TOD IMPLEMENTATION RESOURCES & TOOLS

SUPPORTED BY GLOBAL PLATFORM FOR SUSTAINABLE CITIES (GPSC)

01 DEVELOP INITIAL RANGE OF ROUTE & MODE OPTIONS

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

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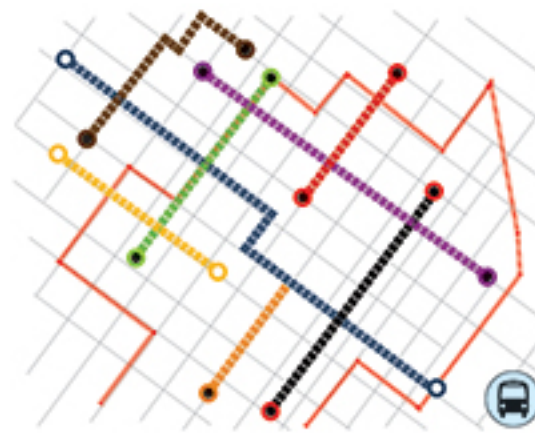
DATA SOURCES

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

STAKEHOLDERS

Primary:
- Transit Planning/ Urban Planning Agency

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

02 UNDERTAKE INITIAL SCREENING

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

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

DATA SOURCES

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

STAKEHOLDERS

Primary:
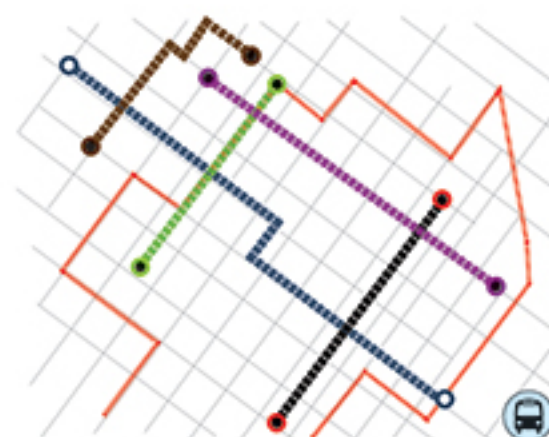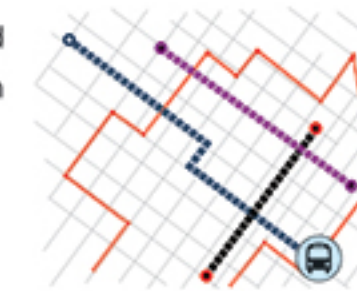- Transit Planning Agency

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

03-A UNDERTAKE DETAILED CORRIDOR SCREENING

03-B UNDERTAKE TECHNOLOGY/ MODE REVIEW

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

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

Evaluate transit technology based on:

