



# Transit-Oriented Development

Framework for Success









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## *How to use this report*

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# Foreword



As cities around the world prepare for the future, a convergence of trends is forcing decision-makers to rethink the planning, designing and building of urban environments.

Urban population growth challenges cities to improve overall livability with access to quality housing near green spaces and amenities. Cities of all sizes now recognize the role of design and structure in influencing a high standard of livability, essential to developing sustainable communities. There is also a growing understanding that the built environment should be resilient to the impacts of climate change and able to adapt to people's changing lifestyle patterns and preferences. Technology is playing an increasing role, driving expectation for tailored, instantaneous service. These and other trends present public-sector stakeholders and private-sector facilitators with a broad range of urban infrastructure requirements.

Transit-Oriented Development (TOD), when well-planned and effectively implemented, can address urban needs by integrating development with transportation. TOD incorporates high-density, mixed-use development into the immediate environs of a public transport/transit node (rail or bus). The ultimate goal is to create livable, thriving and sustainable urban communities where people can walk and cycle their way to reliable public transport connecting to other parts of the city and surrounding areas, including airports to reach global destinations. TOD can also generate revenue from increased ridership and value capture mechanisms to support the considerable government investment required to implement modern public transit systems in complex urban environments.

Though the potential value of TOD has already been recognized around the world, those seeking to bring about TOD still struggle with project scoping and implementation. Timely opportunities exist to reshape not only the social and spatial structure of individual communities where TOD is developed but also the future plans of entire cities—to address rising populations, aging communities, expanding sustainable development objectives, and other key societal trends.

The requirements that TOD meets today will continue to evolve as the living-working preferences of people change. Applying new-mobility technologies and data-informed decision-making will be increasingly important in enhancing urban livability. To realize the ambitions people have for their cities, the public sector and private sector must work collaboratively to create responsive TOD guidelines and criteria, highlighting the need for adaptability in design to address new lifestyles, shifting development patterns and the latest transportation and workforce technologies.

A fresh and forward-thinking approach to delivering effective TOD opens opportunity windows to utilize land more efficiently, provide better housing choices, foster equitable communities, design unique centers of activity, and support a diversity of urban lifestyles for years to come.





Upfront Future Ready<sup>®1</sup>, integrated planning with stakeholders and process facilitators is key to developing momentum and consensus toward delivering with optimal efficiency sustainable outcomes. A clear and thorough understanding of true costs, technical necessities and policy-regulatory issues must be achieved early-on in the process to minimize risk and build progress toward the successful outcome of each TOD project.

We are pleased to present to you our framework for success—based on WSP's global advisory experience and technical contributions to TOD projects in major cities throughout the world. This framework outlines and explores planning and funding priorities directly impacting the viability of TOD's implementation and delivery.

We look forward to discussing your TOD vision.

*Eric Peissel*  
Global Director of Transport & Infrastructure

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<sup>1</sup> **Future Ready<sup>®</sup>** is WSP's global innovation program that seeks to better understand the key trends in climate change, society, technology, and resources and how they are impacting our world, locally and globally. The goal is to work with clients to design for future needs as well as those of today. Future Ready<sup>®</sup> is a registered trademark of WSP Global Inc. in Canada and New Zealand. WSP Future Ready (logo)<sup>®</sup> is a registered trademark of WSP Global Inc. in Europe, Australia and in the United Kingdom.

# Cities on the Rise

“Achieving its [United Nations] 17 Sustainable Development Goals will depend, in large part, on whether we can make cities and human settlements inclusive, safe, resilient and sustainable.”

– United Nations Secretary-General Ban Ki-moon message on World Habitat Day, October 2016.

## Urban Population Growth Around the World

Today, fully 55 percent of the world's population lives in urban areas, compared with just 30 percent in 1950. This number is expected to increase to 68 percent by 2050. Currently, the most urbanized regions of the world include Northern America (82 percent living in urban areas in 2018), Latin America the Caribbean (81 percent), Europe (74 percent) and Oceania (68 percent). In contrast, Africa and Asia remain mostly rural, with 43 and 50 percent of their respective populations living in urban areas. All world regions are expected to urbanize further over the coming decades. Africa and Asia are urbanizing faster than the other regions and are projected to become 59 and 66 percent urban, respectively, by 2050. The rural population of the world has grown slowly since 1950 and is expected to reach its peak in a few years.

The global rural population is now close to 3.4 billion and is expected to decline to 3.2 billion by 2050. Africa and Asia are home to nearly 90 percent of the world's rural population. India has the largest rural population (857 million), followed by China (635 million). The urban population of the world has grown rapidly since 1950, from 746 million to 3.9 billion in 2014. Asia, despite its lower level of urbanization, is home to 53 percent of the world's urban population, followed by Europe (14 percent) and Latin America and the Caribbean (13 percent).

Continuing population increases and urbanization (population shifts from rural to urban centers) are projected to add 2.5 billion people to the world's urban population base by 2050, with nearly 90 percent of the increase concentrated in Asia and Africa.<sup>2</sup>

This significant growth requires a re-examination of conventional approaches to accommodating rising urban populations, such as urban sprawl. Sustainable development depends on successful management of how our cities grow and densify while also improving the livability for residents.

TOD is inherently an evolving developmental process; in fact, TOD can continue to evolve for several decades beyond implementation. TOD plans should always look to address trends due to shifting societal needs and technology applications. For example, as new mobility developments create greater opportunity for public transport advancement, TOD must balance community needs with corresponding infrastructure change.

Urban issues are increasingly prominent on national policy agendas. Cities and metropolitan areas are major contributors to national economies, and they enable global markets. Moreover, at a time of deepening globalization and increasing international competition for investment, metropolitan regions attract a wide range of public interventions. As a result, [...] urban development policies seek to address a range of relevant issues—from managing urban expansion and congestion to fostering competitiveness, innovation, social inclusion and environmental sustainability.<sup>3</sup>

<sup>2</sup> Reference for the text and the data in the graph: [World Urbanization Prospects 2018](#), Department of Economic Affairs, United Nations

<sup>3</sup> [Organization for Economic Co-operation and Development \(OECD\)](#)



