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+ DESIGN DETAILS

Street Art: The Streets were painted with graffiti depicting the authentic history of Comuna 13, and the huge impact on people's lives.

Escalators: The installation of six sections of a giant 384 meters outdoor orange-roofed escalator was built into the mountainside for accessing neighborhoods on the hillside.

Shaded streets: Harvestable fruit trees are planned on the courtyard and along the pedestrian walkway to provide shade and comfort and to cool down the atmosphere in summer.

Public Space: Location for installation of six set of escalators were selected to connect libraries, schools, kindergartens, open sports facilities and public places.

+ APPLICABILITY

Context: Creative solution to overcome accessibility challenges to transit stations in hilly regions.

Scale: Station Area | Corridor

2002-2008

Residents and local artists started **painting walls with beautiful mural graffiti** in memory of innocent people who died in the conflict.

2008

The elected mayor invested a huge amount of money in **a new cable car line in San Javier Station** to integrate this Comuna with other surrounding communities.



2011

The city **created electric escalators to allow people to reach the station in 6-minutes instead of a 25-minutes climb.** The escalators have decorative metal canopies, air-conditioning and connect to public plazas, terraces and amphitheaters.



BOGOTA, COLOMBIA, LATIN AMERICA

+ PROJECT FACTS



Location: Jimenez Avenue, Bogota, Colombia

Project Size: Not Available

Total Project Cost: Not Available

Funding: Government Funded

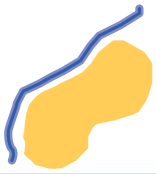
Timeline: 11 years (1996-2007)

Project Settings: Mixed-Use (Institutional/ Commercial) Main Street

Overview:

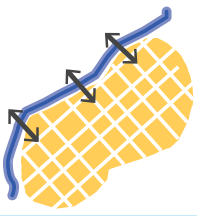
The street originally built over the San Francisco River into a brick-paved paseo featuring native trees, ribbon-like water fountains running along the sloping course, and brick pavement for the Transmilenio. The effect was to create a friendly relationship between public transport and pedestrian traffic while revitalizing the public spaces.

PROJECT STORY

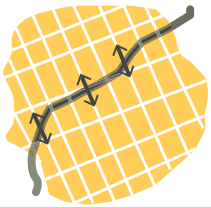


COLONIAL PERIOD

San Francisco River (today Jimenez Avenue) defined the City's northern limit.



When the city started to grow beyond these natural limits, urban planners adapted the orthogonal geometry of the city to the river's meandering path.



1990's

By the early twentieth century, the San Francisco River was essentially a sewer and a garbage dump.



+ DESIGN DETAILS

Public Place: The highly congested street was transformed into a partially pedestrian way equipped with street furniture to serve the Transmilenio system

Landscaping: construction of a watercourse along the avenue, consisting of a continuous descending line of small basins or pools, makes reference to the San Francisco River.

Street Vendors: Accommodates many mobile vendors providing livelihood assistance.

Safety: The site is supervised by a dozen of security guards who are recognizable by their uniforms gives certain people an ambiguous status of the place

Urban Redevelopment: The old historical buildings were renovated along this axis for high-end housing, hotels and commerce.

+ APPLICABILITY

Context: Urban Redevelopment, creating pedestrian-only streets

Scale: Station Area | Corridor



1999-2002

For reviving the old city center, the city first planned infrastructure investment for the new public transportation system (Bus Rapid Transit, named Transmilenio).

2002

A decision was made to hire a renowned architect to design the segment that would enter the city center, through the Av. Jimenez.



Today

The road was closed for private vehicles, creating a pedestrian plaza using cobblestone as opposed to asphalt and recovering the water element that was lost with development.



Bogota, Colombia

TOD KP

PD-P01

TOD PLANS TERMS OF REFERENCE



Template for hiring a consultant to prepare TOD plans at the required scale.

Type: Reference Document



TOD
Global Platform for Sustainable Cities
WORLD BANK GROUP
IBI

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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BACKGROUND

The Terms of Reference for a TOD Plan should provide the following background material:

- **Study Area:** The TOR must define the approximate area for which the Plan is to be developed. The study area must coincide as far as possible with jurisdictional boundaries for which population and employment data is readily available. The Background should also summarize the details of transport services including the primary and feeder modes available.
- **Existing Development:** The Background section should provide a summarized description of existing development and ongoing activities, including any information on real estate opportunities and challenges.
- **Benchmarks and Guidelines:** The Background section should also provide information on resources that a consultant is expected to refer to while preparing the Plan, specifically including TOD Planning Guidelines or Design Standards.
- **Bibliography of Reference Plans, Policies and Studies**
- **List of Project Stakeholders**

OBJECTIVE OF THE ASSIGNMENT

The objective of the assignment is determined by the scale and context of the Study Area:

a. City-level TOD Plan:
   - o Prepare a basis for a spatial growth strategy and density optimization
   - o Identify priority areas for investment for both transit and real estate development

b. Corridor-level TOD Plan:
   - o Prepare a land use and density strategy along the transit corridor to optimize transit availability and affordability
   - o Identify multimodal integration strategies with supporting transit and feeder services.
   - o Identify stations with high-level of challenges and/or opportunities.

c. Station Area Plan:
   - o Prepare a block plan for development prioritizing TOD principles
   - o Prepare public realm plan for a high-quality walking and cycling experience outside the station
   - o Identify catalyst projects for real estate development

d. Greenfield/ Suburban TOD Plan
   - o Prepare a master plan that leverages transit connectivity in walkable neighborhood units

e. Urban Infill TOD Plan
   - o Prepare a plan that identifies opportunities for infill development to optimize densities around transit

f. Urban Redevelopment
   - o Prepare land restructuring plan to leverage transit connectivity

SCOPE OF ACTIVITIES

CITY-LEVEL TOD PLAN

TASK 1 – DATA COMPILATION AND INVENTORY:

- **Review of Existing Documents & Studies:** Compile and review of the previously completed and current planning efforts underway in the Study Area with the intent to identify gaps and consistencies of the various policies, strategies and development projects when assessed against a backdrop of TOD Principles (Refer Guidance Document) under the following broad categories:
  - Planning & regulatory context
  - Regional context
  - Mobility & Access
  - Land Use, Public realm & Urban Design
- **Undertake site visits(s) & prepare an inventory of the planning & physical characteristics of the Study Area** –The existing conditions inventory will include the preparation of a detailed base map and a series of inventory maps and photographs.
- **Existing Conditions Inventory:** Map the existing data using AutoCAD and GIS mapping procedures. Inventory will include the following at a minimum:
  - Existing land uses
  - Proposed land uses
  - Zoning
  - Major nodes & activity centers
  - Major roads & infrastructure (Parking)
  - Existing natural features
  - Proposed key developments
- **Develop Case Studies and Best Practices in Transit Oriented Development:** Select best practices that demonstrate successful TOD projects nationally and internationally in similar context. The case studies will highlight successes, failures and lessons learned.
- **Undertake focus group meetings & key interviews** with stakeholders to help generate buy-in, identify major issues confronting the project and the social, economic, and political goals for the project.
- **Review of existing real estate needs at the city-level** to summarixe the findings of a city-level real estate analysis [see AS-P01] in terms of demand of different types across the urban space.

TASK 2 – STUDY AREA ANALYSIS

- **Analysis, Baseline Conditions Assessment and SWOT analysis:** Undertake an analysis of baseline conditions and prepare Weaknesses & Threats maps - utilize the existing conditions inventory to evaluate the physical characteristics of the study area.
- **Identify priority transit corridors**- Prioritize the "right" corridor to determine momentum for TOD based on the following parameters:
  - **Map existing land uses, proposed land uses and key developments** to understand the distribution of residential, employment and institutional uses in the city.
  - **Identify activity generators:** Map housing, employment and recreational centers to determine the desired lines and identify routes of high commuter traffic.
- **Delineate influence zone of transit** to determine the area around transit routes or stations, where transit-supportive development needs to be prioritized based on:
  - Population Density
  - Employment Density
  - Accessibility
  - Environmental Context
- **Identify development context:** TOD Planning must take into consideration different aspects of the city and the context before beginning the planning of TOD. It helps in integrating sustainable development principles at the outset by respecting and nurturing existing environmental and settlements. The development context can be identified as:
  - Greenfield
  - Urban Infill
  - Redevelopment
- **Conduct an analysis of opportunities around all stations** to develop a preliminary typology of stations based on their node place, and market potential view (for example - see Salat and Ollivier Transforming the urban space through TOD: the 3V approach) with the existing transit network and the proposed future network.
- **Identify preliminary goals and targets** with respect to the institutional support, plans, policies and development market.

TASK 3 – VISIONING AND STAKEHOLDER ENGAGEMENT, TOD "CHARRETTE"

An organized design workshop; where more focus will be to create a vision for TOD plan. Invite and engage key stakeholders including elected officials and staff from various agencies to the visioning workshop. Focused charrette shall achieve the following objectives:

- Articulate quantitatively and qualitatively how TOD could support the city social, economic and environmental objectives;
- Discuss the integration of land use, transportation, and infrastructure and solicit implementation strategies from charrette participants;
- Share and revalidate the identified transit-first goals and targets;
- Prioritize goals into short-term, mid-term, and long-term opportunities; and
- Identify the market, generate project interest and solicit feedback.

TASK 4 – RESILIENCE STRATEGY – ANALYSIS OF RISKS & ADAPTABLE PLANNING

Unlike disaster preparedness, urban resilience should focus on strengthening the City-Level TOD Plan to adapt to and disruption that may occur. Traditional TOD/land use planning is built on assumptions about a future state considering population growth, modal split, market understanding and demand for specific development/land use types amongst others. However, the introduction of disasters such as resulting from climate change e.g. flooding or extreme weather events could significantly impact the TOD planning. An innovative City-level TOD Plan needs to better account for such uncertainty, and plan for adaptable methods that can respond to changes to the city's physical, economic or social conditions.

- **Assess risks specific to the City** (including climate-related risks) that may impact the realization of the land use, transportation and infrastructure implementation to its fullest potential
- **Develop objectives and goals** related to resilience through a participatory process
- **Provide risk-informed planning recommendations** for the following to ensure adaptable planning and informed decision making for the TOD recommendations
    - **Land Planning for Emergencies -** Develop a strategy for during and post-disaster recovery to ensure critical emergency response
    - **Land Planning for Adaptability –** Develop a strategy for the zoning /land uses to adapt to the City's physical, economic or social conditions**.**

TASK 5 – DRAFT TRANSIT ORIENTED DEVELOPMENT RECOMMENDATIONS

- **Prepare a draft conceptual TOD Plan:** Recommend modifications to the Development Plan and/or land development regulations, policy changes, DCR amendments in order to achieve the desired intent of TOD within the city. Draft TOD Recommendations Plan should be inclusive of the followings:
    - Parking Management Tools
    - Infrastructure Upgrades
    - First & Last Mile Connectivity
    - Differential Densities
    - Desired Land Use Mix
    - Financial Strategy
    - Public Transport Goals
    - Affordable Housing
    - City-level amenities (such as parks, major health and education centers)

TASK 6 – IDENTIFY A FINANCING STRATEGY

- Develop an understanding of the city's financing system impacting implementation of TOD related land development and infrastructure projects.
- Introduce innovative funding tools to integrate TOD within the city's urban management and financing systems
- Develop a Capital Investment Strategy for TOD station areas and projects.

TASK 7 – IDENTIFY A PHASING AND IMPLEMENTATION STRATEGY INCLUDING CATALYST PROJECTS

- **Prepare a phasing for the TOD Plan** which includes preliminary recommendations to enable the City/development and planning agency to systematically implement the recommendations of the TOD Plan.
- **Technical Capacity Building Recommendations:** Assessment of existing capacity of the Planning teams and to identify gaps and to recommend measures of augmentation of Technical Capacity.

CORRIDOR-LEVEL TOD PLAN

TASK 1 – DATA COMPILATION AND INVENTORY:

- **Review of Existing Documents & Studies:** Review and analysis of the previously completed and current planning efforts underway in the Study Area with the intent to identify gaps and consistencies of the various policies, strategies and development projects when assessed against a backdrop of promoting TOD Principles under the following broad categories:
  - Planning & regulatory context
  - Regional context
  - Mobility & Access
  - Land Use, Public realm & Urban Design
  - Transit & Station Area
- **Undertake site visits(s) & prepare an inventory of the planning & physical characteristics of the Study Area** –The existing conditions inventory will include the preparation of a detailed base map and a series of inventory maps and photographs.
- **Existing Conditions Inventory:** Map the existing data using AutoCAD and GIS mapping procedures. Inventory will include the following at a minimum:
  - Existing land use
  - Proposed land uses
  - Land Ownership
  - Parking
  - Zoning
  - Major nodes & activity centers
  - Major roads & infrastructure
  - Existing Natural features
  - Parks and Open Spaces
  - Proposed key developments
  - Circulation and Accessibility, with special emphasis on Multimodal Integration and NMT infrastructure
- **Develop Case Studies and Best Practices in Transit Oriented Development:** Select best practices that demonstrate successful TOD projects nationally and internationally in similar context. The case studies will highlight successes, failures and lessons learned.
- **Undertake focus group meetings & key interviews** with stakeholders to help generate buy-in, identify major issues confronting the project and the social, economic, and political goals for the project.
- **Review of existing real estate needs at the city-level** to summarixe the findings of a city-level real estate analysis [see AS-P01] in terms of demand of different types across the urban space.

TASK 2 – STUDY AREA ANALYSIS

- **Study the transit and the station characteristics (planned/existing):** There are key differences in TOD strategies for different transit mode. Undertake an analysis of baseline conditions and prepare SWOT maps- utilize the existing conditions inventory to evaluate the physical characteristics of the study area
- **Delineate influence zone:** Identify the catchment area around station by transit type where TOD interventions can be applied.
  - Boundary may be defined by a 5–10 minute walking distance
  - Larger catchment area can be defined as the areas that are accessible by feeder transit
- **Identify preliminary goals and targets** with respect to the institutional support, plans, policies and development market

TASK 3 – VISIONING AND STAKEHOLDER ENGAGEMENT, TOD "CHARRETTE"

An organized design workshop; where more focus will be to create a vision for TOD plan. Invite and engage key stakeholders including elected officials and staff from various agencies to the visioning workshop. Focused charrette shall achieve the following objectives:

- Articulate quantitatively and qualitatively how TOD could support the city social, economic and environmental objectives;
- Discuss the integration of land use, transportation, and infrastructure and solicit implementation strategies from charrette participants;
- Share and revalidate the identified transit-first goals and targets;
- Prioritize goals into short-term, mid-term, and long-term opportunities; and
- Identify the market, generate project interest and solicit feedback.

TASK 4 –DEFINE STATION AREA TYPOLOGIES AND PRIORITIZATION OF TOD AREAS:

- **Identify Station Area Typologies in relation to the urban context and character**- Station areas along a transit corridor are set in different urban contexts, play different roles in the transportation network, and present unique challenges and opportunities.
- **Conduct an analysis of opportunities around all stations** to develop a preliminary typology of stations based on their node place, and market potential view (for example - see Salat and Ollivier Transforming the urban space through TOD: the 3V approach) with the existing transit network and the proposed future network. The typologies will include the following at a minimum:
  - Urban Context
  - Station Area Character
  - Predominant land use & intensification potential
  - Land use mix and density & FAR's
  - Key site characteristics
  - Planning & development challenges
  - Ideal Land use mix
  - Transportation Parameters and location within the network
  - Multimodal Integration
- **Create a vision for each of the identified station types in terms of ultimate character and development form:** Based on this vision, land use mix, urban design and parking policies and a set of development standards should be developed in order to provide the basis of a regulatory framework that would allow this vision to be achieved.
- **Develop a selection criteria matrix to identify the prioritized TOD areas:** Based on the following (but not limited to) quantitative and qualitative parameters
  - Identify development/ redevelopment potential based on:
    - » Land availability and ownership- presence of underutilized lots, vacant lots, lots of large block sizes, and properties in dilapidated conditions
    - » Allowable land uses
    - » Future/ proposed development patterns
    - » Real Estate Market Potential
  - Higher transit ridership (expected/proposed)
  - Presence of intermodal service
  - Typology and applicability of the number of stations of the same typology
  - Higher land use mixes

- Station area character
- Market Potential - for residential, office, and retail mixed-use development based on interviews with knowledgeable real estate development groups and review of other studies and planning documents

TASK 5 – RESILIENCE STRATEGY – ANALYSIS OF RISKS & ADAPTABLE PLANNING

Resilience should focus on strengthening the Corridor-Level TOD Plan to adapt and respond to changes in the physical, economic or social conditions. Traditional TOD/land use planning at the station level is built on assumptions about a future state considering population growth, modal split, market understanding and demand for specific development/land use types amongst others. Introduction of disasters such as resulting from climate change e.g. flooding or extreme weather events could significantly impact the TOD planning. An innovative corridor-level TOD Plan needs to better account for such uncertainty, as well as be adaptable to changing market conditions.

- **Assess risks specific to the Corridor** (including climate-related risks) that may impact the realization of the land use, transportation and infrastructure implementation to its fullest potential
- **Develop objectives and goals** related to resilience through a participatory process
- **Provide risk-informed planning recommendations** for the following to ensure adaptable planning and informed decision making for the TOD recommendations
  - **Land Planning for Emergencies -** Develop a strategy for during and post-disaster recovery to ensure critical emergency response.
  - **Land Planning for Adaptability –** Develop a strategy for the zoning /land uses to adapt to the changes in the physical, economic or social conditions.

TASK 6 – DRAFT TRANSIT ORIENTED DEVELOPMENT RECOMMENDATIONS

- **Create a conceptual Corridor Plan**
  - **Establish and/or reconnect street grid** – develop a comprehensive street grid of small blocks, accommodating pedestrian, vehicular and cycling connections
  - **Summarize the potential overall development** (existing development, redevelopment or new development) along the corridor and at each station.
  - **Provide intermodal connections** - near transit stations, for IPT with the intention of establishing a well-connected, efficient, transportation system, providing robust connections throughout the community for all modes.
  - **Develop appropriate parking strategies** with reduced parking as the goal- Encourage use of on-street parking to meet parking requirements. Conceal parking structures within development or screen from view on low-value land
  - **Upgrade the Infrastructure carrying capacity** to support the increased demand
- **Integration of TOD Plan with Zonal Development Plan/ Local Area Plan**
- **Identify Priority Station Areas as TOD demonstration project.**

TASK 7 – IDENTIFY A FINANCING STRATEGY

- Develop an understanding of the city's financing system impacting implementation of TOD related land development and infrastructure projects.
- Introduce innovative funding tools to integrate TOD within the city's urban management and financing systems
- Develop a Capital Investment Strategy for TOD station areas and projects.

TASK 8 – IDENTIFY A PHASING AND IMPLEMENTATION STRATEGY INCLUDING CATALYST PROJECTS

- **Prepare a phasing for the TOD Plan** which includes preliminary recommendations to enable the City/development and planning agency to systematically implement the recommendations of the TOD Plan.
- **Technical Capacity Building Recommendations:** Assessment of existing capacity of the Planning teams and to identify gaps and to recommend measures of augmentation of Technical Capacity.

STATION-LEVEL TOD PLAN

TASK 1 – DATA COMPILATION AND INVENTORY:

- **Review of Existing Documents & Studies:** Review and analysis of the previously completed and current planning efforts underway in the Study Area with the intent to identify gaps and consistencies of the various policies, strategies and development projects when assessed against a backdrop of promoting TOD Principles under the following broad categories:
  - Planning & regulatory context
  - Regional context and relevance within the network
  - Mobility & Access
  - Land Use, Public realm & Urban Design
  - Transit & Station Area
- **Undertake site visits(s) & prepare an inventory of the planning & physical characteristics of the Study Area** –The existing conditions inventory will include the preparation of a detailed base map and a series of inventory maps and photographs.
- **Existing Conditions Inventory:** Map the existing data using AutoCAD and GIS mapping procedures. Inventory will include the following at a minimum:
  - Existing land use
  - Proposed land uses
  - Land ownership
  - Parking
  - Zoning
  - Circulation and Accessibility, with special emphasis on Multimodal Integration and NMT infrastructure
  - Public facilities
  - Major nodes & activity centers
  - Public realm & urban design elements
    - Parks, Open Space and Plazas
    - Sidewalk conditions
    - Natural Features
    - Lighting and signage conditions
    - Utilities
  - Proposed key developments
- **Develop Case Studies and Best Practices in Transit Oriented Development:** Select best practices that demonstrate successful TOD projects nationally and internationally for similar station types. The case studies will highlight successes, failures and lessons learned.
- **Undertake focus group meetings & key interviews** with stakeholders to help generate buy-in, identify major issues confronting the project and the social, economic, and political goals for the project.

TASK 2 – STUDY AREA ANALYSIS

- **Delineate Boundaries for TOD Study Area and Influence Area:** Refine TOD study boundary taking into account the existing and proposed site conditions in the following order:
  - Walking Distance from Transit Station based on Willingness to Walk
  - Existing Road Network
  - Ped-Shed Analysis
  - Critical Destinations beyond 10mins
  - Natural Environment Boundaries
  - Existing Built Environment
  - Existing Land Ownership
- **Analysis, Baseline Conditions Assessment and SWOT analysis:**
  - Identify the development character of the station area based on:
    - Station Typology
    - Market Realities
    - Community Needs
  - Undertake an analysis of baseline conditions and prepare SWOT maps based on TOD planning Principles broadly classified into:
    - Accessibility
    - Urban Form and Development
    - Transit & Station amenities
- **Identify preliminary goals and targets** with respect to the institutional support, plans, policies and development market

TASK 3 – VISIONING AND STAKEHOLDER ENGAGEMENT, TOD "CHARRETTE"

An organized design workshop; where more focus will be to create a vision for TOD plan. Invite and engage key stakeholders including elected officials and staff from various agencies to the visioning workshop. Focused charrette shall achieve the following objectives:

- Discuss the integration of land use, transportation, and infrastructure and solicit implementation strategies from charrette participants;
- Share and revalidate the identified transit-first goals and targets;
- Prioritize goals into short-term, mid-term, and long-term opportunities; and
- Identify the market, generate project interest and solicit feedback.

TASK 4 – RESILIENCE STRATEGY – ANALYSIS OF RISKS & ADAPTABLE PLANNING

Resilience should focus on strengthening the Station-Level TOD Plan to adapt and respond to changes in the physical, economic or social conditions. Traditional TOD/land use planning at the station level is built on assumptions about a future state considering population growth, modal split, market understanding and demand for specific development/land use types amongst others. Introduction of disasters such as resulting from climate change e.g. flooding or extreme weather events could significantly impact the TOD planning. An innovative station-level TOD Plan needs to better account for such uncertainty, as well as be adaptable to changing market conditions.

- **Assess risks specific to the station area** (including climate-related risks) that may impact the realization of the land use, transportation and infrastructure implementation to its fullest potential
- **Develop objectives and goals** related to resilience through a participatory process
- **Provide risk-informed planning recommendations** for the following to ensure adaptable planning and informed decision making for the TOD recommendations
    - **Land Planning for Emergencies -** Develop a strategy for during and post-disaster recovery to ensure critical emergency response.
    - **Land Planning for Adaptability –** Develop a strategy for the zoning /land uses to adapt to the changes in the physical, economic or social conditions

TASK 5 – DRAFT TRANSIT ORIENTED DEVELOPMENT RECOMMENDATIONS

- **Prepare a Conceptual Plan** incorporating the TOD Planning Principles (TOD Guidance Document - 1.3) under the themes: Integrated Transportation | NMT Accessibility | Compact Development | Liveability.
- **Prioritize**—'quick-win' public realm investments as catalyst projects and low-cost demonstration projects to showcase future transformations envisioned in TODs.
- **Prepare transit supportive development code at the station level** which will include the following at a minimum
    - **Develop appropriate parking strategies** with reduced parking as the goal
    - **Urban form**- compact development, articulated densities, mix of uses, integrate informal sector, active building frontage, and housing typology

TASK 6 – IDENTIFY A FINANCING STRATEGY

- Develop an understanding of the city's financing system impacting implementation of TOD related land development and infrastructure projects.
- Introduce innovative funding tools to integrate TOD within the city's urban management and financing systems
- Develop a Capital Investment Strategy for TOD station areas and projects.

TASK 7– IDENTIFY A PHASING AND IMPLEMENTATION STRATEGY INCLUDING CATALYST PROJECTS

- **Prepare a phasing for the TOD Plan** which includes preliminary recommendations to enable the City/development and planning agency to systematically implement the recommendations of the TOD Plan.
- **Technical Capacity Building Recommendations:** Assessment of existing capacity of the Planning teams and to identify gaps and to recommend measures of augmentation of Technical Capacity.

SITE-LEVEL TOD PLAN

TASK 1 – DATA COMPILATION AND INVENTORY:

- **Review of Existing Documents & Studies:** Review and analysis of the previously completed and current planning efforts underway in the Study Area with the intent to identify gaps and consistencies of the various policies, strategies and development projects when assessed against a backdrop of promoting TOD Principles under the following broad categories:
  - Planning & regulatory context
  - Regional context
  - Mobility & Access
  - Land Use, Public realm & Urban Design
  - Transit & Station Area
- **Undertake site visits(s) & prepare an inventory of the planning & physical characteristics of the Study Area** –The existing conditions inventory will include the preparation of a detailed base map and a series of inventory maps and photographs.
- **Existing Conditions Inventory:** Map the existing data using AutoCAD and GIS mapping procedures. Inventory will include the following at a minimum:
  - Existing land use
  - Proposed land uses
  - Land ownership
  - Parking
  - Zoning
  - Circulation and Accessibility, with special emphasis on Multimodal Integration and NMT infrastructure
  - Public facilities
  - Major nodes & activity centers
  - Public realm & urban design elements
    - Parks, Open Space and Plazas
    - Sidewalk conditions
    - Natural Features
    - Lighting and signage conditions
    - Utilities
  - Proposed key developments

TASK 2 – STUDY AREA ANALYSIS

- **Identify development context:** TOD Planning must take into consideration different aspects of the city and the context before beginning the planning of TOD. It helps in integrating sustainable development principles at the outset by respecting and nurturing existing environmental and settlements. The development context can be identified as:
  - Greenfield
  - Urban Infill
  - Redevelopment

- **Analysis, Baseline Conditions Assessment and SWOT analysis:** Undertake an analysis of baseline conditions and prepare Weaknesses & Threats maps - utilize the existing conditions inventory to evaluate the physical characteristics of the study area.
- **Identify preliminary goals and targets** with respect to the institutional support, plans, policies and development market
- **Create a development program**
  - Site Layout Plan- proposed land use mix
  - Detailed Development Programme
  - Infrastructure Upgrades Plan
- **Prepare the Real Estate Market Feasibility Study based on**
  - Demand assessment of the site
  - Feasibility assessment/study of the proposal

TASK 3 – VISIONING AND STAKEHOLDER ENGAGEMENT, TOD "CHARRETTE"

An organized design workshop; where more focus will be to create a vision for TOD plan. Invite and engage key stakeholders including elected officials and staff from various agencies to the visioning workshop. Focused charrette shall achieve the following objectives:

- Discuss the integration of land use, transportation, and infrastructure and solicit implementation strategies from charrette participants;
- Share and revalidate the identified transit-first goals and targets;
- Prioritize goals into short-term, mid-term, and long-term opportunities; and
- Identify the market, generate project interest and solicit feedback.

TASK 4 – RESILIENCE STRATEGY – ANALYSIS OF RISKS & ADAPTABLE PLANNING

Resilience should focus on strengthening the Site-Level TOD Plan to adapt and respond to changes in the market conditions. Traditional TOD/land use planning at the site level is built on assumptions about a future state considering market understanding and demand for specific development/land use types amongst others. Introduction of disasters such as resulting from climate change e.g. flooding or extreme weather events could significantly impact the site plan. An innovative site-level TOD Plan needs to better account for such uncertainty, as well as be adaptable to changing market conditions.

- **Assess site-specific risks** (including climate-related risks) that may impact the realization of development potential
- **Develop objectives and goals** related to resilience
- **Provide risk-informed planning recommendations** for the following to ensure adaptable planning and informed decision making for the TOD recommendations
  - **Land Planning for Emergencies -** Develop a strategy for during and post-disaster recovery to ensure critical emergency response.
  - **Land Planning for Adaptability –** Develop a strategy for the zoning/land uses to adapt to market realities

TASK 5 – DRAFT TRANSIT ORIENTED DEVELOPMENT RECOMMENDATIONS

- **Prepare a Conceptual Master Plan** include the following at a minimum
  - **Built Form**
    - » Site Layout Plan- proposed land use mix
    - » Detailed Development Programme
    - » Infrastructure Upgrades Plan
  - **Placemaking**
    - » Public Realm Strategy
    - » Access Management
    - » Transit Plaza Design
    - » Streetscape Improvement
  - **Mobility and Circulation Strategy**
    - » Pedestrian Accessibility Plan
    - » Traffic Circulation Plan
    - » Road Network Design
    - » Parking Management
- **Prioritize**—'quick-win' public realm investments as catalyst projects and low-cost demonstration projects to showcase future transformations envisioned in TODs.

TASK 5 – IDENTIFY A FINANCING STRATEGY

- Develop an understanding of the city's financing system impacting implementation of TOD related land development and infrastructure projects.
- Introduce innovative funding tools to integrate TOD within the city's urban management and financing systems
- Develop a Capital Investment Strategy for TOD station areas and projects.

TASK 6 – IDENTIFY A PHASING AND IMPLEMENTATION STRATEGY INCLUDING CATALYST PROJECTS

- **Prepare a phasing for the TOD Plan** which includes preliminary recommendations to enable the City/development and planning agency to systematically implement the recommendations of the TOD Plan.
- **Technical Capacity Building Recommendations:** Assessment of existing capacity of the Planning teams and to identify gaps and to recommend measures of augmentation of Technical Capacity.

DELIVERABLES

TASK	DELIVERABLE	TIMELINE
1	**Inception Report** including problem statement, goals, objectives, study needs and methods	M + 2 weeks
2	Memo #1: Study Area Analysis	M + 2 months
3	Memo #2: Stakeholder Engagement Summary	M + 3 months
4	Memo #3: Resilience Strategy	M + 4 months
5	Memo #4: Draft TOD Plan Recommendations	M + 6 months
6	Memo #5: Financing and Implementation Strategy	M + 7 months
7	Final TOD Plan	M + 8 months

QUALIFICATION OF CONSULTANTS

The Consultant Team must have experience in at least:

A. One similar TOD Study

OR

B. At least two Infrastructure Development Plans that followed compact development principles

The Consultant Team must include the following key expertise:

	Key Experts	Year of Experience
1	Project Manager and Senior Urban Planner	15 years
2	Urban Planner	5-10 years
2	Urban Designer	5-10 years
3	Transport Planner	5-10 years
4	Environmental Planner	5-10 years
5	Regulatory Expert	5-10 years
6	Municipal Finance Specialist	5-10 years



Curitiba, Brazil

TOD KP

FINANCE

INTRODUCTION



The ‘Finance’ step of the TOD process outlines the processes for assessment of cost variables for transit infrastructure, cross-subsidization potential from revenue generating real estate developments, land value capture mechanisms & best practices, strategic private partnership advisory and financing tools.

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ABOUT FINANCE

The 'Finance' stage presented in this section is applicable to large scale, mixed-use, urban transformative projects near transit stations and corridors that are typically financed by partnerships between public and private sectors. TOD projects are generally associated with complex site acquisition and land assemblage processes, as well as high capital investments towards generous public infrastructure investments (including higher percentage of open spaces, multimodal facilities, affordable housing). From a public sector perspective, these high investment costs require innovation in combining diverse municipal financing tools with strategic private sector partnerships to include market-driven revenue generating components that often deviate from traditional single use development projects. This section provides tools available through traditional municipal financing systems and fundamentals of real estate, project structuring including cost estimation for capital investmentse. These financial tools are supported by, enabling regulatory tools, guidelines and development incentives to forge partnerships for successful financial closure of TOD transformative projects.

Over the last two decades, World Bank client countries have employed diverse financing strategies to enable land value capture mechanisms paving way for viable models to promote TODs. These financial instruments require supporting policies at the national level to also provide for coverage of costs through recurrent revenues from alternate sources. Implementing these policies at the local level requires a detailed structuring of the project implementation parameters with strategic funding mechanisms, and ability to raise capital and allocate revenues. Phasing and timing for transit implementation and real estate development is generally asynchronous – for example, transit-oriented development projects take 10-15 years for implementation as opposed to a 3-5 year timeframe for real estate development projects. Therefore, devising a strategy for funding and aligning with overall project goals may be performed by a combining transit and real estate development processes from the inception of the transit project, including analysis of development potential, revenue earning potential, leveraging structure, risk sharing framework , from both public and private sector perspectives. This needs to be undertaken in a sequential format based on initial planning and then moving ahead on detailed analysis through the financial due diligence and implementation framework.

This section outlines the processes for assessment of cost variables for transit infrastructure, cross subsidization potential from revenue generating real estate developments, land value capture mechanisms & best practices, strategic private partnership advisory and financing tools.

REFERENCES

The following list of references were used to develop the "Assess" Knowledge Products:

- Suzuki, Hiroaki, Jin Murakami, Yu-Hung Hong, and Beth Tamayose. 2015. Financing Transit-Oriented Development with Land Values: Adapting Land Value Capture in Developing Countries. Urban Development Series. Washington, DC: World Bank
- Ardila-Gomez, A. and A. Ortegon-Sanchez. Sustainable Urban Transport Financing from the Sidewalk to the Subway: Capital, Operations, and Maintenance Financing. 2016. Washington, DC: World Bank
- Urban Growth Company, Value Capture Framework and Toolkit, Sept 2017
- James McIntosh, Peter Newman, Roman Trubka, Jeff Kenworthy. 2017. Framework for land value capture from investments in transit in car-dependent cities. The Journal of Transport and Land Use
- William Kohn Fleissig, Ian R. Carlton. 2009. "Convening on Transit Oriented Development: The Investment/Finance Perspective. Center for Transit Oriented Development (CTOD), Boston
- Amirtahmasebi, Rana, Mariana Orloff, Sameh Wahba, and Andrew Altman. 2016. Regenerating Urban Land - A Practioner's Guide to Leveraging Private Investment. Washington, DC: World Bank Group.

KNOWLEDGE PRODUCTS

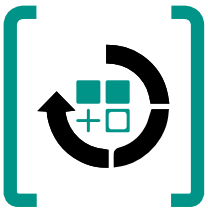
The Knowledge Products presented as part of the 'Finance' stage include:



ANALYTICAL

FI-A01 **Infrastructure Capital & Operating Cost Estimates/ Ranges** *(Spreadsheet + User Guide)*

FI-A02 **Real Estate Development Pro-Forma** *(Spreadsheet + User Guide)*



'HOW-TO' GUIDES

FI-H01 **Land Value Capture Framework** *(Step-by-Step Guide)*

FI-H02 **Private Sector Participation Framework** *(Ref. Doc)*



RESOURCES

FI-R01 **Development Incentives** *(Ref. Doc)*

FI-R02 **Land Value Capture Mechanism Best Practices** *(Ref. Doc)*

FI-R03 **Municipal Finance Tools** *(Ref. Doc)*



Dubai, UAE

TOD KP

FI-A01

INFRASTRUCTURE CAPITAL & OPERATING COST ESTIMATES/RANGES

This Knowledge Product is intended to be used as a reference and an interactive Excel spreadsheet available online on the GPSC's TOD website and the World Bank's TOD CoP website. The reader should first review the summary presented in this section before using the spreadsheet tool.

Type: Spreadsheet + User Guide



TOD Global Platform for Sustainable Cities WORLD BANK GROUP IBI

INTRODUCTION

This tool has been structured to provide a broad reference for arriving at initial cost estimates of a transit infrastructure project. The costing has been considered for integrated developments with transit infrastructure comprising of allied real estate or other developments. The costing is calculated in three major portions as mentioned i.e:

- **Preparatory Activities** mainly comprising of engagement of consultants, etc.
- **Capital Cost** comprising all development costs, including land cost, if any;
- **Operations Cost** - broadly calculated based on the capital cost.

The tool provides a brief description of each item and a broad range of associated cost for development of infrastructure. The local requirements and conditions define the cost applicable, and accordingly, the appropriate cost may be selected for each of the components.

The land cost has not been provided considering the range for this component to be large, depending on the local conditions. Therefore, the applicable rate of land may be provided in the yellow box against the component.

The tool also includes a reference sheet containing details of transit infrastructure cost for various cities across the world.

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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PURPOSE

It is essential to understand and estimate the cost investments that are primarily required for transit infrastructure. The cost of transit infrastructure depends on the mode of transit and terrain of the development area. In the case of requirements for earth cutting and tunneling for network connectivity the transit infrastructure cost increases significantly.

The cost of infrastructure is also dependent on other factors like mode of funding, interest costs, ancillary studies, overall Programme management, land preparations etc. These can be assessed as a derivative of the capital costs for the main network and infrastructure. This section describes the cost of capital investments, as well as allied expenditures expected towards other factors as listed. The sheet “AS-04 Threshold for Rapid Transit” analyses the operational expenditure of transit on Passenger Kilometer Travel (PKT) basis.

The revenue from the transit operations is principally dependent on the ridership and the fares chargeable for the use of the facility. Generally, the charges are directly proportional to the average per capita income of the region and hence, in most cases of World Bank client countries, does not suffice to recover the operational expenditure.

ASSUMPTIONS AND LIMITATIONS

- The tool utilizes per km average cost of transit infrastructure development based on type and category to arrive at total cost.
- The average per kilometer cost was available for the year 2013. The values have been adjusted with reference to the global inflation rate to arrive at rates for the year 2018.
- The ancillary costs listed in the tool are based on broad parameters as a derivative of the total cost of transit arrived at through above methodology.
- A reference to public transit fares has been provided based on available secondary data. No inferences have been drawn with respect to the fares data.

INTENDED OUTCOMES

- The tool aims to provide a block estimate for the transit infrastructure planned for city-wide, corridor or station area development, knowing the length and type of transit network.
- A reference sheet of transit fares across major cities in the world to assist in assessing approximate revenue from commuter/user fees based on the ridership estimates.
- Provide assistance in analyzing the mode of transit infrastructure with reference to the cost of such development.

HOW TO USE THIS TOOL?

First, the user should read the User Guide Tab before using the spreadsheet. The application of the Infrastructure Capital and Operating Cost Estimates tool consists of five basic steps:

01 STEP 1

Decide on the type or mode of transit infrastructure intended to be developed as part of the initial assessment plan.

02 STEP 2

Based on the transit type, the required length of transit infrastructure essential for the TOD needs to be ascertained.

03 STEP 3

The details on type and length of the transit shall have to be provided in **Cost Assessment tab.** The details of type of transit shall have to be selected from the pre-defined list of Bus Rapid Transit (BRT), Light Rail Transit (LRT), Light Rail Transit (LRT) and Heavy Rail Transit (HRT). The BRT is further sub-divided into Gold, Silver, Bronze and Basic categories.

04 STEP 4

The tool automatically calculates the total cost of transit based on pre-defined data and the inputs provided, as above. Also, in cases where the land cost is a component to be incurred for development of transit then that cost must also be provided in the **Cost Assessment tab**.

05 STEP 5

Based on the average range for the ancillary costs, the tool also calculates other costs that may have to be incurred towards project management, conceptualization, design etc.

TOD KP

FI-A02

REAL ESTATE DEVELOPMENT PRO-FORMA



This Knowledge Product is intended to be used as an interactive Excel spreadsheet available online on the GPSC's TOD website and the World Bank's TOD CoP website. The reader should first review the summary presented below before using the spreadsheet tool. review the summary presented below before using the spreadsheet tool.

Type: Spreadsheet + User Guide



TOD

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ABOUT THE REAL ESTATE DEVELOPMENT PROFORMA TOOL

PURPOSE

This Transit Oriented Development Financial Analysis Tool is structure to present transit agencies, local governments, and private sector investors a preliminary assessment of potential return on investments (ROI) based on certain basic project development parameters assumed for TOD projects. The goal of this tool is to help organize the TOD project's total development budget, projected operating revenue and expenses to determine the cash flow over time, and identify the project's potential sources of funding including grants, debts and private sector equity.

The accompanying Excel worksheet calculates the cost of a typical TOD development project based on block cost estimates on per unit area method. It also assists in calculating the projected revenue from different sources through calculation based on the average market rate for capital and rental values in the micro-market. However, it is important to note that the tool is not a discounted cash flow analysis and therefore, does not take into account time value of money in the calculation of return on investment.

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ASSUMPTIONS AND LIMITATIONS

- The tool is based on several assumptions and requires several data inputs to be diligently filled for appropriate outputs.
- Broad parameters have been taken into consideration enlisted in Risk Assessment tab, which may be referred to arrive at different scenarios of financial and market parameters.
- Every project requires its own customization, therefore, the tool is developed on basic factors to derive cash flows separately for transit infrastructure and real estate components.
- The tool requires inputs like operations cost and transit revenue to be assessed through other tools forming part of the TOD Knowledge Product.

INTENDED OUTCOMES

- An assessment of value generation by the development of real estate components forming part of the TOD.
- Derivation of cross-subsidization capacity within an integrated development of TOD with real estate as the significant revenue generator for the infrastructure.
- Determination of viability gap in the development of transit infrastructure.
- Assessment of returns for the developer on equity scale post debt amortization.

HOW TO USE THIS TOOL?

First, the user should read the User Guide Tab before using the spreadsheet. The application of the Real Estate Development Pro-Forma tool consists of five basic steps:

01 STEP 1

Provide inputs related to the area statement of various development components envisaged as per the plan and design exercise in the TOD in the **Area Statement tab**.

02 STEP 2

Other details related to costing, occupancy, revenue, debt structure, interest charges etc. are to be provided in the **Data Sheet tab**.

03 STEP 3

The development timeline and revenue realization timelines need to be provided in the **Timelines tab**.

04 STEP 4

Based on the inputs provided in the above steps, the value are auto-calculated in the subsequent sheets of **Capex tab** (Capital Expenditure), **Opex tab** (Operations Expenditure), **Revenue tab**, **Interest Charges tab**, **cf – Infra tab** (Cashflow for infrastructure) and **cf – real est tab** (Cashflow for real estate).

05 STEP 5

The risk assessment of the overall financial analysis can be made through broad parameters provided in the **Risk Analysis tab**.



Bogota, Colombia

TOD KP

FI-H01



LAND VALUE CAPTURE FRAMEWORK

This Knowledge Product is intended to be used as a process toolkit available online on the GPSC's TOD website and the World Bank's TOD CoP website. The reader should first review the summary presented below before exercising the tool in detail.

Type: STEP-BY-STEP GUIDE



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INTRODUCTION

Land Value Capture (LVC) has been categorized as a profound means for routing revenue from development potential of land. It refers to a broader term, generally used for a policy approach of sharing increases in land values (generated by urbanization, public infrastructure projects, zoning changes, and/or other government initiatives) between private and public sector. The effective application of land value capture systems typically requires a robust real estate market, conducive legal and regulatory framework, strong property tax collection systems, including clear land tenure systems, strict enforcement and adequate training of relevant stakeholders. Land value capture tools often found in varying forms in World Bank client countries include: transferable development rights (TDR), impact fees, public land leasing, increased densities, business improvement districts, and tax increment financing.

Primarily, the techniques support all forms where infrastructure cost or other investments are expected to be incurred for enhancement of land values. Such enhancement or betterment of land value through Land Value Capture (LVC) frameworks provide support for infrastructure development. In lieu, the betterment of land values requires substantial public investments ranging from new infrastructure, such as parking and utility capacity upgrades to open spaces, streetscapes and multimodal facilities, in response to increased densities allowed “by-right” or as a premium to private landowners. Different means for capturing the land value are being exercised across the world. Examples of such initiatives include municipal borrowing against future property tax increments (California, USA) or through charging vacant land tax in TOD areas (Bogota, Colombia).

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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PURPOSE

Financing Transit Oriented Development with Land Values (Suzuki, Murakami, Tamyaose, World Bank 2015), is the main resource that directly addresses the issues and opportunities in applying LVC instruments in low and middle-income countries. The development of transit infrastructure benefits several stakeholders, direct as well as indirect. In most cases, these benefits remain with the beneficiary and in no manner contribute towards financial sustainability or growth of infrastructure. Therefore, it is needed to devise mechanisms to capture these benefits getting created in transit-influenced catchment areas. There are established mechanism and tools devised across the globe for such practices. The Land Value Capture is important among such tools to be used for funding transit infrastructure projects.

At large, there are many land value capture tools being practiced and documented globally. This step-by-step guide elaborates on the processes to be referred to for assessing and implementing land value capture mechanisms in the identified transit-oriented development zones and areas.

In principally, the various methods being used by different countries, governments and land owning agencies are provided below:

- LAND DEVELOPMENT AND SALE- Holding the land, for which the value appreciates, after rolling the transit infrastructure and then selling or developing the land for potential higher revenue from such land parcels.
- LAND VALUE TAX- Tax on the land itself and not any buildings or other physical assets that may fluctuate in value due to market conditions resulting in stabilized property prices.
- LAND USE CONVERSION CHARGES- Additional fees towards conversion of land use for developments having potential of high revenue generation.
- DEVELOPMENT CHARGES- Typically, fees collected by the planning/municipal authority from developers and builders prior to development of a land for issuing a building permit to offset the cost of infrastructure required to provide municipal services to the new development.
- TAX INCREMENT FINANCING- Municipal Authority earmarking future increases in revenue of property tax generated in an identified district/ area, from new real estate developments, for financing present infrastructure projects.

ASSUMPTIONS AND LIMITATIONS

- The framework aims at providing broad level strategy and an overall guidance for taking steps towards supporting TOD through land value capture.
- The implementation of land value capture requires an enabling environment with statutory and legislative support to develop a framework for its implementation. This varies from region to region depending on the local government policies, and need not be similar for applicability to all.

01 INITIATION OF THE PROJECT

- A detailed study of the legislative framework, comprised of rules and regulations in force, for governing land value capture mechanisms, shall have to be conducted.
- The applicability of existing or approved mechanisms with the rules and regulations will have to be assessed for identification of appropriate techniques.
- In case the existing tools or mechanisms are inadequate, there may be requirements to introduce new tools as per the needs of the project. All regulatory reforms concerning the project and required for introduction or enactment of the new tool, may be proposed at once to the government or the approving authority. It is essential that benchmarking and comparative analysis with similar regions and neighborhoods should be conducted in the process to identify new LVC tools, prior to proposing it for approval.

[1]Similar cities, towns, governance pattern etc. Also, further similarity in terms of demographics and economic conditions may be considered.

02 PLANNING

- Planning is needed to identify the catchment area getting influenced due to the new transit project, corridor or planned area. The value of land and other properties will increase in the area of influence.
- The identified would need to be surveyed to collect data on the land ownership pattern.
- Based on land ownership, different tools, like land amalgamation, etc., will need to be planned and structured.
- Identify potential land in separate categories of government and non-government lands.

03 DESIGN AND STRATEGY

- Based on the land ownership and the location plan, the land value capture mechanism shall be identified:

500m ↑					
400m	Hold the land for densification / property price appreciation	Government land - hold the land for densification / property price appreciation Non-Government - Land Development Charges, land Value Tax, Land Use Conversion Charges etc.	Government land - hold the land for densification / property price appreciation Non-Government - Land Development Charges, land Value Tax, Land Use Conversion Charges etc.	Government land - hold the land for densification / property price appreciation Non-Government - Land Development Charges, land Value Tax, Land Use Conversion Charges etc.	Non-Government - Land Development Charges, land Value Tax, Land Use Conversion Charges etc.
300m	Hold the land for densification / property price appreciation	Government land - hold the land for densification / property price appreciation Non-Government - Land Development Charges, land Value Tax, Land Use Conversion Charges etc.	Government land - hold the land for densification / property price appreciation Non-Government - Land Development Charges, land Value Tax, Land Use Conversion Charges etc.	Government land - hold the land for densification / property price appreciation Non-Government - Land Development Charges, land Value Tax, Land Use Conversion Charges etc.	Non-Government - Land Development Charges, land Value Tax, Land Use Conversion Charges etc.
200m	Land development with allied revenue generating components	Government land - land development with allied revenue generating components Non-Government - Land Development Charges, land Value Tax, Land Use Conversion Charges etc.	Government land - land development with allied revenue generating components Non-Government - Land Development Charges, land Value Tax, Land Use Conversion Charges etc.	Government land - land development with allied revenue generating components Non-Government - Land Development Charges, land Value Tax, Land Use Conversion Charges etc.	Non-Government - Land Development Charges, land Value Tax, Land Use Conversion Charges etc.
100m	Land development with allied revenue generating components	Land required for transit - joint development, else separate development of government land and tax increment and other charges applied for non-government land	Land required for transit - joint development, else separate development of government land and tax increment and other charges applied for non-government land	Land required for transit - land amalgamation & joint development, else separate development of government land and tax increment and other charges applied for non-government land	Land required for transit - land amalgamation & joint development, else separate development of government land and tax increment and other charges applied for non-government land
Area of Influence	Land development with allied revenue generating components[2]	Joint development with allied revenue generating components- financing and contractual arrangements to be made accordingly	Joint development with allied revenue generating components- financing and contractual arrangements to be accordingly	Tools like land amalgamation to be applied, then joint development with allied revenue generating components	Tools like land amalgamation[3], if required to be applied and then joint development
	Government				Non-Government →

Table 1: Typical LVC strategy for land parcels within radial distance of 500 meters of the transit infrastructure and depending on land ownership

[2]Here, allied refers to supporting real estate developments for cross subsidizing capital / operational cost of infrastructure development and/or maintenance, as applicable.

[3] Land amalgamation refers to the framework for enabling and also requiring private land owners to come together for a purposeful development that supports the transit-oriented development approach of governments.

- In order to maintain transparency, accountability and to reduce unnecessary reconciliation issues, separate financial accounts with the bank may be maintained by the implementing agency for revenue and expenditure. This helps distinguish and segregated identification of fund flows for complex projects with longer durations.
- It would be essential to execute formal agreements with detailed terms based on the land development / settlement strategy agreed upon between the parties for a land value capture mechanism. Such agreements shall be governed by the prevailing legislative framework and the terms of arrangement shall have to abide by the available framework within the permitted laws.
- In order to protect the interest of either party and to facilitate financial protection towards shared revenue, if applicable, the arrangement of an ESCROW account with a bank may be considered by the parties for operationalizing the value capture mechanism.

04 EXECUTION AND OPERATION

- The following documents (including but not limited to) shall be placed in public disclosure:
    1. Planning and Methodology of TOD Area Development
    2. Proposed Transit Infrastructure Development
    3. Prevailing norms of land value capture mechanisms, approved by local or regional government
- The details of the land value capture mechanism will be shared with each individual owner and also placed in the public domain.
- The procedure of the deposition of funds and the approval or clearance, thereupon, shall be put in place for non-government land/properties.
- A monitoring and evaluation mechanism of the land value capture shall have to be put in place in the following forms:

    (i) Identification of Key Performance Indicators and their measurement from time to time;

    (ii) Constitution of monitoring team / committees with assignment to conduct regular review of the progress and effectiveness of the implementation framework

    (iii) Regular financial and performance audits to keep check on irregularities and system slack, if any.

    (iv) Any other method or institutionalization that the implementing authority or the Government may perceive are required for effective monitoring and control.
- In case of joint developments, the contractual arrangements, including the terms and conditions, shall be placed in the public domain to follow open and transparent procedure.

TOD KP

FI-H02

PRIVATE SECTOR PARTICIPATION FRAMEWORK



Project structuring process or planning of financial resources to meet the project cost

Type: STEP-BY-STEP GUIDE



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INTRODUCTION

PURPOSE

Developing capital intensive public transit infrastructure projects require a robust financial strategy to be in-place for gaining the confidence of private sector investment in real estate. The resulting transit and real estate projects are generally vulnerable to several risks during their life cycle. It is advised to appropriately share and mitigate the risks with the right stakeholders and partners.

It is often witnessed that the land owning agency and/or the implementing agency for transit infrastructure projects would be government bodies. Technical capacity constraints and limitations in understanding real estate markets are a common challenge with government agencies in the case of developing long-term TOD transformational projects.

While public- private partnerships (PPPs) in infrastructure projects, such as highways and public rail-based transit, have shown success in different parts of the world, successful TOD and real estate projects are found mostly in strong and emerging real estate markets. Several countries have formulated robust frameworks for developing Public-Private Partnership (PPP) projects under their legislative guidelines. The general methodology for such arrangements in project implementations is moreover common in all countries, with project to project customization based on different parameters.

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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CONTEXT

The understanding of Public-Private Partnership is important before initiating the project structuring process or the planning of financial resources to meet the project cost. This tool elaborates on the basic understanding of the PPP framework followed globally. It includes an introduction on the stakeholder arrangement, project structuring mechanisms, legislative, implementation and monitoring frameworks, post implementation management and brief case studies.