- Potential Ridership
- Mode Capacity
- Cost Comparison

Refer to AS-A04

DATA SOURCES

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

STAKEHOLDERS

Primary:
- Transit Planning Agency

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

04 UNDERTAKE BUSINESS CASE

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

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

DATA SOURCES

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

STAKEHOLDERS

Primary:
- Transit Planning Agency

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

SITE SELECTION

GREENFIELD

No Connection to Ex. Service Area Available

Connection to Ex. Service Area Available

Independent Source Required

Future Development Plan

Future Demand Analysis

Future Required Improvements

Assess Carrying Capacity

Sufficient

Insufficient

Modify

Capital and Operating Cost Estimates

Capital Investment Needs Plan

REDEVELOPMENT

Ex. Infrastructure Inventory & Assessment

Ex. Demand Analysis

Future Development Plan

Future Demand Analysis

Future Required Improvements

Assess Carrying Capacity

Sufficient

Insufficient

Modify

Capital and Operating Cost Estimates

Capital Investment Needs Plan

INFRASTRUCTURE ASSESSMENT GOALS

PHYSICAL INFRASTRUCTURE

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

WATER SUPPLY

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

WATER CONSUMPTION | WATER SUPPLY | WATER TREATMENT | WATER NETWORKS

SEWERAGE

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

WW GENERATION | WW TREATMENT | WW DISPOSAL

ENERGY

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

ENERGY CONSUMPTION | ENERGY SUPPLY | ENERGY GENERATION | DISTRIBUTION & TRANSMISSION

SOLID WASTE

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

SW GENERATION | SW DIVERSION | TREATMENT & DISPOSAL | COLLECTION & TRANSFER

INFORMATION

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

INFORMATION DEMAND | COLLECTION AND COMMUNICATION MODES | INFORMATION NODES | INFORMATION NETWORKS

LANDSCAPE

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

LANDSCAPE DEMAND | LANDSCAPE PROGRAM | LANDSCAPE PATTERN | LANDSCAPE MAINTENANCE

INFRASTRUCTURE ASSESSMENT GOALS

SOCIAL INFRASTRUCTURE

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

HEALTHCARE

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

ADEQUACY | ACCESSIBILITY | AFFORDABILITY | QUALITY

EDUCATION

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

ADEQUACY | ACCESSIBILITY | AFFORDABILITY | QUALITY

RECREATION

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

ADEQUACY | ACCESSIBILITY | AFFORDABILITY | QUALITY

POLICE/ FIRE/ OTHERS

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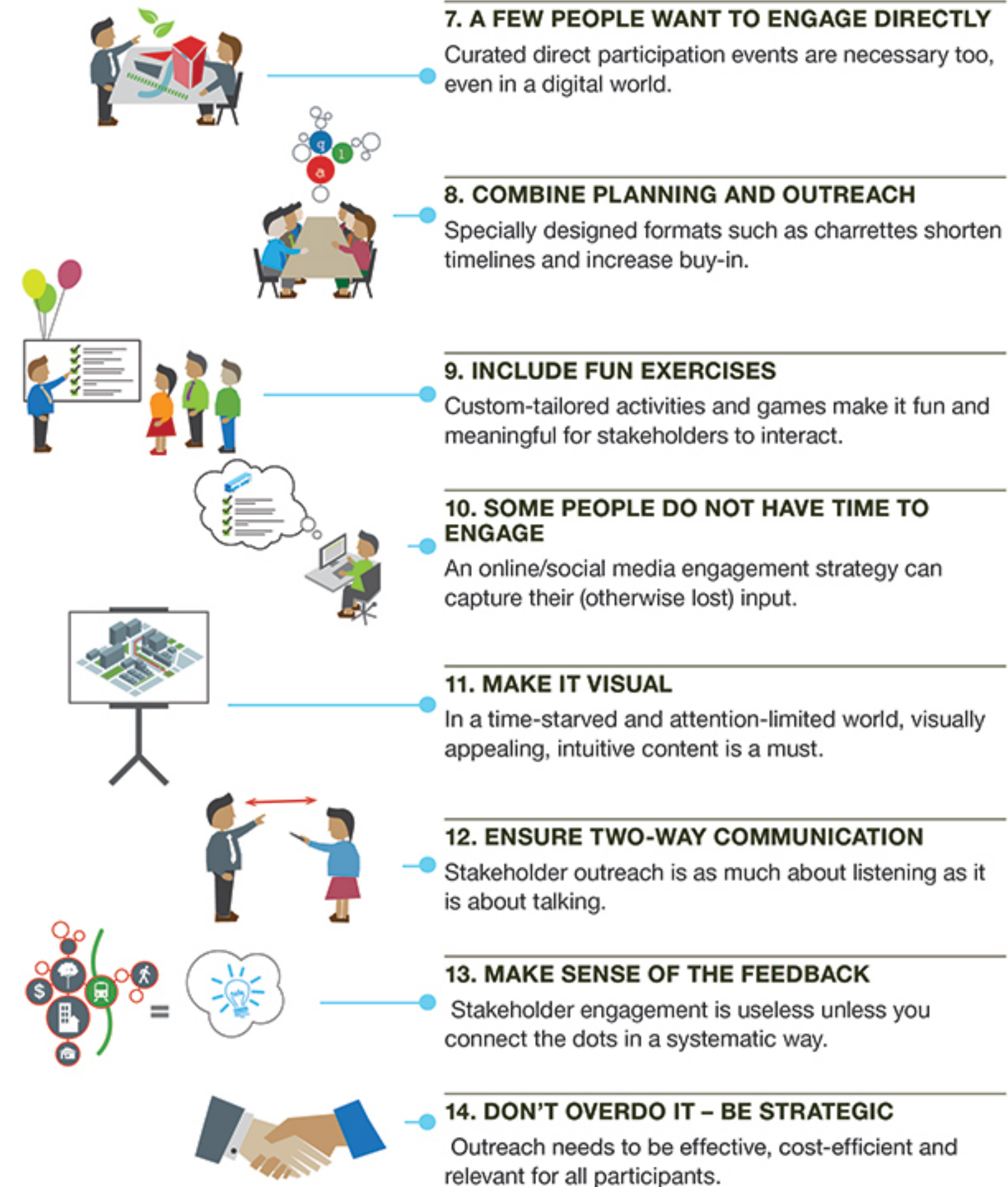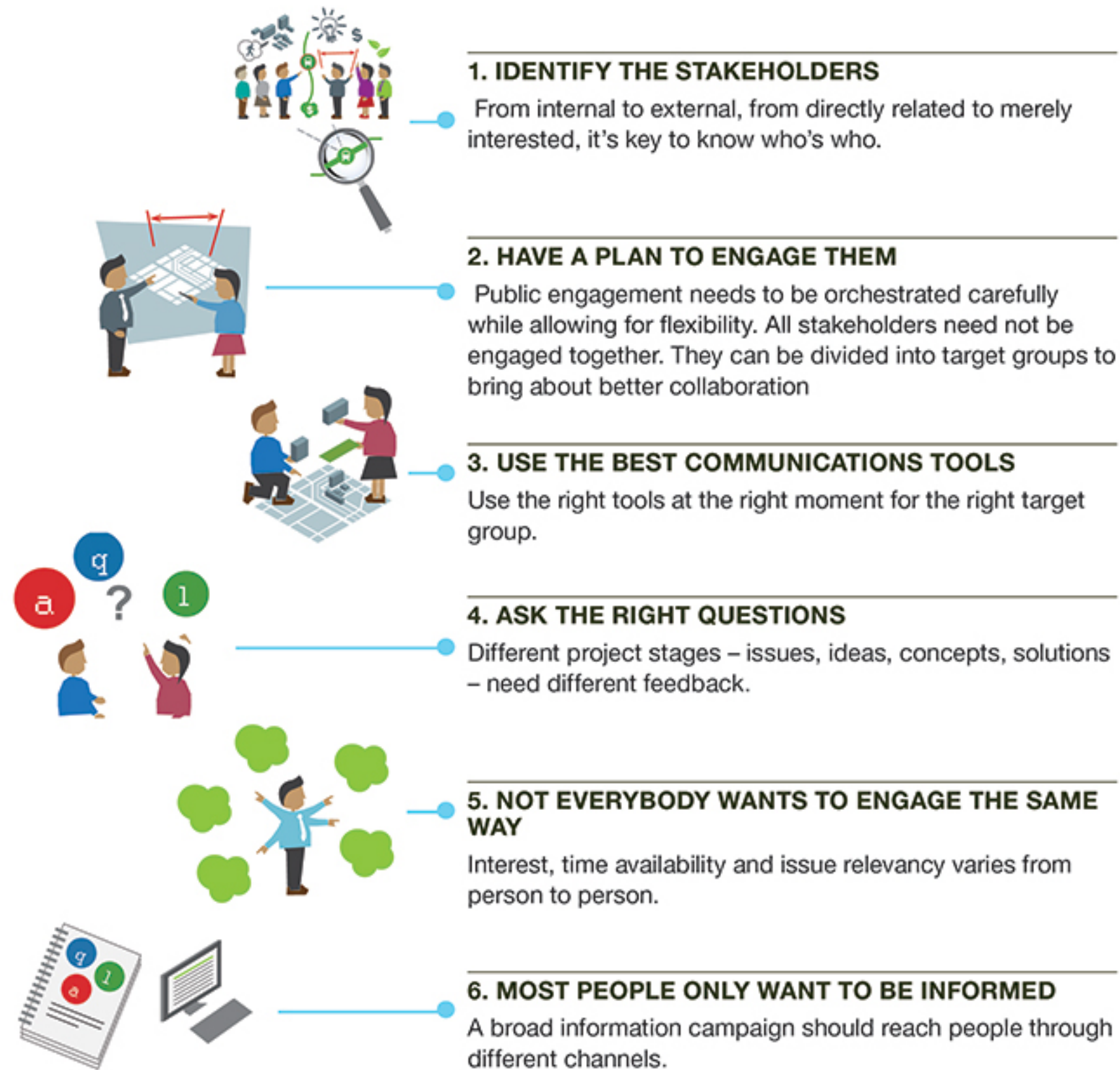
ADEQUACY | ACCESSIBILITY | QUALITY

