

Public Transport Orientated Development:  
Lessons from North America & Asia

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**ABSTRACT**

Faced with the need to address issues like urban sprawl, traffic congestion, accessibility and climate change, a broad range of policy options must be considered in order to reach a sustainable future. One of these opportunities brings residences, shops, jobs and leisure closer together by locating them in close proximity to a network of rapid, reliable and high capacity public transport corridors.

Public transport oriented development (PTOD) and its associated policy tools are a way of generating a critical mass of traffic that can justify the large-scale investments that need to be made in rapid transit networks. By attracting an intense level of mixed-use activity within a five-minute walk of stations, it is possible to greatly reduce the need for car use, which is more attractive when daily activities are dispersed. As a larger number of stations generate PTOD, the network becomes highly interconnected, and a greater proportion of daily activities enter the catchment of a node on the network.

This paper discusses the policies that can be used to increase densities, provide public amenities, reduce parking and provide strong linkages between the station and surrounding areas. A partnership between the public and private sector is required. The public sector must be willing to invest in a system that is capable of reducing the need for new road infrastructure and reducing crime by presence. The private sector can benefit by providing a more desirable location for its workers and potential cost savings through the reduction of parking provision.

One of the keys to promoting PTOD is by connecting its local objectives to strategic regional and national objectives. By intensifying station precincts with mixed-uses, it can be demonstrated that congestion growth, carbon emission growth, social exclusion and crime can be reduced. Additionally, accessibility and community vitality can be increased.

Policy tools like “eminent domain” (compulsory purchase), “density bonusing”, “public sector coordination”, “tax increment financing” and “joint ventures” will be reviewed, as a means of overcoming the many barriers that restrict the widespread

implementation of PTOD. These barriers include NIMBYism, a lack of public sector financial and policy commitment, complicated land acquisition and planning processes, financing and marketing with the perception of risk, and the accommodation of multiple transport modes in station areas.

A review of international best practices presents empirical evidence of the implementation of various policy tools for the successful development of specific PTOD projects in the developed and developing world. The creative adaptation of various planning tools to local circumstances has been proven to succeed in places as diverse as Portland, USA and Hong Kong, China. In the current context of urbanisation and climate change, PTOD becomes increasingly important. By clearly articulating how its success has been achieved it will be possible to make PTOD a part of mainstream planning, rather than a selectively implemented idealistic alternative.

## 1.0 INTRODUCTION

Modern cities share many of the same effects of a car dominated transport system. The detachment of transport and land use integration has resulted in a model of functionally separated uses, built at low densities, and covering greater areas of land. This demand for space has created a system in which the failure to have car access results in a disadvantage within society. This disadvantage is linked to the fact that public transport, and other self-powered modes of travel, cannot efficiently service the needs of daily life.

As the form of land use in an urban region generates transport demand, the speed, location and capacity of transport supply influences land uses. Prior to the dominance of the car, new developments were forced to locate in the vicinity of public transport corridors and other mixed uses. It was assumed that most retail and service-oriented trips would occur within a walking area, and that a large number of work and 'destination' trips would take place by public transport services like trams, streetcars, commuter rail or metro. Cars provided an opportunity for the free market to dictate land use planning, as the range of developable land extended to cover vast areas of the urban edge and beyond. By shifting infrastructure investment to toll free motorways, reducing public transport investment and dispersing employment and retail development to isolated locations at peripheral highway locations, society became dependent on the car. Public transport became redundant in most suburban areas, as the dispersed patterns of single use, low density development prevented rapid transit, and even buses, from serving large tracts of many urban regions.

The ongoing debate regarding land use and transport often views these components in isolation. The reality, however, is that all demand for transport is generated by land use activities, and land use potential is impacted by the type of transport infrastructure. The evolution of transport in the twentieth century shifted demand away from rail to a car-based society. As a result, the system of mixed-use walking communities surrounding rail stations and tram stops was replaced by low density, space intensive, functionally separated land uses. Mixed use was deemed unnecessary, as the car provided unfettered access to any location with road access, to a growing population of mobile car owners. Shopping malls replaced local shops, office parks replaced transit-oriented workplaces, and an underlying assumption emerged within local policy that all daily trips would require a vehicle. This impacted everything from parking provision to road widths to freeway construction and density limits. Stations and mixed uses became irrelevant, and the character of local streets was blown apart by a focus on traffic movement, parking provision and separation of uses.