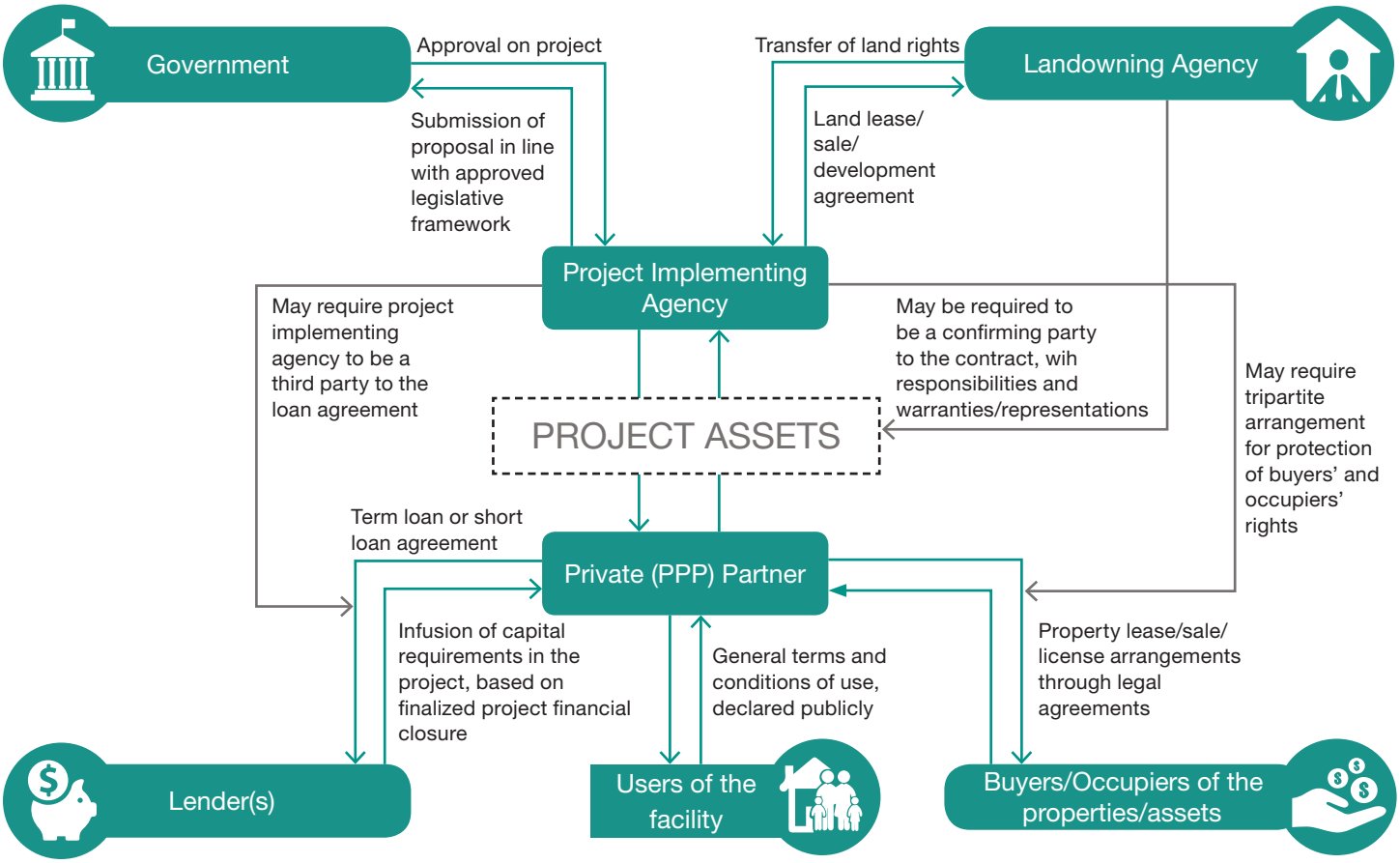
STAKEHOLDERS

In public-private partnerships, the identified stakeholders, i.e. those providing resources, those approving the implementation, who exploit resources to develop the project and who receive the services or benefits out of the envisaged plan, are contractually bound based on their responsibilities. These stakeholder can principally be identified as:

- Government– Legislative Body/Approving Authority– Generally responsible for ruling and monitoring the legislative framework for PPP arrangements in their jurisdiction and are also often the approving authority for the project.
- Landowning Agency(ies)– Generally, the land for transit infrastructure projects are owned by government agencies, different from the project implementing agencies. There may also be private land owners falling in this category.

- Project Implementing Agency(ies)– In most cases, there is a government agency that is entrusted with the responsibility to undertake the implementation of the project. The agency analyzes and proposes the implementation structure for the project, whether through public-private partnership or otherwise.
- Private partner– These are the private partner(s) participating in the implementation and operations, either as developers, investors or the concessionaire for the project.
- Lenders– The lenders are the important stakeholder in the whole business of public-private partnership projects, as they generally bring in the maximum financial resources to the project and their interests have to be protected at all times. They may be senior lenders or subordinate lenders, depending on the financial structuring of the project.
- Users/Occupiers/Buyers– These are the users of the project components, whether it be transit facility or other such public components. It also includes the purchasers and buyers of properties and assets developed within or allied to the project. Generally, they are not any direct party to the project development and operations contracts, but their interests are protected in the project through warranties, representation and responsibilities of other parties.

A schematic matrix of the relationship among these stakeholders is presented below for reference:



PROJECT STRUCTURING

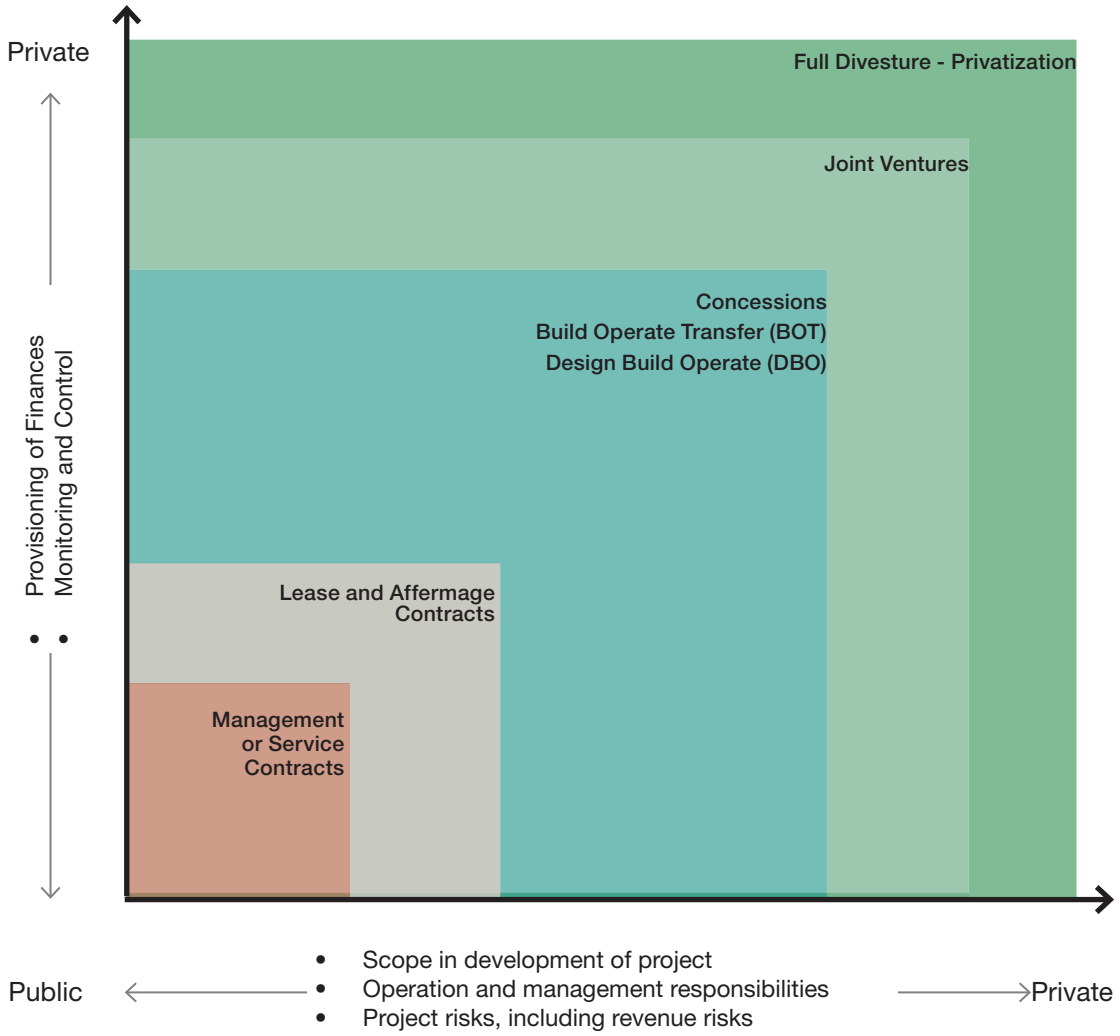
The structuring of public-private partnership projects depend on several factors and requires project level, detailed analysis before arriving at any specific model. These include the sharing of the following between the implementing agency and the private partner:

- Scope in development of project
- Provisioning of resources
- Operation and management responsibilities
- Project risks, including revenue risks
- Monitoring and control

Based on these shared responsibilities, the public-private partnership projects may be classified as following:

- Management or Service Contracts
- Lease and Affermage Contracts
- Concessions/Build-Operate-Transfer (BOT)/Design-Build-Operate (DBO)
- Joint Ventures
- Privatization

The selection of an alternative is the result of the assessment of project and stakeholder requirements. A reference framework providing benchmarks for this purpose is provided below:



LEGISLATIVE- POLICY AND REGULATORY FRAMEWORK

It is important for the project formulator(s) to have an in-depth understanding of the legislative framework governing the development and operations of the project. The project structure, including tenure of development and operations, financial and land resources, stakeholder and partner selection, rights and responsibilities, compliance requirements, revenue-based rules and guidelines, etc. shall all be required to adhere to the policies and regulations, brought in force specific to the area or generic to the jurisdiction of government.

In case of complications or requirements of clarifications, formulation of consultative committees and making reference to approving authorities at a preliminary stage is highly recommended. Some specific projects may also require reforms to the norms laid down by government for PPP projects, land development or land transfers, etc. These should be undertaken in priority, before proceeding further on the project structuring and implementation.

PROCUREMENT AND IMPLEMENTATION

Based on the decided project implementation structure, the procurement is undertaken through standard terms and conditions of bidding documents and the draft contract agreement appended to it. The draft contract agreement generally addresses all aspects of project structure parameters and aligns a risk sharing framework in the contractual terms and conditions. All federal government and in many contexts, the provincial or local government, prescribes standard bidding documents for PPP procurement as a reference. These documents may be followed with customizations to suit the requirements of project. These documents are generally termed as model concession agreements and model request for proposal documents.

It is also important that there is efficient contract management and project monitoring. For this purpose, the implementing agency may institutionalize a separate team or engage a specialized consulting organization(s) for this purpose. There is a specific role of independent engineer for all milestone certifications and minor dispute resolutions. These are independent consultants engaged by either the implementing agency or jointly, by both the parties, to check the quality of development and protect the interest of the project.

In general cases, the implementation of the project is undertaken by the private partner, independently. However, the partner takes all prior and post-implementation approvals from the implementing agency, independent engineer or any other third party, as defined in the terms of the agreement.

POST-IMPLEMENTATION MANAGEMENT

The agreements govern the entire period of the contract/concession from the date of engagement till the handover of assets back to the implementing agency, if applicable. The contract management team of the implementing agency is responsible for overseeing and monitoring the overall performance of the contract by either parties, especially the private partner. Site programming for soft components such as destination management, placemaking, safety, and overall place branding are factors that should continue through the life-cycle of the project in order to increase the value proposition for the site in the overall market.



Hong Kong SAR, China

TOD KP

FI-R01

DEVELOPMENT INCENTIVES



A guide of financing tools for planners and economic development specialists

Type: Reference Document



TOD

Global Platform for Sustainable Cities

WORLD BANK GROUP

IBI

INTRODUCTION

Since TOD is a deviation from traditional single use development models, incentives are often used to attract developers and investors in developing the TOD area, especially in the case of peripheral areas of the city or greenfield contexts. Some incentives are also aligned towards the citizens, encouraging heightened community participation in the development process. This helps in ensuring that the project is co-created with impacted stakeholders, and chances of delays in obtaining project approvals and implementation are minimized. The following outlines the potential development incentives that can be implemented:

INCENTIVE	OUTCOME
Increased densities offered by-right around transit nodes, as well as density bonuses in exchange for public amenities and infrastructure constructed by private sector, subject to market demand.	Conducive to development and reduce infrastructure expansion costs
Local Growth Management Strategies and incentives to promote TOD to land developers and investors at the local level.	Provides better urban planning and growth guidelines, thereby increasing the attractiveness potential of the area
Incentives to developers in the form of technical assistance for architectural design, site plan approval, understanding zoning regulations.	Resulting in quality development
Incentive to developers by relaxing height restrictions and reducing the requirement for providing car parking. These may be justified where the development is located near shops and close to public transport, as envisaged in TOD, depending on market demand.	Opportunity for mixed-use, compact development
For projects with a strong focus on transit use, incentives can include full or partial fee rebate on development application fees.	Reduces processing time and improves efficiency
Financial assistance for activities such as organizing initial community consultation and integrating affordable housing and community facilities as part of the TOD project.	Participatory planning
Incentives such as fee waivers, expedited processing of development applications to streamline approval process.	Value addition to the service improves project delivery

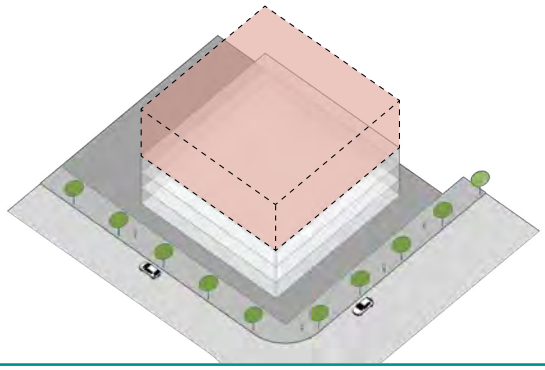
Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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ZONING INCENTIVES

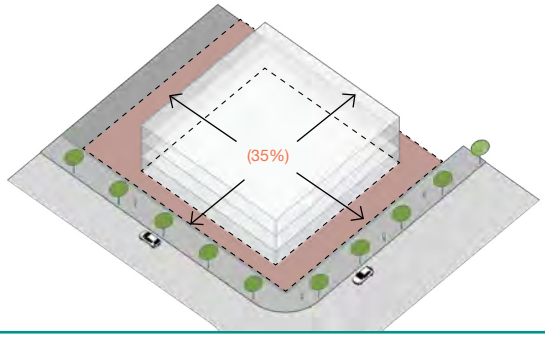
MODIFY MAXIMUM BUILDING HEIGHT

Increased allowable height may vary depending on the current zoning and the location in relation to transit nodes, but would increase buildable area.



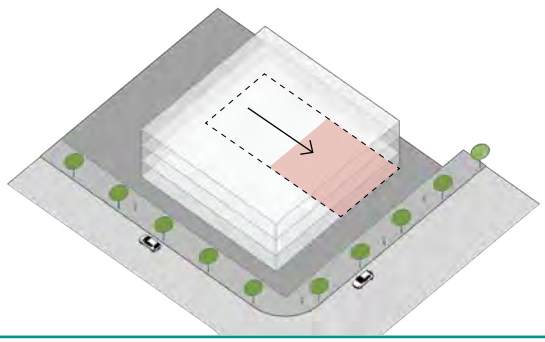
MODIFY MAXIMUM LOT COVERAGE

Increased maximum lot coverage may vary depending on the current zoning and the location in relation to transit nodes, but would increase buildable area.



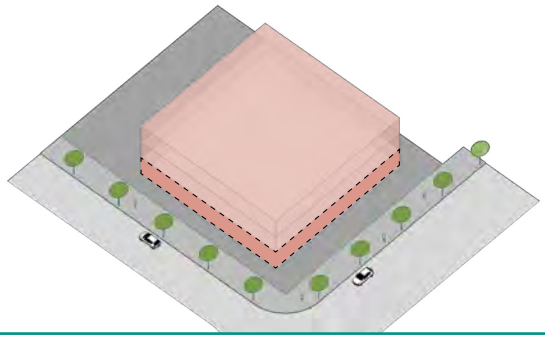
MODIFY ALLOWABLE RESIDENTIAL DENSITY

Decreasing the required land area per dwelling unit creates an opportunity for increased housing density near transit and more housing flexibility and choice.



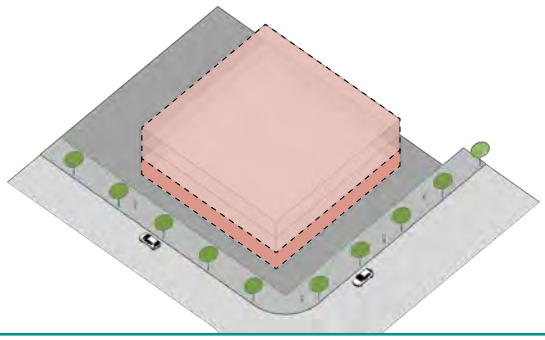
MODIFY PERMITTED USES

Amending principal permitted uses, to include a full range of residential and commercial uses within a walkable distance of transit, reinforces pedestrian activity.



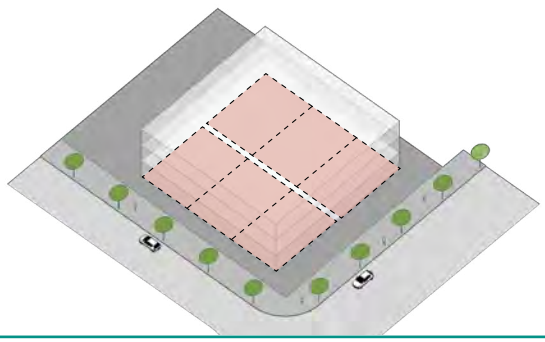
INCENTIVIZE MIXED USES

Requiring or incentivizing a mix of uses increases the opportunity for a vibrant place that contributes to active and walkable transit.



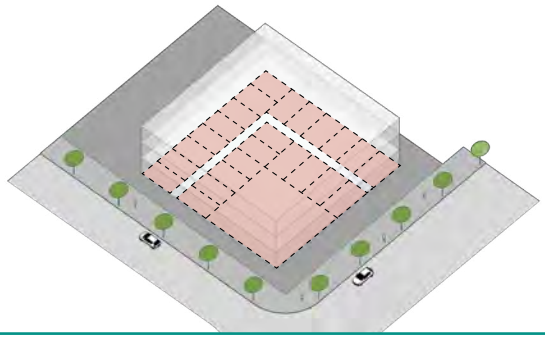
INCENTIVIZE RESIDENTIAL CONVERSION

Incentivizing existing structures to convert to residential uses would enable more contiguous, walkable districts to occur near transit stations.



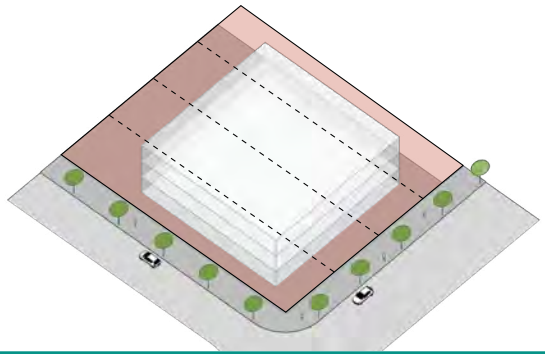
INCENTIVIZE SPECIFIC DESIRED USES

Providing additional height or density entitlements to specific uses, in specific locations, creates the opportunity to align private and public investments.



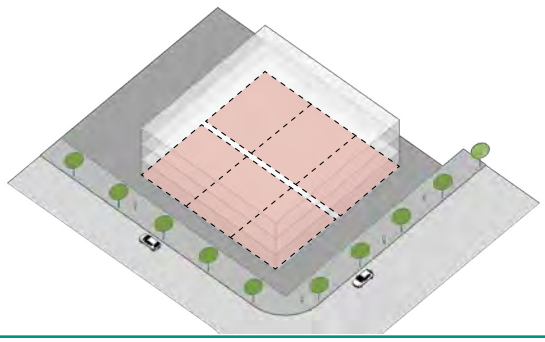
INCENTIVIZE SPECIFIC DESIRED USES

Incentivizing parcel assembly creates new opportunities for larger scale redevelopment where desirable.



INCENTIVIZE HOUSING CHOICE / OPPORTUNITY

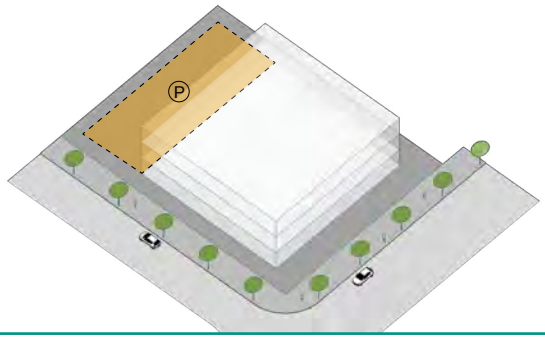
Variation in housing opportunities strengthens compact, walkable neighbourhoods and builds upon the strengths of residential demand.



PARKING INCENTIVES

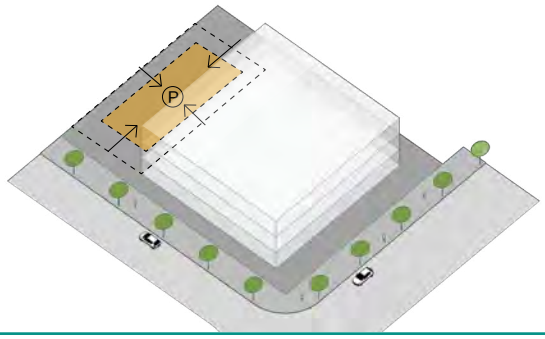
DEFINING PARKING LOCATION AND ORIENTATION

Parking located at the interior of blocks, behind buildings or concealed by landscape buffers, provides a more walkable and uninterrupted environment to support transit use.



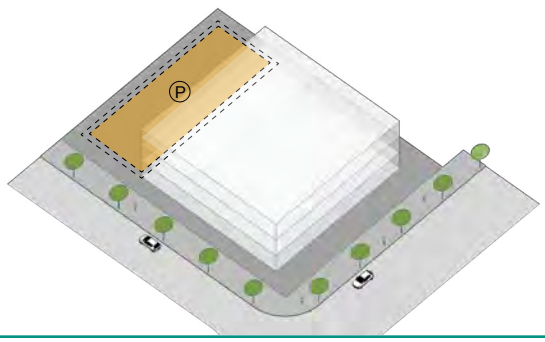
MODIFY PARKING REQUIREMENTS

Reducing required parking allows a larger proportion of a parcel to be used for redevelopment, increasing the residential and commercial space.



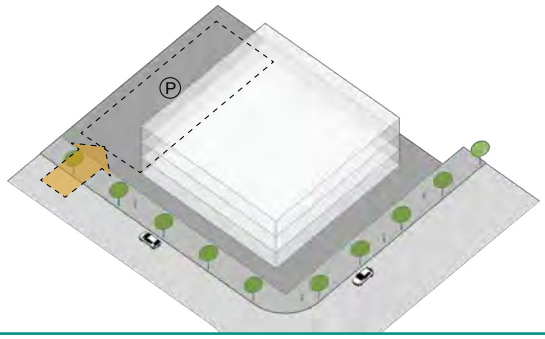
ESTABLISH PARKING MAXIMUMS

Parking maximums can be used to limit the amount of land area devoted to parking capacity by parcel or by district.



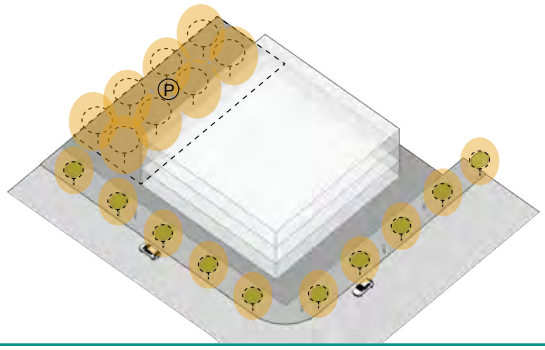
ESTABLISH PARKING ACCESS RESTRICTIONS

Reducing parking access to a single curb cut on a secondary street minimizes disruption to the pedestrian environment.



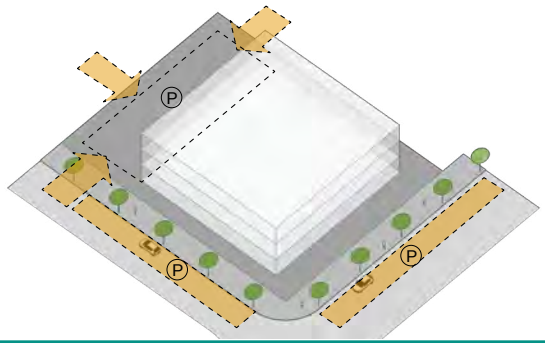
REQUIRE PARKING LANDSCAPE/BUFFERS

Landscape buffers and islands can help to screen parking areas from view and reduce large expanses of impervious surfaces.



INCENTIVIZE SHARED AND OFF-SITE PARKING

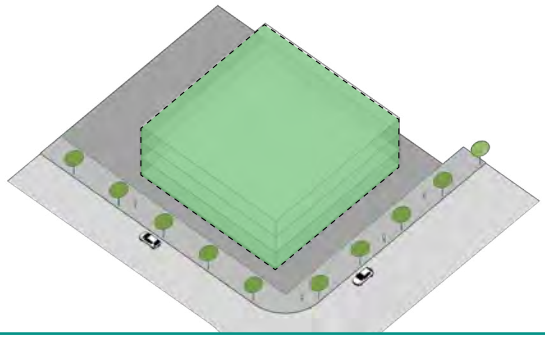
Parking resources between adjacent sites can be combined and shared to increase capacity, shared between various uses or combined with on-street parking to be more efficient.



FINANCIAL INCENTIVES

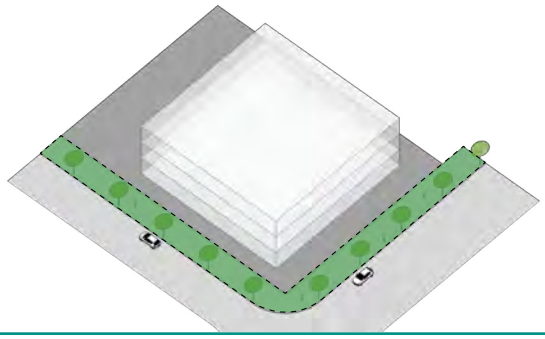
PROMOTE TAX CREDITS

Several types of tax credits- at the federal and state level- offer opportunities that would be applicable to potential redevelopment in the transit nodes.



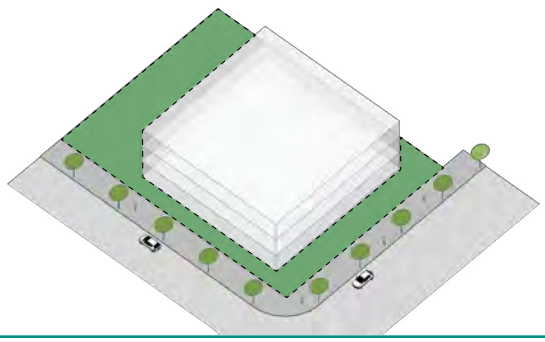
INVEST IN INFRASTRUCTURE AND STREETSCAPE

Investments in streetscape and infrastructure are critical to creating a pedestrian-friendly and private investment-friendly environment.



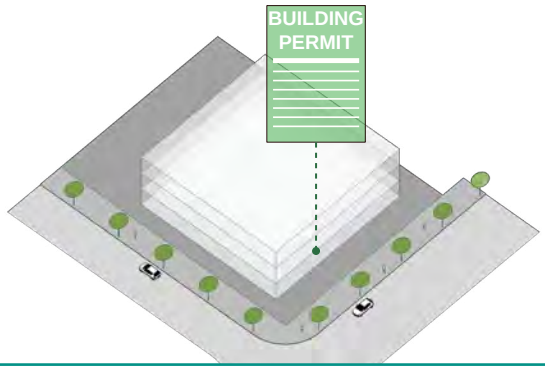
OFFER PROPERTY TAX ABATEMENTS

Property taxes are a component of redevelopment projects that the city can modify to be used as an incentive to encourage specific projects.



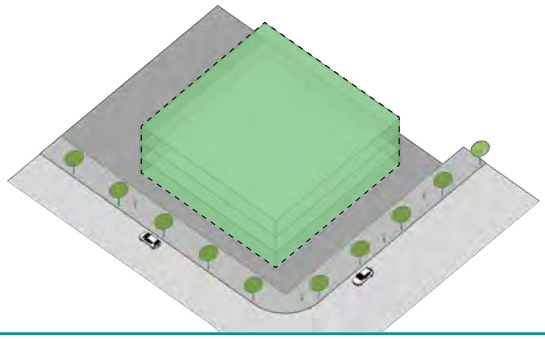
OFFER EXPEDITED PERMITS AND APPROVALS

Unpredictable approvals processes become a major impediment to implementing redevelopment improvements. A special expedited review for certain project types can be used as an incentive.



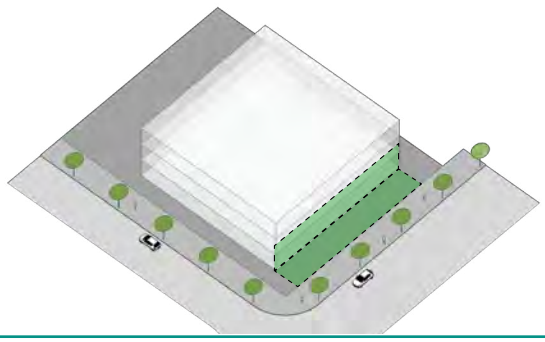
ESTABLISH TARGETED LOAN FUNDS

Targeted and revolving loan funds can be used to provide financial assistance to small businesses within the transit nodes, resulting in improvements and increased activity in these districts.



ESTABLISH GRANT PROGRAMS

Targeted grant programs to improve storefronts in commercial districts are an example of leveraging public funds to incentivize private investment that is aligned with city goals.





Hidalgo, Mexico

TOD KP

FI-R02



LAND VALUE CAPTURE BEST PRACTICES

Examples of land value capture tools employed in World Bank client countries to help fund transit projects

Type: Reference Document



TOD | Global Platform for Sustainable Cities | WORLD BANK GROUP | IBI

INTRODUCTION

PURPOSE

Pressure from urban agglomeration, coupled with related infrastructure problems and rising cost, forces policymakers running on tight budgets to improve critical transport infrastructure. There are techniques to facilitate these transit facilities with use of various land value capture (LVC) tools, which generate funds from the uplift in property values that results from new transit lines and stations. In LVC deals, governments share in the profits, rather than concede them to developers or landowners. There are many types of LVC instruments, but generally, they are either fee-based, such as land taxes, or development-based, such as joint development. If executed properly, these tools could provide a more sustainable source of financing to prudent governments and better align public and private sector participation. Their ability to boost area density also allows cities to include LVC in transit-oriented development strategies, now a popular practice across urban planning departments.

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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STRUCTURE

Cities have been identified from low and middle income countries, where LVC instruments have been used to fund transit development projects. Each city story is briefed under the following subheadings, representing different phases of the transit project completion:

- **Scoping**: explains the underpinnings of the project and feasibility assessments.
- **Planning**: explains the planning process followed in the respective case.
- **Institutions**: explains the institutional roles and responsibilities to use LVC.
- **Financing**: talks about the different financial tools adopted by the city for the funding of the project.
- **Implementation:** explains how the LVC tool was implemented
- **Outcomes and Lessons**: explains the outcomes of the LVC implementation and lessons learned.

NANCHANG RAILWAY TRANSIT GROUP

Nanchang, China

CONTEXT

Nanchang is a provincial capital in southeastern China and also a major regional center for agriculture, manufacturing and commerce. Considering factors like high GDP and the population growth rate of the city, construction of a rail transit system in Nanchang was first proposed in 2000. The population of the urban core of Nanchang is projected to reach 3.5 million people by 2020. Annual gross domestic product (GDP) growth in 2007–11 was a very robust 16–22%.

Incorporated in 2008, the Nanchang Railway Transit Group (NRTG) in Nanchang, China adopted development-based land value capture (DBLVC), as part of the funding strategy for the Nanchang Metro Line 1 (28.7 kilometers), Line 2 (23.3 kilometers), and Line 3 (18 kilometers), with full support from the Nanchang Municipal Government (NMG). NRTG's DBLVC approach involves direct property development on excess land around transit stations, acquired through the NMG public land leasing scheme during transit construction.

SCOPING

In August 2005, Jiangxi Provincial Development & Reform Commission and Nanchang City Government replied to the proposal of building a metro system and the city considered listing the proposal in the budget plan. In November, a plan of 4 metro and 1 light rail was drafted. After continuous deliberation with successive levels of governments in the hierarchy, the construction of Nanchang Metro was formally included in the priority agenda.

PLANNING

Public transport accounted for only 13.5% of total daily trips in the city. Moreover, roads in southern Nanchang see heavy congestion, while in other parts, cars are favored due to the availability of wide roads. In southern Nanchang, the Nanchang municipal government (NMG) plans to decrease the population in the historic core, lower its development densities, lessen traffic congestion and preserve historic buildings. To achieve these goals and resolve the growing congestion, NMG has designed an extensive public transport system with fully integrated bus services and metro railway networks to facilitate smooth travel. NMG plans to build five metro lines; two are under construction. Once complete, the metro railway network will be about 160–170 kilometers long with 128 stations. With a target completion date of 2020, lines 1, 2, and 3—60–70 kilometers in all—will form the basic structure of the metro railway network, connecting major business centers, the financial district, recreational areas, sport facilities, two industrial parks and three universities.



Figure 1: Lines 1-5 of Nanchang Metro

Source: Urban Planning and Design Research Institute of Nanchang 2013.

INSTITUTIONS

NMG delegated the responsibility for city-level land use planning and investments in local infrastructure and services to the established Nanchang Railway Transit Group Co. Ltd. (NRTG), which plans to build and operate the metro system. To better

leverage the private sector's expertise, NRTG set up a special property management division with key staff recruited from the private sector to manage all real estate assets owned by the company. It also acts as a key liaison between government agencies to coordinate their planning and review of metro railway investments and projects.

FINANCING

NRTG's estimated investment in direct development schemes is $1.4 billion (USD). However, the expected revenues from the overall development scheme for the 2012–2015 period include:

- Sale of development rights: $574 million
- Sale of 500,000 square meters of commercial property: $1.5 billion
- Average annual rental income: $65.6 million
- 2012–2015 annual rental income: $198 million
- Projected 2015 net profit: $1.1 billion dollars (20.5% of the construction costs for line 1 and 2)

Overall, the projected financial benefits of NRTG's future real estate investments (including land development, station rental, property sales and property lease) along the Nanchang Line 1 and Line 2 rail corridors will be $2.2 billion for the 2012-2016 period and $3.6 billion for the 2012-2020 period. NRTG's DBLVC (Development-Based Land Value Capture) program is a model for other Chinese cities considering transit value capture financing.

IMPLEMENTATION

Upon acquisition or lease of excess land by the NRTG from the Nanchang Municipal Government (NMG), the government, in return, increases the allowable floor space within 500 meters of stations to make DBLVC ventures profitable. It employs transit-oriented development principles on transit adjacent land to generate real estate revenues for transit construction and operation. NRTG develops above ground and underground development at select rail stations. As a business policy, it first develops high-density mixed-use development around station areas that are close to the city center. Similar developments are then replicated on a smaller scale at station areas located in the suburbs, to improve the overall financial viability of direct property development ventures. NRTG is developing 23 mixed-use developments above stations, five of which are being directly financed and developed, while the other 18 developments are being co-financed and developed with private developers. In addition, NRTG is building five underground developments, three of which will be directly finance and developed, while two will be co-financed and developed with private developers.

OUTCOMES AND LESSONS

The following are the inferences drawn out from the case study:

- Economy-induced population growth rate offers better job opportunities for city dwellers and promotes healthy migration. This could be capitalized on by offering good real estate opportunities for the people along a mass rapid corridor within the city.
- Marketing and business development is a key attribute for the success of TOD via any LVC tool, as they help investors and developers understand the benefits of such an intervention.
- Ample backing from ULB or a city-governing institution for LVC helps to expedite the transaction.
- Empowering the ULB to make all the decisions pertaining to transit development is important. This could be phased, by inducting a pool of experts and devolving funds and power.
- The lack of urban redevelopment schemes is a critical constraint for implementing TOD and LVC in mass transit investment at city- and region-wide levels.
- LVC tools must be able to capture the long-term increase in value brought by mass transit and meet the need for recurrent financial support for operation, maintenance and renewal.
- Mechanisms shall be applicable to mass transit agencies to share recurrent revenues fairly with developers. This can be achieved through development-rights arrangements or other financial instruments that capture long-term increases in land value, such as property taxes, impact fees and betterment taxes.

DELHI METRO RAIL CORPORATION

New Delhi, India

CONTEXT

The Delhi Metropolitan Area consists of the National Capital Territory of Delhi (NCTD) and the first ring of towns around the capital, including Ghaziabad, Loni, Noida, Faridabad, Gurgaon, and Bahadurgarh. Home to more than 22 million inhabitants within 1,483 square kilometers, it is projected to increase to 33 million inhabitants by 2025. The NCTD's per capita income is 2.4 times higher than the national average, so its population ratio below the poverty line is also around half the national figure. Greater economic opportunities are adding more immigrants to the city and, as such, augmentation of transit infrastructure remains a primary focus.

SCOPING

The Mass Rapid Transport System (MRTS), forms a roughly 250-kilometer network of underground, elevated and surface lines across the territory by 2021. It is expected that after the full network is developed, about 60% of the urbanized area of Delhi will be no more than a 15-minute walk from an MRTS station. Such investments are also expected to generate greater opportunities for economic growth and employment by calling for selective redevelopment and densification of the existing built-up areas, given local conditions and informal settlement patterns such as land pockets of slum and Jhuggi Jhoppadi (a cluster of slum colonies).

PLANNING

The Master Plan of Delhi recommends a comprehensive redevelopment scheme of the catchment areas of MRTS stations be created, with multiple land use categories and floor area ratios. The Delhi Development Authority (DDA) with the help of Unified Traffic and Transportation Infrastructure Planning and Engineering Centre (UTTIPEC), proposes to greatly raise FARs in Delhi under MPD-2021. A 500-meter wide transit-oriented development (TOD)/multi-use zone would be overlaid on both sides of the metro corridor to encourage a mix of commercial and employment- generating activities along with residential developments. Higher FARs would be permitted subject to certain setback and height restrictions. One redevelopment package will be included in the influence zone if more than 70 percent of the site area falls inside the 500-meter buffer. Property developments around the MRTS stations, up to a maximum area of 3.0 hectares, will be allowed in all use (mixed land use) zones, with some exceptions. This flexible land use coordination could lead to a mix of residential and commercial uses, as well as densely built areas, but whether this actually triggers redevelopment along the corridor is yet to be ascertained.

INSTITUTIONS

DMRC has decision-making power in railway business practices, while the exercise of land development rights remains with government authorities. The Ministry of Urban Development often intervenes in DMRC's station plans with property development projects. DMRC has to get statutory clearance from multiple government stakeholders at NCTD level. For architectural and conceptual plans, clearance is derived from the Delhi Urban Arts Commission; land use changes—DDA; building plans— municipal authorities; no objection certificates—the Land and Development Office and DDA; archaeological surveys—the Archaeological Survey of India; fire-fighting clearance—Delhi Fire Service; and environmental clearance—the Ministry of Environment.

FINANCING

The current and proposed Delhi MRTS network combined is about 293 kilometers long and has three project phases (table 7.3). The national government's direct participation in project funding in the three phases was required to secure concessional Japanese yen loans (30 years, including a 10-year grace period, with an interest rate of about 1.8 percent) from the Japan International Cooperation Agency (JICA).

IMPLEMENTATION

The land parcels belonging to the various bureaus, agencies, and municipalities are transferred to DMRC at intergovernmental transfer rates decided by the Ministry of Urban Development for a 99-year lease. The Delhi government is essentially in charge of acquiring private lands for public projects and then transferring them to DMRC. In some locations, DDA also provides the land for free to DMRC. The cost of land acquisition is treated as a premium to be recovered, as an interest-free subordinate debt over a 25-year period in the fund allocation schemes.

Sales of development rights are undertaken in two steps. After the land transfers are obtained from multiple government agencies, DMRC usually invites shortlisted bidders to make concession agreements with successful tenders for the development rights. Most residential development projects on depot and standalone plots with 90-year leases generate substantial upfront payments, whereas commercial properties within station buildings with short (6–12-year) leases and on large plots outside stations with medium-term (20-year) leases produce more recurrent revenue streams.

OUTCOMES AND LESSONS

The following are the inferences taken from the case study:

- Good purchasing power and consumer-driven economy is an indicator for applicability of TOD.
- The parameters or LVC tools shall be determined not based on fixed standards, but on local site conditions, network wide node characteristics and market-based demands.
- The slow and convoluted process of land transfer through multiple organizations held up project prospects for DMRC and private developers, the main barrier to delivering property development projects on MRTS station sites.

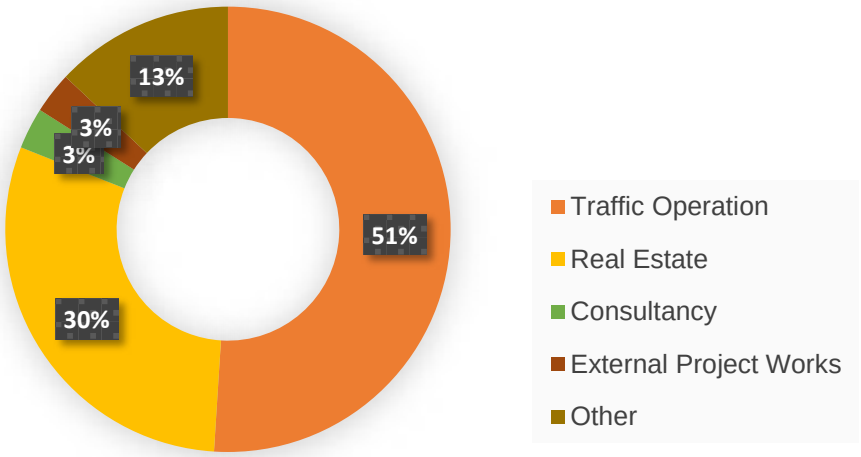


Figure 2: DMRC's net income till 2013

HYDERABAD METRO RAIL LIMITED
Hyderabad, India

CONTEXT

Hyderabad, the capital of Telangana, has long been the international corporate hub for service and knowledge-based industries. More than 7.5 million people live within the 7,257 square kilometers of the Hyderabad Metropolitan Development Area (HMDA), which includes the Greater Hyderabad Municipal Corporation (GHMC). Hyderabad's metropolitan population is projected to grow to more than 11.6 million by 2025.

SCOPING

Moreover, the majority of the rise in population is anticipated to occur in the surrounding municipalities of GHMC. Hence, there is a need to think long-term about public infrastructure investments and land use regulations, reflecting population growth patterns and the emerging industrial clusters across the whole metropolitan area.

PLANNING

Hyderabad's master plans have been updated to address emerging population growth patterns and business location shifts for the long-term. Once the metro development plan was complete, the master plan of the GHMC was amended by the state government to introduce a 300-meter wide "multi-use zone (mixed land use)" on both sides of the metro corridor. This amendment would promote commercial and office uses, which can also benefit from transit services.

INSTITUTIONS

HMDA has the spatial control in the planning and regulation of the region. The state government intended to provide a rail system for 71.16 kilometers on elevated structures in Hyderabad via design-build-finance-operate-transfer invited proposals from bidders. Larsen & Toubro Limited (L&T) won the bid, as it asked for the lowest viability gap funding (VGF) (Rs 1,458 crores/$230 million) and signed the concession agreement with the state government for the project over 35 years, of which 5 years are for construction. Hyderabad Metro Rail Limited (HMR) was enacted as a special purpose vehicle. In this framework, HMR is an intermediary, ensuring that L&T gets the right-of-way for the metro construction, coordinating with the GHMC, traffic and police departments and utility agencies for multiple clearances. Two important obligations of the concessionaire are to achieve integration with the surrounding landscape, by engaging architects and town planners to design the metro system to accommodate interchange facilities with other transport modes and new corridors.

FINANCING

The government meets 40% of the project costs—half from the national government and half from the state government. The balance of 60 percent has to be provided by L&T Metro Rail. A consortium of 10 banks led by the State Bank of India provided financing. The debt to equity ratio set out for this rail project was 2:1. L&T Metro Rail foresees around 50% of corporate revenue coming from fares, about 45% from real estate development, and 5% from adverts and parking fees. The total project costs are $3.07 billion, which include $0.41 billion for real estate development along the metro rail corridors.

IMPLEMENTATION

L&T Metro Rail is entitled to use the stations' parking and circulation spaces offered by government for real estate development on the 25 sites, accounting for 23 hectares and a maximum floor area of 557,000 square meters. L&T Metro Rail is expected to provide public amenities, specifically where a 300-meter wide band from the metro corridor is envisaged for TOD at higher densities.

OUTCOMES AND LESSONS

The following are the inferences drawn from the case study:

- The PPP project is a perfect example for transaction and implementation of future Metro rail projects for cities aspiring to augment their transport infrastructure.
- Giving private sector the opportunity to engage with TOD projects will bring the much required expertise and efficiency in execution of the project.

AIR RIGHT SALES
Sao Paulo, Brazil

CONTEXT

São Paulo, Brazil's vibrant financial center, is among the world's most populous cities, with numerous cultural institutions and a rich architectural tradition. The city's gross domestic product increased 10 times and the population quintupled to up to about 12.1 million people. But since the 1990s, São Paulo's economy has become heavily deindustrialized.

SCOPING

The high pace of income and population growth linked to unstable political and financial conditions, as well as inadequate implementation of a spatial development vision and strategy in past years, have led to urban expansion.

While the city-region boundaries persistently drive outwards, the central area presents a high concentration of job openings, educational activities, public services, businesses and entertainment activities. These have generated excessive commuting patterns between the city center and surrounding municipalities, where the majority of people live.

PLANNING

Several laws and master plans guide São Paulo's urban development and transit investment across federal, state and municipal governments. An urban operation (Operacion Urbanisica/UO), defined by the City Statute as a tool to promote the restructuring of large areas of the city through land-based incentives, is offered to public-private partnerships (PPP), including local public authorities, developers, landowners and other stakeholders as independent investors. UOs are implemented through instruments called Operações Urbanas Consorciadas (Consortia Urban Operations). The urban infrastructure investments in UOs will be financed by the incremental value created by public investment, land use and zoning change.

INSTITUTIONS

State and municipal governments have formed multiple departments and agencies for regional and local transport systems. The state Secretariat of Metropolitan Transport (STM) has three operating companies: São Paulo Company of the Metropolitan (METRO), São Paulo Metropolitan Trains Company (CPTM) and Metropolitan Urban Transportation Company (EMTU). Within the STM, the tasks for public transport and traffic management are split between SPTrans (São Paulo Transporte S.A.) and CET (Traffic Engineering Company). As a primary transit agency, SPTrans coordinates all municipal bus services, which are operated by eight private companies within the city of São Paulo. Important transit projects are being undertaken by two units: STM and the Municipal Secretariat of Urban Development. The latter works mostly on urban planning and design around new transit corridors and terminuses, controls land regulations and oversees the municipal urban development company (São Paulo Urbanismo).

FINANCING

The funding for most transit projects in the city of São Paulo and surrounding municipalities relies heavily on local government resources, especially São Paulo state government's general budget for metro, commuter rail and intercity bus transit investments. To raise the capital funds required in the coming decades, Integrated Urban Transport Plan 2025 examined financing scenarios for transit investments, based on conventional tax resources and innovative financing schemes, including value capture. According to the funding arrangement models analyzed in the master plan, substantial development benefits could be captured by air rights sales in urban intervention areas, accompanied by PPP initiatives and congestion charges.

IMPLEMENTATION

In São Paulo, the city planning department sets the "base" FAR for the city at 1.0–2.0, though specific FARs within this range depend on location and land use. If landowners want to build beyond "as of right" development up to the maximum allowable

FAR (1.0–4.0 depending on location and land use), they have to buy additional FARs. The as of right base FAR in certain areas is lower than the pre-existing basic FAR. The revenues generated from the sales of OODC (Outorga Onerosa do Direito de Construir) are deposited in the Urban Development Fund, which finances public urban investments, including slum upgrading within the city boundary.

CEPACs, Certificate of Additional Construction Potential, are a market-based instrument to finance public urban investments through air rights transactions within designated UOs. Through CEPACs, municipalities can raise infrastructure investment funds by selling the bearer additional building rights, such as a higher FAR and possible land use changes that should induce private investments in the transformations wanted by urban development policy.

OUTCOMES AND LESSONS

The following inferences are drawn from the case study:

- High market demand, government capacities to create and manage auction markets, political will and regulatory capacity to ensure enforcement for additional required development rights were key attributes for success of this model in São Paulo.
- The greatest advantage of tradable air right sales is that local governments in developing countries, with limited developable lands, can produce substantial upfront cash flows for capital intensive urban infrastructure projects, without increasing their public debt.
- A transparent project finance scheme has to be developed, with clear rules and mechanisms to share profits and risks among multiple agencies, local government, transit agencies, landholders, residents, developers and investor. Coordination mechanisms must also exist between stakeholders in planning, financing and implementing transit and urban development.

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Beirut, Lebanon

TOD KP

FI-R03

MUNICIPAL FINANCE TOOLS

This Knowledge Product is intended to be used as a reference sheet available online on the GPSC's TOD website and the World Bank's TOD CoP website. The reader should first review the summary presented below before using the reference sheet.

Type: Reference Document



TOD | Global Platform for Sustainable Cities | WORLD BANK GROUP | IBI

INTRODUCTION

TOD often requires significant investments in infrastructure and community facilities for the type of development envisioned in TOD planning principles such as streetscape improvements, plazas and open spaces, utility capacity enhancements, land acquisition costs, and other supporting investments. In addition to initial capital improvement costs, operation and maintenance costs are also an added burden on the high-quality urban spaces that are promoted as part of TODs.

With limited financial capacities, unclear land entitlements, and low property tax collection revenues, local governments in low and middle-income countries continue to struggle to raise finances to support the types of investments that TODs aim to achieve.

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.*

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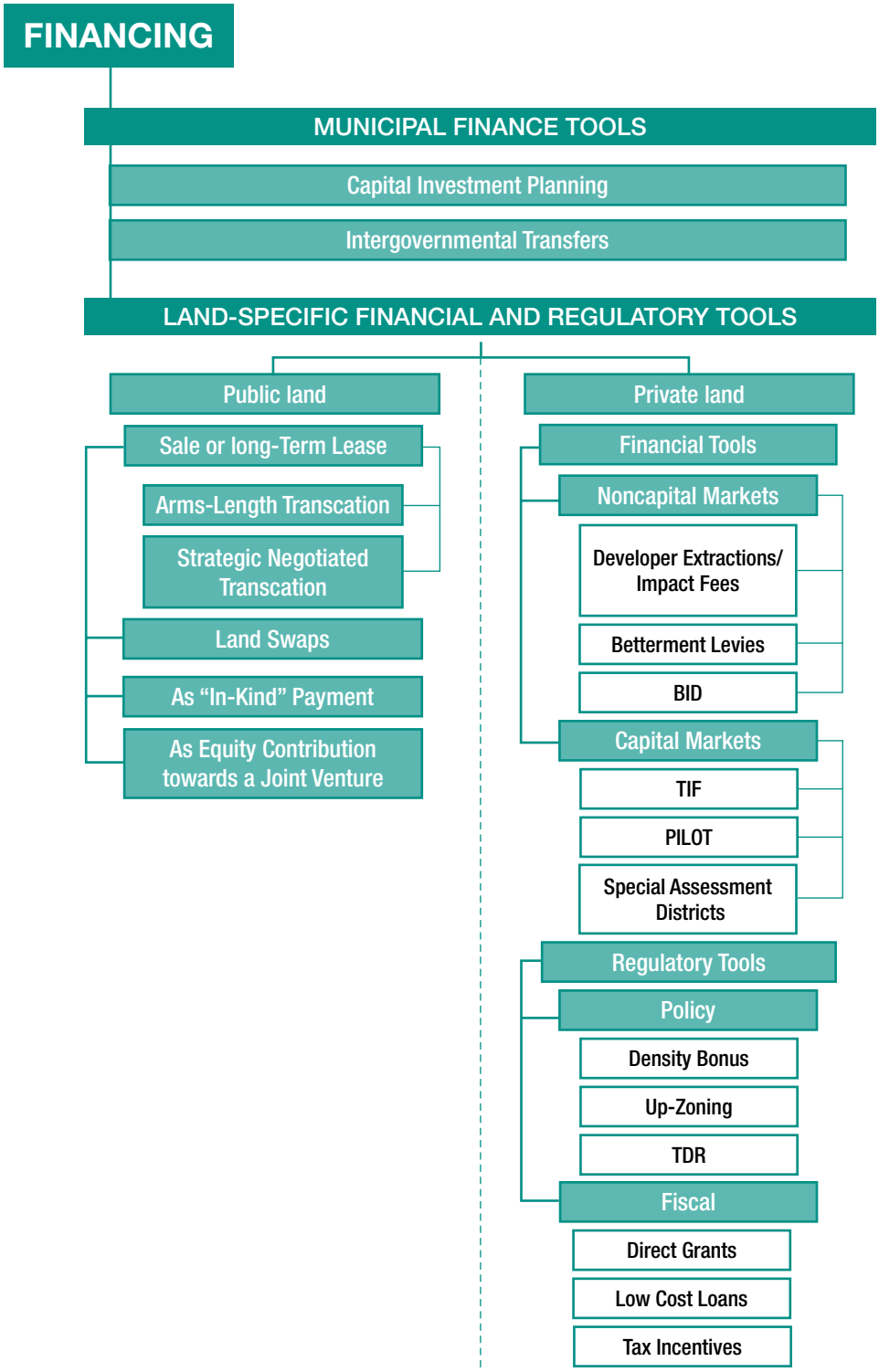
PURPOSE

While the fundamental principles of municipal financing tools are similar globally, how cities deploy these tools depends on the local context including the regulatory processes, legal context and political will. This tool presents a comprehensive listing of financing instruments employed in many countries to fund public infrastructure and services.