*Applicable at all scales

Greenfield | Urban/ Suburban

METHODOLOGIES

"Good TOD plans are 50% professional best practices and 50% local knowledge.
You can only access local knowledge through concerted public outreach."

1. IDENTIFY THE STAKEHOLDERS
From internal to external, from directly related to merely interested, it's key to know who's who.

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

3. USE THE BEST COMMUNICATIONS TOOLS
Use the right tools at the right moment for the right target group.

4. ASK THE RIGHT QUESTIONS
Different project stages – issues, ideas, concepts, solutions – need different feedback.

5. NOT EVERYBODY WANTS TO ENGAGE THE SAME WAY
Interest, time availability and issue relevancy varies from person to person.

6. MOST PEOPLE ONLY WANT TO BE INFORMED
A broad information campaign should reach people through different channels.

7. A FEW PEOPLE WANT TO ENGAGE DIRECTLY
Curated direct participation events are necessary too, even in a digital world.

8. COMBINE PLANNING AND OUTREACH
Specially designed formats such as charrettes shorten timelines and increase buy-in.

9. INCLUDE FUN EXERCISES
Custom-tailored activities and games make it fun and meaningful for stakeholders to interact.

10. SOME PEOPLE DO NOT HAVE TIME TO ENGAGE
An online/social media engagement strategy can capture their (otherwise lost) input.

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

12. ENSURE TWO-WAY COMMUNICATION
Stakeholder outreach is as much about listening as it is about talking.

13. MAKE SENSE OF THE FEEDBACK
Stakeholder engagement is useless unless you connect the dots in a systematic way.

14. DON'T OVERDO IT – BE STRATEGIC
Outreach needs to be effective, cost-efficient and relevant for all participants.

01 MAP LAND USES AND KEY DEVELOPMENTS

CITIZEN'S INPUT

To understand the distribution of residential, employment and institutional uses in the city.

DATA SOURCES
- Satellite Image/GIS Data
- As per the approved Master Plan (MP)/Development Plan (DP)/Comprehensive Plan (CP)
- Field Surveys along major transit corridors
- Stakeholder Workshop

02 IDENTIFY ACTIVITY GENERATORS

CITIZEN'S INPUT

To help identify routes of high commuter traffic and origin-destination travel patterns. [**Housing, Employment and Recreational Centres**]

DATA SOURCES
- As per approved MP/DP/CP
- Field Surveys along major transit corridors
- List of Approved Developments
- Stakeholder Workshop

03 IDENTIFY PRIORITY TRANSIT DEMAND CORRIDORS

Based on population distribution, land use plans, location of activity centers and travel demand forecasting (if available) for the transit type proposed.

