A Leading Practice Framework for Sustainable Transport Corridors

SUSTAINABLE TRANSPORT CORRIDOR RESEARCH

University of the Sunshine Coast

AUGUST 2012
Acknowledgments
The authors would like to thank the Queensland Department of Transport and Main Roads and the City of Vancouver for their support of this research. Thanks also to Daniel Koch, Richard Day and Vicky O’Rourke.
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Introduction

Purpose of Research

The purpose of this research is to develop a leading practice framework to assist all stakeholders and decision-makers in understanding the planning and policy provisions for the development of sustainable urban transport corridors.

The significance of the research is the consideration afforded to the interdependency of the range of conflict and compatibility issues associated with leading practice transport corridors. The components and requirements of transport corridors will be explored in relation to their ability to act as mixed use and public transport corridors. This research will:

- Identify and define the key issues required to support a sustainable transport corridor;
- Identify and examine leading practice knowledge and case study examples;
- Create a framework to assist stakeholders in developing a multifaceted approach to achieve high sustainable modal share;

This document represents Stages 1 – 3 of the research process. Stage 4 is the intended application of the framework to a particular project, plan or development. Examples of this specific context based analysis are not detailed within this report.

The research has progressed in the following stages:

STAGE 1
LEADING PRACTICE LITERATURE REVIEW

STAGE 2
LEADING PRACTICE CASE STUDY INVESTIGATION

STAGE 3
LEADING PRACTICE FRAMEWORK DEVELOPMENT

• STAGE 1
Leading Practice Literature Review

What is a sustainable transport corridor? Research into leading practice indicates that there is value in the examination of transport corridors from both functional and spatial perspectives (Premius and Zonneveld, 2003; Hale 2011; CTOD 2011). That is, the nature of transport corridors as connectors, economic generators, and urban growth facilitators, in addition to the role of the corridor at a site, local or regional scale. The Leading Practice Literature Review will assist in the identification and analysis of the six key themes considered fundamental to the success or failure of high quality sustainable transport corridor – Governance, Land Use Planning, Design and Place-making, Network Planning, Financial and Market Mechanisms, and Sustainable Development.

• STAGE 2
Leading Practice Case Study Investigation

The key issues contributing to sustainable transport corridors have been further developed through the identification and examination of successful and unsuccessful national and international examples of public transport corridor programs and development. Here the research analyses case study transport corridors and their urban catchments to assist the interpretation of the underlying issues in practice, and allow for greater understanding of transport corridors both functionally and spatially.
Sustainable Transport Corridors Research Framework

References


Stage 3
Leading Practice Framework Development

The intention of the Sustainable Urban Transport Corridor Framework is to provide an informative structure that may assist a multidisciplinary approach to identifying the requirements for successful and sustainable transport and urban corridors. This Framework recognises a range of interdependent issues at a variety of spatial contexts – regional, local, corridor and site – and provides new knowledge and perspectives based on the Leading Practice Literature Review and Leading Practice Case Study Investigation.

Stage 4
Specific Context Analysis

Having developed a Leading Practice Framework for Sustainable Transport Corridors, this stage of the research is intended to apply the Framework to a specific urban transport context. These investigations would explore the key themes of Governance, Land Use Planning, Network Planning, Design and Place-making, Financial and Market Mechanisms and Sustainable Development in the context of seeking to establish sustainable urban transport corridors.
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* Literature review
1. Introduction

The following document is a review of academic, government, community and commercial literature examining the policy; principles and practice of sustainable transport and sustainable urban transport corridors. This literature review will:

- Examine the concept of sustainable transport
- Examine the concept of sustainable transport corridors – functionally and spatially; and
- Identify and define the range of key issues fundamental to the success or failure of high quality sustainable transport corridors
Stage 1 Leading Practice Literature Review

2. Research Process

This research has been undertaken as a desktop review of local, national and international literature in sustainable transportation and transport corridors. This work will assist in moving toward the establishment of transport corridors that reflect the best practice of sustainable transport systems worldwide.

This research draws upon literature from three key areas: government policy, academic publications and consultancy reports. Key elements and ideas relating to sustainable urban transport corridors were collated from across the transportation and land-use planning disciplines including engineering, urban design, human geography, environmental and social science. An extensive reference list is tabled in 9.0 References for Sustainable Transport Corridor Research.

Databases

The following research databases and internet sources were used to search for relevant literature and definitions of key terms (Table 1).

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3. Sustainable Transport (Corridor)

The History and Characteristics of Sustainable Transport

The current description of ‘sustainable transport’ has emerged from global and nationally adopted principles of sustainable development over the last 20 years.1 In recent years there has been an increased effort to define and detail the practice of sustainable transportation (Kennedy et al. 2005; Schiller et al. 2010; Bannister et al. 2011). While closer to home there has been a growing responsiveness to sustainable transport in Australian policy directives and state strategies (Garnaut 2008; Aust. Govt. 2011; TMR 2011; SCRC 2011).

Unsurprisingly the term sustainable transport has a very broad and complex issue base. In the literature it has progressed from planning for transport; to the integral relationships between transport and land use; to the ad hoc incorporation of the principles of sustainable development; to the recognition of more substantive planning practice in recent years (Anas and Moses 1979; Hall 1983; O’Connor et al. 2011).

In the 1990s transportation was identified as one of the main challenges to achieving sustainable development. This was due largely to ever-increasing social, economic and environmental impacts including traffic congestion, air pollution, safety and noise issues, accessibility, equity and the degradation of urban landscapes (Newman and Kenworthy 1999; Vuchic 1999; Schiller et al. 2010). This global awareness resulted in debate about how to best address the key principles of sustainable development with regards to transportation and with what mechanisms (Banister 2002; 2005). The outcome has been a more coherent understanding of sustainable transportation, including the identification of the key elements – i.e. networks, multimodality, land use planning, supply management – necessary to successfully implement high quality transport systems in different contexts.

The literature on sustainable transport overwhelmingly cites the importance of having an understanding and critique of the components that make up conventional transport planning in order to be able to move from business as usual (BAU) ‘predict and provide’2 to ‘deliberate and decide’ planning (Schiller et al. 2010). What is also clear from the literature, despite efforts to the contrary, the most likely transport planning future of our regions and local areas is the traditional BAU framework (Newman and Kenworthy 1999; Kennedy et al. 2005; Banister 2005; Mees 2000; 2010).

This research will seek to assist the shift from policy discourse into the development of an economically viable urban transport corridor that reflects community priorities of sustainable transport.

A description of future goals and an example of the ‘catch-all’ expectations of sustainable transportation is outlined by Schiller et al. (2010 p xxii):

“... to aim at promoting better and healthier ways of meeting individual and community needs while reducing the social and environmental impacts of current mobility practices. This includes lowering financial costs to society, improving health and lessening dependence upon automobiles, including appropriate modes, infrastructure and technology”.

It is important to consider the implications of these sustainable transport ‘descriptions’ for the current and future practice of transport planning. The discussion around sustainable transport needs to reflect which key areas or ‘themes’ may be included to provide suitable scope for the establishment of performance principles for further development as evaluation indicators. Bannister 2003 (p263) and Schiller et al. 2010 (p2) consider that the operationalisation of sustainable transport from a performance perspective needs to take into account a range of goals and community priorities:

• Servicing multiple economic and environmental goals;
• Maximising resource efficiency;
• Meeting basic access needs in ways that do not degrade the environment;
• Enhancing the liveability and human quality of urban regions;
• Accessibility as opposed to mobility; and the
• Inclusion of a broad social-based criterion.

1. The description and goals of Sustainable Transport began with The World Commission on Environment and Development (1983) publication Our Common Future also known as the Bruntland Report (WCED 1987)
2. ‘Discover the trend in the use of different modes of transport in a population and project it forward a given number of years. Then design a transport system to fit the projection’ (Low 2003 p174).
Table 2 compares some of the aspects of the business as usual approach compared with that of sustainable transport as identified within the literature (Bannister 2003; Kennedy et al. 2005; Schiller et al. 2010; Hale 2011)

Table 2. Comparisons of business as usual and sustainable transportation

<table>
<thead>
<tr>
<th>Business As Usual</th>
<th>Sustainable Transportation</th>
</tr>
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<tbody>
<tr>
<td>Emphasises mobility and quantity (more, faster)</td>
<td>Emphasises accessibility and quality (closer, better)</td>
</tr>
<tr>
<td>Emphasises one mode (uni-modality)</td>
<td>Emphasises plurality (multi-modality)</td>
</tr>
<tr>
<td>Often lacks good connection between modes</td>
<td>Emphasises interconnections (intermodality)</td>
</tr>
<tr>
<td>Accommodates and accepts trends</td>
<td>Seeks to interrupt and reverse harmful trends</td>
</tr>
<tr>
<td>Plans and Builds based on forecasts of likely demand (predict and provide)</td>
<td>Works backwards from a preferred vision to planning and provision (deliberate and decide)</td>
</tr>
<tr>
<td>Expands roads to respond to travel demands</td>
<td>Manages transportation or mobility demand</td>
</tr>
<tr>
<td>Ignores many social and environmental costs</td>
<td>Incorporates full costs within planning and provision</td>
</tr>
<tr>
<td>Transportation planning often in silos disconnected from environmental, social or other planning areas</td>
<td>Emphasises integrated planning combining transportation and other areas</td>
</tr>
<tr>
<td>Engineering standards for amenity, and off the shelf support infrastructure</td>
<td>Context driven urban design and place response</td>
</tr>
<tr>
<td>Investment based on individual projects with pre-existing political support</td>
<td>Investment made based on a comprehensive range of desired urban objectives on a broader scale over time</td>
</tr>
<tr>
<td>Community participation and agenda setting restricted</td>
<td>Place based economic and governance mechanisms utilised</td>
</tr>
<tr>
<td>Urban form and density define public transport patronage</td>
<td>High quality networks and service</td>
</tr>
</tbody>
</table>

Source: Bart Everts - Creative Commons
Definitions of Sustainable Transport

Conclusive definitions of sustainable transport have been emerging and encouragingly several institutions are adopting similar definitions and in some cases the very same definition (TCST 2005). The European Union Council of Ministers of Transport and the Centre for Sustainable Transportation in Canada and importantly for this research, the Sunshine Coast Regional Council (Sustainable Transport Strategy 2011-31) all define a sustainable transport system as one that:

- Allows the basic access and development needs of individuals, business and society to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations.
- Is affordable, operates fairly and efficiently, offers a choice of transport mode and supports a competitive economy and balanced regional development.
- Limits emissions and waste within the planet’s ability to absorb them, uses renewable resources at or below their rates of generation, and uses non-renewable resources at or below the rates of development of renewable substitutes, while minimising the impact on the use of land and the generation of noise (SCRC 2010; Schiller et al. 2010).

Connecting SEQ 2031: An Integrated Regional Transport Plan for South East Queensland (Queensland Government 2011) is intended to provide a vision for a sustainable transport system, and offers following definition:

A sustainable transport system is resilient and capable of continuing to operate over the longer term with minimal effect on the environment. To be sustainable, a transport system must:
- meet the access and equity needs of individuals, businesses and the community;
- be cost effective to construct, operate and maintain;
- offer choice, convenience and support economic activity;
- reduce pollution and waste; and
- limit consumption of resources to sustainable levels.

Evidence of a sustainable transport system would be seen through:
- managed levels of congestion and system crowding;
- reducing levels of pollution, carbon emissions and other environmental impacts;
- resilience in the face of climate change impacts; and
- cost effective infrastructure and operating costs” (p11).

Nationally, the story has been different. The National Guidelines for Transport System Management in Australia (ATC 2006) refers to sustainable transport as an aspiration the Australian Transport Council seeks to achieve, and also as a focus for educational programs as part of community transport demand management. The Commonwealth Government framework for a Sustainable Australia, states that the foundation of the nation’s wellbeing to include economic prosperity, liveable communities and environmental sustainability - transport is interwoven here as an underlying theme but not dealt with explicitly. Supporting documents include the recent National Urban Policy (2011); Population Strategy (2011), and Creating Places For People: an urban design protocol for Australian cities (2011); and while none refer specifically to sustainable transport many of the national documents include key elements and principles of sustainable development.

It is important to recognise that a raft of sustainable transport definitions does little for ensuring its application at an operational level. Many of the qualitative and descriptive terms used in these definitions do very little in making their intentions any more accessible to planners, engineers, economists or the broader community. These limitations are partially addressed in the political arena and professionally through the identification and development of key performance principles, whereby practitioners and community recognise and assess the impact of transport initiatives according to sustainable transport principles. However distinct gaps between policy and practice are evident (Hale 2011).
**Sustainable Transport Performance Principles**

The development of indicators to measure the performance of a sustainable transport system is another important theme within the literature. Kennedy et al. (2005) believes that a transition from business as usual to sustainable urban transport requires consideration of matters such as ‘the provision of accessibility and the facilitation of broader economic activity (cost effectively and equitably), while safeguarding health and minimising the consumption of natural capital and emissions of pollutants’ (p395).

The identification and development of ‘performance principles’, such as these, is an important precursor for the establishment of indicators and measures. Kennedy et al. (2005) highlights that while the attributes or principles (for sustainable transport) will remain consistent, composite indicators and measures should be expected to vary across regions reflecting differences in scale, geography and culture. Kennedy et al. (2005) outlines several issues which may be considered for inclusion in the development of Sustainable Transport Performance Principles:

- Accessible
- Health and safety
- Cost effective
- Economic activity
- Consumption of natural capital
- Pollution (local and global)
- Governance
- Financing
- Infrastructure
- Neighbourhoods

A similar approach is also seen in the Douma and Kriz (2003) model to assess transport corridors. They identify five major areas of decision-making with regards to sustainable transport: Governance; Economic Impacts; Financing; Design; and Citizen Preferences.

In the Australian context Hale (2011) explores how to deliver targeted changes in: transport policy; infrastructure and network enhancements; improved service characteristics; better network utilisation and stronger financial performance in transport planning. Hale (2011) examined the current approach of strategic urban transport assessment in which project analysis is based on benefit-cost analysis and intermediate metrics such as vehicle kilometres travelled, time savings and road user costs. Hale (2011) argues that broader key performance criteria are required at an urban level, recognising principles of sustainability and urban design in good transport planning integrated with categories of traditional analysis and evaluation metric. Significantly for this research the importance of spatial evaluations of transport have been highlighted as key in a gaining a clearer interpretation of sustainable transport systems - Category (6) Analyses particular to the corridor, subregional and precinct scale (Hale 2011 p179).

Further, Infrastructure Partnerships Australia in a 2012 research report of global best practice has identified five areas of integration for successful transport delivery.

- **Institutional Integration**
  - to ensure the right transport choices are made for commuters;

- **Physical Integration**
  - to ensure commuters can enjoy the most convenient travel experience possible;

- **Network Integration**
  - to ensure commuters can make a joined up journey from origin to destination;

- **Information Integration**
  - to ensure commuters can make informed decisions before and during their journey; and

- **Fare Integration**
  - to ensure commuters aren’t penalised for making the most efficient use of an integrated transport system (IPA 2012 p49).
4. Transport Corridors

**Historical context of the ‘corridor’**

A corridor is a connection between two places. The Latin origin of the word *corridor* was first used by the Spanish as the name of a person whose role in society was to ‘run fast’ and changed over time from describing a person to a space. It has become embedded in architectural language as a place to walk and to describe a connection between places. Over time the word corridor was also used as reference to ‘put power into the hands of who control it’ and as a social space via the ‘windows’ (opportunities) enjoyed along and within the journey between spaces (Jarzombek 2010 p770).

Christopher Alexander (1977) noted that the rationalism of the modern age ‘infected’ the term *corridor*, and has left it stripped of any beauty. The corridor became an instrument of modernity, industrialisation and the corporatisation of life, to define transport, migration and information, updating itself from body to building to pipeline. The distinction here is that the term corridor is more than a singular metric, but brings with its historical and contemporary interpretative meanings of people and place; movement and connection; fast and slow; form and function; culture and economy; at a range of scales.

**Defining a Transport Corridor**

Over time the definition and use of the term ‘transport corridor’ has changed along with priorities of land use planning. This has meant that the uses and analysis of a transport corridor in the literature is in part determined by its definition. These definitions and interpretations of transport corridors are ultimately tied to the objectives of either an agency, a policy, a community or a person. It is important to acknowledge that position and perspective, as much as function and scale, play a very large role in defining a transport corridor. They are many things to many people and the same transportation corridor may be used by different organisations and disciplines in differing ways. Several descriptions of transport corridors incorporate principles of sustainability and urban design (Premius and Zonneveld 2003, Curtis 2008; Adams 2009). For many transport stakeholders and practitioners this has only added complexity to decision-making and broadened the necessary considerations and opportunities for planning and implementation (Hale 2011).

Table 3 provides a summary of how transport corridors are defined across a range of literature. It is clear that there are a number of conflicting goals and intents for them. What is also evident is that transport corridors are considered as key infrastructure in the larger system of urban and regional transport geography. As such it is important to recognise that like any infrastructure network a change within a corridor – by means of policy or design – is then reflected through the entire system. The understanding and management of any change, both intended and unintended, is fundamental to the establishment of sustainable transport corridors.

**Table 3. Transport Corridor Description**

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<td>The Australian Transport Councils 2006 National Guidelines for Transport System Management defines a corridor as ‘comprising of parallel/competing modal routes between two locations. A corridor is multimodal where more than one mode operates. Multimodal network planning works across corridors and modes including route and link and corridor planning reflects local conditions’ (p17).</td>
</tr>
<tr>
<td>Corridor can be seen as a complex area of braided infrastructure – ‘spatial dynamics of transportation, economic development, urbanisation and institutional functions’ (Chapman et al. 2003).</td>
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<tr>
<td>A bundle of infrastructure for the single purpose of moving people and freight from one point to another (Premius and Zonneveld 2003).</td>
</tr>
<tr>
<td>Transportation corridor as a geographic area between two points, linking multiple centers, and moving people and freight (Douma and Kriz 2003).</td>
</tr>
<tr>
<td>Operate as a series of corridors in a hierarchy and network, as part of a spatial strategy for a wider region (Mees 2010).</td>
</tr>
<tr>
<td>Can be single or multi modal corridor with sustainable hierarchy – pedestrian, bicycle, public transport, private motor vehicle, and Freight (Schiller et al. 2010)</td>
</tr>
<tr>
<td>They may be guided by environmental principles – Green Corridors are a European concept denoting long-distance freight transport corridors where advanced technology and co-modality are used to achieve energy efficiency and reduce environmental impact (ECMT 2009).</td>
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<tr>
<td>Transport corridors link ‘activity centres’ via the provision of effective and efficient public transport services. Transport corridors are usually centred around passenger train services, but can also be centred around road corridors (South Australian Government 2011).</td>
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</table>
Defining Bus Rapid Transit

It is important to acknowledge the difference between a ‘Transport Corridor’ and ‘Bus Rapid Transit’ (BRT) for the purpose of the research and further case study investigation. Much like the term ‘transport corridor’ the precise definition of BRT is elusive. It is generally understood to include bus services that are at minimum faster than the traditional bus service and at maximum include grade separated bus operations. This can also include faster fare collection and boarding opportunity, system image and branding treatments and bus priority lanes. In summary, BRT is an integrated system of facilities, services, and amenities that collectively improves the speed, reliability, and identity of bus transit (TRB R90 2003 p7-9).

Many of the case studies that examine BRT include separate lanes (and sometimes tracks) with right of way, often called BUSWAY systems as seen in Curitiba, Adelaide, Brisbane, and Ottawa for example. Lessons regarding sustainable transportation process and design elements from these BRT systems are important however examination of urban bus corridors with separate bus lanes and some priority is of key focus and research relevance within the context of South East Queensland.

Transport Corridors – A Functional and Spatial Perspective

Preliminary research indicates that there is value in the examination of transport corridors from both functional and spatial perspectives (Premius and Zonneveld 2003; Jones et al. 2007; CTOD 2011; Hale 2011). That is, the nature of transport corridors as connectors, economic generators, and urban growth facilitators, in addition to the role of the corridor at a site, local or regional scale (Premius and Zonneveld 2003; CTOD 2011; Hale 2011). Hale (2011) and Arrington and Cevero (2008) identify the need to carry out analysis at different scales to understand how a particular transport initiative, corridor upgrade or Transport Oriented Development (TOD) proposal relates to outcomes at a larger urban scale. Hale (2011) argues that this is a practical step forward and must be carried through the development of analytical tools, ultimately leading towards better outcomes for projects at different spatial scales over time. Further literature examines the value of the urban network or network principles and urban design within the definition of a transport corridor; the importance of scale; and the implications of governance including institutional and participatory policy directions (Curtis 2008; Adams 2009). Transport corridors of any scale or function and their surrounding urban environment have reciprocal latent and explicit impacts which require further investigation, understanding and management.