# World Population Residing in Urban Areas

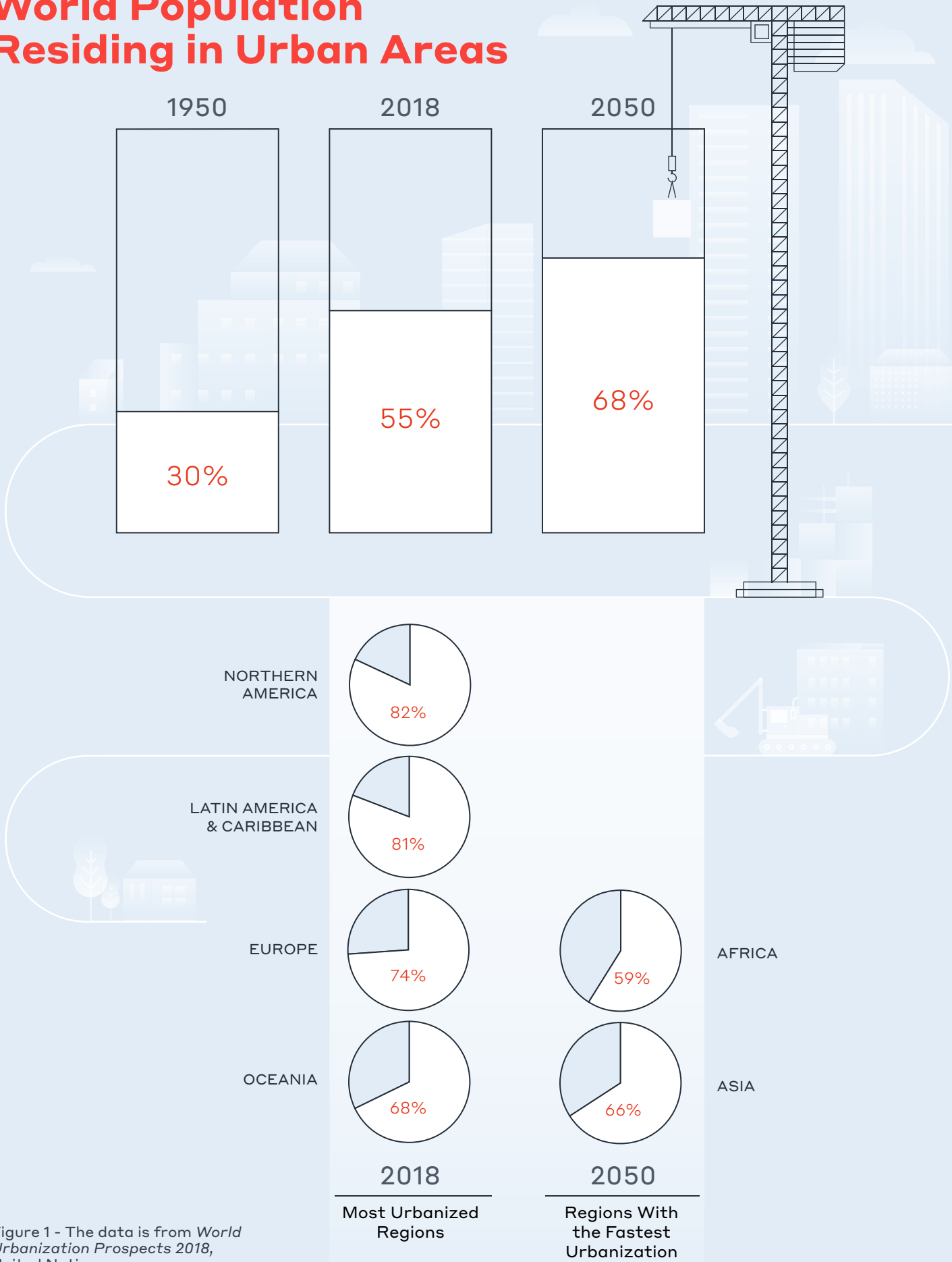


Figure 1 - The data is from *World Urbanization Prospects 2018*, United Nations



## Countering Urban Sprawl

In cities, land for development is typically scarce and relatively costly. This premium makes expansion into “greenbelt” land to provide housing and associated services a seemingly attractive alternative. But the result is often sprawl, urban and suburban sprawl, leading to consequences that thwart sustainable outcomes, as it:

- Increases per capita land consumption, leaving less land for agriculture and increasing the potential for further climate change
- Reduces accessibility and efficiencies enabled by population and infrastructure clusters/agglomeration
- Increases transport costs including road and parking facilities, accidents and pollution damage
- Increases public infrastructure needs, outside cities and urban areas, adding costs for service, maintenance, and climate resiliency—which, in turn, increases tax and utility costs

The Global Commission on the Economy and Climate notes in its New Climate Economy project that policies which increase land-use accessibility and transport-system efficiency are likely to support economic productivity, while policies that under-price motor vehicle travel and encourage sprawl tend to reduce economic productivity overall. For example, density-limiting policies in large, highly productive cities in the United States reduce aggregate national economic output by about 13 percent, or more than CAD 1.3 trillion (USD 1 trillion) annually.<sup>4</sup>

<sup>4</sup> “Analysis of Public Policies That Unintentionally Encourage and Subsidize Urban Sprawl,” The New Climate Economy project, The Global Commission on the Economy and Climate

At the third United Nations Conference on Housing and Sustainable Urban Development, in 2016, the adopted New Urban Agenda addressed TOD and coordinated metropolitan land use planning. Most of the sections on sustainable spatial forms were implicitly about TOD, and the document calls specifically for equitable implementations of TOD:

We will promote access for all to safe, age- and gender-responsive, affordable, accessible and sustainable urban mobility and land and sea transport systems, enabling meaningful participation in social and economic activities in cities and human settlements, by integrating transport and mobility plans into overall urban and territorial plans and promoting a wide range of transport and mobility options, in particular through supporting:

- A significant increase in accessible, safe, efficient, affordable and sustainable infrastructure for public transport, as well as non-motorized options such as walking and cycling, prioritizing them over private motorized transportation
- Equitable “transit-oriented development” that minimizes the displacement, in particular, of the poor, and features affordable, mixed-income housing and a mix of jobs and services
- Better and coordinated transport and land-use planning, which would lead to a reduction of travel and transport needs, enhancing connectivity between urban, peri-urban and rural areas, including waterways; and transport and mobility planning, particularly for small island developing States and coastal cities
- Urban freight planning and logistics concepts that enable efficient access to products and services, minimizing their impact on the environment and on the liveability of the city, and maximizing their contribution to sustained, inclusive and sustainable economic growth



# Diverse Benefits and Value of TOD

Implementing TOD can have significant benefits for individuals, communities and regions. Below are potential benefits of TOD, largely based on the *Statewide Transit-Oriented Development Study: Factors for Success in California's Transit-Oriented Development*.<sup>5</sup>

## **TOD brings a sustainable approach to urban development.**

Because TOD focuses on dense centers rather than low-density car-oriented growth, it reduces the need to convert hinterland and open spaces to development.

## **TOD can provide mobility options.**

By creating “activity nodes” linked by public transport, TOD provides important mobility options/intermodal connectivity, much needed in the most congested zones of metropolitan areas. This also allows young people, the elderly and people who do not own cars or prefer not to drive to be more mobile with the ability to use multiple modes of transportation for point-to-point travel.

## **TOD can increase public safety and sense of place.**

By creating active places that are busy through the day and evening and providing “eyes on the street,” TOD helps increase safety for pedestrians, public transport users and many others. The increased focus on pedestrian-centric areas also promotes an improved sense of place.

## **TOD can increase public transport ridership.**

TOD improves the efficiency and effectiveness of public transport service investments by increasing the use of public transport near stations by 20 to 40 percent, and up to five percent overall at the regional level.

## **TOD can reduce rates of vehicle kilometres/miles travelled (VKT/VMT).**

Vehicle travel has been increasing faster than population growth. TOD can lower annual household rates of driving by 20 to 40 percent for those living, working, and/or shopping within metro station areas. Reduced automobile dependence and parking also improves the livability of the city.

## **TOD can provide access to more jobs.**

With added public mobility options, households of all incomes can access a greater job pool.

## **TOD reduces air pollution and energy consumption rates.**

By providing safe and easy pedestrian access to public transport, TOD can lower rates of air pollution and energy consumption. Also, TODs can reduce rates of greenhouse gas emissions by 2.5 to 3.7 tons per year per household.

## **TOD can play a role in economic development.**

TOD is increasingly used as a tool to help revitalize aging downtowns and declining urban neighbourhoods, and to enhance revenues for local authorities where revenues are linked to property values or retail sales.

<sup>5</sup> The study was developed by WSP and the California Department of Transportation



#### **TOD can decrease infrastructure costs.**

Depending on circumstances, TOD can help reduce infrastructure costs (such as water, sewage and roads) on governments and property owners by up to 25 percent through more compact infill development, avoiding sprawling growth.

#### **TOD can contribute to more affordable housing.**

TOD can add to the supply of affordable housing by providing lower-cost and accessible housing, and by reducing household transportation expenditures. Housing costs for land and structures can be significantly reduced through more compact growth patterns.

#### **TOD can improve public health.**

TOD can provide added health benefits from walking and biking to access work and leisure activities.

#### **TOD can increase resilience to natural hazards.**

By concentrating activities and housing, TOD allows for increased levels of network redundancy, providing for the ability to establish well-connected multi-option refuge zones in case of an emergency.

#### **TOD can be a source of revenue.**

Contributions by private developers or the monetization of increased value of development can be used to offset the capital cost of transportation investments.