Public transport has taken a secondary role, as low densities and a lack of road priority have resulted in an uncompetitive mode that cannot match the comfort, convenience and speed of the car. Infrequent services and excessive walking distances to public transport stops makes the system unattractive to car owners. Service improvements are not justified because the car is planned, through land use and transport policy decisions, to be the default mode of transport for all regular and semi-regular trips in the region, with the possible exception of the central business district. By breaking up the integration of transport and land use, large areas of our urban areas are no longer within the range of high quality public transport. This results in a growing need for cars, as a greater number of daily and weekly trips lie outside the zone of high quality public transport. The two critical generators of daily trips, employment and retail uses, once considered public transport connections to be a critical prerequisite of development. The relocation and reorientation of these key uses has redefined transport and land use patterns.

The current dilemma of congestion and sprawl is directly linked to these processes, therefore any divergence from this 'system' can only occur within the context of prioritising alternative transport modes and reconfiguring surrounding land uses to generate demand. In contrast, car

demand must be curbed by removing the underlying policy assumptions of car supremacy in these locations, while facilitating the efficient interaction of mixed uses in a compact urban setting, linked to other metropolitan mixed-use nodes by an efficient rapid transit system. Within the current context, public transport orientated development (PTOD) offers communities an alternative form of development that can retrofit existing station areas, facilitate pedestrian-orientated trip chaining for local needs, and generate new public transport ridership for longer trips, without the costly investment of new infrastructure. While augmented by existing car-orientated residents and neighbours, PTOD's success is based on the creation of a new market of mixed uses that feed off each other, and the rapid transit network.

This paper will discuss the concept of PTOD, and address some of the challenges and opportunities that affect its implementation. Multiple stakeholders are able to shape or delay the development process, often resulting in a variety of barriers that require innovative policy measures and creative negotiation. The benefits of various planning tools will be demonstrated by examining their implementation in a wide range of policy environments in North America and Asia. This will provide new ideas for European planners that are interested in investigating alternative policies and development formulas, particularly in poorly developed suburban areas, where car use has become dominant. While market conditions play a major role in the supply and demand of PTOD, the diversity of results in various economic, geographical and political environments indicates that policies, persuasion and information can lead to success in the most challenging of places.

## 2.0 CONTEXT

Public transport-orientated development (PTOD) is a form of land development that seeks to integrate rapid transit with an immediate walking catchment area around stations. It is modelled after the North American and European transit cities that developed during the railway era prior to the Second World War. Also referred to as transit-oriented development (TOD) in North America, PTOD has been adopted by many urban regions as a means of coping with traffic congestion that has resulted from dispersed, single use car-oriented travel patterns. PTOD can occur in greenfield settings, but is usually associated with retrofitting existing suburban areas along new and existing rapid transit corridors. Evidence suggests that a 5 minute walk, or 400 meter radius from the station, is the critical zone of highest attraction for travellers shifting from their car to rapid transit (Cervero 1998). Within the context of this paper, PTOD, therefore, refers to developments that exhibit urban features, mixed uses and restrained car parking within this critical zone.



Figure 1: Pedestrian-Oriented Features of PTOD – UniverCity Development, Vancouver (Canada)

Figure 2: Station Concourse Retail – Broadway Station, Vancouver (Canada)

PTOD is an attempt to plan and develop large trip generators in the vicinity of rapid transit stations in order to provide a convenient and legitimate alternative to the car. Developments are either directly integrated with stations, or are located within a short walking distance of a

station entry. They usually involve a mix of uses, around and within the station, in order to facilitate a high level of trip chaining. Parking is not considered a high priority, as most users will arrive either by public transport or pedestrian modes. These hubs also generate a significant number of internal trips, as close interaction between residential, services, employment and leisure diminishes the need for external travel. Furthermore, a series of hubs along an integrated rapid transit network allows for close interaction among a number of PTODs at different stations. The following criteria are a way of measuring the success of a PTOD (Niles and Nelson 1999):

- Extent of mode shift away from the car
- New public revenues and cost savings versus capital and operating costs
- Local success (single PTOD) versus regional success (PTOD proliferation)
- Extent of population and job growth in PTODs
- Amount of new private investment leveraged by public investments
- Urban design and parking reductions in the station area

Many developments that lie within the critical 400 meter zone rate poorly in terms of these criteria, and are referred to as transit-adjacent development rather than PTOD (Belzer and Autler 2002). Most of these developments were either built prior to the arrival of rapid transit, or simply turned their back on public transport as a legitimate alternative generator of trips. This is often influenced by policies that do not differentiate station areas from other locations.

