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.
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 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 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.
‘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)
REFERENCES


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.
**01 MAP LAND USES AND KEY DEVELOPMENTS**

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**

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
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
- Zoning Codes

08 ESTABLISH STATUTORY RELEVANCE
Options to establish statutory relevance for TOD principles include:

- **OPTION 1**
  Include a TOD chapter in Master Plan/Development Plan/Comprehensive Plan as an amendment

- **OPTION 2**
  Create a TOD policy as a special law that supersedes the existing regulations

- **OPTION 3**
  Establish a TOD overlay district as a special area in existing development regulations
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.
01 MAP TRANSIT ALIGNMENT AND STATION LOCATIONS

To understand transit system features and station characteristics.

**TRANSIT TYPE**
- BRTS | MRTS | Commuter Rail

**ALIGNMENT**
- System Coverage

**PHASING**
- Priority Corridor(s)

**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

**PHASING**
- CATCHMENT AREA
  - 800 m - 2 km /feeder network
- INFLUENCE ZONE
  - 400m –800m / 10min walk
- PRIMARY STATION AREA
  - 0-400 m / 5 Min walk

03 ANALYZE DEVELOPMENT OPPORTUNITIES

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
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
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
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.

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.

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

02 CREATE INVENTORY AND ANALYZE EXISTING CONDITIONS

ACCESSIBILITY

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
Social: Parks | Public Amenities | Street Vendors | Road Safety
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

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

**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
- Parking Management
- Pedestrian and Cycle Mobility
- 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
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
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
- 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
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
**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
**ESTABLISH TOD ZONING VARIATIONS**

- **TOD Zones**
  - Core Area
  - Primary Zone
  - Influence Zone

- **Built Form**
  - Building Use
  - Plot Size
  - Building Height
  - FAR

- **Transport**
  - Road Width
  - Travel Lanes
  - Road Types

- **Special Area**
  - TOD Typologies
  - Heritage Area
  - Others

- **Miscellaneous**
  - Topography
  - Natural Features
  - Physical Barriers

Replace existing regulations where possible or create new transit supportive regulations related to (at minimum):

**PD-R02** TOD ZONING CODE TEMPLATE

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

**UPDATE/AMEND CITY DEVELOPMENT REGULATIONS/ORDINANCE (DCRS)**

- Setbacks
- Block Width
- Complete Streets Standard
- Pedestrian & Bicycle Standards
- Suggested Land Use Mix
- Density Matrix
- Street Frontage
- Parking

**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

**NOTIFY TOD ZONING AMENDMENTS**

Follow the city’s existing protocol for amendments to regulations notification
SUPPORTING ZONING FRAMEWORK
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
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.
**PREPARATION OF LAND**

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
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
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

PREPARE PROJECT DELIVERY PLAN

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:

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.
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
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 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.

RESOURCES:

1 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.

2 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.
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

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 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 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.

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

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)]

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]
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.]

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>City Area - A</td>
<td>GM</td>
<td>2.25</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>City Area - B</td>
<td>GM</td>
<td>2.00</td>
<td>0.5</td>
<td>2.5</td>
</tr>
<tr>
<td>3</td>
<td>Gamtal</td>
<td>GM</td>
<td>2.25</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Gamtal Extension</td>
<td>GM</td>
<td>1.5</td>
<td>-</td>
<td>1.5</td>
</tr>
<tr>
<td>5</td>
<td>TOZ</td>
<td>SP05</td>
<td>1.8</td>
<td>2.2</td>
<td>4.0</td>
</tr>
</tbody>
</table>

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:

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]

<table>
<thead>
<tr>
<th>Type of Use</th>
<th>Minimum Required</th>
<th>Parking Visitor’s Parking and Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercantile-1</td>
<td>35% of Total Utilised FSI</td>
<td>20% of the required parking shall be provided as visitors parking</td>
</tr>
</tbody>
</table>

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)

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.
SAMPLE ZONING CODE

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.