DATA SOURCES
- As per approved MP/ DP/ CP
- Mobility Plan/Transportation Plan
- Transit System Detailed Report
- Latest Census Population and Projected Estimates as per MP/DP/CP
- Right-of-way widths: Google earth/satellite images/field surveys/street views

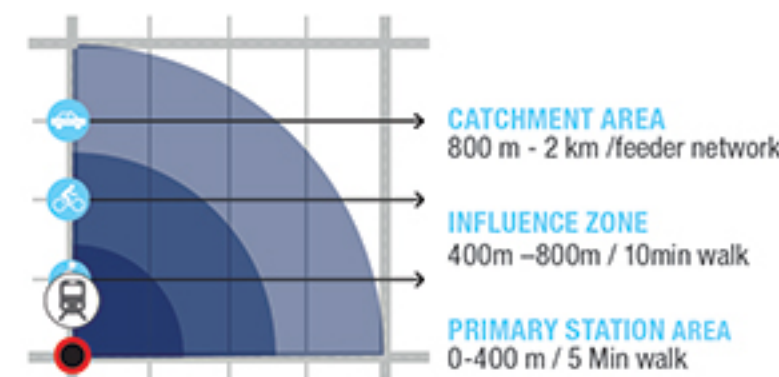*[Refer to* **AS-H02** *How to undertake Rapid Transit Alternatives Assessment]*

04 DELINEATE INFLUENCE ZONE OF TRANSIT

To determine the catchment area around transit routes where transit-supportive development needs to be prioritized.

DATA SOURCES
- Existing Station Locations
- Satellite Imagery/Google Street View
- GIS Database for land parcels, road network and natural features
- Master Plan/Development Plan/Comprehensive Plan
- Mobility Plan/Transport Plan
- Field Survey

CATCHMENT AREA
800 m - 2 km /feeder network

INFLUENCE ZONE
400m –800m / 10min walk

PRIMARY STATION AREA
0-400 m / 5 Min walk

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05 DETERMINE DEVELOPMENT CONTEXT

To determine the real estate market dynamics, land availability and ROW constraints.

| GREENFIELD | SUBURBAN | URBAN REDEVELOPMENT | URBAN INFILL |
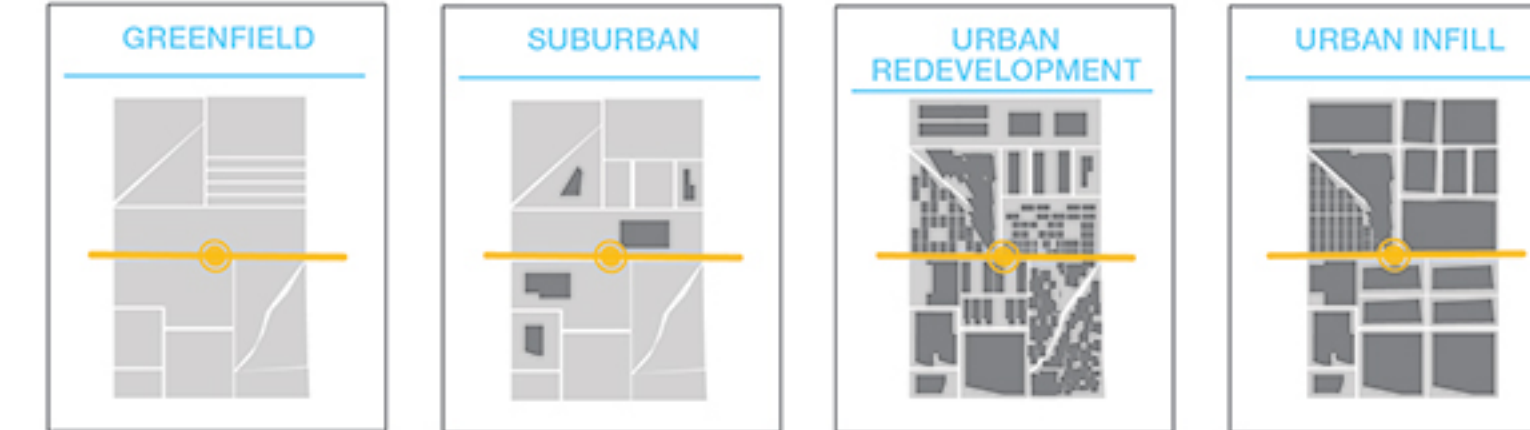
[Refer to **AS-A02** *TOD Scale & Context Assessment]*

06 IDENTIFY GOALS AND TARGETS

CITIZEN'S INPUT

For different areas within the TOD influence zone, based on city vision, growth scenarios and multi-stakeholder participation.