Premius and Zonneveld (2003) outline transport corridors from three (3) distinct functions influencing and being influenced by the surrounding urban environment:

- **The corridor as an infrastructure axis**
  Defined in terms of traffic engineering – a focus on efficiency and movement, with limited cross flow.

- **The corridor as an economic development axis**
  Defined in terms of economic opportunity and traffic axes – economic activities are spatially determined by the corridor, such as strip developments.

- **The corridor as an urbanisation axis**
  Defined in terms of existing and potential urbanisation as the basis for residential and work activity and development – supporting public transport and place identity.
The Centre for Transit Oriented Development (2011) (CTOD) explores ‘transit’ corridors in the context of them functioning as connecting or joining a series of transit orientated developments (TOD) along a corridor. This work from the United States Department of Transportation identifies 3 types of corridor:

**Corridor Type 1: Destination Connector** Destination connectors’ link residential neighbourhoods to multiple activity centres, including employment, medical and commercial centres and academic campuses. Because they make these connections, these transit corridors consistently result in ridership that is higher than what was projected. Destination connectors encourage ridership in both directions throughout the day because they serve 9-to-5 employment centres as well as other destinations. Some destination connectors also serve as commuter corridors (CTOD 2011 p6).

**Corridor Type 2: Commuter** Unlike destination connector corridors, commuter corridors generally serve only one major activity centre – typically the central business district – with riders travelling into the CBD in the morning and out of the CBD at the end of the day. This is in contrast to destination corridors that provide access to a variety of activity centres and result in ridership throughout the day. Heavy rail is the transit technology most often used for commuter corridors, but they can also be served by light rail and high-quality bus service. Transit service along commuter corridors is typically moderate to high-frequency during peak business hours, and tapers off during off-peak business hours (CTOD 2011 p7).

**Corridor Type 3: District Circulator** District circulators facilitate movement within an “activity node” – typically a downtown or a commercial, medical or educational centre. Circulators extend the walkability of these districts, making it easier to access amenities without a car. Circulators also connect neighbouring activity nodes (CTOD 2011 p8).

Transport corridors that seek to integrate within the local urban environment are naturally complex as they transverse across different scales and are influenced by a collection of economic, environmental and social relationships (functions) connecting people and place. As such, corridors make up an important component of local and regional strategies, facilitating appropriate development along both major and local transport corridors, while sustaining neighbourhoods and generally improving accessibility across the wider urban area.

The concept of ‘Link and Place’ (Jones et al. 2007) seeks to address some of the complex issues associated with accommodating different function and scale requirements with urban roadway corridors. It advocates an approach based on streets as movement conduits (Links) and destinations in their own right (Places). It does this primarily through the development of a matrix with ‘link status levels’ along one axis and ‘place status levels’ along the other. This matrix allows all streets, indeed all sections of all streets, to be classified as belonging to 1 of between 16 and 36 categories (the matrix can grow from 4x4 to 6x6 depending on the size/complexity of the town/city in question).

The benefits of such an integrated and placed based approach are outlined as including: it is intuitive and understood and supported by stakeholders; gives due weight to both movement and non-movement functions of streets; encourages strategic view and comprehensive performance assessment; and results in site-sensitive designs – not uniform solutions along a corridor. Criticisms have included that it is complex and is a stakeholder and resource intensive process for what is largely only incremental and site specific modifications (RUDI 2011).
Transport Corridors and the Queensland Policy Context


This transport plan for South East Queensland identifies two key types of corridor; ‘priority transit corridors’ and ‘transit corridors’. Priority transit corridors are outlined as locations where to – ‘encourage increased density and a greater mix of infill housing, local employment and community services along strategic public transport corridors’ (p27). They are further identified as ‘areas where an increase in density can start immediately’ (p15). These corridors are identified for each local government area in Part D of the plan and were selected for inclusion within the plan based on the following key criteria:

- supports a regional activity centre
- provides a committed high frequency public transport service with multiple or overlapping services running in both directions all day, every day
- higher density development consistent with regional and local planning frameworks
- represents an opportunity for urban redevelopment and regeneration (p30).

The glossary definition of ‘priority transit corridors’ - These are serviced by high frequency public transport services and are identified as areas where higher density development would have the most benefit in delivery of transport outcomes (p142).

Queensland State Government - South East Queensland Regional Plan 2009 – 2031

The terminology used in the South East Queensland Regional Plan (SEQ Regional Plan 8.6,12.1) within regards to transport corridors includes a definition for a Priority Transit Corridors and Transit Corridors as, ‘areas long key public transport routes where mixed use, public transport supported activities and development comprising 40 dwellings or about 80 jobs per hectare or higher are to occur; and are serviced by a high frequency public transport services and are identified as areas where higher density development should have the most benefit in delivery of transport outcomes’. The SEQ Regional Plan definition applies to many roadway and multimodal corridors on the Sunshine Coast.

Queensland State Government - South East Infrastructure Plan and Program 2010 – 2031

This document makes reference to a variety of corridors, using the term descriptively without providing details for any. Corridor types in the SEQIPP include: Western; coastal; public transport; transport; transit; significant; project preservation; future growth; growth; infrastructure; rail; urban; bus; inter-regional; and quality bus. Within this document the Coast Connect Initiative is identified as a quality bus corridor.

Sunshine Coast Regional Council Sustainable Transport Plan 2011

The term corridor is used extensively and applied in both a spatial and functional context with reference to 20 corridor ‘types’. All modes (public transport, road, cycle and freight) are included as transport corridors, with the modal description outlining the modal attributes and hierarchy. Due to the multiple functions of many roads they are also often classified as transport corridors. This indicates the problems associated with the use of the term corridor, and in particular the potential for practitioner confusion in the planning and implementation of transport initiatives.

Corridors referred to with regard to public transport include the North Coast rail line, the Caboolture to Maroochydore (Public Transport) Corridor Study (CAMCOS public transport corridor - both the gazetted corridor and the alignment as proposed by council through the Caloundra South greenfield area). The Palmview Greenlinks (North-South and East-West) – proposed to provide for public and active transport only - are also included, although the North-South and the East-West extent requires further investigation and are not defined.

Note: ‘Transit corridors’ are considered to have the same features as ‘priority transit corridors’ but are not an immediate opportunity or priority.
Transport Corridor Performance Principles

Good access; high quality transport; service; creating liveable communities; providing for economic development; and working across jurisdictional boundaries and institutional departments are highlighted within the literature as key factors in the development and implementation of transport corridors (Mees 2010; Douma and Kritz 2003). Douma and Kritz (2003) also highlight additional areas of decision-making such as economic impacts, financing, design and citizen preferences. Within the literature these are all seen as being influential factors for ensuring the successful integration of transport corridors into local urban and regional areas. However in practice we often see the lack of integration with the urban environment and the transport corridor singularly focused and designed as an infrastructure corridor. Rob Adams (2009) argues for the economic and sustainability benefits of integrating transport corridors and urban design, renaming the traditional transport corridor as an ‘urban corridor’ to fully capture these contextual elements as part of a greater spatial plan.

Transport corridor development demands an improvement of the governance structures with respect to infrastructure, urbanisation and economic development, especially in coordination of policy areas (Premius and Zonneveld 2003 p176; Mees 2010). Corridors have a multitude of social, environmental and economic interests that need to be integrated via policy packaging and collaboration between stakeholders and decision-makers. Mechanisms to mediate power issues between disciplines and hierarchy are important to ensure best practice and policy directions are realised (Rutherford and Munroe 2011).

Significantly, both the concept of transport and urban networks are gradually replacing corridors as the spatial planning concept. For example key design principles for the public transport ‘network effect’ (Vuchic 1999; Mees 2000, 2010; Dobson, Mees and Burke 2011), and in Perth, with the implementation of TOD development models suggests that corridors are becoming more complex urban places and need to reflect the additional role of ‘living room’ for people living along the corridor (Curtis 2008).

Section 7 of Stage 1 outlines the ‘issues’; ‘principles’ and ‘criteria’ within the literature – both sustainable transport and transport corridor – which have been identified as key areas for the development of sustainable transport corridors and provide the framework for investigation in Stages 2 - 4 of the research.
Stage 1 Leading Practice Literature Review

5. Transit Oriented Development & Urban Design

An examination and review of the literature on transport corridors and urban development inevitably leads to the concept of transit oriented development (TOD). The government and academic literature on TOD’s far surpasses what is available regarding transport corridors. Significant and useful parallels exist between the literature for transit orientated development and transport corridors (CTOD 2011; SCRC 2011). There are interdependent principles of TOD, sustainable transport and urban design which require acknowledgment if decision-makers hope to move towards sustainable transport (and urban) corridors.

Hale (2006; 2007; 2008) has written extensively on TOD and argues that they provide the opportunity to move toward a more efficient urban structure through the creation of compact, pedestrianised precincts centred on modern transit stations and public space, incorporating commercial, civic and residential uses.

Hale (2008) believes that TOD offers the opportunity to build mode share; boost patronage and ticket revenues; and concentrate activity at key locations in the transport network. Indeed Hale (2008) sets a vision for the future of the Australian transit sector to engage more deeply in strategic transport planning for major infrastructure projects such as subways, orbital transit corridors and high speed regional rail. This approach would be planning driven, as opposed to the current top-down politically-orientated approach and may pay closer attention to the TOD and ‘value capture’ finance opportunities that transit infrastructure provides. Delivery mechanisms that leverage urban corridor outcomes with public private partnerships and joint ventures is further detailed in Newman and Jan Scheurer (CUSP). Other key literature with regards to TOD and relevant to the current research includes:

- Arrington and Cevero (2008) Transit Cooperative Research Program (TCRP) Report examined the Effects of TOD on Housing, Parking, and Travel. They concluded that evidence strongly suggested that people living in TODs drive less, and this should be reflected in the assessment of traffic impacts of TODs, resulting in increased ridership, affordability and more compact communities (p55)
- SEQ TOD Traffic Generation Study 2011 prepared for the Queensland Government Department of Infrastructure and Planning demonstrated that current models tend to overestimate the traffic and parking infrastructure in mixed used developments affecting pedestrian and permeable street networks (McCormick Rankin Cagney Pty Ltd, July 2011).
- Curtis, Scheurer and Bertolini (eds) (2009) examine literature and case studies facilitating the development of TODs. Of particular interest for our research was the literature regarding the management of density via TOD, policy and smart growth and the Portland TOD Toolkit (p111).
- Rob Adams (2009) Urban Designer, City of Melbourne advocates for the development of urban transport corridors incorporating both urban design and TOD principles – coined urban corridor.
- Curtis’ (2008) article looks at the evolution of three different TOD model for low-density cities with a case study of Perth’s new railway corridor. Station spacing; route alignment options; high quality interchange; spatial framework; cross agency and state and local criteria were highlighted as important when designing to compete against the car, and developed as appropriate to the local context (p301) Gold Coast Rapid Transport Study August 2011 Repositioning the City, examines light rail and TOD with key themes of place-making, economics; streets and public places; building form; and corridor access and mobility. Gold Coast City Council and Hassel (2011).

Transit Orientated Development and the Queensland Policy Context

The literature on the definition and urban impacts of TOD development in a Queensland context is outlined in TOD – Guide for Practitioners in Queensland 2011 (action from the Queensland Growth Summit 2010), however the document includes no instruments to facilitate and leverage TOD financial mechanisms. Below is a brief summary of the key aspects.

Transit oriented development is a planning concept that promotes the creation of a network of well-designed, human-scale urban communities focused around transit stations. While there are various definitions in use around the world, there is common agreement that transit oriented development is characterized by:

- a rapid and frequent transit service
- high accessibility to the transit station
- a mix of residential, retail, commercial and community uses
- high quality public spaces and streets, which are pedestrian and cyclist friendly
- medium- to high-density development within 800 metres of the transit station (i.e. the TOD precinct)
- reduced rates of private car parking.

Note: The term ‘transit oriented development’ is often used incorrectly to describe a single development adjacent to or above a transit station. TOD refers to the set of principles applying to the broader precinct surrounding the station, rather than any individual development within it.
South East Queensland Regional Plan 2009 - 2031 states that TOD is the primary land-use strategy of the South East Queensland and the Far North Queensland regional plans and therefore should be adopted into the local strategies. The working definition would be guided by the newly released, TOD – Guide for Practitioners in Queensland 2011 document.

Connecting SEQ 2031 - An Integrated Regional Transport Plan for South East Queensland identifies TOD as a planning concept that promotes ‘the creation of well designed and sustainable urban communities focused around transit stations. These communities incorporate a mix of residential, commercial and retail uses, including affordable housing, shops, offices and other facilities, all within a comfortable 10 minute walk of established or planned rail and busway stations’ (p142).

Sunshine Coast Regional Council Sustainable Transport Plan 2011 describes TOD as, ‘mixed-use residential and commercial areas, designed to maximise the efficient use of land through high levels of access to public transport. Transit oriented development usually features higher intensity development, a strongly pedestrianised environment, a clear and interactive community focus, generous public spaces and high quality urban design’ (p77).
The literature over the last two decades is filled with descriptive models of sustainable transport development, with emerging evidence of a broad range of benefits to local and regional catchments that sustainable urban transport corridors may provide. However, in many countries sustainable transportation is largely as transport has always been, but with a broader acknowledgment of potential impacts, and limited practical mechanisms to enable community, stakeholders and professional practitioners to achieve mandated regional spatial plans. Unfortunately, ‘sustainability’ as a new guiding paradigm, is often a policy prefix with flaws in institutional frameworks leading to tensions between professional staff regarding public policy interpretation.

Evidence suggests that access to best practice research, knowledge and resources enables agreed and strong direction for decision-making to achieve long term visions. The literature emphasises the importance of developing broader key performance criteria surrounding ‘transport corridors’ and ‘sustainable transport’ in order to facilitate the transition from ‘business as usual’ to a ‘sustainable transport’ model. Key themes include areas of governance and politics; people and place; equity and access; networks and design; finance and economy; at a range of scales and functions.

The literature also indicates that how a transport corridor, or parts of that corridor, are defined is important to how different organisations and disciplines use and analyse the term. The term ‘corridor’ is often used as a ‘catch all’ descriptive term for what are predominately roadways, railways and highways, but also include conservation and cycleway corridors. Of particular significance has been the rise in policy driven multimodal roads that in reality experience the inevitable trade-offs when each road has to be made to do ‘everything’. The literature also raises the importance of providing for legible and networked higher order policy principles of walking and cycling along and between corridors, in order to build supply of patronage for the public transport mode (bus) and create urban structure for a healthy economy and high urban amenity. It also highlights the importance of the collaboration across institutions, cross boarder governance arrangements and private/public stakeholders for such key design elements to prevail.

In the Sunshine Coast region and adjoining authorities there are a number of key stakeholders (and their policies and programs) which need to be involved in the debate about how to integrate engineered transport solutions into the broader urban fabric.

From a spatial planning perspective, recognition of the urban transport network is established as being an important approach to sustainable transport systems in both high and low density areas (Curtis 2008; Adams 2009; Mees 2010; Dobson et al. 2011). The multiple considerations of corridors, urban design, and transit oriented development assist in the recognition of any ‘cause and effect’ impacts within the broader system. This acknowledgment of reciprocity between the transport corridor and the surrounding urban environment – provides us with the basis for recognition and continued definition of urban corridors.

Despite scepticism, it is encouraging that the concept of sustainability and the concept of corridor are now identified in articulating a desired end state for transport planning in Australia. Key national, state and local planning policies and strategies are increasingly demonstrating a commitment to these ideals, despite the potential for complexity of form and purpose. Importantly, opportunities exist in the present environment to identify gaps and build stakeholder pathways for collaboration to realise future desired strategies. These commitments will assist in overcoming the inertia of the status quo – business as usual – and may begin to commit all stakeholders to the funding, policy analysis and public participation approaches needed to implement the concept of sustainable transport.
7. Key themes - development of sustainable transport corridors

From the literature this research has identified many of the ‘issues’; ‘principles’ and ‘criteria’ that are understood to contribute to the establishment and management of sustainable transport (urban) corridors. In consideration of this data, and the context and purpose of the research project, six (6) key themes have been identified as significant for the interpretation of sustainable transport corridors. It is expected that these themes are interdependent and each is also influenced and impacted by past, present and future adaption of demographic, political and technological change. These themes will support the investigation of case study transport systems and urban catchments, while also providing the basis for the establishment of the leading practice framework in the later stages of this research.

The key themes have been identified as:

1. **Governance**

   This theme is primarily concerned with highlighting and interpreting the formal and informal procedures that provide the framework for governing. This includes the historical governance arrangements; levels of decision-making; the influence of the market and politics; jurisdictional responsibilities; and citizen and stakeholder participation that create strong spatial planning documents to guide sustainable transport and transport corridors. Important sub-themes which requirement specific acknowledgement include:
   
   i. **Institutional Arrangements** These include the level of institutional coordination, policy integration and legislative requirements associated with the management and decision-making structures for transport corridors, including consideration of jurisdictional responsibilities and coordination at different scales.
   
   ii. **Politics** This is the recognition of the influences and the application of power and professional disciplines both within the public and private sector that is often associated with urban and transport planning projects. The importance of political support and the significance of changes that may occur with or without it.
   
   iii. **Public Participation** The significance of public and broader stakeholder participation in problem solving and influencing decision-making is acknowledged. The importance of citizen inclusion to engage, debate, educate and create successful and ongoing transport initiatives cannot be understated.

2. **Land Use Planning**

   Is principally concerned with the spatial arrangement of the range of land uses to best manage the impacts of current development and predict and anticipate the impacts of future development. The influence of these processes to assist in the establishment and on-going configuration of high quality urban transportation systems and associated infrastructure is an important research theme. Three key sub-themes are recognised within this examination of land use planning:
   
   i. **Urban Form & Structure** The character and function of both urban form and urban structure are recognised as key in the delivery of appropriate transport solutions. These sub-themes acknowledge the importance of the arrangement of the physical layout and design; and the degree of connectivity and accessibility between different activities and networks.
   
   ii. **Density** Acknowledges the methods used to calculate the measurement of population and urban density and its interpretation within local and regional spatial planning and economic development.
   
   iii. **Infrastructure** Refers to range of physical and organisational structures which are required to support access to, and delivery of, urban transport systems.

3. **Design and Place-making**

   Here the research is concerned with how transport corridors and adjacent urban spaces are able to respond to their function and surrounds and move towards being places for people. It is the understanding, interpretation and management of urban context and the transport task to establish practical and intuitive place-making opportunities at both site and local levels. There are three sub-themes the research considered fundamental to this theme:
   
   i. **Accessibility** Any space is only as good as the access to, through and from it. Here the consideration incorporates the efficient movement, and interchange, of the variety of transport modes with a particular focus on active transport, including public transport.
   
   ii. **Urban Design** Here key design elements are drawn from the literature and recast in consideration of the development of sustainable transport corridors. A significant compendium of place and design elements are acknowledged and explored, these include, built form, community, connectivity, legibility, adaptability, comfort, amenity, safety, vibrancy and diversity.
   
   iii. **Transit Oriented Development (TOD)** There are significant conceptual linkages between the strategic design intention of TOD and that of transport and urban corridors. The literature and policy on TOD provides an approach which is useful when considering the opportunities presented to provide compact pedestrianised precincts centred on modal interchange.
Network Planning

Network planning is recognised here as important for both the overall strategic governance arrangements in spatial planning; and also as a management mechanism for transport planning. Principles of network planning include elements of frequency and consistency of service, interchanges between modes and line hierarchy. Two sub-themes are relevant when considering network planning:

i. **Management** The management and governance arrangement of the transport network is a significant factor in the financial viability and increases in patronage within public transport systems. Understanding the interdependency and influence of multiple stakeholders including governance arrangement and levels of privatisation across the system is essential.

ii. **Travel Behaviour & Quality Service** These sub-themes are recognised as crucial to the success of transport network planning and the delivery of infrastructure. There are significant research links between travel behaviours and the quality of the service coordination (legibility) and frequency.