<table>
<thead>
<tr>
<th></th>
<th>Total ROW Min &amp; Max</th>
<th>Maximum C/C Intervals between Street Intersections</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Arterial Roads</td>
<td>30m - 48m (excluding green buffer)</td>
<td>200m</td>
</tr>
<tr>
<td>Major</td>
<td>24m - 36m (excluding green buffer)</td>
<td>200m</td>
</tr>
<tr>
<td>Minor</td>
<td>15m - 24m</td>
<td>100m</td>
</tr>
<tr>
<td>intra-Sectoral Roads</td>
<td>12m - 18m</td>
<td>100m</td>
</tr>
<tr>
<td>service Lane</td>
<td>5m - 6m</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Table 3: Pedestrian Mobility Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pedestrian clearance requirements</strong></td>
</tr>
<tr>
<td><strong>Minimum clear height</strong> = 2.4M</td>
</tr>
<tr>
<td><strong>Pedestrian path</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Kerb height</strong></td>
</tr>
<tr>
<td><strong>Kerb crossings</strong></td>
</tr>
<tr>
<td><strong>Accessibility</strong></td>
</tr>
<tr>
<td><strong>Pedestrian refuge islands</strong></td>
</tr>
<tr>
<td><strong>Bollards</strong></td>
</tr>
</tbody>
</table>

Source: Reproduced from NRDA (2013)

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

[Table image]

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.
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.

### Table 4: Active Frontage Standards

<table>
<thead>
<tr>
<th>TOD Zone</th>
<th>Minimum Active Frontage for Commercial/ Mixed-use buildings</th>
<th>Minimum Active Frontage for Residential buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>MU-5</td>
<td>70%</td>
<td>50%</td>
</tr>
<tr>
<td>MU-10</td>
<td>50%</td>
<td>30%</td>
</tr>
<tr>
<td>Rest of the City</td>
<td>30%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Source: Reproduced from NRDA (2013)

Within MU zones, maximum front setbacks will be maintained as defined below.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Use</th>
<th>Maximum Setbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public ROW &gt;24m</td>
<td>Public ROW &lt;24m</td>
</tr>
<tr>
<td>1</td>
<td>Commercial, retail, offices and non residential Uses</td>
<td>3m</td>
</tr>
<tr>
<td>2</td>
<td>Institutional / industrial etc.</td>
<td>3m</td>
</tr>
<tr>
<td>3</td>
<td>Residential</td>
<td>5m</td>
</tr>
</tbody>
</table>

Source: Reproduced from NRDA (2013)
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.

- 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.

<table>
<thead>
<tr>
<th>Table 9: NMT Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segregated NMT paths/trails</td>
</tr>
<tr>
<td>Marked NMT lanes</td>
</tr>
<tr>
<td>Vertical clearance</td>
</tr>
<tr>
<td>Minimum horizontal radius</td>
</tr>
<tr>
<td>Gradients</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Source: Reproduced from NRDA (2013)
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.

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.

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, 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, combating 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. 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.

![Diagram of Edges and Parking](image)

---

Rear Setback

Front Setback

Side Setback

Surface Parking

Multilevel Parking

Basement Parking

Edges
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.

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](http://www.reconnectingamerica.org/assets/Uploads/bestpractice230.pdf)
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.
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 a 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:

<table>
<thead>
<tr>
<th>Retail/Commercial</th>
<th>Office</th>
<th>Industrial</th>
<th>Mixed-Use</th>
<th>Res&gt;7du/ac</th>
<th>Res&lt;7da/ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenience Retail</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail and Service Uses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hotel or Motel Lodging</td>
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<td></td>
</tr>
<tr>
<td>Mixed Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Live-Work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed-Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Offices</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Offices</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Civic</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Day Care Facilities</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Post Offices</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Schools &amp; Community Buildings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government Offices</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospitals/Clinics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sports Facilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single-Family Detached</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single-Family Attached</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apartments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessory Units</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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 of
- 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. 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