When these numerous and diverse benefits are considered collectively, the total value provided can far outweigh the costs of implementing TOD. There are different ways to provide, realize and quantify value in TOD; value should not be defined only by the creation of capital. Value in TOD should be directly associated with both the tangible and intangible benefits that TOD provides and the cascading effects these benefits produce. For instance, TOD value can mean increased productivity and/or reduced costs from:

- Improved travel times for people. Reduced congestion and increased accessibility from more mobility options/inter-modal connectivity can translate into valuable saved time that can be used for economically productive work.
- The clustering/agglomeration of businesses
- Improved movement of goods from enhanced mobility networks can translate into cost savings for shippers.
- Decreased impact from externalities, such as vehicle emissions/air pollution, energy consumption rates and road traffic accidents.



# Essential Elements of the Framework

The framework for TOD success should be viewed holistically to understand the requirements of each element, the relationships between them and how each contributes to a positive outcome. Typically, implementation of TOD projects take place over 10 to 20 years, involving mobilization of resources and people and iterative reviews of processes.

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## Established TOD Scenarios

Varying classifications can fall under the umbrella of TOD, but two distinct TOD scenarios are prevalent, as described below. The first addresses development based on an existing station, and the second process starts with the proposal of a new station. Both scenarios can result in transformation of an existing area to better support people and business activity. The private and public sectors must be informed regarding costs and funding, and developing a delivery strategy that is consistent with funding availability, to reduce risk and build momentum for future development.

### EXISTING PUBLIC TRANSPORT INFRASTRUCTURE

TOD can happen when an existing or newly introduced piece of public transport infrastructure such as a station acts as a catalyst for market-led densification and land-use development.

A fresh perspective on planning, design and implementation is required to reposition and leverage the value of existing transport assets toward reaching new levels of development and prosperity. The early development of project costs and funding information and policy discussions allow decision-makers to understand upfront important risks and implementation options. This integrated perspective brings to the forefront a common understanding and focus on the important elements that drive a successful business scenario.

Such “transformative” development does, however, present challenges due to planning, policy and regulation and the constraints of construction in an operational environment. Therefore, the business case needs careful and early consideration to determine if the ultimate value of the development is greater than the cost of implementation. To reduce risk and enhance viability toward ultimate success, comprehensive collaboration with multiple stakeholders from both the public and private sectors is essential. These diverse stakeholders contribute to the early planning process, and share in the ultimate outcome and success, whether through the creation of value, or setting the stage for future opportunities. The public sector establishes the early vision and the political agenda, and provides guidance, project focus and oversight; the private sector brings potential financing and a market understanding. Informing both sectors regarding costs and funding, and developing a delivery strategy that is consistent with funding availability, reduces risk and builds momentum for future development.