ASSUMPTIONS AND LIMITATIONS

- The list of financing tools is generic in nature and will need to be contextualized as per each city's legal and regulatory policies.
- Several tools may require an enabling legislative framework or may be more market driven. Such an assessment should be conducted as part of due diligence while analyzing the applicability.

ORGANIZATION OF TOOLS



LAND VALUE CAPTURE (LVC)

LVC tools are generally used to finance infrastructure improvements by setting aside a pre-determined share of the increase in values or savings resulting from public investment in infrastructure improvements

Cities using this tool: Delhi, Tokyo, Hong Kong SAR, China

TAX INCREMENT FINANCING (TIF)

TIF is a method to use future gains in taxes to finance current improvements (which theoretically will create the conditions for those future gains). When a development or public project is carried out, there is often an increase in the value of surrounding real estate, and perhaps new investment. This increased site value and investment sometimes generates increased tax revenues. The increased tax revenues are the tax increment. Tax Increment Financing dedicates tax increments within a certain defined district to finance debt issued to pay for the project. TIF is designed to channel funding towards improvements in distressed or underdeveloped areas, where development might not otherwise occur. TIF creates funding for public projects that may otherwise be unaffordable to localities, by borrowing against future property tax revenues.

Cities using this tool: Arlington, Chicago (USA)

LAND READJUSTMENT

Land readjustment is an effective tool in allowing local governments to take on TOD projects, especially in greenfield contexts, in partnership with original residents and landowners as. Public amenities and infrastructure is then provided, using government funds or loans, and then the serviced plots are sold at market rates. The increment in the land value goes to the development agency instead of the original land owners, which can again be used to finance infrastructure upgrades. In return, each land owner receives a serviced plot of smaller area, but often at much higher value within the same neighborhood.

Cities using this tool: Mumbai, Maharashtra, Gandhinagar, Gujarat (India)

DEVELOPER FEES AND EXACTIONS

This financing tool is often collected in the form of impact fees, as a one-time fee, and used as part of the city‘s general fund to finance public infrastructure improvements, such as utilities and transportation. Developer exactions are also used for dedication of land for public benefit, construction of public improvements such as sidewalks, parks or recreation center in a TOD area, sometimes in exchange for higher densities.

Cities using this tool: Bangalore (India)

JOINT DEVELOPMENT

One of the oldest financing mechanisms used for financing development by transit agencies, this tool is a form of public-private partnership involving real estate development on public owned land with private investment.

Cities using this tool: Seoul (Republic of Korea), Bangalore (India)

MUNICIPAL BONDS

These are debt obligations issued by municipalities to fund urban infrastructure projects and various municipal services. Purchasing municipal bonds means lending money to the government body, which in return pays specified interest throughout the locking period and returns the principal amount at the end of tenure. Municipal bonds are available in both taxable and tax exempt formats. There are two types of bonds: General Obligation Bonds (GO) and Revenue Bonds. GO bonds, issued to raise immediate capital to cover expenses, are supported by the taxing power of the issuer. Revenue bonds, which are issued to fund infrastructure projects, are supported by the income generated by those projects.

Cities using this tool: Ahmedabad Municipal Corporation, Gujarat, Delhi

BANK LOANS AND FINANCING

The most conventional methods for financing urban infrastructure projects are term loans from bank or other lending institutions. The steps involved are:

- Municipal council/standing committee approval to issue debt
- Technical approval from the concerned local authorities
- Apply for term loan, with brief description of the proposed project, DPR with an accompanying financing plan, past budget documents and necessary approvals
- The lending institution establishes the loan terms based on the risk perception of the project and the applicant‘s financial viability

Cities using this tool: Tamil Nadu Urban Development Fund

DIRECT FEES THROUGH TOOLS LIKE CONGESTION PRICING & PARKING FEES

Direct fees are user charges for public amenities and infrastructure, such as transit, toll roads, bridges and parking facilities. Direct fees are dependent on local conditions and case-specific based on the demand. Normally these fees are collected by public and private authorities to recover capital cost and operation and maintenance costs of the infrastructure.

Congestion pricing is a tool to manage demand for a particular service based on level of use or time of day. It is used to mitigate traffic congestion. The revenue collected is used to support and improve transit services and transportation systems.

Cities using this tool: Singapore, London

GRANTS

Grants are non-repayable funds disbursed by one party (grant makers), often a government department, corporation, foundation or trust, to a recipient, often (but not always) a non-profit entity, educational institution, business or an individual. In order to receive a grant, some form of "grant writing," often referred to as either a proposal or an application, is required. Most grants are made to fund a specific project and require some level of compliance and reporting. The grant writing process involves an applicant submitting a proposal (or submission) to a potential funder, either on the applicant's own initiative or in response to a Request for Proposal from the funder.

Cities using this tool: Singapore, London

SPECIAL FUNDS SUCH AS URBAN TRANSPORT FUND (UTF)

The Ministry of Urban Development, Government of India recommended the creation of a dedicated transport fund, both at the state and the city-level, for funding urban transport initiatives. Creation of the Urban Transport Fund is a mandatory reform under JnNURM guidelines. The UTF will be collected in the form of a surcharge on the sale of petrol, taxes on existing personalized vehicles and an Urban Transport tax on the purchase of personalized vehicles. It will be used for traffic transportation studies, capacity building, awareness building and projects aimed to promote public transport, NMT and accessibility to public transit.

Cities using this tool: Indian Infrastructure Debt Funds

CROWDFUNDING

Crowdfunding is an Internet-enabled way for businesses or other organizations to raise money – typically from about US$1,000 to US$1 million – in the form of either donations or investments, from multiple individuals. This new form of capital formation emerged in the wake of 2008 financial crisis in response to the difficulties faced by early-stage enterprises in generating funding. In less than a decade, crowdfunding has spread across the developed world, and is now attracting considerable interest in the developing world as well. Crowdfunding began as an online extension of financing by friends and family: communities pool money to fund members with business ideas. During crowdfunding's early stages, capital came in the form of donations, but increasingly it takes the form of debt or equity investments targeting high-growth entrepreneurs – only one of many ways the model is evolving as awareness spreads. Crowdfunding uses web-based technology and the knowledge and wisdom in communities to determine which projects should receive funding and how much funding they should receive, as well as providing real-time feedback on start-ups and small businesses. It leverages the power of technology, particularly social media, to market the idea, raise funds, and hold entrepreneurs accountable. Developing economies may have the potential to capitalize on this new funding mechanism. Countries wishing to implement crowdfunding ecosystems need to understand how crowdfunding works, the role that government and regulation should play and the technological infrastructure requirements involved.

Source: Crowdfunding's Potential for the Developing World. 2013. infoDev, Finance and Private Sector Development Department. Washington, DC: World Bank

LOCAL CURRENCY LOAN

A decade ago, the lending markets were less vulnerable to the currency exchange rates. Borrowings were happening in the preferred currency of lender putting the currency exchange risk in borrower's basket. The revenue currency being different from the lending currency posed risk and required to always keep a watch on the volatility in currency exchange rates. Thereafter, the need for a sustainable lending term and conducive environment for private sector development was observed. Accordingly, the lenders identified a mechanism to support lending in the local currency, by absorbing the risk of currency rates.

Local currency loans capture the financial benefits within local area to promote local economy. Loans in local currency can eliminate the currency exposure for companies operating in developing countries. A company may prefer a local currency loan instead of a foreign currency loan if it has its main income in a local currency or if it wants to minimize the credit risk and uncertainty connected with a foreign currency loan. Loans in local currency can be provided to new as well as ongoing project companies.

IBRD offers local currency financing through (i) loan conversion options, and (ii) free-standing local currency swaps. i) Local currency conversion option: The conversion option is included in the loan agreement to enable borrowers to convert current disbursements (Automatic Conversion of Loan Currencies or ACLC) and disbursed and outstanding loan balances (DOB) into local currency; all subject to market availability. IBRD may provide the conversion by a) hedging through swap market transactions, or b) funding through local currency bond issuance (back-to-back financing).

IBRD Local Currency Financing, The World Bank | Treasury

As an internationally rated AAA institution, IFC leverages its powerful credit to provide customized local currency products to private sector clients. The local currency can come directly from IFC in the form of a local currency loan or swap. IFC also mobilizes other sources of local currency, like local banks and capital markets, through credit enhancement. Whether the client prefers senior debt, quasi-equity, funding from IFC or from some other source, IFC stands ready to provide flexible, market-based instruments.

IFC and Local Currency Financing, International Finance Corporation, World Bank Group



Camana Bay, Cayman Islands

TOD K P

IMPLEMENT

INTRODUCTION



Tie the diverse interventions needed to ‘Make TOD happen’ from prioritizing projects, to capacity building and monitoring

TOD
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ABOUT IMPLEMENT

Developing successful TOD projects requires mobilizing a multitude of resources, partnerships and innovative implementation mechanisms that help leverage public sector investment in transit and infrastructure with private sector development. The 'Implement' stage is a discussion of programs and interventions that can convert plans into reality.

Once the visioning and detailed planning stage is completed, the stage to turn ideas into reality starts to take shape. Similar to any urban transformation project, the implementation of TOD projects typically takes place over 10-20 years, with public and private sector interests being constantly balanced. Developing successful TOD projects requires mobilizing a multitude of resources, forging partnerships, balancing trade-offs, complex negotiations, and constant monitoring to ensure success.

This section builds on the previous research related to TOD implementation, that suggests a sequencing of implementation steps with a caveat that the steps typically do not follow a linear process, but instead is often an iterative process with continuous feedback loops. Two key sources- Regenerating Urban Land (Amirtahmasebi, et al. 2016) and Module 6: Sequencing for Implementation of the TOD Corridor Course (World Bank Group and WRI 2015) - inform the key components of the TOD Implementation Framework:

- Monitoring and Evaluation
- Phasing Strategy
- Capacity Building

The impacts of key planning and policy interventions can never be anticipated fully and accurately. The process of monitoring and evaluation allows an agency to learn and understand the comparative ability of specific strategies to cause change in their respective context. Key Performance Indicators (KPI) provide a way for cities to measure the performance of their TOD initiatives against larger, global standards and outcomes. Smaller TOD projects need individual monitoring and evaluation frameworks that should be developed based on the specific project objectives. A number of performance indicators for TOD were considered in deriving the Monitoring and Evaluation Knowledge Product, including the TOD Standard (ITDP 2017), Module 8: Monitoring and Evaluation of the TOD Corridor Course - (World Bank Group and WRI 2015), and the LEED v4 for Neighbourhood Development (USGBC).

Capacity building has become one of the recurring themes in institutional literature and in the agenda of public administrations, international agencies, government and nongovernment organizations. The United Nations Development Programme (UNDP) sees capacity development as the process through which individuals, organizations and societies obtain, strengthen and maintain the capability to set and achieve their own development objectives over time. The UNDP Primer on Capacity Development (UNDP 2009) has informed the Capacity Development Knowledge Product.

Implementing TOD is both a time and resource-intensive undertaking. As such, a phased approach to transit-oriented development is key to success over the long-term. Phasing allows for development to be scheduled based on factors such as overall time frame, resource availability, priority to the city, possible risks and the required stakeholder responsibilities. 'Quick Wins' are generally the first activities to take place in a TOD, as they bring about positive changes for a city with little risk or financial/time constraints. This allows the, often controversial, transit-oriented development to enhance public buy-in and reputation. Consequently, activities that are higher risk and financially or resource intensive are scheduled for the long-term, providing a buffer for contingencies, potential resource delays and budgetary constraints.

While some of the components identified above are covered in previous frameworks, products for the 'Implement' Framework, presented in this section, are repurposed to be applied in the context of World Bank client cities, with an emphasis on highlighting the challenges faced from a political, regulatory, enforcement, financing, and other factors related to monitoring and evaluation of TOD projects, establishing Key Performance Indicators (KPI's) for TOD projects, project phasing and capacity building.

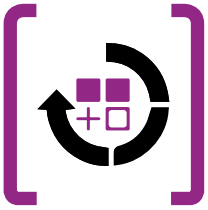
KNOWLEDGE PRODUCTS



ANALYTICAL

IM-A01 **Monitoring and Evaluation** *(Spreadsheet + User Guide)*

IM-A02 **TOD KPI** *(Spreadsheet + User Guide)*



'HOW-TO' GUIDES

IM-H01 **How To Undertake Capacity Building** *(Step-by-Step Guide)*

IM-H02 **How To Develop A TOD Phasing Strategy** *(Step-by-Step Guide)*



PROCUREMENT

IM-P01 **Capacity Building Terms Of Reference** *(TOR Template)*

TOD KP

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TOD K P

IM-A01

MONITORING AND EVALUATION FRAMEWORK



Analytic methodology to define the appropriate monitoring and evaluation framework for the TOD project or program

Type: Spreadsheet + User Guide



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ABOUT THE MONITORING AND EVALUATION TOOL

PURPOSE

The impacts of key planning and policy interventions can never be anticipated fully and accurately. The process of monitoring and evaluation allows an agency to learn and understand the comparative ability of specific strategies to cause change in their respective context.

Monitoring primarily refers to monitoring "outputs" of a plan, policy, or program, with respect to defined targets. Project outputs are the particular goods or services provided by a project intervention, for example, the length of sidewalks constructed is a project output.

Evaluation primarily refers to evaluating "outcomes" of a plan, policy, or program, with respect to idealistic goals. Project outcomes measure the extent to which a project achieves a long-term, wide-scale objective, for example in the case of the same project, the increase in the modal share of people walking to transit stations is a project outcome.

This Monitoring and Evaluation Framework Knowledge Product provides guidance on defining a framework for project-specific needs. It illustrates the potential methodology to define the baseline, followed by collecting the relevant data to compare using analytic means. It also includes typical indicators that can be used to construct a project-specific framework.

Disclaimer: *The TOD Knowledge Products are designed to provide a high-level framework for the implementation of TOD and direction to cities in addressing barriers to TOD at all stages of planning. As the context in low and middle-income cities varies, the application of the TOD Knowledge Products must be adapted to local needs and priorities and customized on a case-by-case basis.* © 2018 International Bank for Reconstruction and Development/ The World Bank

References

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USGBC (US Green Building Council). 2018. "*LEED v4 for Neighborhood Development*".

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HOW TO USE THE TOOL?

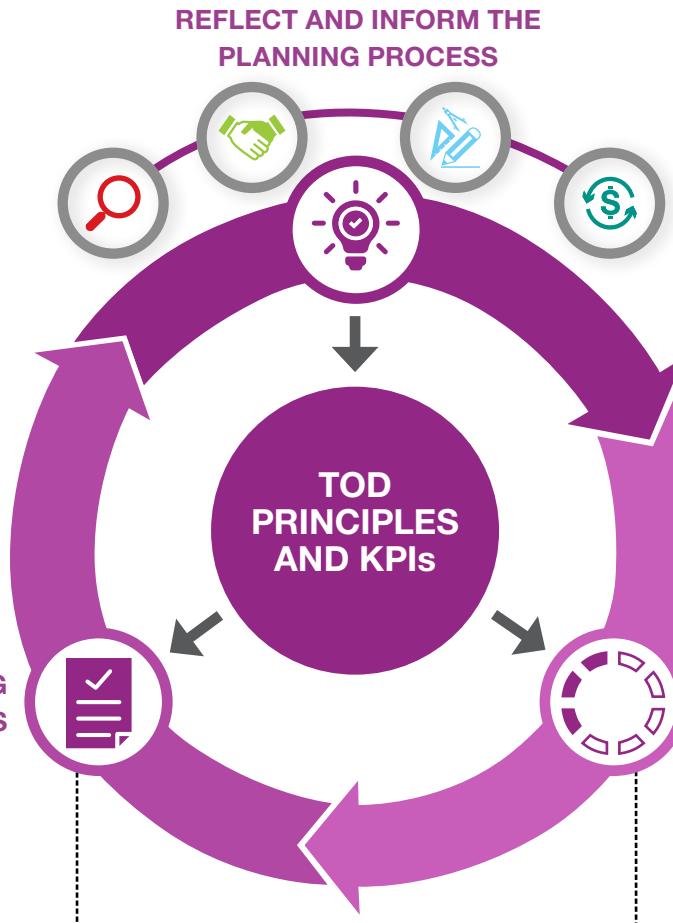
This Tool should be read in combination with an Excel Spreadsheet that contains a series of project output and outcome indicators that will help monitor and evaluate the performance of projects against TOD goals.

The overall framework is largely organized along the lines of the WRI and World Bank generated Corridor level Transit-Oriented Development Course and uses indicators from the ITDP TOD Standard v.3.0, and the LEED v4 for Neighbourhood Development. The TOD benefits measured using this framework are related to **Mobility, Social, Environmental, and Economic Benefits.** Project-specific project outputs and outcomes would need more detailed indicators, which would need to be developed as per project specifics. For each indicator, the framework provides methods of measuring, the scale of application, the best visualization method, and the expected TOD goal.

Some examples of how the monitoring and evaluation framework can be used for project-specific needs are given below:

- TOD Planning Project: Use the framework to monitor if the agency is performing the required planning tasks.
- Implementation of a Transit Construction Project: Use the framework to monitor if the agency is prioritizing key TOD requirements and causing minimum damage to the existing public environment.
- Implementation of a Parking Pricing Policy: Use the framework to evaluate the impact of the policy on the pedestrian environment and travel behavior.
- Evaluating Statutory Plans: Use the framework to evaluate the impact of the plans on the ability to plan for TOD.

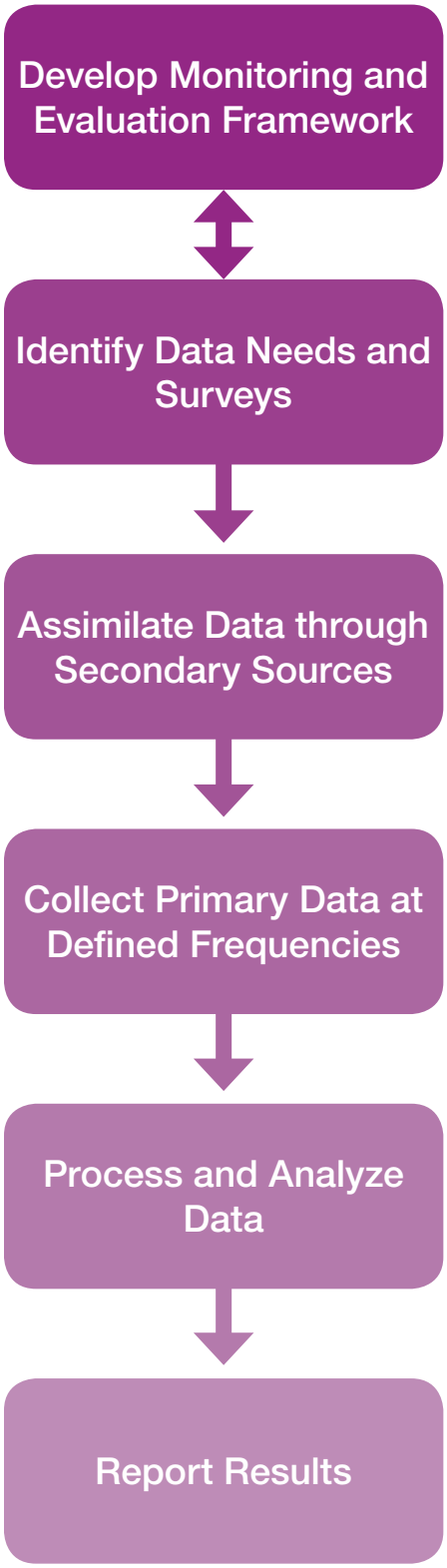
DEFINE THE FRAMEWORK



- DEFINE DESIRED OUTCOMES
  HOW SHOULD THE PROJECT IMPACT LIVABILITY?
- DEFINE INDICATORS
  SPECIFIC, MEASURABLE, RELEVANT
- DEFINE MEASURES OF SUCCESS
  BENCHMARKS, STANDARDS
- DEFINE EVALUATION TIME FRAME

- DEFINE IMPLEMENTATION GOALS AND PROJECT OUTPUTS
  WHAT SHOULD THE POLICY OR PROJECT ACHIEVE?
- DEFINE TARGETS
  SPECIFIC, MEASURABLE, TIME-BOUND
- DEFINE MEASURES OF PROGRESS
  INCREASE, DECREASE, % ACHIEVEMENT
- DEFINE MONITORING FREQUENCY

HOW TO MEASURE PERFORMANCE



THE IMPORTANCE OF ASSESSING AVAILABILITY AND QUALITY OF DATA TO INFORM THE MONITORING AND EVALUATION FRAMEWORK

The process of measuring is critical to ensure successful outcomes from a monitoring and evaluation framework, which is influenced largely by the availability and quality of data. It is extremely important to understand the prevailing data limitations in the context before defining the monitoring and evaluation framework. Overestimating the ability of an agency to collect reliable data can compromise the effectiveness of the monitoring and evaluation framework to offer constructive lessons for the future.

DEVELOPING PROXY INDICATORS

Where data availability for a particular ***target*** or ***indicator*** is unreliable or is of poor quality, it is recommended to utilize proxy indicators that allow for reliable prediction of the performance against the desired outcome.

SAMPLE FRAMEWORK

Two sample frameworks are suggested on the next page. Use the criteria from the Excel Spreadsheet to populate any one of the two frameworks, as preferred for the project goals.

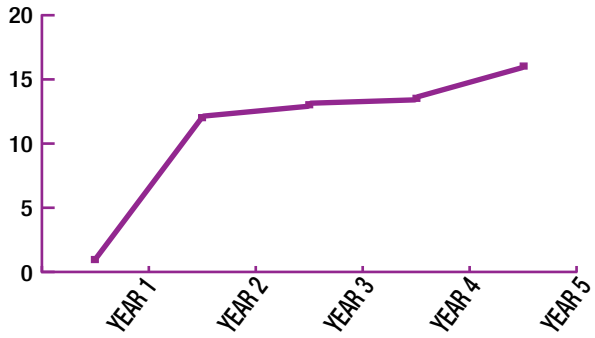
MONITORING AND EVALUATION FRAMEWORK TEMPLATE

SAMPLE FRAMEWORK TYPE 01

TOD PERFORMANCE PARAMETERS	IMPLEMENTATION OBJECTIVES/ OUTCOMES	INDICATORS/ TARGETS	MEASURES	DATA SOURCE	DATA LIMITATIONS/ NOTABLE BIAS	MEASURING FREQUENCY
Mobility and Travel Behaviour*	Objective 1					
	Objective 2					
	Objective 3					

* Refer to IM02 for TOD Key Performance Indicators

The implementation objectives can be analyzed individually, in this case, to monitor progress or analyze the extent to which each objective, output, or outcome is achieved. This allows for evaluation of the impact of a project or program on specific objectives.



SAMPLE FRAMEWORK TYPE 02

A	MOBILITY AND TRAVEL BEHAVIOUR				
[DESCRIPTION OF INTENT]					
Features		Yes	No	N/A	Comments
A1	Desired Outcome 01				
A2	Desired Outcome 02				
A3	Desired Outcome 03				
	Sub - Total				

This framework allows for a qualitative measurement of the OVERALL performance of a TOD project or program, with respect to desired goals or outcomes.

TRANSIT-ORIENTED DEVELOPMENT SCORECARD

1 point is assigned per item if 'Yes' is checked. 0 points are assigned if 'No' is checked. All 'Yes' and 'No' checks are considered applicable and points from each section should be added and included in the table below. The 'Score' for each section is calculated by dividing the points by the 'Total Applicable'. This produces a percentage score. Comments may be written to explain the score for each section.

		Total Possible	Total Applicable	Points	Score (%)	Comments
A	Mobility and Travel Behavior	X				
B	Economic Performance	X				
C	Environmental Performance	X				
D	Social Benefits	X				
TOTALS		X				
FINAL SCORE						



Rio de Janeiro, Brazil

TOD KP

IM-A02



KEY PERFORMANCE INDICATORS FOR TOD

This Knowledge Product is intended to be used as an interactive Excel spreadsheet. These tools are available online on the GPSC's TOD website and the World Bank's TOD CoP website. The reader should first review the summary presented below before using the spreadsheet tool

Type: Spreadsheet + User Guide



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ABOUT THE TOD KEY PERFORMANCE INDICATORS

PURPOSE

This TOD Key Performance Indicator (KPI) tool provides a way for cities to measure the overall performance of their TOD initiatives against larger, global standards and outcomes. Smaller TOD projects need individual monitoring and evaluation frameworks that should be developed based on the specific project objectives (**Refer IM-A01**). This tool allows a city to measure how the city is performing as a whole, with respect to TOD.

Structurally it follows the same organization as the Monitoring and Evaluation Framework Tool, along with the Corridor-level TOD Course (WRI and World Bank 2015), including **Mobility, Socio-Economic, and Environmental Benefits.**

The ratings for each indicator are simplified from the ITDP generated TOD Standard v3.0 (ITDP 2017).

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References

ITDP (The Institute for Transportation and Development Policy). 2017. "*TOD Standard. 3rd ed.*" New York.

World Resource Institute and World Bank Group. 2015. *Corridor Level Transit-Oriented Development Course*. Washington, DC.

THE TOOL INCLUDES:

- USER GUIDE
- MOBILITY ASSESSMENT
- SOCIO-ECONOMIC ASSESSMENT
- PHYSICAL ENVIRONMENT ASSESSMENT
- SUMMARY SHEET
- ASSESSMENT SCORING

Within **EACH ASSESSMENT TAB,** a list of key performance indicators are provided under three main **CRITERIA:**

A. **SUPPORTIVE PLANNING FRAMEWORK:** Under this criteria, the tool evaluates the existence and effectiveness of key planning instruments required to enable change.

B. **PERFORMANCE OF INVESTMENTS:** Under this criteria, the tool evaluates the ability and commitment of public and private investment to create the kind of change desired. This includes providing more mobility options, improving the public realm, improving the value of land and increasing accessibility for poorer populations.

C. **DESIRED OUTCOMES:** Under this criteria, the tool evaluates the impact of TOD initiatives on the larger behavioral aspects and quality of life for all citizens.

HOW TO USE THE TOOL?

01 ENTER INPUTS IN ASSESSMENT TABS

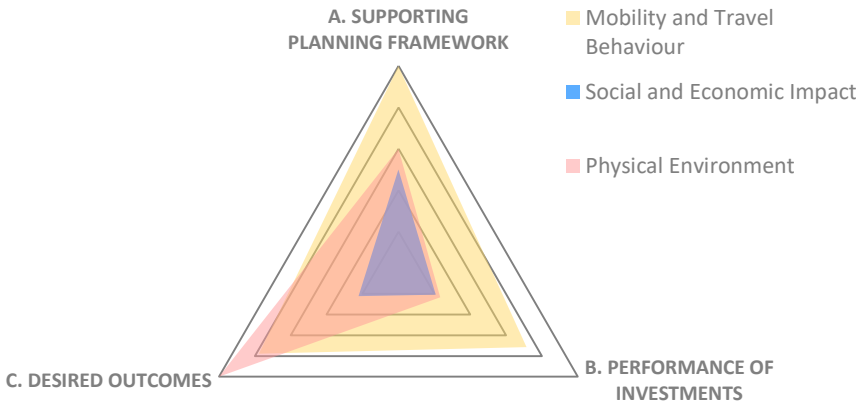
EACH ASSESSMENT TAB consists of indicators and measures. The indicators include the parameters that must be considered in the performance evaluation. The measures include a description of how each indicator should be rated.

Read the measure carefully and select the rating that should be applied to each indicator. While most indicators are measured qualitatively, some quantitative measures are also included.

INPUT SELECTION BOX
Rating from 0 - 3

02 VIEW RESULTS IN THE SUMMARY TAB

The Assessment Scoring Tab is where the raw calculations of the TOD performance are determined. These automatically populate **THE RESULTS CHART** in the Summary Tab as shown below.

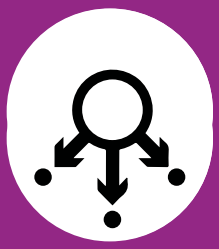




Ciudad Cayala, Guatemala City

TOD K P

IM-H01



HOW TO UNDERTAKE THE CAPACITY BUILDING PROCESS

Guide to building the institutional arrangement for TOD projects or programs

Type: Step-by-Step Guide)



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ABOUT THE IMPLEMENTATION TOOL

PURPOSE

Capacity building is emerging as one of the most critical challenges in World Bank client cities. The lack of institutional and technical capacity has resulted in the improper implementation of large-scale projects including TOD interventions. Capacity building refers to the process of education and optimizing the skills of individuals and institutional support of one or more organizations.

This Knowledge Product is informed by the Capacity Building Primer developed by the United Nations Development Programme (UNDP 2009).

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UNDP's APPROACH TO CAPACITY DEVELOPMENT

UNDP sees capacity development as the process through which individuals, organizations and societies obtain, strengthen and maintain the capability to set and achieve their own development objectives over time. It involves employing, educating and empowering individuals, leaders, organizations and societies in order to help them achieve the desired targets.

In particular, the UNDP's approach stresses that "developing countries should own, design, direct, implement and sustain the process themselves"

OBJECTIVES OF CAPACITY BUILDING

In keeping with the UNDP's approach to capacity building, the following results can be derived from successful capacity building applications in World Bank client cities:

- Make the most of local resources– people, skills, technologies, institutions– and builds on these
- Favor sustainable change
- Take an inclusive approach in addressing issues of power and inequality in relations between rich and poor and mainstream and marginalized (countries, groups and individuals)
- Emphasize deep, lasting transformations through policy and institutional reforms
- Value 'best fit' for the context over 'best practice'; as one size does not fit all

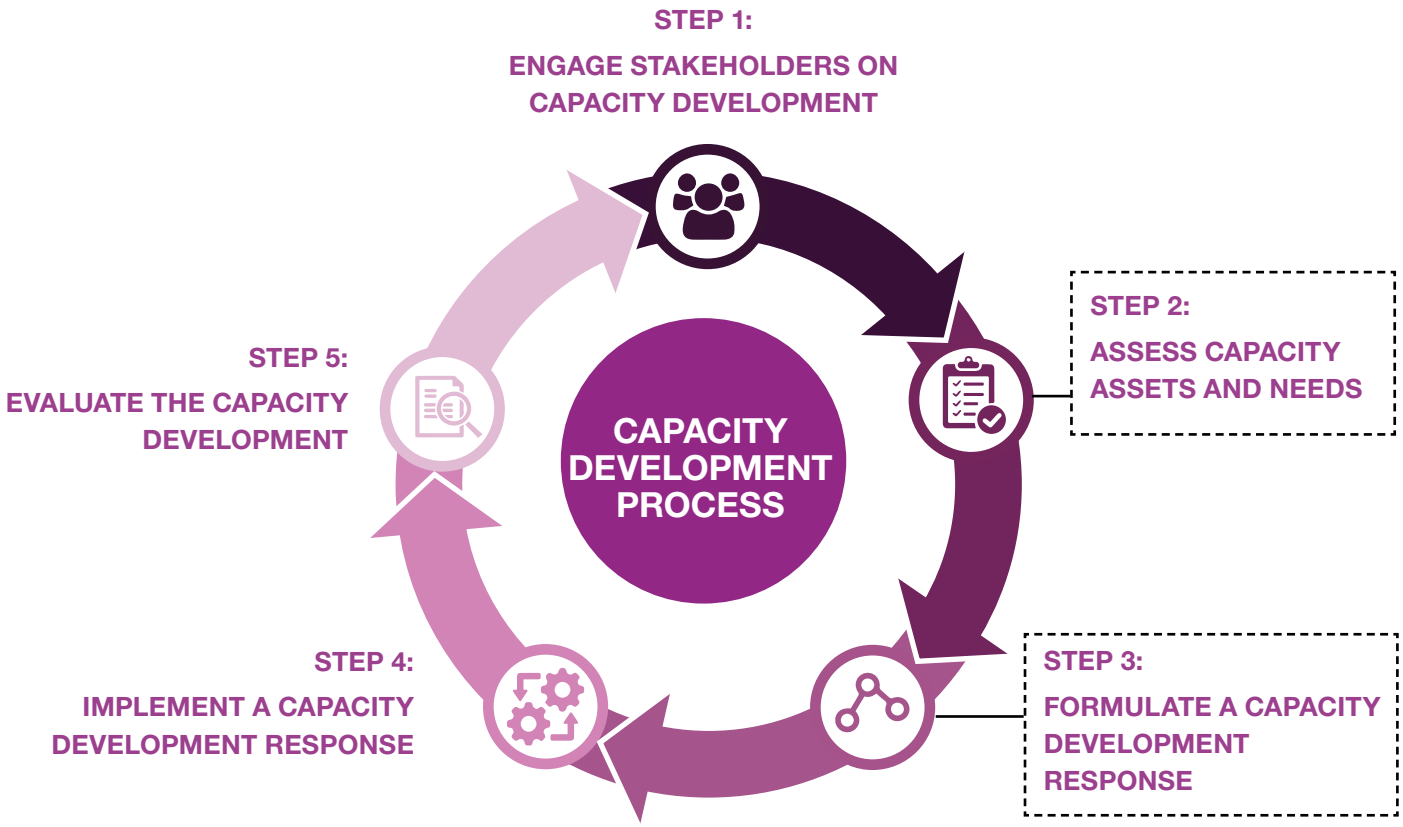
References

UNDP (United Nations Development Programme).2009. *Capacity Development: A UNDP Primer*. New York.

Urban Management Centre (UMC). 2013. "*Training Needs in Sustainable Urban Transport in Madhya Pradesh*". Ahmedabad: Shakti Foundation and Climate Works Foundation.

UNDP'S CAPACITY DEVELOPMENT FRAMEWORK

Developing capacity is a process of growth and evolution. The capacity development process uses a five-step cycle to organize programming work:



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01 IDENTIFY AGENCIES THAT WOULD HAVE A ROLE IN TOD

Implementing TOD projects at any scale requires the coordination of multiple public and private sector entities. However, often these sectors work independently and fail to communicate and align their efforts towards common goals. Identifying the agencies that would have a role in a TOD project, and their effective collaboration is essential to successfully plan for and implement TOD.

02A ASSESS THE TECHNICAL CAPACITY OF AGENCIES

Assess the gaps in the capacity of the technical and management staff with regard to:

INSTITUTIONAL ARRANGEMENT | LEADERSHIP | KNOWLEDGE | ACCOUNTABILITY

Actions for successful implementation of the TOD principles by concerned agencies should be assessed as fully realized, partially realized, and not realized.

For greater details, refer 2A

02B ASSESS FINANCIAL CAPACITY OF AGENCIES

One of the biggest barriers to TOD planning in cities is the lack of adequate budgets to hire and retain the requisite technical capacity. It is therefore essential to assess the financial capacity of the organization in order to suggest viable capacity building responses.

For greater details, refer 2B

DATA SOURCES

- Municipal Budgets/ Organization Budgets
- Existing Resource Plans

03 FORMULATE THE CAPACITY BUILDING RESPONSE FOR TECHNICAL CAPACITY

Strategies to augment the current staff capacity with regard to TOD practices and planning processes should be undertaken. The type of shortages should be identified for potential responses.

INSTITUTIONAL ARRANGEMENT | LEADERSHIP | KNOWLEDGE | ACCOUNTABILITY

For greater details, refer 3

04 DEFINE CAPACITY BUILDING PRIORITIZATION NEEDS DEPENDING ON CITY NEEDS

Prioritize the capacity building response based on the urgency of the needs.

IMMEDIATE NEED	MID-TERM NEED	LONG-TERM NEED

05 CREATE A 5-YEAR RESOURCING PLAN TO ENSURE CONTINUED FINANCIAL SUPPORT FOR CAPACITY BUILDING

It is essential to identify the required budgetary needs and prepare a 5-year plan, to ensure committed and continued support to the resourcing plan.

2A ASSESS THE TECHNICAL CAPACITY OF AGENCIES

HOW TO ASSESS TECHNICAL CAPACITY?

INSTITUTIONAL ARRANGEMENTS

- Are there existing institutions, such as direct agencies or special purpose vehicles, which are used to convene multiple sectors around a development project?
- Does the agency have an institutional mandate to enable TOD?
- Do these entities engage the private sector and civil society groups?

KNOWLEDGE

- What is the number of technical resources in the organization?
- What are their qualifications?
- How familiar are they with TOD concepts and planning processes?

ACCOUNTABILITY

- Is there a mechanism to ensure accountability?
- What is the quality of enforcement?

LEADERSHIP

- Is the leader aware of and supportive of TOD?
- Is there an existing political will for TOD?

2B ASSESS THE FINANCIAL CAPACITY OF AGENCIES

HOW TO ASSESS FINANCIAL CAPACITY?

- Do they have the financial capacity to hire the required resources?
- Do they have local/municipal financing means to fund TOD capital investments?
- Do they have access to external sources of funding for TOD?
- How well do current policy and regulatory tools foster and incentivize TOD?
- What funding sources can be unlocked over the course of the investment?

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3 FORMULATE A CAPACITY BUILDING RESPONSE

The existing capacity is assessed (in Step 2) to identify the gaps and shortages. These are overcome by forming capacity development responses and can collectively cater to immediate needs, mid-term needs and long-term needs.

HOW TO FORMULATE A RESPONSE?

INSTITUTIONAL ARRANGEMENTS	
TYPES OF SHORTAGE	POTENTIAL TYPE OF RESPONSES
Lack of Single Nodal Agency	• Formulate an agency with dedicated roles and responsibilities for implementing a TOD Project
Lack of Coordination	• Set up a TOD Organization / Task Force *For greater detail, Refer to EN-H01 How to build a TOD Institution*

LEADERSHIP	
TYPES OF SHORTAGE	POTENTIAL TYPE OF RESPONSES
No Knowledge of TOD	• Meeting/Workshops with International Experts/Leading Think Tanks, such as WBCoP, ITDP and WRI • Leadership Training including Site visits
No Political Support	• Gather Political Support

KNOWLEDGE	
TYPES OF SHORTAGE	POTENTIAL TYPE OF RESPONSES
Insufficient Skilled Resources	• Internally hire resources with TOD skill sets • Hire a consultancy for a TOD-specific project • *Set up a TOD Knowledge Center
Insufficient TOD Understanding	• Conduct Monthly Training Workshops for the staff in collaboration with NGOs, institutions, or Think Tanks • Set up a TOD Knowledge Centre*

ACCOUNTABILITY	
TYPES OF SHORTAGE	POTENTIAL TYPE OF RESPONSES
No systematic mechanism to identify liable/ responsible personnel	• Set up horizontal and vertical mechanisms to evaluate progress on TOD *For greater detail, Refer to IM-A01 Monitoring and Evaluation Framework*
Lack of Enforcement	• Conduct sensitization program with enforcement agencies

* TOD Knowledge Center: An in-house expert pool of practitioners, researchers and consultants, along with existing technical staff, to collectively build the capacity of the agency for a TOD project.

TOD K P

IM-H02



HOW TO DEVELOP A TOD PHASING STRATEGY

Methodology to help develop phasing strategies for a TOD project or program

Type: Step-by-Step Guide)



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ABOUT THE IMPLEMENTATION TOOL

Implementing TOD is both a time and resource-intensive undertaking. As such, a phased approach to transit-oriented development is key to success over the long-term. Phasing allows for development to be scheduled based on factors such as overall time frame, resource availability, priority to the city, possible risks and the required stakeholder responsibilities. 'Quick Wins' are generally the first activities to take place in a TOD, as they bring about positive changes for a city with little risk or financial/time constraints. This allows the transit-oriented development to enhance public buy-in and reputation. Consequently, activities that are higher risk and financially or resource intensive are scheduled for the long-term, providing a buffer for contingencies, potential resource delays and budgetary constraints.

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PURPOSE

This tool aims to assist with the creation of a phasing strategy for TOD that accurately represents city priorities, the resource considerations at play and the possible risks during each stage of activity. Establishing 'quick wins' in the short-term and achieving overall goals and visions in the long-term will become possible through the scheduling resources available with this tool. An overall phasing strategy, guided by the underlying resource, budgetary and time constraints, should be determined through the step-by-step process provided. An effective phasing strategy for the implementation of TOD must include risk management strategies that can avoid common pitfalls. (Carlton and Fleissig 2014).

References

Carlton, I., & Fleissig, W. (April 2014). *Steps to Avoid Stalled Equitable TOD Projects*. Living Cities.

TIME FRAME AND RESOURCE IMPLICATIONS

TIME FRAME

The total time required to complete each activity must be estimated as shown below:

TIME REQUIREMENT FOR EACH ACTIVITY			
Stage No.	Time estimation	Required time buffer	Total time required
	(Define the number of hours/days required to complete each stage)	(Estimate buffer time to be prepared for any contingencies)	(Sum of the previous two columns)
S1			
S2			
S3			

RESOURCE IMPLICATIONS

The human resource and financial requirements for every stage of the activity must be taken into account while scheduling the activity.

RESOURCE REQUIREMENTS AND RISK MANAGEMENT FOR EACH ACTIVITY			
Stage No.	Resources	Budget Responsible	Risk Management**
	(Define the financial resources and/or number of hours/days required per annum to sustain this stage)	(Specify which organization will provide the required human and/or financial resources)	(Describe the risks for each stage and list out measures that are set in place, in order to proactively manage them)
S1			
S2			
S3			

**** Risk Management:** Some common risks associated with TOD implementation (Carlton and Fleissig 2014) include:

1. Components of affordable housing and placemaking investments increase the cost and resource ambiguities associated with implementation.
2. Redevelopment or land amalgamation projects tend to overstep timelines because of complexities related to a large number of stakeholders.
3. Higher level planning decisions are not always responsive to market trends and demands, which may increase the time taken for projects to be adopted for development. This may also cause miscalculations of finance needs.
4. Market conditions may change during the process of TOD implementation. News of TOD planning can cause market speculation that can change market conditions also.
5. Feasibility studies may miscalculate the viability of TOD projects. This may not bring in the returns envisioned in the initial assessment and lead to derailment of the financing order.
6. Other parallel activities such as infrastructure investments can influence the implementation of dependent TOD activities.
7. It is important to know where gap funding may be needed, so as to keep the project on track.

01 DEFINE THE ACTIVITIES TO BE CONDUCTED

Many smaller activities need to be identified and listed, specifically related to addressing the desired outcomes of the TOD Plan. For example, improving pedestrian mobility requires activities such as widening of sidewalks, improving crossings, building pedestrian facilities, etc. As such, each activity should be listed against the TOD desired outcome.

'Quick Win' Activities should be identified at this stage. These are projects that have minimal risks associated with them and are capable of assured success. These projects help to set the stage for the rest of the project, enabling greater public acceptance.

02 DEFINE THE STAGES FOR EACH ACTIVITY

Define the stages that each activity has to go through from inception to completion, such as pre-planning, planning and design, implementation and monitoring. For each stage, resource requirements vary and these need to be considered in Step 4.

03 DEFINE THE TIME FRAME AND RESOURCE NEEDS FOR EACH STAGE

For each stage within each activity, define the amount of time required and the resource and budgetary needs. Ensure that a buffer is considered for contingencies, to avoid delay or cash flow issues during subsequent stages of the activity.

04 DEFINE SCHEDULING AND PHASING OF ACTIVITIES

Scheduling and phasing of activities should be defined based on the following:

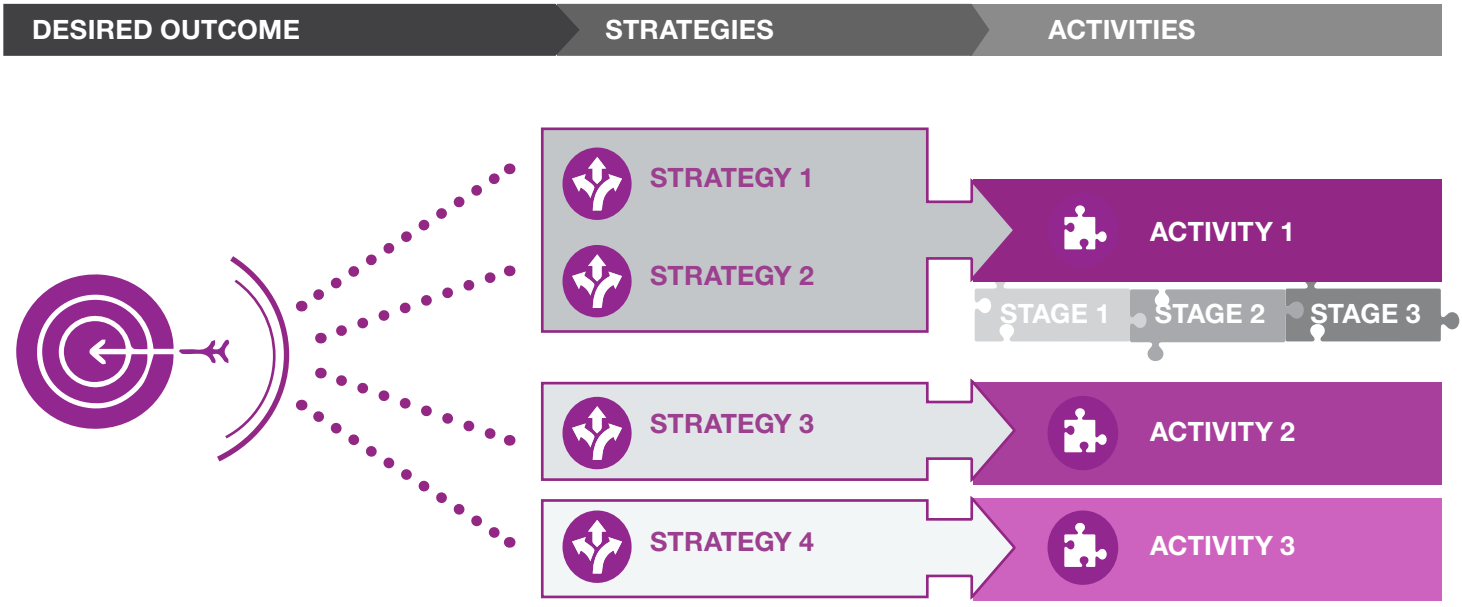
- **Prioritization** depending on immediate needs, ease of implementation or definition of 'Quick Win' projects.
- **Resource considerations** such as availability of equipment or staff. The Critical Path Method or similar should be used to appropriately plan resource distribution
- **Possibility of risks** during each stage of the activities. Risks should be minimized through scheduling in the appropriate season or similar.

05 IDENTIFY STAKEHOLDERS WHO WILL MANAGE EACH ACTIVITY

Define roles and responsibilities clearly for each activity, including planning, implementation and post-implementation responsibilities. Identify regular accountability mechanisms to ensure the timely delivery of the project.

SUMMARY OF ACTIVITIES AND PHASING

SUMMARY OF ACTIVITIES



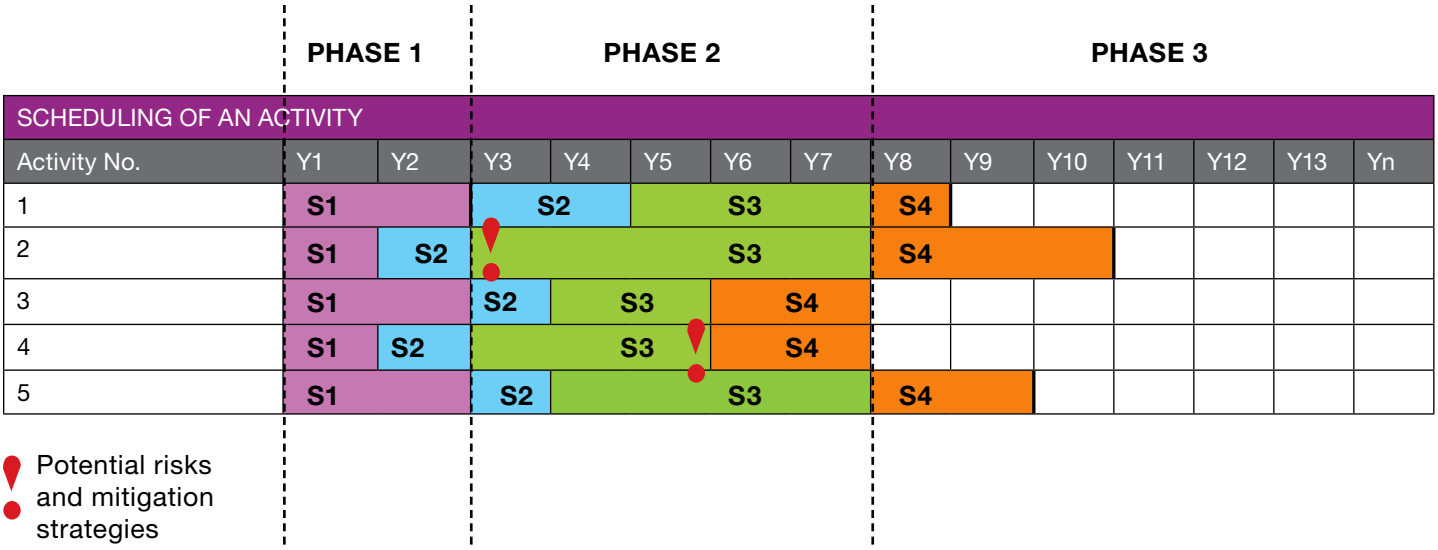
Create a detailed list of activities required to complete the project and specify the following for each of them:

SUMMARY OF ACTIVITIES						
Outcomes	Strategies	Activity	Time frame for each activity	Budget Requirement	Resource Requirement	Agency/ Organization Responsible
(Input the overall outcome required)	(Define the broad strategies required to achieve the desired outcome)	(Describe the activity type. For eg. Project Program Policies)	(Total time duration to complete each activity including all stages)	(Financial requirement to sustain each activity)	(Resource requirement for each activity)	(Organization responsible for planning and implementation of this activity)

SCHEDULING AND PHASING OF ACTIVITIES

SCHEDULING AND PHASING

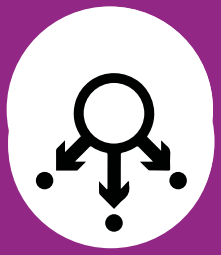
Taking into consideration the time frame for each activity, financial and human resource availability and the risks involved in each activity, the project must be scheduled and phased as shown below. It must take into account activities that have the possibility to be implemented in parallel and the activities that require the completion of a previous task before augmentation.



TOD K P

IM-P01

CAPACITY DEVELOPMENT STRATEGY TERMS OF REFERENCE



Template to outsource capacity building and training exercises for spreading awareness about TOD

Type: TOR Template



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BACKGROUND

The Terms of Reference for Capacity Development for TOD should provide the following background material:

A. **Existing Institutional Structure**: The Background section should provide a snapshot of the existing institutional set-up for which the capacity development strategy is being formulated.
B. **City Profile**: The Background section should also provide information on the city for which the institutional structure exists. This includes details such as city population, economy, municipal jurisdictions, transit system and other municipal services.
C. Bibliography of Reference Laws and Acts
D. List of Project Stakeholders

OBJECTIVE OF THE ASSIGNMENT

The objective of this assignment is to conduct a technical capacity gap and needs assessment of relevant organizations involved in transportation and land use planning and related subjects in the City. This assignment will lead to the preparation of a technical capacity development strategy and action plan for building technical capacities in the respective organizations with respect to TOD planning and supplementary activities.

SCOPE OF ACTIVITIES

The scope of activities for the Real Estate Market Study primarily consists of the tasks described below. The proposer is encouraged to provide suggested refinements to the work plan and schedule based upon experience with similar economic and market studies, and in compliance with national and state policies, where applicable.

1. **Project Initiation:** The selected Consultant will first and foremost review relevant background material provided by the client on the existing institutional framework in the city, before scheduling a kick-off meeting. At the meeting, the Consultant will present their understanding of the consultancy, as well as the proposed methodology and guiding framework. The preliminary identification of key stakeholders should be conducted at this meeting. Based on the discussion, the Consultant will produce an Inception Report, comprising of the proposed approach including specific method(s) and guiding principles; the final proposed work plan; and identification of issues crucial to the viability of the consultancy. The Inception Report must propose guiding values for technical capacity, for eg. number of urban planners per 1000 population, against which technical capacity shall be assessed in Task 2.
    a. Deliverables: Inception Report including proposed approach, methods and guiding principles, work plan and identified issues and limitations.

2. **Technical Capacity Assessment:** The Consultant will review relevant past assessments undertaken in the City, if any, to gain insight on technical capacity trends in the city or organization. The Consultant will then, as per the proposed methodology, conduct surveys, meetings or workshops to summarize the current strengths and capacity gaps of organizations under consideration, with respect to institutional arrangement, leadership, knowledge and

accountability. The assessment parameters will include number of staff, operational procedures related to their mandates, technical expertise against the departments' respective mandates, and measures of accountability. In particular, the Consultant must assess the familiarity and understanding of TOD among the leaders and technical staff in the organization. The Consultant must also assess the channels of communication to determine multi-stakeholder coordination challenges, if any. The Consultant will develop a baseline assessment, against which the success of the capacity building strategy will be measured at the end of the project.

a. Deliverables: Technical Capacity Assessment Report including identification of capacity gaps and baseline assessment.

3. **Technical Capacity Development Strategy and Action Plan:** Based on any technical capacity gaps identified in the final Technical Capacity Assessment Report, the Consultant will prepare specific and practical strategies and associated activities to address such gaps within the expected timeframe (e.g. in-country training delivered by a think-tank, formulating a TOD hand-holding unit led by a TOD expert, sending staff members to an international conference, hiring a private consulting firm to undertake project-specific planning, transfer of employees to a technical agency to obtain relevant skills on-the-job, a short course at a regional university, etc). The Consultant will be expected to study the feasibility of the strategies proposed with respect to cost and availability, before adding them to the Action Plan. The Consultant will prepare a Capacity Development Strategy and Action Plan Report including the conclusions of the capacity needs assessment and the proposed capacity development approach for each concerned government organization and department. Building on the baseline assessment, a monitoring framework should be identified with proposed indicators, timelines and targets.

   a. Deliverables: Capacity Development Strategy and Action Plan including proposed capacity development responses to existing gaps, and timeframe for implementation.