<table>
<thead>
<tr>
<th>Distance from Station</th>
<th>Max. Building Setback</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-150m</td>
<td></td>
</tr>
<tr>
<td>150-400m</td>
<td></td>
</tr>
<tr>
<td>400-800m</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Distance from Station</th>
<th>Max. Building Setback</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-150m</td>
<td></td>
</tr>
<tr>
<td>150-400m</td>
<td></td>
</tr>
<tr>
<td>400-800m</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Distance from Station</th>
<th>Minimum FAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-150m</td>
<td></td>
</tr>
<tr>
<td>150-400m</td>
<td></td>
</tr>
<tr>
<td>400-800m</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Distance from Station</th>
<th>Min. Residential Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-150m</td>
<td></td>
</tr>
<tr>
<td>150-400m</td>
<td></td>
</tr>
<tr>
<td>400-800m</td>
<td></td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Distance from Station</th>
<th>Max. Building Heights</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-150m</td>
<td></td>
</tr>
<tr>
<td>150-400m</td>
<td></td>
</tr>
<tr>
<td>400-800m</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Distance from Station</th>
<th>Max. Ground Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-150m</td>
<td></td>
</tr>
<tr>
<td>150-400m</td>
<td></td>
</tr>
<tr>
<td>400-800m</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Distance from Station</th>
<th>Min. Building Frontage as a Percentage of Lot Frontage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-150m</td>
<td></td>
</tr>
<tr>
<td>150-400m</td>
<td></td>
</tr>
<tr>
<td>400-800m</td>
<td></td>
</tr>
</tbody>
</table>

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.

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.
7. STREET AND SIDEWALK REGULATIONS