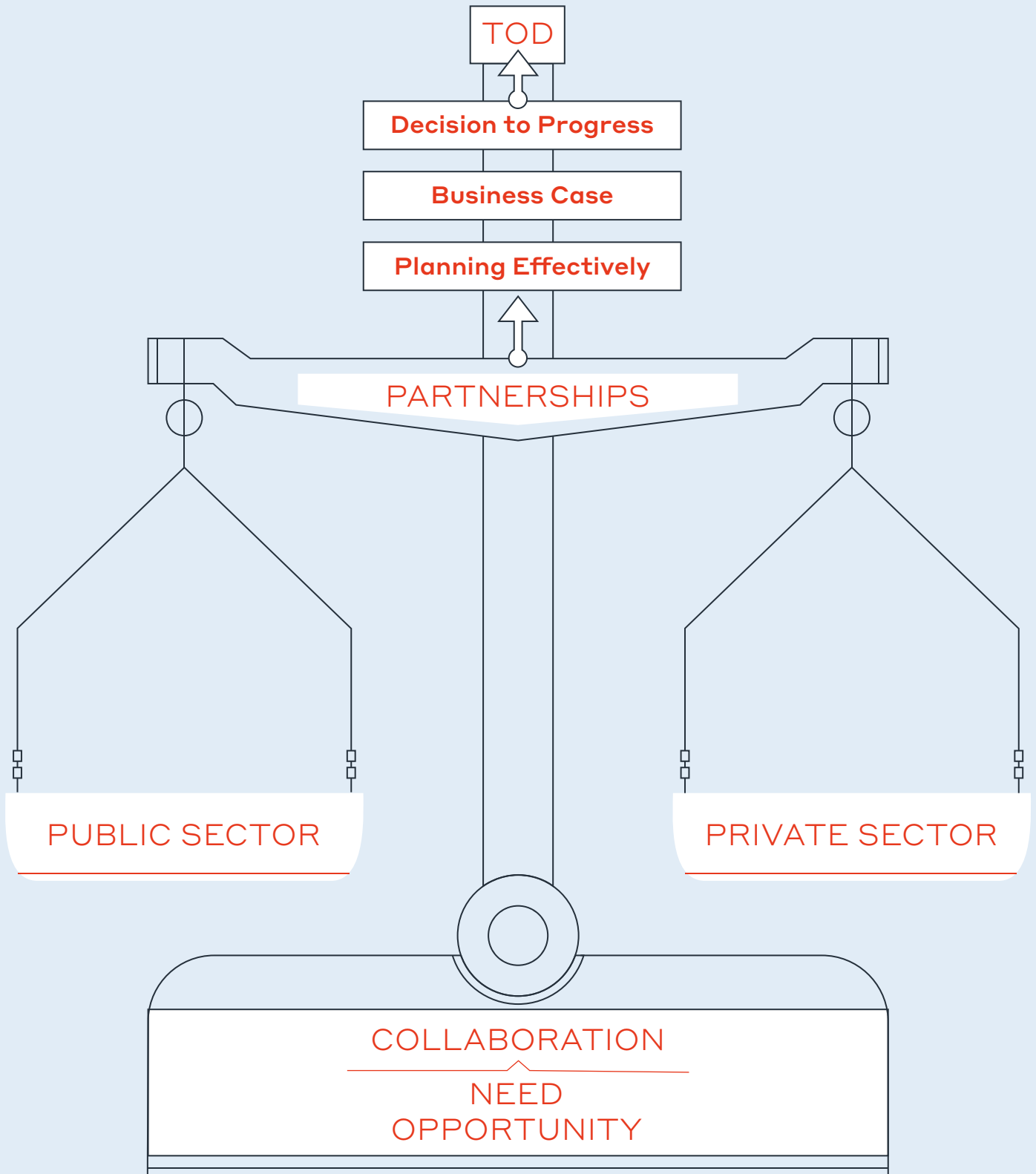


Figure 2 - Essential Elements of the TOD Framework



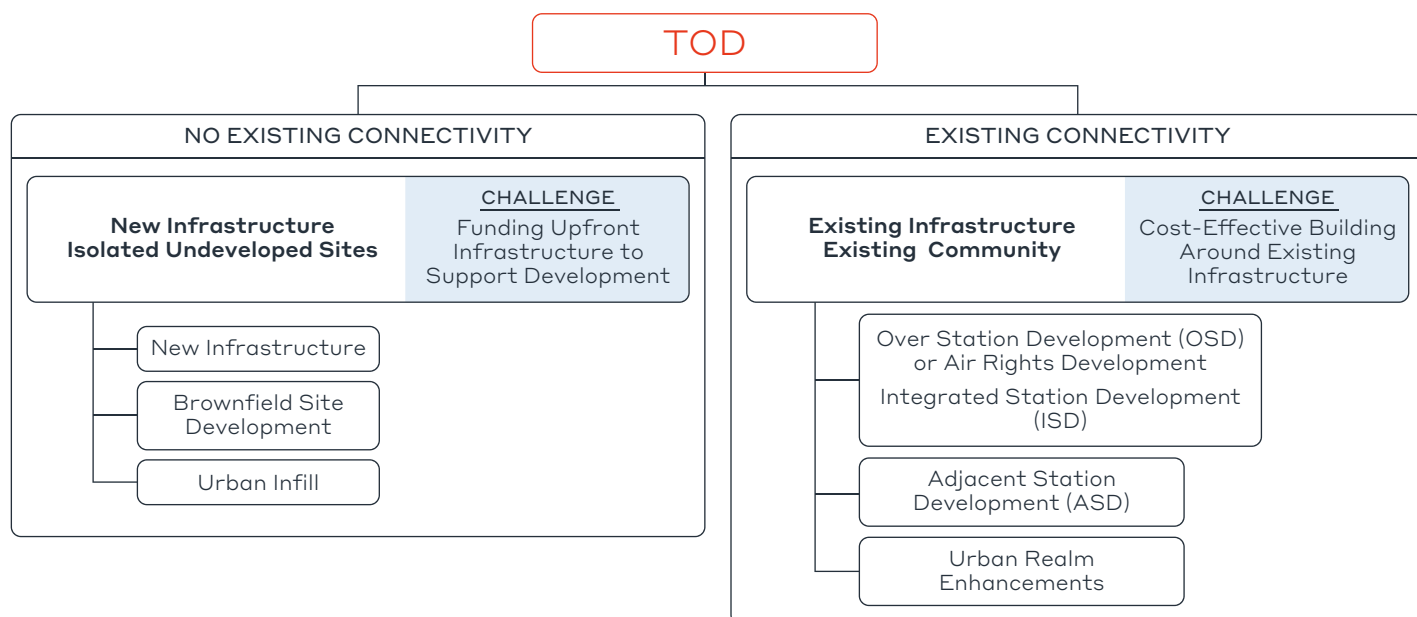


Figure 3 - Types of TOD

## NEW TRANSPORT INFRASTRUCTURE

Whereas TOD can call for development centered around existing transport infrastructure, transforming an existing community and environment, another way to initiate TOD is through the introduction of new transport infrastructure first, stimulating the regeneration of previously inaccessible locations and brownfield sites. A new public transport station, once opened, can generate a “ripple effect” for development in the surrounding area. In some cases, schemes involve stitching together land parcels and forming a larger, completely new precinct.

Though similar to the first scenario (discussed on page 12) in terms of the requirement for an early informed integrated approach, building a station to initiate a TOD process is more ambitious, requiring major upfront political commitment and significant leadership and investment from the public sector; generally, large-scale planning processes are required, such as government acts, major public consultations, land acquisition and public inquiries. Identifying the necessary infrastructure and securing the mechanism for funding to support new development are upfront requisites.

The underlying premise of TOD is that the investment in transport infrastructure will ultimately unlock the value of the surrounding property; the property, in becoming more accessible and valuable, opens up development opportunities. When TOD focuses on the public transport investment first, a parallel land-use discussion toward actions that allow for increased density will create a more viable process. Bringing together

the public transport investment in terms of projected ridership metrics and land-use policy decisions in a coordinated manner early in the process sets the stage for success. A realistic assessment of the potential public transport ridership reduces the risk of delivering underachieving operations.

To realize a long-term urban vision, an adaptive plan, which is responsive to emerging needs and changing conditions, is essential. City policy should be instructive, with built-in attention to how change can be applied and benefit the whole community. Having proper guidelines and statutes with mechanisms to effect change, as opposed to restrictive policy and design conditions, are critical to a dynamic development process, as some of the challenges in implementing TOD only surface through practical application.

## Broad Collaboration

Whether or not to consider embracing TOD depends on diverse factors that vary across continents due to governance, political influences, cultural acceptance and market demand. Every TOD effort is a unique process—one that can take many years to implement, deliver, and further evolve.

Successful TOD outcomes are products of shared decision-making among diverse stakeholders and the ongoing coordinated work among multidisciplinary teams. Attention to interrelated details requires cooperative ways of dealing with stakeholder conflicts. A collaborative subframework (within the larger TOD framework) is necessary to establish who will

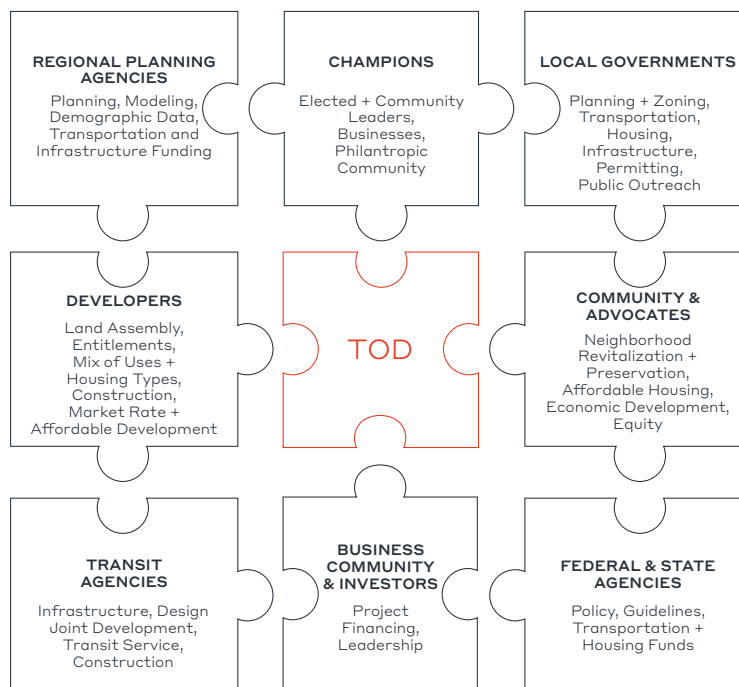


Figure 4 – Planning for TOD - a look at diverse stakeholders potentially involved in TOD efforts.  
Adapted from *The Center for Transit-Oriented Development*

decide how cities will be shaped to serve the people living in them, who will determine each project's value, and how to deal with the issues arising from the complex and often controversial nature of TOD. High-density development can prompt unease among community members unless a clear and cohesive vision is communicated.

To advance TOD, governing bodies develop policies and associated guidelines that embrace TOD as a regional concept and provide instructional help on local and regional levels. Well-considered inclusive planning and forward-thinking public policy can also encourage increased market interest in targeted city areas once clear zoning and land-use regulation are in place to facilitate TODs. The City of Hamilton, in the Province of Ontario, Canada, recently created a Transit-Oriented Corridor Zone (TOC), pre-zoning for higher density, in anticipation of a proposed light rapid transit (LRT) line; new home construction along this line has increased to an average of 6-units per square kilometre between 2016 and 2018, from 0-units between 2010 and 2014.<sup>6</sup> In New Jersey, in the United States, the State Transportation Department in cooperation with NJ TRANSIT, has established the designation of "Transit Villages," as part of a Smart Growth partnership which provides the mechanism for cooperation between local jurisdictions and NJ TRANSIT to develop plans for integration of new development and transit facilities.

Every stakeholder and facilitator (group) plays a unique part in enabling and advancing today's TOD planning effort. Each public-sector stakeholder —governments, transport agencies and planning organizations—and private-sector facilitator—

urban planners, private developers, architects and engineers—may have different goals and objectives, but a regional TOD planning effort can create common ground and help ensure that responsibilities and rewards are shared, and that affordable and financeable strategies are developed and put in place.<sup>7</sup>

TOD is typically driven by government and public agencies but dependent on private-sector participation. Embracing a common vision of land and infrastructure development around TOD can be a major hurdle in itself; but TOD can also be the mechanism to develop these visions.

Matching new TOD with transit expansion efforts and connecting plans with regional development efforts can create vibrant public-transport-oriented communities, thus reinforcing the case for TOD's continued evolution.

<sup>6</sup> *Transit Nodes in Ontario Have Untapped Development Potential*, 2019, Centre for Urban Research and Land Development.

