# TRANSIT – ORIENTED DEVELOPMENT IMPLEMENTATION RESOURCES & TOOLS

2nd Edition

The editions of the document were prepared for the World Bank
by IBI Group and World Resources Institute India

IBI

WRI INDIA

Bogota, Colombia

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# ABBREVIATIONS

| | |
|---|---|
| ADB | Asian Development Bank |
| AE | Automated Enforcement |
| AICTSL | Atal Indore City Transport Services Limited |
| ANSV | Agencia Nacional de Seguridad Vial |
| 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 |
| BIGRS | Bloomberg Initiative for Global Road Safety |
| 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 |
| CCTV | Close-circuit television |
| 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 |
| ERP | Electronic Road Pricing |
| FAO | Food and Agriculture Organization |

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|---|---|
| FAR | Floor Area Ratio |
| FIFA | International Federation of Association Football |
| FOB | Foot over Bridge |
| 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 |
| GLS | Government Land Sales |
| 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 |
| iRAP | International Road Assessment Programme |
| 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 |
| MOUD | Ministry of Urban Development, India |
| 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 |
| PIARC | World Road Association (Permanent International Association of Road Congresses) |
| 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 |
| RIA | Road Safety Impact Assessment |
| ROI | Return on Investment |
| ROW | Right-of-Way |
| RSA | Road Safety Audit |
| RSI | Road Safety Inspections |
| RTA | Road and Transportation Authority |
| RTAAP | Rapid Transit Alternative Analysis Process |
| RTC | Road Transport Corporation |
| RTOD | Rapid Transit Oriented Development |
| RWA | Residents Welfare Association |
| SAM | Safe Access Mass Transit |
| SAP | Station Accessibility Plans |

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|---|---|
| SAR | Special Administrative Region |
| SBC | Sustainable Buildings and Construction |
| SDI | Seoul Development Institute |
| SDG | Sustainable Development Goals |
| 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 |
| UNRSF | United Nations Road Safety Fund |
| UPU | Universal Postal Union |
| URA | Urban Redevelopment Authority |
| USAID | United States Agency for International Development |
| USDOT | United States Department of Transportation |
| 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 |
| VDM | Vehicle Demand Management |
| VKT | Vehicle Kilometer Traveled |
| VGF | Viability Gap Funding |
| WB | World Bank |
| WHO | World Health Organization |
| WRI | World Resources Institute |

# DOCUMENT ORGANIZATION

TOD KP

# TOD KNOWLEDGE PRODUCTS

## OVERVIEW

WORLD BANK GROUP | TOD | Global Platform for Sustainable Cities | gef | UKaid from the British people | GRSF Global Road Safety Facility | IBI | WRI INDIA

# 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. **A**lign human/economic densities, mass transit capacity and network characteristics for greater accessibility
2. **C**reate compact regions with short commutes
3. **E**nsure resilience of areas connected by mass transit
4. **P**lan and zone for mixed-income neighborhoods at corridor level
5. **C**reate vibrant, people-centric public spaces around stations
6. **D**evelop neighborhoods that foster walking and biking
7. **D**evelop good quality, accessible, and integrated public transit
8. **M**anage private vehicle demand

The *Transit-oriented Development Implementation Resources & Tools* publication brings 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, Gurugram 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 road map 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 (FAR) 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 Version 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**

The 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 and Fleissig 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.

**Good Practice Note – Road Safety: Environment & Social Framework for Investment Policy Financing Operations (World Bank 2019) Link**

This good practice note is created for The World Bank to provide guidance on supporting efforts of the borrowers for improving road safety. It outlines the Bank's road safety goals based on holistic and systematic methods of Safe System approach, which is based on the Swedish *'Vision Zero'* and Dutch *'Sustainability and Safe'* strategies. This guidance isn't limited to transport projects but caters to 'any project which generates or relocates traffic, influences travel speeds, travel modes, traffic patterns, and is likely to result in new or changed road safety risks'.

**Good Practice Note – Integration of Road Safety Considerations in TOD Projects (World Bank 2020): Link** This good practice note created as part of the toolkit provides an overview on how to integrate road safety considerations at each stage of the TOD process.