Finance and Marketing Mechanisms

Financing and cost recovery analysis of transport initiatives is central to the decision-making associated with service and infrastructure investment. The research highlights the importance of the range of methods and mechanisms used to reflect the strategic planning and policy objectives of all tiers of government whilst responding to community need. There are two sub-themes of significance for this research:

i. **Approach** The research focuses on examining the principal methods used in the forecasting and modelling of transport demand and investment. This includes highlighting issues around established funding pathways, accountability, incentives, power and politics.

ii. **Indicators** The range of performance indicators and measures used to address policy frameworks and the cost of public transport investment includes wider sets of principles in the context of ‘sustainable transport’.

Sustainable Development

This key theme highlights the importance of clear definitions for sustainable transport and transport corridors across all tiers of government; business and the broader community. The case study research examines how the range of definitions has affected policy, participation and interdisciplinary best practice. Significantly this research seeks to establish a clearer interpretation of sustainable transport corridors through the examination of corridor function and scale. The research considers two key sub-themes for clarity in defining sustainable (transport) development:

i. **Sustainable Transport** This research acknowledges the European Union and North American policy and practice definition of sustainable transport is also reflected in many Australian transport planning strategies and defined in this literature review.

ii. **Transport Corridors** The definition and interpretation of transport corridors varies across professional disciplines and raises question of this distinction within strategic planning documents, implementation and community participation mechanisms.
8. Summary of preliminary literature findings

The following section summarises aspects of the reviewed literature and the relationship to the key themes articulated in this research. These primary findings and observations may be considered important to the success or failure of high quality sustainable transport corridors. This data set also highlights the issues and interdependencies within and across the six key theme areas.

- Institutional arrangements; governance mechanisms; and widely held (mis)beliefs about the requirements for successful transport planning have affected Government and other organisations implementing sustainable transport.
- There is often a lack of power or influence at any one level of government to address metro-wide concerns of public transport and water (Steele 2012).
- Historically there has been a lack of overarching authority and responsibility for the planning and provision of services, including cross-departmental communication.
- Transport Corridors require the integration and management of governance issues regarding density, population, TOD and Smart Growth (Curtis et al. 2009).
- Policy change and policy mechanisms are just as important as density increases as a lever to create efficient changes in transport (Bannister 2002; Vuchic 2005; Mees 2010).
- Policy levers need to include incentives and disincentives. Policy ‘packaging’ must be mutually reinforcing and include national targets and local objectives (Bannister 2005 p88).
- Transport policy frameworks must successfully integrate policy positions regarding walking, cycling, walk to transit with investment priorities which support footpaths, cycling and local transport improvements.
- Policy and meaningful participation precede and set the stage for effective planning and transport systems. The cities and regions that are the exemplars of public transport have citizen and stakeholder alliances that politicians and planners help to establish and be informed by. This is the beginning of a long-term strategic orientation in maintaining and building on place qualities. (Newman and Kenworthy 1999; Mees 2000; 2010; Bannister 2002; Grant 2009; Curtis and Low 2009).
- Political leadership and direction from senior government staff plays a crucial role in the success stories of sustainable transport. The connections between elected politicians, government officials and the institutional environment can have significant impacts on the success or failure of transport initiatives.
- The last 50 years has seen a greater (funding) capacity and organisational strength within road authorities and departments, while public transport institutions have weakened. This has resulted in path dependency in government funding in the favour of roads over public transport (Low and Astle 2009).
- Organisational restructuring that is conductive to policy development and implementation is not enough to achieve sustainable transport and needs to be worked in conjunction with a networked governance approach together with strong regulation. Case study of Melbourne and Perth (Legacy et al. 2012).
- Transport corridor development demands an improvement of the governance structures with respects to infrastructure, urbanisation and economic development, esp. coordination of policy areas (Premius and Zonneveld 2003).
- Curtis (2009 p300-1) highlights the elements of a successful case study in Perth with partnerships built between transport providers, land use planners (state and local), and land use agencies and included the use of a conceptual spatial framework of activity corridors, activity centres and transport corridors alongside a cross agency committee; an action plan; and linked performance and evaluation criteria.
- Place governance in local corridors is useful as a strategic mechanism to improve local economics. Investment, diversity, building (Adams 2009; Healey 2010).
Integrated land use and transport strategies have long been established as the basis of strong spatial planning documents.

The question of urban form verses structure is at the centre of the ‘sustainable’ compact city debate. Urban structure and form play an important role at varying scales in the development of ‘sustainable transport’.

Coordinated attention to detail at the community scale while concurrently planning major transportation corridors lies at the heart of successful integrated land use transportation planning (Kennedy et al. 2005 p395).

Stone and Muhammad 2010; Curtis and Scheurer 2010; Mees et al. 2010 have all demonstrated that dispersed urban form is not the barrier to running an efficient and integrated public transport system.

A car dependant urban structure; low quality public transport; reliability and timetabling; and a lack of local employment all play integral role in transport choices (Buxton and Tieman 2005).

Transport choices are affected by employment - Challenge for suburban transport planning is to reduce car trips between suburban jobs and suburban houses (Moriarty and Mees 2006; O’Connor et al. 2011; Mees 2010).

An increase in leisure and recreation has resulted in an increase in car use and needs to be taken into consideration when designing transport networks.

Households have been evidenced to change their travel behaviour pattern when exposed to different urban form. However Jarvis’ (2010) research demonstrates that it can have more to do with the practicalities of daily life and space-time coordination in addition to where leisure activities and shopping centre development occurs.

Households are becoming more complex. Connections need to be made between spheres of housing, transport, technology, work, and employment and family life. Need to consider the future of cities and transport alongside the future or work, employment and everyday life (Jarvis 2010).

Walking has a long history of shaping human physical development and defines the public realm and its capacity to support the human community (Schiller, Bruun and Kenworthy 2010).

Poor weather has been shown not to be a determining factor for the uptake of supporting modes of walking and cycling Canadian and European cities have significantly higher bike and walking than Australia.

When considering urban density Mees (2010) highlights:

- Competing modes influence mode choice more than differences in density.
- Suburbs have a greater influence on density figures as this is where more people live in each house (p59-60).
- Urban structure is more important than urban form when considering public transport mode share.
- Competing modes influence mode choice much more than differences in density.
- Argues that 400-300 residents per hectare as a population threshold figure for public transport is unsupported by evidence (2010 p66).
- Geographical classifications from the ABS affect urban density figures and Mees (2010) advocates for the use of density profile charts, which will show a range of transparent calculated figures. Urban centre/locality and statistical divisions (SD) for example. SD’s include small, urbanised sections which include high population per household, distorting figures.
- The type of measurement and definition used affects density figures. Density gradient figures need to incorporate all areas inner, middle & outer. Density (person per hectare) gross density; net density; residential (gross and net).
- Net residential density – is calculated using the residential blocks on which houses are built. Gross residential density includes non-residential uses found in residential areas such as local schools or parks.
- ‘Overall urban density’ includes all other urban uses such as industrial spaces transport terminals and regional open space. This shows density often being higher on the fringe due to more people in each house (family/kids); and inner city figures lower than perceived. ABS zones for data can also result in only having data for inner city areas, which also affects results.
Planning for accessibility is key to planning for a sustainable transport system. There have been a number of accessibility measures created which are of interest for consideration in our case study analysis.

- ‘Sustainability accessibility’ – an accessibility measure to be used in interactive creative plan making processes (Bertolini et al. 2005).
- Goldman et al. (2006) advocates for a systems perspective, which acknowledges the interaction between transport and other economic and social systems. Policy approaches for accessibility in sustainable transport could include: New mobility; city logistics; intelligent management system; liveability (p271).
- Rob Adams (2009) Urban Designer, City of Melbourne advocates for the development of urban transport corridors incorporating both urban design and TOD principles – coined ‘urban corridor’.
- Corridor development needs to be modified to favour rapid public transport, bicycles and pedestrians over cars. Clear principles and prescriptive controls around the transition between corridor and active frontages, vehicle access and over looking conditions.
- Right of Way design along corridors is very important. Transit is greatly influenced by such conditions – the higher the RoW the higher the speed and capacity. Particular reference in the literature regarding 3 Types of RoW design using Vuchic terminology (2007). Designing Interchanges is important on the local scale (Mees 2010).
- Urban design is concerned with the arrangement and functionality of towns and cities from both the perspective of people and physical space as both a process and outcome. Urban Design occurs at a number of levels.
  - First the urban structure and this includes planning, zoning, transport and infrastructure networks. This is the essential framework of a place and shows relationships between zones of built forms, land forms, natural environments, activities and open spaces. This includes Transport and Infrastructure networks.
  - Secondly at the micro level and in consideration of human scale and the end user – street furniture and bus stops, finishes and fittings.
- It is important to integrate urban design principles at both the local and regional policy levels. Planning systems and urban design can be used to inform infrastructure and built form and can significantly improve the economic, social, environmental and cultural performance of developments.
- Urban design is important in the context of making places for people or place-making as the term is now referred to. Scale, proportion, and architectural rhythm – the weaving together of the urban fabric and corridor/street scene as well as place-governance principles as mentioned above.
- Place-making opportunities include each intersection, bus stops, pathway language (way finder), activity centres, shop frontages, bike paths, and maintenance management. Interaction between government intervention and citizen involvement improves place qualities and drives the long-term incremental nature of sustainable corridor development.
- The South East Queensland Place Model is designed to promote a more compact urban form, including increased availability and diversity of housing for people of all income levels, walkable neighbourhoods, attractive mixed use communities, access to transportation choices, reduced car dependency, and protecting our natural landscapes (Council of Mayors & Queensland Govt. 2011).
- Transit Oriented Development (TOD) is a key component of Sustainable Transport, both with guiding attributes and the endorsement of approach to achieve sustainable urban transport corridors. TOD provides the opportunity to move toward more efficient urban structure, through the creation of compact, pedestrianised precincts centred on modern transit stations and public space, incorporating commercial, civic and residential uses (Cevero 2008).
Current models tend to overestimate the traffic and parking infrastructure in such developments affecting the pedestrian and permeable street network that has been shown to be crucial for the TOD and PT use. (McCormick Rankin Cagney 2011)

Making TOD Happen (2009) edited by Curtis, Scheurer and Bertolini, is an excellent resource examining literature and case studies facilitating the development of TODs. Of particular interest for our research was the literature regarding the management of density via TOD, policy and smart growth and the Portland TOD Toolkit (p111).

Rob Adams (MCC) outlines an urban transport corridor advocating for dense mixed-use corridors to be developed and use existing infrastructure and leave undisturbed the majority of leafy dispersed traditional suburbia (Adams 2009).
Network planning in sustainable transport is important at two levels. First as an overall strategic governance arrangement in spatial planning and secondly as a management mechanism for transport planning.

Network planning allows for timetables to be created that are based on supply not demand, which allows for demand to increase and for the natural balanced flows of the day to occur and increase.

Consistent service standards need to be offered across the entire network (Mees 2010 p8).

Intermodal connections are characteristics that influence travel behaviour and therefore system effectiveness (Miller and Meyer 2001).

5 Public Transport Network Principles (Mees 2010; Dobson and Mees 2011 p3)
- Simple and direct network structures
- Plan a hierarchy of lines into network
- Plan for speed, consistency and reliability
- Coordinate convenient transfers
- Provide clear, ubiquitous and consistent information and marking.

Network planning is a step forward in systems planning with network principles as discussed by Mees 2000; 2010; 2011 and the 4 Step Model to transport planning as first defined by Vuchic 1999; 2005.

It essentially uses a different set of measures and not just numerical analysis based on what we do now as a determinate for what to provide for in the future. This modelling approach is a system popular with politicians because of its perceived rationality i.e. savings to the economy in dollars. It is based on the assumptions that forecasting methods are accurate, what people do reflects what people want to do, and that people and their travel patterns are predictable.

Network planning is a policy approach widely adopted in the EU (valuable case studies of Amsterdam, Netherlands, and Zurich etc.) Perth also has important literature examples on network planning principles.

The ‘network effect’, occurs when public transport imitates the flexibility of the car by knitting different routes and modes into a single, multi-modal network. Making transfers between the different routes near effortless enables the public transport network to mimic the ‘go anywhere, anytime’ flexibility of a road system (Mees 2000; 2010).

Better access to transport networks and infrastructure increases travel speeds and extends the distance that can be travelled in a fixed time, as well as distance from home to nearest bus stop or railway station affecting modal share (Bannister 2005; Vuchic 2005).

Transport corridors need to the paired with one or more activity corridors to form a network (Curtis 2009)

What is becoming very clear in the research with regards to increasing patronage is the value in a high quality service, predicable frequent timetabling with carefully managed routes (Mees 2010; Mees and Dobson 2011).

Case study of Perth TOD demonstrated the importance of designing a transport system to compete with the car (speed) in low-density areas (Curtis 2008)
Financing and cost recovery analysis is a decisive factor in transport planning and has been open to different methods over the two decades.

Forecasting demand and costs is a major source of uncertainty and risk in the appraisal of transport infrastructure projects and this is important to take into consideration in the decision-making process.

Political mechanism – high-inbuilt costs of a planning system with large amount of inbuilt discretion, negotiation and no enforcement capability (Goodman 2009).

Flyberg (2005 p144) evidenced how travel demand forecasting for road and rail are generally inaccurate, and concludes that the problem is based on misinformation and is an issue of power and profit. It requires mechanisms of transparency and accountability. A planner and decision-maker must take into account any traffic forecasts that do not explicitly take into account the uncertainty of predicting future traffic.

Much of the contention lies in approaches that do not account for a wider set of variables (Business as Usual). Transport economics such as pricing, incentives, transportation demand management and mobility management programmes, need to be subject to intense analysis and fit well with policy and planning objectives. This includes:

- Accounting for externalities – i.e. pollution loss of amenity should be an important part of economic planning.
- Incentives for the modes you want must be coupled with disincentives for the mode not desired. At present the cost of motoring has declined comparatively to incomes. If you want to change something you have to have policy and investment that is bias toward that end goal.
- Net present value – Highly problematic when trying to promote sustainable development in a public investment context (Schiller 2010). NPV is a mathematical expression of the idea that the sum of all monetary and monetized benefits over a certain number of years minus the sum of all monetary and monetized cost has to be greater than zero. Future cost benefits zero within 30 years (p 171).
- Joint development and value capture Where the community is able to share in broader economic benefits of the shared and multuse of transport corridors, particularly station areas, to the benefit of both transit agency and private parties (Kenworthy, 2010)

The evaluation criteria for the redevelopment of new or existing transport corridors, requires a wider set of principles and measures to address policy frameworks and the true cost of public transport options (Kennedy et al. 2005; Naess and Flyvbjerg 2006; Hale 2011).

Broader key performance indicators at an urban level are required given the principles of sustainability and urban design in transport planning for the delivery of targeted changes in policy, infrastructure and network enhancements improved service characteristics, better network utilisation and stronger financial performance in transport planning. These wider considerations will include aspects such as urban form, urban design, and liveability.

- Sustainability performance indicators and measures should be expected to vary between regions reflecting differences in scale, geography and culture (Kennedy 2005).
- Five major areas of decision-making with regards to transport corridors: Governance, economic impacts, financing, design and citizen preferences (Douma and Kriz 2003).
- Gold Coast Rapid Transit Light Rail Key Performance Criteria - Passenger capacity; comfort; reliability and safety; sustainability; value for money.
The interpretation and definition of key terms such as transport, transport corridor, transit, rapid transit, urban corridor, corridor hierarchy category and TODs is varied across disciplines organisations, stakeholders. This influences both functional and spatial aspects of corridor development.

The term corridor brings with its historical and contemporary interpretation meanings of people and place; movement and connection; fast and slow; form and function; culture and economy; at a range of scales. Not just a single focused metric.

Sustainability performance indicators and measures should be expected to vary between regions reflecting differences in scale, geography and culture. Governance, financing; infrastructure and neighbourhoods as a framework model (Kennedy 2005).

Patsy Healey 2010 – key attributes of a 21 Century Planning Project:
- An orientation to the future and the belief that action now can shape future potentialities
- An emphasis on livability and sustainability for the many and not the few
- An emphasis on interdependencies and interconnectivities between one phenomenon and another, across time and space
- An emphasises on expanding the knowledge ability of public action, expanding the ‘intelligence’ of a polity
- A commitment to open, transparent government processes, to open processes of reasoning in and about the public realm.

6. Sustainable Development Definitions

Sustainable Transport • Transport Corridors
9. References


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Gray, R., Gleeson, B., Burke, M (2010) Urban Consolidation,


Stage 1 Leading Practice Literature Review


Stage 2: Leading Practice Case Study Investigation

STAGE 1
LITERATURE REVIEW

STAGE 2
CASE STUDY INVESTIGATION

STAGE 3
FRAMEWORK DEVELOPMENT

Source: Erik Fredericks - Creative Commons
Stage 2 Leading Practice Case Study Investigation

Introduction

This section represents Stage 2 – Case Study Investigation of the four stage research project to develop a Leading Practice Framework for Sustainable Transport Corridors. It builds on the key themes identified in Stage 1 – Leading Practice Review. Here the research will identify and examine leading practice examples of urban areas that have benefited from land use planning; economic development; infrastructure improvements; and place making initiatives centred on transit corridor development. This research will assist in the interpretation of the key themes in practice, and allow for greater understanding of transport corridors both functionally and spatially.

Case Study Focus

Within the case study investigations the research focus on the key themes will additionally seek to explore those issues from a variety of spatial contexts – regional, local, corridor and site. These spatial contexts are largely indicative to allow for the broader inclusion of the impacts and interdependencies between the key themes. The research focus for each of the themes is detailed below:

Governance: Institutional Arrangements, Politics and Public Participation.

Regional and Local At this scale the research is primarily concerned with highlighting and interpreting the formal and informal procedures that provide the framework for governing. This includes the historical governance arrangements; levels of decision making; the influence of the market and politics; and the factors (citizen and stakeholder participation) that create strong spatial planning documents that guide sustainable transport and transport corridors.

Local, Corridor and Site Here the research examines institutional mechanisms including the jurisdictional responsibilities for the development of sustainable urban corridors. Consideration has been afforded to the role of policy development and professional best practice across the institutional framework. Identification of examples includes the importance of political debate and citizen and stakeholder participation in the formulation of policy and corridor plans.

Land Use Planning: Urban Form, Urban Structure and Density

Regional and Local This section of the research is concerned with how urban form and structure, including population distributions, affect the establishment of high quality transport systems. Issues concerning integrated transport and land use management; policy packaging; and the influence of the market are highlighted.

Local, Corridor and Site At this scale the investigation focuses on urban intensity and local connectivity to meet human need; accessibility and local economic development; and employment.
Stage 2 Leading Practice Case Study Investigation

Design and Place-making: Accessibility, Urban Design and Transit Orientated Development

Regional and Local  This section is concerned with the identification of broad types and functions of the corridor, both intended and causal. The research is interested in identifying underlying urban design, engineering, and transport oriented principles which are key in the establishment of sustainable transport and broader urban catchment corridors.

Local, Corridor and Site  In addition to the establishment of key design elements this section examines the practical and intuitive nature of context based urban design; pedestrian prioritisation and place-making opportunities at the site scale.

Network Planning: Principles, Management and Quality Service

Regional and Local  The research includes the establishment of network planning design principles; transport management arrangements; and the quality of service coordination (legibility) of urban systems along the entire corridor.

Local, Corridor and Site  In this section the research investigates the impact of these principles and arrangements (and identifies opportunities) in building the capacity and patronage levels required to develop and maintain a successful public transport system.

Finance and Market Mechanisms: Approach and Indicators

Regional and Local  The research focuses on examining the approaches used with the modelling, forecasting and decision-making behind infrastructure investment. This includes identifying issues around transparency, professional best practice across disciplines; and the use of economic ($) figures as a political tool.

Local, Corridor and Site  At this scale the focus includes the identification and examination of performance indicators and measures used (including examples of a wider set of principles) to address policy frameworks and the true cost of public transport investment.

Sustainable Development: Sustainable Transport and Transport Corridors

Regional, Local, Corridor and Site  The research highlights the importance of clear definitions for sustainable transport and transport corridors including function and scale. The case study investigations are interested in establishing how these definitions affect policy, community participation and interdisciplinary best practice.