DELIVERABLES

TASK	DELIVERABLE	TIMELINE
1	Inception Report	M + 2 weeks
2	Technical Capacity Assessment Report	M + 2 month
3	Capacity Development Strategy and Action Plan	M + 3 months

QUALIFICATION OF CONSULTANTS

The Consultant Team must have experience in at least:

A. One similar Capacity Development Study

OR

B. At least two studies or project reports which included at least two of the following components: Technical Capacity Assessment, Planning Framework formulation, TOD Planning

The Consultant Team must include the following key expertise:

	Key Experts	Year of Experience
1	Project Manager and Senior Capacity Building Expert	15 years
2	Human Resource Specialist	10 years
2	TOD Specialist	10 years

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San Pedro Sula, Honduras

TOD KP

CASE STUDIES

COMPILATION OF GOOD AND INNOVATIVE PRACTICES



TOD

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LEVEL 1 SCREENING

A comprehensive list of cities from low-middle income countries were shortlisted as potential candidates for Case Studies. This list of Case Studies was derived from:

- Case Studies already included in World Bank publications/ workshops and presentations
- Part of GPSC/ World Bank-identified city TOD list
- Representative of the TOD framework as well as geographic distribution:
  - Scale- City/ Corridor/ Station
  - Context- Urban/ Suburban/ Greenfield
  - Mode of higher order transit- BRT/ MRT/ Heavy Rail
  - Size of city- Large and medium-sized cities (Tier 1 and Tier 2)

LIST OF BEST PRACTICE CITIES		
	1.	Mexico City, Mexico
	2.	Bogota, Colombia
	3.	Lima, Peru
	4.	Recife, Brazil
	5.	Curitiba, Brazil
	6.	Mumbai, India
	7.	Delhi, India
	8.	Hubli-Dharwad, India
	9.	Nanchang, China
	10.	Shenzhen, China
	11.	Guangzhou, China
	12.	Shijiazhuang, China
	13.	Tianjin, China
	14.	Hong Kong SAR, China
	15.	Ho Choi Minh City, Vietnam
	16.	Hue, Vietnam
	17.	Kuala Lumpur, Malaysia
	18.	Jakarta, Indonesia
	19.	Addis Ababa, Ethiopia
	20.	Dakar, Senegal
	21.	Abidjan, Africa
	22.	Johannesburg, South Africa
	23.	Cape Town, South Africa
	24.	Santiago, Chile
	25.	Dar es Salaam, Tanzania

LEVEL 2 SCREENING

The following table provides the updated list of relevant case studies based on World Bank's input, case studies recommended by experts and peer-reviewers, WRI/ITDP and IBI projects that explain good practices and innovative strategies from countries at low to medium income levels. The intent is also not to duplicate existing case studies already compiled by World Bank. E.g. Kings Cross TOD, London, UK.

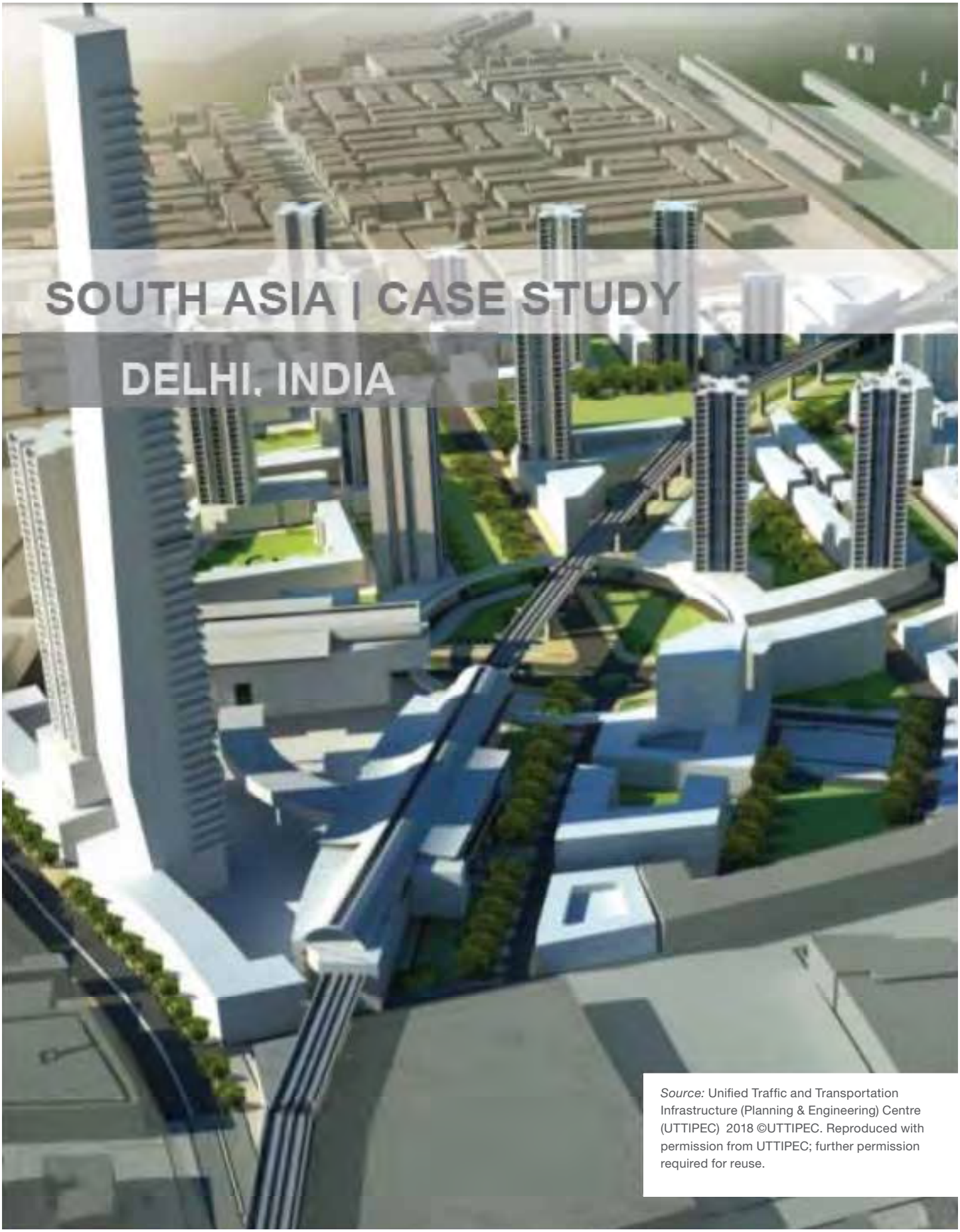
Relevance of the Case Study to the Scale and Development context is also provided along with relevance to specific knowledge product(s). Key criteria for selection were based on the following factors:

- Is there policy-level support for promoting TOD at one or more governmental levels- central, state, local?
- Has TOD been applied at more than one scale- City/ Corridor/ Local (neighborhood)/ Station?
- Are there any TOD projects at the station scale implemented (operational/ under construction/ tendered/ development agreement in-place)?
- Does the city/ example represent a case where the conventional planning paradigm was challenged to implement TODs (e.g. land banking, land readjustment, PPPs).

COMPLETE LIST OF CITIES EVALUATED FOR LEVEL 2 SCREENING & RECOMMENDED CITIES FOR CASE STUDIES:	
South Asia	1. Delhi, India
	2. Hubli-Dharwad, India
Asia	4. Hong Kong SAR, China
	5. Shenzhen, China
	6. Guangzhou, China
	7. Seoul, Republic of Korea
America	7. Mexico City, Mexico
	8. Santiago, Chile
Africa	9. Cape Town, South Africa
	10. Johannesburg, South Africa

SOUTH ASIA | CASE STUDY

DELHI, INDIA



Source: Unified Traffic and Transportation Infrastructure (Planning & Engineering) Centre (UTTIPEC) 2018 ©UTTIPEC. Reproduced with permission from UTTIPEC; further permission required for reuse.

DELHI, INDIA

QUICK FACTS

Geographic Context
South Asia (India) – National Capital Region, India

Scale
City, Corridor, Neighbourhood, Station

Context
Urban, Suburban, Greenfield

Mode of Higher Order Transit
Metro (Delhi Metro Rail Corporation)

Size of City (Population)
16.7 million (Tier-1)

Case Study Covered in WB Publication
No

URBAN CONTEXT

The National Capital Territory (NCT) of Delhi is the fastest growing city-region and the second most populous urban area in India. The metropolitan region spans a collection of cities and suburban settlements across the three states of Delhi, Uttar Pradesh, and Haryana. In 20 years between 1991 and 2011, the city region has grown in size from 685 to 1114 sq km, and grown in population from 8.7 to 16.3 million. The steep rise in population can be contributed primarily to migration from smaller towns and villages from across the country attracted by growing job opportunities in new developments in the outskirts of the city. This growth of working-class households was supported significantly by the first-of-its-kind metro system network developed by the Delhi Metro Rail Corporation (DMRC) in 2002. An average of 2.6 million commuters use the metro daily[1].

Much of Delhi's growth is observed along the outskirts of the city in areas like Gurgaon, Noida, Ghaziabad and East Delhi. The city at large exhibits large block sizes, low densities, segregated land uses etc. which reflects vehicle-centric planning. This has not only had catastrophic effects on the air quality of the city but has also resulted in congestion that can now essentially be described as a gridlock. In response, the DMRC began construction of the metro network in 2002. By 2018, until the writing of this study, DMRC has built over 8 lines spanning 332 km. The metro network has brought huge relief to the average commuting population. However, the sprawled nature of Delhi has made it difficult for the metro to expand its accessibility as effectively. In 2006, the National Urban Transport Policy was launched, which emphasized the importance of public transport and the need for Transit Oriented Development to leverage this investment. The Unified Traffic and Transportation Infrastructure Planning & Engineering Center (UTTIPEC), formulated to envision a unified and integrated mobility outlook for the entire region, identified a need for Transit Oriented Development (TOD) to accompany metro development in the city-region and began creating the TOD Draft guidelines in 2008.

OVERALL TOD STRATEGY

The Delhi Metro Rail Corporation (DMRC) was jointly set up by the Government of India and Government of Delhi in 1995. The construction of the network was planned in 4 phases[5].

Phase I: A total of 65km of rail with 58 stations was planned for Phase I. Initial rail development was constrained within the Delhi limits and stations were built and opened between sDecember 2002 and November 2006.

Phase II: A total of 124.63 km long network with 85 stations and 10 new routes and extensions were built, out of which seven are an of the Phase I network. Color-coded lines and lines connecting to adjacent cities were created (Yellow Line to Gurgaon, Blue Line to Noida and Blue Line to Ghaziabad). These stretched from the national capital region, outside the physical limits of Delhi state, to the states of Haryana and Uttar Pradesh. At the end of Phases I and II, the cumulative total length of the network became 189.63km, including 143 stations over time. Operation of the network initiated between June 2008 to August 2011

Phase-III: Consisted of 11 extensions to the existing lines and two additional ring lines (Pink and Magenta lines). This expansion included 28 underground stations and a total of 167.27km.

Phase IV: is expected to be complete in 2021 which totals to 100km.

The TOD Policy in Delhi was framed within the Influence Zone along MRTS corridor, designated as the **Transit Oriented Development (TOD) Zone** in the Master Plan for Delhi 2021, modified with the latest revisions in 2017. This zone comprises of all the areas lying within 500m of the metro transit corridor on either side. This area is expected to be delineated in the Zonal Development Plans to avoid ambiguity. The Master Plan incorporates TOD as a redevelopment strategy, encouraging private landowners to assemble and redevelop lands that have high TOD potential[2].



Figure 4: TOD Influence Zone Delineation | *Source*: Delhi TOD Policy Manual, 2007 ©Delhi Development Authority.

The Transit Oriented Development Principles adopted by the TOD Policy to guide the framing of regulations include:

1. Pedestrian and Non-Motorized Transport Friendly Environment
2. Connectivity and Network Density
3. Multi-modal Interchange
4. Inducing Modal Shift by easing access to public transport and dis-incentivizing private motor vehicle use.
5. Placemaking and Ensuring Safety
6. High-Density, mixed-use, mixed-income development near Stations

INFRASTRUCTURE PROVISION FOR DENSITY

The Master Plan of Delhi 2021 suggests requirements for decentralized infrastructure and resource conservation facilities, specifically including:

- Recycling of treated wastewater with a dual piping system
- Groundwater recharge through rainwater harvesting, conservation of water bodies and regulating groundwater extraction
- Treatment of sewage effluent for recycling for non-potable uses such as gardening.
- Passive cooling systems to ensure energy efficiency
- Solar heating systems are recommended on all plots for roofs of 300sqm or above.
- Incentive FAR and ground coverage is offered for implementation of the above.

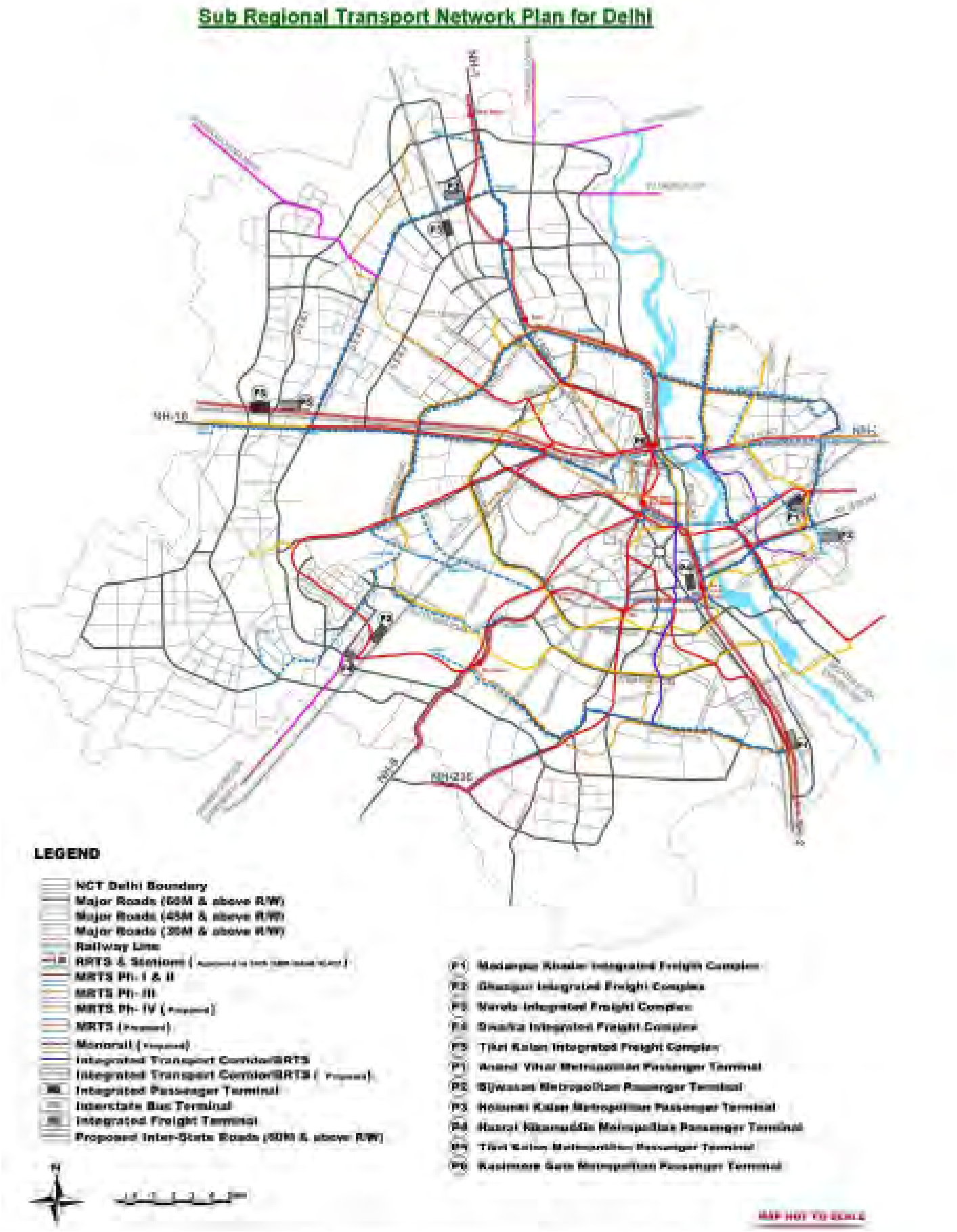


Figure 6: Delhi MRTS and Transport Corridors | *Source*: Master Plan of Delhi 2021, 2007 ©Delhi Development Authority.

KEY ROLES AND RESPONSIBILITIES OF STAKEHOLDERS

The stakeholders involved in implementation of the Delhi TOD Policy include primarily the Delhi Development Authority (DDA), whose responsibility it is to evaluate TOD schemes and give development permissions; Competent Authority (CA) instituted under the respective State Acts, whose responsibility it is to acquire public amenity land and issue development permissions; and the Developer Entity (DE), who undertakes to participate in the TOD scheme. The roles and responsibilities of each entity during the development permitting process is shown below (Source: Delhi TOD Policy Manual):



Figure 7: TOD Roles and Responsibilities Scheme | *Source*: Delhi TOD Policy Manual, 2007 ©Delhi Development Authority.

DESIGN STRATEGIES TO ENCOURAGE TRANSIT USE

The TOD Policy Manual suggests design strategies for TOD that govern the Development Control Regulations incorporated in the Master Plan of Delhi 2021. The Development Control Norms include the following strategies for land parcels measuring 1 HA or more[3]:

- **FAR and Density**: Higher densities are allowed for all developments that are planned on individual or amalgamated land parcels of size of 1HA or more. A minimum mandatory Floor Area Ratio (FAR) is imposed for housing for the economically weaker section. This norm is intended to encourage land pooling as a redevelopment strategy in the TOD influence zones. Larger land parcels allow DDA to extract land for public use including open spaces and transit plazas.
- **Mix of Uses**: Minimum 30% residential use, 10% commercial use, and 10% public amenities are compulsorily required on all land parcels irrespective of their dominant land use as per the Master Plan. Within the minimum residential area requirement, the Master Plan mandates housing units to be of smaller sizes. This is intended to encourage economic diversity within transit influence zones. Smaller unit sizes allow buyers the flexibility of purchasing small units in case of budget limitations and purchasing multiple units and combining them in case of larger family sizes. However, in practice, this requirement has been the most difficult to meet, because it increases the planned density of the development substantially. This, in turn, increases the infrastructural and parking requirement for the development.
- **Road Network**: A minimum 20% of the land is required to be reserved for roads, adhering to principles of 250m c/c road density of vehicular roads and 100m c/c density of the pedestrian network. These roads will be handed over to the Government as public roads, but will be maintained and kept encroachment free by the DE.
- **Open Spaces**: A minimum 20% of the land is required to be reserved for green open spaces for public use, adhering to principles of inclusion and another 10% green space for private use. In parcels smaller than 1 HA, private open space is allowable in the form of common terraces, rooftops or podiums.
- **Public Facilities**: Public facilities like schools and health facilities are required to be provided as part of the development.
- **Green Buildings**: The built form of the development is required to achieve a minimum of 3 stars or gold rating as per the Indian Green Building Standards
- **Traffic Impact**: Is expected to be assessed and mitigated through traffic management measures.

In addition to the above norms, the Master Plan also prescribed Street Design Regulations to be followed within the streets planned in a development under the TOD scheme. The street design elements are intended:

- Promote Preferable Public Transport Use
- For Safety of All Road Uses by Design
- For Pedestrian Safety, Comfort and Convenience on All Streets
- For climatic comfort for all Road Users
- To ensure universal accessibility and amenities for all street users
- To reduce Urban Heat Island Effect and Aid Natural Storm Water Management

FINANCIAL MODEL

There is no single financial model that can be identified in Delhi. Some of the expected sources of revenue are through the sale of FSI, external development charges (EDC) and betterment charges.

Extra FSI charges as per the Master Plan are as per standard rates, irrespective of land use/ use premises, to avoid any complications to change the use of FSI in future. This is both an advantage and a disadvantage as the uniform FSI rates for commercial and residential in Delhi, either adversely affect the affordability of residential or there are chances for the government to lose the opportunity to earn from the commercial FSI.

Though the resources of finance (direct collection and land value capture) have been identified, the use of revenue generated from TOD is not ensured through the regulations.

TOD KP

IMPLEMENTATION STRATEGIES

TIMELINE:

- **1991-** Region was 685 sq km with a population of 8.7 million
- **1995-** DMRC was jointly set up by the Government of India and Government of Delhi
- **2002-** Began construction on first metro network by Delhi Metro Rail Corporation (DMRC)
- **December 2002-** Phase 1 starts
- **2006-** National Urban Transportation Policy was launched
- **November 2006-** Phase 1 competes
- **2008-** UTTIPEC began creating the TOD Draft Guidelines
- **June 2008-** Phase 2 begins
- **2011-** Region was 1,114 sq km with a population of 16.3 million
- **August 2011-** Phase 2 completes
- **2017-** Modified and revised Master plan for Delhi 2021
- **2018-** DMRC metro network has 8 lines spanning 332km
- **2021-** Phase 4 expected completion

ACTIONABLE STEPS

The TOD Policy Framework has been tested in different models of TOD pilots in Delhi, the most well-known being the Karkadooma station in East Delhi. The proposed site of the pilot TOD project of Karkadooma lies within Zone- E of the Zonal Development Plan, the land use of which is residential. More than 70% of the site falls within the 500m influence zone of two metro stations at Karkadooma, therefore the norms for 'Influence Zone' shall be applicable. The figure below illustrates three conceptual designs that follow the TOD norms[4].

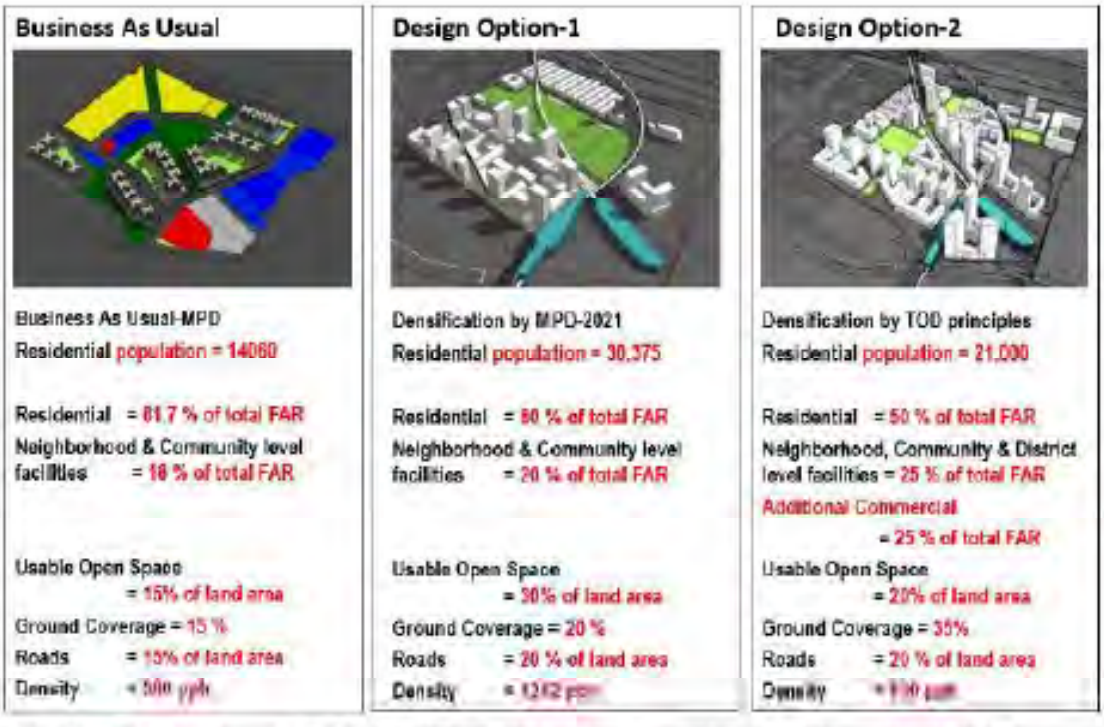


Figure 8: TOD Design Options | *Source:* Delhi TOD Policy Manual, 2007 ©Delhi Development Authority.

Design option two was favored during the stakeholder consultation process which was conducted to prioritize civic amenities.

The stakeholders consisted of resident welfare associations, trade associations, NGOs and civic society institutions, schools and local ward counselors.

KEY LESSONS

The following key takeaways should be derived from the Delhi example:

- The TOD policy in Delhi prescribes strict norms to follow and is, therefore, a comprehensive approach to planning TOD.
- Delhi is trying to provide affordable housing in TOD but with the strict percentage, it can restrict the market to participate.
- With regards to parking, Delhi is adopting a one-size fits-all approach even with various TOD typologies: city center TOD, suburban TOD, commercial TOD, Residential TOD.
- Even though Delhi has stringent TOD policies and urban design guidelines, there is still a lack of clarity in terms of the implementation process.

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1. Delhi Metro Rail Corporation Ltd. 2018. “Delhi Metro Interchange Stations Increase to 16, Ridership Registering Steady Growth.” http://www.delhimetrorail.com/press_reldetails.aspx?id=bhc0DzbE6tklld
2. Mehta, Prerna V., Neha Mungekar, and Merlyn Matthew. 2016. “Transit Oriented Development Manual – Delhi TOD Policy and Regulations Interpretation.” *World Resources Institute*. http://wricitieshub.org/publications/transit-oriented-development-manual-delhi-tod-policy-regulations-interpretation
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4. Uttarwar, P.S., and Paromita Roy. 2015. “Transit Oriented Development (TOD) Policy - East Delhi Hub - Kadkadooma TOD project.” UTTIPEC. http://urbanmobilityindia.in/Upload/Conference/ae9770cd-2c9c-4599-80b6-3f0cd3a83bfe.pdf
5. Transit Oriented Development for Indian Smart Cities. 2016. “Case Studies.” *National Institute of Urban Affairs (NIUA) and Foreign & Commonwealth Office, Government of UK. https://tod.niua.org/todfisc/book.php?book=1&section=4*

SOUTH ASIA | CASE STUDY

HUBLI DHARWAD, INDIA



Source: Hubli-Dharwad BRTS Company Ltd 2016. ©HDBRTS. Reproduced with permission from HDBRTS; further permission required for reuse.

HUBLI DHARWAD, INDIA

QUICK FACTS

Geographic Context
South Asia (India) – Karnataka, India

Scale
Regional, Corridor

Context
Urban, Suburban, Greenfield

Mode of Higher Order Transit
Bus Rapid Transit System (Hubli Dharwad BRTS Company Ltd.)

Size of City (Population)
0.97 million (Tier-2)

Case Study Covered in WB Publication
No

CITY SUMMARY

Hubli and Dharwad are twin cities in the state of Karnataka and located at a distance of around 20km from each other. Hubli-Dharwad is the oldest city in Karnataka state with strong cultural and historical importance and is also the second-largest urban settlement in Karnataka after Bengaluru. While Dharwad is the district headquarters and Hubli is the business hub.

According to Census 2011, the city had a population of 9.43 lakhs. HDMC's population accounts for 4% of the urban population of the state and 90% of the urban population of the district. The population density in Hubli-Dharwad has been on an increase during the past three decades. The density increased from 1,837 persons per sq. km in 1971 to 4,292 persons per sq. km in 2011. However, the area of the corporation remained the same.

There is a steady and high volume of passenger traffic between the twin cities. Currently, this demand is catered by the NWKRTC through a bus-based system and private vehicles. Though buses account for only 7-11% of total traffic flow on the road between Hubli and Dharwad, they carry about 70-80% of people. A BRTS has been conceived along the P.B. road between Hubli and Dharwad, in order to meet the increased demand for ridership.

URBAN CONTEXT

The urban character of both Hubli and Dharwad cities is found to be complex, and the old city areas in both cities have been retained their original and traditional character. They are acting as religious nodes and are with narrow streets and inefficient infrastructure services. However, in other areas, due to the availability of services, cultural attractions, proximity to city core has always been under constant development pressure and resulted in over densification. While fringe areas are exhibiting a different development pattern which is comparatively organized growth pattern. Both cities exhibit medium density with medium-rise buildings with average 3-4 storeys.

As per the Karnataka Town and Country Planning Act, 1961, the Hubli-Dharwad Urban Development Authority (HDUDA) was constituted in the year 1987 for undertaking the responsibility of physical planning, and its jurisdiction includes the HDMC area and about 10 km area beyond HDMC, to include villages that could eventually become part of the urban area in future[1].

- Disjointed City Form: Hubli Dharwad grew organically as two different cities, which were amalgamated in 1964 into a single municipal corporation. Even though their economies are interdependent, structurally these cities have remained disjointed connected only by the present-day BRT corridor. Most development between the 2 cities is sprawling in

nature, which physically divides the 2 cities and forces intense urban development outwards and away from the primary corridor.

- Urban Sprawl: Availability of large tracts of land with urbanizing potential and very little demand has led to proliferating urban sprawl. Sprawl poses a threat to the forested and agricultural lands around the city cores.

Hubli-Dharwad today stands on the brink of a reformation in urban development. There the Spatial Development Framework created as a guide for the City Development Framework (2030), seeks to address five major issues in Hubli-Dharwad's spatial and social landscape[1]:

- Lack of spatial vision for the cohesive development of the city
- Urban sprawl and fragmentation
- Increasing pressure on the natural environment infrastructure
- Spatial inequalities and the jobs-housing mismatch
- Exclusion and disconnection emanating from
- High potential underused areas
- Disconnected street networks
- Inefficient residential densities and land use diversity

The strategies towards setting the TOD framework and the implementation strategies have been adopted from the Hubli Dharwad 2030 City Development Framework. They have been summarized below.

OVERALL TOD STRATEGY

Hubli-Dharwad area is currently undergoing rapid population growth. The proposed BRT will further fuel this growth. To cope with this, transit-oriented development is proposed along the corridor. This BRT system will minimize sprawl and will serve as a ready to use commuter system for the additional population. Also, the proposed revision of the comprehensive development plan (CDP) for Hubli Dharwad in 2015 is an opportunity to incorporate the TOD principles. Incorporating TOD into the development plan will help in delivering efficient, comfortable and affordable mobility options to its citizens. The urban cores of Hubli and Dharwad are 22km apart which is one of the primary factors defining the spatial growth pattern of the twin-city region.

Hubli-Dharwad has a road network which is dense but with constrained right-of-ways in the city cores. The two city cores are connected by PB Road, the only arterial road in the twin cities, which was also formerly a national highway. National Highway, radiating from Hubli center, including NH4, which is recently developed to bypass the traffic passing through these city cores. The constraints in road ROWs in the employment centers limits densification potential and results in congestion.

The spatial vision envisaged by the CDF 2030 is a compact polycentric city with dense urban cores linked by efficient public transport networks to mixed-use, complementary sub-centers, situated within a protected and integrated natural environment[1]. Development triggers in the area are ongoing projects like the widening of P.B. road, upcoming Hubli Dharwad BRT, Hubli airport modernization, proposed electrification and doubling of the railway line, inland container depots, goods yard along with improved Mumbai-Chennai road corridor etc. High land values in Hubli and Dharwad have led to haphazard development adjoining PB road and it needs to be streamlined to ensure optimal utilization of the road widening as well as the upcoming Hubli Dharwad BRT[1]. The City Plan (Vision 2030) promotes land use that supports transit. The Development Density Framework suggests a differential density paradigm for the city. It proposes higher densities and FAR allowances for areas with higher amenities and higher accessibility to jobs and city services. Primarily, the framework is defined with the metropolis boundary as the base.

- The Metropolis Boundary - Reimagining the Metropolis Boundary as a potential Urban Growth Boundary (UGB) allows for enforced limitations to new development outside of it. This area measures 220 sq km. However, developing the entire metropolitan area with the same density of development will lead to sprawled development. Accordingly, the next layer of density is defined, a high growth Zone measuring 83 sq km.
- High Growth Zone – Proposed Zone A – This zone includes all high demand and high opportunity areas as well as future strategic areas of growth. Within this zone, larger mix of uses and higher FAR should be proposed to enable compact and mixed-use development. The HDUDA Master Plan already recommends more intensive uses in "Zone A". It is proposed therefore that the High Growth Zone be considered for inclusion in the Master Plan as Zone A. However, unlike the Master Plan, this zone must be allowed

higher FARs to accommodate the market demand.

- The final layer of the differential density is the TOD Zone, the areas within walking distance of the new BRT corridor connecting Hubli and Dharwad. TOD Zone - This zone has the advantage of access to a high capacity, high-frequency public transport system, which is expected to catalyze compact, mixed-use, and inclusive development.

The development structure of a city must be imagined in parallel with a transportation network that can support its growth and ensure equitable accessibility at all stages of growth. In addition to the BRT Corridor and the Proposed Bypass Road, a network of priority roads and corridors are identified, that contribute to the spatial strategy of growth.

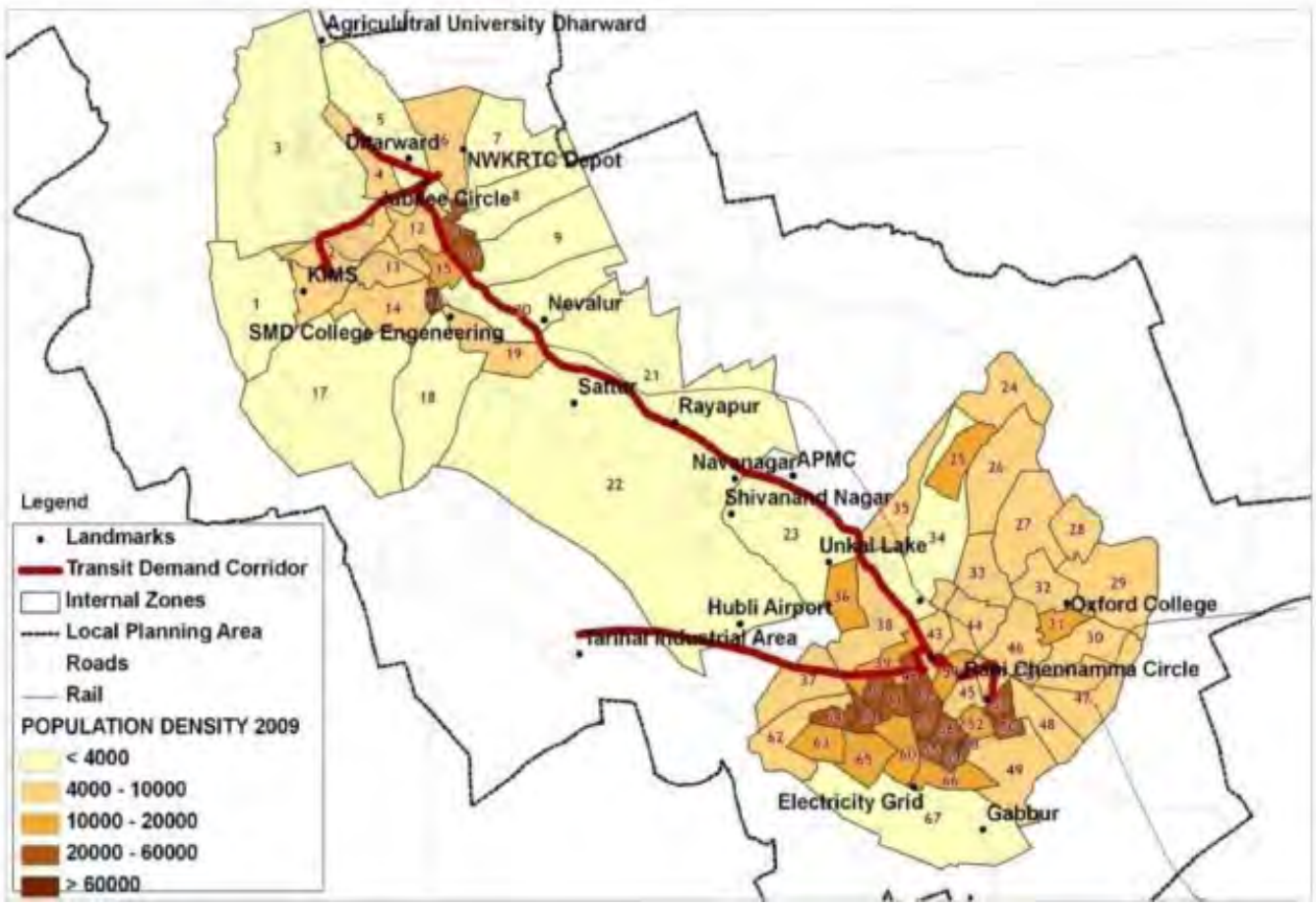


Figure 9: Density Framework for TOD | *Source:* Hubli Dharwad 2030 City Development Framework 2014 ©IBI Consultancy India Pvt Ltd.

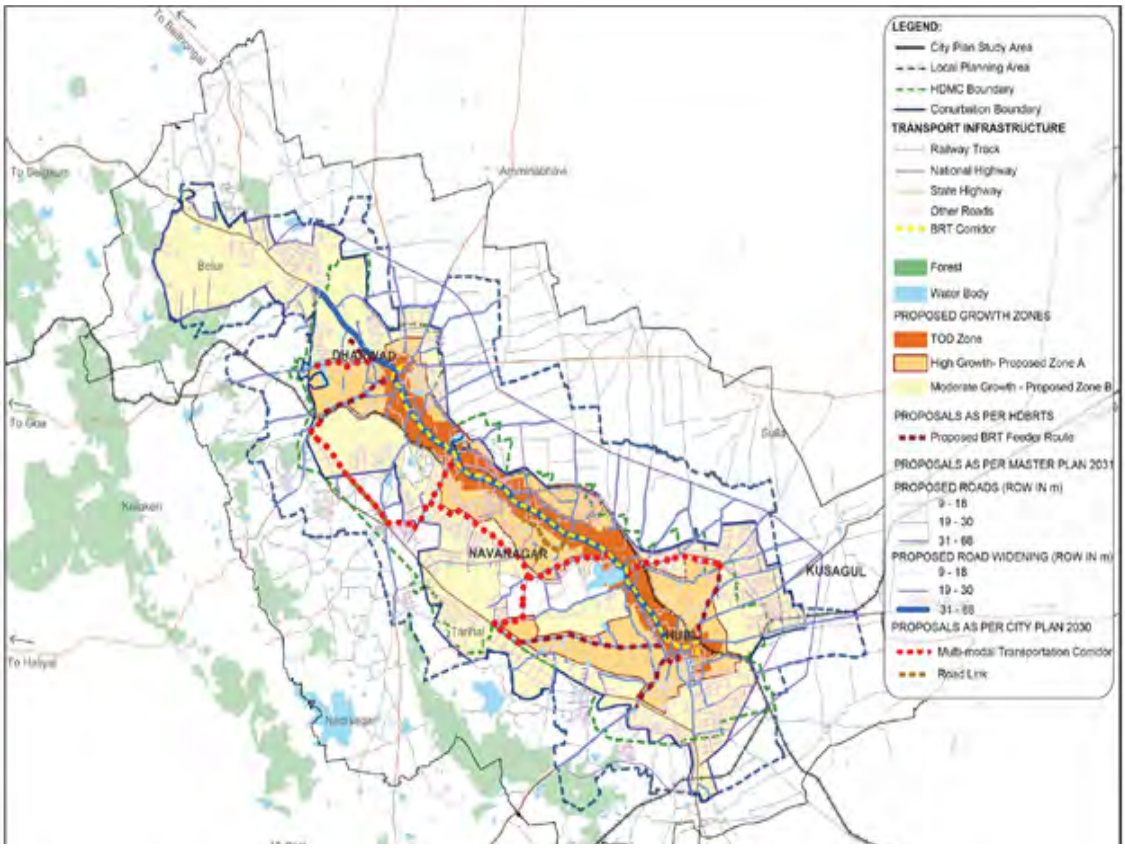


Figure 10: Proposed Transportation Framework as per Master Plan 2031 | Source: Hubli Dharwad 2030 City Development Framework by IBI Consultancy India Pvt Ltd.

KEY ROLES AND RESPONSIBILITIES OF STAKEHOLDERS

The Hubli Dharwad 2030 City Development Framework (CDF), as the first of its kind in India, is set up to prepare Hubli Dharwad for the future by creating a vision and path for the future even before new programs at the State and Central level are introduced[1]. All potential opportunities for funding and financing can be streamlined to achieve the vision set forth in the Framework. Along with providing a larger Vision, the CDF also proposes immediate actions that the city agencies can adopt using existing sources of funds. A break-up of the CDF components and relevant implementation roles is illustrated in the figure below.

The Dharwad District Administration is envisioned as the Authority that will own the first three components of the Framework and be responsible for integration across sectors and jurisdictions. The implementation and monitoring of the Framework shall be within the scope and mandate of sector-specific and jurisdiction-specific agencies. The Primary Vision and Goals and Targets shall be monitored by a City Transformation Cell which in turn shall establish a continuous medium of interaction with the city and rural residents to enable resident inputs to inform the Framework.

While the DA shall be the Nodal Agency for the Spatial Growth Concept and Density Framework, as this will allow an integrated city-rural approach to guide economic growth in the study area, the HDUDA, HDMC, KIADB, and Gram Panchayats will be responsible to implement the proposals for setting up of growth nodes and growth corridors within their jurisdictions.

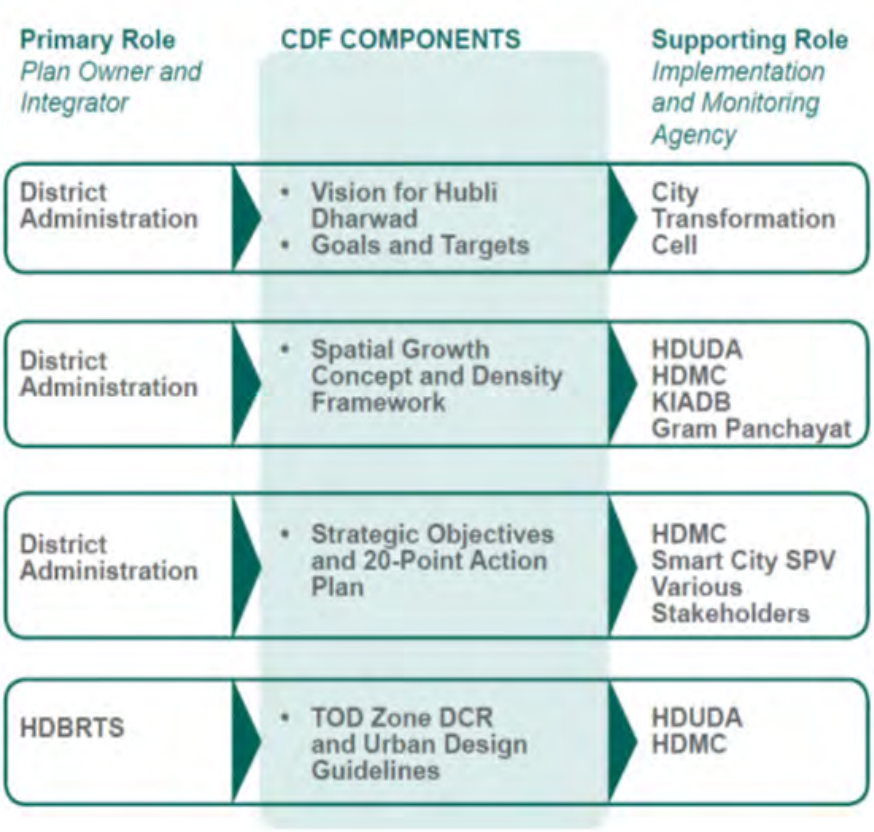


Figure 11: Proposed Transportation Policy Framework | Source: Hubli Dharwad 2030 City Development Framework 2014 ©IBI Consultancy India Pvt Ltd.

STRATEGIES TO ENCOURAGE TRANSIT USE

The HDBRTS, under the aegis of DULT shall be the Primary Nodal Agency for the TOD Zone DCR and Urban Design Guidelines. The HDUDA shall incorporate the TOD Zone DCRs into the Master Plan, while the implementation of the DCRs and Urban Design Guidelines shall be done by a TOD Implementation Committee set up within the HDMC.

OPPORTUNITIES

- Compact city cores connected by a high-capacity BRTS system offers the opportunity to create more well-connected compact cores.
- A large potential for intensification exists in many underutilized areas, without sprawling to natural areas.

FINANCING

TOD Incentives provide an opportunity to earn increased revenues through:

- Sale of Premium FAR
- Increased revenue through property taxes levied on higher built up areas

The revenues earned through the tools listed above shall be shared between the HDBRTS and HDMC as per mutual agreement. This source of revenue shall be used by HDBRTS for operations and maintenance of the BRTS system and shall be used by the HDMC to implement crucial public realm improvements.

IMPLEMENTATION STRATEGIES

The special regulations for Transit Oriented Development are intended to be provided to areas within walking distance of the corridor to incentivize high-density growth that can take advantage of transit and reduce reliance on private vehicles. The HDUDA Provisional Master Plan 2031 identifies a special BRT impact area which is 500m on either side of the BRT corridor and is earmarked as the TOD zone.

The lack of existing market demand in the TOD Zone will make it difficult to attract developments that are high density and mixed use. Hence the Hubli Dharwad city plan proposes the following key strategies[1]:

1. Create Statutory Regulations that encourage compact development – Decreased setback requirements and parking requirements will enable compact development in the TOD Zone. In addition FAR and other incentives should be offered for high density mixed-use developments in the TOD, the follow the urban design guidelines.
2. Institute a Land Taxation Scheme that incentivizes compact development

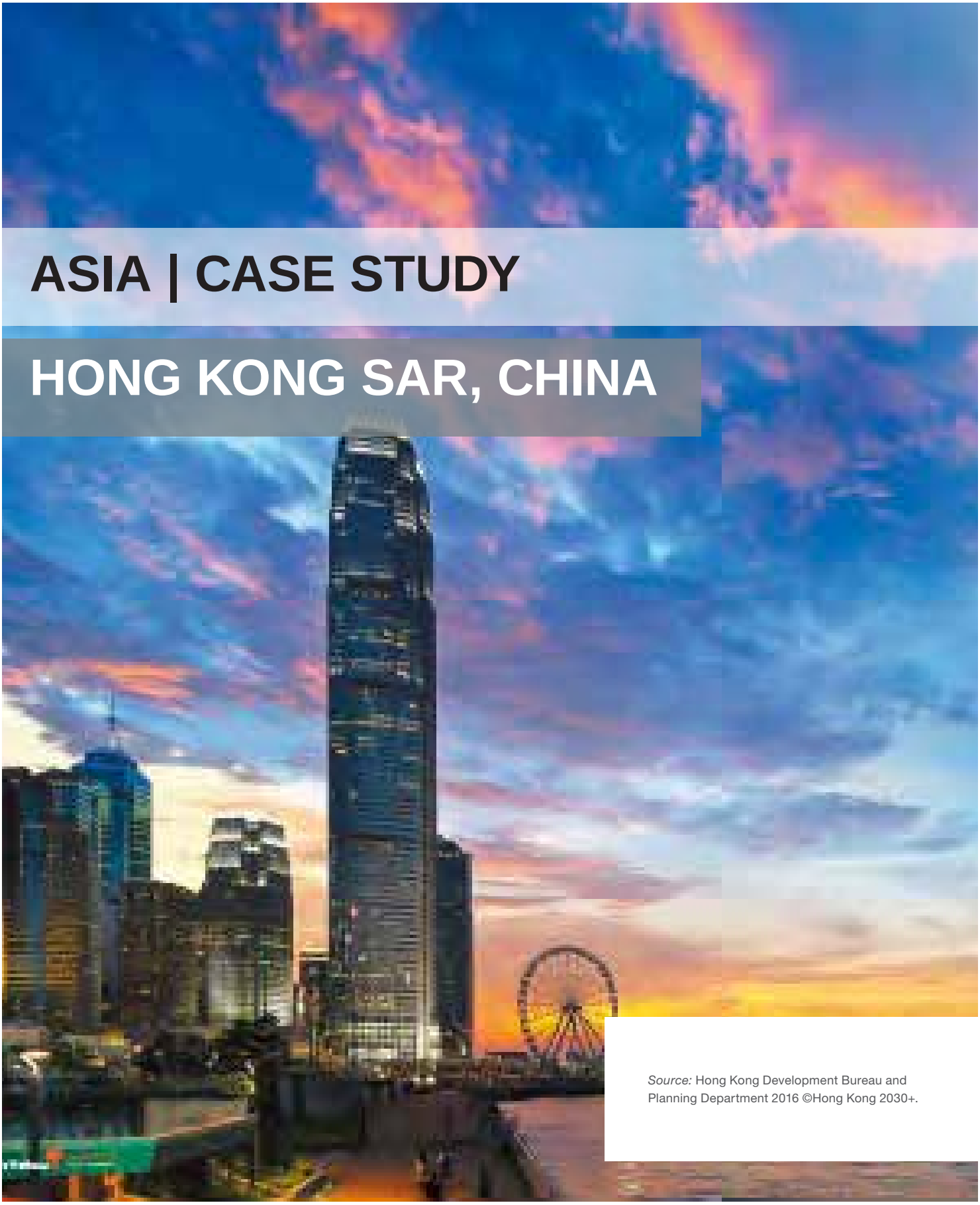
- Vacant Land Tax in High Growth Areas - Vacant land tax is proposed for all land parcels that are left undeveloped for a period of 5 years after implementation of the HDUDA Master Plan 2031 and the special TOD Zone regulations. Vacant Land Tax places a higher emphasis on taxing the land itself rather than on its improvements. This system will intend to incentivize compact development in areas identified for high-intensity growth and discourage land purchase and development in low growth areas.
- Higher Registration Fees in Moderate Growth Areas – high registration fees are proposed to discourage the sale of land in moderate growth areas to discourage speculative buying. Instead, Government authorities should be encouraged to purchase and bank lands near future growth nodes in moderate growth areas.

ENDNOTES

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ASIA | CASE STUDY

HONG KONG SAR, CHINA



Source: Hong Kong Development Bureau and Planning Department 2016 ©Hong Kong 2030+.

HONG KONG SAR, CHINA

QUICK FACTS

Geographic Context
East Asia (China)

Scale
City, Corridor, Neighbourhood, Station

Context
Urban, Suburban, Greenfield

Mode of Higher Order Transit
Hong Kong MTR (Mass Transit Railway)

Size of City (Population)
7.4 million (Source: Census and Statistics Department, SAR Hong Kong, web)

Case Study Covered in WB Publication
Yes

CITY SUMMARY

Hong Kong SAR, China is one of the world's leading international financial centres with a long history of designing and implementing a robust and sophisticated multimodal public transportation network. The network is estimated to move over 12 million passengers a day which includes automated people mover systems (escalators and moving pavements), two high-capacity railways, trams, buses, mini and double-decker buses, taxis, and ferries. It is estimated that public transport trips make up 90% of the daily journeys in Hong Kong SAR, the highest rate in the world. The Hong Kong rapid transit railway system, known as the MTR, which alone caters to nearly 4.7 million daily trips.

URBAN CONTEXT

From the lens of urbanization and city form, Hong Kong's compactness can be attributed largely to its constrained geography and topography consisting of several islands, hills, and the sea. While the city has some of the highest urban area densities in the world, only 30% of its total area is built-up resulting in relatively low gross densities compared to other Asian cities. Hong Kong SAR is estimated to have an urban area density of 26,100 people per square kilometer as compared to 31,700 persons per square kilometer in Mumbai, and 29,800 people per square kilometer in Surat (Gujarat). The city's resilience and its high quality of life index have helped in placing it as one of the top five liveable cities in Asia. On the other hand, the high cost of living expenses, housing affordability and deteriorating air quality are some of the challenges that the city continues to address through its integrated long-range planning process.

Governed under the structure of "one country, two systems", Hong Kong SAR, China has capitalized on its autonomous status and strategic location to emerge as one of Asia's leading metropolises with a strong sustainable development agenda. The integration of land use, transportation demand management and rail transit has been one of the hallmarks of Hong Kong's evolution as a compact city with one of the most profitable mass transit systems in the world. In Hong Kong SAR, all lands are public-owned (except the land on which St John's Cathedral stands) and the government can lease or grant the land to public entities.

Hong Kong's "Rail + Property" development model has enabled the city to maximize the limited area available for development in and innovative and aesthetic manner while at the same time enable its transit agency to generate revenues to finance investments in transit infrastructure and high-quality public realm design. In addition to this successful development model, Hong Kong's transportation demand management strategies

such as car registration fees and transit-first policies have also played a substantial role in making Hong Kong SAR one of the success stories of Transit Oriented Development in the world.

The MTR is financed, constructed and operated by the Mass Transit Railway Corporation (MTR)- currently serving as a private entity with Hong Kong's administration (HKSAR) serving as a large shareholder.[8] The following discussion highlights some of the key elements of Hong Kong's successful experience with creating transit-oriented development communities with a special emphasis on MTR's integrated property and rail development model within the organizing framework: enabling governmental policies, planning and design processes, use of innovative financial investment tools, and supporting implementation mechanisms.