[Refer to **AS-A01** *TOD Readiness Assessment]*

07 DRAFT CITY-WIDE TOD PLAN

Implementing TOD at a city-wide level includes policy recommendations and actions related to various TOD principles across various TOD implementing agencies, identified below:

APPLICABLE TOD PRINCIPLES

- WELL DESIGNED TRANSIT SYSTEM
- TRANSIT PLAZA
- COMPACT DEVELOPMENT
- MULTI-MODAL INTEGRATION
- WALKABILITY
- MIX OF USES
- COMPLETE STREETS
- PUBLIC REALM
- HOUSING DIVERSITY
- TRAFFIC MANAGEMENT
- URBAN PARKS & OPEN SPACES
- INFORMAL SECTOR INTEGRATION

COMPONENTS OF A CITY LEVEL PLAN

- City-wide Policy recommendations
- Master Plan Integration
- Typology of corridors and stations (AS-A03)
- Zoning Codes

08 ESTABLISH STATUTORY RELEVANCE

Options to establish statutory relevance for TOD principles include:

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

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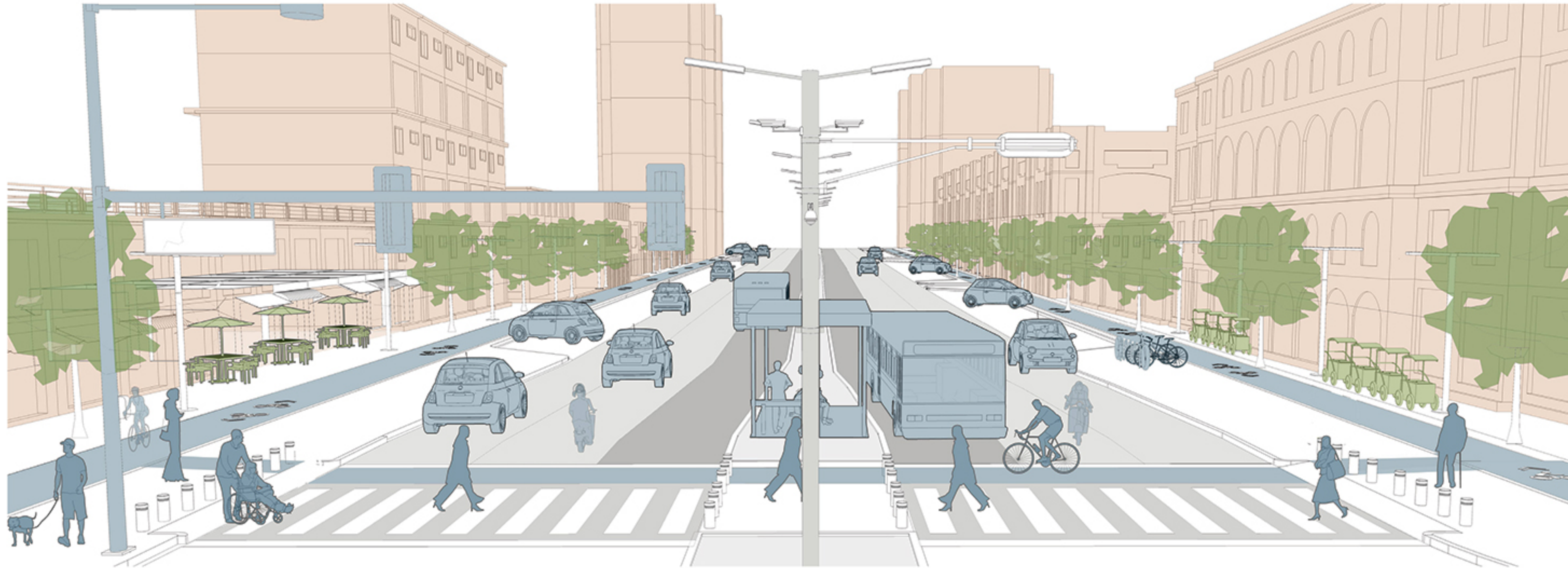Create a TOD policy as a special law that supersedes the existing regulations