High levels of rapid transit service allow travellers the convenience to complete a range of activities without the need to penetrate a hub and find parking, as well as avoiding associated costs. For example, a PTOD commuter would be able to live and access daycare services at one hub, work and purchase groceries in a second hub, conduct meetings and have lunch at a third hub and go to the cinema at a fourth hub. Provided that each of these hubs are within a reasonable distance of each other, the traveller will find the journey far less complicated than by car, as each activity will be within a very short walk of a station.

Public transport ridership gains momentum as PTOD proliferates along the rapid transit network. As a greater number of mixed-use traffic generators emerge along the network, the number of daily activities that can be conducted in station areas rises, thus reducing the need for car use. Just as the proliferation of car oriented development reduced the relative importance of station area locations, growing networks of rapid transit and parking-restrained PTODs have the potential to make station areas more competitive for new development.



Figure 3: Proliferation of PTOD Along the Network – Yonge Line, Toronto (Canada) (Toronto Transit Commission)

The enhancement of social equity is also possible, as a wider range of social groups have access to housing, employment and services in the vicinity of high quality rapid transit. Car-oriented development patterns put lower income groups at a disadvantage as they must spend far more time commuting to inaccessible locations where high quality public transport is not economical. Greater transport choice also creates economic benefits, particularly in the knowledge and service economy, where disruptions to the movement of people hinders commerce. PTOD reduces reliance on congested roads.

With the environment agenda gaining momentum as a result of recent climate change evidence, PTOD has been identified as one way to reduce greenhouse gas emissions, by reducing the number and length of daily trips and promoting a more compact urban form that preserves agriculture lands for local production, and forests, which absorb carbon. All levels of government are seeking ways of reducing carbon emissions and promoting sustainable development and travel patterns. A re-evaluation of the functional separation model of planning is long overdue. Despite its unprecedented provision of mobility and space, the 'road and sprawl' model is an unsustainable system that has reduced transport choice and created an unhealthy dependence on the car.

### 3.0 KEY ISSUES: OPPORTUNITIES AND CONSTRAINTS

In spite of their appeal to public officials, planners, innovative developers and users, PTOD has not been widely embraced by the development community in North America (Dittmar and Ohland 2004). A frequent argument in many centres is that the public transport system is simply not good enough to justify this development form on a wider scale. Without high frequency public transport services that offer competitive travel times, it is not possible to justify lower parking standards, higher densities and investments that enhance pedestrian movements between buildings and stations. Compared to single use developments that feed off the existing road network, PTOD is a complex development product that requires more sophisticated design, financing, construction and sales techniques (Aho 2003). There are also a number of micro-level barriers which must be overcome.

#### 3.1 Technical Constraints, Parking and Land Use Economics

There are a number of key technical challenges that are often not justified by land use economics. Unless land values justify increased expenditure on features that enhance the orientation of a building to public transport, the costs are often deemed unacceptable (Guichard 2004). In suburban areas there is a tension between accommodating the car and orienting towards public transport. For several decades, the development formula has included a large parking supply with good access to main roads. Most developers are concerned that an insufficient supply of parking will make their development unmarketable because most site users travel from car-oriented locations (Aho 2004). Designing a development that accommodates both modes can be complicated, particularly when underground parking or direct station connections are involved. In most suburban locations, these cost penalties are deemed unworkable. Partnerships with the public sector are often the only way to narrow the gap between an auto-oriented development and a PTOD in the suburbs (Aho 2004).

#### 3.2 Zoning, Taxation, Politics and NIMBYism

Politics is always a major factor in the development and infrastructure sector. The routing of rapid transit lines and zoning allowances can have a major impact on whether PTOD will occur in a given location. Politicians are concerned about disturbing vocal segments of society, but their election campaigns are often funded by some of the largest developers. Many proposed PTODs are perceived to have a negative impact on a neighbourhood despite

the fact that there is often a major opportunity to provide new services and amenities that would otherwise never be delivered (McCauley 2004).