Minimum Width
Sidewalks within the TOD Overlay District shall have a minimum 75 cm 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>
<thead>
<tr>
<th></th>
<th>1.0 space for each __ square meters of gross floor area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RETAIL/COMMERCIAL</strong></td>
<td></td>
</tr>
<tr>
<td>Bank</td>
<td></td>
</tr>
<tr>
<td>Bars/Nightclubs</td>
<td></td>
</tr>
<tr>
<td>Bed &amp; Breakfast</td>
<td></td>
</tr>
<tr>
<td>Bookstores</td>
<td></td>
</tr>
<tr>
<td>Convenience Retail</td>
<td></td>
</tr>
<tr>
<td>Dry Cleaners</td>
<td></td>
</tr>
<tr>
<td>Eating and Drinking Establishments</td>
<td></td>
</tr>
<tr>
<td>Hotel or Motel Lodging</td>
<td></td>
</tr>
<tr>
<td>Live-Work</td>
<td>1.25 spaces per dwelling unit and 1 space for each employee not residing in the dwelling unit</td>
</tr>
<tr>
<td>Lodging limited Bed and Breakfast Inn</td>
<td>1.0 space for each room or suite of rooms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MIXED USE</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed-Use</td>
<td>1.0 space for each __ square meters of gross floor area</td>
</tr>
<tr>
<td>Retail and Service Uses</td>
<td>1.0 space for each __ square meters of gross floor area</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>OFFICE</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional Offices</td>
<td>1.0 space for each __ square meters of gross floor area</td>
</tr>
<tr>
<td>Other Offices</td>
<td>1.0 space for each __ square meters of gross floor area</td>
</tr>
<tr>
<td>CIVIC</td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Day Care Facilities</td>
<td>__ spaces per employee</td>
</tr>
<tr>
<td>Gov’t Offices</td>
<td>1.0 space for each __square meters of gross floor area</td>
</tr>
<tr>
<td>Lodges/Clubs</td>
<td>1.0 space for each __square meters of gross floor area</td>
</tr>
<tr>
<td>Hospitals/Clinics</td>
<td>1.0 space for each __square meters of gross floor area</td>
</tr>
<tr>
<td>Museums</td>
<td>1.0 space for each __square meters of gross floor area</td>
</tr>
<tr>
<td>Post Offices</td>
<td>1.0 space for each __square meters of gross floor area</td>
</tr>
<tr>
<td>Schools-Elementary/Jr. High</td>
<td>10 spaces + __ per classroom</td>
</tr>
<tr>
<td>Schools-High/College</td>
<td>__ spaces per student and staff</td>
</tr>
<tr>
<td>Sports Facilities</td>
<td>1.0 space for each __square meters of gross floor area</td>
</tr>
<tr>
<td>Theaters</td>
<td>__ spaces per seat</td>
</tr>
<tr>
<td>Worship</td>
<td>__ spaces per seat</td>
</tr>
<tr>
<td>RESIDENTIAL</td>
<td></td>
</tr>
<tr>
<td>Studios and Efficiencies</td>
<td>__ spaces per dwelling unit</td>
</tr>
<tr>
<td>1 Bedroom</td>
<td>__ spaces per dwelling unit</td>
</tr>
<tr>
<td>2 Bedroom</td>
<td>__ spaces per dwelling unit</td>
</tr>
<tr>
<td>3 Bedroom</td>
<td>__ spaces per dwelling unit</td>
</tr>
<tr>
<td>Accessory Units</td>
<td>__ space per accessory dwelling unit</td>
</tr>
<tr>
<td>AUTOMOBILE PARKING</td>
<td></td>
</tr>
<tr>
<td>“MAXIMUMS” FOR</td>
<td></td>
</tr>
<tr>
<td>PERMITTED USES</td>
<td></td>
</tr>
<tr>
<td>Boarding Houses</td>
<td>__ space per bedroom</td>
</tr>
<tr>
<td>Nursing Home</td>
<td>__ space per bed</td>
</tr>
<tr>
<td>Elderly Housing</td>
<td>__ space per bed</td>
</tr>
<tr>
<td>INDUSTRIAL</td>
<td></td>
</tr>
<tr>
<td>Manufacturing/Light Industry</td>
<td>1.0 spaces per__square meter of gross floor area</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Intermodal Gateways</th>
<th>Employment Centres</th>
<th>Destination Nodes</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Milwaukee Intermodal Station" /></td>
<td><img src="image" alt="Raffles Place, Singapore" /></td>
<td><img src="image" alt="Mahalaxmi, Bangalore" /></td>
</tr>
</tbody>
</table>

#### What are the characteristics of the Station Area?
- **Intermodal Gateways**: Significant hubs of transport activity with supporting commercial and informal activities.
- **Employment Centres**: Significant center of economic and community activity. Stations serve the main public/semi public-amenities & offices of the city.
- **Destination Nodes**: Stations which provide access to unique destinations.

#### What is the Character of Land Use Mix & Density?
- **Intermodal Gateways**: Moderate- to high-density mix of industrial, commercial, employment, public - semi public / cultural and residential uses.
- **Employment Centres**: Moderate to high-density mix of employment, public-semi public / cultural uses. Some residential and local-retail also supported.
- **Destination Nodes**: 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?
- **Intermodal Gateways**: 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.
- **Employment Centres**: Introducing housing into predominantly employment/public-semi-public uses and improving connections/access to transit.
- **Destination Nodes**: Creating sustainable off-peak uses and accommodating peak travel demand.