<sup>7</sup> *Planning for TOD at the Regional Scale*, document 204, Center for Transit-Oriented Development





## Planning Effectively

Upfront forward-thinking and integrated planning is key to delivering sustainable outcomes with optimal efficiency. A clear and thorough understanding of costs, technical necessities and policy-regulatory issues must be achieved early in the process to reduce risk and create continued momentum toward the success of every TOD project.

As TOD is based on development above or around an existing, planned or yet-to-be planned piece of transport infrastructure, the path chosen will affect the level of complexity involved. With visionary planning and design, a station can act as a catalyst for market-led densification and demand for land-use development, ultimately resulting in an impressive mini-precinct and significant land value uplift. Newly created vibrant precincts can bring a fresh dimension to the urban fabric of cities.

Digital technology, such as the [Customer Connectivity Tool](#),<sup>8</sup> can guide the development of transport infrastructure and integration into the existing transport network, helping jurisdictions address people's needs in the early stages of design. Advanced technology can be combined with decision-making based on [scenario planning](#)<sup>9</sup> to position programs for long-term success.

Strategic planning requires public policy that communicates TOD as integral to its long-term vision, and statutes and zoning provisions that facilitate density and mixed land use. TOD can be applied based on a range of high densities. Some outlying city areas may focus on developments that offer access to transit connecting to employment venues and high-density

downtowns, which boast a mixture of residential, employment, retail and entertainment options. Making TOD an integral consideration in a city's master plan underlines the importance of TOD, opening the door for urban designers and transportation planners to establish essential ingredients for future development.

<sup>8</sup> The WSP *Connectivity Tool* was developed to support the 30-minute TOD concept in Australia.

<sup>9</sup> WSP *Scenario Planning – Decision Making for Alternate Futures – Applying scenario planning to create resilient strategies in a time of rapid change*, WSP Global Inc., 2018.





Determining the scope of each TOD project is a prerequisite for preparing a feasible TOD plan. Delineating the appropriate catchment area creates the correct TOD geography to address considerations, such as land development opportunities and scale. Understanding the proposed project site and mode of transportation infrastructure needed and working in collaboration with stakeholders will help to identify inherent challenges, budgetary considerations and risks to be mitigated. Key considerations within a geographic catchment area include:

- Project site: rural or inner city; public or privately owned; leased or some combination of the two; multiple parcels adjacent to existing or proposed infrastructure; or air rights.
- Modes of transportation: diesel or electric, or public-transit service, such as light-rail transit (LRT), bus-rapid transit (BRT) or heavy-rail regional service
- Stakeholders and facilitators: Transit agencies, other developers, urban planners, architects, engineers, planning organizations and governments

Taking all these aspects into account will dictate scope, help quantify a budget, and define the project timeline and key milestones. Each will play a unique role in enabling and advancing the TOD plan/project and solidifying the necessary elements to be addressed and used to structure the project. Equally important is the early engagement of public officials and local authorities to determine the TOD scope. This key step will mitigate surprises as the plan is introduced to various Authorities Having Jurisdiction (AHJ), or permitting entities,

and to the general public impacted by the project (whether through scheduled transportation service interruptions or construction logistics).

Once the TOD scope is determined, and agreed to by key stakeholders, community buy-in—meeting with community leaders and holding local public meetings—will help identify any additional considerations, further reinforcing the project.



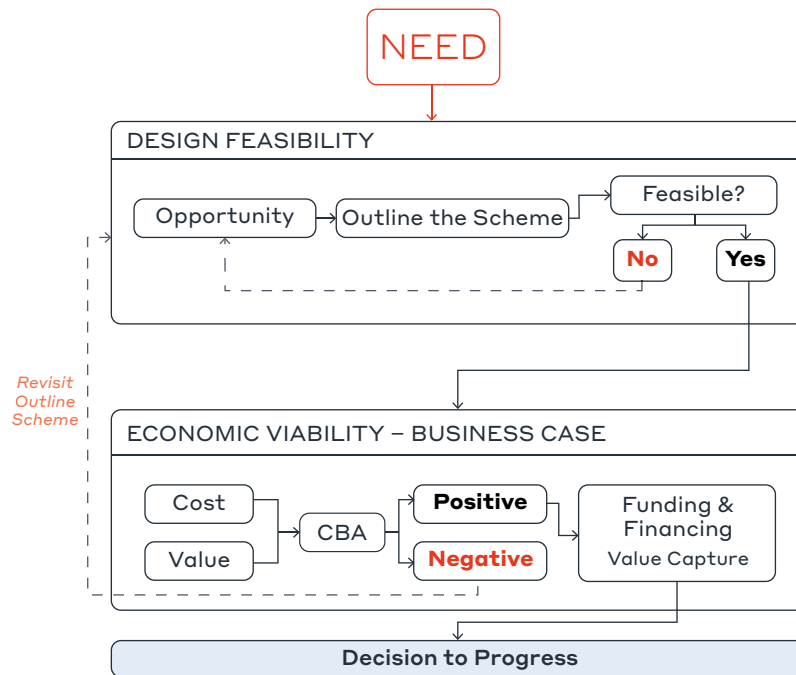


Figure 5 - Fundamental stages toward the “decision to progress” - a detailed look at processes in Figure 6 on page 19.

## Business Case

The TOD business case emerges from the integration of lifestyle considerations and the expected development of efficient and reliable public transportation services. It presents the opportunity to leverage these elements to finance investments.

Principally, the TOD business case identifies whether or not development and transportation investment can be financed, and how parallel transportation benefits (revenue and ridership) are considered and valued. The business case assesses project value against the cost and/or a masterplan that ensures a structured approach to development. Targeted planning can contribute to a community’s wider masterplan by raising revenue for capacity enhancement through matching public sector needs with private sector investment.

The business case involves an examination of a strategy that includes multiple considerations: economic, financial, deliverability potential, and operations. Early understanding of costs and how to secure funding should be addressed in conjunction with identification of TOD options. This effort should also address the allocation of costs to accommodate flexibility in design. All costs should be justified based on the value that an opportunity can realize. The value should, at the absolute minimum, justify the cost. If acceptable value cannot be reached—due to factors such as location; measurable social, sustainability and environmental benefits; demand and land scarcity; infrastructure needs; and development potential—then the project should be re-evaluated. This step can lead to

restructuring the project financially, rescaling the project scope and re-examining partnerships with stakeholders.

The economic viability of any transportation project can be measured using a Cost-Benefit Analysis (CBA) framework. A CBA is an evaluation framework to assess the economic advantages (benefits) and disadvantages (costs) of an investment alternative, in this case any TOD development. Benefits and costs are broadly defined and are quantified in monetary terms to the extent possible. The overall goal of a CBA is to assess whether the expected benefits of a project justify the costs from a national or regional perspective.

Once the need for TOD has been established, there are two fundamental stages that inform the “decision to proceed” process:

1. **Feasibility of TOD Opportunity**  
Will proposals comply broadly with planning policies and strategies? Also, in principle, can TOD be implemented and satisfy design and functional requirements?
2. **Viability of Proposal or Options**  
Produce costs and value, and determine the net benefit—to develop a funding-financing plan or business case.