# 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 publication *Transit-oriented Development Implementation Resources & Tools* 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.

- **SAFE SYSTEM APPROACH:** The Safe System approach is a shift away from a traditional approach of preventing collisions to a more forgiving approach of preventing fatalities and mitigating serious injuries in road crashes. The traditional approach emphasizes the responsibility of road users to avoid crashes rather than the responsibility of system designers to provide a safe mobility system. The Safe System approach was pioneered in the 1990s, through programs such as *'Vision Zero'* in Sweden and *'Sustainable Safety'* in the Netherlands.

  The Safe System approach considers humans as vulnerable and fallible, and errors are to be expected. It aims at ensuring these mistakes do not lead to a crash, and if a crash does occur, it is sufficiently controlled to not cause a death or a life-changing injury. It also emphasizes on shared responsibility between the various government agencies, policy makers, road designers, vehicle manufacturers, enforcement officers, emergency medical agencies, road safety educators etc – who are accountable for the system's safety and all road users – drivers, cyclists, and pedestrians who are responsible for complying with the system rules.

# OBJECTIVES OF THE TOD KNOWLEDGE PRODUCTS

The purpose of the *Transit-oriented Development Implementation Resources & Tools* is to provide a one-stop resource for practitioners, city leaders, stakeholders, and academics to support TOD implementation. The TOD Knowledge Products 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.

Roads within a TOD are multi-functional. They serve two or more of the access, distribution and through functions. They also cater to a very high mix of users of varying volumes and speeds, which leads to raising safety concerns for all. Therefore, it is very critical to look at road safety while assessing, planning and designing networks within a TOD whereby covering overarching safety principles of the Dutch *'Sustainable Safety'* vision i.e. ***functionality, homogeneity, and predictability***. It is imperative to note that these safety principles are applicable to all kinds of roads and road networks with mono-functional use. However, within a TOD area, these principles need to be adapted more comprehensively to better align with the inherent multi-functional nature of TOD areas.

Based on these safety principles, Knowledge Products ***AS-H04 How to undertake road safety assessment, PD-H07 How to Plan Safe Access in The Station Area***, and ***PD-R02 TOD Planning Principles & Design Guidelines*** provide a framework for contextualizing assessment tools, planning, and designing road networks respectively for facilitating implementation of road safety measures specifically within a TOD area.

The main objectives of the toolkit include:

- Creating a comprehensive TOD knowledge resource that reiterates the basic arguments for TOD, with a emphasis on detailed design requirements and implementation mechanisms, ensuring road safety for all users.
- Combining policy best practices with planning and design guidance based on safe system approach, 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 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, Road Safety Assessment, Alternatives Analysis & Infrastructure Design