Approach to Case Study Selection:

The basis for case study selection (including multiple transport corridors) of Vancouver, Canada; Portland, USA; Auckland, New Zealand; and Melbourne, Australia included:

- Availability of a detailed data – Access to appropriate and reliable levels of data, including the scope of research papers and policy was important to be able to conduct desktop review of local and regional context and international best practice transport corridors.
- Obtaining a balanced approach - Both successful and unsuccessful sustainable transport systems and transport corridors case study areas were chosen to provide a balanced approach to lessons learned.
- Ability to compare and contrast – ‘Whole of corridor’ case studies, where similar demographic parameters exist were included based on considerations of the type of transport corridor; density figures and census data dates; cultural similarities; economic significance; and future growth projections.
Case Study Areas

Vancouver, British Columbia, Canada

In the context of this research, Metro Vancouver (region) was examined for its leading practice governance and strategic document establishment. Additionally the City of Vancouver was the focus of three (3) specific urban corridor investigations. The corridors illustrate how different types of urban corridors can work together to provide a balance of sustainable modes of transport within a district.

1. Broadway Corridor
2. Cambie Street Urban Corridor
3. Hornby Street and Dunsmuir Street separated bike paths.

Portland, Oregon, USA

The case study investigation of Portland focused on the success and limitations of implementing comprehensive Transit Orientated Development (TOD) policy and financial models.

1. LRT (Light Rail Transit) Yellow Line, is a 2 way light rail TOD corridor that runs along Interstate Ave, and provides an interesting example of a mature urban corridor.
2. The Portland Streetcar, more recently opened in the Pearl District, highlights the importance of urban transit as a critical mechanism to engage the support of community, business and developers to revitalise urban corridors and districts.

Melbourne, Victoria, Australia

The significance of this case study is with regard to how the detail of the sustainable corridor key theme areas have worked together and influenced planning of urban transport corridors with an examination of the Urban Growth Corridor Plan (2009). This plan, on hold since the 2011 Victorian state elections, details an intensification of transport corridors developed along existing infrastructure, including a compact and livable city, while coexisting with a dispersed leafy urban form - sustainable with good design.

Auckland, New Zealand

This case study included a partial examination of the Auckland transport system and a focus on the historical governance framework and financial approach that has influenced Auckland’s position as one of the most car dependent cities with some of the lowest public transport use in the world.

The individual corridor(s) investigated include:

1. The Auckland Central Corridor Connector.
2. The Ellerslie-Panmure Highway Corridor Plan.
Stage 2: Case Study - Vancouver
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1. Vancouver Case Study Summary

Vancouver is the largest city in British Columbia and is located on the south west of mainland Canada. Within this research context the investigation will consider the broader metropolitan area, referred to as Metro Vancouver while the focus of much this study is within the City of Vancouver.

Despite having low population density figures, a traditionally dispersed urban form and a very cold climate Vancouver experiences high public transit use and high levels of walking and cycling for urban mobility. The trajectory that began over 30 years ago in Vancouver challenges all the common perceptions of the necessary conditions of a financially viable and quality public transport system.

Metro Vancouver, the regional governing body, actively engages as a political forum to advocate for, collaborate with and educate the community. Equally, planning and associated practitioners at the regional and local level are essentially trusted by the community to keep them informed on best practice and to deliver the agreed mandate of a compact liveable and sustainable city.

This is clearly evidenced in the highly accessible data and inclusion of balanced argument within strategy documents regarding why certain approaches are being taken and what performance measures will be used. This is in addition to the use of policy packaging and incentives and disincentives to achieve desired outcomes.

Equally sustainable transport does not mean that each road has to include all modes (regardless of safety) but works to provide a complementary network of mode choice. This network approach is also responsible for the high patronage levels (supply) including simultaneous scheduling, interchanges and quality of service.

One of the most interesting aspects of Vancouver is the lack of a need to align themselves with a one size fits all method for corridor and TOD planning. Although aspects of TOD are used in the planning of key corridors and station areas, overall a ‘whole of corridor’ approach is taken which is context based and less prescriptive. Transport corridors are considered first as part of a ‘whole’ and secondly in sections based on existing neighbourhoods. This is also reflected in the funding mechanisms and consideration the true cost of private transport into analysis.

The policy intention of transport corridors and sustainable transport is clear. Along with a definition of sustainable transport, corridors are referred in key guiding documents as related to transit corridors and priority corridors as opposed to all aspects of the transport network. The only other use is with conservation corridors and there is no mention of the term corridor with regard to roadways. Interestingly there is no definition of TOD in the Transport 2040 or the Regional Growth Strategy (2011). This is an important distinction, enabling corridor development not to be confused with highway or road development in both political rhetoric and pathway dependence for funding and policy development. Secondly, this allows the design and human interface of a corridor to align itself not just based on station segments but on the context as related to individual sections along the corridor.
In the context of this research, Metro Vancouver will be examined for its leading practice governance and strategic document establishment. Additionally, the City of Vancouver will be the focus of three specific urban corridor investigations, each of which will be further detailed later within this case study investigation. The corridors illustrate how different types of urban corridors can work together to provide a balance of sustainable modes of transport within a district.

1. The Broadway Corridor is a well-established local urban Bus Rapid Transit (BRT) corridor that is important economically to the region. Currently in Stage 2 of a planning process for future upgrade to a possible Light Rail Transit (LRT), this corridor provides evidence of the approach used to increase patronage levels, the importance of network management, and the crucial role of key stakeholder relationships.

The evaluation summary provides a good practical example of the application of a wider set of principles and measures that not only addresses policy frameworks, but takes into consideration the true cost of public transport options.

2. The Cambie Street Corridor provides for the analysis of a government-initiated program of corridor planning. It is a contemporary TOD corridor planning project which has regional significance as part of the city building, economic development, and local design importance within each section of the existing neighbourhood communities.

3. This case study will also detail the nature of the Hornby Street and Dunsmuir Street separated bike paths. As corridors they provide a good example of how to achieve mode share increases for cycling without the inevitable tradeoffs when each road has to be made to do everything.

Of key interest is the design – Hornby and Dunsmuir St have utilised three different separated pathway designs along the street (similar approach to the way they plan for buses and light rail depending on the situation – part underground, at grade and elevated). This flexible approach allows for mental blocks to be overcome (professional and institutional) and appropriate context based design to prevail.
2. Case study context review

Metro Vancouver & Vancouver City Context:
Planning and Regulation

Metro Vancouver’s three main areas of planning and regulatory responsibility relate to: regional growth (land use through municipalities and transportation through TransLink); waste management (solid and liquid waste) and air quality management (a delegated Provincial function). Metro Vancouver also serves as the main political forum for discussion of significant community issues at the regional level. It acts as a facilitator, convener, partner, advocate and a significant instrument for providing information and education to the community (Metro Vancouver 2011).

Each year, Metro Vancouver prepares an Action Plan that provides specific and measurable targets for the organization’s work in the year ahead.

Researcher Note: Metro Vancouver constitutes a representational governance model – regional/metropolitan representation. Management has balanced targeted compact and transit oriented planning and a high level of democratic legitimisation (Gleeson et al. 2010; Mees 2010).

Metro Vancouver is the inter-municipal administrative body that used to be known as the Greater Vancouver Regional District (GVRD) established in 1967. Metro Vancouver is both a nonpartisan political body and corporate entity operating under provincial legislation as a ‘regional district’ and ‘greater boards’ on behalf of twenty-four local authorities, including the City of Vancouver.

History and guiding policy documents

The Liveable Region Strategy for the province of Greater Vancouver was first developed in 1975. It was the first guiding document for the entire region and set the scene for the current spatial planning paradigm. It is largely a package of policies that strongly supports goals of a compact city, transport corridors, liveability and sustainability to achieve the vision for the city and region.

This approach to spatial planning was largely initiated from an anti-freeway demonstration, which ran from 1968-1972, and started a community and political dialogue regarding issues of urban sprawl. During the 1980s this further evolved into action via an open minded and flexible way of managing physical change in neighbourhoods and cumulated into the development of the internationally acclaimed 1996 Liveable Region Strategy. As a result over the last decade Vancouver’s residents have enjoyed high standard of living conditions, a reduction in car use and ownership, a lively street life, considerable social and ethic mixing and improvements in people’s health (Healey 2010 p81).

City Context - City of Vancouver

The City of Vancouver is one of 24 local authorities planned and regulated under Metro Vancouver and is recognised by The Economist (2011) as one of the most livable cities in the world. The key goals promoted to guide the City of Vancouver through their policy documents are: liveability, accessibility and inclusivity (City of Vancouver 2011).

In the province of British Columbia, the City of Vancouver is unique. A provincial statute called the Vancouver Charter, rather than the Local Government Act governs it. The Charter contains the rules that govern how the City operates, what by-laws City Council can create, and how budgets are set. Under the Vancouver Charter, Vancouver City Council has authority to pass by-laws to regulate such things as noise and land use, buy and sell property, collect certain taxes, approve expenditures, take on debts, give grants, and hire and discharge employees (City of Vancouver 2011).
3. Key Regional (Metro Vancouver) Growth Management Strategies

Liveable Region Strategy (1996) This was the prominent strategy document with regards to public consultation process and outcomes. It has seen significant amendment over the years and remained the key strategy document until Metro Vancouver 2040 in 2011.

The Sustainability Framework (2010) A framework for decision-making for Metro Vancouver with sustainability at the centre of the operating and planning philosophy.

Sustainable Region Initiative 2002-2011 A Road Map to Sustainability This Sustainability Framework provides the foundation for Metro Vancouver’s suite of plans, including the Regional Growth Strategy.

Metro Vancouver’s new Regional Growth Strategy: Metro Vancouver 2040 – Shaping our Future was adopted on July 29th, 2011, after being unanimously accepted by all local governments in the region. It includes a focus on strategies such as creating a network of Urban Centres and Frequent Transit Development Areas (Metro Vancouver, 2011).

Population

The current population of the region of Vancouver (Metro Vancouver) is 2.2 million people, and the new Metro 2040 Regional Growth Strategy released November 2011 is planning for an extra 35,000 people per year in the region up to 2040. Metro Vancouver (the region) has an area of 282,000 hectares.

Within Metro Vancouver, the City of Vancouver represents 27% of the population on only 4% of the land area. The City of Vancouver (focus of this case study) covers 114.7 sq km (44.3 sq miles) and is the third largest metropolitan area in Canada with a city population of 578,000 (2006 census) (City of Vancouver 2011).

Demographics

Vancouver is considered the most diverse of all Canadian cities. The percentage of Vancouver residents whose first language is English is 49.1 per cent and Chinese is 25.3 per cent (City of Vancouver 2011).

The majority of housing type completion is over two thirds apartments and has remained consistent since 1996 (City of Vancouver website 2011 Source: Canada Mortgage and Housing Corporation (CMHC 2009)).

Density Figures

Density figures reflect the strong landuse and transportation policy over the last 30 years, of a compact city integrated by transport corridors and Transit Oriented Development being informed by neighbourhood guidelines (Schiller 2010; Healey 2010; Mees 2010).

Data on density figures fluctuates based on the methods used – below are two different figures derived from two notable sources.

- Density figures of the region since 1961 started at 24.9 people per hectare declining to 18.4pph in 1981, then increasing in 1991 to 20.8pph and continuing this trend in 2006 rising to 25.2pph. During this time Vancouver has had a steady increase in transit patronage unlike most other cities in North America and Australia (Schiller et al. 2010 p263).

- Vancouver population density is about a third lower than Toronto and about the same as Melbourne (when methodological differencing are taken into account) at 17.2 people per hectare yet has the highest modes share between US, and Australia for public transit, walking and cycling (Mees 2010 p60). This is despite the poor weather for much of the year and is attributed to the integration of walking accessibility and bike paths from public transit stops.

The average temperature - 3 degrees Celsius in January and 18 degrees Celsius in July.
Translink ‘creates and implements plans to meet the transportation needs of Metro Vancouver’ (Translink 2008 p5). It is the authority responsible for Metro Vancouver regional transit; cycling and community; Air Care; and Intelligent Transport systems programs. It also shares responsibility for major Road Networks and Cycling with the different municipalities. The South Coast British Colombia Transportation Authority Act requires Translink to have a long-term transport strategy (Transport 2040) that supports Metro Vancouver growth and sustainability goals. The legislation states that Translink must have a 10-year Transportation and Financial Plan. The Act also stipulates that the plan must be fully funded, showing the amount and sources of the funding necessary to pay for it (Translink, 2011).

The key strategy document for Metro Vancouver is titled: Transport 2040 - A Transportation Strategy for Metro Vancouver, Now and in the Future (2008). The Translink Regional Transportation Plan must support the Metro Vancouver Regional Growth Strategy. The language is interconnected not hierarchical, also illustrated with horizontal representation of key goals and how each plan reinforces each other (Metro Vancouver 2011 p3).
The strategic transport planning of the City of Vancouver is administered under the Transport 2040 plan. However, the City of Vancouver cites the 1997 forward thinking City of Vancouver Transportation Plan as the beginning of its city building strategy. This document was acknowledged and designed for the entire range of transport users by supporting transit, creating greenways and incorporating bicycle lanes. The result to this approach has been a 44% increase in walking, a 180% increase in bike trips and a 10% reduction in vehicle trips since 1997. Transit ridership has increased by 50% in the last decade (City of Vancouver 2011). Additional interrelated strategies within the City of Vancouver currently include:

- **EcoDensity Charter (2008)** The EcoDensity Charter commits the City to make environmental sustainability a primary goal in all city planning decisions - in ways that also support housing affordability and livability - and the Initial Actions provide the ‘roadmap’ to begin implementation of the EcoDensity Charter.

- **Greenest City Action Plan (GCAT) (2009)** – Vancouver 2020: A Bright Green Future Action Plan (2009) A self-confessed bold plan based on 10 long term goals supported by a set of measurable and attainable targets. The aim is for environmental sustainability as the path for prosperity to be implemented aggressively and creatively and cement Vancouver’s position as a Green Capital – green buildings, businesses, transit, independence from fossil fuels, health and food systems.

### Transit Modes in City of Vancouver

Over the last 25 years of public transit, the City of Vancouver has primarily been serviced by bus (diesel), trolley bus (bus tram), and fully automated light rail. The first heavy rail line was built in 2009 called the Canada Line. Each of these modes especially the bus transit system has been important in the development of the system at both at the local and regional scale and the centrepiece of creating compact liveable and sustainable neighbourhoods and city region.

The city region focus is now firmly focused on developing light rail along successful bus corridors and creating district circulators connecting key knowledge centres.

**Researcher Note:** Other city case study analysis (Perth, Adelaide, Canberra and Portland) is also pointing firmly in the development of light rail for future network investment.

### Vancouver Sky Train

The Vancouver Sky Train, opened in 1986, is a fully automated, driverless, rapid transit system. It has three lines including the Expo, Millennium and Canada Line. Expo and Millennium are both light rail systems, which are largely elevated, but also run at grade and underground in sections. The Canada Line, which opened in 2009, is a 19km heavy rail line partially under, at grade and elevated. It runs under much of Cambie Corridor.

Each line of the SkyTrain has been designed with Transit Oriented Development station precincts every 400-800 metres. Urban design has played particular attention to bike access of surrounding areas and purposely-limited park and ride opportunities at certain stops to increase public realm and to support long-term goal and vision of the area – liveability and containment. Speed, efficiency and reliability have been the key benefits of the automated system, which also allows higher cost recovery and quality of service due to regularity. This funding is then used to balance the less consistently viable but vitally important bus network and feeder system.
Mode Share

A City of Vancouver report, *A Decade of Transport 2007*, outlines the results of the mode share statistics and targets of the first *Transportation Plan* developed alongside the Liveable Regional Strategy in 1997. The report demonstrates how targets have been reached or surpassed in all key areas (pedestrian, cycle, transit and car) despite the decade being characterised by a period of growth and an increase in overall trips within Vancouver of 23%. The 1997 plan emphasised:

- Limiting overall road capacity to the 1997 level;
- Providing more comfortable walking and biking environments;
- Increasing the provision and use of transit;
- Calming traffic in neighbourhoods, and
- Maintaining an efficient network for goods movement.

Results included: Population and employment in Vancouver grew steadily between 1996 and 2006, resulting in a 23% increase in trips to Vancouver. Over the same period there was a statistical mode share increase in: walking 44%, cycle 180% and transit 20% and a decrease in car use 10%. In particular, walking has become the fastest growing and most important way of getting around the city. The final report emphasises the investment of choices prioritising transit alternatives and policy packaging with land use planning key to the success (City of Vancouver 2006).

Additional statistics

- The net effect of car use has also fallen by 17 per cent 1991-2006.
- Low average road speed of 38.6km per hour (US and Australia/52km per hour).
- Areas with the most speedy transit are the most popular to live and work.
- Statistically positive link between higher densities, mixed uses, positive economic and enhanced liveability.

(Kenworthy 2009; City of Vancouver BC 2006)

Researcher Note: Vancouver’s transport and land use strategy and documents provide easy to find information regarding mode share statistics, which is also complimented by information regarding the individual and community costs associated with private car use.

Average Household Expenditure (Excluding Personal Taxes)

- **Shelter**: 26%
- **Transportation**: 34%
- **Food**: 9%
- **Household Operation**: 13%
- **Other**: 18%

Source: Translink Transport 2040

Owing a car is a significant household expenditure. Canadian Automobile Association estimates that the annual cost for a compact car is $6,500 while a minivan costs $8,500.
Governance Politics and Community

The process of developing regional strategies and transport policy over the last 30 years in Vancouver has been steered by local communities, stakeholders and professional practitioners. Current decision-making reflects this earlier mandate of sustainability and liveability and a compact city built along transport corridors. It is a proud culture and approach that has taken up residence in the City Council and provincial Vancouver (Metro Vancouver), where the community on the most part trusts the city planning team in consultative processes and best practice research to achieve a result that will improve the overall urban environment. But this style of governance does not just happen. The Vancouver story has been an incremental process of success that has created the momentum for new projects to take place, based on evidence and a vision for the type of place the people of Vancouver valued.

Vancouver has a unique governance structure, financing mechanisms, jurisdictions, and planning philosophy. The planning documents are not just policy speak but provide an agreed and strong direction for decision-making in order to achieve long-term visions. This had been clearly demonstrated in the last 15 years in particular, with the achievement in mode share livability, sustainability and economic prosperity shared within the region. Note the timeframe of only 10-15 years.

Governance Summary

Individual

The planning of freeways to cut through the City of Vancouver dominated the policy trajectory of the 1960s and 1970s. An important individual – Mr Michael (Mike) Harcourt (Published - City Making in Paradise 2007) – made his political career based on fighting freeways starting with being a local advocate, councillor, and mayor to becoming the Premier of British Columbia (1991-1996).

Clearly having such a champion at many levels of the governance structure was important in developing the cities approach, however Vancouver is not considered to be a ‘one man’ success but a result of engagement across many stakeholders to establish the overall qualities of a city (Mees 2010; Healey 2010; Schiller et al. 2010).

Institutional

- **Liveable Region Plan (1996)** – The process of developing this plan has been described as being owned by local government and community groups, and took sustainability seriously (Mees 2003).

- The removal of heavy industry and not building freeways during the 70s and 80s ensured that two of the biggest threats to urban environmental quality were eliminated (Punter, 2004).

- The attitude to creating the city was that traffic congestion is what was needed to make public transport viable. However decision-makers understood the potential economic social and environmental concerns and negotiated to keep the freeway corridors in the event that the transport plan did not work (which it did).

- The City of Vancouver had considerable legal and administrative independence from both British Columbia and the Canadian National Government, but was still able to access national funding. This autonomy created a healthy tension and dialogue between politicians, city planners, and real estate developers. It was further enabled by the fact that no one had the power to override consensus based decisions.

- Planners were working as a community allies, engaged in talking, listening and mutual learning.

- The model used in Vancouver worked because the city had delegated all decision-making to the Director of Planning over land-use bylaws, while retaining control over policy to the elected members of the councilors – with a strong appeal process to control power relations (Stephen Willy 2005 in a comparative study undertaken on planning systems in Australia, UK and Vancouver).