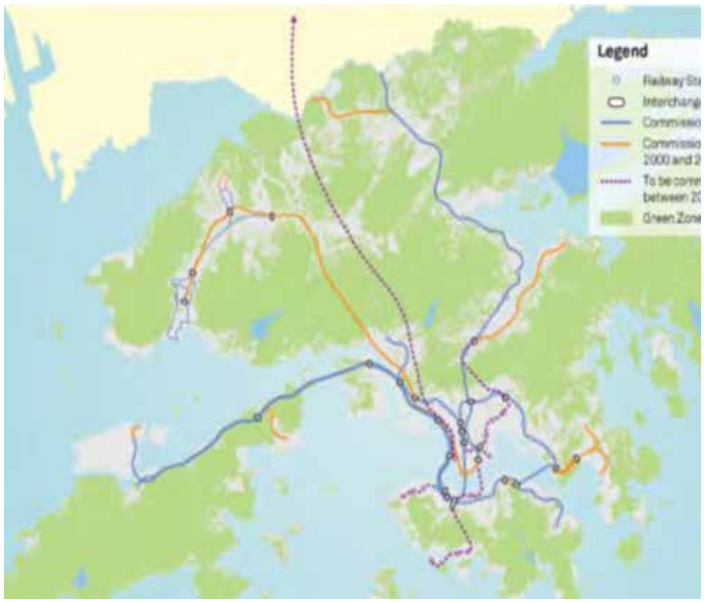


Figure 12: Hong Kong's Railway Network in 2021 | *Source:* Hong Kong Railway Development Strategy 2014 TOD Design Options ©Hong Kong Transport and Housing Bureau.



Figure 13: MTR Stakeholder Roles | *Source:* MTR Corporation Limited 2014 ©MTR.

OVERALL TOD STRATEGY

The R+P development model is a cooperation between public and private interests using the TOD concept to concentrate development around a new MTR stop. The government hands out development rights around the station to the railway company, who in turn develops the land and can gain profit from the rising property values. By using this strategy the huge investments in new rail lines can be returned by profits from property development.

The initial investment in Hong Kong's mass transit system was limited to a 20 kilometer stretch, constructed in 1972. In the early years, two agencies were charged with operating the rail service- Mass Transit Railway Corporation (MTR) and Kowloon- Canton Railway Corporation (KCRC). In 2000, MTR was partially privatized with no subsidies received from the government in theory. Subsequently, in 2007, MTR merged with Kowloon-Canton Railway (KCR) Corporation. Through its development control legal framework, transit-first policies and a shareholding in the MTRC, the government of Hong Kong SAR, China has successfully created an environment that provides financial flexibility and development control which ensures public interest related to transit-oriented developments in the city.

The following table outlines some of the key enabling policies and legal framework used in support of transit and property development[9]:

	Policy: Land Development[9]	Key Features
1	Grant of exclusive property development rights of the station areas to MTRC in exchange for its commitment to provide and improve mass transit railway as an essential mode of public transportation.	Incentive-based approach to encourage the corporation to plan and develop sites in a financially viable manner by "internalizing" benefits from rail and property development; Eliminates the costs associated with land banking and acquisition
2	Established MTRC as an independent corporation with government as a major shareholder to strengthen the role of transit agency as the single entity to serve as the master planner, property developer and property manager as well as generate revenues to sustain the transit service.	Government's commitment to remain as the majority shareholder of the MTRCL after the privatization for at least 20 years and own no less than 50% of shares and votes of the MTRCL; Lower transaction costs with single entity as opposed to multiple agencies
3	Permit joint ventures in real estate development with private sector investment in TODs	
4	Use of Transfer of Development Rights combined with commitment to encourage redevelopment of existing areas rather than allowing for suburban development	

Table 1: *Source:* IBI Group

The supporting public transportation system policies that have enabled TOD projects to flourish in Hong Kong's case include[6]:

Policy: Land Development[6]	Key Features
Limiting private car ownership and usage	Initial registration tax ranging from 35% to 100% of the vehicle cost.
	High fuel tax
Transit service coordination and protection (1980s)	White Papers on transportation policy
	Prohibited direct competition by other PT/feeder modes along the rail routes
Service proliferation and competition (1990s)	Railway Development Strategy, which set out development plans for four new rail lines or extensions.
	White Papers on transportation policy
Service rationalization and consolidation	Public transport interchanges are a required component of new railway stations to facilitate inter-modal feeder services
	Increase the proportion of rail-based public transport journeys from 33% in 1997 to 40–50

Table 2: *Source:* IBI Group

Hong Kong's planning system comprises development strategies at the territorial level and various types of statutory and departmental plans at the district/local level. In 1996, a consolidated plan known as the Territorial Development Strategy (TDS), the highest hierarchy of town plans, came to fruition. It provides a board, long-term framework on land use, transport and environmental matters for the planning and development of the territory.

In addition to acting as the transit operator and real estate developer, MTR has a significant role in the master planning and controlling the development processes in collaboration with the private sector. MTRC works in close collaboration with the city planners to define various parameters of station area planning from the time any plans to extend or construct new rail transit lines are proposed. These parameters include:

- Transit Alignment;
- Station Locations;
- Land values;
- Density potential;
- Financial returns;
- Long-term planning objectives; and
- Land use mix based on market demands and zoning constraints.

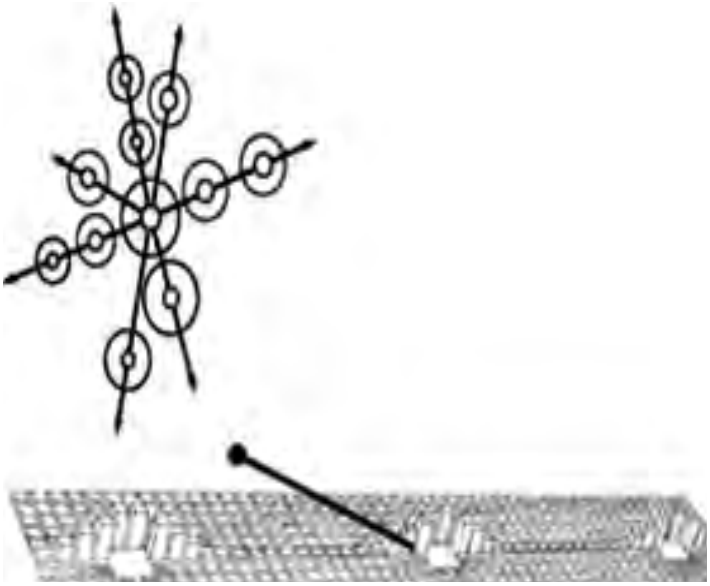


Figure 14: TODs as a "Necklace of Pearls" | *Source:* UC Berkeley 2010 ©UC Berkeley Center for Future Urban Transport. Reproduced with permission from Transport and Housing Bureau; further permission required for reuse.

KEY ROLES AND RESPONSIBILITIES OF STAKEHOLDERS

Tang et al. (2004) identified the following four key elements behind the R+P approach in their study of the Integrated Rail-Property Development in Hong Kong[9]:

1. Policy. Favorable government support of transit and land-use integration, expressed by land grants and financial assistance to MTRC;
2. Process. Forward-looking planning, management, and control procedures that ensure an efficient approach from project inception to completion;
3. Project. High-quality real estate projects that appeal to tenants, shoppers, and transit users; and
4. Organization. An entrepreneurial entity that balances the financial interests of investors with larger societal goals.

The main agencies involved in shaping urban development policy and its integration with transit services in Hong Kong SAR, China include:

- Land Development Corporation

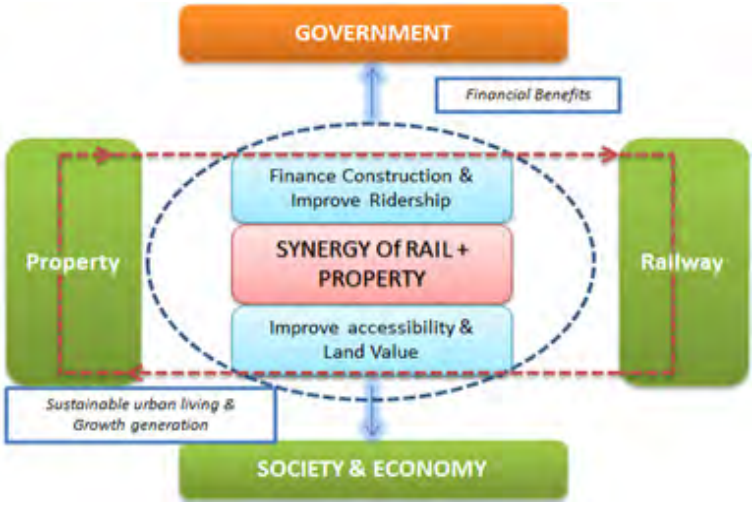


Figure 15: Institutional Mechanism of "R+P" Model | *Source:* MTR Corporation Limited 2011 ©MTR. Reproduced with permission from Transport and Housing Bureau; further permission required for reuse.

The LDC, founded in 1988, negotiated in length with owners to acquire land and to demonstrate that it was aquired in a fair and reasonable manner before applying to the Secretary for Planning, Environment and Lands for compulsory land resumption. The LDC was replaced by the URA in 2001.

- Urban Renewal Authority (URA)- statutory government agency;

The URA was established in May 2001 under the Urban Renewal Authority Ordinance, to replace the Land Development Corporation, as the statutory body to undertake, encourage, promote and facilitate urban renewal of Hong Kong SAR, China with a view to addressing the problem of urban decay and improving the living conditions of residents in old districts.

- Mass Transit Railway Corporation (MTRC)- statutory corporation with government as a majority stakeholder listed on the Hong Kong stock exchange;

Originally established in 1975, to "construct and operate, under prudent commercial principles, an urban metro system to help meet Hong Kong's public transport requirements[8]"; MTR was re-established in 2000 as MTR Corporation Ltd. MTR Corporation is involved in businesses outside of transportation, including residential and commercial development, property leasing and management, advertising, telecommunication services and international consultancy services.

- Hong Kong Housing Society- Founded in 1948, the Hong Kong Housing Society is the second largest public housing provider in Hong Kong SAR. It is a major urban renewal agent, which began its Urban Improvement Scheme (UIS) in 1974. Under the scheme, dilapidated buildings in the urban areas were acquired/resumed and redeveloped into modern housing blocks.

DESIGN STRATEGIES TO ENCOURAGE TRANSIT USE

MTR's transit-oriented development (TOD) model follows the 'network of pearls' urban development model, which designates widely spaced transport hubs connected through a fast transit network. Majority of the new R+P projects are defined by well-design station area plans that ensure "seamless integration" with its surrounding neighborhoods. Each station area is unique and varies by virtue of its contextual relationship with surrounding properties. Cervero and Murikami (2008) classify the R+ P projects into five broad typologies[8]. These include:

- High-Rise Office (HO): high-rise, predominantly office uses on small sites;
- High-Rise Residential (HR): high-rise, predominantly residential uses on small sites;
- High-Rise Residential (HR): high-rise, predominantly residential uses on small sites;
- Mid-Rise Residential (MR): medium-density, predominantly housing projects on medium-size plots;
- Large-Scale Residential (LR): predominantly residential uses on large sites with comparatively low plot ratios; and
- Large-Mixed Use (LM): mixture of housing, offices, retail, hotels, and others on large sites with medium plot rate.

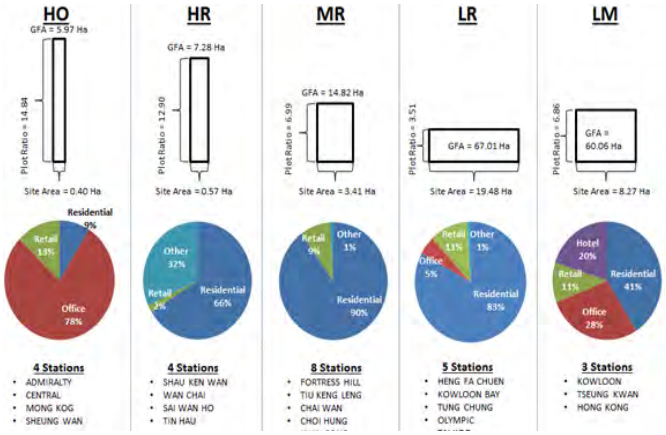


Figure 16: Classification of MTR Stations according to the Built-Environment Type and key clustering variables | *Source:* UC Berkeley 2010 ©UC Berkeley Center for Future Urban Transport. Reproduced with permission from Transport and Housing Bureau; further permission required for reuse.

Station Area Planning and "Podium" Development

As discussed above, the 2nd and 3rd generations of MTR property developments have exerted a strong focus on pedestrian integration and connecting with the surrounding communities. The figures shown below illustrate the conceptual model followed by MTR in some of its recent property developments as some of its large-scale developments were raised public concerns related to alienating the surrounding neighborhoods, creating wall effects with towers that reduce air ventilation and increasing housing costs within these developments.

One of the typical station architecture styles representative of Hong Kong's development in the last two decades or so, is the "podium development" model[16]. The podium model involves building above the railway station, a "podium" retail level that can be accessed through the street level. Residential and commercial towers often sit on top of the podium level that are accessible from the station and the street level. The podium's roof is also seen in many instances serving the dual function of a landscaped park with community facilities for the residents.

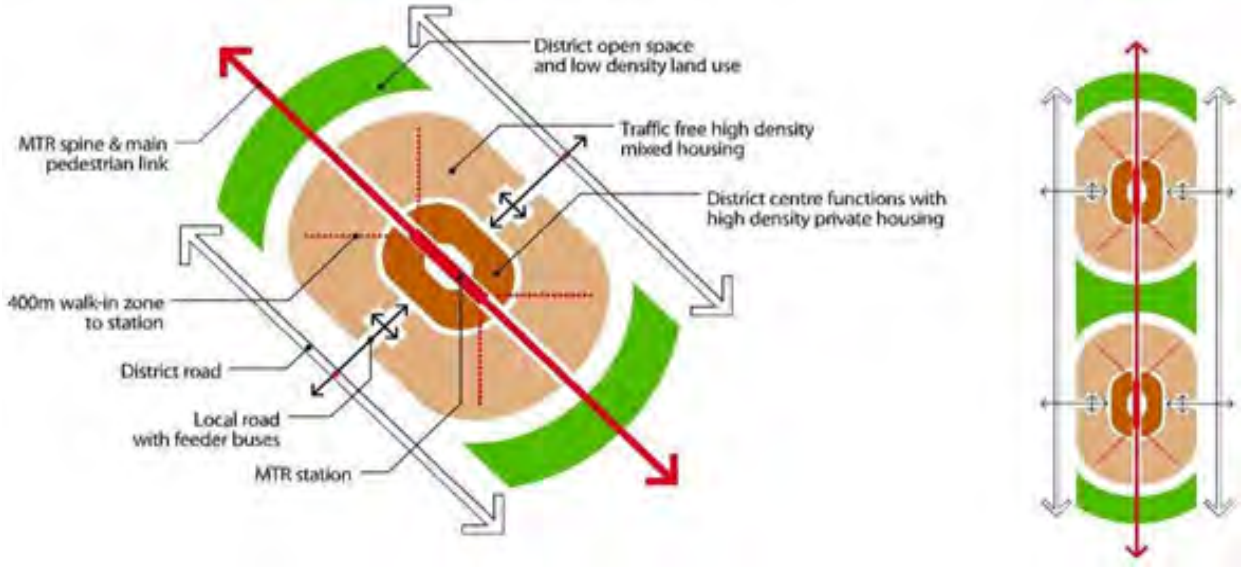


Figure 17: Overview of MTR's concept of R+P Development | *Source:* MTR Corporation Limited 2011 ©MTR. Reproduced with permission from MTR; further permission required for reuse.



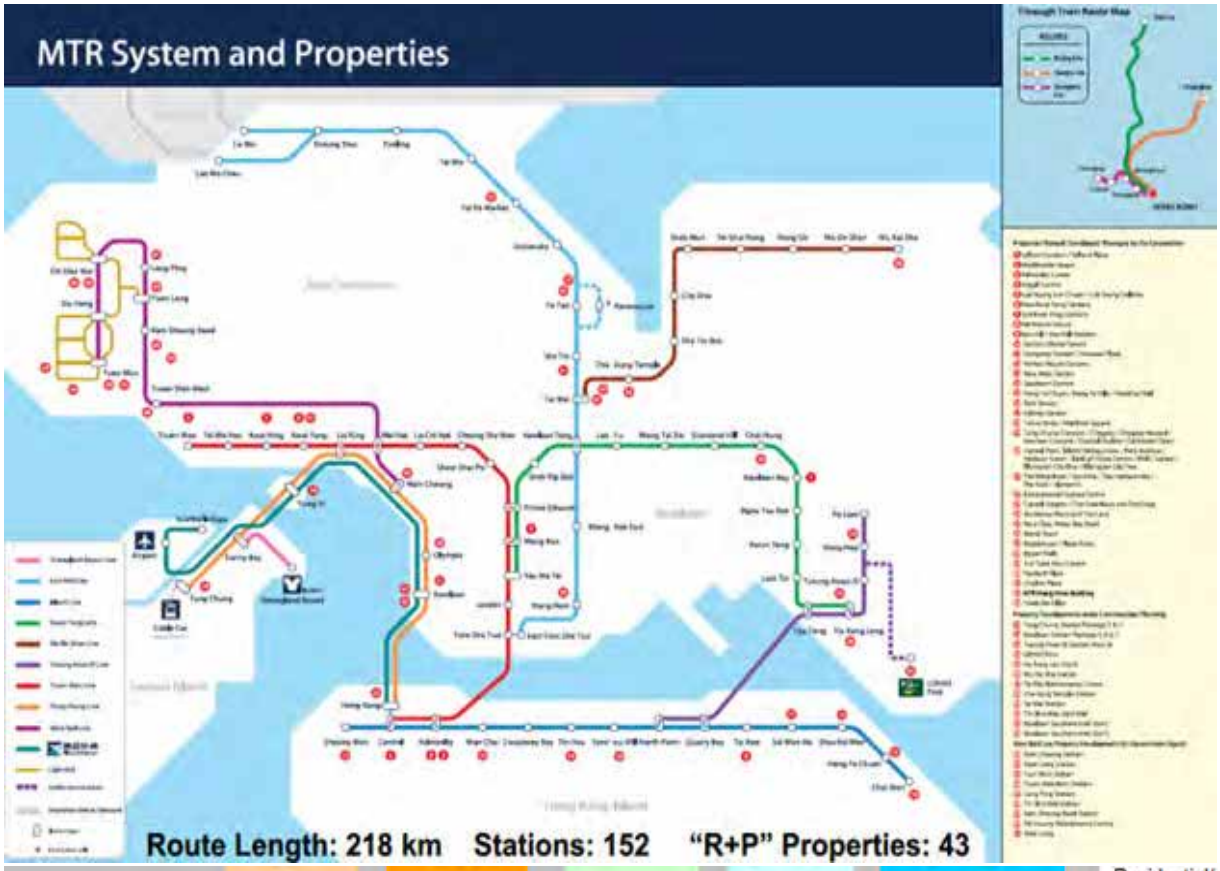
Figure 18: Podium Development Typologies in Hong Kong SAR, China | Source: Dr. Sujata S. Govada ©UDP International. Reproduced with permission from Transport and Housing Bureau; further permission required for reuse.

Invest: Rail + Property (R+P)-Hong Kong's Joint Development Financing Model

Since all lands are owned by the government in Hong Kong SAR and leased to the private sector on a 50-year lease (renewable once for the same time period),

MTR receives assistance from the government in the form of land grants and development rights. This implies that MTR has to function as a self-sufficient entity able to generate its own revenue for operation maintenance and infrastructure improvements.

Since its inception in the late 1970s, MTR has focussed on leveraging its property assets as a source of revenue by undertaking diverse real estate development projects in the lands surrounding above the transit stations. MTR's strategy to pursue integrated property development has been the driving force for attracting the right mix of residential and employment densities that continues to improve the viability of its public transit system serving its dense urban cores. What helped Hong Kong apply the principles of value capture so effectively was the "combination of high population density, public land ownership,



	Office (sq.m.)	Retail (sq.m.)	Others (sq.m.)	Residential (units)	Total GFA (million sq.m.)	Residential/ Commercial ratio
Urban Line	234,898	299,363	-	31,366	2.6	78%
Airport Express Line	611,877	306,571	316,473	28,473	3.5	65%
Tseung Kwan O Line	5,000	105,814	63,030	30,414	2.3	93%
East Rail Line	67,541	113,238	113,491	4,771	0.7	60%
West Rail Line	95,800	145,130	50,346	19,206	1.8	84%
Ma On Shan Line	-	65,193	38,191	10,314	0.9	88%
Light Rail	-	53,117	-	9,108	0.6	91%
Kowloon Southern Link	-	-	-	1,500	0.1	100%
	1,015,116	1,088,426	581,531	135,152	12.5	

Figure 19: MTR System and Properties | *Source:* MTR Corporation Limited 2014 ©MTR. Reproduced with permission from MTR; further permission required for reuse.

and low automobile dependency". The R+P programme could be divided into three stages:

1st Generation: This initial stage of the R+P programme used solely a financing mechanism to recover the transit infrastructure investment costs and yield a net profit from nearby property developments as single-use properties above new stations along its Urban Line.

2nd Generation: The 2nd generation of the programme was influenced by Hong Kong's growth as a financial hub in the global market resulting in large-scale foreign-direct investments and international property developers.[10] During this phase, the development models transitioned from single-use properties to "mixed-use, pedestrian-oriented town developments examples of place-making" along the new Airport Express and Tseung Kwan O line extensions, also aimed to better connect jobs near the airport with residential areas concentrated in the traditional urban core.[10]

3rd Generation: The 3rd and the present generation of the R+P programme coincides with the opening of the fifth MTR subway line are more typical of "greenfield TODs" built on undeveloped or reclaimed lands from the sea, encompasses a diverse set of urban and suburban areas (in the New Territories). These sites encompass nearly 62 hectares and are planned based on unique station typologies that are context-sensitive and integrate innovative architectural and urban design concepts to create new destinations for the growing city. The most recent of such developments was the large Pop Corn shopping centre development which was built in conjunction with Tseung Kwan O station.

As mentioned earlier, the R+P model is one of the most successful joint development models in contemporary urban planning practice in terms of achieving the economic, social and growth management goals envisioned through implementation of TODs. In Hong Kong's case, this principle has also enabled the MTR to be classified as one of the most profitable transit systems in the world. The financial mechanism for the R+P development is relatively simple- MTR receives from the government the right to purchase 50-year leases on lands and in return pays a land premium to the government on a "Greenfield no railways basis" . Next, the MTR invests in the transit infrastructure and develops the property either on its own as a developer or in partnership with the property developer. With time, the property values increase because of its proximity to the rail transit network and its integration with the station. The increment in values is captured by MTR to invest in new infrastructure as well as offset the maintenance and operation costs.

In some cases, for example on lands with technical complexities such as development above stations, MTR generally sells the land only after having built the foundations and thus undertakes a part of the construction activities as an alternative profit source. In addition to selling development rights, MTR generally negotiates a share in the future property with the selected developer and profits and/or receives a co-ownership. MTR has also been successful in developing a strong portfolio of residential and commercial real estate projects that the agency has constructed, leased and rented. Finally, MTR often remains involved in the development as a property manager, generating additional incomes that way. At the end of 2011, MTR owned and rented over 85,000 residential units and 750,000 m² of commercial and office spaces in Honk Kong.

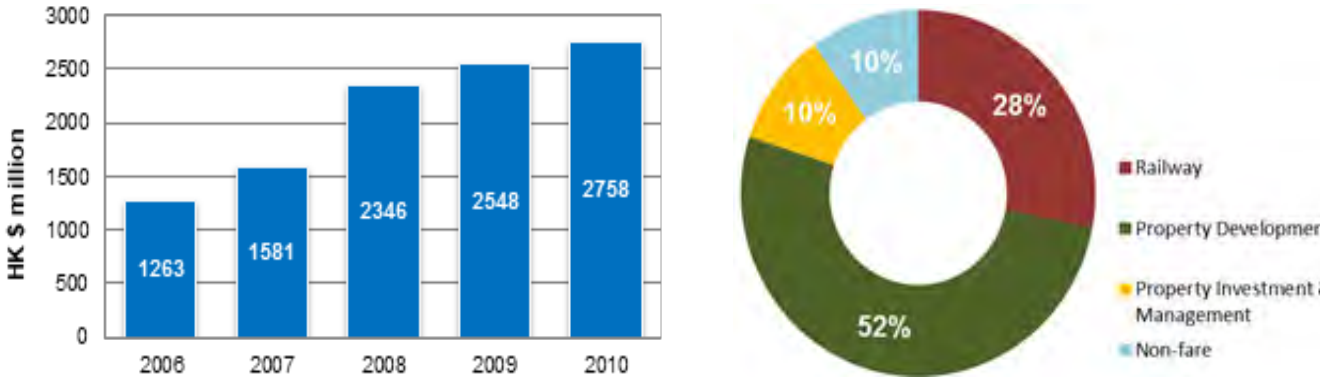


Figure 20: Property Rental Income, MTR (Left) and MTRC Revenue 2001-2005 Average (Right) | *Source:* MTR Corporation Limited 2014 ©MTR. Reproduced with permission from MTR; further permission required for reuse.

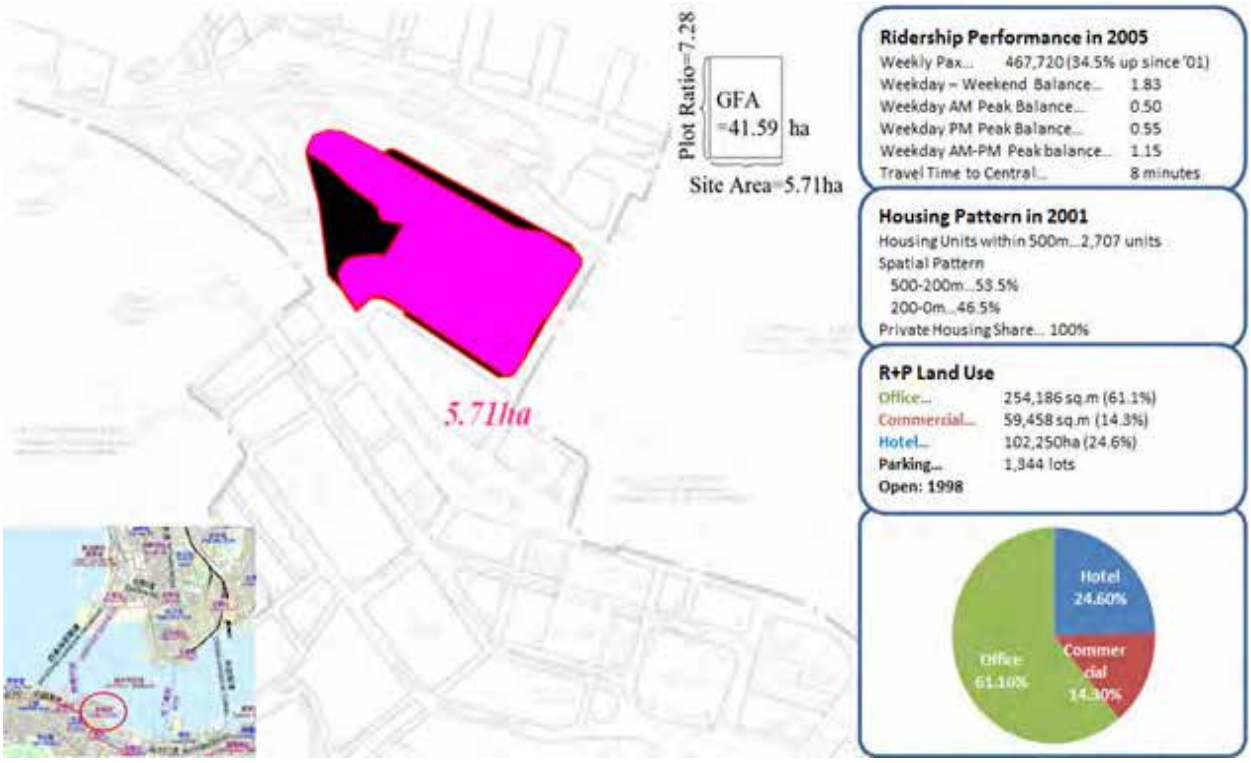


Figure 21: A case summary of Hong Kong's Rail + Property development | *Source:* UC Berkeley 2010 ©UC Berkeley Center for Future Urban Transport. Reproduced with permission from Transport and Housing Bureau; further permission required for reuse.

INFRASTRUCTURE PROVISION FOR DENSITY

To help create capacity for sustainable growth, which is one of the building blocks proposed under Hong Kong 2030+, a smart, green and resilient city is proposed. It focuses on the scope that are relevant to land use planning, mobility and infrastructure in the built environment and is particularly applicable to new development areas and new neighbourhoods where comprehensive planning is more feasible.

Three building blocks of the territorial development strategy are proposed for achieving the vision and overarching planning goal. These building blocks are translated into spatial terms in a conceptual spatial framework.



Figure 22: Hong Kong's Railway Network in 2021 | *Source:* Hong Kong Development Bureau and Planning Department 2017 ©Hong Kong Development Bureau and Planning Department.

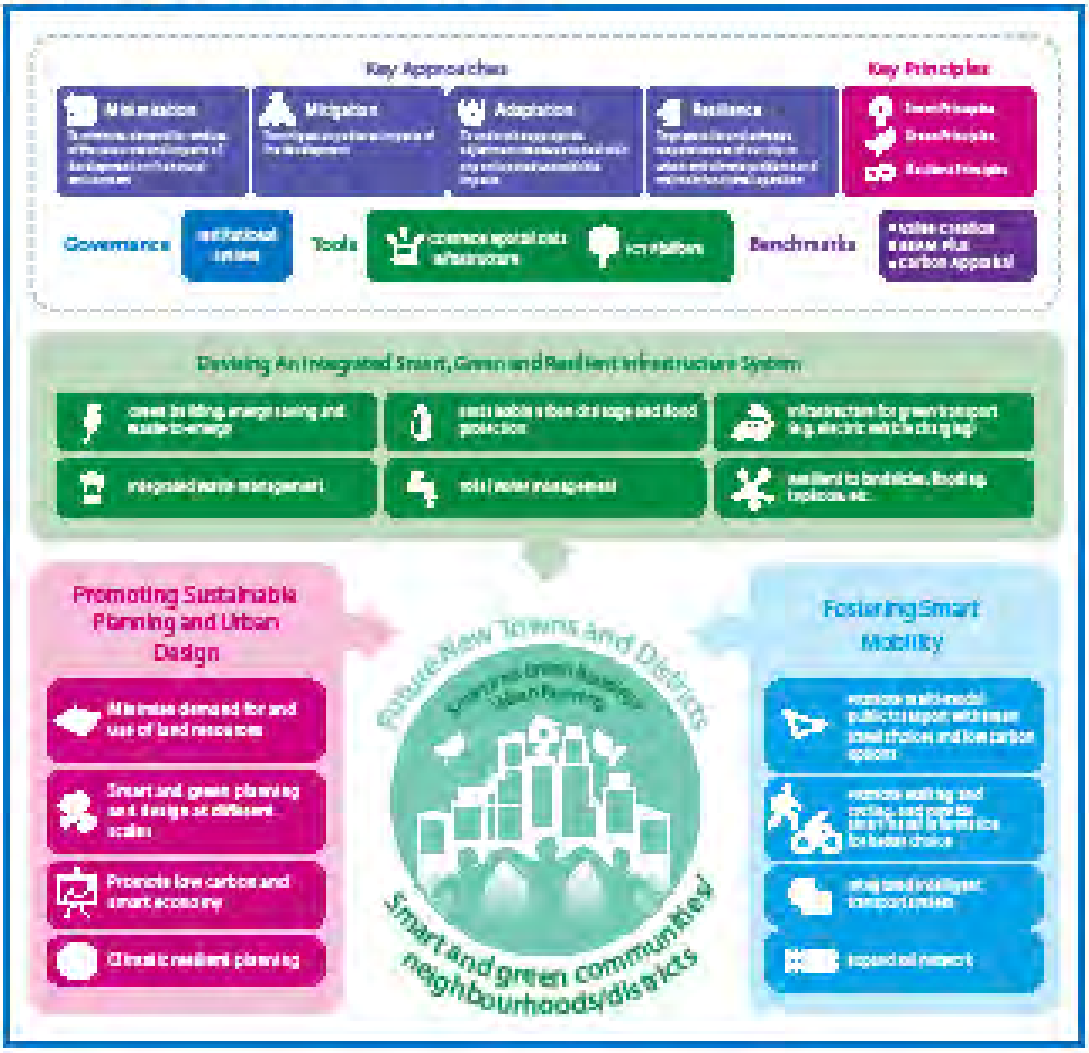


Figure 23: Smart, Green and Resilient City Framework for the Built Environment | *Source:* Hong Kong Development Bureau and Planning Department 2017 ©Hong Kong Development Bureau and Planning Department.

IMPLEMENTATION STRATEGIES

Tang et al. (2004) identified the following four key elements behind the R+P approach in their study of the Integrated Rail-Property Development in Hong Kong[9]:

1. Policy. Favorable government support of transit and land-use integration, expressed by land grants and financial assistance to MTRC;
2. Process. Forward-looking planning, management, and control procedures that ensure an efficient approach from project inception to completion;
3. Project. High-quality real estate projects that appeal to tenants, shoppers, and transit users; and
4. Organization. An entrepreneurial entity that balances the financial interests of investors with larger societal goals.
5. From a perspective of defining the roles and relationships of these agencies pertaining to the "R+P Development Model", the following illustrations provide a summary of the institutional arrangement and functions that have ensured successful implementation of TOD projects in Hong Kong[11].

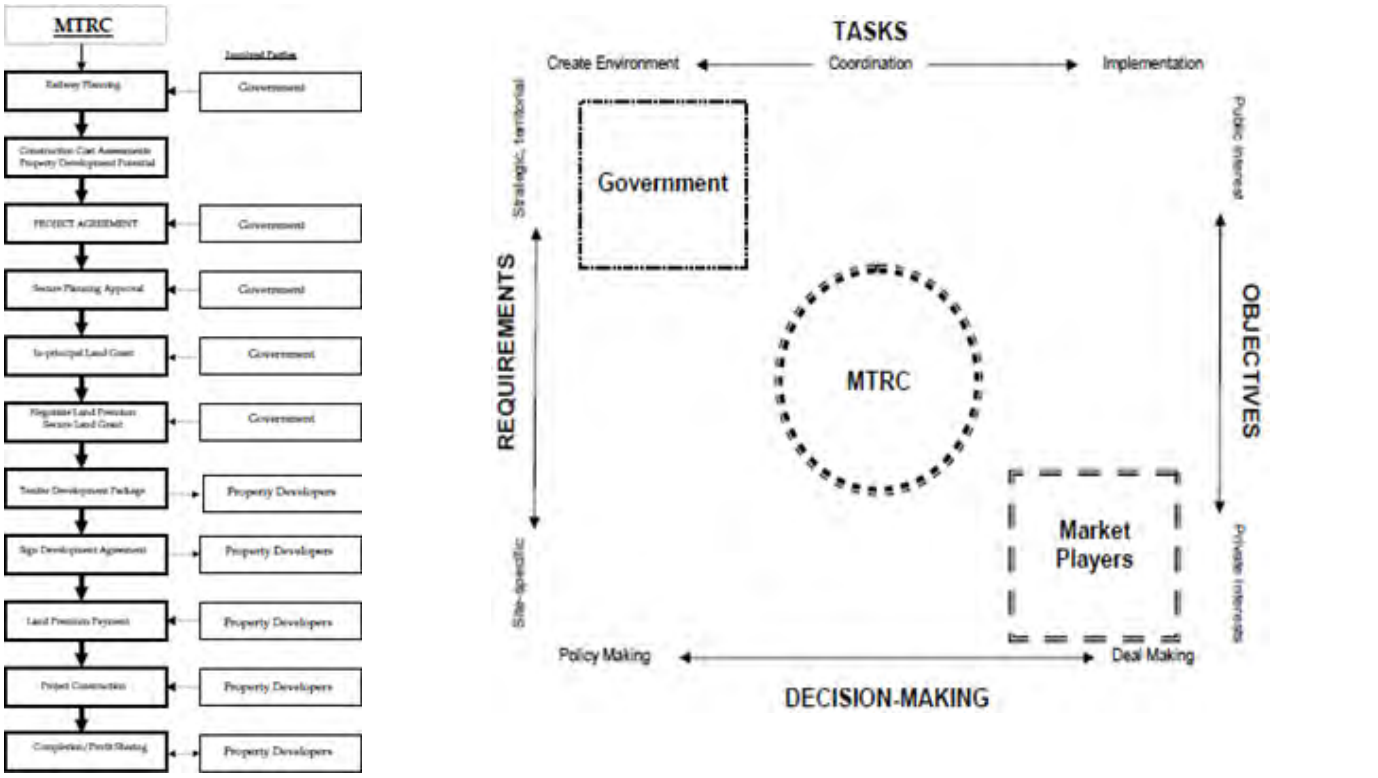


Figure 24: Institutional arrangement for R + P Development Model | *Source:* MTR Corporation Limited 2011 ©MTR. Reproduced with permission from Transport and Housing Bureau; further permission required for reuse.

KEY LESSONS LEARNED AND BEST PRACTICES

Lessons Learned from Hong Kong SAR applicable to Global cities

An important lesson from the Hong Kong SAR, China experience is that integrating transit with land-use can yield the finances needed to support TOD. The use of "Value Capture" as an infrastructure financing concept that seeks to capture land value created by new infrastructure, particularly transit. Value capture is effective in financing transit infrastructure, particularly in dense and congested settings. This is due to the high perceived importance for improved accessibility and an institutional capacity fit
to support transit. Accessibility benefits present enormous opportunities for recapturing some of the value created by transit investment in land values and effectively supplement the traditional forms of revenue for transit systems, like fares.

The study by Tang et al. (2004) on Study of the Integrated Rail-Property Development Model in Hong Kong SAR confirm the positive relationship between property development and MTR ridership as follows[9]:

a. High population concentrations and densities are associated with high MTR station ridership.

b. Private housing units clustered around MTR stations tend to exert a greater impact on the ridership than public housing.

c. Mixed land uses, compact environment and exciting street-level activities in the existing urban districts promote MTR ridership.

d. New development districts with attractive design, commercial facilities and efficient pedestrian connections along rail corridors enhance MTR ridership. Pedestrian connections must be convenient, direct, safe and pleasant for these developments to be successful and to increase property values.

The R+P program applied by the MTR Corporation in Hong Kong SAR has been central to the success of Hong Kong in developing its rail system. The R+P program enabled MTR Corporation to capture real estate income to finance part of the capital and running costs of new railway lines, and to increase transit patronage by facilitating the creation of high-quality, dense and walkable catchment areas around stations.

The following three key concepts applied in the R+P program are essential to the program success and can be adopted by global

cities with railways as the trunk transit mode, by taking the transit-oriented development mechanisms to help finance new rail lines[14] :

Financial Sustainability Approach: The value for a rail company to only under-take those rail investments that can achieve a targeted rate of return (after factoring government support, in the form of land rights provided at before-rail price, used in a R+P program, or cash subsidies) to be financially sustainable.

Market-driven Approach: The need to plan development along each rail line comprehensively, with multiple stakeholders and partners, and to define the scale and timing of such developments based on market demand, location characteristics and institutional capacity.

Risk management approach: The value for a railway company to bring in relevant expertise and transfer a large part of commercial risks to private developers through PPPs and transactions with external partnerships.

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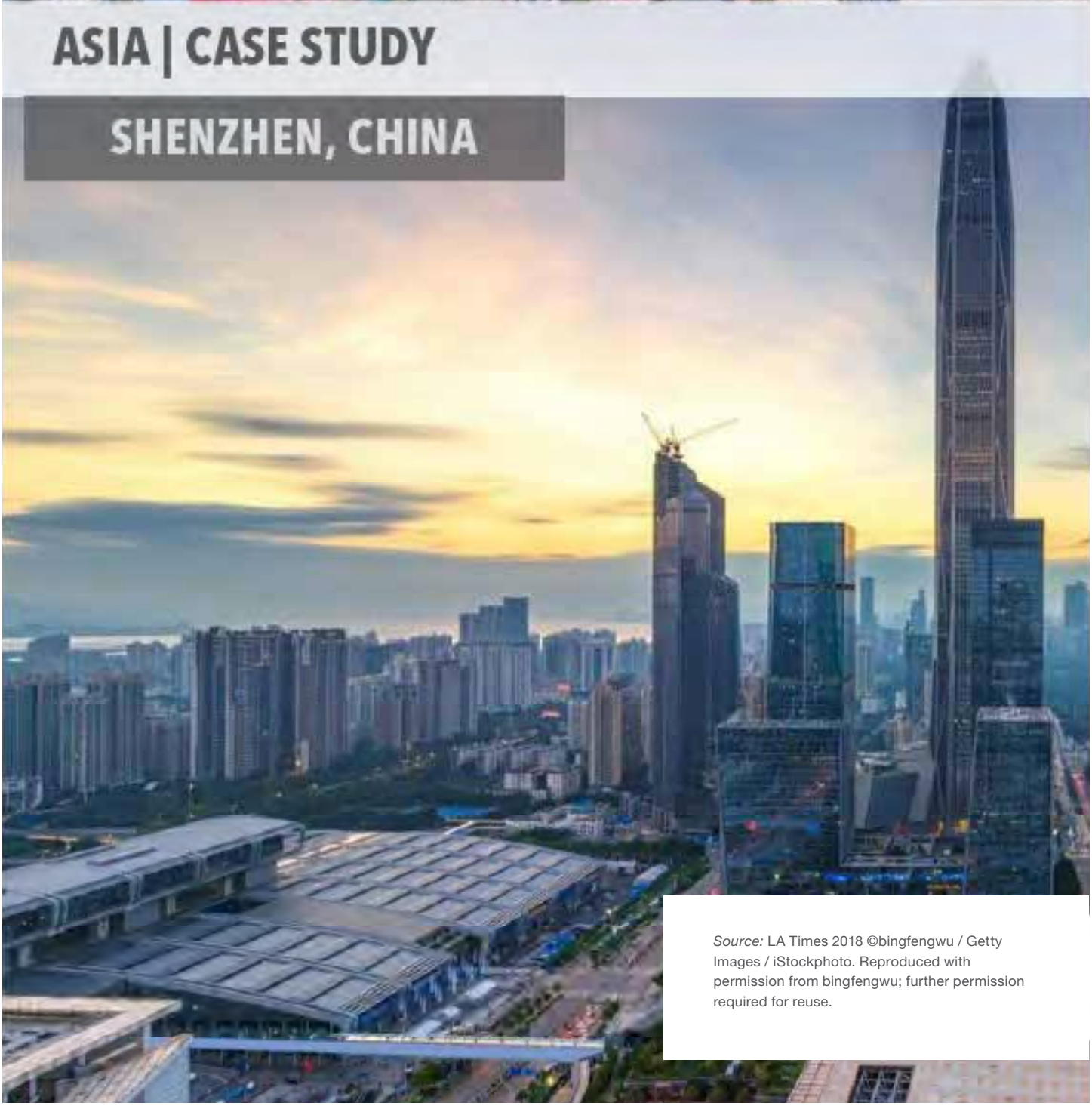
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ASIA | CASE STUDY

SHENZHEN, CHINA



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SHENZHEN, CHINA

QUICK FACTS

Geographic Context
East Asia (China)

Scale
City, Corridor, Neighbourhood, Station

Context
Urban, Suburban, Greenfield

Mode of Higher Order Transit
Metro (Transport Commission of Shenzhen Municipality & Shenzhen Metro Group)

Size of City (Population)
11 million (Tier-1)

Case Study Covered in WB Publication
No

URBAN CONTEXT

China's population is rapidly urbanizing, with 70% of its citizens expected to be living in urban areas by 2030[3]. Shenzhen is no exception, with a rising population of 11 million and the fastest urbanization rate in Eastern Asia.1 With such fast growth and a large urban realm, the provision of adequate and readily available public transportation is an essential part of combating and avoiding the congested road conditions that result in large populations. Metro integration within large cities is known as an effective, but expensive method of providing public transit.

Shenzhen is one of China's most rapidly growing cities in terms of economy and urbanization. With over 11 million people residing within the city in the Guangdong province, its large urban extent allows for a fairly low population density of over 2,000 people per square kilometer.1 This is substantially smaller when compared to its counterparts in Asia. Shenzhen has become one of the frontier cities that is leading the economic growth of China as the first of the nation's five Special Economic Zones (SEZ).2Special economic zones receive allowance from the government for more flexible, free market-oriented economic policies. Shenzhen is unsurprisingly designated as an SEZ, as after less than twenty years of development, it has transformed from a small fishing village to one of the largest metropolises in China.

In the 1990s, the economy in Shenzhen continued to grow exponentially, with a significant increase in secondary industries. The market-oriented policies allowed for foreign investment, which has led to continuous growth in the manufacturing industry.

With such immense growth, Shenzhen has started to design and develop a new development strategy for the city called the "Shenzhen 2030 Urban Development Strategy." Amongst this strategy is a focus on public transit, emphasized at the city's most major form of infrastructure development moving forward. In meeting this goal for improved public transit, the city began its strategic planning of a metro in 1998. The resulting metro and its funding methodology remain a model for transit implementation in Asia.

TOD KP

OVERALL TOD STRATEGY & CITY STRUCTURE

IMPACT ON URBAN FORM

The improved convenience, accessibility and quality of life allowed for by transit attracts development, intensification and investors to the rail corridor. The R+P funding mechanism is largely dependent on using the consequent increase in land value to incentivize the involvement of private stakeholders. The scarce availability of land in Shenzhen, due to its hilly topographic nature, allows for continued high housing prices. It is this scarcity which motivates the joint development undertaken by Shenzhen, SZMC and MTR.

The first phase of subway development was guided by government investment. Lacking experience with substantial transportation infrastructure projects like the metro, Shenzhen failed to capitalize on integrating property development with public transit development. In the Chinese context, the notion of transit-oriented development has yet to become supported by planning policy. The inflexible nature of Chinese planning policy does not allow the integration of transit and property development, and measures such as up-zoning for high-density development surrounding the rail corridor are not triggered by transit creation. The lack of integration of the interrelated systems led to the first phase of development largely ignoring land value, as the time-consuming nature of changing policy to support TOD would have led to too many delays.[4]

The second phase of the metro development was much more cognizant of subsequent increases in land values and used this to incentivize the SZMC to assist in funding the rail development. Special auctions of land were used to ensure that the metro company would receive land at a discounted price. Moreover, land concessions were refunded to the company as capital investments, which gave SZMC use of the land for no charge, while also allowing the value captured after the construction of the metro to be kept by the company.[3]

Finally, in the third phase of metro development, land-equity investments were engaged in place of capital investments. This agreement granted undeveloped land along the corridor to a third-party, thereby incentivizing involvement through the promise of land-value appreciation. In the case of the MTR, land premiums were shared 50/50 between the private entity and the government, in exchange for a build-operate-transfer agreement (BOT). [3]

Overall, the strategy for utilizing land values in funding the metro construction after establishing an R+P mechanism involved creating value, realizing that value and recycling it. Creating value involves the strategic siting of routes, stations and updating zoning parameters to allow for more profitable transit-oriented development along the rail corridor. This value must then be realizes by transferring land use rights to the involved stakeholders in exchange for joint development of the subway that captures land value premiums for the land developed after the metro construction. Finally, these land values can be recycled by using the land value appreciated to fund future transit and urban design projects that will further increase land values.



Figure 25: Land Value's integral role in the R+P funding Progress | *Source:* World Resources Institute 2017
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FINANCIAL MODEL

In the context of Shenzhen, the rapid growth and economic affluence the city is experiencing lends to the application and viability of Metro-led transit-oriented development (TOD). As a central manufacturing city, connectivity to surrounding metropolitans in the Pearl Delta River Region could be improved with the introduction of a metro system. Specifically, the strategy looked to improve connection with Hong Kong SAR, China. To justify such a large undertaking, the innovative funding approach of Rail + Property (R+P) funding was experimented with, a trailblazer of its kind.

R+P funding not only encourages both state-owned and private metro companies to participate in R+P projects, but also uses innovative land-use rights transaction methods to overcome current barriers within the land-leasing system.[3] During the early stages of R+P implementation, it was realized the R+P was a new concept for local developers and led to increased costs and risks for private companies[3]. Particularly impacted was local metro company—Shenzhen Metro Group. To incentivize SMG, the local government reduced its cost and risk burdens through a complex financial arrangement[3]. The R+P financial scheme in the context of Shenzhen can be separated into three phases: government-led capital investment, auctions with special conditions and land-concession fee reimbursement, and land equity investment.[3]

The first, government direct investment, was scaled back to reduce public costs and to place a larger onus on private companies to invest. The Shenzhen city government, Reform and Development Commission, and Planning Commission proposed to decrease of government investment in capital costs from 70 to 50 percent, forcing the metro company to use bank loans and property development to make up the difference.[3]

Consequently, the government used special auctions to transfer land to Shenzhen Metro. Traditionally this land would have to be auctioned in an open, public auction.[3] However, the city ventured to pilot special auctions for R+P development projects. Special terms restricted the number of bidders, ensuring that Shenzhen Metro would obtain the land at a low price.[3]

Finally, land concession fees paid by the metro company were diverted to fund capital investments for the subway. This complex method allowed the city to grant land-use rights to the subway company free of charge, while also allowing Shenzhen Metro inherit the land premiums captured in the future.[3]

This three-phased financial scheme was not only an incentive for private entities to become involved, but also reduced the costs and risks undertaken by the government. Through a build-and-transfer (BT) arrangement for property development, construction risks were minimized and the private stakeholders were held accountable for their involvement in the project team. The implementation of R+P is vital to the success of the Shenzhen metro project and is a financial strategy that could improve the viability of metro projects going forward. [3]

KEY STAKEHOLDERS & GOVERNMENT RELATIONSHIPS

Traditionally, the onus for large infrastructure projects, such as this, falls on the government and public to fund and implement. However, this case study exemplifies the beneficial shift from government-led to mixed-model funding of public transit projects. Shenzhen's exploration with R+P includes a partnership between the government and key stakeholders, the Shenzhen Metro Group and the MTR Shenzhen Corporation. Both private entities shared in the responsibility of financing the metro through an incentivized approach that captures the future land value and resources following the completion of the project.

The Shenzhen Metro Group Co. (SZMC) was enacted in 1998 as a large-scale proprietor under the control of the state-owned Assets Supervision and Administration Commission of the Shenzhen government. Creating the state-owned private entity allowed responsibility for metro expansion, construction and operation to be held in the private sector. Today, the private entity is responsible for the continued operation of the metro system it constructed and looks to continue to improve the safety and comfort of existing services.[5]

The MTR Shenzhen Corporation was the second stakeholder in the construction of the Shenzhen Metro. The corporation is Hong Kong's major rail developer, as well as a significant land developer. Their role in the metro construction was incentivized by offering them pre-rail value for land abutting the rail corridor, lending to profitable and discounted development for the corporation.

The evolution of the Shenzhen Subway's financing mechanism has benefited from more than 10 years of efforts by the Shenzhen city government, dramatically altering the process of obtaining capital investment for large infrastructure projects. Instead, a flexible mechanism of cost recovery was created that made infrastructure costs a shared public-private investment and revenue generator.[3] This approach was effective in incentivizing the subway company to participate in R+P programs and ensuring the financial sustainability of subway projects. R+P development leverages the partnership between the public sector, transit companies, and developers for a collaborative financing and development scheme. By capturing the land value appreciation that follows transit projects, R+P can successfully finance large infrastructure investments without long-term debt for stakeholders.[3]

DESIGN STRATEGIES TO ENCOURAGE TRANSIT USE

The success of Shenzhen's R+P planning can also be attributed to a streamlined and coordinated planning process that integrates multiple disciplines. Shenzhen borrowed from Hong Kong's experience to streamline the details of the different phases of rail transit plans and to adjust its planning process.[3] This adjustment allowed for the creation of synergies between rail transit plans and the overall urban planning process, paving the way for successful TOD.

The coordination between land-use and transit plans in Shenzhen occurs at the route level by bundling zoning revision with transit planning.[3] Specifically, once the route plan of new metro lines is determined, an independent market analyses can be conducted and land-use surveys can pinpoint vacant lots with high development potential. The planning institute can then collaborate with the metro company and other governmental departments, to shortlist land lots for joint development. The zoning of these properties will be discussed by stakeholders to reach a consensus. Normally, the FAR of developable sites near metro stations is increased significantly, and more diverse land uses are permitted. This draft route plan with zoning proposals will be then submitted to the municipal planning committee (led by the mayor of the city) for further deliberation.[4]

Despite this innovative process, Shenzhen's integrated planning experience remains limited, when compared with Hong Kong SAR. As the "master planner and designer," the MTR Corporation is actively engaged in the entire urban planning process, whereas in Shenzhen they play a weaker role in the planning process and only route-level plans are determined.[3] This late-stage engagement may lead to missed opportunity for joint development, thereby restricting the extent to which transit plans could be optimized.[3] Thus, to fully achieve designs that reflect transit-oriented development, the policy framework that allows for integrated land use and transit planning must be advanced.

INCLUSIVITY & AFFORDABLE TOD SYSTEMS

The Songgang rolling stock depot is a typical example of the R+P development occurring in the suburbs of Shenzhen (Type 1). It is located near Bitou Station along Line 11 and borders Shenzhen and Dongguan. The depot covers an area of 42.09 hectares and is zoned as a "special control zone," based on future anticipation for subway construction[4]. In line with the aspirations of local communities, this land will not only be served by public transit services, but will be equipped with mixed uses and community facilities.[4]

These include[4]:

- Affordable housing on land above the rolling stock depot—FAR 2.0.
- Schools and residential housing east of the depot—FAR 3.0.
- Commercial and office developments near Bitou Station—FAR 6.0

Along with the renewed affordability of R+P housing along the rail corridor, using the metro costs only 2 yuan for the first 4 kilometers of travel. While this is accessible, riders from more affordable and periphery locations in Shenzhen may experience higher metro costs, as prices vary based on distance. This potential lack of affordability further justifies the integration of TOD design strategies like active transportation with the metro system. Adaptations and inclusions such as improved walkability could assist in keeping the metro system as affordable as possible.[4]

IMPLEMENTATION OF SOLUTION

APPROXIMATE TIMELINE

- **1998**- City began strategic planning of a metro. Shenzhen Metro Group was enacted
- **December 2004**- Metro service began
- **June 2011**- 5 more lines were opened
- **2016**- Line 7,9,11 Opened
- **2030**- Planed completion target

ACTIONABLE STEPS

- Identify needs/ Take Inventory
- Create Strategy Plan (Phases)
- Identify Key Stakeholders
- Find Funding
- Mitigate Competition
- Optimize/ Utilize Land Value
- Create Design Strategies to Encourage Transit Use

KEY LESSONS LEARNED AND BEST PRACTICES

SUMMARY

Shenzhen's metro system is a precedent for effective metro implementation, as its funding methodology improved the affordability of the mode for local governments and allowed for a public-private partnership in funding transit.