Figure 4: High Density Zoning in the Vicinity of Islington Station – Toronto (Canada) (Toronto Transit Commission)

In North America, politics governs taxation and zoning policies. As a result, there is often no incentive to develop near stations when taxes and densities are no different than in a car-oriented location. In reality, the impact of PTODs on local infrastructure is usually much lower than car-oriented developments, as the proportion of vehicles that must be accommodated on-site and on the road network is much lower. Furthermore, a compact, dense site has a lower environmental impact and servicing costs are less costly in the long term. In communities where zoning and taxation for car oriented office and retail parks is favourable, there is little incentive for developing on more sustainable PTOD sites (Bass 2004). Development charges and property taxes should reflect the ‘true cost’ of a development on society.

### 3.3 Lending Institutions

The financial industry is a major contributor to the development patterns of urban regions. Developers require access to substantial amounts of capital in order to undertake a given project. In most suburban locations, car oriented, single-use developments have become entrenched as the safe norm for lenders. They are predictable and less complicated than PTOD, and are therefore seen as an easier route to securing the capital required. The perception of greater risk is not always justified, therefore it is critical for all of the stakeholders to simplify the development formula for PTOD, in order to gain the full confidence of lenders. Furthermore, lenders should re-evaluate their inherent bias towards single use, car oriented developments.

## 4.0 TOOLS FOR OVERCOMING BARRIERS

A number of planning tools have been identified as being successful ways of promoting PTOD in different cities. Their application to particular settings would provide varied results because of differing contexts, policies and infrastructure, however, the general impact of each will be discussed.

### 4.1 Restrict land supply for outward growth

There is little incentive to choose brownfield, greyfield or underdeveloped sites near stations when a vast supply of greenfield sites are available at the periphery. Centres with some form of urban growth boundaries have achieved greater success in attracting PTOD as developers are forced to creatively develop sites on the existing urban land base. Vancouver (Canada) and Portland (USA) are examples of contained urban regions, mostly developed in the post-

war period, that have achieved a more compact urban form through investment in rapid transit and the active promotion PTOD.

#### 4.2 Public investment in infrastructure and offices

If the public sector wishes to promote PTOD then it must create a larger supply of high quality public transport and generate demand by locating government offices and services in PTODs. The public sector controls large landholdings in the vicinity of stations, and often does not capitalise on the opportunities for development. Investing in rapid transit is a logical component of developing a network of PTODs in an urban region. However, many cities have great difficulty in obtaining funding and agreeing on the routing of large projects.

Many governments express their desire for PTOD but their property and leasing divisions seek low cost locations in car oriented developments (Bass 2004). The disconnect within governments must be addressed in order that a double standard is avoided. The public sector must be leaders in the promotion of PTOD. By following through with what they promote, it sends a positive message to the private sector. Joint ventures at PTOD sites could be secured through guaranteed long term lease agreements for government offices, services or affordable housing. There are excellent examples of PTOD coordinated with large scale public transport infrastructure investments including the Washington DC (US) suburbs of Bethesda and Silver Spring, Ottawa (Canada) and the Vancouver (Canada) suburbs of Burnaby and Surrey.



Figure 5: Retail, Government Office and University Complex at Surrey Central Station, Vancouver (Canada)

Figure 6: Station Area Redevelopment Potential: Downsview Station, Toronto (Canada), Toronto Transit Commission

#### 4.3 Taxation, Zoning and Parking Policies

A number of tax policies can influence redevelopment around stations by favouring higher intensities at these locations. Many cities tax land based on its assessed value according to use. This leads to lower tax rates for less intensive uses. A number of cities in the U.S. state of Pennsylvania have taxed land and use separately, and progressively increased the 'land' rate in order to induce more intensive development (Bass 2004). This has led to regeneration, as properties that are underutilised (ie. surface car parks) must generate greater revenue to pay tax rates that are nearly as high as more intensive uses.

A number of U.S. cities use a tax tool called tax increment financing (TIF) to attract investment to station areas. TIFs capture the value of future tax increases, as investment increases property values, and offers it as an up-front grant to developers who risk investing in a less attractive area. Over a period of years, the initial grant or incentive is paid for by the increased property assessments and taxes that would not have otherwise taken place. A variation of this policy is to provide a tax abatement to a PTOD for a number of years, and recoup the lost tax revenues with the higher property values achieved later (Guichard 2004).