Importantly there was a single public agency for the management and delivery of transit initially called the ‘Public Transport Bureau’ now known as ‘Translink’ (est. 1999), with a subsidiary company set up for Bus Services. See both Translink’s governance structure (Figure 1) and Corporate Structure (Figure 2) (Translink 2011; Guess 2008 pp 252-255). Translinks responsibility is as a ‘steering’ organization for planning, policy and funding of transport services and facilities in the region.
Figure 1. New TransLink Governance Model
Source: Transport 2040 2011 p6

**Mayors’ Council**
- Composed all mayors in Metro Vancouver
- Appoint Chair of Mayors’ Council
- Appoints TransLink board of directors
- Appoints Commissioner & Deputy Commissioner(s)
- Receives and approves transportation and financial plans as laid out in the Legislation

**Commissioner**
- Advises whether parameters and assumptions (including financial estimates) in 10-year transportation and financial plans are reasonable
- Approves short-term fares
- Approves customer satisfaction survey process
- Oversees sale of major assets
- Publishes an annual report and submits it to the Mayors’ Council

**TransLink Board of Directors**
- Appoints chair board of directors
- Appoints CEO
- Establishes subsidiaries and appoints boards & chairs
- Supervises the management of the affairs of TransLink
- Prepares and implements long-term transportation strategies (30-year) & 10-year transportation and financial strategic plans
- Proposes to the Commissioner a customer satisfaction survey process and conducts surveys annually
- Proposes to the Commissioner a customer complaint process and implements it
- Publishes an annual report
- Holds a public annual general meeting
- Approves project & program public consultation plans

Figure 2. Translink Corporate Structure
Source: Guess 2008 p242

**TransLink**
- Wholly Owned Subsidiaries
  - Coast Mountain Bus, Sea Bus, and Community? Shuttl
  - West Coast Express
  - Major Project Offices
- Contractors
  - Skytrain
  - Intelligent Transportation System
  - HandyDart
- Transportation Demand Management
  - Aircare
- West Vancouver Transit
- Major Road Network Partnership with 21 Municipalities
  - Albion Ferry
The place of politics and political forum at the regional and local scale has been crucial in the outcomes achieved in Vancouver. Regional/Provincial and metropolitan governance and policy documents overtly outline advocacy, collaboration and education within politics as one of its three interconnected roles alongside Core Services and Policy (Metro Vancouver 2008 p9). Importantly, Metro Vancouver remains a non-partisan political body, which enables issues to be discussed based on best practice rather than along party lines. The issue of best practice based on argued and agreed professional view is often an assumed role that takes place within our public service. Too often that is not the case and difficult long-term decisions that should be put to the public to consider does not occur.

Metro Vancouver also plays a key role in championing sustainability under an agreed mandate to incorporate sustainability into all operations (Figure 3). The Metro Vancouver Sustainability Framework: a framework for decision making and moving ideas into action (2010), clearly illustrates the core political nature of the authority along with core services and policy development.

![Figure 3. Sustainability Framework](Source: Metro Vancouver 2010 p9 Sustainability Framework)
The documented success of their approach includes:

- Increased supply as a process for increasing demand.
- Community Pass for significantly discounted fares for people who lived in newly built neighbourhoods that were accessed by transit.
- Used seed Commonwealth money to directly market households illustrating examples of increased density and compact living communities. This also included landscape designs to demonstrate the improved interface between pedestrian environment and public transit.
- Uses a participatory planning process and addresses concerns through plans and policies and design services that meet the needs of diverse communities.
- The establishment of a Regional Framework – local area transit plans with public advisory committees and stakeholder groups.

**Community**

From the catalyst of the freeway revolt and the nexus between politicians and real estate developers telling people what their places should look like, a movement was created that focused on liveability and local identity, and created a new ‘practice culture’ for the management development change (Healey 2010 p81).

- University of British Columbia (examined in further detail under the Broadway Corridor Analysis) has since the 1970s been the mainstay of advocacy, best practice research, concept designs and importantly offered meaningful financial assistance which acted as a catalyst to support the implementation of sustainable transport policy objectives, for example the U Pass\(^3\). The U Pass program provides a free yearly ticket for students with their University fees. As important however was the management of the transport schedules to correspond with lecture times (Mees 2010 p175).

- The more recent technological advancement providing real time information (via phone applications) about buses and trains has been a very powerful tool. When the PT user has the power of such information it matters less if a service is a few minutes late (one can always grab another coffee/finish a conversation) than not having access to information and freedom to make choices. This is what often makes the private motorcar so appealing – freedom and choice. This also includes Trip planner Widgets, Buzzer blog and Next Bus SMS. See http://www.translink.ca/en/Rider-Info/Mobile.aspx for more information.

- Early community consultation is at the forefront of the process. The establishment of initiatives such as local advisory committees, while not remarkable in its self, creates an environment for meaningful public participation on elements of transport planning, which the public can interact with and understand.

- One of the defining features of the Vancouver system is the simple and factual language of reports and in the delivery of statistical information. Moving through the regional growth, transport strategies and city policy the language is clear and reinforces direction. This accessibility of the facts is also reflected in the University of British Columbia Line Design Guide, which provides easy to understand maps and cross sections and information of the seven alternatives for the corridor. The importance of accessibility of information for the average community member and for professions seeking data cannot be underestimated in the success of city and regional building.

**Researcher Note:** These new technological tools will revolutionise how the public interacts with, perceives, and uses public transport. Essentially this will allow the commuter more control and freedom in their movement similar to a car. For example, if you know a bus is going to be late you can stay longer at work/friends, drop in and have a coffee somewhere, or change the mode and network option to get you to your destination.

- Adherence to strategies - Liveable City Strategy 1996
  – This document remained the foundational strategic document (with amendments) until the development of Metro Vancouver 2040 in 2011. There has been minimal influence allowed by the market, and developers’ lobbying (despite attempts) has not been influential, as the land use plan was seen as not negotiable. This also creates a feeling of trust between community and government and has assisted further development processes.

- A small steps approach to development has allowed the successful projects of compact liveable communities do the selling for them – a snowball effect of small wins.

- These processes established shared public and political beliefs in environmental quality, liveable city, participatory planning.

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3. A variant of the U Pass scheme is currently being trialed at the University of the Sunshine Coast. It is the first university in Australia to implement the scheme.
Design and Place-making

As this section is concerned with the underlying design principles of the corridor much of this detail will take place under the next section, however in brief, the key overall principles to the success of Vancouver include:

- Delegated independent power for technical excellence and incentives for design.
- Planning and design community with the ability to influence decision-making.
- Gifted committed long serving politicians, planners and architects with shared ethos.
- Connected people with the short distance travel.
- Created specific design manuals for a range of housing types and size.
- 800 metre radius rather than 400 metres for the development of TODs.
- High quality design and construction along Broadway B line – alleviated fears of box style apartment living.
- Park and ride opportunities at TOD stations are controlled.
- Access for walking and cycling developed in conjunction with corridors and stations.
- Sustained economic growth.

(Punter 2004; City of Vancouver 2011; Schiller et al. 2010; Mees 2010)

Land Use Planning: Density and Urban Form

The key to Vancouver’s success has been a long-term integrated land-use and transportation plan that was prepared via a consensus public participation program. The main finding with regards to urban form and density thresholds for the uptake of public transport in Vancouver is that it does not follow the ‘business as usual’ assumption that successful public transport system requires high density. There is an increased acknowledgment of other mechanisms in the urban structure that are of equal or greater importance including policy packaging, education and management of the services. That is not to dismiss the ongoing land use policy of a compact city and transport corridors but these measures are only part of the story:

- Overall population figures are relatively low for Vancouver City area – 578,000 comparatively to other cities (Mees 2010). The greater Metro Vancouver region has a total population of 2.2 million.
- The different methods used to calculate density figures affects the total. In 2006 Kenworthy’s density figures are 25.2 per hectare, however Mees, after taking out parks and industrial land etc, has final Vancouver population density at 17.2 per hectare (Mees 2010 p60; Kenworthy 2009 in Schiller et al. 2010 p262).
- Vancouver population density is about a third lower than Toronto and about the same as Melbourne (when methodological differences are taken into account) yet has the highest modes share between US and Australia for public transit, walking and cycling. This is despite the poor weather for much of the year.
- Success is attributed to the integration of walking accessibility and bike paths from public transit stops. During this time Vancouver has had a steady increase in transit patronage unlike most other cities in North America and Australia.
- Provincial Government helped service new land for TOD development. That is the provision of new infrastructure before land release for high-density areas and then subsidised tickets were given to new residents to build the patterns and supply of public transport use.
- Ensure the appropriate land use zoning to support precinct and station land along corridors.
- Local area strategies development within an 800 metre radius – not just 400 metre for TODS.

Local council place-making initiative - Turning streets into public places

VIVA Vancouver is transforming street spaces into people places and giving you extra space to walk, bike, dance, skate, sit, hang out with friends and meet your neighbours. Streets are closed for weekends and returned to the community. Every weekend on downtown Granville Street this summer, it will play host to community events and more. The program has grown out of a successful pilot program with the public’s support. The program’s three main goals are to:

- Create a variety of public spaces for a mix of engaging activities and sojourning.
- Increase neighbourhood liveability benefiting residents, businesses, community groups and visitors.
- Encourage sustainable and active transportation by creating more safe and interesting spaces for walking and cycling.

Source: http://www.celebratevancouver125.ca/2011/07/open-streets/
Network Planning: Travel Behaviour, Quality Service and Management

- The integration and attention to the detail of network planning including the quality of the service is an important feature of the success of Vancouver's transit planning and policy.
- Translink has a strong network planning strategy in place with a multi-destination service orientation. Translink's Service Guidelines – Comprehensive, Convenient, Comfortable, Simple, Efficient (Guess, 2008 p249; Dobson et al. 2011).
- These guidelines have been attributed as contributing to the success of the system as it increases passenger safety, comfort and ease of use.
- The Vancouver system has a high level of interchange design and coordination of timetables between SkyTrain and bus services.
- Minimal transfer times and frequency of service (SkyTrain every 2-3 minutes).

Financing and Market Mechanisms: Principles, Measures and Indicators

- Much of the funding for public transport over the last 25 years has come from taxes of fuel, and patronage fares.
- The funding model used for the development of the Canada Line has been hailed as being very successful and has been said that it will be adopted for further transit projects. The public private partnership included the private sector; Vancouver Airport Authority; Federal Government through the Canadian Strategic Infrastructure Fund; Provincial government; Translink and City of Vancouver funds.
- The company established for the project InTransitBC (www.intransitbc.ca) designed, built and took a 35-year lease on the line and will collect a percentage of fares. However, the government still sets fare pricing, and remains in control and owns the line. This partnership requires the line to meet projected daily rides of 100,000 by 2013. If it fails to meet those targets Translink will have to compensate the private company (the TransportPolitic, 2009). Current ridership is 110,000 passengers per day (PPP profile available - http://www.metroplanning.org/news-events/article/6160 May 2011).
- Translink’s approach has included increasing supply of public transit as a process of increasing demand and included incentives and discounts for certain population groups and areas. The marketing of new transit oriented developments especially the streetscape design and liveability aspects (community, safety, diversity, vitality and place economics) has all worked together to leverage support and investment for new projects.

Translink has used a cost recovery analysis of each mode to assist with distribution of funding. SkyTrain is the most cost effective because it is fully automated and it runs on time (high supply). The revenue generated helps to balance the funds for the bus system, which services a larger area and is susceptible to a greater number of variables.

Researcher Note: This analysis has also been used in the decision-making of which services to upgrade; including the focus of Metro 2040 plan to shift from Buses to Light Rail transit.

Figure 4 gives a clear breakdown of the percentage of funding sources from 2012 for the Moving Forward: Improving Metro Vancouver’s Transportation Network. Importantly the improvements plan is supported by an increase in regional motor fuel taxes ($0.02).

Figure 4. Metro Vancouver Improvement Plan Financial Sources
Source: Translink 2011
Figure 5 has been included as it demonstrates sustainable funding strategy preliminary findings to be considered for the development of long term sustainable funding, and have the potential to be implemented in the near term.

**Researcher Note:** that this is another example of policy packaging that provides incentives and disincentives for desired land use, transport and sustainability outcomes. Additional sources include system-wide road pricing, land value capture, development charges, and additional parking taxes.

### Figure 5. Potential sustainable funding strategy

*Source: Translink 2011 p13*

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Fuel Tax</td>
<td>Encourages modal shifts to transit, cycling and walking</td>
</tr>
<tr>
<td></td>
<td>Stable in the near term, while becoming less reliable in the long term</td>
</tr>
<tr>
<td>Transportation Improvement Fee</td>
<td>Potential to encourage more sustainable vehicle purchase choices in support of Transport 2040 goals</td>
</tr>
<tr>
<td></td>
<td>Depending upon the fee level, helps reduce passenger vehicle kilometres travelled (VKT); though once paid does not influence demand levels</td>
</tr>
<tr>
<td>Carbon Tax</td>
<td>Encourages modal shifts to transit, cycling and walking</td>
</tr>
<tr>
<td></td>
<td>Stable in the near term, while becoming less reliable in the long term</td>
</tr>
<tr>
<td>Property Tax</td>
<td>Very stable in both the near and long term</td>
</tr>
<tr>
<td></td>
<td>Does not function as transportation demand management tool</td>
</tr>
</tbody>
</table>
Sustainable Development: Definitions as compared to sustainable development and BAU

Sustainability as a primary ethos provides the foundation and framework for Metro Vancouver's suite of plans including the Regional Strategy and Transportation Plan. The Sustainability Framework (2010) provides the foundation for Metro Vancouver's operations and planning. This document provides a vision for the future but importantly is also a tool for decision-making principles for the organisation. Three fundamental imperatives drive the process for achieving sustainability – Service Provider, Policy Maker and Political Forum (p 9).

The Sustainability Framework includes 5 goals:
1. Create a Compact Urban Area
2. Support Sustainable Economy
3. Protect the Environment and Respond to Climate Change
4. Develop Complete communities
5. Support Sustainable Transport Choices

Performance measures are stated under each for yearly review (p66 Sustainable Framework) and quantifiable measures are included under each goal.

Sustainable Transport - definition

As identified in Stage 1 Literature Review the definition of sustainable transport that has been adopted by the EU and Canada and Australia (some US states) initially came from the University of Winnipeg's Centre for Sustainable Transportation in Canada.

The Vancouver region uses this definition throughout their documents as not just ‘policy speak’ but to inform the decision-making process. The consensus vision of a compact city, transport corridors, livability and sustainability is reflected in all planning strategies.

Corridors and TOD definitions

One of the most interesting aspects of Vancouver is the lack of a need to align themselves with a one size fits all method for corridor and TOD planning. Although aspects of TOD are used in the planning of key corridors and station areas, overall a whole of corridor approach is taken which is more context based and less descriptive. This is also reflected in the funding mechanisms.

There is no definition of TOD in the Transport 2040 or the Regional Growth Strategy 2011. Corridors are referred to in both documents as related to transit corridors, priority corridors as opposed to all aspects of the transport network. The only other use is with conservation corridors. There is no mention of the term corridor with regard to roadways.

A sustainable transport system is one that allows the basic access and development needs of individuals, companies and societies to be met safely and in a manner consistent with human ecosystem health, and promotes equality within and between successive generation.

It is affordable, operates efficiently, offers choices of transportation, and supports a competitive economy as well as balanced regional development.

It limits emissions and waste within the planet’s ability to absorb them, uses renewable resources at or below their rates of generation, and uses non-renewable resources at or below the rates of development of renewable substitutes while minimising the impact of the use of land and the generation of noise.

Source: Adapted from the Ministers of Transport from the European Union 2001

Researcher Note: This is an important distinction. First, corridor development cannot be confused with highway or road development in both political rhetoric and pathway dependence for funding and policy development. Secondly, this allows the design and human interface of a corridor to align itself not just based on station segments but on the context as related to individual sections along the corridor. However, unlike Portland that has adopted the TOD process in design and funding, Vancouver's corridors are 'urban' and do not needlessly follow along highways. There is also a greater level of consensus around the use and opportunities in the corridor strategies of Vancouver.

Researcher Note: The language is unique across the case study cities and includes simple and easily understandable metrics such as—annual, percentage; number of; travel time; volume of and so on. This allows for a transparent and easily understandable process to take place – this has not been evidenced in the other case studies.
Regional and Local Context

The focus of this case study will be on the section of the corridor from UBC to Broadway station (Figure 6). In fact the corridor runs all the way to Lougheed, which sits just outside the City of Vancouver’s municipal boundary. Opening in 1996 it was the first bus rapid transport in Vancouver – a 27 km route from Broadway to Lougheed with 14 stops, one every kilometre. The function of the corridor is integrated within and defined by the urbanisation policies of the City of Vancouver - facilitating its success.

A second bus rapid transit line was opened in 2001 called the 98 B-Line running from Richmond to Vancouver. The service was an immediate success, and created the environment (high patronage, city building with regards to urban form and structure) that lead to the further development and its replacement with the Canada Line which opened in 2009 (Figure 6), (under the Cambie Corridor). Important to note are the recent timeframes of both these bus corridors and the momentum driving the infrastructure development and the economic growth and community building along these urban corridors.

Figure 6. 99 B-Line Bus Rapid Transit Route
Source: http://www.translink.ca/__media/Route_Files/79/routemap/01099.aspx
Local Corridor Context - University of British Columbia (UBC) Campus to Broadway Station

The corridor from Broadway Station to UBC is characterised as being in the middle of Vancouver’s downtown. It includes the City Hall and the Vancouver General Hospital, as well as the interchange station for the Canada line, connecting to the Vancouver airport and the southern suburbs. This corridor is very important not only to the broader Vancouver region but importantly the local urban neighbourhood and economic context. It is a growth corridor with in excess of 100,000 trips taken by bus every day with an additional 30% more jobs and people expected by 2041 (Translink 2011 p2). The Broadway corridor has:

- A diversity of unique neighbourhoods supporting residential, commercial and institutional uses.
- Over 85% of 99 B-Line bus passengers travel to two key transit destinations: 49% to Central Broadway and 38% to UBC.
- 35,000 residents and 56,000 jobs in the area.

The existing service is reaching capacity, currently journey times are unpredictable, buses are full and 2,000 people are passed up in the morning rush every day. With buses already arriving every one to two minutes at peak times, a better solution is required. The Broadway B-line bus has remained competitive mode of transport (even though it is slow running at 20km per hour) because there is no freeway running into the city and is still realistically faster and cheaper than the private car. It is has been running at capacity for some time, with cramped conditions and studies are now focus on converting this line into a Light Rail (Schiller et al. 2010 p264; City of Vancouver 2011).

The UBC Line Rapid Transit Study 2010 is a technical study to identity and evaluate rapid transit alternatives for the corridor. It is being progressed in three phases:

- **Phase 1** – Shortlist Identification (Summer 2009 – Spring 2010).
- **Phase 2** – Option Development and Evaluation (Spring 2010 – Mid 2012).
- **Phase 3** – Detailed Design Development (timing to be determined).

Details of this study are available at http://vancouver.ca/engsvcs/transport/rt/ubcline/.

This study is currently in Phase 2, which includes consultation of design-drawing alternatives. Figure 7 (below) shows the section of the Corridor from UBC to to Broadway.

**Figure 7. UBC Corridor**

Source: City of Vancouver 2011
Function of the Corridor

The main function of the B Line Broadway Corridor is defined by this study as a Commuter Corridor as it primarily serves the University and also the central business district with riders travelling in and out each day. The focus however on mixed use development, different peak usage times and interconnection points with Canada Line, Cambie Corridor, and Skytrain make this an important Destination Connector to employment, services and recreation locations. To a lesser extent it is a District Circulator expanding the accessibility of connective pedestrian areas, with the level of importance changing along each section of the corridor (CTOD 2011 p6; Stage 1 Literature Review 2011).

The Broadway Corridor’s main function is primarily as an Infrastructure and Economic Development corridor with the long-term aim the further integration of urbanisation through mixed-use development and place identity with a series of transit oriented developments (Premius and Zonneveld 2003).

Governance: Politics, Community Participation

- 99 B-Line express bus services along Broadway began in 1996-7 and have been very successful due to policy package which included the U-Pass funding. Extra services were made possible by staggering start times at the university to spread the morning peak (Mees 2010 p196).
- Part of the City of Vancouver’s approach has been to utilise buses to extend into the suburbs (dispersed areas) in order to provide the beginning for rail, light rail and rapid bus networks (Mees 2010 p199).
- University of British Columbia played a very important role in policy shift toward sustainable transport not just along the B-Line /Broadway but across the entire transport system. The University has been the mainstay with regards to continued presence both with people and design and has driven sustainable transport from the 1960’s to the Liveable Region Plan of the 1990s and continuing to the present day (Mees 2010 p196-197).
- The University supported the system by providing a free yearly ticket with their University Fees and subsided by the University (U Pass) and through the coordination of timetabling to correspond with lecture times. (Mees 2010 p175)
- 2006 introduced more bus only lanes and closed the 988-Line to open the Canada Line.
- The current UBC – Broadway Study is being undertaken as a collaborative project between Translink and Province of British Colombia (main) with the City of Vancouver, University of British Columbia, University Endowment Fund and Metro Vancouver.
- The following excerpt from a 2002 study gives an insight into the issues regarding the line a decade ago. It is interesting to note within the current Line Rapid Transit Study 2011, there is a noticeable change in the language with the issue of ‘supply’ changing the immediate demands and concerns. The understanding of transport being at the centre of sustainable living and economic growth remains clear. And the debate is less about car parks and more about accessibility, speed, service quality and the urban interface. There are lessons here for the Sunshine Coast Region.