Although the Shenzhen metro construction may not be a perfect example of TOD, it shows definite strives towards becoming transit-oriented and its R+P funding strategy stands as an exemplary model for increasing the viability of metro systems within low-mid income cities.

ROADBLOCKS AND WAYS TO IMPROVE

In the Chinese context, the notion of transit-oriented development has yet to become supported by planning policy. The inflexible nature of Chinese planning policy does not allow the integration of transit and property development, and measures such as up-zoning for high-density development surrounding the rail corridor are not triggered by transit creation.

To improve from a situation like this they largely ignoring land value at the beginning phases, as the time-consuming nature of changing policy to support TOD would have led to too many delays. Then they established an R+P mechanism involved creating value, realizing that value and recycling it.

KEY LESSONS

The following key takeaways should be derived from the Shenzhen example:

- R+P funding uses innovative land-use rights transaction methods to overcome current barriers within the land-leasing system.
- The successful transition from a State-owned subway company to Private-owned subway companies.
- Streamlining and coordinating the planning process by integrating transit planning, land use planning and financial planning allowed for the creation of synergies between the series of rail transit plans and the overall urban planning process.

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GUANGZHOU, CHINA

QUICK FACTS

Geographic Context
East Asia (China)

Scale
City and Corridor

Context
Urban

Mode of Higher Order Transit
BRT and Metro

Size of City (Population)
25 million (Tier-1)

Case Study Covered in WB Publication
Yes

URBAN CONTEXT

Guangzhou is the capital of Guangdong province and the third-largest city in China with over 14.5 million residing within in. Located North of Hong Kong SAR, China along the Pearl River, the city is rapidly growing in density, with nearly 1,800 people per square kilometer. The city is well-known as both a commercial center and a bustling port city with a sprawling population.[2]

As one of China's largest metropolitans, meeting the demands of a rapidly growing population places a burden on Guangzhou's public resources and services. The drive towards being a developed and world-class city required the strategic thinking that led to the initiation of the Bus Rapid Transit system. Particularly, Zhongshan Avenue is the corridor that links the most rapidly growing districts within Guangzhou. At its most western point, the Tianhe District on Zhongshan Avenue is home to intensive growth and densification, with large-scale high-rise development and a new rail station residing within it. At the end of the 22.5 km corridor, the Huangpu District is also dense and nature and urbanizing to include large high-rise communities and developments. With the urbanization and intensification occurring along Zhongshan Avenue, updating the transit networks to support this growth will be vital to the city's prosperity and overall efficiency.[2]

Prior to the introduction of the Guangzhou Bus Rapid Transit (BRT) system, congestion, gridlock and overcrowding, were words that characterized the former public bus system of China's Guangzhou. The city of over 14.5 million residents was tasked with the difficult challenge of reforming the flawed transit system to more effectively serve the users along Zhongshan Avenue, a central truck road, particularly.[4] Adopting a method of relieving the high demand placed on the bus and road systems along the corridor was a necessary adaptation to improve the efficiency and success of their transit systems. These challenges led way to the creation of Guangzhou's Bus Rapid Transit (BRT) system, which would soon become one of the most successful of its kind in Eastern Asia. The 2011 Sustainable Transport Award winner for innovative transport solutions, Guanzhou's BRT is a leader of its kind. Executive Director of the Institute for Transportation and Development Policy has stated "Guangzhou's transformations are nothing short of amazing… The new BRT system is changing perceptions about bus-based and high-quality mass transit. We hope all cities, not least those in the US, will be inspired by these examples".[5] A good example of successful transit-oriented development (TOD) and BRT implementation, the system is a prime illustration of the success transit can bring a city.

Although Guangzhou is void of specific policy promoting development along the BRT corridor, in practice, the city's planning authorities are more inclined to allow higher-density developments in recognition of the need for improved traffic conditions. The authorities are also open to relaxing minimum parking standards in light of the BRT's presence.

OVERALL TOD STRATEGY & CITY STRUCTURE

A BRT system was determined to be the most economical and timely method to overcome the shortcomings of the city's transportation networks. The alternative, building a metro system, posed the challenge of huge capital costs and delays in resolving congestion. Enacting this strategy was not without its challenges, as authorities had to overcome decades' worth of disjointed and piecemeal transportation planning within the city's street network. Years of slow service and delays on the bus system also left negative perceptions of bus transit with city residents.

Despite the circumstances, Guangzhou successfully opened its 22.5-kilometre BRT corridor in February of 2010.[2] It was structured with the goal of reducing congestion on one of the city's busiest roads, Zhongshan Avenue. With aims of improving the overall efficiency of the existing bus system, combatting congestion and its environmental impacts and changing public perception, the BRT represented a step towards transit-oriented development. Today, the Guangzhou BRT boasts of 850,000 average weekday riders, making it the busiest bus corridor in Asia (and the second-busiest bus corridor in the world, after Bogota).[2] The Guangzhou BRT's passenger flows are more than three times than those in other BRT systems within Asia.

To achieve such success in their BRT system, Guangzhou used careful planning and analysis to justify such a large-scale system. With twenty-six stations along a 22.5 kilometer stretch of the city's most congested roadway, the strategic approach includes express routes, designated bus lanes, direct metro connections and higher-capacity buses.1 Moreover, the system would support some of the world's highest flows and capacity, with buses arriving at stations every ten seconds during peak hours. Demand analyses played a large role in designing the system, with each BRT station designed to have separate east and westbound waiting platforms located on corresponding sides of the bus lanes. Their sizes have been calibrated to meet modeled demand and the needs of bus operations. Some stations are as short as 55 meters while Gangding, the busiest station in the world at 55,000 daily riders, is 250 meters long (the world's largest) and has multiple pedestrian bridges for access. [2]

The construction of the system was phased, with the first phase completed in February of 2010. Paired with the improvement of active transportation networks and supplementary transit systems along the BRT corridor, the approach proved to be the relief required for the congestion experienced along Zhongshan Avenue.



Figure 26: Gangding Station before (left) and after (right) the implementation of the BRT | *Source:* ITDP 2011 ©ITDP. Reproduced with permission from ITDP; further permission required for reuse.

KEY STAKEHOLDERS & GOVERNMENT RELATIONSHIPS

In achieving such a successful implementation of the BRT system, stakeholder collaboration of both public and private entities was vital. Preliminary planning for a BRT system in Guangzhou began in 2003 by the Guangzhou city government. With no exemplary high-capacity BRT systems in China, the city was considering other corridors with significantly high congestion. To help with this the government enlisted the aid of The Institute of Transportation and Development Policy (ITDP) and Guangzhou Municipal Engineering Design and Research Institute (GMEDRI) for the planning and design. The two groups drafted the concept plan and carried out demand analyses and corridor comparison. They also drew up the operational and traffic plan, which included opening the BRT to more than one bus operator and allowing the buses to run both inside and outside the BRT corridors. The overall infrastructure funding for the project was provided by the Government of the People's Republic of China. Once the plans were constructed they were run by the operating agency GZ BRT Management Company and seven private bus companies.[7]

FINANCIAL MODEL

Capital costs for the Guangzhou BRT project reached 950 million Yuan (USD 103 million), which although high, is about one-twentieth of the per-kilometer costs of the alternative, a metro expansion.[2] The cost-effective investment was a more efficient way of increasing capacity and did not lead to increased consumer costs, due to significant government subsidy to reduce fare prices. The consequent benefits and cost-saving measures initiated through the BRT, including reduced operating costs, time savings, and reduced emissions and thereby emission credit and reduced consumer trip and health costs would pay for the project in just one year. The financial return on this initial government investment justifies the use of the BRT as a resolution for the congestion issues faced in Guangzhou.

DESIGN STRATEGIES TO ENCOURAGE TRANSIT USE

Public and green space improvements along the BRT corridor became a priority after its initiation. Guangzhou began implementing a greenway improvement project in 2010, creating hundreds of kilometers of green corridors across the city. This scheme saw the restoration of the Donghaochong Canal, an ancient canal that dates back to the Song Dynasty, which several BRT routes serve. The effort is part of a major project to clean up waterways around the city, including several canals connecting with the BRT corridor.

Additionally, cycling has received higher priority, with fully-separated and updated bicycle lanes built along both sides of the entire BRT corridor. Bicycle sharing programs have been enacted along the corridor, offering over 5,000 bicycles to citizens and thereby reducing motorized trips by over 7,500 daily, according to the ITDP.[1] The corridor also offers safe, free bike parking along the bus route. Pedestrian safety and comfort was also prioritized through the enactment of the BRT in Guangzhou, with the addition of new street crossings, pedestrian bridges connecting BRT stations to adjacent buildings and, whenever possible, seamless urban design and architecture that lend to a more comfortable walking experience. These investments have significantly improved perceptions of pedestrian safety and the quality of the walking environment.[2]

Aggregate yearly operating cost savings	93 million yuan (USD 14 million)
Value of aggregate time savings (2010)	158 million yuan (USD 24 million)
Average yearly value of certified emission credits	25 million yuan (USD 4 million)
Aggregate consumer savings on trip cost in 20 10	672 million yuan (USD 103 million)
Yearly reduction in health costs from respiratory illness	Unknown

Table 3: Annual value created by the BRT System | *Source:* ITDP 2011 ©ITDP. Reproduced with permission from ITDP; further permission required for reuse.

INFRASTRUCTURE PROVISION FOR DENSITY

Although the Donghaochong Canal restoration project was not directly coordinated with the BRT project, improvements in this area and in public spaces and pedestrian facilities along the BRT corridor will help retain high levels of transit passengers, by ensuring that corridors for accessing BRT by walking and cycling are attractive and vibrant. A similar transformation of a drab streetscape into a spectacular public space was achieved through the restoration of the Lizhiwan Canal, which also opened in 2010. These serve as examples of the shift towards transit-oriented development and corridor improvements in Guangzhou, as a shift towards improving the image and functionality of the BRT corridor has come to exist.

Until recently, the Donghaochong Canal was a polluted ditch running mostly under an elevated expressway. Uncontrolled urban development had encroached on the banks of the canal, and buildings were periodically flooded when waters overflowed the banks, sometimes spilling sewage into adjacent residential and commercial properties. Starting in 2009, a 3-kilometer stretch of land along the Donghaochong Canal was cleared and turned into a greenway, featuring world-class walking and cycling facilities and popular new green public spaces. In the surrounding area, more than 329,000 square meters of new commercial real estate is being developed.[3] The Donghaochong Canal Museum, housed in two historic villas, recently opened providing information on the canal and its history. The greenway project attracts people to live, work, and play and has become a popular free swimming area in the summer.



Figure 27: The Donghaochong Canal before and after restoration efforts to improve the vital public space along the BRT corridor. | *Source:* Far East BRT Planning Co., Limited ©Far East BRT Planning Co. Reproduced with permission from Far East BRT Planning Co.; further permission required for reuse.

INCLUSIVITY & AFFORDABLE TOD SYSTEMS

Along with improved modal options for BRT users, affordability has also significantly improved with the creation of the BRT system. Bus fares have undergone substantial simplification and restructuring as a part of a citywide low-fare program. Previously most bus fares were 2 Yuan (USD 0.30), though some longer routes had fares as high as 5 Yuan. As of 2010, all route fares cost 2 Yuan, a deliberate attempt by city government to subsidize and make the BRT system more accessible to all citizens. Also, within the BRT system, riders are allowed free bus transfers, whereas outside the BRT system they must pay a second fare to transfer. Smart Cards provide frequent BRT users a discount as well: after the first fifteen rides in a month subsequent fares are 1.2 Yuan. All of these changes have the effect of decreasing the average fare price for BRT riders.[2]

However, not only low-income households are enjoying the benefits of the project. Higher-income households along the BRT corridor, often car owners, initially opposed the BRT, fearing traffic conditions would worsen because of the reduced road space for cars. Contradictorily, the BRT has improved not only bus speed and travel time, but also private car speeds and travel time. With an encouraged and incentivized use of public transit, less private vehicles on the road has been beneficial for both the BRT system and those who decide to travel by private vehicle.

For those without cars, the BRT system has significantly enhanced regional accessibility by reducing the amount of time needed to travel around the city. It has also reduced travel costs, as users can transfer for free from BRT buses to other buses serving different routes. The system bodes well for lower-income households by allowing them simple access to the city center, while retaining their lower-value property on the periphery of the city. This increased affordability can be attributed to the success of the overall system.

IMPLEMENTATION OF TRANSIT ORIENTED DEVELOPMENTS

APPROXIMATE TIMELINE

- **2003-** Preliminary planning for a BRT system began
- **2005-** Conceptual plan, demand analysis & corridor comparison[6]
- **2006-** Phase 2 planning; traffic, operational and design planning; & demand analysis for Phase 1[6]
- **2007-2008-** Implementation planning & design[6]
- **2009-** 3km stretch along Donghaochong Canal was cleared and turned into a greenway
- **2010-** First phase of construction completed February

ACTIONABLE STEPS

1. Identify needs/ Take Inventory
2. Conduct Analysis of Area
3. Create Strategy Plan (Phases)
4. Identify Key Stakeholders
5. Find Funding
6. Optimize/ Utilize Land Value
7. Create Design Strategies to Encourage Transit Use
8. Market to Encourage Active Transport

KEY LESSONS LEARNED AND BEST PRACTICES

SUMMARY

A good example of successful TOD and BRT implementation, the system is a prime illustration of the success transit can bring to a city. The success of the project will undoubtedly bring transit-oriented development that intensifies and urbanizes the city along the Zhongshan corridor, lending to a more environmental and social-inducing urban form. Evidence from around the world shows that when high-quality transit service is in place, it encourages denser, more mixed-use land uses, setting a land use pattern more conducive to walking, biking, and transit in place of automobile trips. If this investment in multi-modal transportation encourages even a very small fraction of the several million people who live along the Zhongshan corridor to forgo a car purchase the impacts on GHGs is very large.[4] Further, if local developers capitalize on these alternative transport assets and build dense, walkable, mixed-use housing developments with low parking ratios, the impact will grow larger than estimated here and be better sustained over time.

ROADBLOCKS AND WAYS TO IMPROVE

Enacting this strategy was not without challenges, as authorities had to overcome decades' worth of disjointed and piecemeal transportation planning within the city's street network. Years of slow service and delays on the bus system also left negative perceptions of bus transit with city residents. The methods used to improve were careful planning and analysis to justify such a large-scale system. Demand analysis played a large role in designing the system. The project also supports a comprehensive approach to transportation planning in rapid-growth scenarios, as congestion cannot be resolved without a balanced modal share and shift in user attitude.

KEY LESSONS

The following key takeaways should be derived from the Guangzhou example:

- Adopting a method of relieving the high demand placed on the bus and road systems existing along the corridor were a necessary adaption to improve the efficiency and success of their transit system
- The Guangzhou BRT boasts 850,000 average weekday riders.
- Public/ Private Partnership.
- Exemplifies modal connectivity and encourages active transportation as a supplementary mode, with updated cycling and pedestrian infrastructure that is both safe and of world-class design.

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ASIA | CASE STUDY

SEOUL, REPUBLIC OF KOREA



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SEOUL, REPUBLIC OF KOREA

QUICK FACTS

Geographic Context
East Asia (Republic of Korea)

Scale
City, Neighbourhood, Station and Corridor

Context
Urban and Suburban

Mode of Higher Order Transit
BRT and Metro

Size of City (Population)
25 million (Tier-1)

Case Study Covered in WB Publication
Yes

URBAN CONTEXT

With over 22 million residents and a population density of 10.4 million inhabitants over a land area of 605 square kilometers, Seoul is one of the largest and fastest growing mega-cities in the world. Amongst this population, only a small percentage of Koreans have access to a car (2 per 1,000 persons) as of 1970. Although ownership has increased vastly over the last 30 years, with 215 of every 1,000 currently owning a vehicle, this increase can be attributed to the inadequate transit provision within Seoul.[1] The result of such demand is a burdened bus system, characterized by both high passenger volumes, lengthy ride durations and distances and reduced bus speeds. Demand greatly outweighing the public provision of transit, a drive towards transit-oriented development (TOD) became a necessity to solve the overwhelming congestion and declining bus quality experienced in the city.

Until 1974, Seoul was almost entirely dependent on bus services with intensive congestion, passenger volumes and trip distances. This encouraged the creation of an urban rail system. Seoul's first metro line was enacted in 1974 and has since grown to a total of 487 km in 2004 with close to 400 stations.

The rail network in Seoul is now one of the largest in the world and carries 8.4 million passengers per day—more than twice the daily passenger volumes on the New York subways and the London underground. [6]

The main problem, however, was poor bus service, which, in turn, encouraged increasing car use. Although it did not deal with the core problem of unregulated private bus firms, the Seoul Metropolitan Government made several attempts to improve bus service and ridership. The first curbside bus lanes were installed in 1984 and expanded to 89 km by 1993, 174 km by 1994, and 219 km by 2003.[4] The network of reserved bus lanes helped speed up bus travel somewhat, but it did not succeed in raising bus use. Clearly, more drastic changes were necessary. Hence, Myung-Bak Lee, the former mayor of Seoul, implemented more pressing reforms that involved generating car-dominated areas, reclaiming space for pedestrians, and fully integrating a BRT system supported by policy interventions and technical advocates. Due to such high densities, the Seoul metropolitan government over the years has also aggressively sought to decentralize growth, mainly in the form of building master-planned new towns sited on the region's periphery.

TOD K P

OVERALL TOD STRATEGY & CITY STRUCTURE

Over the past several decades Seoul has followed a pattern of American-style sprawl with a rise in private automobile ownership. However, population densities in Seoul have historically been and remain high by global standards.[5] The city of Seoul itself, along with the port city of Incheon and surrounding Kyunggi Province, constitute the Seoul Metropolitan Area (also called the Seoul National Capital Area), with more than 23 million inhabitants—the world's second-largest urban agglomeration.[5] In 2006, Seoul and Incheon combined had the sixth-highest population density in the world (16,700 people per square kilometers).[5]

The deep reform of public transport in Seoul has been a major step towards retaining its competitive edge. The former Mayor of Seoul, Myung-Bak Lee, led the charge of reinvesting in Seoul. In 2001, Lee ran for mayor of Seoul, largely on a platform of reinvigorating the central city as means of creating a more sustainable yet productive city.[3] His platform called not only for expanding public transit services, but also for reducing the ecological footprint of private cars by reclaiming urban space consumed by roads and highways. "Why scar the interior of the city," he reasoned, "to funnel suburbanites to office jobs in the core?"[3]

INFRASTRUCTURE PROVISION FOR DENSITY

A major culprit was the network of elevated freeways into central Seoul—facilities that severed longstanding neighborhoods, formed barriers and created visual blight[5]. Although freeways provided important mobility benefits, Lee recognized that those benefits had to be weighed against their nuisance effect.

Public transit had to be substantially expanded and upgraded to absorb traffic. The city did so by extending subway lines and creating seven new lines of exclusive median-lane buses (stretching 84 kilometers, later expanded to 162 kilometers) and 294 kilometers of dedicated curbside bus lanes.[3]

LAND TENURE & LAND VALUE CAPTURE

The freeways to greenways conversion created higher market demands. The greenways along the TOD corridors further boosted land value and development activity along these busy corridors. When the elevated freeway existed housing prices within three kilometers fell.[2] This shows the previous blight that Mayor Lee spoke about. When the freeway was convert to a greenway the housing prices within 2km of it rose as much as 8%. [2] More high-value industries and commercial parcels also came to the corridors near the greenway. This spoke volumes for the community's values. Quality of place won over a car dominance.

KEY STAKEHOLDERS & GOVERNMENT RELATIONSHIPS

The former Mayor Lee, and the Seoul Development Institute (SDI) were crucial in enacting far-reaching reforms for Seoul's public transit system. When elected in June 2002, Lee promised to improve the public transport system in Seoul and commissioned a series of comprehensive studies performed by the research division of SDI.[4] The studies resulted in recommendations for the modernization of the metro and bus fare structures and payment systems, better integration of bus and metro services, an expanded network of reserved



Elevated Freeway



Urban Greenway

Figure 28: Freeway to Greenway Conversion[2] | *Source:* The World Bank 2013 ©Seoul Metropolitan Government 2003. Reproduced with permission from WB; further permission required for reuse.

bus lanes, and a complete overhaul of the organization and operation of bus services.[4] The transport specialists at SDI, led by Dr. Gyengchul Kim and Dr. Keeyeon Hwang, were the main technical advocates for these changes, while Mayor Lee and his staff provided the necessary political support.[4]

DESIGN STRATEGIES TO ENCOURAGE TRANSIT USE

One of the first major changes was an entire redesign of the bus network to integrate more than 400 different bus routes. All bus services are now grouped into four types, color-coded for passenger ease.

To coordinate bus services, the Seoul Metropolitan Government set up a new Bus Management System (BMS) using advanced intelligent transport system (ITS) technology. Global positioning system (GPS) terminals located in every bus now permit a central bus control center to monitor all bus locations and speeds, adjust the number of buses per route, communicate with bus drivers, and provide real-time information to passengers.[4] The new BMS facilitates more dependable bus service and optimizes service distribution by adjusting bus assignments and schedules to conform to travel demands.[1]

In addition to the complete redesign of the route network, the system of dedicated bus lanes was expanded from 219 km to 294 km, with more expansions planned.[4] Most significant, however, is the development of a true BRT network with dedicated center bus lanes, high-quality median bus stops, real-time information integration and state-of-the-art buses.[3]

The Seoul Metropolitan Government now views BRT as a much more economical and efficient way to provide public transport services than metro expansion, which can take many years to construct and requires large capital investments.

Nevertheless, the extensive rail system in Seoul remains the backbone of public transportation. Better integrating bus services with the metro is, therefore, essential. Bus routes and stops have already been relocated to facilitate simple transfers between modes. The city is currently in the process of building 22 additional transfer centers as well.

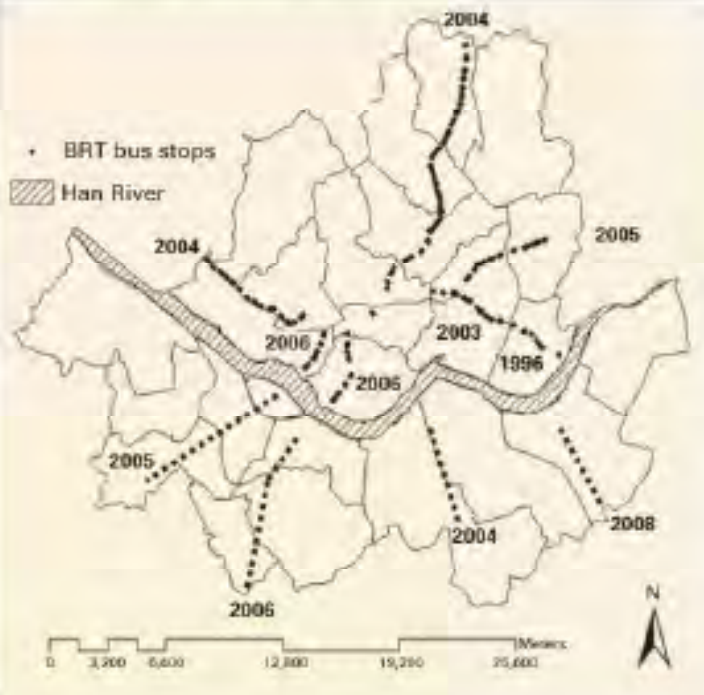


Figure 29: Bus Rapid Transit Corridor in Central Seoul[2] | *Source:* The World Bank 2013 ©World Bank. Reproduced with permission from WB; further permission required for reuse.

IMPLEMENTATION OF TRANSIT ORIENTED DEVELOPMENTS

APPROXIMATE TIMELINE[6]

- **1953-** First public bus began services
- **1970-** Only 2 in every 1000 people had access to a car
- **1974-** Seoul Conducted its first metro line, 8km long
- **1984-** First curbside bus lanes were installed
- **1993-** Bus lanes expanded to 89km
- **1994-** Bus lanes expanded to 174km
- **2001-** Myung-Bak Lee ran for mayor on the platform of reinvigorating the central city as means of creating a more sustainable yet productive city
- **June 2002-** Lee was elected and promised to improve the public transport system
- **2003-** Bus lanes expanded to 219km
- **December 2003**- Results from studies performed by SDI were published recommending coordination and modernization of the metro and bus systems.
- **January 2004-** Mayor Lee conducted public relations campaign to explain the benefits of reform
- **July 2004-** Start date for implementation of reform
- **2004-** Metro line expanded to 487km and bus lanes expanded to 294km
- **July 2009-** Metro line 9 opened for operation

ACTIONABLE STEPS

1. Identify needs/ Take Inventory
2. Create Strategy Plan (Phases)
3. Establish Policies
4. Identify Key Stakeholders
5. Optimize/ Utilize Land Value
6. Create Design Strategies to Encourage Transit Use
7. Market Plan

KEY LESSONS LEARNED AND BEST PRACTICES

The dramatically altering reforms of July 2004 completely restructured bus services in Seoul and increased demand-based control over routes, schedules, and other aspects of service. An integrated metro and bus system allow for seamless transition between modes and a far superior overall public transport system. Central to the reforms was the introduction of an entirely new system of fully-separated BRT routes.

Studies have proven that BRT systems around the world can provide excellent express service at a fraction of the cost of new rail systems. The experience with BRT in Seoul has been a resounding success.

ROADBLOCKS AND WAYS TO IMPROVE

One roadblock appeared right after the major reform in which there was tremendous service disruption, public discontent, and political uproar. A smooth transition to the completely new bus routes, fare structure, and fare payment system required more time. In particular, there should have been a trial period to test the reforms on a selective basis instead of immediately adopting them system-wide. Mayor Lee created campaigns to inform the citizens about this major reform however he only ran the campaign for six months prior to the start date. To improve this in the future, more time and effort to distribute the appropriate information to the public before implementing the reforms should be planned.

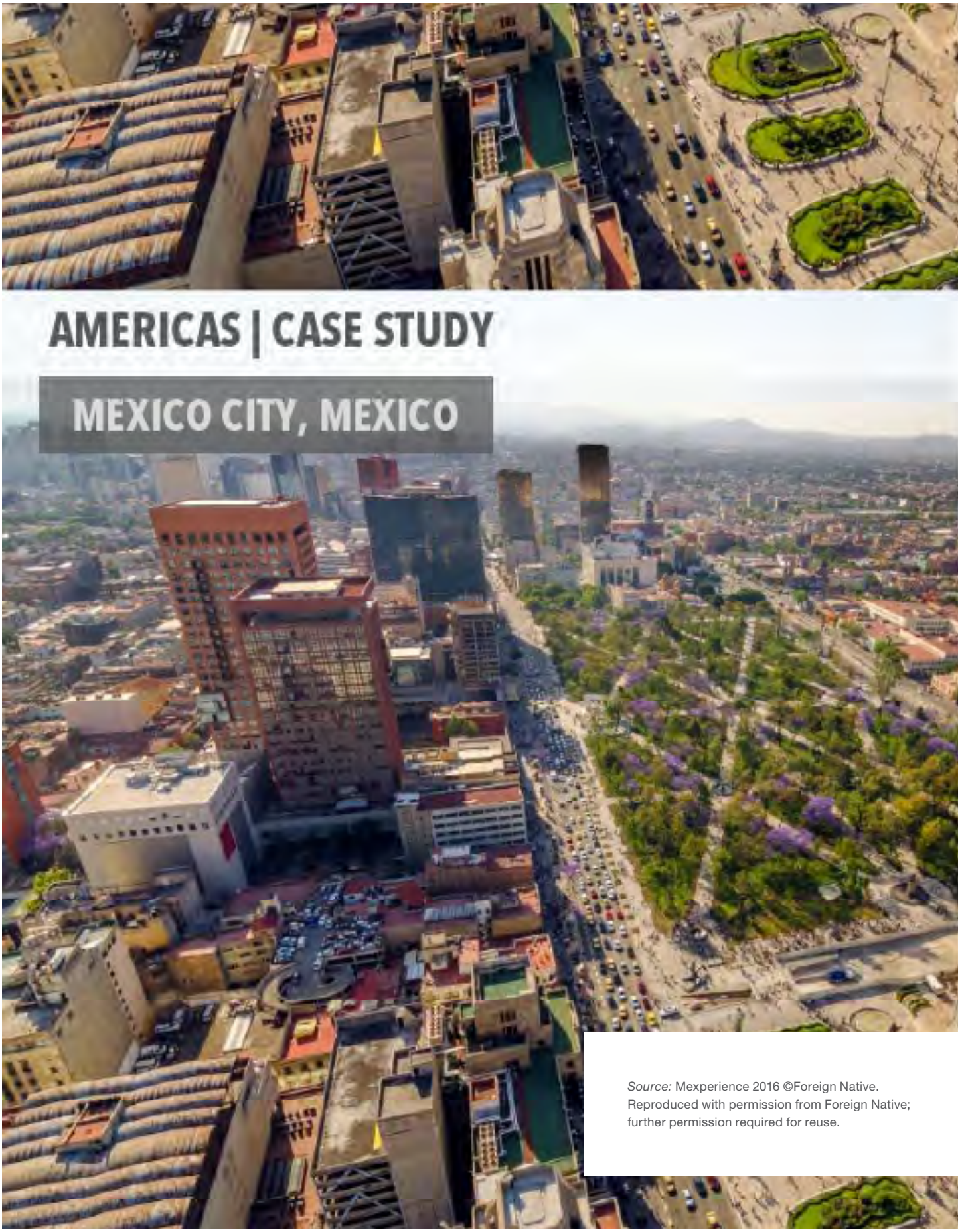
KEY LESSONS

The following key takeaways should be derived from the Seoul example:

- Mayoral-led efforts
- Minimized network of elevated freeways
- Both BRT and metro lines were exponentially increased in length
- Integrated Intelligent Transportation Systems (ITS)
- Created 400 bus routes and constructed 22 major transfer centers.

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MEXICO CITY, MEXICO

QUICK FACTS

Geographic Context
South America (Mexico)

Scale
City, Corridor, and Station

Context
Urban

Mode of Higher Order Transit
BRT Metrobus and Metro

Size of City (Population)
21.4 million (Tier-1)

Case Study Covered in WB Publication
Yes

URBAN CONTEXT

Mexico City, the capital of Mexico, is home to over 17 million people and a population greater than any other city in North America. The city has a population density of approximately 8,400 people per sq. kilometer and is growing by 2.5% annually.[1] With such an immense population and an urban area that is gradually becoming denser, various issues have come to arise as a result. Congested travel modes, significant pollution and smog, and unsafe transit systems are each a result of the growth Mexico City has been experiencing. In order to combat these adverse effects, in 2005, Mexico City created a Bus Rapid Transit (BRT) system called Metrobus.

Metrobus is the world's sixth busiest BRT system and is a continually-expanding system which now carries more than 300 million passengers a year across 125 kilometers and six lines of exclusive bus lanes.[8] Compared to the jitney bus services that BRT replaced, travel times in BRT corridors have fallen by 40 percent and there are 30 percent fewer accidents. In addition, 15 percent of drivers in corridors served by BRT reportedly have switched to public transit.[4]

The improvements have also produced modest reductions in emissions of greenhouse gases and smog.

The Metrobus greatly enhanced the public sector's direct involvement in the planning of key transportation services and administrative faculties, which had suffered throughout previous decades. This outcome is arguably just as—if not more—important than BRT's impacts on mobility, safety, and pollution. Mexico City's surface transit industry has transitioned from a system dominated by an unruly and unmanageable set of independent, small-scale operators concerned only for personal gain. Instead, a professional, modernized, faster, safer, environmentally-conscious system replaced jitney service improving the experiences of millions that rely on public transportation in their day-to-day lives.

OVERALL TOD STRATEGY & CITY STRUCTURE

Mexico City generated a quick-to-implement, modest, and yet highly visible programmatic success on key corridors in the city. In 2005, Metrobus opened and replaced 350 standard buses with 97 BRT vehicles, owned by both private and public companies.[6] The project consists of two components, the first being the construction of a mass transit corridor along Insurgentes Avenue, integrated with traffic management for private vehicle travel. The system would include various elements for more efficient and comfortable travel including: exclusive bus lanes, upgraded pedestrian facilities leading to stations and low-polluting buses to replace the former polluting and low-capacity vehicles. The second component of the project would be the monitoring of the system and the creation of cycling linkages and new corridors to create a more integrated system. [6]

The approach towards implementing the BRT system was particularly complicated for Mexican officials, as existing, independent bus and jitney providers were highly resistant to the movement, as it would essentially put them out of business. The independent operations being undertaken prior to the BRT can be characterized as unruly and unmanageable, with operation sacrificing service standards for revenue.[5] The shift towards greater public control over transit allows for a focus on achieving transportation best practices that are beneficial socially, economically and environmentally. Reaching this point of public-sector control required strategic compensation, negotiation and persuasion at times. Initially, the government granted private operators compensation, which financially onerous, was replaced with guaranteed income in the new BRT system. Moreover, when financial methods were unsuccessful in inducing collaboration with jitney operators, city officials used rivalry groups to outflank operators that were not cooperating and threaten to move forward with new partner's instead.[5] This strategic approach to combating BRT opposition proved successful.

The siting of Mexico City's first BRT system was also strategic in its creation. Although ridership was projected to be lower, BRT implementation began Insurgentes Avenue, on the basis that it was located in a very prominent area and that political negotiations with the independent bus operators were likely be simpler. This allowed for a less-costly and quick example of visible BRT success in the city, paving the way for subsequent corridors to be expanded to match the successes of Insurgents.

INFRASTRUCTURE FUNDING

In addition to the submission of opposition, the strategy towards BRT financing would prove both beneficial and forward-thinking for Mexico City. Projected to cost over USD49.4 million, a combination of public, private and carbon financing methods were used.[8] Specifically, with regard to carbon financing, Mexico City government intended to use the purchase of greenhouse gas emission reduction to finance the project, as well as Clean Development Mechanism (CDM) revenues. With the objective of reducing carbon emissions through the introduction of the BRT, this financing method proved to be viable and resulted in more funding than anticipated for the Metrobus. Over 35,000 tons of carbon dioxide are reported to have been reduced annually due to the new BRT system.[6]

KEY STAKEHOLDERS & GOVERNMENT RELATIONSHIPS

Essential to the success of Mexico City's BRT system was the mayor-led drive for control over the existing transportation system in Mexico City. Gaining control over the formerly unmanaged private sector service providers, through compensation, negotiation and when unsuccessful, credible threats, allowed for public transit to be expanded to actually include the public sector. The project overall can be characterized as government-led, with the strategic integration of private entities to assist in financing and operating the system.

The planning, management and construction financing were largely provided by the Mexico City government. Internalizing infrastructure costs allowed for large-scale capital financing to be taken care of, while vehicle provision and fare administration were contracted to reputable private entities, RTP and CISA.

The newly elected Mayor, Lopez Obrador, strategically timed changes to Mexico City's bus service to solidify public support, by pushing the agenda for both BRT and highway expansion, exemplifying an agenda of balanced transportation.[5] This assisted in quieting the car-supportive voters that would normally have opposed the project. Policy objectives of safety, enhanced air quality, environmental sustainability and urban redevelopment of distressed areas of the city led the drive and appeal for the project.

This government intervention was paired with the creation of a new public entity, Metrobus, and partnering with private entities RTP and CISA, which would operate and maintain operations of the BRT. This allowed for safer and more professional operation of the public transit system that provided fair and objective fare systems to residents. As well, the city expanded the financial benefits of public-private partnership arrangements beyond original bus and jitney owners to generate more widespread industry support for the changes.[5] Providing the public bus operator with the opportunity to act as a participant in the creation of the first BRT line, city officials gained the support of public sector workers, accessed their experiential wisdom, and reduced the number of new buses requiring financing.

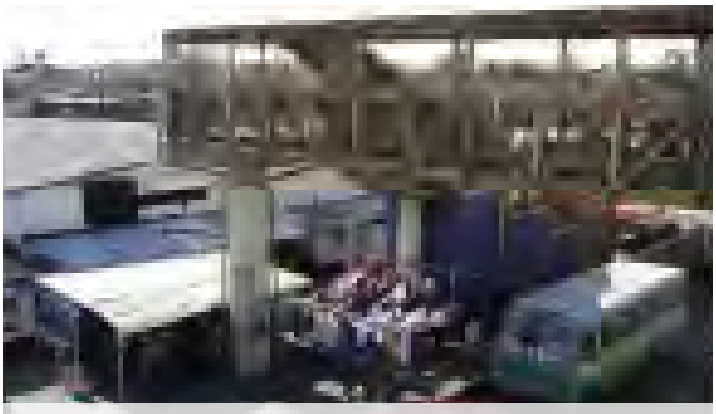
Public and private entities involved also strived to be transparent with and cognizant of the citizens that would be utilizing the system. To understand whether a mandate for change existed within Mexico City's residents, public consultation booths across the city were used to gain an impression of locals' thoughts and opinions on a potential BRT system. By using a comprehensive approach, inclusive of the various stakeholders, Mexico City was able to introduce a system that was widely supported and successful as a result.

DESIGN STRATEGIES TO ENCOURAGE TRANSIT USE

Mexico City implemented tried and true policy templates from other cities, as well as, leveraging external resources to help catapult new ideas for transport onto the public agenda. Environment Minister Claudia Sheinbaum developed the BRT proposal with the support and advice of a global network of sustainable transport researchers, funders and development agencies. In designing their BRT system, Mexico City was driven by the mayoral political agenda of supporting a balanced transportation system.[5] With this said, future developments intend to address cycling networks and the extension of the BRT corridor to better integrate these modes. With over 855,000 passengers daily, Metrobus has been successful in ensuring a shift from a car-dominated modal preference.[4] Ridership has instead switched to transit, as well as cycling which has been seamlessly integrated into the BRT system with the 2010 creation of EcoBici. EcoBici is a bike sharing program created to increase the popularity of bike commuting in Mexico City, with over 6,000 bikes and 250 stations dispersed amongst the city as of 2015.[3] The widespread system is efficient and simple to use and was strategically launched near transit stations to encourage multi-modal travel. With the intention to expand the system even further in 2018 and to improve bike infrastructure to support EcoBici, cycling is likely to be a large influence in discouraging car travel in Mexico City.

To encourage this increased transit use, which has resulted in a reduction of car use by 15%, focusing on the environmental aspect of transportation was an important driver.[4] Formerly plagued by smog and pollution, the BRT system aimed to mitigate these adverse effects and reduced the amount of harmful air pollutants riders were exposed to be 2-3 times. Accident rates were also significantly reduced by up to 30%. Providing a safer and healthier system to its citizens was one important factor to improving their use of transit.[4]

Additionally, upgrades to the stations and fleet of buses being used allowed for greater capacity and comfort for riders. Overcrowding and congestion discourage ridership, thereby combating these issues is vital to encouraging transit use. The use of vehicles with a 160 passenger capacity versus the smaller standard buses in the past system was beneficial to tackling the issue of crowding.[6] Moreover, the improved efficiency that arose from the BRT system was a vital determinant in encouraging a shift for private car use to public transit. Commute time have been reported to have seen reduction of up to half an hour and buses are strategically timed to arrive at high frequencies of up to 56 per hour during peak times of the day.[6] In scenarios where public transit becomes the more efficient option, it is unsurprising that the modal shift moves in its favor.



Tepalcates Central Station (Before)



Tepalcates Central Station (After)

Figure 30: MetroBus Station Design | *Source:* New York City Global Partners Innovation Exchange 2012 ©Metrobus.

INCLUSIVE & AFFORDABLE TOD SYSTEMS

Inclusivity and affordability are also essential parts of improving the appeal of public transit. In the case of Mexico City's Metrobus, all paper tickets and cash payments have been removed from the system and payment occurs solely with the use of rechargeable fare cards.[2] This method of payment, although efficient, has its shortcomings, in that only some of the stations have card recharge stations. It also costs citizens 10 pesos to initially purchase the card, which has impacts on the system's affordability. Each ride costs 6 pesos, which includes as many transfers as need be and use of all five BRT lines.[2] The ability to travel at such lengths and with unlimited transfers has the effect of improving the affordability of the transit line for riders that travel from periphery neighborhoods to the inner city. While the system may not be as largely subsidized comparably with examples in Asia, for instance, the price is by no means a complete barrier to public transit use.

In the spirit of transit-oriented development, including affordable housing in the developments that result along the BRT corridor is being emphasized to cater to the diverse population using the system. One example is the IntegrARA Iztacalco development which is less than a quarter mile from a BRT line and is reusing a greyfield industrial site to create 720 affordable housing units.[7] The development includes courtyards, recreational spaces, cycling facilities and mixed-use, high density buildings to create a neighborhood closely resembling best practices of transit-oriented development. By catering to a broad range of income levels and providing a mix of private and public spaces with close access to both the BRT and metro corridors, the development makes living near transit an affordable option.

IMPLEMENTATION OF TRANSIT ORIENTED DEVELOPMENTS

APPROXIMATE TIMELINE [9]

- **June 2005-** Metrobus Bus Rapid Transit (BRT) began operations- Line 1 Phase 1
- **March 2008-** Opening of Line 1 Phase 2
- **December 2008-** Opening of MetroBus Line 2
- **2010-** EcoBici, bike sharing program, was created
- **May 2010-** Start of construction of Line 3
- **February 2011-** Opening of Line 3
- **April 2012-** Opening of Line 4
- **November 2013-** Opening of Line 5
- **2015-** EcoBici had 6,000 bikes and 250 stations in Mexico City
- **January 2016-** Opening of Line 6
- **February 2018-** Opening of Line 7
- **2018-** Expand EcoBici system further and improve bike infrastructure.

ACTIONABLE STEPS

1. Identify needs/ Take Inventory
2. Create Strategy Plan (Phases)
3. Identify Key Stakeholders
4. Find Funding
5. Mitigate Competition
6. Optimize/ Utilize Land Value
7. Create Design Strategies to Encourage Transit Use

KEY LESSONS LEARNED AND BEST PRACTICES

SUMMARY

Mexico City's implementation of a BRT system is well-known as best practice in the TOD development realm. With clear improvements to efficiency, environmental impact, rider satisfaction and capacity, the system has been a success. Mexico City was successful in their use of public-private partnerships and environmental reduction as methods of financing the large capital cost infrastructure project. Mexico City involved not only private corporations, but the bus operators and drivers as well, which allowed for a diverse investment group to buy-in to the project. Moreover, by focusing on the environmental aspects of transit provision, the city was able to capitalize on carbon emission reduction costs to finance the project, whilst also improving their ecological footprint.

ROADBLOCKS AND WAYS TO IMPROVE

A major roadblock while implementing the BRT system was the independent bus and jitney providers were highly resistant to the movement, as it would essentially put them out of business. The independent operations being undertaken prior to the BRT can be characterized as unruly and unmanageable, with operation sacrificing service standards for revenue. The way that they improved this situation was first by compensation, negotiation and persuasion. When financial measures were unsuccessful city officials used rivalry groups to outflank operators that were not cooperating and threatened to move forward with new partners instead.

KEY LESSONS

The following key takeaways should be derived from the Mexico City example:

- Project consisted of two components- Construction of a mass transit corridor and then monitoring the system and creating cycle linkages and new corridors.
- Metrobus greatly enhanced the public sector's direct involvement in the planning and territorial management of key transportation services.
- Over 35,000 tons of carbon dioxide are reduced annually due to the new BRT system.
- Increased transit use resulted in a 15% reduction in car use.
- Accident rates have been reduced by to 30%.
- Less than a quarter mile from a BRT line 720 affordable housing units were created.

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TOD K P

AMERICAS | CASE STUDY

SANTIAGO, CHILE



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SANTIAGO, CHILE

QUICK FACTS

Geographic Context
South America (Chile)

Scale
City and Corridor

Context
Urban

Mode of Higher Order Transit
BRT and Metro

Size of City (Population)
6.3 million (Tier 2)

Case Study Covered in WB Publication
Yes

URBAN CONTEXT

Santiago, Chile, the capital city of Chile, is one of the most densely populated cities in the Americas. With a population of over 7 million people, it is the most populous city in Chile, with a density of almost 9,000 people per square kilometer.[1] The population is dispersed across a large urban area, which continues to increase in its extents and population annually. Transportation in Chile has be known to be lengthy and inefficient, with safety and passenger treatment receiving very low priority. Between the absence of fare integration with other transport services or with the subway, higher demand than provision, the poor treatment of passengers and a high accident rate, the transit system does not provide an environment that encourages its use.[3] Commuter resentment against the system was rising and according to a survey conducted in 2003, the bus system was voted the city's worst public service.[3]

Persistent and severe complaints prompted intervention from the government of Chile to overhaul the city's public transport system with a metro and bus-based integrated system, focused on including a high-tech centralized control system. An entirely new transport industry structure was conceptualized and financed through an international bid for tenders.

The resulting system of a seamlessly integrated BRT and metro lends to the ideals of transit-oriented development (TOD) that are being emphasized in planning and development practices currently. A system of efficiency, passenger comfort and safety for both riders and the environment has resulted from necessary interventions.

OVERALL TOD STRATEGY & CITY STRUCTURE

Transantiago, the public transport system in Santiago, Chile is comprised of a bus rapid transit (BRT), feeder bus lines and a metro system. It completed its fourth year of operation in February 2011. Prior to Transantiago's implementation, the city's public transport system proved to be problematic. The system was fully privatized and run by 3,000 independent operators, using a fleet of converted trucks, unfit for public transport.[3] Since 2001, the buses enabled 43 percent of the motorized trips in the city.[3]

Santiago's overall strategy to improving the shortcomings of these systems was an integrated multi-modal system inclusive of a BRT and an expanded Metro network. BRT development involved the creation of 18.8 km of segregated corridors, 4.6 km of new road connections, 62.7 km of road and pavement improvements, and construction of about 70 bus stops.[3] The bus fleet was made up of 1,200 new low-floor articulated trunk buses, 1,500 conventional trunk buses and 2,300 feeder buses.[3] The expansion of the metro network expansion included construction of 66 km of tracks and 68 stations at a total cost of USD $2.4 billion. About 45 km of tracks were built between 2000 and 2006, enhancing the ability of the system to deliver 830,000 trips per day. Another 21 km were built after 2006 which enabled 254,000 additional daily trips.[3] The integration of cycling facilities and bike sharing within public transit is also planned for enhancement, to allow for active transportation options with the modal split.

Integration of transit services involved the installation of a unified financial system, contactless fare cards, and the construction of two inter-modal stations. The system allowed for the integration of information systems for operational control and data collection, investment estimated at USD $30 million.[3]

Overall, the implementation of Transantiago was based on two objectives: complementation and integration. Complementation related to the enhancement of both the BRT and Metro systems to better complement each other and create a multi-modal system. Integration references the development of a single-fare system of both bus and Metro. Through these underlying objectives, a system that serves over.

DESIGN STRATEGIES TO ENCOURAGE TRANSIT USE

Santiago has utilized a variety of design strategies to ensure the increased and continued use of their transit services upon their expansion. A main driver in ridership is the seamless integration of the BRT and Metro systems. With a unified fare system which uses contactless fare cards, transferring between modes is efficient and affordable.[3] In the case of Santiago's two inter-modal transit stations, riders do not even have to leave the confines of the station to transfer between modes. This increased accessibility and convenience for riders is a vital influence in their use of the full transit system, all modes included.

Essential to furthering Metro and BRT integration was the introduction of connected cycling infrastructure within transit systems. Formerly, Santiago had very few cycling networks separated or on their roadways, which was mitigated in 2007 with a plan to introduce 690 kilometers of bike lanes throughout both rural and urban areas.[2] Still in its implementation phases city-wide, examples of inclusion in districts of the city have come to exist. For example, the district of Providencia engaged in a public bike system as of 2009, which has grown from an initial 1,000 bikes to over 4,000. Costing only USD2.00 monthly for unlimited trips of up to an hour, the system caters to a broad range of citizens from 14 to 80 years of age.[2] Compared to other South American cities, Santiago is reported to have the best cycling integration as shown in the table below. With heightened and simplified access to and from transit stations via bicycle, citizens' willingness to use transit rather than private vehicles has improved.

	Santiago	Montevideo	Quito	Florianopolis	Score per item
Bicycles allowed on board only off peak (3) any time (4) special facilities (5)	0	1	1	0	2
Bicycle ease access to public station/stops	2	0	1	0.1	3.1
Public Bicitaxis and/or bicycles access to stops and stations	1	0	0	0	1
Cycling facilities at stations/stops, lifts, ramps, etc.	2	0	0	0.6	2.6
Educational facilities that encourage use of bicycles	2	1	2	0.3	5.3
Other policies that promote cycle friendly culture. Ex. Coordinating agency for public transport and cycling.	2	1	0	0.3	3.3
General quality	**10**	**5**	**4**	**2.3**	

Score explanation: 0: there is nothing, 1: minimum facilities, 3: reasonable quality facilities 5: broad existence of high quality facilities and high level of integration

Table 4: Santiago's cycling integration statistics when compared to similar Latin American cities.[2] | *Source:* Paolo Jiron ©UN Habitat. Reproduced with permission from UN Habitat; further permission required for reuse.

Moreover, a continued focus on ensuring Transantiago is expanding to meet demand ensures efficiency and capacity, which are both drivers for heightened ridership. Santiago, Chile is reported to have the highest rail extension growth of all Latin American countries, with over 60km of rail expansion anticipated as shown in Figure.[2] In addition, simple design measures such as; colored bus lanes to avoid private vehicle incursion and delays in travel, lighting inclusion within bus stops for safety purposes and environmental policies that reduced emissions up to 20%.[3] These strategies, although seemingly minuscule, have large impacts on the efficiency and comfort of public transport systems in Santiago and can be attributed to greater rider satisfaction.

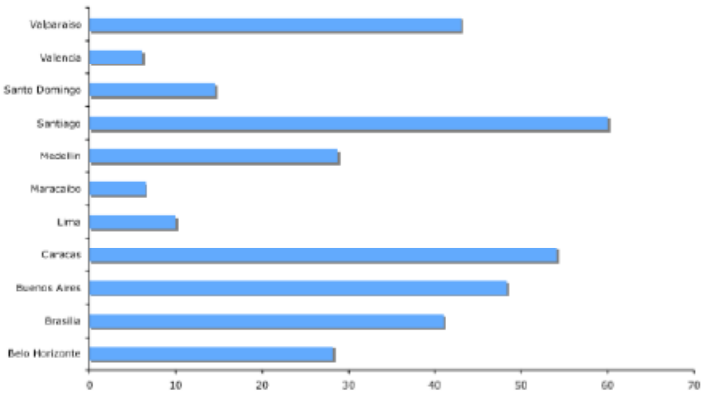


Figure 31: The rail expansion (in km) expected for various Latin American countries, Santiago leading the expansion trends.[2] | *Source:* Paolo Jiron ©UN Habitat. Reproduced with permission from UN Habitat; further permission required for reuse.

KEY STAKEHOLDERS & GOVERNMENT RELATIONSHIPS

Essential to the implementation of Transantiago were the various stakeholders that played a role in its road to fruition. Developed under the mandate of the Urban Transportation Plan for Santiago (PTUS), a Presidential Advisory Commission was enacted to create an institutional framework for implementing the project. The commission consisted of the Ministers of Public Works and Housing, the Santiago Metropolitan Region, Transport Under-secretary, Environmental Commission Director and the Metro leaders.[2] Each with different priorities and focuses with regards to transportation, different perspectives were brought to the planning process and an integrated framework of a variety of urban priorities was developed.

The overall infrastructure funding was raised multiple ways. Forty-five percent of it was raised through public-private partnerships. Whereas, the remaining infrastructure was founded by the Ministry of Housing and Urbanism.[4]

The PTUS was eventually restructured and replaced with Transantiago, still led by the presidential advisors. The lack of lower-level stakeholder integration, in this case, can be described as one of the biggest downfalls to the project. With only high-level organization leaders engaged, local authorities, citizens and operating staff were not advised. Instead, the Presidential Advisory Commission had sole control, which led to a lack of accountability, coordination and efficiency.[2] Decentralizing the responsibilities with regards to public transit and including lower-level actors represents a much more effective institutional framework. Best practices from other contexts should be considered in this case for future success with public transit.

TOD KP

INCLUSIVITY & AFFORDABILITY IN TOD SYSTEMS

Offering more adequate public transportation is a step in the right direction in terms of offering equitable and accessible transport for all. Based on factors such as cost and safety of transit options, Santiago is working towards improved inclusivity in Transantiago. With regards to fare affordability, Transantiago costs USD$0.74 per ride paid via contactless fare cards. Statistically, lower income groups are more likely to walk, but compared with higher-income groups, use the bus more often and are not likely to drive private vehicles as shown in figure.[2]

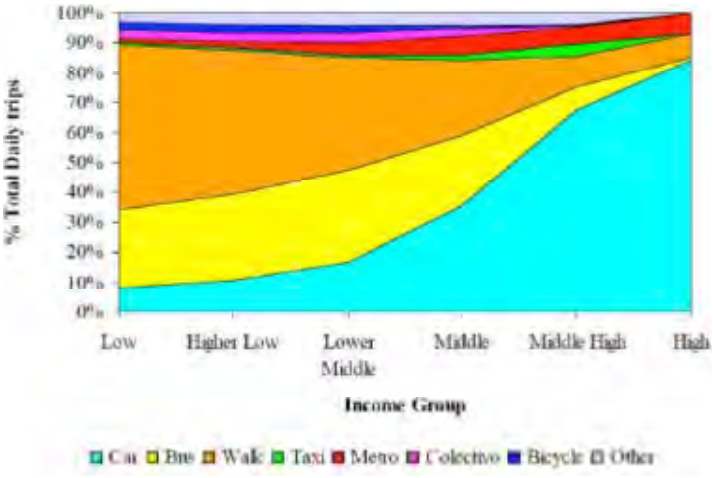


Figure 32: Modal share by income level in Santiago, Chile.[2] | *Source:* Paolo Jiron ©UN Habitat. Reproduced with permission from UN Habitat; further permission required for reuse.