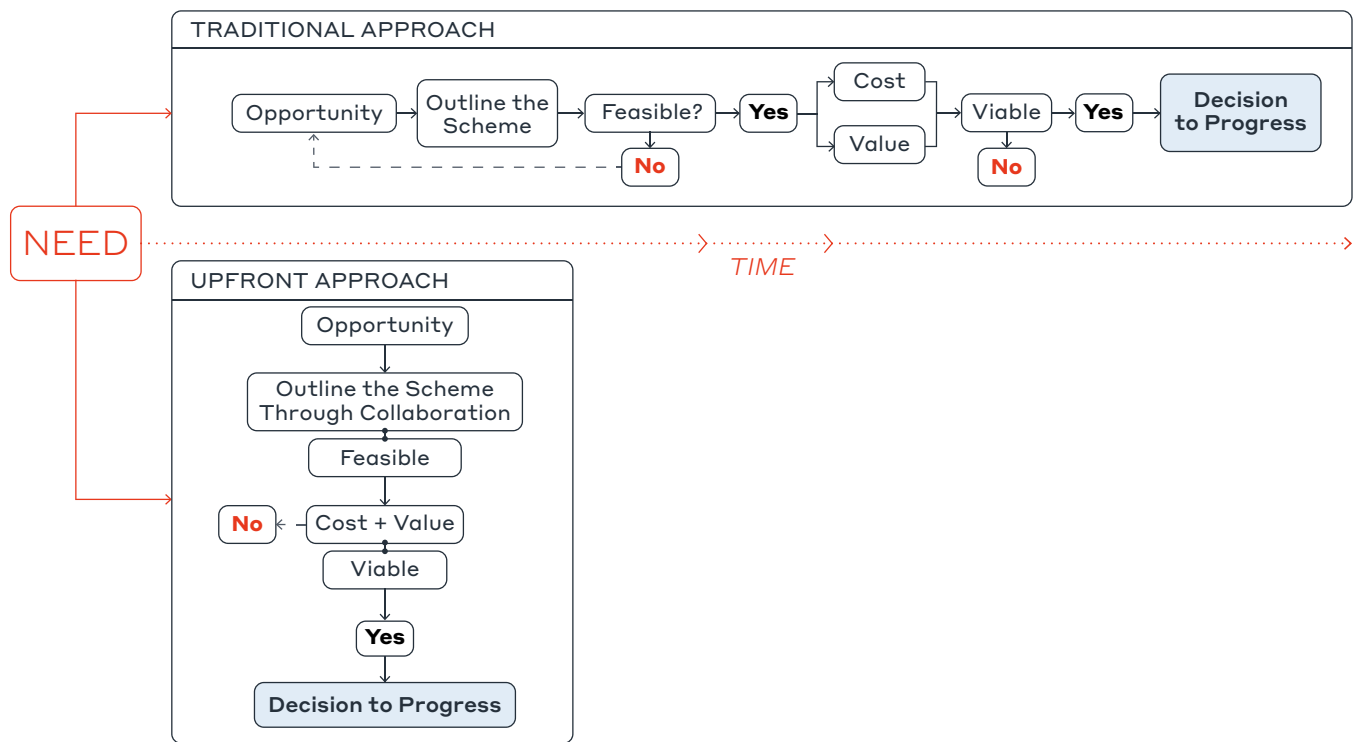


Figure 6 – Shifting to WSP's upfront collaborative approach to TOD

## REACHING THE DECISION TO PROGRESS – TO GO OR NOT TO GO

Historically, the assessment of funding requirements occurred later in the process, when cost estimates and development options were refined and a preferred alternative identified and selected. Today, with increased competition for scarce funding resources, an early assessment of costs and potential funding mechanisms/resources enables flexibility to reshape a TOD opportunity that is in line with realistic funding resources. Such a proactive comprehensive approach is recommended, even at a conceptual level, to gauge whether a TOD opportunity is viable. Reaching the “decision to progress” point means that costs have been assessed, value is understood and funding mechanisms are identified, though most likely not fully secured at that early point.

In the traditional approach to TOD (sequential approach), as shown in the top portion of Figure 6, alternatives are initially developed and analyzed, with costs and financial options subsequently identified. This process, however, can result in a plan that may not be affordable, financeable or implementable. In such a case, processes can become cyclical or recurrent—TOD options are produced but ultimately cannot be financed, and they present limited opportunities for incremental implementation; this process repeats in cyclical-fashion until a feasible alternative is identified.

A realignment of this process (upfront collaborative approach), as shown in Figure 6, ensures reaching the “decision to progress” much earlier in the process. This adjustment focuses on early

integration of key elements: cost information; policy and regulatory considerations such as up-front zoning changes to allow for the appropriate mix and density of uses; and strategic implementation such as obtaining buy-in from key public-sector stakeholders, private-sector facilitators and the community.

Though the type, source and amount of available funding varies between jurisdictions, there are typically three distinct sources of funding in most TOD opportunities regardless of the location: public financing; private financing; and a public-private sector partnership (PPP or P3). A P3 approach is a combined commitment where both the public and private sectors assume a share of the risks for a project in terms of financing, planning, designing, constructing and, in some cases, the long-term operation and maintenance. P3 can be an effective means to advance well-considered opportunities.

The P3 approach has become an increasingly popular way to finance TOD linked to transportation projects worldwide, as financing new projects in the public sector has become increasingly difficult due to competing public interests. The P3 partnership that is formed allows for these key transportation projects to move forward, increasing land values in proximity to these projects and creating a mechanism to finance TOD through the “value capture” benefit realization.





Value capture, an effective way to help finance a TOD project, is a type of public financing that uses some or all of the value created by public infrastructure to help pay for the capital, debt service, and/or operating costs of that infrastructure. Value capture is created when newly built infrastructure increases adjacent land values, generating increased values for private landowners and increased tax collections for local government. This new infrastructure could include rail and bus, roads and bridges, and water/sewer systems. Improved infrastructure, also increases the potential for development, further increasing property values, local taxes, and even sales and income taxes collected by government.

It is important for transport agencies or other project sponsors to engage the local jurisdictions that will benefit from the new development through new property taxes and sales or transient occupancy (hotel) taxes before the development occurs. Such engagement also applies to the landowners and developers who will likely benefit from a new public-transport station leading to accelerated and denser development. Often, there is a rent “premium” for development in close proximity to a new station, which is a clear benefit to the developers of TODs.

The ultimate objective is to create a community of partnerships where the participants share in the revenues brought about by the new development underpinned by public transportation.

The business case should effectively assert why the local jurisdiction and landowners should participate together. Public-sector and private-sector “champions” must be identified and agree to engage in creating the business plan and promoting it to the jurisdictions, landowners and developers. An important part of the business plan is to determine how incremental and assessment revenues will be used to progress TOD. For example, they can support multipoint universal access to stations, modern efficient multimodal parking, amenities, open space and placemaking. Agreements between landowners and developers on assessments and elements to be funded increase the chances of creating a successful value capture structure.

Choosing the right value-capture mechanism will help justify the business case and secure critical backing from key stakeholders and facilitators, ensuring the support and advancement of the TOD project.

In the state of Massachusetts (United States), there are various forms of value capture.<sup>10</sup> Most fall into these categories:

- Special Assessment Districts: special tax assessed against property owners within a defined area, identified as receiving a direct benefit as a result of public infrastructure.

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<sup>10</sup> Metropolitan Area Planning Counsel, Massachusetts, United States





- **Tax Increment Financing:**  
special tax allowing the public sector to “capture” all or a portion of the growth in property tax resulting from new development and increasing property values. The tax increment is the difference between the original assessed value tax and the new assessed taxes due to the property’s increased value as a result of planned improvements, from both public infrastructure and subsequent private development; all or a portion of the tax increment is dedicated to supporting the debt service or operating cost of the infrastructure.
- **Development Impact Fee:**  
a fee assessed on new development as a means to defray the cost to the jurisdiction of expanding and extending public services to the development.
- **Joint Development and Air Rights:**  
cooperation between the public and private sectors to develop publicly owned land adjacent to transit/station areas, or through air rights. Joint development usually funds vertical construction like TOD, with lease payments to the public entity. Joint development becomes an infrastructure financing strategy when lease payments to the public entity support the operating cost of the infrastructure or new infrastructure, such as an upgrade to a transit station area or rail extension. In some instances, the private entity pays for the infrastructure in return for use of the public land.