Excellent community consultation via an interactive website (Webinar) regarding alternatives for the rapid transit corridor UBC - Broadway Study 2010.

Stakeholder Engagement included two groups – Corridor Stakeholders (local) and the other Citywide & Regional Stakeholders (Appendix C City of Vancouver, 2010).
Design and Place-making

The B-Line has been characterised by high quality design along the corridor and this has been an important factor in its success. The current thinking in the analysis of the corridor through the UBC Line Rapid Transit Study is to identify segments of the corridor and match the transit outcomes to the urban context of that section (Figure 8).

Figure 8. Corridor Segments
Source: UBC Line Rapid Transit Study Guide March 2011

This study has identified seven rapid transit alternatives for the corridor (Figure 9, below). Additionally the study team developed design concepts for street integration for each of the alternatives, making assumptions such as:

- Whether the system would operate in a tunnel, at street level and where in the street, or elevated.
- The number and location of stations.
- How road space is shared between rapid transit and other uses, like parking, travel lanes and sidewalk space.
- The priority given to rapid transit at intersections.


Figure 9. Corridor Segments
Source: UBC Line Rapid Transit Study Guide March 2011

The study team utilised a series of concept images (Figure 10-12 next page) as consultation tools to seek public feedback on street integration and the functioning of intersections. The following images are indicative of some of the design alternatives the public were asked to comment on.
An illustration of LRT and BRT could function at intersections. This diagram is not intended to depict the character of the Broadway corridor.

An illustration of LRT and BRT could function at intersections. This diagram is not intended to depict the character of the Broadway corridor.
Land Use Planning: Density and Urban Form

Transportation is considered as part of an overall approach to achieve the broader context of the quality and livability of neighbourhoods, rather than being a goal in itself. Within Vancouver there have been ongoing efforts (over 25 years) to integrate high-density residential and mixed-use development at significant nodes. More recently under the guise of transit oriented development. The SkyTrain network has a planned TOD approach whereas there is no mention of TOD in the guiding principles of the current Broadway upgrade. This may be due to the acknowledgement of the entire corridor achieving many of the principles associated with TOD and therefore the identification of particular sites as representing TOD principles unnecessary.

Researcher Note: Addressing both effective transportation planning and land use/density is at the core of the principles to achieve the city’s Greenest City objectives. It must also be noted that according to the Census data 2009 looking at dwelling types and households 75% of the population of Vancouver City live in apartments (City of Vancouver 2011).

The Broadway Corridor plays a key role in realising the regional and local targets for ridership, walking, reducing GHG emissions and increasing local economic development and employment. It is also recognised that the Broadway Corridor currently has a higher density than the Vancouver average. Nonetheless, Table 1 illustrates the changes in density figures based on the sections of the corridor and employment projections, with a high level of employment within corridor at central Broadway and the University (Locally considering: Maroochydore, Sunshine Coast University, and the University Hospital).

Table 1 shows that between 2006 and 2041 there could be an increase of almost 50,000 residents and workers in the identified segments.

Researcher Note: The below analysis would be a valuable data set to be collated for the CoastConnect Transport Corridor.

Table 1. Vancouver Broadway Corridor Population & Employment growth 2006-2041

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Blanca - Alma</th>
<th>Alma - Burrard</th>
<th>Burrard - Main</th>
<th>Main - SkyTrain</th>
<th>Broadway Corridor Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>2006</td>
<td>2041</td>
<td>2006</td>
<td>2041</td>
<td>2006</td>
</tr>
<tr>
<td>Total</td>
<td>10,939</td>
<td>14,119</td>
<td>25,364</td>
<td>28,661</td>
<td>34,998</td>
</tr>
<tr>
<td>Density (pop / ha)</td>
<td>61</td>
<td>79</td>
<td>117</td>
<td>133</td>
<td>126</td>
</tr>
<tr>
<td>Population Growth 2006-41</td>
<td>3,180</td>
<td>3,297</td>
<td>18,526</td>
<td>4,089</td>
<td>29,092</td>
</tr>
<tr>
<td>% Change 2006-41</td>
<td>29%</td>
<td>13%</td>
<td>53%</td>
<td>16%</td>
<td>30%</td>
</tr>
<tr>
<td>Employment</td>
<td>2006</td>
<td>2041</td>
<td>2006</td>
<td>2041</td>
<td>2006</td>
</tr>
<tr>
<td>Total</td>
<td>3,327</td>
<td>3,478</td>
<td>12,117</td>
<td>12,280</td>
<td>57,412</td>
</tr>
<tr>
<td>Density (jobs / ha)</td>
<td>19</td>
<td>20</td>
<td>56</td>
<td>57</td>
<td>207</td>
</tr>
<tr>
<td>Job Growth 2006-41</td>
<td>151</td>
<td>163</td>
<td>9,254</td>
<td>9,802</td>
<td>19,370</td>
</tr>
</tbody>
</table>
| % Change 2006-41 | 5%           | 1%            | 16%           | 75%             | 22%
Financing and Market Mechanisms: Principles, Measures and Indicators

The original and current B-Line service was funded by user fees and dedicated taxes on fuel, partly subsidised by the success of SkyTrain. It is anticipated that the new line upgrade will be financed with a similar process to the successful Canada Line- PPP (Schiller et al. 2010 p265).

The evaluation criteria in Table 2 have been applied to the evaluation of the Broadway Corridor: They represent an evaluation of the performance of each of the rapid transit alternatives (BUS LRT, RRT) against a ‘business as usual’ scenario where no rapid transit alternatives were considered. The Evaluation Summary of these findings outlines the detail and argument for the assessment is well worth closer examination.

The most effective rapid transit projects, in ridership terms, are the result of combining many markets, and many constituencies, and many goals, into one service. Beware of proposals that say we should serve these people and not those, or that a corridor is local but not also regional. Dividing and diminishing the market in this way means a weaker political base for the project, and a weaker ridership outcome if the project gets built

Jarrett Walker Transport Planner, Human Transit 2010 comments on the new Broadway corridor

Table 2. Evaluation Criteria for Rapid Transit on Broadway Corridor

<table>
<thead>
<tr>
<th>Account</th>
<th>Criteria Considered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic Development</td>
<td>Construction Effects, Tax Effects, Goods Movement</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions Reduction, Noise and Vibration, Biodiversity, Water Environment, Parks and Open Space</td>
</tr>
<tr>
<td>Financial</td>
<td>Capital Costs, Operating Costs, Cost Effectiveness</td>
</tr>
<tr>
<td>Social and Community</td>
<td>Health Effects, Low Income Population Served, Community Cohesion, Heritage and Archaeology</td>
</tr>
<tr>
<td>Transportation</td>
<td>Transit Users, Non-Transit Users, Transit Network/System Access, Reliability, Capacity and Expandability</td>
</tr>
<tr>
<td>Urban Development</td>
<td>Land Use Integration, Land Use Potential, Property Requirements, Urban Design Potential</td>
</tr>
<tr>
<td>Deliverability</td>
<td>Constructability, Acceptability, Funding and Affordability</td>
</tr>
</tbody>
</table>
Broadway Corridor Rapid Transit Principles

The establishment of these principles is intended to assist the staff of the City of Vancouver in planning and implementing rapid transit. They recognise both the value of rapid transit and the land use planning initiatives of the City of Vancouver. They fall into six themes and each theme contains key considerations that are specific to the Broadway Corridor (Table 3).

Table 3: Broadway Corridor Rapid Transit Principles

<table>
<thead>
<tr>
<th>Theme</th>
<th>The rapid transit line should... (Principle)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Sustainability</td>
<td>1. Significantly support GHG reduction and related environmental targets and objectives established by the Province, regional agencies, and the City (e.g. Greenest City Action Plan).</td>
</tr>
<tr>
<td></td>
<td>2. Provide an affordable, cost-effective, and timely rapid transit solution for both construction and operation over the long term.</td>
</tr>
<tr>
<td>Financial Affordability</td>
<td>3. Provide transit capacity, service quality, and system resilience to support existing and future transit targets and objectives.</td>
</tr>
<tr>
<td></td>
<td>4. Integrate rapid transit with walking, cycling, and local transit, while accommodating goods movement needs.</td>
</tr>
<tr>
<td>Transportation</td>
<td>5. Serve existing and planned land use including major destinations, and help shape future land use policies including higher densities where appropriate.</td>
</tr>
<tr>
<td></td>
<td>6. Provide a consistently high standard of urban design and amenity, and significantly improve the public realm for pedestrians, cyclists, and transit users.</td>
</tr>
<tr>
<td>Urban Development</td>
<td>7. Promote a diverse, healthy and green economy, improve local access to major commercial and institutional destinations, and support the concentration of jobs on Central Broadway.</td>
</tr>
<tr>
<td>Economic Development</td>
<td>8. Address the needs of local and regional transit users, neighbours and adjacent communities, and businesses.</td>
</tr>
<tr>
<td></td>
<td>9. Minimize and mitigate construction and operation impacts.</td>
</tr>
<tr>
<td></td>
<td>10. Provide opportunities for meaningful engagement of stakeholders and the general public.</td>
</tr>
</tbody>
</table>

Network Planning

Travel behavior / Quality Service / Management

- The current Broadway B Line success has been attributed to the interchange design with the SkyTrain network and other trolley and diesel buses and bus stops; the quality of service, timetabling and its competitiveness to the car (Mees 2010 p174; Schiller et al. 2010; City of Vancouver 2002 p2010). Networks with the SkyTrain and other buses operate at the same frequency so they can be scheduled to arrive, wait and enable transfers – especially to outer suburban areas.
- Vancouver buses and trolley buses stop at each side of the approach side and departure side of intersections. This allows passengers to transfer services with little more than a few steps and without having to cross the road. Stops are generally provided on both lines that cross at an intersection.
- Consistent service standards and frequency exist across the entire network. This may result in low patronage at some times of the day, however this enables for a balance in overall supply and frequency to occur. This is a good example of how ‘supply’ based transport planning works, enabling demand to rise.
The Cambie Corridor is a contemporary TOD Corridor planning project, which has regional significance as part of the city building, economic development, and local corridor value within each station precinct. The Cambie Corridor Plan was approved by Vancouver Council on May 9th 2011. It is a good example of seeking to deliver the required conditions to attract transport investment to produce growth and the policy and institutional conditions to direct the desired future of a compact city and transit oriented development. Importantly, it is viewed a ‘complete corridor’ with individual place-making /urbanism junctions. (http://vancouver.ca/commsvcs/planning/cambiecorridor/resources/pdf/CambieCorridorPlan.pdf)

Cambie Street runs along the central spine of the city from Fraser River in the South to 16th Ave in the North and intersects with the Broadway B-Line and includes four (4) underground Canada Line Stations. The current population in the corridor is 21,500 and projected to be as much as 35,000 in 2040.

The planning principles for the Cambie Corridor include:

1. Provide land use that optimizes the investment in transit
2. Provide a complete community
3. Create a walkable and cycleable corridor of neighbourhoods seamlessly linked to public transit
4. Focus intensity and community activity at stations and other areas with strategic opportunities for sustainability, renewable energy and public amenity
5. Provide a range of housing choices and affordability
6. Balance city-wide and regional goals with the community and its context
7. Ensure job space and diversity

(Cambie Corridor Plan 2011)
Function of the Cambie Corridor

The overall function of the Cambie corridor is to facilitate mixed use development with flexible zoning, and to provide for accessibility and mobility.

The Cambie Corridor may be recognised as a Commuter Corridor with a focus on surrounding residential development and different peak usage times. The Cambie Corridor Plan aims to shift a greater percentage of the function of the corridor to a Destination Connector and a District Circulator. After the Canada Line opened in 2009 (heavy rail which runs under much of the corridor) the corridor was less inhibited and allowed greater accessibility for pedestrian areas. It provides rapid transit in both directions throughout the day and night and connects employment centres, airports and civic buildings and places (CTOD 2011; Friedman 2011).

This corridor primarily functions as an Urbanisation corridor – residential mix and economic opportunity of TOD precinct developments, with its importance as an Infrastructure axis redefining the corridor with the opening of the Canada Line. Clearly the economic activities determined by the corridor place an overall emphasis on the integration of each function as being of valued importance along the corridor (Premius and Zonneveld 2003). It is this interdependency that many TOD corridor developments and policy directions aim to achieve.

Governance: Politics, Community Participation

In brief, the Cambie Corridor Plan has favourable political and institutional factors. It fits in with the wider city building city goals – transportation, energy and land use – overriding goals alongside Sustainability, Liveability and Affordability (Friedman 2011 p3). The communities to be developed on the sections of the corridor in TODs support the shift from car to transit. The evidence that transportation reduces household costs is clearly articulated in the plan and supports key principles.

Planning Principles

The Cambie Corridor Planning Principles were developed to inform land use changes and development detail on the Cambie Corridor. They were generated with the community and included the following stakeholders:

- Residents
- Business
- Neighbourhood advisory group (key)
- TOD experts
- Academics

Within the corridor plan each of the principles is further detailed in an accessible way and without the need for overcomplicated language. They illustrate how policy principles can be written to facilitate desired outcomes and avoid competing statements that lead to different interpretations by professional disciplines (engineers; planners; architects and economists) often resulting in BAU due to a lack of information and resources (power hierarchy). For example, below,

**Principle 1: Provide land use that optimizes the investment in transit** (City of Vancouver, 2011 p5)

*What this means...*

New developments should significantly assist in optimizing a shift in travel choice to walking, biking and taking transit. Land uses will be primarily supportive of these sustainable movement modes. Non-supportive land uses will be avoided.

*Supportive land uses are those that:*

- include high employee and residential densities, recognizing that the highest densities will be focused at stations and other areas with strategic opportunities for sustainability (i.e. large sites and significant district energy opportunities) and decrease with distance from these areas
- ensure adequate and appropriate job space
- encourage travel time outside of peak periods
- attract reverse flow travel
- encourage travel by walking and cycling

*Non-supportive land uses are those that:*

- are oriented more towards travel by automobile rather than walking, cycling or taking transit
- generate high levels of vehicular traffic
- require significant parking
- provide low-density building forms
- create an unpleasant environment for pedestrians
- have limited hours of operation
Land Use Planning: Urban Form and Density
The Cambie Corridor Plan (2011)

Key points regarding the urban form and character elements of the corridor include:

- **Mixed used and concentrated urban form**
- **Jobs and a healthier lifestyle**
- **Local business and economic development**
- **Offering services that meet the human need along the complete corridor, and help reduce the ecological footprint**
- **Mid-rise development not high rise podium style**
- **Plan emphasizes walking and cycle philosophy, ‘every transit trip starts and ends with your feet’**.
- **Accessibility and mobility along the corridor**
- **TOD to create the distinct attribute of each neighbourhood**

The argument is reinforced at the beginning of the report outlining what the City has learnt regarding urbanism and the approach to city and regional building (City of Vancouver 2011 p4, below).

We have learned that compact and complete communities that combine a concentrated, well designed mix of housing types, job space, shopping, local gathering places, and community facilities make neighbourhoods more walkable, livable and sustainable. Such communities enable people of different life stages, income levels and abilities to grow and age in place. A concentrated urban form, where jobs and services are close to housing, also supports a healthier lifestyle. This results when people are able to choose walking, biking and public transit as alternatives to the automobile through proximity, or ‘the power of nearness’.

Problems with Rezoning and Redevelopment in the Cambie Corridor

It is important to note that not all Cambie corridor residents are in favour of the corridor development. The intention of the corridor is to increase densities near the transit stops associated with the Canada line. This includes the rezoning of land along the corridor to accommodate buildings up to 8 storeys. While some residents and developers are pleased with the proposed changes, others would like to see the original character of the corridor maintained.

Cambie corridor development plans shock locals (13/06/10)

The City of Vancouver is moving forward with a plan to increase density along the Cambie Street corridor, a strategy that staff describe as the most complex piece of area planning outside the city’s central region.

Vancouver city council voted 7-2 in favour of the Cambie Corridor Plan on Monday (May 10).

The long-term area plan focuses on land use along the Canada Line on Cambie Street, a corridor which city staff estimate will draw an increase in population of about 13,500 by 2041.

Residents living near the King Edward Canada Line station are fuming over city plans to construct apartment buildings in the area, fearing they will block sunlight, decrease property values and obliterate scenic views.

Full article: http://www.ctvbc.cbc.ca/servlet/an/local/CTVNews/20100609/bc_cambie_corridor_development_100609?hub=BritishColumbiaHome

Cambie Corridor Redevelopment Gold Rush – Everybody Wants a Piece (22/12/10)

Developers keen to build high density, highrise projects in and around transportation nodes are ‘assembling’ (buying up three of four adjacent single family parcels in preparation for rezoning and development) along the Cambie corridor. Home owners are asking ridiculously high prices and developers are paying them. This because the profit margins for the developer are nice and fat given the higher and better use of the land after upzoning, build-out and sale.

Not so fast says the City of Vancouver. Having spotted the huge potential profits on the table along the Cambie corridor ‘redevelopment belt’, the City has decided to take a much bigger piece of the pie. Arguing that the higher density projects will increase stress on existing neighbourhood infrastructure, they want more in the form of DCL’s or development cost levies.

Full article: http://valuabledirt.com/2010/12/22/cambie-corridor-redevelopment-gold-rush-everybody-wants-a-piece/
The Cambie Corridor is intended to increase the overall efficiency of the transit system and will contribute to an increase in productivity in the City of Vancouver. Successful TOD developments are determined by design and quality of service; dedicated lanes, walkability/bikeability retail and housing market performance (TOD 2010). In a recent paper by Friedman (2011 p3), he argues that The Cambie Corridor has all three conditions for transport investment to produce growth (outlined by Banister and Berechman 2001).

1. Economic conditions existing successful mixed-use centres and key job/service centres (Hospital etc.)
2. Investment opportunities developers and investors with the increase in TODs and walkable complete communities;
3. Favourable political and institutional factors – fits in with the wider city building city goals – livability, compact and sustainable.

The Cambie corridor also intersects with the Broadway Corridor, which has existing and future infrastructure commitments and opportunity with the B-line upgrade to a possible LRT. It supports the supply and economic development of the newly opened Canada Line through its job creation, affordable housing (important for entrepreneurs and diversity – creating a place), and emphasis on a pedestrian oriented development that increases ridership and lowers per person cost (Friedman 2011 p9).

In addition the project has recognised experience from other TOD projects including:

- The unbundling of housing and driving costs for parking space and a ratio of parking per person that reflect the overall aims of the mixed used transit district.
- Non-drivers over pay to fund driving infrastructure, as shown in the Table 4 below (Litman 2009 p13). Those who do not drive pay more than their fair share of taxes compared to a motorist. Therefore drivers underpay their share of what it takes to fund driving infrastructure. Non-drivers in TODs have also been eligible for tax rebates as an incentive.

Final recommendations by Friedman (2011) include:

- Developer incentives allows for greater certainty in TOD planning of station areas including the relaxation of parking standards (less) and give density bonuses for affordable housing, supportive zoning, aided land assembly and public funded streetscape improvements, all which foster better projects (Cevero 2008b in Friedman 2001 p11).
- Desirable to have urban TODs of 20 to 30 dwelling units per hectare, and floor area ratios greater than 1.0.
- The quality of the streetscape and the encouragement of new patterns of use are important to add the vitality and economic benefits to the area.

### Table 4. Cost of Driving Infrastructure

<table>
<thead>
<tr>
<th>Transport Factors</th>
<th>Driver</th>
<th>Non-Driving</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Annual local mileage</td>
<td>10,000</td>
<td>3,000</td>
</tr>
<tr>
<td>B. Household’s general taxes used for road related services</td>
<td>$300</td>
<td>$300</td>
</tr>
<tr>
<td>C. Motorist user fees spent on local road (0.2c per mile)</td>
<td>$24</td>
<td>$0</td>
</tr>
<tr>
<td>D. Total road system contribution (B+C)</td>
<td>$324</td>
<td>$300</td>
</tr>
<tr>
<td>E. Tax payment per mile of travel (B/A)</td>
<td>$0.032</td>
<td>$0.10</td>
</tr>
<tr>
<td>F. Roadway costs (cars = 5c/ml, walking = 2c/ml)</td>
<td>$500</td>
<td>$48</td>
</tr>
<tr>
<td><strong>Net of D to F</strong></td>
<td><strong>Underpays $176</strong></td>
<td><strong>Overpays $252</strong></td>
</tr>
</tbody>
</table>
Partnership and Performance Indicators

In order to be able to better understand how the proposed development for the Corridor performs from a sustainability perspective the council partnered with the University of British Columbia to create visualisations and establish performance criteria and sustainability indicators to determine if the draft plan could support a low carbon community or district energy system. They asked:

- What the Corridor might look like in the future?
- How the plan performs from a transit ridership perspective?, and
- If the draft plan provides for the opportunity for low carbon district heating systems?