To be derived from the above figure is the lower use of metro when compared to the BRT, as well as the tendency for lower-income households to walk instead. These statistics can lend to a question of affordability in the system. Although the fare seems insignificant when compared to North American comparable cities, in the context of Santiago, the underlying avoidance of public transit should be studied to consider possibilities for public subsidy.

Additionally, with regards to TOD, affordable housing has become a larger priority for the city since the 1990s, as shantytowns and slum housing were a prevalent option for lower-income households. To mitigate the effects of this unhealthy and inadequate housing type, conditioned planning has emerged in Santiago. This form of land use planning allows urban development to expand beyond city limits on a case-to-case basis, allowing residential development to spill out into the peripheries of the city.[2]

The issue with this form of housing development is its lack of connectivity and self-sufficiency, often creating instances of urban islands on the city periphery. Although this allows for larger areas for social housing and more affordable land, transportation in the future must better link these areas to allow for true TOD. As well, the creation of separated low-income districts is a concept that has been largely refuted in present times, as these locations amplify crime and safety concerns and are likely to be disproportionality exposed to health hazards when compared to middle and high-income groups. Strategic mixing of different income groups and better transportation integration with these periphery locations should be considered for development in the future.

IMPLEMENTATION OF TRANSIT ORIENTED DEVELOPMENTS

APPROXIMATE TIMELINE

- **2000-** Metro network expansion started
- **2001**- Buses enabled 43% of the motorized trips in the city
- **2003-** Bus System was voted worst public survey
- **2006-** Added 21km to existing 45km of metro network
- **2007-** Plan was mitigated to add 690lm of bike lanes through rural and urban areas.
- **2009-** Providencia engaged in a public bike system
- **2011-** Transantiago completed fourth year of operation

ACTIONABLE STEPS

1. Identify needs/ Take Inventory
2. Create Strategy Plan (Phases)
3. Identify Key Stakeholders
4. Conduct Inter-Agency Collaboration
5. Find Funding
6. Optimize/ Utilize Land Value
7. Create Design Strategies to Encourage Transit Use

KEY LESSONS LEARNED AND BEST PRACTICES

SUMMARY

Santiago is the resulting system of a seamlessly integrated BRT and metro lends to the ideals of transit-oriented development(TOD) that are being emphasized in planning and development practices currently. A system of efficiency, passenger comfort and safety for both riders and the environment has resulted from necessary interventions.

A positive lesson to be taken from the case study is the concept of modal integration. Route re-organization was a complex technical problem (requiring a supply-demand balance for a social optimum), but allowed for Metro and BRT interaction. Strives towards also including cycling networks within this system will further the integrated nature of Transantiago. Ensuring a range of modal options not only allows for variety, but affordability and convenience in transit systems, and thus moving this agenda forward in other contexts will be essential.

ROADBLOCKS AND WAYS TO IMPROVE

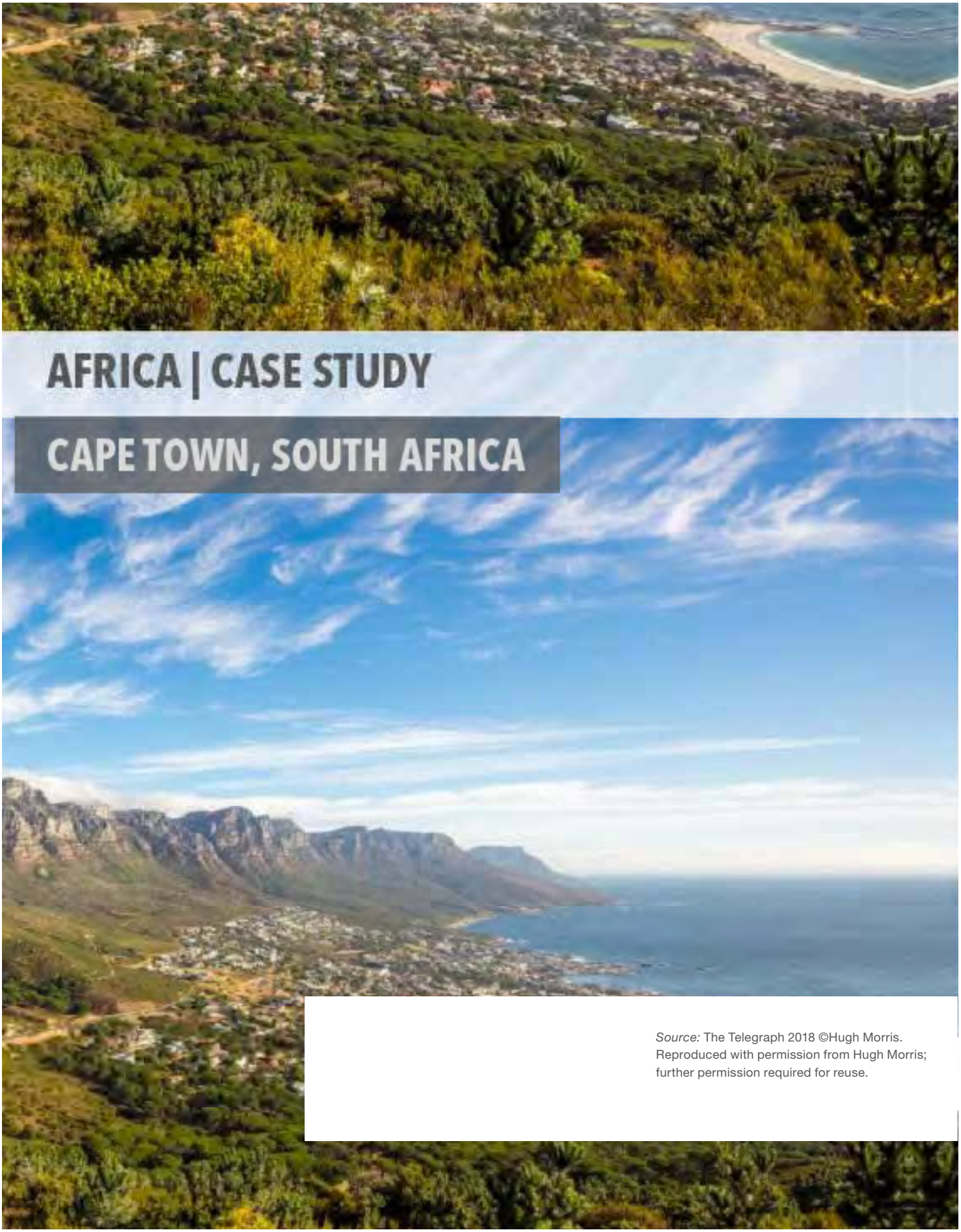
Although Santiago created a widely used and integrated BRT and Metro system with Transantiago, the project had various roadblocks that should be learned for in applying BRT and Metro systems to other contexts. The first of these roadblocks was the lack of inter-agency collaboration in the planning of the system. In theory, this advisory commission provided an organized method of involving various government agencies, however, the tactic failed to include lower-level agencies and public input. A way to improve from this aspect of the project is the need for institutional coordination, which the project was successful in achieving, but also the inclusion of those that will use, operate and interact with the transit system on a daily basis. Another roadblock of the project is its potential concerns with regards to affordability, both with regards to fare and housing around the corridor. A way to improve this would be to develop transit with social issues and inclusivity in mind. This should be a priority in all context.

KEY LESSONS

1. The following key takeaways should be derived from the Santiago example:
2. Santiago's overall strategy for improving the shortcomings of these systems was an integrated multi-modal system inclusive of a BRT and an expanded Metro network.
3. Transantiago was based on two objectives: complementation and integration
4. Affordable housing includes strategic mixing of different income groups and better transportation integration.

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CAPE TOWN, SOUTH AFRICA

QUICK FACTS

Geographic Context
Africa (South Africa)

Scale
City, Neighbourhood, and Corridor

Context
Urban and Suburban

Mode of Higher Order Transit
BRT

Size of City (Population)
3.7 million (Tier 2)

Case Study Covered in WB Publication
Yes

URBAN CONTEXT

Cape Town, South Africa is the second largest city in South Africa, after Johannesburg, with a population of over 3.7 million people. [1] The population is dispersed across close to 2500 square km of land, providing for a population density of 1,480 per square km, which is also lower than that of Johannesburg. [2] By 2030 the population is projected to only increase slightly to about 4.3 Million.[5] Unique to the South African context, when comparing it to other low-mid income cities, is its quite high proportion of citizens living under the poverty line. Over 36% of Cape Town's citizens are below the poverty line, with 4 % having no access to electricity and almost 10% without access to sanitation. [2] With such a high proportion of its citizens in need of social assistance, the 2010 World Cup in South Africa provided a valuable opportunity to the city to improve its social services, specifically adequate public transportation for low-income households.

At the national level, 12 cities were chosen to receive extra support to upgrade and integrate all modes of public transport to better host the event. Nine of the 12 cities were host cities to World Cup events, including Cape Town and Johannesburg among other cities. The BRT in Cape Town is still functioning and can be considered to be Africa's second system after Johannesburg's Rea Vaya.

OVERALL TOD STRATEGY & CITY STRUCTURE

The MyCiTi service forms part of an economic development strategy reliant on integrated transportation in the City of Cape Town (CoCT) in South Africa. In 2010, MyCiTi opened two pilot routes for the 2010 World Cup. The following year, the City of Cape Town began full services on MyCiTi's 16km corridor, rated bronze-standard. [4] The system continues to expand and servces the city center and airport.

MyCiTi began operations in May 2010, shortly before the FIFA World Cup, providing a shuttle service from the Civic Centre to Cape Town International Airport. It also included a temporary route around the City Bowl for the World Cup specifically. The first proper Bus Rapid Transit (BRT) phase (Phase 1A) opened in May 2011.[4] Characterized by features beyond those of traditional bus services, such as exclusive bus lanes, frequent timetables and an automated fare system, MyCiti is Cape Town's version of Bus Rapid Transport (BRT). It is an unprecedented public transport venture for the city, implemented in the hope of providing greater mobility to the majority of the population. [4]

By 2015, MyCiTi provided a BRT service and feeder services in most areas of the city, including low-income areas disadvantaged by their distances from the amenities and employment opportunities concentrated in the center. [4]

In addition to the BRT, concurrent ITDP work has included bringing the Access Africa program to Cape Town. This program intends to allow health care workers to visit more patients daily by providing bicycles to low-income health care workers who traditionally would work long hours and only access patients by foot. [4]

KEY STAKEHOLDERS & GOVERNMENT RELATIONSHIPS

The Institute of Transportation and Development (ITDP) began working in the City of Cape Town in 2002, initially focused on building support for the concept of BRT. They would become one of the largest and most vital stakeholders in driving the improvement of public transportation in Cape Town. Through workshops and the exchange of international best practices – particularly bringing in experts involved in the implementation of Bogota's gold-standard TransMilenio – support for the BRT grew. [4] In 2007, ITDP joined the team creating the business plan and financial model for the MyCiTi BRT, and helped guide the project to success.[4]

As part of the process, ITDP assisted with the formalization of Cape Town's existing informal public transport industry, empowering small business owners to enter the formal market and transform into competitive companies. [4] Like in Johannesburg, the BRT system is now operated by companies comprised of former taxi operators. [4]

That said, MyCiTi service was largely a public funded initiative. One can argue that the success of the BRT necessitates greater integration of private sector participation at the outset, rather than the private sector waiting to see the success of the system.[4] The time horizon for such a scheme – which aims to have connected the entire city by 2030 – must take into account the long and difficult processes of navigating land changes, poor spatial legacies, uncertainty surrounding the minibus taxi industry, and major shifts in societal attitudes towards public transport.

DESIGN STRATEGIES TO ENCOURAGE TRANSIT USE

The MyCiTi Integrated Rapid Transport system was very unique compared to other BRT systems in the sense that it incorporated all the other motorized and non-motorized transport methods that had already existed in the area into one cohesive new system instead of replacing them. By doing so MyCiTi was able to design a system that encompassed a passenger's entire journey, including arriving to the bus system from over 50m away, to easily being able to board the vehicles, and to be able to report any problems that may have occurred along the way. The system paid specific attention to accessibility to all. The stations provide level, seamless boarding onto vehicles through the use of dedicated boarding points, wheelchair accessible toilets, and wide entrance gates. The new fleets include low floor kneeling vehicles with level entry and wheelchair seating. They also have created "Kassel Kerbs" which allows drivers to position their vehicle close to the bus stops without tire damage.[5]

Along with accessibility, MyCiTi has also planned the wayfinding of the area to help encourage usage. In each station is equipped with audio LED screens and service information in a wide variety of formats. Outside the station is door to station infrastructure to lead the way from anywhere in town. They did this by providing tactile signage, tactile paving, and dedicated customer support staff to help lead the way.[5]

Due to the incredible design of the stations, the influence is spreading the rest of the city. The growth in commuter numbers, private developers and local businesses is bringing value to the area and encouraging public growth, public investment, and new development to occur.

INCLUSIVE & AFFORDABLE TOD SYSTEMS

Many sources point to the BRT system's potential as representative of a healthy democracy. Such a characteristic, similar to environmental benefits, the mixing of different backgrounds, or more equitable access to amenities, all of which are important barriers to Cape Town's prosperity, hasn't been evaluated through a cost-benefit analysis or other quantifiable measures. To paraphrase a comparison by Enrique Peñalosa, who championed the BRT system when he was the mayor of Bogotá in Colombia, a city now renowned for its thriving public transport system: "that thirty people on a bus can zoom past a Maserati with one person in, because thirty people should get thirty times the space as one person, no matter how much money they make. That's true democracy." [3]

With such vast poverty experienced in Cape Town, achieving a truly democratic system of transport is an essential priority going forward. With simple necessities such as sanitation and electricity unachievable for many South African households, public subsidy and increased affordability of transit should be explored to encourage heightened use. Without this affordability, modal preferences will remain dominated by cars (for higher-income households) and walking or cycling (for lower income households).

IMPLEMENTATION OF TRANSIT ORIENTED DEVELOPMENTS

APPROXIMATE TIMELINE

- **2002-** The Institute of Transportation and Development (ITDP) began work in Cape Town
- **2007-** IDTP created business plan and financial model for MyCiTi BRT
- **2010-** Opened two pilot routes to operate during 2010 World Cup
- **May 2010-** MyCiTi began operations
- **May 2011-** Bus Rapid Transit (BRT) Phase 1A opened
- **2015-** MyCiTi provided a BRT service between 8 cities with additional feeder services
- **2030-** Goal year for entire city to be connect with MyCiTi

ACTIONABLE STEPS

1. Identify needs/ Take Inventory
2. Establish Transportation Department
3. Create Strategy Plan (Phases)
4. Identify Key Stakeholders
5. Find Funding
6. Integrate Existing Operators with New Operators
7. Optimize/ Utilize Land Value
8. Create Design Strategies to Encourage Transit Use

KEY LESSONS LEARNED AND BEST PRACTICES

SUMMARY

The 2010 World Cup in South Africa provided a valuable opportunity to the city to improve its social services, specifically adequate public transportation for low-income households. Building a BRT system through MyCiTi was not enough on its own. It was essential that it was affordable for all. Without this affordability, modal preferences would remain dominated by cars for the higher income households and walking and cycling for the lower income households.

ROADBLOCKS AND WAYS TO IMPROVE

Underlying the issue of low ridership levels was the greater challenge of how effectively BRT can operate within Cape Town's urban form. The roadblock of implementing BRT in a city characterized by long travelling distances for residents, meaning less revenue than in other denser cities, as well as peak periods when buses are virtually empty on their return trips.

Ways to improve to a successful BRT system is the concerted effort to develop urban areas around transit-oriented principles. Measures such as zoning land for dense, high-rise development around BRT corridors and constraining development further away from them would increase the ridership needed for BRT in Cape Town to be as impactful as possible.

KEY LESSONS

The following key takeaways should be derived from the Cape Town example:

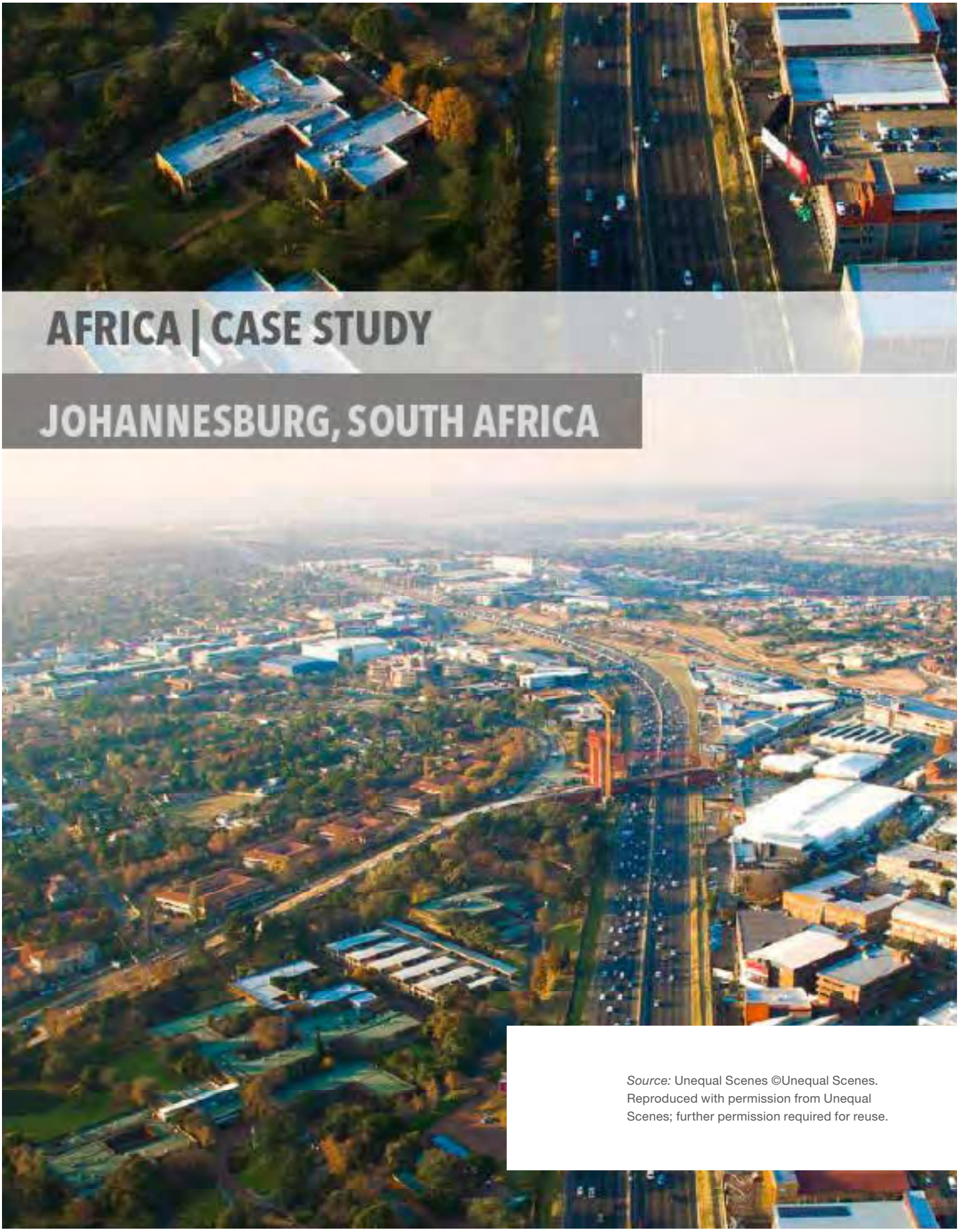
- Over 36% of Cape Town's citizens are below the poverty line
- The BRT system is now operated companies comprised of former minibus taxi operators.
- MyCiTi service was largely a public funded initiative
- Access Africa program was also incorporated, providing bikes to low-income health care workers

ENDNOTES

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AFRICA | CASE STUDY

JOHANNESBURG, SOUTH AFRICA



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JOHANNESBURG, SOUTH AFRICA

QUICK FACTS

Geographic Context
Africa (South Africa)

Scale
City, Neighbourhood, and Corridor

Context
Urban and Suburban

Mode of Higher Order Transit
BRT and Metro

Size of City (Population)
10 million (Tier 1)

Case Study Covered in WB Publication
Yes

URBAN CONTEXT

The political capital of the Republic of South Africa, Johannesburg is situated in Gauteng province, the most densely urbanized area of the Republic. It is home to an estimated 10 million people and has a population density of 2,900 people per square kilometer.[5] By 2030 Johannesburg is projected to grow to about 11.5 Million.[5] Despite a growing population and economy, there is extreme income disparity and around 63 percent of households do not own a car. [2]

In 2006, following municipal elections, the new Mayor created a transportation department with the aim of better organizing urban mobility. This entity became responsible for transport planning and regulation within the city boundary. [3]

Upon awarding of the 2010 (19th) FIFA World Cup event, Johannesburg took a keen interest in improving the transport system in order to live up to the projected image of being a 'World Class City'. In particular, Johannesburg would need to accommodate the fans and tourists that would visit during the events and Rea Vaya was planned and implemented as a result. [1]

Rea Vaya was the first full bus rapid transit (BRT) system to be implemented on the African continent and provides many learning experiences that can be replicated in other cities.

Its key objectives are:

- Economic growth
- Poverty alleviation
- Restructuring the apartheid city
- Sustainable development
- Good governance

TOD KP

OVERALL TOD STRATEGY & CITY STRUCTURE

The lack of investment in public transport, as well as the long distances (beyond a reasonable walk or bike trip) which separated home and the workplace in Johannesburg led directly to the growth of the informal 'taxi minibus' industry. Initially, this development was viewed as a positive 'entrepreneurial' trend as it required little to no state control.

The ability of the private sector to make money with low levels of investment quickly led to an oversupply and intense competition between service providers. By the 1990s, as in many cities across the developing world, the situation had degenerated into a system that served the operators, while simultaneously marginalizing the user with poor travel times, high fares and unsafe vehicles driven by drivers with poor skills.[3]

Johannesburg's bus rapid transit system Rea Vaya has saved South Africa as much as $890 million so far in reduced travel time, improved road safety and reduced carbon emissions, according to a recent report by the New Climate Economy, a project affiliated with the World Resources Institute.[4]

LAND TENURE & LAND VALUE CAPTURE

The Rea Vaya provided enhancements to the surrounding areas creating an increase in land values for neighboring property owners. Some of these enhancements include:

- Increases in regional productivity
- Enhanced employment accessibility;
- Environmental Benefits

KEY STAKEHOLDERS & GOVERNMENT RELATIONSHIPS

One of the most challenging aspects of implementing any transport reform is the resistance to change by those benefiting most from the present system. In much of the developing world this usually means the informal minibus owners and drivers.[1]

In Johannesburg, much of the resistance to changes in transport organization came from the powerful taxi unions. These strong groups made a solid defense of their right to operate unhindered and un-regulated. This was identified early on as a major challenge to successful public transportation implementation.

Today, there are four levels of institutions responsible in some way for transport in South Africa. There are national, regional (provincial), city or metropolitan area and local or district bodies.[1] The national Ministry of Transport is responsible for policy and legislation for transport. It is also responsible for:

- Implementing national policy and legislation;
- Coordinating the functions of the Department of Transport
- Preparing and initiating legislation
- Performing any other executive function provided for in the Constitution or in national legislation.

The Gauteng Provincial Government's role is to ensure the implementation of national policy across the province by providing oversight.[3] A creation of a new body called the Gauteng Transport Management Authority became responsible for improving transport at the regional-level and in setting quality standards and norms. The Gauteng Intermodal Strategic Public Transport Network (GISPTN) forms the basis for reform and requires linkage between the road and rail networks. It also prioritized public transport services and investments in developing infrastructure.[3]

In 2003, the City of Johannesburg formulated an Integrated Transport Plan (ITP) signed by the political head of province, as well as the Minister of Transport. It consisted of the priority for public transport, improvements to curbside lanes, infrastructure for commuters, better signage and improved passenger information.[3] These improvements really gave minibuses a better traffic environment to function.

Typically in transport, there is a split in responsibility between national and city governments that can be challenging to resolve. There was also the additional challenge of engaging existing operators and establishing a forum under which they can productively participate in the eventual delivery of mass transit. The technical skills required for planning are complex and often do not exist at the local-level. Thus, it was not until city officials and the Mayor became aware of the system in Bogotá, Columbia that the idea of BRT for Johannesburg was born.

The new city administration decided to more aggressively explore BRT systems in other cities, specifically Bogotá, Columbia and Guayaquil, Ecuador. Through a step-by-step approach, Johannesburg established a planning and development department for the delivery of the BRT.[3] The BRT system had to be planned within a fairly constrained urban environment, both financially and in land provision. It would be planned as the backbone of a future transport system interconnected with rail to provide high levels of accessibility and capacity.[3]

DESIGN STRATEGIES TO ENCOURAGE TRANSIT USE

Attention was given to making the system and stations functional and attractive.[3] This included pre-paid boarding; level boarding for full accessibility; multiple stopping bays; and secure, weather-protected stations. Stations have been designed with the local urban environment in mind and aesthetics were prioritized, commissioning local artists to add character and culture to bus stops.[3]

BUS MANAGEMENT SYSTEM USING INTELLIGENT TRANSPORT SYSTEMS (ITS)

A robust but affordable bus management system was required in the context of Johannesburg. The Automatic Public Transport Management System (APTMS) was developed by a private consortium to deliver an ambitious range of information and services, including dynamic passenger information.[4]

Passenger information provision was a new concept to both those providing public transport and those using it.[4] Traditionally, minibuses were merely numbered or known by the drivers' names and routes varied and stop locations were unpredictable. The concept of having a set timetable and frequency was, therefore, a learning curve for drivers and passengers.[4]

INCLUSIVE & AFFORDABLE TOD SYSTEMS

It was also agreed that the development of Rea Vaya would be employment neutral, providing an equal number of jobs to citizens as those that were lost. It was also decided that it should have a strong identity and brand image – and the concept Rea Vaya 'we are going' was adopted.[3]

Since its inception, 700 permanent jobs have been created in Phase 1A and some 3300 temporary jobs during the construction period.[4] Efforts have been made to design a system that is accessible to those with mobility impairments, such as level boarding at the BRT stations. This system has been a considerable benefit to all levels of society, but especially to women as minibuses were often unsafe, especially at night.[4] The stations are manned, the surroundings are monitored and initial overcrowding of the service has now been overcome, solving many of the grievances with former minibus service.

Executive Mayor Parks Tau stated "Left to the forces of the market alone, the poor would be cast to the edges of the city, huddled together in crowded shacks, trapped there by the cost of mobility," Mayor Tau said in his address. "This is exactly what we seek to disrupt and transform when we speak of confronting apartheid spatial patterns."[7] Rea Vaya created the ability to have mixed-use, mixed-class development, and focuses on location and affordability of housing.

TOD KP

IMPLEMENTATION OF TRANSIT ORIENTED DEVELOPMENTS

APPROXIMATE TIMELINE [6]

- **2003-** The City of Johannesburg formulated an Integrated Transport Plan (ITP)
- **November 2006-** A transportation department was created within the city of Johannesburg's government
- **October 2007-** Rea Vaya BRT construction begins
- **April 2009-** Beginning of Phase 1A
- **August 2009-** First bus began operating
- **June 2010-** FIFA World Cup 2010 awarded 12 cities infrastructure funding.
- **February 2011-** Taxi industry shareholders hand over their operating licensed and equity in return for share in Rea Vaya.
- **October 2013-** Phase 1 completed

ACTIONABLE STEPS

1. Identify needs/ Take Inventory
2. Create Strategy Plan (Phases)
3. Establish Transportation Department
4. Identify Key Stakeholders
5. Find Funding
6. Mitigate Competition
7. Create Brand
8. Market Plan
9. Optimize/ Utilize Land Value
10. Create Design Strategies to Encourage Transit Use

KEY LESSONS LEARNED AND BEST PRACTICES

SUMMARY

The successful implementation of Rea Vaya is a real milestone in Africa, a place which has suffered, particularly low-income populations, lacking formal public transport for the past 25 years. An affordable but high-quality bus system has been put in place, while also overcoming significant political challenges that have hampered initiators before them. In addition, it has saved South Africa $890 Million so far by reducing travel time improving road safety, and cutting down on carbon emissions.[4]

ROADBLOCKS AND WAYS TO IMPROVE

One of the most challenging aspects of implementing any transport reform is the resistance to change by those benefiting most from the present system. In much of the developing world this usually means the informal minibus owners and drivers, which fought to remain unregulated in the case of Johannesburg.[1]

To improve this relationship, Johannesburg created a plan that integrated all forms of transportation with political support. The plan consisted of modest priority for public transport, both minibus taxis and buses, improvements to curbside lanes, modest infrastructure for commuters, better signage and improved passenger information. 3These improvements really gave minibuses a better traffic environment to function rather than creating a proper public transport network across the city.

KEY LESSONS

The following key takeaways should be derived from the Johannesburg example:

- Rea Vaya was designed to address historical inequalities, increase civic pride and to provide safe, affordable transport
- Inclusion of a strong and powerful informal sector into formal and professional transport planning
- Marketing plan was highly inspired by the Transmilenio in Bogota
- Project was employment neutral- creating at least as many jobs as it removed.

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TOD K P

TOD KP

GLOSSARY OF TERMS



TOD Global Platform for Sustainable Cities WORLD BANK GROUP IBI

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GLOSSARY OF TERMS

ACTIVE USES

Land uses, such as retail, coffee shops, storefronts, cafes, restaurants and hawkers zones, which keep the area active with pedestrian activity at street level and maintain visual interest, are termed as active uses.

AFFORDABLE HOUSING

Affordable housing provides housing mainly for those whose income is below the median household income. Both the private sector and government in India are exploring options for creating housing for low-income groups. The Government of India, both at central and state level has initiated various schemes to assist in the delivery of affordable housing. It includes public sector working as a facilitator and engaging the private sector to build housing, with rental units that are subsidized by the government through rental subsidy programs.

ANNUAL DEPRECIATION ALLOWANCE

Annual depreciation allowance is the amount of tax deduction allowed by the tax code that investment property owners may take each year until the entire depreciable asset is written off.

To calculate, you must first determine the depreciable basis by computing the portion of the asset allotted to improvements (land is not depreciable) and then amortizing that amount over the asset's useful life, as specified in the tax code: Currently 27.5 years for residential property and 39 years for non-residential.

Property Value x Percent Allotted to Improvements

= Depreciable Basis

Then,

Depreciable Basis ÷ Useful Life

= Annual Depreciation Allowance

ASSET

In financial accounting, an asset is an economic resource. Anything tangible or intangible that can be owned or controlled to produce value and that is held by a company to produce positive economic value is an asset.

BUSINESS IMPROVEMENT DISTRICT (BID)

A business improvement district (BID) is a defined area within which businesses are required to pay an additional tax (or levy) in order to fund projects within the district's boundaries. The BID is often funded primarily through the levy but can also draw on other public and private funding streams. These districts typically fund services, which are perceived by some businesses as being inadequately performed by the government with its existing tax revenues, such as cleaning streets, providing security, making capital improvements, construction of pedestrian and streetscape enhancements and marketing the area. The services provided by BIDs are supplemental to those already provided by the municipality[1]. The revenue is derived from a tax assessment on commercial property owners and in some cases, residential property owners.

BREAK-EVEN RATIO (BER)

BER is a ratio some lenders calculate to gauge the proportion between the money going out to the money coming, so they can estimate how vulnerable a property is to default on its debt if rental income declines. BER reveals the percent of income consumed by the estimated expenses.

(Operating Expense + Debt Service) ÷ Gross Operating Income

= Break-Even Ratio

BER results:

Less than 100% - expenses consuming less than available income

Greater than 100% - expenses consuming more than available income

BROWNFIELD REDEVELOPMENT

Development on a brownfield site is commonly referred to as Brownfield redevelopment. Brownfield sites are abandoned or underused industrial and commercial facilities available for reuse. Expansion or redevelopment of such a facility is often complicated by real or perceived environmental contaminations. The land may be contaminated by low concentrations of hazardous waste or pollution and has the potential to be reused once it is cleaned up. Land that is more severely contaminated and has high concentrations of hazardous waste or pollution,

such as a superfund site, does not fall under the brownfield classification.

BUS RAPID TRANSIT (BRT)

BRT systems use buses or specialized vehicles on roadways or dedicated lanes to transport passengers without interference from other traffic. Such systems usually include dedicated bus lanes, signal priority at intersections, off-bus fare collection to speed up boarding, level boarding (low-floor buses or high-level platforms) to speed up boarding and enhance accessibility and enclosed stations.

CAP RATE

This popular return expresses the ratio between a rental property's value and its net operating income. The cap rate formula commonly serves two useful real estate investing purposes: To calculate a property's cap rate, or by transposing the formula, to calculate a property's reasonable estimate of value.

Net Operating Income ÷ Market Value

= Cap Rate

Or,

Net Operating Income ÷ Cap rate

= Market Value

CAPACITY

The maximum number of people that can be carried past a given location during a given time period under specified operating conditions, without unacceptable delay, hazard, or restriction, and with reasonable certainty

CAPACITY BUILDING

Capacity building (or capacity development) is the process by which individuals and organizations obtain, improve and retain the skills, knowledge, tools, equipment and other resources needed to do their jobs competently or to a greater capacity (larger scale, larger audience, larger impact, etc).

CAPITAL INVESTMENT

Capital investment refers to funds invested in a firm or enterprise for the purpose of furthering its business objectives. Capital investment may also refer to a firm's acquisition of capital assets or fixed assets, such as manufacturing plants and machinery that is expected to be productive over many years.

CASH FLOW AFTER TAX (CFAT)

CFAT is the amount of spendable cash that the real estate investor makes from the investment, after satisfying all required tax obligations.

Cash Flow Before Tax - Tax Liability

= Cash Flow After Tax

CASH FLOW BEFORE TAX (CFBT)

CFBT is the number of dollars a property generates in a given year after all expenses, but in turn still subject to the real estate investor's income tax liability.

Net Operating Income - Debt Service - Capital Expenditures

= Cash Flow Before Tax

CASH ON CASH RETURN (COC)

CoC is the ratio between a property's cash flow in a given year and the amount of initial capital investment required to make the acquisition (e.g., mortgage down payment and closing costs). Most investors usually look at cash-on-cash, as it relates to cash flow before taxes during the first year of ownership.

Cash Flow Before Taxes ÷ Initial Capital Investment

= Cash on Cash Return

CATALYST PROJECTS

Catalyst projects are public or private projects that are planned and designed to cause a corresponding and complementary development reaction to surrounding properties. They are projects of sufficient magnitude to stimulate redevelopment of underdeveloped properties or major rehabilitation of underutilized buildings. The identification and implementation of catalyst projects provide an opportunity for public and private investments to receive a reasonable return. The measure of return on investment can include jobs creation, increase in land value, improved transportation and access and new housing units.

CENTRAL BUSINESS DISTRICT (CBD)

The heart of an urban area, usually located at the meeting point of the city's transport systems, containing a high percentage of shops and offices. High accessibility leads to high land values,

and therefore intensive land use. Consequently, development is often upwards. Within the CBD, specialist areas, such as a jewelery quarter, benefit from external economies. Vertical land-use zoning is also common, so that retail outlets may be on the ground floor, with commercial users above them and residential users higher up.

CENTRALITY

In graph theory and network analysis, indicators of centrality identify the most important nodes. Centrality can be used to identify the most influential people in a social network, key infrastructure nodes in the Internet or urban networks, and superspreaders of disease. Betweenness, closeness, and degree centrality are the three most important indicators for transit networks.

CLOSENESS CENTRALITY

A measure of accessibility to a node within a network that measures the inverse of the sum of the distances of a node from all other nodes.

COMPLETE STREET

Road design philosophy where road space is allocated to safely balance the needs of all road users, including pedestrians, cyclists, transit and motorists. Transportation choice is increased when safe and appealing options for getting from place to place are provided- options to walk and bike provide opportunities for increased community health and reductions in air and noise pollution.

CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED)

Crime Prevention Through Environmental Design (CPTED) is a multi-disciplinary approach to deterring criminal behavior through environmental design. CPTED strategies rely upon the ability to influence offender decisions that precede criminal acts. As of 2004, most implementations of CPTED occur solely within the built environment.

DEBT COVERAGE RATIO (DCR)

DCR is a ratio that expresses the number of times annual net operating income exceeds debt service (e.g. total loan payment, including both principal and interest).

Net Operating Income ÷ Debt Service

= Debt Coverage Ratio

DCR results:

Less than 1.0 - not enough NOI to cover the debt

Exactly 1.0 - just enough NOI to cover the debt

Greater than 1.0 - more than enough NOI to cover the debt

DEGREE CENTRALITY:

Number of times a node has with other nodes in a network. In transit networks, interchange stations between many lines or modes (hubs) have a high degree centrality.

DEVELOPMENT CONTROL REGULATIONS (DCRS)

DCRs are the primary regulatory tool used to guide development that ultimately shapes a city's urban form and functions. It includes guiding the development and use of land, built environment FAR's, density, heights, setbacks and the public realm. Critical to the success of an efficient and effective transit system is the combination of basic employment opportunities and a mix of housing typologies supported with major retail, civic, cultural, entertainment and community facilities. The DCRs, which are currently proposed as blanket for the entire city, need to be revisited and should be modified into more context-specific Development Code Regulation.

DEVELOPMENT PLAN

It is an aspect of town and country planning comprised of a set of documents that set out the local authority's policies and proposals for the development and use of land in their area. The development plan guides and shapes day-to-day decisions as to whether or not planning permission should be granted, under the system known as development control or development management. In order to ensure that these decisions are rational and consistent, they must be considered against the development plan adopted by the authority, after public consultation and having proper regard to other material factors.

EMPLOYMENT DENSITY

Number of jobs in an area.

ENCLOSURE

Degree to which buildings, walls, trees, and other vertical elements define streets and other public spaces.

FLOOR AREA RATIO (FAR)/FLOOR SPACE INDEX (FSI)

The FAR or FSI is the ratio of the total floor area of buildings at a certain location, to the size of the land at that location, or the limit imposed on such a ratio.

As a formula: Floor Area Ratio= (Total covered area on all floors of all buildings on a certain plot)/(Area of the plot).

Thus, an FSI of 2.0 would indicate that the total floor area of a building is two times the gross area of the plot on which it is constructed, as would be found in a multiple-storey building.

FEEDER BUS ROUTES

A feeder bus route is a bus service that picks up and delivers passengers to a higher order transit station, such as a rapid rail transit station, express-bus stop or terminal.

FORM-BASED CODE

Form-based codes foster predictable built results and a high-quality public realm by using physical form (rather than separation of uses) as the organizing principle for the code. These codes are adopted into city or county law as regulations, not mere guidelines. Form-based codes are an alternative to conventional zoning.

Form-based codes address the relationship between building facades and the public realm, the form and mass of buildings in relation to one another and the scale and types of streets and blocks. The regulations and standards in form-based codes, presented in both diagrams and words, are keyed to a regulating plan that designates the appropriate form and scale (and therefore, character) of development, rather than only distinctions in land-use types. This is in contrast to conventional zoning's focus on the micro-management and segregation of land uses and the control of development intensity through abstract and uncoordinated parameters (e.g., FAR, dwellings per acre, setbacks, parking ratios, traffic LOS) to the neglect of an integrated built form. Not to be confused with design guidelines or general statements of policy, form-based codes are regulatory, not advisory.

FUTURE VALUE (FV)

FV shows what a cash flow or series of cash flows will be worth at a specified time in the future. FV is calculated by "compounding" the original principal sum forward in time at a given "compound rate".

GROSS VEHICLE MASS (GVM)

Gross vehicle mass is the maximum operating weight/mass of a vehicle as specified by the manufacturer [1], including the vehicle's chassis, body, engine, engine fluids, fuel, accessories, driver, passengers and cargo, but excluding that of any trailers. [2]. The term is used for motor vehicles and trains.

The weight of a vehicle is influenced by passengers, cargo, even fuel level, so a number of terms are used to express the weight of a vehicle in a designated state. Gross combined weight rating (GCWR) refers to the total mass of a vehicle, including all trailers. GVWR and GCWR both describe a vehicle that is in operation and are used to specify weight limitations and restrictions.

GREENFIELD DEVELOPMENT

Greenfield development is the creation of planned communities on previously undeveloped land. This land may be rural, agricultural or unused areas on the outskirts of urban areas. Unlike urban sprawls, where there is little or no proper suburban planning, greenfield development is about efficient urban planning that aims to provide practical, affordable and sustainable living spaces for growing urban populations. The planning takes future growth and development into account, as well as avoiding the various infrastructure issues that plague existing urban areas.

GROSS OPERATING INCOME (GOI)

GOI is gross scheduled income after vacancy and credit loss, plus the income derived from other sources such as coin-operated laundry facilities. Consider GOI as the amount of rental income the real estate investor actually collects to service the rental property.

Gross Scheduled Income - Vacancy and Credit Loss + Other Income

= Gross Operating Income

GROSS RENT MULTIPLIER (GRM)

GRM is a simple method used by analysts to determine a rental income property's market value, based upon its gross scheduled income. You would first calculate the GRM using the market value at which other properties are sold and then apply that GRM to determine the market value for your own property.

Market Value ÷ Gross Scheduled Income

= Gross Rent Multiplier

Then,

Gross Scheduled Income x Gross Rent Multiplier

= Market Value

GROSS SCHEDULED INCOME (GSI)

GSI is the annual rental income a property would generate if 100% of all space was rented and all rent was collected. If vacant units do exist at the time of your real estate analysis, then include them at their reasonable market rent.

Rental Income (actual) + Vacant Units (at market rent)

= Gross Scheduled Income

HIGHER ORDER TRANSIT

Higher order transit refers to a transit service that operates on a dedicated right-of-way or in a priority situation, and therefore moves more efficiently than the regular flow of traffic and can carry large numbers of people quickly and comfortably. Examples of higher order transit include buses that have dedicated lanes, metro and commuter rail, which operate on their own separate tracks.

HISTORICAL DAILY PEAK HOUR FACTOR

The ratio of Peak Hour Peak Direction Passenger Demand for a typical route (i.e. representative of the system as a whole) to its total daily boardings in both directions. His factor helps to convert daily passenger flows into peak hour passenger flows. It should be ideally be determined by looking at historical data. Please note that this factor is usually higher for public transport as compared to total traffic.

INFILL DEVELOPMENT

Infill development is the term used for new development within existing communities on previously underutilized sites, typically at a higher density. Good infill developments fit in seamlessly within the existing urban fabric and the contributing elements include: setback- the distance from the front facade of the house to the street and should be the same distance as other houses on the street, height- which should be compatible with the height of buildings surrounding the lot and mass- the bulk of the house.

INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)

It refers to technologies that provide access to information through telecommunications. It is similar to Information Technology (IT), but focuses primarily on communication technologies. This includes the internet, wireless networks, cell phones and other communication mediums.

INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

ITS refers to the application of information and communication technologies to transportation infrastructure and vehicles.

INTENSIFICATION

Urban intensification is the construction and reconstruction of compact communities in the existing built-up area of the city. Intensification includes new development, which raises the density on sites and within communities. These compact communities are supportive of transit, cycling and are pedestrian-friendly and promote local jobs and services.

INTERMODAL TRANSIT HUB

Intermodal Transit Hubs are stations or centres where a range of different transportation modes (i.e. cycling, walking, metro, private vehicle, bus, autos and taxis) come together and allow for easy transfers from one mode to another. They can also facilitate transfers at different scales: local, regional and intercity.

INTERNAL RATE OF RETURN (IRR)

This popular model creates a single discount rate, whereby all future cash flows can be discounted until they equal the investor's initial cash investment. In other words, when a series of all future cash flows is discounted at IRR, that present value amount will equal the actual cash investment amount.

LAND AMALGAMATION

Amalgamation can relate to the combining of one or more allotments to create one single parcel of land. It is required for the purpose of assembling land for urban expansion, infill development, or redevelopment. In this process, the original landowners or occupants voluntarily contribute a certain percentage of their land to the government or other project initiators, and in return receive compensation in the form of money, or serviced land, or any other form.

LAND VALUE CAPTURE (LVC)

Land value capture is a policy approach that enables communities to recover and reinvest land value increases that result from public investment and other government actions.

Common land value capture tools include: transferable development rights, betterment contributions, public land leasing, inclusionary housing and zoning, linkage or impact fees, business improvement districts and certain applications of the property tax. These tools can help finance transit and infrastructure improvements, affordable housing, parks and open spaces, utility upgrades and other critical services. With this additional funding, local and regional governments can more sustainably advance municipal fiscal health, enable infrastructure investment and address the challenges of sustainable urbanization.

LEGIBILITY

Ease with which people can create a mental map so that the spatial structure of a place can be understood and navigated as a whole.

LIGHT RAIL TRANSIT (LRT)

It is a form of urban rail transport using rolling stock similar to a tramway, but operating at a higher capacity, and often on an exclusive right-of-way. It operates primarily along exclusive rights-of-way and uses either individual tramcars or multiple units coupled to form a train that is lower capacity and lower speed than a long, heavy-rail passenger train or metro system.

A few light rail networks tend to have characteristics closer to rapid transit. Other light rail networks are tram-like in nature and partially operate on streets. Light rail systems are found throughout the world, on all inhabited continents. They have been especially popular in recent years, due to their lower capital costs and increased reliability compared with heavy rail systems.

LOAN TO VALUE (LTV)

LTV measures what percentage of a property's appraised value or selling price (whichever is less) is attributable to financing. A higher LTV benefits real estate investors with greater leverage, whereas lenders regard a higher LTV as a greater financial risk.

Loan Amount ÷ Lesser of Appraised Value or Selling Price

= Loan to Value

LOCAL TRANSIT

Public transport operating on fixed routes with frequent stops (100-400 m apart), generally in mixed traffic on surface roadways, relying heavily on walk access and egress.

LOCAL TRANSIT SERVICE AREA

The reasonably contiguous area served by the local transit network, not including regional services. Indicative extent would be the area within 1 km of regularly served local stops. This area does not include portions of the metropolis connected to the local service area solely by regional services.

LOCAL TRANSIT BOARDINGS

The annual number of passengers boarding local transit vehicles, counting separately each boarding made in the course of single journey or trip between origin and destination. Also known as unlinked passenger trips (UPT). Boardings on regional services should not be included in city totals when using this tool.

MASS RAPID TRANSIT

It is a type of high-capacity public transport, generally found in urban areas. Unlike buses or trams, mass rapid transit systems are electric railways that operate on an exclusive right-of-way, which cannot be accessed by pedestrians or other vehicles of any sort and which is often grade separated in tunnels or on elevated railways.

Modern services on rapid transit systems are provided on designated lines between stations, typically using multiple electric units on rail tracks, although some systems use guided rubber tires, magnetic levitation or monorail. The stations typically have high platforms, without steps inside the trains, requiring custom-made trains in order to minimize gaps between train and platform. They are typically integrated with other public transport and often operated by the same public transport authorities. However, some rapid transit systems have at-grade intersections between a rapid transit line and a road or between two rapid transit lines. It is unchallenged in its ability to transport large numbers of people quickly over short distances, with little to no use of land.

MARKET POTENTIAL VALUE

Unrealized market value of a station area, sometimes measured through a composite index considering major drivers of demand, including current and future human densities, current and future number of jobs accessible within 30 minutes by transit, and major drivers of supply (including the amount of developable land, potential changes in zoning, and market vibrancy).

MEAN LOCAL TRANSIT TRIP LENGTH

The average distance traveled by one public transit boarding passenger, calculated by dividing total local transit person-km by total local transit boardings

MIDBLOCK CROSSING

Midblock crosswalks facilitate crossings to places that people want to go, but that are not well served by the existing traffic network. These pedestrian crossings, which commonly occur at schools, parks, museums, waterfronts and other destinations, have historically been overlooked or difficult to access, creating unsafe or unpredictable situations for both pedestrians and vehicles.

MIXED-USE

Mixed uses are defined by a diverse mix of land uses, including housing, employment, regional attractions and public spaces, allowing people to walk to work or to shop rather than driving for all daily needs. It also includes vertical types of mixed-use development, like residential land use over the commercial uses, so that the distance between the activities is decreased and accessibility between different activities is increased.

MODE SHARE

Trips taken by a particular mobility choice, such as car, transit, cycling or walking, as a proportion of the total number of trips.

MULTI-MODAL TRANSPORT SYSTEM (MMTS)

Multi-Modal Transportation System (MMTS) explores the coordinated use of two or more modes of transport for efficient, safe, pleasant and comfortable movement of passengers in urban areas. It provides the convenient and economical connection of various modes to make complete journeys from origin to destination. Generally, MMTS has been characterized by increased capacity, efficient access and better location of both integration and nodes. Public transport is an important constituent of the multi–modal transportation system and hence, the local and regional public transportation system must be an integral part of the same.

MULTI-LEVEL CAR PARKING

Structured parking refers to an above- or below-grade structure designed to accommodate vehicle parking. This type of parking is more expensive than surface parking, but is a much more efficient use of land (a 3-storey parking structure requires a third as much land as a surface lot) and has long-term value for integrated mixed-use development.

MULTI-USE DEVELOPMENT

Multi-use development is a type of urban development that blends residential, commercial, cultural, institutional or entertainment uses, where those functions are physically and functionally integrated and provide pedestrian connections [1][2]. Mixed-use development can take the form of a single building, a city block or entire neighborhoods. The term may also be used more specifically to refer to a mixed-use real estate development project—a building, complex of buildings or district of a town or city that is developed for mixed-use by a private developer, (quasi-) governmental agency, or a combination thereof.

NET OPERATING INCOME (NOI)

NOI is a property's income after being reduced by vacancy, credit loss and all operating expenses. NOI is one of the most important calculations to any real estate investment because it represents the income stream that subsequently determines the property's market value– that is, the price a real estate investor is willing to pay for that income stream.

Gross Operating Income - Operating Expenses

= Net Operating Income

NET PRESENT VALUE (NPV)

NPV shows the dollar amount difference between the present value of all future cash flows using a particular discount rate– your required rate of return– and the initial cash invested to purchase those cash flows.

Present Value of all Future Cash Flows - Initial Cash Investment

= Net Present Value

NPV results:

Negative - the required return is not met

Zero - the required return is perfectly met

Positive - the required return is met with room to spare

NETWORK EXTENT

The number of kilometers of route in a public transport network, without double-counting kilometers where routes share the same path.

NODE VALUE

Measure of importance of a public transit station based on passenger traffic volume, intermodality, and centrality within the network; measured through a composite index.

NON-MOTORIZED TRANSPORTATION (NMT)

Non-motorised Transportation (also known as active transportation and human-powered transportation) includes walking and cycling and variants such as small-wheeled transport. It can be a very attractive mode of transport for relatively short distances, which make up the largest share of trips in cities. The key to reversing the trend toward more private vehicle use is making walking and cycling attractive, together with improving public transport. This can be done through a range of activities, including construction of sidewalks and bike lanes, bike sharing programmes, urban planning and pedestrian-oriented development. NMT is a highly cost-effective transportation strategy and brings about large health, economic and social co-benefits, particularly for the urban poor.

OPERATING EXPENSES

Operating expenses include those costs associated with keeping a property operational and in service. These include property taxes, insurance, utilities and routine maintenance. They do not include payments made for mortgages, capital expenditures or income taxes.

OPERATING EXPENSE RATIO (OER)

OER expresses the ratio (as a percentage) between a real estate investment's total operating expenses dollar amount to its gross operating income dollar amount.

Operating Expenses ÷ Gross Operating Income

= Operating Expense Ratio

OVERLAY ZONE

Overlay zone means a set of land use and development requirements designed to be applied over, or in addition to, the requirements of the underlying zone for a specific purpose, without removing or modifying the underlying zone.

PERT CHART (PROGRAM EVALUATION REVIEW TECHNIQUE)

A PERT chart is a project management tool used to schedule, organize and coordinate tasks within a project. A PERT chart presents a graphic illustration of a project, as a network diagram consisting of numbered nodes (either circles or rectangles), representing events or milestones in the project linked by labelled vectors (directional lines), representing tasks in the project. The direction of the arrows on the lines indicates the sequence of tasks.

PASSENGER-KILOMETERS TRAVELED

The total distance traveled by passengers on transit vehicles (for a single route or a system), which may be determined by multiplying the number of unlinked passenger trips by the average length of such trips.

PASSENGER TRAFFIC DENSITY

The total number annual transit passengers passing the average point along a system or route in both directions combined, formed by dividing system PKT by network extent (for a system) or route PKT by route length (for a single route).

PARK AND RIDE

Park and rides are car parking lots that offer transit users a place to park their car, then transfer to a public transit service to complete their journey. They are typically used in suburban locations where distances from destinations to transit service are further. Park and ride facilities should be visible from, and located along, heavily used commuter routes. They should be landscaped, weather resistant, well-lit and should contain a range of amenities.

PEDESTRIAN PLAZA

A public space that can act as an important organizing element within a station area, helping to facilitate transfers between modes, acting as receiving points for pedestrians and containing a range of services and amenities for transit users.

PEDESTRIAN-FRIENDLY DESIGN.

Design intended to enhance the pedestrian experience, typically through improved amenities (for example, attractive landscaping, lighting, and seating areas) and by improving the efficiency of walking (for example, small city blocks, grid street patterns, and high road connectivity that provide direct, less circuitous pathways).