OPTION 3
Establish a TOD overlay district as a special area in existing development regulations

TOD DESIGN PRINCIPLES

TRANSIT (TRANSPORTATION)

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

ORIENTED (OPEN SPACE)

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.

DEVELOPMENT (BUILT ENVIRONMENT)

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.

T3

COMPLETE STREETS

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

RISK & MITIGATION

- Addressing competing needs of space from diverse user groups in an existing built context deters the objective of designing complete streets due to lack of available space.
- Street upgrades within various agencies and different timelines hinders the implementation of complete streets.
- Prioritizing other initiatives that help support the complete streets objective including traffic management, promoting walking & bicycling culture to be addressed in parallel.
- Inter-agency coordination and institutional support to bring the agencies together mitigates the risks on differing timelines.

W Pender Street & Hornby Street, Vancouver, Canada

1. DESIGN THE STREETS FOR THE ENTIRE RIGHT OF WAY

- Multi-Utility Zone (MUZ) of minimum 1.8 m width should be provided on all Collector and Arterial Roads, to accommodate bus stops, street utilities, trees, street furniture, planting for stormwater management; informal transit and ride-sharing services/ NMT stands, paid idle parking, etc.

  -Adapted from TOD Guidance Document, MOUD, 2016

2. CREATE A BALANCE BETWEEN NEEDS OF ALL USERS AND MODES OF TRAVEL

- No vehicular street R/W within 500m of TOD station shall be more than 30m unless already notified in the Master Plan.

  -Adapted from TOD Guidance Document, MOUD, 2016

- In a slow-speed local street (below 30 km/h), the optimum width for a carriageway is 3 m for one-way movement and 4.5 m for two-way movement.
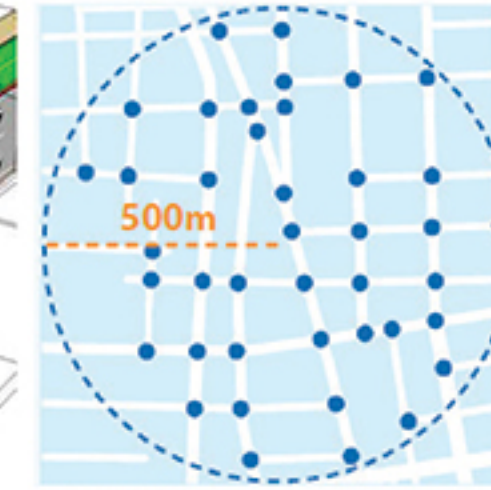
  -Adapted from TOD Guidance Document, MOUD, 2016

- Create dedicated and protected bike lanes, at least 3 meters wide in each direction, on all streets except low-speed local streets.

  -Adapted from The Energy Foundation, 2012

Building Edge-to-Edge Design | source: MOUD, 2016

Intersection Density | source: MOUD, 2016

Block Sizes & Street Hierarchy | source: MOUD, 2016

LEGEND
- Arterial
- Sub-Arterial
- Collector/Local
- NMT Network

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:
  o Arterial - 50m to 80m - 50km/hr
  o Sub-Arterial - 30m to 50m - 50km/hr
  o Distributor - 12m to 30m - 30km/hr
  o Access - 6m to 15m - 15km/hr

+ REFER OTHER PRINCIPLES

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

+ REFER OTHER KNOWLEDGE PRODUCTS

AS H03, P03 **EN** C01, C02, H01, R01, P01 **PD** H01, H02, H03, R03, P01 **FI** A01, A02, H01, H02, R01, R02, R03 **IM** A01, A02, H01, H02, P01