### B: BEST PRACTICE PLANNING & DESIGN TODS

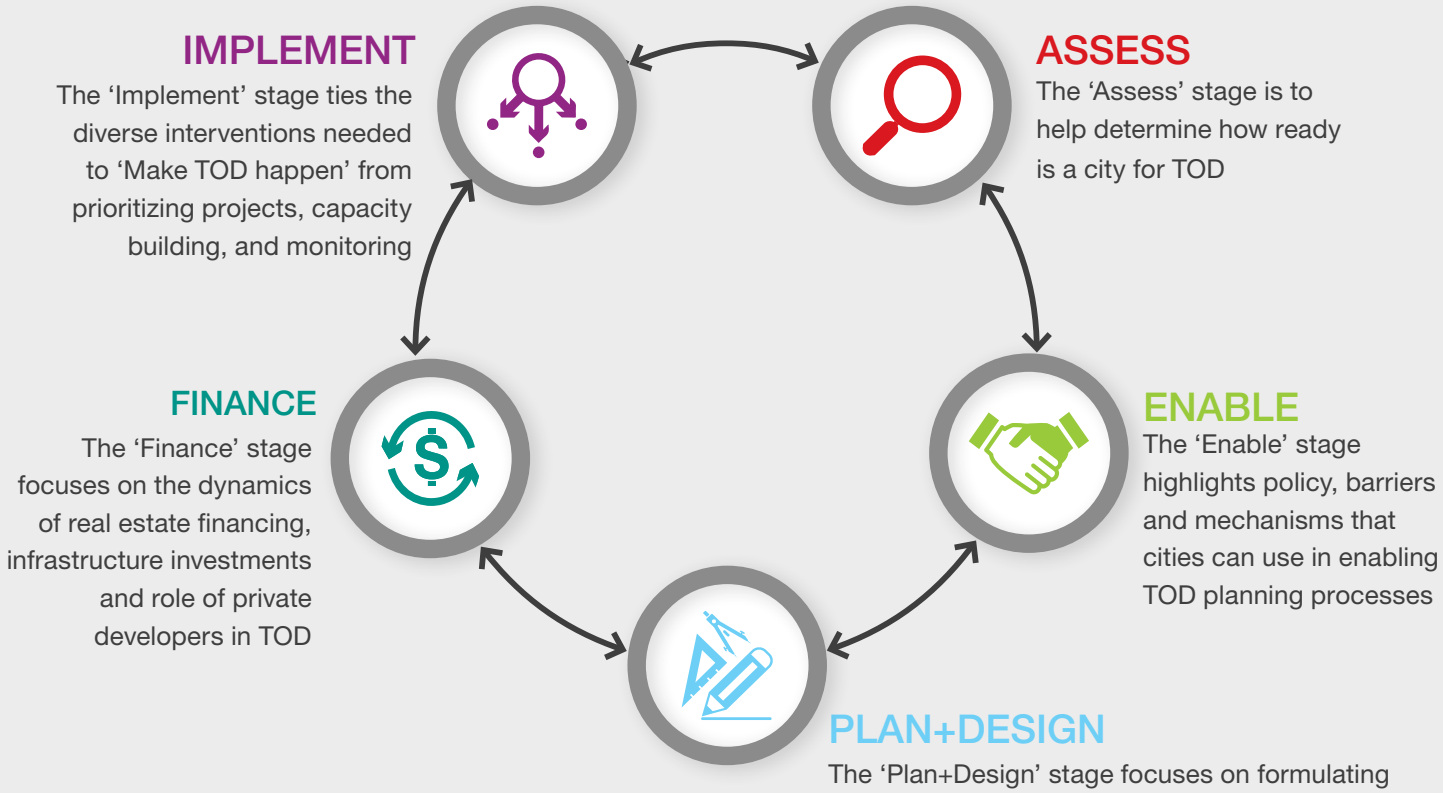
3. Safe System Approach for Road Safety, Regional Strategic Planning and Intergovernmental Coordination
4. Network Planning, Urban Design, Road Safety Standards, Parking Standards and Zoning Regulations

### C: TOOLS & MECHANISMS FOR TOD IMPLEMENTATION

5. Land Value Capture, Financing Mechanisms and other Incentives for developers to promote Non-motorized Transport
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.**<br>Intended to inform planners about the underlying demand for new real estate space for different types of development projects. | How-To Guidance,<br>Analytical tool to evaluate Real Estate Demand<br>Best Practices |
| | **A2 \| Road Safety Assessment, Travel Demand Projections, Alternatives Analysis & Infrastructure Design.**<br>The other essential prerequisite to developing TOD projects is ensuring that the transport investment ensures road safety, 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<br>How-To Guidance |
| 02 ENABLE | **B3 \| Regional / Strategic Planning & Intergovernmental Coordination.**<br>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<br>Roles & Responsibilities Of Stakeholders |
| | **C7 \| Making the Case for TOD to the Public.**<br>Addressing misconceptions and legitimate concerns like road safety, safe access to stations, potential displacement must be corrected before successful implementation. | Communication strategy<br>Stakeholder Game template |
| 03 PLAN + DESIGN | **B4 \| Urban Design, Parking Standards & Land Use Zoning Regulations.**<br>Most planning efforts happen at interrelated scales. TOD principles, road safety measures 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<br>TOD Zoning Code Template<br>How-to Guidance for Planning at difference Scales and for different outcomes<br>Best Practices |

| STEP | KNOWLEDGE PRODUCT TOPIC | TYPE OF RESOURCES NEEDED |
|---|---|---|
| **04** **FINANCE** | **C5 \| Land Value Capture & Other Financing Mechanisms.**<br>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, NMT infrastructure, road safety or other social services. | How to Guidance on structuring different financing arrangements<br>Compendium of Tools and Incentives<br>Best Practices |
| | **C6 \| Supporting Infrastructure, Physical Implications & Cost Estimates.**<br>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.**<br>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<br>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