Zoning is an important planning tool that allows cities to influence the intensity and type of land use in a particular location. While often used to restrict certain types of developments, it can also be used in a pro-active way to promote high density redevelopment in station areas. Density bonusing has helped cities like Toronto, New York and Vancouver to attract dense mixed-use projects in the vicinity of key public transport interchanges, while securing public benefits for the skeptical community. By allowing new developments to exceed the density threshold that land economics might warrant, additional profits are generated for the developer, which must be shared with the surrounding community through the provision of amenities such as daycares, station connections, community centres, public art or additional park/community space.

Parking standards are a critical aspect of PTODs. While some parking is required in order to make a development commercially viable, there are many cities that require excessive parking because of standardised policies for the entire jurisdiction. The flexibility of local governments in station areas is an important way to generate cost savings and reduce car use, particularly where structured parking is necessary. Public sector development of multi-story car parks can reduce the financial burden of developers, while providing cities with the ability to manage their parking supply and generate revenue through pricing.

#### 4.4 Coordinate TOD Promotion

The creation of a regional office for PTOD is one of the most important steps that can be taken to centralise the gathering of information, the promotion of benefits and the provision of incentives. If a developer knows that a single location can provide technical and financial details of available sites and previous PTODs, the process is simplified and a growing base of knowledge is accumulated that can be presented to the lending industry and skeptical public sector funders (Guichard 2004).

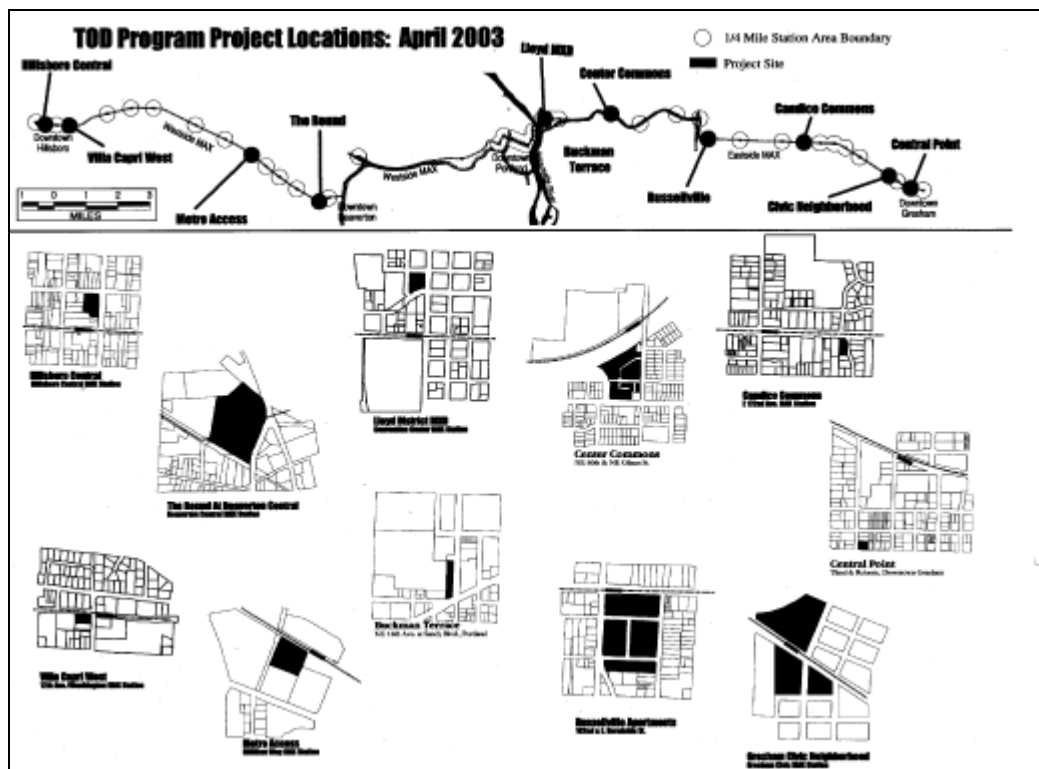


Figure 7: Coordination of TOD Promotion and Information – Portland TOD Coordinating Body

Portland and Seattle (US) have active TOD coordinating bodies, which are authorised to negotiate directly with developers and facilitate the best possible development through the use

of various incentives. The experience developed within this working group provides the public sector with a strong negotiating team that can extract maximum public benefits but also understands the concerns and needs of developers and lenders. In cases where political approval is required, the PTOD coordinating office can advise leaders on matters such as density, zoning and land acquisition.