A tool was developed which allowed for comparison of various neighbourhoods with existing developments. The results found that each neighbourhood along the corridor would achieve the sustainability goals and has provided additional information for the community consultation and participation.

Design and Place-making: Accessibility, Urban Design and TOD

The Cambie Corridor is based on a unified corridor of 5 neighbourhoods and seeks to build on the existing character and context in each neighbourhood, while building additional housing and employment concentrations close to transit and district energy. Each section includes an overall analysis and then breaks the section down into segments. For example the Cambie Village section of the corridor has 4 areas, each with different typology, density and housing density and overlays. Two examples are below (City of Vancouver 2011 p34-38).
### Network Planning: Travel Behaviour, Quality, Service and Management

Cambie Corridor is a crucial part of the network plan for Vancouver as a destination connector (CTOD 2010).

The plan focuses on providing the key elements of network planning with Translink responsible for the overall management of the transit system. The plan also allows for a collective design development process of the vital pedestrian, cycle and public space areas. Translinks responsibilities in achieving this plan also include: increasing Bus service and Canada line frequency; improving amenity and lines and safety; and coordinating scheduling and route adjustments (Cambie Corridor Plan 2011 p84).

Briefly, it is a comprehensive public realm plan (Cambie Corridor Plan 2011 p76) that builds a coordinated legibility of public spaces and urban systems along the entire corridor this includes:

- Human scaled pedestrian network along routes to transit and schools, commerce, civic and community destinations.
- The goal is to have a series of supported network routes to greenways running parallel to the corridor.
- The provision of a public space network.

### Sustainable Development: Definitions as compared to Sustainable Transportation and BAU

With regards to the key elements of sustainable transport as outlined in the literature review The Cambie Corridor is an excellent example of how Vancouver has integrated policy direction, urban design and TOD planning that moves beyond BAU.

As the Regional and City planning documents only define corridors with regards to transit and urban development (compact, livable) and for green nature corridors, there is no confusion with the roads and highways nor is there a confusing hierarchy of corridor networks that also includes bikes and pathways. This enables intent to remain clear and avoids community confusion when stakeholders are referring to ‘corridors’. This is not seen in the other international case studies.

*Source: Paul Krueger - Creative Commons*
The Vancouver Transport Plan outlines the city’s focused commitment to increasing cycling to assist in maintaining the livability and sustainability goals, due in part to the many transit systems put in place over the last decade at or near capacity. The City of Vancouver has chosen to deliver separated bike lanes on existing bike routes that run as connectors to key destinations, such as the central business district, but run adjacent or near to busy transit corridors.

The experience of other cities globally suggests that the perception of safety is essential to attracting more people to cycling and that separated bike lanes are perceived to be safer and more satisfying for cyclists than cycling next to traffic. The only increase in cycling that other cities have seen is in the male professional 30-35 age range. Otherwise on road cycling remains a serious safety barrier for the uptake of cycling - the public uptake on cycling is increased when separate lanes are built. In this case a 6 monthly comparative figure monthly bicycle trips have steadily increased in January 2011 from 25,000 per month to 65,000 in July 2011.

Interestingly the weather is often blamed as the key reason people do not cycle more. Vancouver already had the highest per capital cycling mode share (Canada, US and Australia) despite the low temperatures (Mees 2010). Of key interest is the design – Hornby and Dunsmuir St have utilised three different separated pathway designs along the street (similar approach to the way they plan for buses and light rail depending of the situation – part underground, at grade and elevated). This flexible approach allows for mental blocks to be overcome (professional and institutional) and appropriate context based design to prevail.

The Three Design options include—
1. Green barrier
2. Medium with bike parking facilities
3. Planters with a row of parked vehicles

Rights turns are limited along the street to allow for the flow of bikes and zebra crossings are at intervals to facilitate pedestrians crossing the road at bus stops and providing a clear right of way environment.
The planters that have been installed along Dunsmuir and Hornby Streets are locally made and from recycled plastic. They have a reservoir in the bottom that allows the plants to regulate their uptake of water and reduces the amount of maintenance required.
**Intersection Design**

The implementation of the two-way separated bike lanes on one-way vehicle streets (Dunsmuir and Hornby) requires additional traffic signals for both cyclists and drivers. Below is a summary of some of the signing and design solutions that have been employed, that include right of way signals. In addition to this an extensive public education program has complemented this – behaviour change.

Marking the bike path through the intersection with a coloured treatment in order to enhance visibility and recognition of the bike lane — improving cycling safety.

To reduce the right turning conflict, the following measures have been used:

1. Designating right turn lanes, so cyclists know the vehicle next to them intends to cross a bike path
2. Setting back stop bars from the crosswalk
3. Signage on intersecting streets showing motorists that they cannot turn right on a red signal allowing cyclists on the separated bike path to cross the intersection on a green signal without conflicting with a turning motorist.
4. Separate right turn signals and bike signals at locations with high right turn volumes to reduce conflict between cyclists/pedestrians and motorists. When motorists have a green at the right turn signal they will be permitted to turn right, but cyclists and pedestrians will be stopped. When motorists have a red at the right turn signal, they will be stopped, and cyclists and pedestrians will be permitted to cross the intersection.

- According to the Motor Vehicle Act BC a person operating a bicycle has the same rights and duties as a driver of a vehicle. That means cyclists are expected to obey traffic control devices and signage the same as drivers.
- The bike box (green area) (Figure 17) is an advanced stop area for cyclists, allowing cyclists to be more visible to drivers. It can also be used to turn left onto an intersecting street.
- When cyclists are permitted to use a crosswalk, they still must yield to pedestrians.
- Cyclists are required to yield to pedestrians crossing a bike path at transit stops, passenger zones, and crosswalks.

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**Figure 16. Separated bike lanes**

Source: Paul Krueger - Creative Commons

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**Figure 17. Cyclist yield signs**

Source: City of Vancouver
Vancouver separated bike lane business impact study

These separated bike lanes are only a recent initiative of the Vancouver City council and as such their impact on business has been reviewed. Some businesses had expressed concern about the impact of the separated bike lanes and as such the Vancouver Economic Development Commission; City of Vancouver; and the Downtown Vancouver Association commissioned the Vancouver separated bike lane business impact study. In July 2011 the results were published and below are some excerpts from that study (Stantec 2011):

- In 2011, the net impact on sales that was attributed to the bike lanes (calculated as the bike lane streets annual sales change minus the annual sales change along the comparator streets) among those who responded was:
  - Hornby St: minus 10%
  - Dunsmuir St: minus 4%

- These numbers represent the high end of the range of business impacts and have been used to estimate the overall business impacts. Despite the use of comparator lanes to eliminate the impact of the numerous policy changes identified in the Economic Context section above, there may still be some residual impact from these factors in the data.

- The business impacts on the bike lane side of both streets were greater than the impacts on the side without the lanes.

- The financial impact of the bike lanes has been a loss of sales and a loss of profit. The total loss in sales is estimated at $2.4 million over a year. Assuming profit is approximately 20% of sales, the estimated annual loss in profit over a year would be about $480,000. This is relatively moderate based on industry standards and, in general, insufficient to create persistent vacancies. The downtown is and will remain vibrant and the moderate negative impact of the lanes will diminish over time as long as mitigation strategies take effect.

- Of the employees located on the lanes who responded to the survey, 59% disliked the bike lanes while 20% liked the bike lanes. Meanwhile, 39% of employees located in buildings a block away also disliked the lanes, as opposed to 31% who liked the lanes. The reasons given for disliking the bike lanes are that they have increased the overall commute time and/or reduced ease of access to the building.

A series of recommendations were also produced including a series of measures to:

Minimize negative impacts:

- Monitor changes in traffic flow and make changes based on any issues that arise
- Create a list of potential hot spots in coordination with businesses and work out mitigation strategies well before construction through detailed consultation including one-on-one meetings and workshops with businesses, in order to resolve any potential business issues
- Have a targeted safety education campaign ready to implement in the weeks after completion of the separated bike lanes, or other major facilities
- Consider the parking, visibility, loading zone and access needs of businesses block-by-block in undertaking consultation/communication programs
- Closely monitor safety in the period after construction, looking out for pedestrian/cyclist/motorist near misses in order to modify signage, turn signals, etc., with targeted safety education campaigns ready in advance if needed
- Provide a phone number or email address to leave messages about bike lane issue

Maximize positive effects:

- Create joint marketing and promotional events to connect cyclists and business along routes prior to and after construction
- Create bike parking and bike rental stations along separated bike lane routes
- Budget for some beautification and enhancement of streets where bike lanes will be constructed
- Budget for street branding and banners to promote bike lane streets as destinations in cases where lanes are on retail corridors
- Work with private parking companies to implement a linked electronic vehicle count and information system that indicates how full each parking garage is, and if at capacity, shows where other parking facilities with vacancies are located
- Relax by-laws on bike lane streets to allow, for example, larger advertising signage, more outdoor seating, or reduced onsite parking requirements to help businesses attract customers and ease the transition from the start of construction through the post-construction adjustment period, with the option to make some changes permanent.
10. References


Stage 2: Case Study - Portland
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Portland Oregon has moved successfully from a highly car dependent region to one with significant public transport mode share. This has been attributed to strong land use policies and the development of transport corridors facilitated by principles of transit orientated development (TOD). TOD has been a central mechanism of Portland’s land use and transport policy since 1998, culminating with the formal adoption of a TOD Strategic Plan in 2011. This is illustrated in the case study documents that focus on the station areas of corridors (sections), rather than document the examination of whole urban transport corridors. These policies have changed the once dispersed urban form to a more compact form connected via urban transport corridors. By 2040, two thirds of jobs and 40 percent of households are to be located in and around ‘centres’ and corridors served by buses and light rail transit (Metro 2040).

Despite freeway protests in the 60s and 70s that created the base of the political forum and urban growth boundary, freeways do run close to the urban centre with many of the LRT lines running adjacent to them. Unsurprisingly this does not make for human scale integrated urban corridors and transit competition with car use remains high.

Many of the newer developments are in the outer suburbs driven by cheaper land and affordability of housing choice, while the inner city core has enjoyed considerable revitalisation and economic gain. The gap however is highlighted in the middle ring areas that are characterised by steady and loyal public transit users who are not being rewarded with quality service and upgrades. Instead, public transport services have been reduced and cancelled in order to move funds to the inner and outer area lines and TOD developments.

Light rail is the preferred method of transit by the community and stakeholders, as evidenced in the range of strategy reports, documents, websites and blogs. Buses inherently are important feeders to Light Rail Transit, and play a significant role in the network planning with the simultaneous frequency and scheduling at key interchanges. Network management and quality of service has been of key importance to Portland’s success.

This case study also highlights the significance of recognising the internal complexities of households and the need to consider these domestic and recreational impacts in PT management and system design.

The importance of the role that metropolitan and local government plays in the development of a community with a strong political forum and participatory process cannot be underestimated. This remains key to maintaining and evolving the shared vision of the city, enabling action and policy directive to become a reality and momentum to be maintained. This participatory process is formalised within the planning system through Advisory Committees, made up of a wide selection of community members that steer the policy directions based on best practice and local knowledge.

Finally the Governance framework across all three tiers of government has enabled successful direct financing mechanisms to facilitate TOD development. This includes the provision of the highest and best use, which requires the valuer to take into account local transport; land use and economic development plans; and financial returns with other key objectives such as increasing ridership. At the local level, in addition to direct access of funding from the federal government, is a toolkit that comprehensively outlines the different mechanisms that local government, stakeholders and community can use to stimulate mixed-use development corridors.

The case study investigation of Portland will be focused on the success and limitations of the comprehensive TOD policy and financial models implemented, highlighting two case studies:

1. The first transport corridor case study examines the LRT Yellow Line, which is a two way light rail TOD corridor that runs along Interstate Ave, and provides a good example of a mature urban corridor.

2. The second transport corridor case study of The Portland Streetcar recently opened in the Pearl District, and highlights the importance of transit as a critical mechanism to engage support of the community, business and developers to revitalize urban corridors and districts.
2. Case Study Context Review

The City of Portland (Figure 1) functions as the compact core to a polycentric regional metropolitan area where sprawl has been limited by the adoption in 1973 of a strong Urban Growth Boundary. This was created after a political debate surrounding freeways and quality of living in the region. These debates subsequently informed the trajectory that has guided the spatial planning approach since (Marshall 2000; Jarvis 2010; Schiller 2010).

‘Metro Council’ is the elected regional government responsible for strategic planning and policy. It is the only citizen elected Metropolitan Planning Organisation (MPO) in America.

The key documents that guide the region include:

**Metro Growth Strategy 2040** This is a 50-year growth management strategy developed from 1992 and formally adopted in 1995 with unanimous support from the Metro Policy Advisory Committee. This committee is comprised of local elected officials, special district representatives and citizens. The Metro Growth Strategy includes a Regional Framework Plan that integrates land use transportation and other regional planning mandates.

In 1996 Metro approved the **Urban Growth Management Functional Plan** which facilitates the use of land, and includes a toolbox of planning policies for local governments to use to implement the 2040 Growth Concept.


**Transit Oriented Development Strategic Plan May 2011** This document formalises the TOD approach to transit and compact growth and has been designed to provide the momentum and business case for infill and higher density development and the creation of more walkable and livable neighbourhoods. Prepared by CTOD for Metro Portland.

These documents and programs provide for the future development of housing, transport, retail (and limited business activity) and are focused on the following key areas:

- Central City; 9 Regional Centres (including City);
- New Station Communities;
- Existing and new Town Centres ‘with emphasis on compact development and good transit provision’;
- Main Streets supplying residential neighbourhoods with retail and service development served by transit;
- Corridors designed as ‘high quality pedestrian environments adjacent to transit facilities with higher residential densities’ (e.g. ‘row houses’);
- Employment Areas;
- Inner Neighbourhoods with housing on small lots;
- Outer Neighbourhoods zoned for ‘residential’
  neighbourhoods farther away from large employment
  centres with larger lot sizes and lower density housing
  (Jarvis 2003).

**Population**

Recent population figures for the Portland indicate the population is currently at approximately 2 million (Mees 2010; Schiller 2010). However the population of the seven-county areas used to define the Metro region is 1.4 million people (Metro Oregon 2011).

**Transport Modes**

The transport system in Portland is made up of Westside Express heavy rail, The Metro Area Express (MAX) light rail (blue, red, yellow and green line), buses (some with limited priority), and the recent Portland Street Car (Figure 2).

Metro Area Express LRT opened in 1986 to service the city and stretch to the neighbourhoods, but service quality and frequency has a strong city central focus (Ozawa 2004).

**Researcher Note:** Buses play an important role in Portland as service connectors and feeders to LRT. However reporting on bus corridors and its role within Portland’s transport system is very understated. Interestingly the LRT vs BRT debate regarding future upgrades and extension and with TOD often favours LRT and this could be part of the strategic approach to maintain creating of argument and value with LRT.

**Mode share statistics**

Table 1, below, illustrates the low level of transit trips and the high level of driving. It also demonstrates the Metro intentions of absorbing future population growth and maintaining current levels.

These figures also reflect the research data of (Mees 2010 p60)- trips to work are still made up of a very high car dominance of 89%, PT 9%; walking 3% and cycling 1%.

**Table 1. Mode share, Portland**

Source: Regional Transport Plan 2035

**Figure 2. Trimet Rail System**

Source: www.trimet.org/pdfs/maps/railsystem.pdf
Governance: Politics and Community Participation

The region of Portland, Oregon has been heralded as one of the exemplar cities with regards to transportation and land use planning, in particular its focus on Transport Oriented Development to achieve its long-term urban structure. Since the 1960s Portland has had a strong land use and transportation policy enabled by the 1978 creation of a formal regional planning tier of metropolitan governance with powers to deliver collective services and engage in urban planning (Schiller et al. 2010). Particular attention was focused on developing a shared vision of the city/region through the development of a political community and inclusive planning processes (Healey 2010).

The 2040 Growth Management Strategy developed in the 1990s enabled a shift in the funding pathway from freeways to public transport and compact urbanization activity centres – about a decade earlier than most countries in the 80s and 90s. This tight urban growth boundary also required local government to limit parking and adopt zoning and consistent comprehensive plan changes. Two thirds of jobs and 40 percent of households by 2040 are to be located in and around centres and corridors served by buses and light rail transit facilitated by transport investment that maximises accessibility (Arrington 2009; Schiller et al. 2010).

The vision of the 2040 Growth Concept is to establish complete communities that include:

- Safe and stable neighborhoods for families.
- Compact development that uses both land and money more efficiently.
- A healthy economy that generates jobs and business opportunities.
- Protection of farms, forests, rivers, streams and natural areas.
- A balanced transportation system to move people and goods.
- Housing for people of all incomes in every community.

Arrington (2009) describes how the three tiers of governance work together to secure TOD at a state, regional and local level.

State level

The State level administers the Urban Growth Boundary and Transport Planning Rule, in addition to the:

- 1993 Transport and Growth Management Program.
- 1995 TOD tax exemption - this allowed for a property tax exemption in community-designated areas over ten years of up to 80% (Schiller 2010 p275).

Regional

1994 Regional Growth Management Plan, works with the Metro 2030 vision and the TOD Implementation Program (1998) (and now TOD Strategic Plan 2011) which has access to both federal and local funding. At this scale growth management plans work with local government requirements through growth targets, parking maximums, density minimums, and street connectivity standards to encourage walking and cycling and easy routing of buses.

Local

Tools at this level are very detailed and include Joint Developments (1997) which allows Tri-Met to write down the value of the TOD development to get the highest and best transit use and capitalise on the 1996 tax exemption provision. This style of tax increment financing is used in urban renewal districts to secure affordable housing as seen in the Yellow line, and is an important local tool that enables governments to prepare and adopt planning for 800 metre radius development.

A very successful initiative has been a set of planning resources and guides called the Community Investment Toolkit. This is a Metro strategy that seeks to identify proven strategies and tools that can be used to stimulate investment in the region’s centers, corridors, employment and industrial areas to implement the 2040 Growth Concept. The Community Investment Toolkit provides local government officials, developers, property owners, nonprofit organizations, investors and others with ideas and information on ‘innovative practices and approaches to create thriving and healthy urban centres’ (http://www. oregonmetro.gov/).

The Community Investment Toolkit focuses on three topics and will be addressed under the relevant key themes of the case study.

1. Financial incentives.
2. Urban design and local zoning and building codes.
3. Economically and ecologically sustainable employment and industrial development.
Politics & Community

In the 1960s Portland developed its political and transport agendas, like many cities, based around the provision of freeways. The political community sought to combine urbanisation and economic growth that would maintain and enhance urban qualities while safeguarding rural and natural landscapes. This has created a place of lively debate regarding the environment and liveability and planning orientation (Ozawa 2004; Healey 2010 p187).

Ultimately, it was like-minded community that was mobilized and motivated to oversee appropriate urban and regional planning and become the councilors, government staff and their alliances and the guardians of the regional strategy over time (Healey, 2010). Politicians, planners and importantly the specialist community groups all work together as advisory committees to promote various aspects of the plan.

These committees make up a crucial part of the governance structure of Metro’s ‘regional roundtable’ of committees. Committee members are made up from mayors and neighbours to business owners and academics. Committee areas include: transport, policy, citizen involvement and solid waste. Committees are also made up of representatives from key interest groups in the area. For example Figure 3, provides an overview of the Portland Bicycle Advisory Committee.

Figure 3. The 5 ‘P’s’ of Transit Orientation
Source: TOD Strategic Plan 2011 p33

PEOPLE
PLACE
PED/BIKE CONNECTIVITY
PERFORMANCE
PHYSICAL FORM

Figure 4. Portland Bicycle Advisory Committee
Source: BTA Oregon, 2011

Portland City Bureau of Transportation: Portland’s Bicycle Advisory Committee

Portland’s Bicycle Advisory Committee has been a standing city committee since the early 1970s. Its purpose is to advise the Mayor, City Council, and all City departments on all matters relating to bicycling for transportation and recreation.