The South Boston waterfront was once home to over 1000 acres of docks, warehouses and parking lots. Today, thanks to TOD and value capture, Boston’s Seaport District is one of the fastest growing areas in all of Massachusetts. Upwards of 300 acres of mixed-use TOD has been created within this district thus far, through the introduction of three BRT stations coupled with the successful formation of partnerships between the public and private development communities. Through development contributions and lease payments from multiple development entities, a new high-density TOD district has emerged, with value generated, helping to sustain transit operations, provide for upkeep of existing infrastructure, and deliver improvements for future expansion.





## Conclusion

Around the world, urban population growth challenges city leaders to create livable, thriving and sustainable communities and places. Addressing housing needs, congestion, decarbonization objectives and other pressing concerns requires practical yet visionary thinking.

Effective localized response requires multifaceted collaborative efforts between key public-sector stakeholders and private-sector facilitators. Well-structured partnerships can give rise to new funding resources and fresh ideas to create human-centric cities for years to come.

An upfront perspective of the TOD process with an evolved approach to investment and land-use development decisions can bring about urban environments that meet 21<sup>st</sup>-century infrastructure needs and quality-of-life expectations. With proper planning, collaboration and a solid business case, TOD provides the means to realize visions of places where people want to live and work as our cities continue to evolve.

*Explore the WSP TOD case studies on the following pages. →*







# WSP Project Case Studies

TOD presents transportation as a catalyst to facilitate and maximize community and economic development. The following case studies explore some of the TOD projects where WSP was instrumental in facilitating the process toward the “decision to proceed” or provided essential services to advance the TOD project.



## Hudson Yards Development

New York, United States

The Hudson Yards transit-oriented development overbuild and the New York City No. 7 Subway Line Extension project represent the kind of forward-thinking, integrated, comprehensive approach to infrastructure development that WSP can bring to cities. In 2005, the City launched its planned transformation of the Far West Side of Manhattan, an area known as Hudson Yards, a 28-acre site comprising blocks of industrial buildings and an expansive rail yard. WSP was responsible for advisory services through alternatives analysis and performing environmental studies to support the rezoning and site planning for an overbuild at the rail yard, and extension of the No. 7 subway line from New York City's 42<sup>nd</sup> Street station. This planning effort helped to create a new vision for high-density office, commercial and residential development, and, with the extension of the subway line, provide a key transit link from this newly created neighborhood to the rest of New York City's subway system.

WSP's advisory work supported the City and the creation of the innovative financing plan for the CAD 4 billion (USD 3 billion) needed to construct the subway extension and other infrastructure for the Hudson Yards development. The centerpiece of this financing strategy focused on value capture, which involved the monetizing of new development within the proposed Hudson Yards neighborhood. The City's financing plan captured the tax and fee revenue increment generated by rezoning for new developments and infrastructure investments, and issued bonds backed by this new revenue source. The potential increase in value was substantial, and was used to finance the infrastructure improvements needed as a backbone of the Hudson Yards development.

The lynchpin was the extension of the No. 7 Line from its terminus in Times Square to a new station at 11th Avenue and West 34<sup>th</sup> Street. The rezoning plan would also generate the revenues to finance the planned boulevard from West 30<sup>th</sup> Street to 42<sup>nd</sup> Street between 10<sup>th</sup> Avenue and 11<sup>th</sup> Avenue, for which WSP is presently managing the design effort.



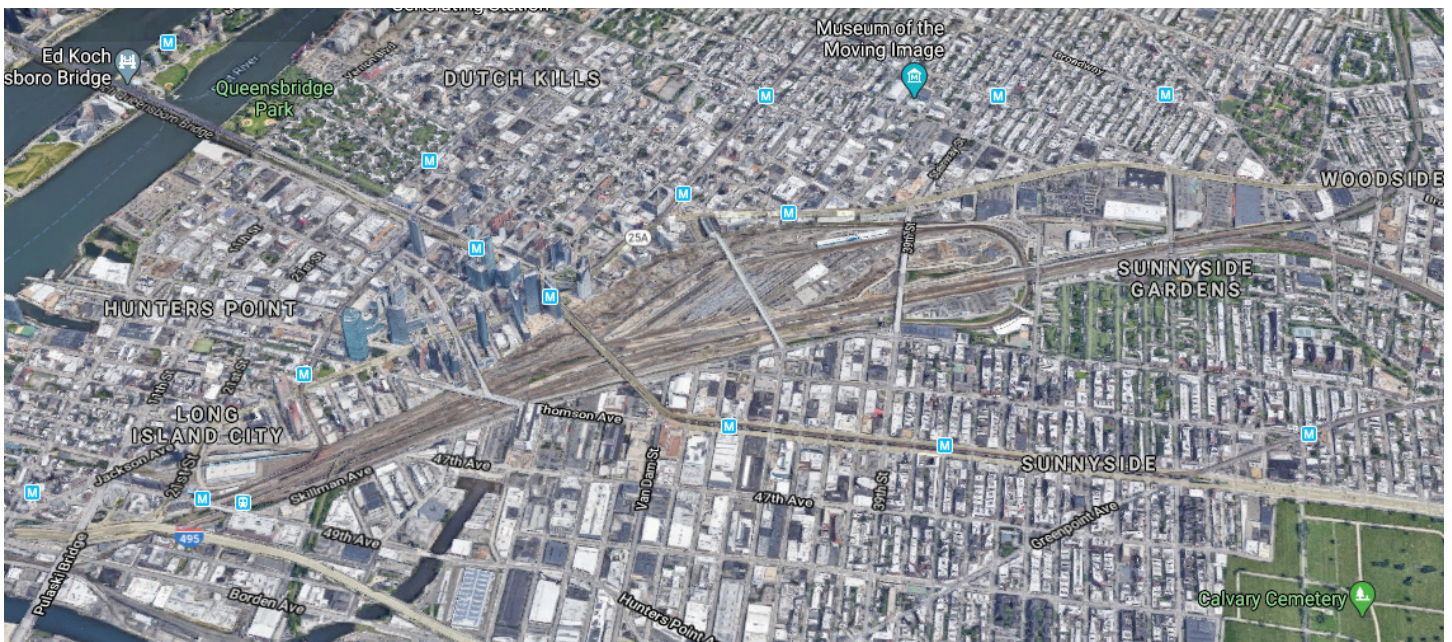
# Sunnyside Yard Development

New York, United States

WSP developed a transit-oriented master plan for Amtrak's Sunnyside Yard in Queens, identifying the potential for an expansive mixed-use high-density development atop an active railyard, in similar fashion to the Hudson Yards Development on the West Side of Manhattan. With the planned expansion of rail services along the Northeast Corridor (NEC) and the New York region, the Sunnyside Yard Master Plan serves as a critical roadmap to create a once-in-a-lifetime redesign of a key portion of New York City. The plan provides the potential for unlocking an otherwise overlooked 180-acre area just over a mile from the East River that runs along Manhattan, and improving the functionality, operations, efficiency, reliability and maintenance of the railyard.

WSP project efforts included an existing conditions assessment; an alternative facilities assessment to recommend methodologies, design approaches, sustainable elements and best practices applicable to Sunnyside Yard; development of master plan programming and operational analyses documents; development of alternative concept scenarios, including an evaluation of costs, constructability, schedule/phasing issues; and selection of a preferred master plan alternative. Potential real estate overbuild feasibility concepts were thoroughly explored, requiring extensive coordination with Amtrak policy, operations, mechanical/maintenance, engineering, materials management, police and real estate departments for both conventional and high-speed rail operations, to define programming elements and to develop a master plan alternative that will meet the needs of Sunnyside Yard and NEC train operations for the next 20-plus years.

As part of WSP's advisory services, a feasibility study was also prepared on behalf of the New York Economic Development Corporation (NYCEDC), undertaken as part of the planning process and viability for development of a mixed-use community over Sunnyside Yard. The study involved an iterative process of engineering, urban design and economic analysis, evaluating four scenarios and alternative approaches for financing the development. In addition, WSP produced baseline conditions and future conditions reports that involved a comprehensive multimodal transportation access review and analysis for the area surrounding Sunnyside Yards, outlining opportunities and constraints in the transportation network that would result from a number of development scenarios, and evaluating the impact of construction on the operations of three different railroads that use the yard.