#### What are land development opportunities?
- **Intermodal Gateways**: Moderate chance of land availability.
- **Employment Centres**: Less possibility of land availability.
- **Destination Nodes**: Less possibility of land availability.
<table>
<thead>
<tr>
<th>Transit Neighborhoods</th>
<th>Urban Core (CBD)</th>
<th>Infill Neighborhoods</th>
<th>New Residential Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predominantly residential district with good access to regional and subregional centres</td>
<td>Significant center of economic, community and cultural activity with regional-scale retail destinations.</td>
<td>Predominantly residential districts located just outside the core/old city</td>
<td>Predominantly residential district outside the core/old city area with good access to the core city</td>
</tr>
<tr>
<td>Potential for community and regional-serving retail but need to balance demands and conflict with surrounding destination retail.</td>
<td>High-density with commercial uses (&gt;75%) + a moderate mix of other uses such as institutions, and residential within a 5 min (400m) walking radius.</td>
<td>Moderate-to high-density with predominantly residential and moderate mix of Commercial, public semi public &amp; community facilities</td>
<td>Moderate-to high-density mix with predominantly residential supported with commercial &amp; community facilities</td>
</tr>
<tr>
<td>Integrating affordable housing in the product mix to increase transit ridership. Provide greater opportunities for commercial activities and informal markets to support household needs.</td>
<td>Integrating high-density housing into existing mix of housing and employment to support local-serving retail and improving connections/access to transit</td>
<td>Integrating new housing and supporting local-serving retail Improving connections/access to transit</td>
<td>Expanding local-serving retail opportunities and high-density housing opportunities</td>
</tr>
<tr>
<td>Less possibility of land availability</td>
<td>Mostly infill developments &amp; retrofitting uses</td>
<td>Very less chance of land availability</td>
<td>Moderate chance of land availability</td>
</tr>
<tr>
<td>Note: All requirements in this Table are subject to calibration for local context.</td>
<td>INTERMODAL GATEWAY</td>
<td>EMPLOYMENT NODE</td>
<td>DESTINATION NODE</td>
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<tr>
<td>a. BASE RESIDENTIAL DENSITY</td>
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<td>Dwelling units per hectare</td>
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<td>b. BLOCK SIZE</td>
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<td>Block perimeter</td>
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<td>c. THOROUGHFARES</td>
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<td>Arterial</td>
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<td>Sub-arterial</td>
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<tr>
<td>Collector</td>
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<tr>
<td>Neighborhood streets</td>
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<td>Bike facilities</td>
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<td>Pedestrian priority streets</td>
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<td>Shared street</td>
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<td>d. CIVIC SPACES</td>
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<td>Park</td>
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<td>Green</td>
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<td>Plaza</td>
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<td>Playground</td>
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<td>e. LOT OCCUPATION</td>
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<td>Lot Width</td>
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<td>Lot Coverage</td>
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<td>f. DEVELOPMENT STANDARDS</td>
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<td>Maximum podium height</td>
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<td>Minimum podium stepback</td>
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<td>g. SETBACKS - PRINCIPAL BUILDING</td>
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<tr>
<td>Front Setback Principal</td>
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<tr>
<td>URBAN CORE</td>
<td>INFILL NEIGHBORHOODS</td>
<td>NEW RESIDENTIAL AREAS</td>
<td>BASELINE STANDARDS</td>
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<td>Medium density</td>
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<td>should be within 500m</td>
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<td>catchment</td>
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<td>150m</td>
<td>130m</td>
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</tbody>
</table>
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
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.
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**

Enable street design that ensures safe access for all users, including pedestrians, cyclists, motorists and transit riders, by providing equitable distribution of road space.

**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.

**COMPLETE STREETS**

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.

**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.
ORIENTED (OPEN SPACE) COMPONENTS

01. TRANSIT PLAZA
Promote congregational activities through inclusive and context-sensitive variety in architecture and landscaping around transit stations.

02. WALKABILITY
Focus on providing an attractive pedestrian environment that is continuous, forms a network and offers an array of experiences and amenities.

03. 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.

04. 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.
DEVELOPMENT (BUILT ENVIRONMENT) COMPONENTS

D1: COMPACT DEVELOPMENT
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.

D2: MIX OF USES
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.

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.