#### 4.5 Joint Ventures and Land Acquisition

For more complicated PTODs, direct public investment or intervention may be required for a project to proceed (Aho 2004). When fractured ownership of land parcels prevents the redevelopment of a station area site, the powers of compulsory purchase have been used to 'clear the brush' and provide a clean slate for a PTOD. Public acquisition of lands can simplify the development process, save time and money, and offers opportunities for joint redevelopment that can benefit both the public and private partners. The public sector can acquire strategic land parcels at low points in the real estate cycle and then capture the value of these properties through general market growth and densification.

Another part of 'clearing the brush' is through the resolution of regulatory issues prior to any partnership with the private sector. Expediting the permit process can reduce 'holding costs' by minimising delays. This can only be accomplished if public partners have resolved internal disputes prior to their dealings with the private partner.

### 5.0 CASE STUDIES

A number of planning tools and development formulas have been successfully used in North America and Asia. The micro-level dynamics of these examples provide a clear illustration of the challenges and opportunities generated by PTOD.

#### 5.1 Vancouver and Toronto, Canada: Zoning Policies and Density Bonusing

In Canada, the most proven planning tool for the promotion of PTOD is zoning. Municipalities can open a particular area for redevelopment by removing controls that protect low density uses. Furthermore, they can leverage public amenities by 'selling' the rights to additional density that exceeds that justified by the land economics of the site. There are many cases of these planning tools attracting large scale developments around stations that were once protected by low density zoning. Collingwood Village in Vancouver and Bayview Station in Toronto have been radically transformed by rezoning that occurred following the construction of rapid transit systems.

One of the greatest obstacles to upzoning (increased density) is the opposition of locals, often referred to as NIMBYs (Not in My Backyard). Vocal residents have successfully lobbied many councils to abandon higher densities in places where it would have the greatest impact in terms of reducing overall car use. Developers, planners and politicians must show local residents that there will be amenity benefits from redevelopment, and must keep in mind the regional benefits of concentrating growth in the vicinity of their very expensive investments in rapid transit.

Density bonusing provides the means to securing benefits from developers by sharing the value of increased densities to provide additional public space, services, art and cash-in-lieu to a community. Developers are willing to enter such agreements in the hope of reducing local opposition that often results in increased holding costs associated with lengthy delays.

Collingwood Village in Vancouver (Canada) was once a vacant industrial site located in the midst of mostly single detached houses. Following the completion of an elevated rail link

between Vancouver City Centre and its eastern suburbs, the accessibility of the site increased dramatically, as it was now less than 10 minutes from the city centre on a high quality rapid transit system. A property developer realised the potential and made an application to rezone the site for high density mixed uses. Following land assembly, the developer began direct consultation with the local community in order to overcome the initial opposition that was apparent. Despite this opposition, many community members realised that the current site uses were having a negative impact on the community.



Figure 8: Collingwood Village at Joyce Station: Before and After (1993-2000) – A Model North American PTOD (Concert Properties)

Through a streamlined negotiation process, an agreement was reached which utilised density bonusing and mixed-use zoning for the development of a ‘transit village’ on the site. The developers were pleased with the allowance of 2,600 residential units and commercial space on 27.3 acres of land, while residents and public officials accepted the devotion of one-quarter of the site area for a local park, along with the provision of affordable housing, a school and a community centre at the cost of the developer.

By clearly identifying the stakeholders, and accessing the silent majority of residents, the developer and city were able to overcome the NIMBY factor, and clear the path for a profitable PTOD that would generate public transport trips and enhance the local community. Furthermore, the city and developer used planning tools such as density bonusing and reduced parking standards to generate new revenues and reduce development costs, while reducing traffic congestion and meeting regional growth objectives. By streamlining the planning process, the developers holding costs were reduced significantly, and the city was forced to deal quickly with internal disconnect among planners, engineers and politicians.

## 5.2 Portland, US: Coordinating the Promotion of Public Transport-Orientated Development

The Transit-Oriented Development Implementation Program (TOD Program) has successfully promoted TOD projects that would have otherwise not been built (Guichard 2004). The main objective of the regional government program is to promote the construction of high density and mixed-use projects that have a physical and functional connection to a station, through a partnership with the private sector. This is accomplished by securing various incentives and grants, as well as reducing parking standards and generating demand for the uses. The program is funded by regional and state governments, and has been operational since 1998. It secured over \$260 million of development in its first five years of operation, and reduced vehicle use by over 30% compared to car-oriented sites (Guichard 2004).