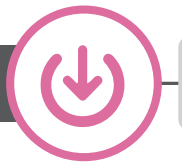
STEP-BY-STEP GUIDE

## 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 *Transit-oriented Development Implementation Resources & Tools* 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.

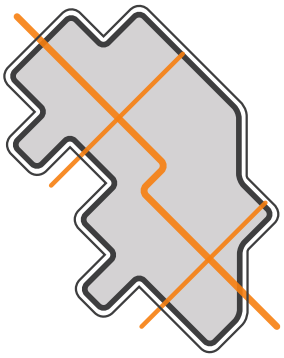
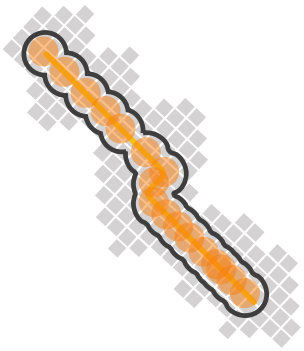
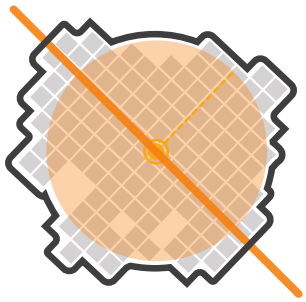
## URBAN DEVELOPMENT CONTEXT

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.<br><br>*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<br>• Generic DCR Modifications<br>• Institutional Framework for Implementation<br>• Metropolitan/City TOD Plan<br>• Safer Network Planning<br>• Road Safety for all Users<br>• Accessibility Guidelines |
|  CORRIDOR | 10-minute (800m-2km) walking/cycling distance on both sides of existing/ planned transit corridor.<br><br>*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<br>• Safer Network Planning<br>• Road Safety for all Users<br>• Generic DCR Modifications<br>• Real Estate/Land Value Capture Potential<br>• Institutional Framework for Implementation |
|  STATION AREA | 5-10 minute (400m-1km) walking distance from station facilities.<br><br>*TRX financial district, Kuala Lumpur* | Focuses on areas surrounding transit stations within a 5-10 minute walking distance focusing on land use, safe access to transit station for all users, transit station accessibility, multi-modal integration and connectivity. | • Detailed Station Area Plan including Road Safety Considerations<br>• Urban Design Guidelines (Built Form)<br>• Road Safety Design Measures<br>• Accessibility/ Streetscape Proposals<br>• Real Estate/Land Value Capture Potential<br>• Investment Strategy<br>• Implementation Plan |
|  SITE LEVEL | Individual parcel within 5-10 minute (800m-1km) walking distance from the station facility.<br><br>*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 Easements and Safety Incentives<br>• Detailed Development Program<br>• Urban Design Plan<br>• Accessibility/ Streetscape Design<br>• Financial Strategy<br>• Implementation Plan |

# DEVELOPMENT CONTEXT

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

**Road Safety Experts** – including street designers and road engineers with experience and knowledge of Safe System principles and complete street design. They can benefit from analytical tools for assessing the context and How-to-Guides and Resources to ensure safety considerations for all road users can be ensured throughout the project cycle.