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.
## TOD SUPPORTIVE PRINCIPLES

<table>
<thead>
<tr>
<th>Supportive Principle</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLIMATE RESILIENCE</strong></td>
<td>S1</td>
</tr>
<tr>
<td>Identify high-risk areas to design TOD projects in consideration with the anticipated hazards and failures associated with climate change &amp; environmental variations.</td>
<td></td>
</tr>
<tr>
<td><strong>INCLUSIVENESS</strong></td>
<td>S2</td>
</tr>
<tr>
<td>Adopt inclusive development of TOD areas at all stages &amp; scales by means of incorporating the needs of diverse user groups including gender, age, abilities &amp; socio-economic segments.</td>
<td></td>
</tr>
<tr>
<td><strong>LAND VALUE CAPTURE</strong></td>
<td>S3</td>
</tr>
<tr>
<td>Adopt development based land value capture as a financial mechanism for upgrading infrastructure along TOD corridors and station areas.</td>
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<tr>
<td><strong>UNIVERSAL ACCESSIBILITY</strong></td>
<td>S4</td>
</tr>
<tr>
<td>Meet and exceed the requirements of accessibility guidelines and standards of all users with different abilities in building or retrofitting pedestrian environments.</td>
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<tr>
<td><strong>SUSTAINABLE INFRASTRUCTURE</strong></td>
<td>S5</td>
</tr>
<tr>
<td>Prioritize and implement innovative green building practices in all aspects of providing or upgrading infrastructure including, energy, water, landscape and waste management.</td>
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</tr>
<tr>
<td><strong>BICYCLE FRIENDLY</strong></td>
<td>S6</td>
</tr>
<tr>
<td>Expand accessibility in TOD areas by promoting bicycles as an alternate or preferred sustainable and healthy mode of choice.</td>
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</tr>
<tr>
<td><strong>TECHNOLOGY INTEGRATION</strong></td>
<td>S7</td>
</tr>
<tr>
<td>Adopt smart technologies within TOD projects such as fare integration, smart parking, real-time information, to provide public transit service an edge over automobiles.</td>
<td></td>
</tr>
<tr>
<td>Reference: <em>ITS Toolkit, IUT</em> (<a href="http://www.iutindia.org/capacityBuilding/Toolkits.aspx">http://www.iutindia.org/capacityBuilding/Toolkits.aspx</a>)</td>
<td></td>
</tr>
</tbody>
</table>
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 another 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.


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.

Recreio Shopping BRT station, Rio de Janeiro, Brazil
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 |
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.

<table>
<thead>
<tr>
<th>APPROX. WALKING DISTANCE FROM EXITS</th>
<th>FACILITY/AMENITY AND PREFERRED LOCATION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within 100 m</td>
<td>Bus stops; vendor zones; convenience shopping; cycle-rental station, high occupancy feeder stop/stand, public toilets; pedestrian-only plazas.</td>
</tr>
<tr>
<td>Beyond 100 m</td>
<td>Private car/taxi “drop-off” location only; validated car parking facility for metro users (park &amp; ride) may be provided.</td>
</tr>
<tr>
<td>Within 500m</td>
<td>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.)</td>
</tr>
</tbody>
</table>

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.

+ REFER OTHER PRINCIPLES

T2

Informal transit at MG road station, Delhi, India
2. **FOCUS ON THE NEEDS OF FIRST N 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.
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

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**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.

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**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.

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**REFER OTHER PRINCIPLES**

T1  T2  T3  T4  O1  O2  O3  O4  D1  D2  D3  D4
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
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.

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.
  -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

- 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

- 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
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
Promote congregational activities through inclusive and context-sensitive variety in architecture and landscaping around transit stations.

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

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.

+ REFER OTHER PRINCIPLES
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 CO1, C02 PD H03, H04, H05, H06, P01 FI A02, H02, R01, R03
IM A01, A02, H01, H02, P01
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.

## 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-f-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
2. MAKE WALKING A COMFORTABLE CHOICE

• Street trees:
  o At least 125 trees per km for streets with ROW smaller than 12m.
  o 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 to other knowledge products: A01, A02, A04, P02, C01, C02, H01, P03, H03, H04, H05, H06, P01, A02, H02, R01, R03, A01, A02, H01, H02, P01
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.