The primary use of TOD program funds is for the acquisition of key station area sites that are locked up by fragmented ownership. Once the various sites are acquired, they are cleared and re-parceled, and then sold with PTOD conditions to private developers. In some cases, incentives and grants are used to offset the higher costs of orienting the development to public transport and pedestrian uses. The program prides itself on turning mediocre developments into good ones by closing the cost gap that results from these cost penalties.

Prior to funding, each project is evaluated to determine the appropriate level of funding and the public benefit received. A base case is established for the development that would have occurred without TOD Program funding. This is assessed against the cost penalties of station orientation and potential increase in farebox revenue and decreased car trip generation. Based on this evaluation, funding is provided up to a maximum amount that is based on the long term benefits of higher public transport ridership and reduced congestion. Developers are expected to make up the difference between TOD Program funding and total cost penalties.

In conjunction with the TOD Program, the City of Portland has implemented a property tax exemption program that is used as an incentive for developers to invest in challenging locations that are oriented to public transport. The portion of redeveloped properties that are oriented to public transport are exempt from property taxation for up to ten years. If one of the building uses generates predominantly car trips, it will be taxed as normal. There are also a number of criteria which must be satisfied, including a minimum number of residential units and a direct pedestrian connection to rapid transit.

### 5.3 Hong Kong, China: Integrating PTOD with Network Expansion

The Mass Transit Railway (MTR) is deemed one of the most successful public transport agencies in the world. Its success has been based on the immediate integration of new stations with PTOD. As the system expands, the MTR acquires station adjacent properties for air rights development and PTOD in order to generate ridership for its extensions, and property revenues through the sale or lease of its mixed-use projects.



Figure 9: Hong Kong MTR: Simultaneous Transport and Land Use Integration

The MTR and its development arm have attracted private capital by obtaining value capture incentives when redeveloping station areas. Rather than waiting for the market to generate demand over time, the MTR creates immediate demand by intervening in local property markets to redefine station areas. Revenues generated are split between the MTR and its private partners. The funds from existing station developments are then used to finance future expansion as demand warrants. Local government encourages this arrangement as a key aspect of its development plan and transport demand management framework. While the context of these policies differs from North America and Europe, there are valuable lessons learned from a centre that has fully integrated its transport and land use development.

### 5.4 Numerous Jurisdictions, United States: Location Efficient Mortgages

Location Efficient Mortgages (LEM) are a financing tool that can assist the promotion of PTOD. By creating an incentive at the lending stage, it is possible to influence PTOD demand by making it more financially attractive than conventional real estate. LEMs acknowledge the transport-related cost savings of a residential PTOD purchaser by adding this amount to the qualifying income of a prospective client. Depending on the quality of public transport services and the proximity of the development to a station and services, a purchaser can obtain up to 25% more capital for their purchase, than if they were to purchase in a car-oriented location. Through its lending practices, the financial sector is a major contributor to urban sprawl and unsustainable growth patterns. This planning tool is one way that lenders could acknowledge the efficiencies of PTOD. LEMs are available in Chicago, Seattle, San Francisco and Los Angeles, among other cities.

## 6.0 CONCLUSIONS

Global cities are in need of innovative and realistic solutions to address worsening urban sprawl and traffic gridlock. A re-evaluation of planning practices and development formulas has been given greater impetus by recent concerns regarding global climate change. There is an acknowledgement that auto-oriented, functionally-separated developments are not sustainable, and are a major contributor to environmental problems in urban areas. PTOD is an important tool that can be used by a range of stakeholders to generate public transport ridership, reduce land consumption and carbon emissions, as well as promoting social equity and economic competitiveness. As national and international agreements seek ways of reducing environmental impacts and increasing transport choice, PTOD must be acknowledged as a way of impacting these targets at the local level.

This paper has discussed PTOD within the context of a number of planning processes in the developed world. The identification of key constraints and opportunities provides a context for the application of planning tools that have been used in a number of jurisdictions in North America and developed Asia. The lessons learned from these examples are of great relevance to the suburban areas of European cities and elsewhere. Places with even greater challenges have found ways to create success in environments that are dominated by the car. The use of tax policies, density bonusing, joint ventures and location efficient mortgages have nudged the market towards accepting PTOD as a commercially viable development product, while generating benefits for local communities and lenders. These ideas certainly have resonance for any major city that struggles with urban sprawl and traffic congestion.

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