**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 KP

# 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* AS-H04 / 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-H03/04 / 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.*

**AS-H 04 - How to Undertake Road Safety Assessment for TOD Areas -** *Also Refer to* AS-A01 / IM-H01 / IM-P01

*A step-by-step guide to help* **urban and transport planners** *assess road safety and crash data within the TOD station area. 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 Games-** *Also Refer to* EN-C01 / EN-P01 / IM-C01

*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*

# 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-H05/07 / PD-R02

*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-H05/07 / PD-R02

*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-H06/07 / PD-R02

*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-R02

*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.*

**PD-H 07 - How To Plan Safe Access for TOD-** *Also Refer to* PD-H01/02/03 / PD-R02 / FI-R01

*A guideline on TOD area network planning to ensure safe access to stations for* **urban and transport planners** *and* **policymakers.** *Applicable at station area scale and all contexts.*

# PLAN+DESIGN
# PD

## RESOURCE - R -

**PD-R 01 - 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 02 - TOD Planning Principles & Design Guidelines-** *Also Refer to* PD-H01/02/03/04/05/07

*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.*

**PD-R 03 - Land Use And Transportation Integration Best Practices-** *Also Refer to* AS-H02 / PD-H01 / PD-R02

*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-R02

*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-R02

*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* PD-H07 /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.*

## COMMUNICATION - C -

**IM-C 01 - Applying Safe Access in TOD Areas** - *Also Refer to* EN-C02

*A guide for* **urban and transport planners** *and* **policymakers** *to identify road safety concerns in a station area and formulate ways to address them. Applicable at station area scale and all 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-R02

*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-**A**01 - TOD Readiness Assessment

AS-**A**02 - TOD Scale & Context Assessment

AS-**A**03 - Thresholds for TOD Real Estate Demand

AS-**A**04 - Threshold for Rapid Transit Mode

FI -**A**01 - Real Estate Development Pro-Forma

FI -**A**02 - Infrastructure Capital & Operating Cost Estimates/Ranges

IM-**A**01 - Monitoring and Evaluation

IM-**A**02 - Key Performance Indicators for TOD

## COMMUNICATION -C-

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

EN-**C**02 - TOD Role Out - Stakeholder Engagement Games

IM-**C**01 - Applying Safe Access in TOD Areas

## RESOURCES -R-

AS-**R**01 - Real Estate Analysis Best Practices

EN-**R**01 - Roles & Responsibilities of Stakeholders

PD-**R**01 - TOD Zoning Code Template

PD-**R**02 - TOD Planning Principles & Design Guidelines

PD-**R**03 - Land Use And Transportation Integration Best Practices

PD-**R**04 - Pedestrian Friendly Design Best Practices

FI- **R**01 - Development Incentives

FI- **R**02 - Land Value Capture Mechanisms Best Practices

FI- **R**03 - Municipal Finance Tools

## 'HOW-TO' GUIDES -H-

AS-**H**01 - How to Undertake Real Estate Market Analysis

AS-**H**02 - How to Undertake Rapid Transit Alternatives Assessment

AS-**H**03 - Infrastructure Carrying Capacity Assessment

AS-H04 - How to Undertake Road Safety Assessment for TOD Areas

EN-**H**01 - How to Build Institutions and Enable Intergovernmental Coordination

PD-**H**01 - How To Prepare A City-Wide TOD Plan

PD-**H**02 - How To Prepare A Corridor TOD Plan

PD-**H**03 - How To Prepare A Station Area Plan

PD-**H**04 - How To Prepare A Site Level TOD Plan

PD-**H**05 - How To Develop TOD Supportive Zoning Framework

PD-**H**06 - Land Amalgamation Framework

PD-H07 - How To Plan Safe Access for TOD

FI -**H**01 - Land Value Capture Framework

FI -**H**02 - Private Sector Participation Framework

IM-**H**01 - How To Undertake Capacity Building

IM-**H**02 - How To Develop A TOD Phasing Strategy

## PROCUREMENT -P-

AS-**P**01 - Real Estate Analysis Terms of Reference

AS-**P**02 - Transit Alternatives Analysis Terms of Reference

AS-**P**03 - Infrastructure Analysis Terms of Reference

EN-**P**01 - Communications Strategy Terms Of Reference

PD-**P**01 - TOD Plans Terms of Reference

IM -**P**01 - Capacity Development Strategy Terms of Reference


Bogota, Colombia