**PUBLIC REALM**

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*

**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**

Public Realm, Sao Paulo, Brazil

**REFER OTHER PRINCIPLES**

<table>
<thead>
<tr>
<th>T1</th>
<th>T2</th>
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</thead>
</table>
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

- 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

- 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

+ REFER OTHER KNOWLEDGE PRODUCTS

AS EN 01, 02 PD H03, H04, H05, H06, P01 FI A02, H02, R01, R03 IM A01, A02, H01, H02, P01
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.

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

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.

Refer Other Principles

+ T1 T2 T3 T4 O1 O2 O3 O4 D1 D2 D3 D4
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
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

RISK & MITIGATION

- Undue focus on increasing FARs and densities independent of market forces and absorption capacity fails the objective of achieving compact development. On the contrary, highly compact built up environments would 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.
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
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.

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

TOD PRINCIPLES + DESIGN GUIDE
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

- **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

- **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
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.

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 EWS, LIG & MIG as an integral component of the housing units with relevant unit sizes.
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
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.

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

**Slum development at Asalpha metro station housing diversity, Mumbai, India**

**REFER OTHER PRINCIPLES**

T1 T2 T3 T4 O1 O2 O3 O4 D1 D2 D3 D4
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.

- 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 |
LAND USE AND TRANSPORTATION INTEGRATION BEST PRACTICES

Examples of land use and transportation integration that influenced significant improvements in cities

Type: Reference Document
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

1963-1965

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.
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.

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

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.

The new Green line BRT corridor was opened.
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 Medellin in 2004, the “Medellin, 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.
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.

The Northeastern Urban Integration Project in Medellin (Proyecto Urbano Integral, or PUI) was initiated by the City of Medellin 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.

**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.

**Context:** Transit for areas with topographical restrictions

**Scale:** Corridor | Station Area | Site

**Related TOD Principles:** Urban parks and open spaces, public realm

**APPLICABILITY**

**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.

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**Bicycle Friendly:** Medellin’s bicycle infrastructure focuses on separated bike paths, located within sidewalks. There are also dedicated pelican signals at important intersections.
SHENZHEN, CHINA

+ PROJECT INFORMATION

| Location: Shenzhen, Guangdong, China |
| Funding: Municipal Corporation (Govt.) |
| Timeline: Ongoing |
| Project Settings: Urban area, suburban areas |

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).
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
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
MATUNGA FLYOVER, MUMBAI, INDIA

+ PROJECT FACTS

<table>
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<th>Location: Mumbai, Maharashtra, India</th>
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<tbody>
<tr>
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<tr>
<td>Total Project Cost: 50 million (INR)</td>
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<td>Funding: Municipal Corporation (Govt.)</td>
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<td>Timeline: 5 Years</td>
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<tr>
<td>Project Settings: Mixed-Use (Residential/Commercial) Main Street</td>
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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

1.5-km long and 17m wide flyover was built at a cost of 700 million(INR) from the Maheshwari Udyans 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.

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.
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.

Context: Underutilized spaces under the elevated transit corridors

Scale: Corridor | Station Area | Site

Related TOD Principles:

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.

After successful petitioning, it got the final approval and in June 2015, BMC began to redevelop the area.

Embroided in some political differences, the park was finally inaugurated in June 2016.
MEDELLIN, COLOMBIA, LATIN AMERICA

+ PROJECT FACTS

<table>
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<th>Location: Medellin, Colombia, Latin America</th>
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<td>Project Size: Not Available</td>
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<td>Total Project Cost: Approx 3.5 million USD</td>
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<td>Funding: Government (City funding)</td>
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<td>Timeline: 7 Years</td>
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<tr>
<td>Project Settings: Residential Neighborhood (Transit Connections - Streets &amp; Plazas)</td>
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</tbody>
</table>

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.
Context: Creative solution to overcome accessibility challenges to transit stations in hilly regions.