## Eglinton Crosstown LRT

Toronto, Canada

WSP is part of a joint venture providing Technical Advisory (TA) services to the provincial transit agency Metrolinx on the Eglinton Crosstown Light Rail Transit (ECLRT) project, a 19-kilometre light rail transit (LRT) line on Eglinton Avenue between Mount Dennis Road and the Toronto Transit Commission's (TTC) Kennedy Subway Station in the City of Toronto. The project includes a 10-kilometre underground tunnel portion, 10 surface stops and 15 underground stations, including three interchange stations with the existing (TTC) subway; there is potential for multiple TOD sites along the alignment.

The project has been procured as a Design-Build-Finance-Maintain (DBFM) contract using Infrastructure Ontario's Alternative Financing and Procurement (AFP) model. As part of the joint venture, WSP helped develop the ECLRT Project Agreement and technical requirements to protect for future TOD at certain station locations through station functional requirement documents and select infrastructure provisions at preselected stations to facilitate interconnection with future developments. WSP also supported Metrolinx in negotiation efforts with the DBFM consortium and developer, to facilitate design alterations during construction for direct station connections/entrances, and in support of future overbuilds.

As part of the joint venture, WSP helped draft technical requirements for implementation of the City of Toronto's planning study for Eglinton Avenue—Eglinton Connects—by helping to define minimum size requirements for station entrances to minimize land takings, facilitating future development adjacent to station entrances. Eglinton Connects defines a TOD vision for the future built form and streetscape along Eglinton Avenue including future intensification by encouraging mid-rise development. The project agreement requires the DBFM consortium to construct the Eglinton Connects streetscape at certain locations along the alignment by the DBFM and construct stations that are compatible for the future built form envisioned for Eglinton Avenue.

WSP is helping to ensure that LRT infrastructure will be consistent with Eglinton Connects and the Project Agreement by reviewing the DBFM consortium's design submittals and through auditing of construction works to ensure that all the requirements are implemented.



# Caulfield to Dandenong Level Crossing Removal Project

Melbourne, Australia

The city of Melbourne is full of level crossings where railway lines cross the road, requiring all the traffic to stop and let the rail pass. The Victorian Government is committed to the removal of 75 level crossings, and to leaving a legacy of transformation in surrounding communities.

The Caulfield to Dandenong Level Crossing Project involved nine of these level crossing removals along the one railway line. The elevated railway solution unlocked 22.5 hectares of open space that had previously been used for at-grade railway.

WSP is part of the alliance that designed and delivered the project. During the tender design WSP worked to deliver an innovative, robust and cost-effective solution, using BIM technology to provide visualisations of the project through 3D modeling. This resulted in a unique rail-over design solution centred on maximising open space and reducing the noise impact on the local community.

With the crossings removed and stretches of railway elevated, the community legacy includes new parkland, shared pedestrian and cycle paths, dog parks, and sports facilities. More than 30,000 trees and shrubs have been planted to green up the new open spaces, nearby parks and reserves. That number includes hundreds gifted to local councils and community groups.

A 17-kilometre walking and cycling path—the Djerring Trail—runs along the project and connects to other key Melbourne bicycle network paths, linking sections of existing track to form a continuous route. The path features rest stops, public bike repair stations and exercise stations.





## West Link

Gothenburg, Sweden



Gothenburg is the second largest city in Sweden, located on the West Coast with a population of more than half a million people. Gothenburg's Central Station is the hub of Western Sweden's railway system. With today's level of traffic, it is being used to its maximum.

The West Link is a railway connection via a tunnel under the center of Gothenburg. The tunnel will transform Gothenburg Central Station from a dead-end station to a through station.

The West Link will provide Gothenburg with two new underground stations situated in central locations. The area around the new underground Gothenburg Central Station, today mainly industrial, will be transformed to a new central business district (CBD) connected to the main urban development areas of Gothenburg "River City". The Central Station area is one of the most important development areas in Gothenburg. At present, it is dominated by traffic, but within 20 years it could be transformed with the creation of 2,000 new homes, 16,000 new jobs and a scope for cultural activities, green spaces and public life that is rich, varied and inclusive.

WSP has been involved in various stages of this development. Working closely with the Swedish Transport Administration and the City of Gothenburg, we have provided design, landscape architecture, and program and project management services.

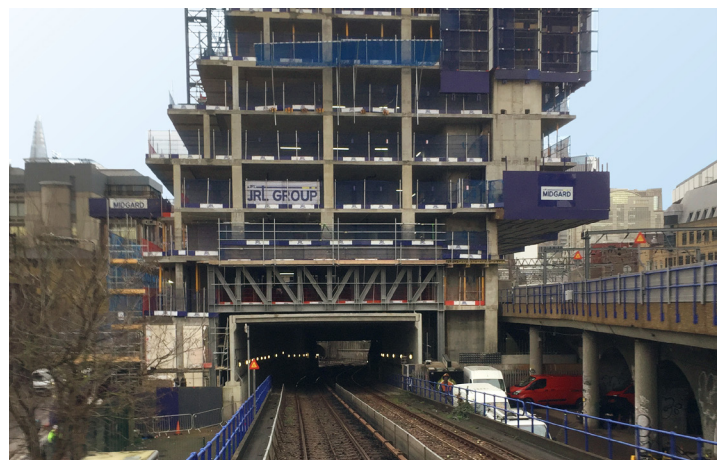
Comprising three blocks (13 to 15 storeys) connected by nine-storey link blocks, Royal Mint Gardens provides 254 high-quality residential units and communal amenity spaces. To offer variety to residents, architect Farrells and their landscape designers have created new public spaces, communal roof terraces and courtyards.

The development fully maximises the site's potential and is arranged over the high level Docklands Light Rail (DLR) line feeding into Tower Gateway; the low level DLR line feeding into Bank station; and cantilevers over viaducts of the Fenchurch Street Network Rail Line Gateway. The low level DLR line feeds into Bank Station and cantilevers over viaducts of the Fenchurch Street Network Rail Line. Spaces within the viaducts are also utilised. Transfer structures were used to realise the project, while meeting the requisite vibration and noise isolation standards with rail box containment and acoustically-isolated foundations. Construction logistics over and adjacent to the railway were carefully considered in order to adhere to DLR and Network Rail asset protection.

WSP's role in the project was to undertake the structural and detail design of the oversite development, altering a previous scheme and unlocking more usable space for the client. WSP provided the design and gained the necessary approvals with both DLR and Network Rail for the encapsulation and viaduct cutback works.

## Royal Mint Gardens

London, United Kingdom



# Key Contacts



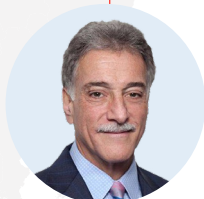
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## Additional WSP Sources

[The Public Transport Addendum to the New Mobility Now report](#)

[Out of Thin Air](#)

[Out of Thin Air - One Year On](#)

### Snack & Learn Webinars on TOD

[Snack & Learn Webinar](#)

Sunnyside Yard, in the United States

[Snack & Learn Webinar](#)

the West Link, in Sweden

[Snack & Learn Webinar](#)

Caulfield to Dandenong Level Crossing Removal Project, in Australia

[Snack & Learn Webinar](#)

Edmonton Metro LRT NW Expansion Project, in Canada

[Snack & Learn Webinar](#)

Principal Place, in the United Kingdom



WSP is one of the world's leading professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, architects, planners, surveyors and environmental specialists, as well as other design, program and construction management professionals. We design lasting solutions in the Transportation & Infrastructure, Property & Buildings, Earth & Environment, Power & Energy, Resources and Industry sectors, as well as offering strategic advisory services. Our talented people around the globe engineer projects that will help societies grow for lifetimes to come.



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