PER CAPITA

For each person; in relation to people taken individually.

The term is used in a wide variety of social sciences and statistical research contexts, including government statistics, economic indicators and built environment studies.

PERMEABILITY

Extent to which urban forms permit the movement of people or vehicles in different directions.

PEAK HOUR PEAK DIRECTION PASSENGER DEMAND

The number of transit passengers carried in the peak hour in the peak direction. This occurs almost universally on weekdays and is measured for a single route at its maximum load point.

PUBLIC INFORMATION CENTER (PIC)

Public Information Centers aim to establish a more effective, centralized distribution mechanism to safeguard the integrity and accurate distribution of government information. Moreover, it serves as a vital framework for collecting public opinions and feedback through building a communication path between the public and the government. It shall be the information source where the government can pertain constant betterment in government administration.

The PIC tends to public inquiries, complaints, suggestions and provides a centralized communication channel with the government. It offers a one-stop service in the provision of government information.

PUBLIC-PRIVATE PARTNERSHIP (PPP)

A formal partnership between a public sector entity and a private corporation often used to construct and operate infrastructure facilities or develop certain urban areas.

PLACEMAKING

Placemaking is a term that began to be used in the 1970s by architects and planners to describe the process of creating squares, plazas, parks, streets and waterfronts that will attract people because they are pleasurable or interesting.

PLACE VALUE

Determinants of the attractiveness of a place, including amenities; schools; health care facilities; type of urban development; local accessibility to daily needs by walking and cycling; quality of the urban fabric around the station, in particular its pedestrian accessibility; small size of urban blocks and fine mesh of connected streets, which create vibrant neighborhoods; and mixed pattern of land use. It is measured through a composite index

POPULATION DENSITY

Population density is a measurement of population per unit area or unit volume; usually quoted per square kilometer or square mile (which may include or exclude, for example, areas of water or glaciers).

Commonly this may be calculated for a county, city, country, territory or the entire world.

PRESENT VALUE (PV)

PV shows what a cash flow or series of cash flows available in the future is worth in today's dollars. PV is calculated by "discounting" future cash flows back in time, using a given "discount rate".

PUBLIC-PRIVATE PARTNERSHIPS (PPP)

Public-private partnership (PPP) describes a government service or private business venture, which is funded and operated through a partnership of government and one or more private sector companies. These schemes are sometimes referred to as PPP or P3.

PPP involves a contract between a public-sector authority and a private party, in which the private party provides a public service or project and assumes substantial financial, technical and operational risk in the project. In some types of PPP, the cost of using the service is borne exclusively by the users of the service and not by the taxpayer. In other types (notably the private finance initiative), capital investment is made by the private sector on the strength of a contract with the government to provide agreed services and the cost of providing the service is borne wholly or in part by the government. Government contributions to a PPP may also be in kind (notably the transfer of existing assets). In projects that are aimed at creating public goods like in the infrastructure sector, the government may provide a capital subsidy in the form of a one-time grant, so as to make it more attractive to private investors. In some other cases, the government may support the project by providing revenue subsidies, including tax breaks or by providing

guaranteed annual revenues for a fixed period.

PPP involves many models, including Design-Build-Finance (DBF) and Design-Build-Finance-Maintain (DBFM).

PUBLIC REALM

The public realm consists of public spaces such as streets, parks and sidewalks. The public realm is also a place where the community can come together through collaborative activities, such as street festivals and other programmable activity.

RAPID TRANSIT

Public transport operating on fixed routes at a significantly higher average speed than local service, usually in exclusive rights-of-way and/or completely separated from surface traffic. Access depends on both walking and local public transport service. Stations are typically 800m-2km apart.

REAL ESTATE ASSESSMENT

The primary goal of the Real Estate Assessment Department is to ensure the fair and equitable assessment of all real property in the County of Gloucester, based on fair market value, with the end result being the fair and even distribution of the tax burden among all property owners.

REGIONAL TRANSIT

Public transport operating on fixed routes within and outside the local service area, offering higher average speeds than even rapid transit, with average station spacing usually longer than 2km. A large share of access may be by motorized transport.

REFUGE ISLAND

A refuge island, also known as a pedestrian refuge, pedestrian island and colloquially as a “pork chop” island, is a small section of pavement or sidewalk, completely surrounded by asphalt or other road materials, where pedestrians can stop before finishing crossing a road. It is typically used when a street is very wide, as the pedestrian crossing can be too long for some individuals to cross in one traffic light cycle. They can often been seen on roads with higher speed limits also.

RIGHT-OF-WAY (ROW)

A right-of-way is land that is used for transportation purposes, such as for a trail, driveway, rail line, street or highway. A right-of-way is often reserved for the purposes of maintenance or expansion of existing services.

ROAD DIETS

A road diet, also called a lane reduction or road rechannelization, is a technique in transportation planning whereby the number of travel lanes, and/or effective width of the road, is reduced in order to achieve systemic improvements.

SENSE OF PLACE

Though sense of place has been defined differently and used in different ways, it is often used in relation to characteristics that make a place special or unique, as well as to those that foster a sense of authentic human attachment and belonging.

SPECIAL ECONOMIC ZONE (SEZ)

A special economic zone (SEZ) is an area in which business and trade laws are different from the rest of the country. SEZs are located within a country’s national borders and their aims include: increased trade, increased investment, job creation and effective administration. To encourage businesses to establish in the zone, financial policies are introduced. These policies typically regard investing, taxation, trading, quotas, customs and labour regulations. Additionally, companies may be offered tax holidays, whereupon establishing in a zone they are granted a period of lower taxation.

SHARED PARKING

Shared parking is a land use/development strategy that optimizes parking capacity by allowing complementary land uses to share spaces, rather than producing separate spaces for separate uses. In effect, shared parking makes spaces publically accessible, rather than reserved for a particular tenant or property owner. It may be privately constructed and operated, depending on a contractual agreement, but should remain within the government’s jurisdiction for long-term transport planning purposes.

SIDE LANES

Side lanes are a type of bike lane in-between a main travel lane and a dedicated turn lane. They can help prevent conflicts between cyclists and motorists who wish to make a turn (this assumes there is a bike lane along the street on the preceding block or blocks).

SIGNAGE

Signage is wayfinding and instructional signs erected at the side of or above roads, to provide information to road users.

SIMULATION

Simulation is the imitation of the operation of a real-world process or system. The act of simulating something first requires that a model be developed; this model represents the key characteristics, behaviors and functions of the selected physical or abstract system or process. The model represents the system itself, whereas the simulation represents the operation of the system over time.

Simulation is used in many contexts, such as simulation of technology for performance optimization, safety engineering, testing, training, education and video games. Often, computer experiments are used to study simulation models. Simulation can be used to show the eventual real effects of alternative conditions and courses of action.

SOLID WASTE

Solid waste means any garbage, refuse or sludge from a wastewater treatment plant, water supply treatment plant or air pollution control facility. It also includes discarded materials, like solid, liquid, semi-solid or contained gaseous material, resulting from industrial, commercial, mining and agricultural operations and from community activities. It does not include solid or dissolved materials in domestic sewage or solid or dissolved materials in irrigation return flows or industrial discharges.

SPRAWL

A pattern of development characterized by uniform low density, lack of a distinctive core, poor accessibility, dependence on automobiles, and uncontrolled and noncontiguous land expansion.

SMART GROWTH

Smart growth refers to a collection of land use and development principles that aim to enhance our quality of life, preserve the natural environment and save money over time. Smart growth principles ensure that growth is fiscally, environmentally and socially responsible and recognizes the connections between development and quality of life. Smart growth enhances and completes communities by placing a priority on infill, redevelopment and densification strategies.

STATUTORY PLAN

A statutory plan is a legal document that must go through three readings and a public hearing before it is adopted. Once adopted, there is a legal obligation on the part of both the municipality and the residents to adhere to the plan.

STORMWATER

Stormwater is water that originates during precipitation events and snow/ice melt. Stormwater can soak into the soil (infiltrate), be held on the surface and evaporate or runoff and end up in nearby streams, rivers, or other water bodies (surface water).

STREET GRID NETWORK

The grid plan, street grid plan or gridiron plan is a type of city plan in which streets run at right angles to each other, forming a grid. These patterns display a higher degree of connectivity than other road hierarchical patterns, which feature dead-end streets and fewer through connections.

STREETSCAPE

It is a term used to describe the natural and built fabric of the street and defined as the design quality of the street and its visual effect. The concept recognizes that a street is a public place where people are able to engage in various activities. A streetscape needs to have boundaries to ensure safe travel for all roadway users. Signs, curbs, fences and landscaping can effectively create an inclusive, yet safe environment that provides a sense of physical comfort for diverse users and activities. The aesthetic appeal elements of beautification initiatives, attractive lighting, street furniture, clean streets and outdoor dining contribute to sense of place. Amenities should be designed to get people out of their cars to socialize, interact with their environment and discover other mobility options.

SWOT ANALYSIS

SWOT analysis (or SWOT matrix) is a strategic planning technique used to help a person or organization identify the Strengths, Weaknesses, Opportunities, and Threats related to business competition or project planning [1]. It is intended to specify the objectives of the business venture or project and identify the internal and external factors that are favorable and unfavorable to achieving those objectives

TAX INCREMENT FINANCING (TIF)

TIF is a method to use future gains in taxes to finance current improvements (which theoretically will create the conditions for those future gains). When a development or public project is carried out, there is often an increase in the value of surrounding real estate, and perhaps new investment. This increased site value and investment sometimes generates increased tax revenues. The increased tax revenues are the "tax increment." Tax Increment Financing dedicates tax increments within a certain defined district to finance debt issued to pay for the project. TIF is designed to channel funding toward improvements in distressed or underdeveloped areas where development might not otherwise occur. TIF creates funding for "public" projects that may otherwise be unaffordable to localities, by borrowing against future property tax revenues.

TAXABLE INCOME

Taxable income is the amount of revenue produced by a rental on which the owner must pay federal income tax. Once calculated, that amount is multiplied by the investor's marginal tax rate (i.e., state and federal combined) to arrive at the owner's tax liability.

Net Operating Income - Mortgage Interest - Depreciation, Real Property - Depreciation, Capital Additions - Amortization, Points and Closing Costs + Interest Earned (e.g., property bank or mortgage escrow accounts)

= Taxable Income

Then,

Taxable Income x Marginal Tax Rate

= Tax Liability

TRANSFERABLE DEVELOPMENT RIGHTS (TDR)

Transferable development rights are the transfer of rights to develop land, to government, local authorities or corporations. When an owner of land transfers his rights to develop their land to a government, local authority, corporation or government use, the same land is used for infrastructure projects such as road widening, metro rail projects, parks, gardens and schools or may be for making new roads or for any other projects of public utility. DRC (Development rights certificate) will then be issued to the owner of the land, the main purpose of the whole process being to aquire the required amount of land in a hassle-free manner. The DRC will allow the landowner an additional built-up area in return for the area for which their rights have been relinquished and enables them to develop the given area or transfer rights for consideration.

TIME VALUE OF MONEY

Time value of money is the underlying assumption that money, over time, will change value. It's an important element in real estate investing because it could suggest that the timing of receipts from the investment might be more important than the amount received.

TRANSFER OF DEVELOPMENT RIGHTS (HEIGHT AND DENSITY EXCHANGE)

Also called density bonusing, this tool offers developments a level of density that surpasses the allowable Floor Area Ratio (FAR). In exchange for increased height/density that surpasses the zoning by-law, developers are required to provide a service or benefit to the community as negotiated by the municipality, such as amenities or housing needed by the community. Density bonusing policies must be written into a municipality's Official Plan in order for it to be used as a development tool.

TRAFFIC CALMING

Traffic calming is intended to slow or reduce motor-vehicle traffic in order to improve safety for pedestrians and cyclists and improve the environment for residents. These may include narrower traffic lanes, speed bumps, raised pedestrian crossings and pedestrian refuge islands in medians, amongst others.

TRANSFORMER STATION

A station of an electricity generation, transmission and distribution system where voltage is transformed from high to low, or the reverse, using transformers

TRANSIT ADJACENT DEVELOPMENT (TAD)

Development that is in close proximity to transit stops or facilities. However, this type of development is not designed to promote transit ridership. A TAD lacks functional connectivity to transit, whether in terms of land-use composition, station access or site design.

TRANSIT-ORIENTED DEVELOPMENT (TOD)

Transit-oriented developments (TOD) are 'urban villages' where all residents are within a 5-10 minute walk of efficient public transit and can 'live, work, play, shop and learn' in a pedestrian-friendly environment- without the need of a car.

TOD is a planning approach that calls for high-density, mixed-use business/residential neighborhood centers to be clustered around transit stations and corridors. TOD is considered a "smart growth" strategy because it addresses the issue of where growth should occur from a sustainability perspective and it coordinates land use and transportation such that both land and infrastructure are used efficiently. As its name implies, TOD is designed to be served by transit, rather than or in addition to the automobile. Networks of streets and multi-use paths are also created to provide a walkable and bikeable environment that is conducive to living, working and shopping in the same area. TOD is focused within an 800m radius of transit stops, with the highest intensity and mix of land uses concentrated within one-quarter mile or adjacent to the station. Land use intensities and densities decrease away from the core area, with transitions included in development plans to ensure compatibility with existing neighborhoods.

Peter Calthorpe summarizes the main characteristics and goals of TOD as follows:

- Organize growth on a regional-level to be compact and transit-supportive.
- Place commercial, housing, jobs, parks and civic uses within walking distance of transit stops.
- Create pedestrian-friendly street networks, which directly connect local destinations.
- Provide a mix of housing types, densities and costs.
- Preserve sensitive habitat, riparian zones and high-quality open spaces.
- Make public spaces the focus of building orientation and neighbourhood activity.
- Encourage infill and redevelopment along transit corridors within existing neighborhoods.

TRANSIT PRIORITY SIGNALS

Traffic signal priority allows transit vehicles to travel through signalized intersections with little or no delay. Since transit vehicles hold many people, giving priority to transit can potentially increase the person throughput of an intersection. There are different types of signal priority: passive, active and real-time. A passive priority strategy uses timed coordinated signals in the area-wide traffic signal timing scheme. An active priority strategy involves detecting the presence of a transit vehicle and gives the transit vehicle special treatment. The system can give an early green signal or hold a green signal that is already displaying. Real-time control strategies can consider not only the presence of a transit vehicle, but the adherence to schedule and the volume of other traffic. One common strategy is to give priority only to late buses, but not to early buses. This strategy optimizes schedule adherence (and therefore waiting time) rather than running time.

TRANSIT SUPPORTIVE DEVELOPMENT (TSD)

TSD consists of a mix of housing, shops, restaurants, offices, civic buildings and open space in close proximity to a transit station. Transit-supportive planning and development rethink land use and development patterns to achieve a balanced transportation system where walking, cycling and riding transit are used more than the private automobile. This is primarily accomplished by designing communities so that walking, cycling and riding transit are more convenient and attractive options.

TRANSPORTATION DEMAND MANAGEMENT (TDM)

By influencing travel behavior through the implementation of strategies such as carpooling, parking management, cycling programs, flexible working hours, high occupancy vehicle lands and incentives for transit, walking and cycling, the resulting transportation system is more efficient.

URBAN REDEVELOPMENT

It is conceptually similar to land readjustment, with the exception that it happens in existing urban areas and often involves a rezoning by the government of a given area from a low-density (single-family housing) to higher-density (mixed-use or commercial) development. It is also accompanied by a provision of infrastructure improvements (mass transit, such as metro lines) that can support such up-zoning.

URBAN HEAT ISLAND

An urban heat island (UHI) is an urban area or metropolitan area that is significantly warmer than its surrounding rural areas, due to human activities. The temperature difference usually is larger at night than during the day and is most apparent when winds are weak. UHI is most noticeable during the summer and winter. The main cause of the urban heat island effect is from the modification of land surfaces. Waste heat, generated by energy usage, is a secondary contributor. As a population center grows, it tends to expand its area and increase its average temperature. The less-used term, heat island, refers to any area, populated or not, which is consistently hotter than the surrounding area.

Monthly rainfall is greater downwind of cities, partially due to

the UHI. Increases in heat within urban centers increases the length of growing seasons and decreases the occurrence of weak tornadoes. The UHI decreases air quality by increasing the production of pollutants such as ozone and decreases water quality, as warmer waters flow into area streams and put stress on their ecosystems.

VALUE CAPTURE

An opportunity to generate revenues by capitalizing on the value created by infrastructure investments (often transit and other government-backed projects) by developing or selling property or collect¬ing fees or taxes. Value capture can be facilitated through direct measures, such as the sale of properties or the granting of a development franchise, or through indirect methods, such as extracting surplus from other property owners (through a betterment tax, for example) or reaping higher proceeds from regular property taxes.

VEHICLE CAPACITY

The average number of people that a vehicle can be scheduled to carry at capacity (as defined herein)

WASTEWATER DISPOSAL

It is a process used to convert wastewater into an effluent (outflowing of water to a receiving body of water) that can be returned to the water cycle with minimal impact on the environment or directly reused.

WAYFINDING

The means in which people orient themselves in physical space and navigate from place to place. Can include the physical design of spaces and assistive features, such as signage.

WORLD BANK (WB)

The World Bank is an international financial institution that provides loans to countries of the world for capital projects. The World Bank's stated goal is the reduction of poverty, which its Articles of Agreement define as commitments to the promotion of foreign investment, international trade and to the facilitation of capital investment.

ZONING REGULATIONS

Zoning regulations specify whether zones can be used for residential, commercial, industrial, institutional or open space purposes, that may also regulate lot size, placement, bulk (or density) and the height of structures.

Zoning consists of dividing a particular region of land into districts or zones and specifying the types of land uses that are allowed and prohibited for each zone. This is performed by the county and is typically specific to certain, unincorporated areas. Zoning, in its basic form, attempts to separate residential property use from other property uses.

TOD K P

TOD KP

SAMPLE DOCUMENTS AND REPORTS



TOD

Global Platform for Sustainable Cities

WORLD BANK GROUP

IBI

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TOD KP

INTRODUCTION

This Supplement to the TOD Knowledge Products provides examples of documents, reports, and terms of references from cities throughout the world where TOD is under implementation. The most relevant case examples are provided for specific groups of knowledge products. The intent of providing these examples is not to limit the scope or understanding of a subject matter. Rather, the user may choose to refer to them to understand the type of output that can be expected by using the various tools and resources provided under the TOD Knowledge Products, knowing and acknowledging that outputs will differ depending on the context of the assignment.

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AS-A04 Thresholds for Rapid Transit Mode Selection / **AS-H02** How to Undertake Rapid Transit Alternatives Assessment / **AS-P02** Transit Alternatives Analysis Terms of Reference Template ... 5

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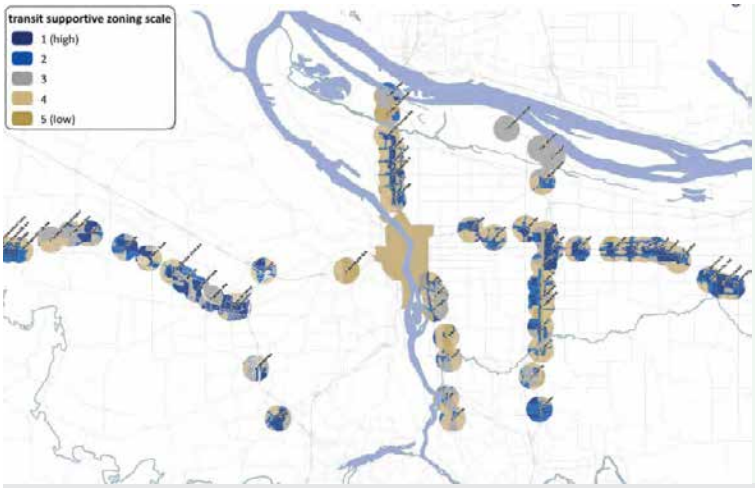
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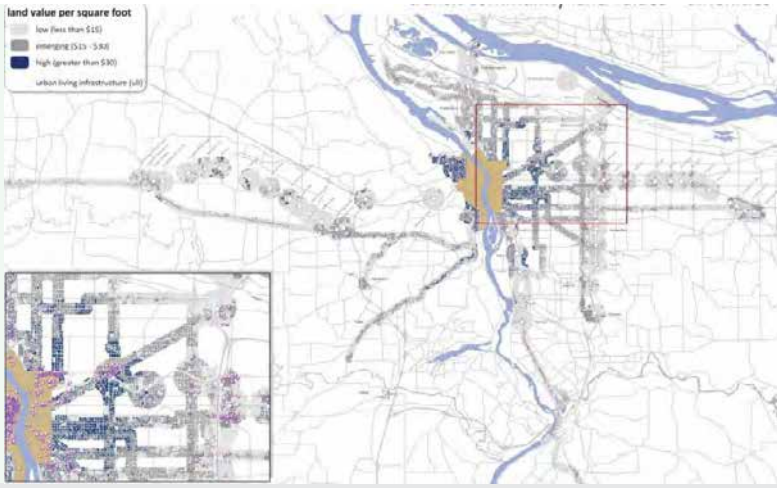
FI-H01 Land Value Capture Framework / **FI-R01** Development Incentives / **FI-R02** Land Value Capture Mechanisms and Best Practices / **FI-R03** Municipal Finance Tools ... 12

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ASSESS

AS-A01 TOD READINESS ASSESSMENT

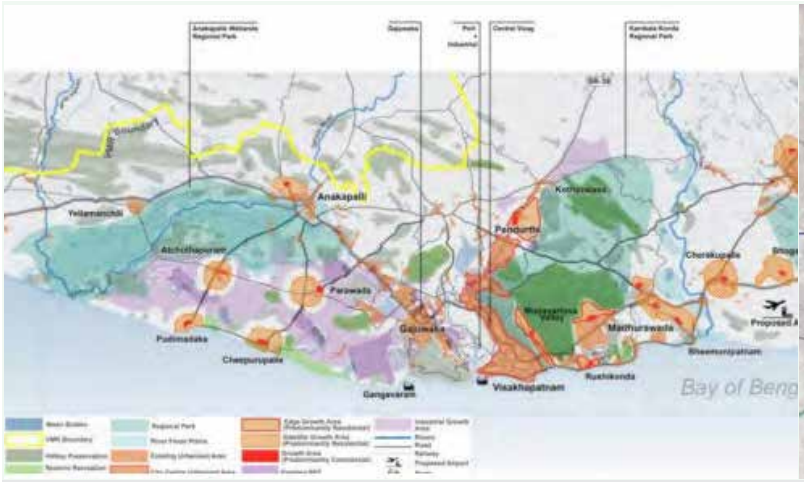
AS-A02 TOD SCALE AND CONTEXT ASSESSMENT

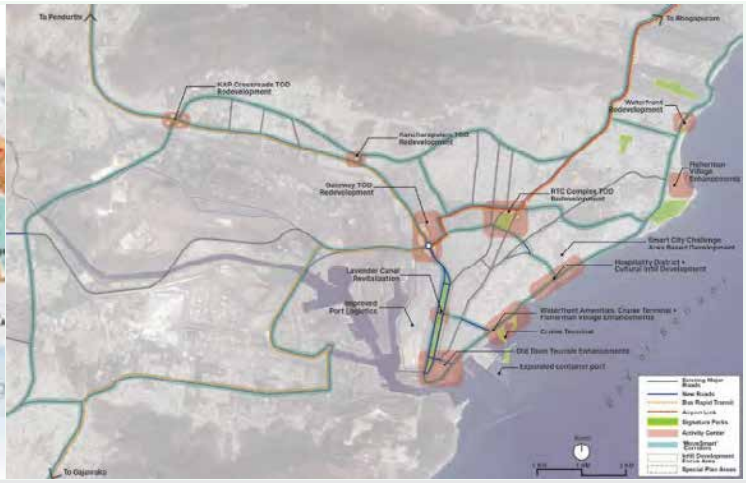
PRODUCT SUMMARY

The TOD Readiness Assessment and Scale and Context Assessment tool are developed to help cities in understanding the contextual readiness of the city, corridor, or site and identify the appropriate scale and context at which to plan for TOD.

CASE EXAMPLES

Example	Type	Example Source	URL
Transit Oriented Development Strategic Plan - Denver, US	Report	City of Denver. 2014. *Transit Oriented Development Strategic Plan*. Consultant Report, MIG, EPS, OV Consulting, Denver, CO: Federal Transit Administration.	Link
TOD City Specific Plan - Bhopal, India	Report	MOUD (Ministry of Urban Development), India. 2016. *TOD City Specific Plan - Bhopal*. Consultant Report, IBI Group, Bhopal: Sustainable Urban Transport Project (SUTP).	Link
Transit Oriented Development Strategic Plan - Portland US	Report	CTOD (Center for Transit-Oriented Development), Nelson Nygaard. 2011. *Transit-Oriented Development Strategic Plan*. Consultant Report, Portland: Portland Metro.	Link





ASSESS

AS-A03: THRESHOLDS FOR REAL ESTATE DEMAND

AS-H01: HOW TO UNDERTAKE REAL ESTATE MARKET ANALYSIS (STEP-BY-STEP GUIDE)

AS-R01: REAL ESTATE ANALYSIS BEST PRACTICES (REF DOC.)

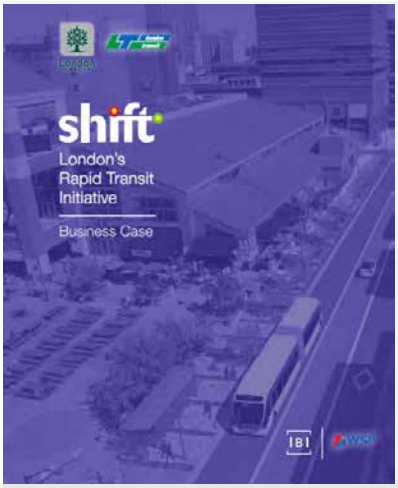
AS-P01: REAL ESTATE ANALYSIS TERMS OF REFERENCE (TOR TEMPLATE)

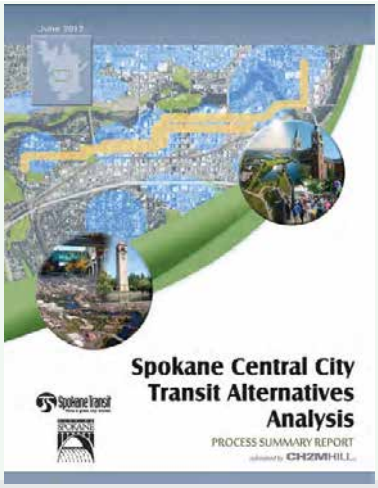
PRODUCT SUMMARY

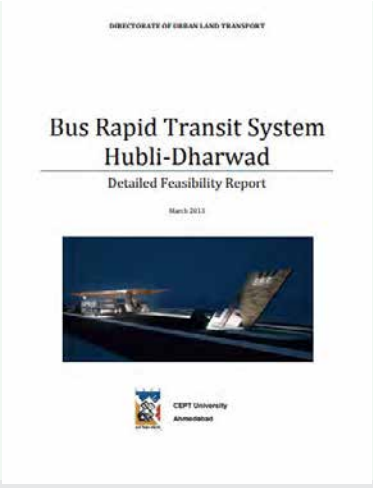
The real estate tools aid in establishing the real estate knowledge required to undertake a successful TOD development. Through the use of the tools, the market area with the appropriate demand can be determined. It can also be better understood what development is most in demand, based on demographic, geographic and economic trends.

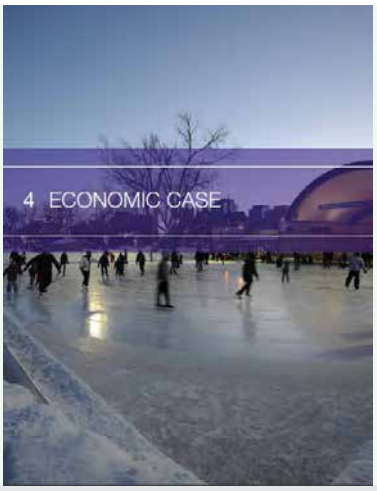
CASE EXAMPLES

Example	Type	Example Source	URL
Transit-Oriented Redevelopment of the Dwarka Bus Station	Report	GVMC (Greater Visakhapatnam Municipal Coorporation), USTDA (US Trade and Development Agency). 2017. "*Transit-Oriented Redevelopment of the Dwaraka Bus Station- Feasibility Study Final Report*." Consultant Report, AECOM, IBM, KPMG, Visakhapatnam: AECOM.	Link
Revenue maximizing study in particular for non-fare box revenues with affordability studies	Report	MRVC (Mumbai Railway Vikas Corporation Ltd). 2014. "*Revenue maximising study in particular for non-fare box revenues with affordability studies*." Consultant Report, PriceWaterhouseCooper, Mumbai.	Link
Real Estate Information System	Weblink	Urban Redevelopment Authority. n.d. *Realis Tool*. Accessed 08 18, 2018.	Link









ASSESS

AS-A04: THRESHOLDS FOR RAPID TRANSIT MODE SELECTION

AS-H02: HOW TO UNDERTAKE RAPID TRANSIT ALTERNATIVES ASSESSMENT (STEP-BY-STEP GUIDE)

AS-P02: TRANSIT ALTERNATIVES ANALYSIS TERMS OF REFERENCE (TOR TEMPLATE)

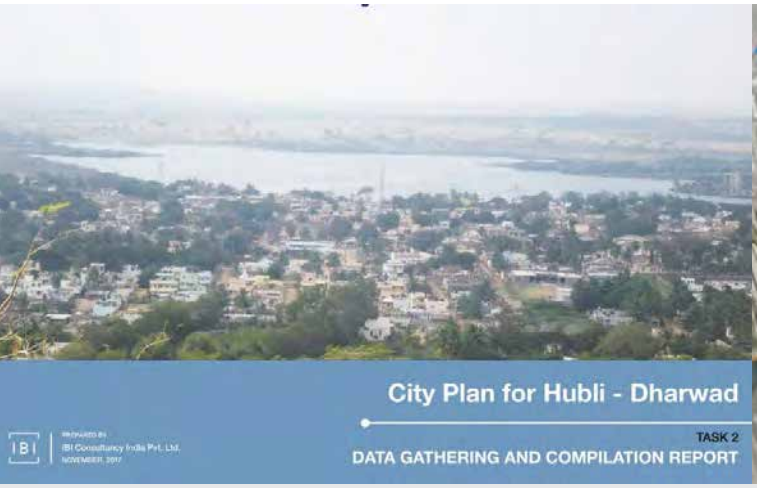
PRODUCT SUMMARY

The rapid transit assessment tools are intended to help cities who are planning the first rapid transit corridors or those that are planning an extension of existing transit networks.

The tools will aid in identifying, evaluating and selecting the appropriate rapid transit alternative including route alignment, mode and technology relative to existing city conditions and financial viability.

CASE EXAMPLES

Example	Type	Example Source	URL
Bus Rapid Transit System Hubli-Dharwad	Report	DULT (Directorate of Urban Land Transport) (2013). *Bus Rapid Transit System Detailed Feasibility Report.* Consultant Report (CEPT), Hubli-Dharwad	Link
Spokane Central City Transit Alternatives Analysis	Report	Sound Transit (2012). *Spokane Central City Transit Alternatives Analysis Process Summary Report*. Consultant Report (CH2M Hill), Spokane	Link
Rapid Transit Initiative - London, ON	Report	City of London, ON; LT (London Transit). 2016. "*SHIFT -London's Rapid Transit Initiative*." Consultant Report, IBI Group, WSP, London ON, Canada	Link
Corridor Assessment and Ranking for Selecting one Pilot Smart Corridor	Report	EDF (European Development Fund) (2016). *Report on the Corridor Assessment and Ranking for Selecting at Least One Pilot Smart Corridor.* Consultant Report (NTU/LB). Addis Ababa: The European Union.	Link





ASSESS

AS-H03: HOW TO UNDERTAKE INFRASTRUCTURE CARRYING CAPACITY ASSESSMENT (STEP-BY-STEP GUIDE)

AS-P03: INFRASTRUCTURE ANALYSIS TERMS OF REFERENCE (TOR TEMPLATE)

FINANCE

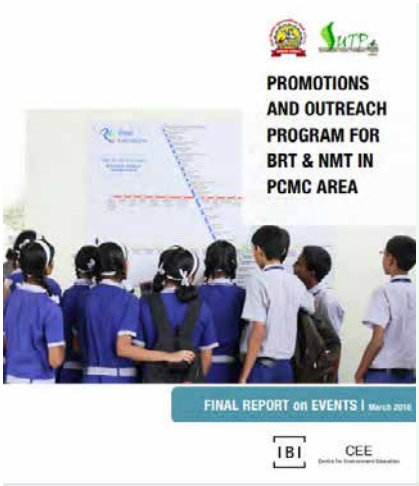
FI-A01: INFRASTRUCTURE CAPITAL & OPERATING COST ESTIMATES/RANGES (SPREADSHEET)

PRODUCT SUMMARY

These tools help in evaluating the infrastructure carrying capacity of a site for transit-supportive densities, based on the development context. Further, they help in estimating the cost requirements for infrastructure capital and operating costs.

CASE EXAMPLES

Example	Type	Example Source	URL
Hubli-Dharwad City Plan - Data Gathering and Compilation Report	Report	HDBRTS Ltd. (2017). *City Plan for Hubli-Dharwad Data Gathering and Compilation Report*. Consultant Report (IBI Consultancy India Pvt Ltd), Hubli-Dharwad.	Link
TOD Regulations for Delhi - Annexure-1 - (vii) Infrastructure Provision	Statutory Document	DDA (Delhi Development Authority). (2016). *Proposed Transit Oriented Development (TOD) Regulations - Page 19*. New Delhi, Delhi, India.	Link
Capital Improvement Program, California	Report	California National City 1887 Incorporated. (2017). *Fiscal Year 2017 - 2021 5-Year Capital Improvement Program (CIP)*. Budget Report, National City.	Link
Capital Operating and Maintenance costs estimates, Nashville	Report	Nashville Area Metropolitan Planning Organization. 2007. "*Nashville Southeast Corridor High-Performance Transit Alternatives Study - Chapter 9*." Final Report, Nashville TN.	Link







ENABLE

EN-C01: STAKEHOLDER ENGAGEMENT - GAME (REF. DOC.)

EN-C02: MAKING A CASE FOR TOD TO THE PUBLIC - COMMUNICATION STRATEGY (REF.DOC.)

EN-P01: COMMUNICATION STRATEGY TERMS OF REFERENCE (TOR TEMPLATE)

PRODUCT SUMMARY

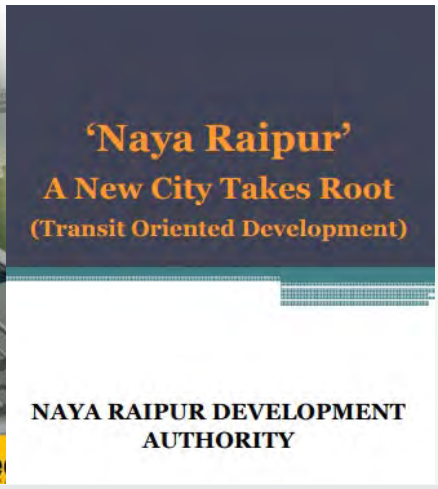
The Communications tools help to build ownership among all the TOD stakeholders. The myriad tools that can be employed include online and print strategies, physical games and other media that can communicate the benefits of the TOD plans.

CASE EXAMPLES

Example	Type	Example Source	URL
Community Engagement, Roosevelt Station TOD	Report	Sound Transit. (2017). *Summary of Community Engagement*. Seattle: City of Seattle, Roosevelt Neighborhood Association	Link
Strategic Communications Plan, Manassas Park	Report	Arup USA, Inc. 2009. "*Marketing TOD Strategic Communications/ Marketing Plan*." Manassas Park.	Link
Promotion and Outreach Program, Pimpri Chinchwad	RFP	PCMC (Pimpri Chinchwad Municipal Corporation). n.d. "Selection of Consultants for Promotion and Outreach Program (POP) for BRT & Non-Motorized Transport (NMT) Systems in Pimpri-Chinchwad." Pimpri Chinchwad, India.	Link
Promotion and Outreach program for BRT & NMT in PCMC area	Report	PCMC (Pimpri Chinchwad Municipal Corporation). 2016. *Promotions and Outreach Program for BRT & NMT in PCMC Area.* Consultant Report (IBI Group, Centre for Environment Education), Pimpri Chinchwad: SUTP (Sustainable Urban Transport Project).	Link







PLAN+ DESIGN

PD-H01: HOW TO PREPARE A CITY-WIDE TOD PLAN (STEP-BY-STEP GUIDE)

PD-H02: HOW TO PREPARE A CORRIDOR TOD PLAN (STEP-BY-STEP GUIDE)

PD-H03: HOW TO PREPARE A STATION AREA PLAN (STEP-BY-STEP GUIDE)

PD-H04: HOW TO PREPARE A SITE LEVEL TOD PLAN (STEP-BY-STEP GUIDE)

PD-R01: TOD PLANNING PRINCIPLES & DESIGN GUIDELINES (REF. DOC.)

PD-P01: TOD PLANS TERMS OF REFERENCE (TOR TEMPLATE)

PRODUCT SUMMARY

The How-to Guides for Plan+Design along with the Planning Principles demonstrate the processes to be followed in undertaking TOD planning at different scales under different contextual conditions. The outputs below are an illustration of how these tools will help you define the final products.

CASE EXAMPLES

Example	Type	Example Source	URL
Dar es Salaam BRT Phase 1 Corridor Development Strategy	Presentation	Broadway Malyan. 2018. "Dar es Salaam BRT Phase 1 Corridor Development Strategy." Client PO-RALG Tanzania. EAPI Summit 2018. Dar es Salaam: The World Bank; Nordic Development Fund	Link
Kakardooma TOD Proposal, Delhi	Presentation	UTTIPEC (Unified Traffic and Transportation Infrastructure (Planning & Engineering) Centre). n.d. East Delhi Hub – Kadkardooma TOD Proposal. New Delhi: Delhi Development Authority	Link
Naya Raipur TOD Study	Presentation	NRDA (Naya Raipur Development Authority). 2013. 'Naya Raipur' A New City Takes Root (Transit Oriented Development). Naya Raipur.	Link
City of Cape Town TOD Strategic Framework	Report	Transport for Cape Town. 2015. "City of Cape Town TOD Strategic Framework." Strategic Plan, City of Cape Town.	Link





PLAN+ DESIGN

PD-H05: HOW TO DEVELOP TOD SUPPORTIVE ZONING FRAMEWORK (STEP-BY-STEP GUIDE)

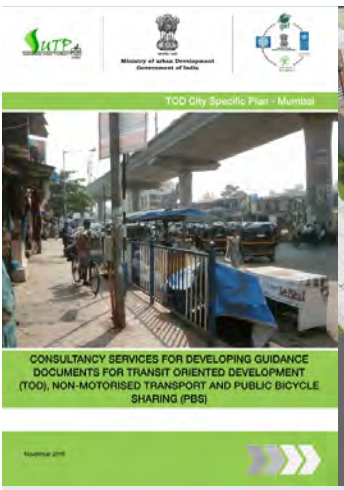
PD-R02: TOD ZONING CODE TEMPLATE (REF. DOC.)

PRODUCT SUMMARY

The TOD Zoning Framework tools provide guidance on how TOD concepts and ideas can be converted into a statutory zoning regulation within the city.

CASE EXAMPLES

Example	Type	Example Source	URL
TOD Regulations for Delhi	RFP	Delhi Development Authority. 2017. “Master Plan for Delhi-2021”. New Delhi	Link
Sample TOD Overlay Zoning Ordinance - Reconnecting America	Report	Valley Connections. 2001. Model Transit-Oriented District Overlay Zoning Ordinance. http://www.reconnectingamerica.org/assets/Uploads/bestpractice230.pdf, California: Community Design + Architecture, Inc.	Link
Comprehensive Development Control Regulations, Ahmedabad	Weblink	UD&UHD (Urban Development and Urban Housing Department). 2017. “Comprehensive General Development Control Regulation - 2017.” Gandhinagar.	Link
Spatial Development Framework, Johannesburg	Report	City of Johannesburg. 2016. "Spatial Development Framework 2040 City of Johannesburg Metropolitan Municipality." Prepared in collaboration with Urban Planning and Design Lab, Iyer Urban Design Studio and Urban the Morphology & Complex Systems Institute, Johannesburg.	Link







PD-H06: LAND AMALGAMATION FRAMEWORK (STEP-BY-STEP GUIDE)

PLAN+
DESIGN

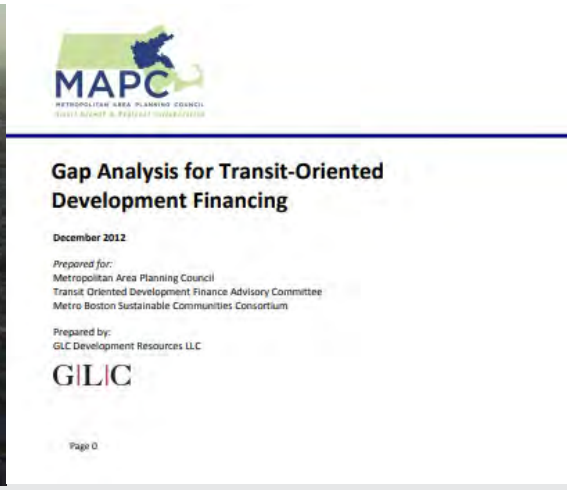
PRODUCT SUMMARY

The Land Amalgamation Framework tools guides cities on how to develop and define the area to be amalgamated and different ways to undertake the amalgamation process.

CASE EXAMPLES

Example	Type	Example Source	URL
Dar es Salaam BRT Phase 1 Corridor Development Strategy	Presentation	Broadway Malyan. 2018. "Dar es Salaam BRT Phase 1 Corridor Development Strategy." Client PO-RALG Tanzania. EAPI Summit 2018. Dar es Salaam: The World Bank; Nordic Development Fund	Link
TOD Manual, Delhi	Manual	UTTIPEC (Unified Traffic and Transportation Infrastructure (Planning & Engineering) Centre), WRI India. 2014. Transit Oriented development Manual- Delhi TOD Policy & Regulations Interpretation. Delhi: World Resource Institute.	Link
TOD City Specific Plan, Mumbai	Report	MOUD (Ministry of Urban Development), India. 2016. *TOD City Specific Plan - Mumbai*. Consultant Report, IBI Group, Mumbai: Sustainable Urban Transport Project (SUTP).	Link





FI-A02: REAL-ESTATE DEVELOPMENT PRO-FORMA (SPREADSHEET)

FINANCE

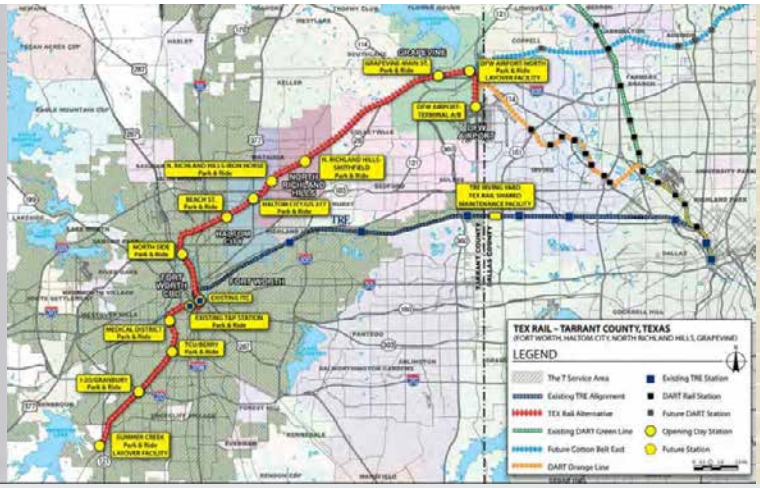
PRODUCT SUMMARY

The Real Estate Development Pro-Forma tool provides primary understanding about the assessment of return on investment (ROI), based on certain basic project development parameters.

CASE EXAMPLES

Example	Type	Example Source	URL
Market and Pro-Forma Analysis	Report	City of Sacramento. 2007. “Market and Pro-Forma Analysis.” Sacramento : Bay Area Economics .	Link
Transit-Oriented Development in Mexico City	Presentation	DUSP (Department of Urban and Spatial Analytics), MIT. 2016. “Transit-Oriented Development in Mexico City.” Mexico City.	Link
Gap Analysis for Transit-Oriented Development Financing	Report	MAPC (Metropolitan Area Planning Council). 2012. “Gap Analysis for Transit-Oriented.” Consultant Report (GLC Development Resources LLC), Boston.	Link







FINANCE

FI-H01: LAND VALUE CAPTURE FRAMEWORK (STEP-BY-STEP GUIDE)

FI-R01: DEVELOPMENT INCENTIVES (REF. DOC.)

FI-R02: LAND VALUE CAPTURE MECHANISMS AND BEST PRACTICES (REF. DOC.)

FI-R03: MUNICIPAL FINANCE TOOLS (REF. DOC.)

PRODUCT SUMMARY

The development incentives, municipal finance, LVC and PPP tools will guide cities or developers in structuring projects so as to maximize value and revenue and share the risks during the life cycle of the project.

CASE EXAMPLES

Example	Type	Example Source	URL
Land value capture as a funding source, Warsaw Metro	Report	Polska, Sprawne Panstwo Program- Ernst & Young. 2011. "*Land value capture as a funding source for urban investment- The Warsaw metro system*." Warsaw.	Link
Transit Value Capture Analysis, Chicago Region	Report	CMAP (Chicago Metropolitan Agency for Planning). 2010. "*Transit Value Capture Analysis for the Chicago Region*." Consultant Report (S. B. Friedman & Company).	Link
Feasibility Study, Dwarka	Report	Corporation, Greater Visakhapatnam Municipal. 2017. "*Transit-Oriented Redevelopment Of the Dwaraka Bus*." Consultant Report (AECOM, IBM, KPMG), Visakhapatnam.	Link
Tax Increment Financing	Presentation	Chapa, Jay. 2013. "*Tax Increment Financing: TEX Rail/Transit-Oriented Development*." Fort Worth.	Link
Innovative Municipal Financing, Tamil Nadu	Report	Venkatatachalam, Pritha. 2005. "*Innovative Approaches to Municipal Infrastructure Financing: A Case Study on Tamil Nadu, India*." Tamil Nadu, India: Development Destin Studies Institute.	Link





FI-H02: PRIVATE SECTOR PARTICIPATION FRAMEWORK (REF. DOC.)

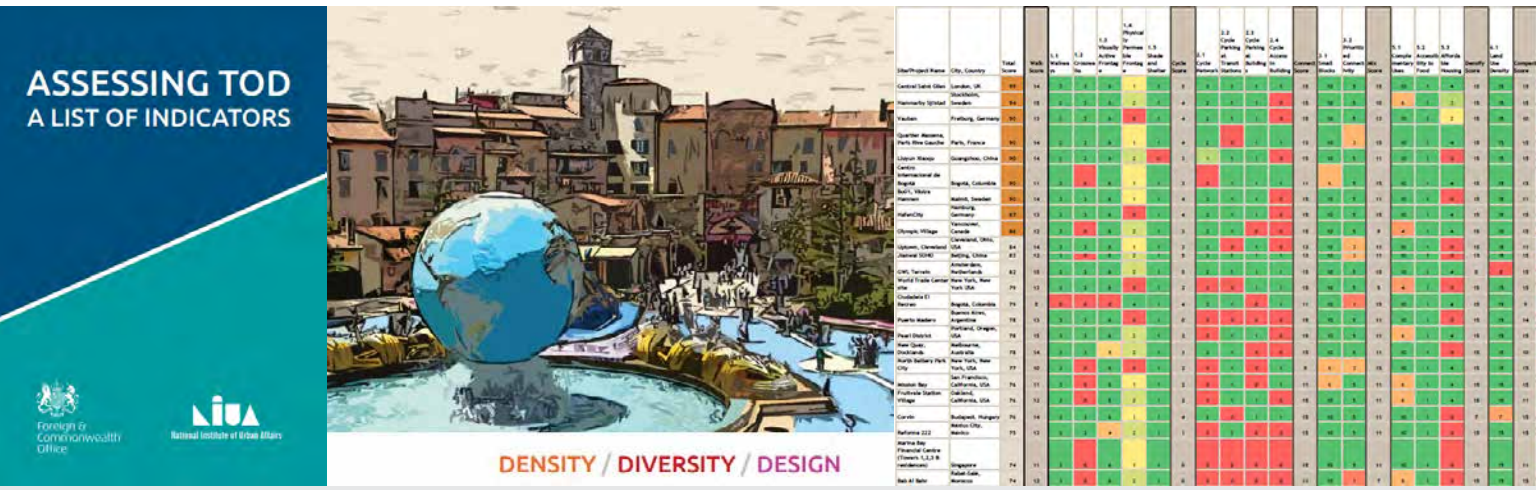
FINANCE

PRODUCT SUMMARY

This resource provides a compilation of municipal financing tools that are applied globally and a guide for the cities on how to deploy these tools.

CASE EXAMPLES

Example	Type	Example Source	URL
Indian Stations Redevelopment PPP Framework	Report	Indian Railways; FICCI. 2017. "Indian Railways Station Redevelopment- Transforming Railways and Creating Win-Win Opportunities." Consultant Report (The Boston Consulting Group).	Link
TOD Development – Capitol Hill Properties Redevelopment	RFP	Sound Transit. 2014. "*Request for Proposals TOD Development – Capitol Hill Properties Redevelopment*."	Link



IMPLEMENT

IM-A01: MONITORING AND EVALUATION (CHECKLIST)

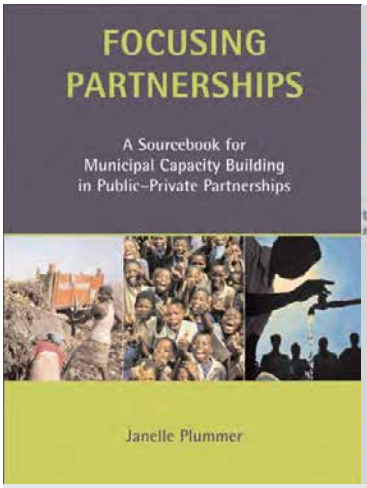
IM-A02: TOD KPI (Spreadsheet)

PRODUCT SUMMARY

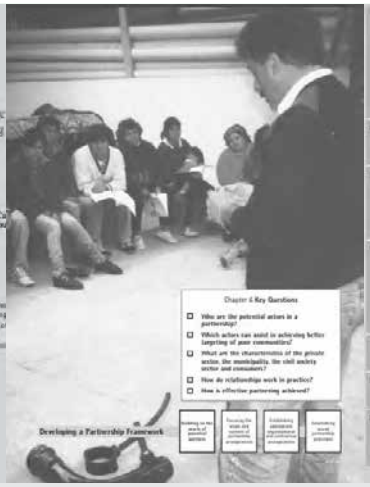
The Monitoring and Evaluation tools provide cities with guidance on how to monitor and evaluate the performance of ongoing and completed projects with respect to TOD goals.

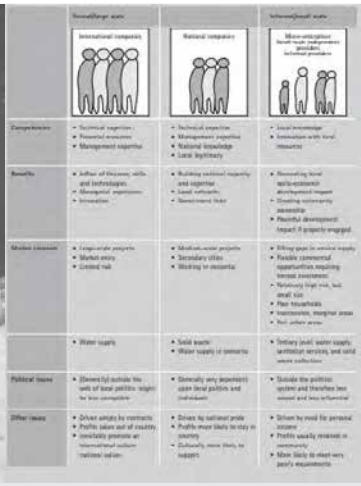
CASE EXAMPLES

Example	Type	Example Source	URL
Evaluating Transit-Oriented Development Using a Sustainability Framework	Report	Renne, John L. n.d. "6 *Evaluating Transit-Oriented Development Using a Sustainability Framework: Lessons from Perth's Network City*." Perth	Link
Project Evaluation Report, Philadelphia	Report	Commission, Delaware Valley Regional Planning. 2003 . "*Project Evaluation Report Implementing Transit-Oriented Development in the Philadelphia Metropolitan Area*." Philadelphia	Link
TOD Indicators	Report	NIUA (National Institute of Urban Affairs). n.d. *Assessing TOD- A List of Indicators*. India: NIUA and Foreign and Commonwealth Office (UK).	Link
TOD Scores	Weblink	(ITDP), The Institute for Transportation and Development. 2014. TOD Scores.	Link









IMPLEMENT

IM-H01: HOW TO UNDERTAKE CAPACITY BUILDING (STEP-BY-STEP GUIDE)

IM-P01: CAPACITY BUILDING TERMS OF REFERENCE (TOR TEMPLATE)

PRODUCT SUMMARY

These tools will help cities assess their own capacities and formulate a response to be able to build capacities as needed for planning and implementing TOD.

CASE EXAMPLES

Example	Type	Example Source	URL
Comprehensive Capacity Building Programme	Weblink	Municipal Corporation Dharamshala. n.d. Comprehensive Capacity Building Programme. Accessed August 20, 2018. http://mcdharamshala.in/comprehensive-capacity-building-programme/	Link
Capcity Building Reforms, Kolkata	Presentation	KMC (Kolkata Municipal Corporation). 2009. “KMC: Capacity Building Program – A Reforms Initiative.” Kolkata.	Link
Assessment of Capacity Building Needs	Presentation	NIUA (National Institute Of Urban Affairs). 2015. *A Study to Qualitatively Assess the Capacity Building Needs of Urban Local Bodies (ULBs)*. Research Division, NITI Aayog,.	Link
Capacity Building in PPPs	Report	Plummer, Janelle. n.d. *FOCUSING PARTNERSHIPS- A Sourcebook for Municipal Capacity Building in Public–Private Partnerships*. UNDP, Earthscan Publications Ltd, London,Sterling, VA.	Link