Scale: Station Area | Corridor

**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**

Residents and local artists started painting walls with beautiful mural graffiti in memory of innocent people who died in the conflict.

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.

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.
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

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.

By the early twentieth century, the San Francisco River was essentially a sewer and a garbage dump.
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 security guards who are recognizable by their uniforms giving 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.

For reviving the old city center, the city first planned infrastructure investment for the new public transportation system (Bus Rapid Transit, named Transmilenio).

A decision was made to hire a renowned architect to design the segment that would enter the city center, through the Av. Jimenez.

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.
PD-P01
TOD PLANS TERMS OF REFERENCE

Template for hiring a consultant to prepare TOD plans at the required scale.

Type: Reference Document
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**:
   - Prepare a basis for a spatial growth strategy and density optimization
   - Identify priority areas for investment for both transit and real estate development

b. **Corridor-level TOD Plan**:
   - Prepare a land use and density strategy along the transit corridor to optimize transit availability and affordability
   - Identify multimodal integration strategies with supporting transit and feeder services.
   - Identify stations with high-level of challenges and/or opportunities.

c. **Station Area Plan**:
   - Prepare a block plan for development prioritizing TOD principles
   - Prepare public realm plan for a high-quality walking and cycling experience outside the station
   - Identify catalyst projects for real estate development

d. **Greenfield/Suburban TOD Plan**
   - Prepare a master plan that leverages transit connectivity in walkable neighborhood units

e. **Urban Infill TOD Plan**
   - Prepare a plan that identifies opportunities for infill development to optimize densities around transit

f. **Urban Redevelopment**
   - 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. 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**

- **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

- **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**

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

**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. 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

- **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:

- 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. 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
  - Retain characteristics
  - Planning & development challenges
  - Ideal Land use mix
  - Transportation Parameters
  - 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
  - **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
  - 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. 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 Adaptable - 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:
  o Planning & regulatory context
  o Regional context
  o Mobility & Access
  o Land Use, Public realm & Urban Design
  o 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:
  o Existing land use
  o Proposed land uses
  o Land ownership
  o Parking
  o Zoning
  o Circulation and Accessibility, with special emphasis on Multimodal Integration and NMT infrastructure
  o Public facilities
  o Major nodes & activity centers
  o Public realm & urban design elements
    » Parks, Open Space and Plazas
    » Sidewalk conditions
    » Natural Features
    » Lighting and signage conditions
    » Utilities
  o 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:
  o Greenfield
  o Urban Infill
  o 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.
DEPARTMENTAL SERVICES

PLAN + DESIGN

TERMS OF REFERENCE

DELIVERABLES

<table>
<thead>
<tr>
<th>TASK</th>
<th>DELIVERABLE</th>
<th>TIMELINE</th>
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<tbody>
<tr>
<td>1</td>
<td>Inception Report including problem statement, goals, objectives, study needs and methods</td>
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<tr>
<td>2</td>
<td>Memo #1: Study Area Analysis</td>
<td>M + 2 months</td>
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<tr>
<td>3</td>
<td>Memo #2: Stakeholder Engagement Summary</td>
<td>M + 3 months</td>
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<tr>
<td>4</td>
<td>Memo #3: Resilience Strategy</td>
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<td>Memo #4: Draft TOD Plan Recommendations</td>
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<tr>
<td>6</td>
<td>Memo #5: Financing and Implementation Strategy</td>
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<tr>
<td>7</td>
<td>Final TOD Plan</td>
<td>M + 8 months</td>
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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:

<table>
<thead>
<tr>
<th>Key Experts</th>
<th>Year of Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Project Manager and Senior Urban Planner</td>
<td>15 years</td>
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<tr>
<td>2 Urban Planner</td>
<td>5-10 years</td>
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<tr>
<td>2 Urban Designer</td>
<td>5-10 years</td>
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<td>3 Transport Planner</td>
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<td>5 Regulatory Expert</td>
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<td>6 Municipal Finance Specialist</td>
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