Committee members meet monthly to review and make recommendations on:

• Planning documents affecting bicycling
• Funding priorities for bicycle-related projects
• The activities of other jurisdictions that affect bicycling in Portland

This volunteer committee is made of up 13 members with full standing, and up to seven alternate members. To qualify, applicants must:

• Be an adult resident of the Portland Metropolitan area
• Have an interest in promoting the use of the bicycle for transportation and recreation
• Make a commitment to attend monthly meetings and participate in the work of the committee.

Members are appointed to a 3-year term.
Design & Place-making

The Community Investment Toolkit focuses urban design and local zoning and building codes as one of its three key areas. More specifically it has developed one volume of the toolkit which deals with ‘Innovative Design and Development Codes’.

‘The Innovative Design and Development Codes volume of the toolkit provides model approaches for local governments to consider in adapting design and development codes to reduce the costs of development projects and provide the regulatory framework that enables the types of development that are desired and can be tailored to the unique identities of different communities’

Topics include:

- Public realm transitions that enable the development of more pedestrian-scaled, urban environments with a vibrant mix of uses.
- Density and use transitions that allow local governments to better integrate mixed-use in centers and corridors.
- Code flexibility that promotes standards so that new developments can be designed and tailored to fit within the context of an existing community.
- Transition zones that provide more gradual transitions in building form to enable new mixed-use developments to better complement existing single-family neighborhoods.
- Parking management that can help reduce congestion and demand for parking and improve the urban design of a center or corridor.
- Visualization tools that can analyze whether local zoning codes can enable the desired development forms and help citizens better understand how innovative new development projects can take shape and enhance local communities.
- Neighborhood involvement tools that enhance public engagement in developing design and development codes that build greater public support for new urban development.

(Source: http://www.oregonmetro.gov/index.cfm/go/by.web/id=28446)

These design and development codes exist to enable efficient land use and support investment in centres and corridors with the aim of assisting local government, community and business groups. The innovative design and development codes essentially contain more than just broad conceptual statement but provides the ‘nuts and bolts’ of how to work with the 10 urban design types as defined in Metro 2040 centres and corridors.

Important to note is that it acknowledges that each city and county in the Metro Region faces different political, regulatory and financial situations and advocates that each area therefore will need to assess which tool, model approach or combination is appropriate. Essentially the document is made up of regulations and development incentives, urban renewal and business improvements. The model approaches for implementing the tools included in the toolkit are:

- From suburban style development to walkable urban style places, including how to phase these changes over time.
- Flexibility to support building design that fits in the existing neighborhood context and improve the relationship between buildings and areas of different scale.
- Parking to maximize and support urban form.
- Zoning to improve policy decisions and facilitate developer and neighbourhood understanding.
- Involve neighborhood residents and community leaders in the planning and development process.

(Source: Metro 2008)

Transit Oriented Development Strategic Plan (2011)

This plan jointly developed with Centre for Transit Oriented Development, Metro and Consulting Associates uses typologies to define TOD Program Investments.

In brief, the purpose of the plan is to enable the prioritisation of station areas for investment in TOD, and evaluates the current physical, economic, and demographic characteristics of transit communities throughout the region. The TOD Investment Framework has two primary components:

1. The ‘place’ types divide the transit communities into nine categories that connect the market and urban form characteristics of each area.
2. Similar ‘place’ types are grouped into clusters to offer a general overview of the types of actions appropriate for each. This also allows new programs or activities to be introduced where appropriate to maximize future TOD potential. The framework is then used to make recommendations on the phasing of investment activities and a description of how these investments can be made.

Researcher Note: Of interest here is how this impacts on how the corridors are viewed and may explain why it is difficult to find a ‘whole of corridor’ study that looks at the integration of the urban corridor rather than just large station developments.
The Program’s strategies for maximising TOD potential include:

- Contributing to local identity through multi-year investments in catalyst projects and place-making elements.
- Creating market comparables for higher-density mixed-use development near transit and in centres.
- Cultivating developers with expertise in higher-density and mixed-use development in suburban settings.
- Building community acceptance of urban style building types in suburban communities.

(TOD Strategic Plan 2011 p5)

The Plan recognises three composite TOD cluster types (Figure 5):

1. **Plan and Partner Cluster**  
   Lowest priority areas for direct investment lack key market and physical features however long range planning undertaken to ensure full investment capture.

2. **Catalyze (transform something) and Connect Cluster**  
   Demonstrates either strong transit orientation but limit market support. Theoretically could have strong market but in practice didn’t exhibit these conditions.

3. **Infill and Enhance Cluster**  
   These are the most TOD ready areas however they may need support or should be top priority for catalytic investment.

**Figure 5. TOD Typology Clusters**  
Source: TOD Strategic Plan 2011 p57
The Crossings': An example of a successful TOD in Gresham, Oregon

The Crossings provides an excellent mixed use station design concept.

The Crossings is a distinct, mixed-use project located in the heart of Gresham’s Civic Neighborhood in the Gresham Regional Center. The design is innovative and creative: the building encompasses an entire block yet appears to be a number of narrow, human-scale buildings that include traditional and modern architectural accents reminiscent of the buildings lining the canals in Amsterdam.

Laying the groundwork

In 1995, the city adopted the Gresham Civic Neighborhood Plan, which called for the 100-plus acre ‘super block’ bounded by Burnside and Division on the north and south, and Eastman Parkway, on the north and south, and Eastman Parkway and Wallula Avenue on the east and west to be broken up into a number of smaller blocks that would foster a more pedestrian-friendly environment. The site had been occupied by a plywood plant, lumberyard and a few remaining strawberry fields. But by the mid-90s, the location, just northwest of downtown Gresham and bisected by the MAX line, was an ideal site for higher-density urban infill.

In 2001 and 2002, with the Civic Neighborhood coming together, Metro’s transit-oriented development program purchased three sites totalling 13 acres surrounding the future Civic Drive MAX station in the district’s core. The Crossings was developed on the 1.9-acre south-eastern site.

The Crossings is a public-private partnership between Peak Development, Gresham, Metro and the State of Oregon. Peak is the project’s developer, builder, owner and operator. Metro’s participation included negotiation of a Disposition and Development Agreement to ensure a transit-supportive site plan, higher-density housing and mix of retail uses. A transit-oriented development easement and land value write down were applied to this project to offset cost premiums. Cost premiums are the additional construction costs associated with building higher-density vertically mixed-use building types.

Tools used

State of Oregon transit oriented development tax exemption
Metro transit oriented development program, transit oriented easement and land value write down.

Award

Best Transit oriented design Award from Multi housing news 2007

Source: http://www.oregonmetro.gov/index.cfm?m=oby_web/id=26409
Land Use Planning: Density and Urban Form

Portland's urban structure resembles the closely integrated arrangement of housing, shops, schools and parks typically assumed to foster self-containment and localised living with a low density urban form that is moving toward a TOD compact city urban form, along key corridors (Jarvis 2007; Mees 2010).

The urban growth boundary has survived many legal and ballot challenges, which demonstrates the public mandate and understanding of the growth strategy and the strength of the process since 1970s.

Land use and transport planning was following a TOD approach even before the concept was completely developed, and has been a formal guide since 1995, with further provision in the newly released TOD Strategic Plan 2011 with CTOD and Metro.

Newman (1999) Mees and Schiller (2010) all concur Portland is one of the few US cities to have overcome the dominant paradigm of automobile-based planning, however single occupant private car represents the primary mode of transport. According to Mees (2010) trips to work are still made up of a very high car dominance of 89%, public transport 9%; walking 3% and cycling 1%.

However, Portland also has low density per hectare figures of 12.9 persons / hectare (Mees 2010) but a significantly more utilised service, which raises the important transport question of minimum thresholds to support a viable public transport system.

Network Planning

Much of the success of Portland has been attributed to its network planning (Mees 2010 p171).

Portland Tri Met uses a regular interval and ‘clockface’ departures which make the timetable easy to remember and in some areas compensates for the lower frequencies.

Importantly, this approach enables for the simultaneous scheduling for different routes at key interchanges, allowing for the frequency of service to be scheduled to enable the transfers of train and bus to arrive together and wait a short time before departing.

Clearly this does not work across all interchanges, so at minor interchanges service frequencies are maximised, and schedules are coordinated to ease transfers in the dominant direction of travel.

Travel Behaviour

Jarvis (2007) in a study looking at three West Coast Cities in the US, including Portland, examined whether household preferences for compact, self-contained neighbourhoods actually translate into localised living. Jarvis (2007) demonstrated that although there is a stated preference for the compact city paradigm, there remains a jobs and housing mismatch that does not take into consideration decision-making based on household needs, which is what largely determines travel model choice.

The report concludes that Portland needed to address the question of how to manage households of growing internal complexity and consider the future of cities alongside the future of work, employment and everyday life (Jarvis 2003 p602 - 603).

Management

TriMet is a municipal corporation of the State of Oregon. It is a public body with broad powers to provide mass transportation on behalf of the district. It can issue and sell general obligation and revenue bonds; levy an employer payroll tax; and levy a tax measured by net earnings from self-employment.

It is important to note that while there have been some positive outcomes for TriMet and TOD, performance targets have not been reached and there has been recent criticism of the management of building new infrastructure and the decline of service quality (Allen 2011). In the last 2-3 years there has been a decline in the service frequency (weekend services particularly) and steady rise in fares while that the same time there has been billions of dollars spent on new investments, in particular the opening of the Green Line. TriMet blamed this on the poor national and regional economy however opinion (Walker 2011; Allen 2011) state that this approach is penalising committed public transport users and advocates.

The inner city has a no fare zone called fareless square, however the street car moves in and out of the no fare zone and ticket purchases are based on an honesty system. Unsurprisingly most people who go out of the zone do not buy a ticket. This no fare approach has recently been voted against by the street car staff and this resolve has been recommended to the Advisory committee. However concern is that this will be the end of the success of the Streetcar.

‘The new price of an all-you-can-ride streetcar pass would be dramatically higher than the current $8.33 per month.’ (http://portlandafoot.org/ Jan 2012).
Finance and Market Mechanisms

This section includes key extracts from Newman and McMahon (2009 p81-86) How Do You Pay for Light Rail? Section E of The Knowledge ARC Light Rail, by Peter Newman and Jan Scheurer, Curtin University Sustainability Policy (CUSP).

Public private partnerships (PPP’s) or ‘joint development’ is used in the US and Portland for the planning and investment of TOD. Essentially the land is owned by transit agencies in an income producing real estate project involving another partner i.e. private developer.

The Federal Transit Administration (1997 mandate) acts as a third party for the acquisition of land for sale or lease to be used in a number of ways to encourage transit agencies to undertake TOD development.

- Used to enhance economic development; or
- Incorporate private investment – commercial and residential development
- Used to improve pedestrian and cycle access to a transit facility

By allowing transit agencies to direct the sale proceeds to eligible projects, the federal government is investing in TOD.

Key points of contract

- Transit agency must regain control over the joint development (important point given the failed private arrangement in London and Melbourne and the evidenced need for public central control)
- Funds must be used to help shape the community that is being served by the transit system

Eligible projects

1. Physical – those built on air rights over a station or built within or adjacent to transit facilities.
2. Functional – projects that are linked by activity and use to transit services or facilities including if it providing a benefit to the public and enhances use of or access to transit services or facilities.

Functional relationship can be negotiated beyond 800 metre radius.

Highest and Best Use

One of the most important provisions for transit agencies is being able to make sales/lease arrangement based not only on revenue terms but also on highest and best transit use. The valuer is required to take into account the local transportation, land use and economic development plans and FTA concurrence with the final transfer value. Highest and best transit use recognizes that the value to the government is not in the selling price alone. Instead, financial return is balanced with other benefits such as increasing ridership, strengthening connections between trips or reducing trip durations that improve the value of the trip development to transit.

Researcher Note: This approach is recommended by Newman and McMahon (2009) to be used to foster TOD development in Australia. The Gold Coast Rapid Transit is an example of using this approach.

TOD UpLift:

As the main delivery mechanism for securing new infrastructure or improving existing service for public transport is financial – PT or TOD development needs to be able to establish that it can increase the value and hence the yield from associated development along a corridor. This process demonstrates the opportunity to leverage urban corridor outcomes with PPP’s/joint venture development. Such Federal conditions enables the developer to in fact produce a much higher yield that would normally be found, helping both government to proceed with a TOD contract and private developers confident they will achieve a good return.

Portland Metro provides such grants to developers that encourage increased transit patronage through their development, with part of this grant to provide help in calculating ‘TOD uplift’ associated with development, so that a developer can take to a financier to ensure they receive necessary funds to enable TOD to proceed. In addition, value capture techniques such as special rates can create the possibility of public-private partnerships around rail-based TODs that can then be used to help pay for the rail system.
Financial Incentives Toolkit

The Community Investment Toolkit is coordinated by Metro to provide local government officials, developers, property owners, nonprofit organizations, investors and others with ideas and information on innovative practices and approaches to create thriving and healthy urban centres. One of these three handbooks is the Financial Incentives Toolkit.

This Toolkit outlines the different mechanisms that local governments can use to stimulate mixed-use development in centres and corridors and near transit areas. It also provides ideas and information on ways to promote the redevelopment of underutilized property and to finance infrastructure improvements necessary to enable private development to occur.

Topics include:

- Vertical housing incentives that encourage development of dense, mixed-use projects in specific areas through the provision of targeted tax abatements
- Transit-oriented tax exemptions that promote the construction of transit-oriented, multiple-unit housing developments in urban centers in order to improve the balance between the residential and commercial nature of those areas
- Brownfields assessment and cleanup funds that enable local governments and property owners to identify and clean up polluted or contaminated sites and make them suitable for redevelopment
- Urban renewal and tax increment financing that can stimulate private investment in targeted areas and provide a source of equity to make capital improvements and development projects financially viable
- Improvement districts that can fund physical and visual improvements in centers, corridors and employment areas and attract more private investments to make these areas vibrant and healthy
- Impact-based system development charges that can more accurately reflect the costs of infrastructure development, determine charges based on the impact of different development patterns, and serve as a financial incentive for more effective provision of facilities and services.

Source: Will Vanlue - Creative Commons
Stage 2 Case Study - Portland

Gateway Project - TOD Tax Abatement Program

Source: City of Portland Financial Incentives Toolkit 2007 p.19

The City of Portland created its Transit Oriented Development (TOD) tax abatement in 1996 to provide the TOTE to high density housing and mixed-use projects located on vacant or underutilized sites along transit corridors whose design and features encourage building occupants to use public transit. The PDC manages the TOD abatement program and sets the requirements and guidelines for projects eligible to receive the TOTE. The cost to apply in Portland is $5,000.

Project sponsors must first demonstrate that the property tax exemption is necessary to make the project financially feasible. The project must also contain ten or more dwelling units. The project design must provide for a continuous pedestrian connection to a light rail station or mass transit system, include one or more of several specific design features, and must provide one or more public benefits.

The Bookmark Apartments, in the Hollywood Town Center, is a mixed-use development with a ground floor library branch that received the TOTE through Portland’s TOD abatement program. Other projects made feasible through Portland’s program are Russellville Commons Townhouse Apartments at Southeast 102nd Avenue and Pine Street in a light rail station community on the abandoned Russellville School site, Gateway Towers in the Gateway Regional Center and the Cooper Street Town Homes in the Lents Town Center.

Ten years after implementing the program, Portland is still committed to providing tax abatements to multiple-unit housing projects in TOD areas. In 2006, the city renewed the TOD abatement program with revisions in order to increase the effectiveness of the program. With additional financial and staffing resources in the City of Portland, the advantages of a locally designed program outweigh complications experienced similar to those in Gresham.

“The TOD Tax Abatement program has been an invaluable tool in our condominium developments in the Gateway area of northeast Portland. Nearly 93 percent of all purchasers have qualified for the tax abatement, and it is safe to say that nearly all of them would have been unable to qualify for their loans had they not had the advantage of the lower payment this afforded them. The TOD Tax Abatement program has increased our absorption rate and reduced our marketing costs, which has allowed us to keep our unit prices extremely affordable. The result in Gateway is 138 homeowners who would most likely still be renting if it were not for this program.”

– Gordon C. Jones, Real Estate Developer

The Bookmark Apartments in Hollywood Town Center, City of Portland
Performance Targets and Indicators

Metro planners, with participation from partner agencies, developed a set of investment packages and used the regional travel demand forecast model and MetroScope, the regional land use model, to estimate how well each investment package would improve the region’s performance on measures that the community cares about. The set of system evaluation measures that were selected by a regional working group to evaluate the plan’s performance are listed below. The working group aimed to select performance measures that would provide the best information across mobility, accessibility, equity, and the environment for making investment decisions. The group chose to not specify desired targets for these measures, but to instead just indicate the desired direction the region wanted to pursue such as decreased delay on the regional freight network.


Metro 2035 Regional Transportation Plan System Evaluation Performance Measures

1. Decrease vehicle miles travelled (total and per capita)
2. Decrease total delay and cost of delay on the regional freight network in mid-day and PM peak
3. Decrease motor vehicle and transit travel time between key origin-destinations for mid-day and 2-HR PM peak
4. Decrease congestion – Location of thoroughways, arterials, and regional freight network facilities that exceed RTP motor vehicle-based level of service thresholds in mid-day and 2-HR PM
5. Increase mode share and non-drive alone trips system-wide, by mobility corridor and for central city and individual regional centers (Number of daily walking, bicycling, shared ride, and transit trips and % by mode)
6. Increase transit productivity (transit boarding rides per revenue hour) for High Capacity Transit (HCT) and bus
7. Increase number and percent of homes within 1/2-mile of regional trail system
8. Increase number and percent of homes and environmental justice communities (census data) within 1/2-mile of HCT or 1/4-mile frequent bus service
9. Decrease tons of transportation-related air pollutants (e.g., CO, ozone, and PM-10)
10. Decrease tons of transportation-related greenhouse gas emissions (e.g., CO2)
11. Decrease percent of projects that intersect high value habitat areas

(Metro 2035 Regional Transportation Plan).

In order to establish a basis for the measurement of these performance measures, Metro has developed a ‘Mobility Corridor Atlas’ (http://www.oregonmetro.gov/index.cfm/go/by/webfld=35555 ). This Atlas includes performance data for several regional measures such as travel time, safety, and bike and pedestrian network completion. The Atlas also provides information about the land uses located within each of the

Australian Context

Currently in Australia the development of Transit Oriented Development is facilitated at the state level with the treasury seeking the highest-level payback from the sale or lease of state owned lands. This often leads to the developer underperforming in terms of TOD benefit. Newman and McMahon (2009) recommended that Federal level funding could be extended from building infrastructure to acquiring and jointly developing land around transit stops as TOD.

The Gold Coast LR projects utilised this process in the form of Alliance Contracting, which brought together all the key stakeholders with the main contractor being the main operator, and has been attributed to lack of success in other TOD projects.

A transport model based on recognising the value of transit includes the following beneficiaries

- Transit users (unlike road users these are often a minor part of the value);
- Landowners, tenants and developers (range from 20%-100% of the cost of the transit system);
- Road users (43% of the City Rail system in NSW flows to road users through reduced congestion)
- National and regional economies including social and environmental benefits (which is why government funds major part of the transit system);
- After funding, contracts need to be drawn up that tap into the land value of the entire urban corridor, not just the station area - creating a mutually beneficial relationship.

corridors. In addition to this, Metro has developed a strong partnership with Portland State University, which is working on new methods for collecting, analysing, and archiving transportation system performance data.

**Sustainable Development**

Given that the initial version of the current 50-year growth strategy Metro 2040 began in 1995 some of the language typically reflects this time. As our literature review showed the concept of ‘sustainable transport’ is more recent terminology.

Nevertheless, the lack of this definition or that of sustainable development in both the regional planning and transportation documents highlights the focus and mandated TOD methodology and illustrates the overall values influencing the land use/transport system and approach.

**Definition of terms within Portland strategic documents**

**Metro 2040 Plan – The Nature of 2040**
(the regions 50-year plan for managing growth).

- Corridors are major streets that serve as key transportation routes for people and goods. Examples of corridors include the Tualatin Valley Highway and 185th Avenue in Washington County, Powell Boulevard in Portland and Gresham and McLoughlin Boulevard in Clackamas County. Corridors are served extensively by transit.

**Urban Growth Management Functional Plan**

No definition on sustainable transport, sustainable development, corridor or TOD

**Regional Framework Plan – Transportation – 1997**

- **Corridors** While some corridors may be continuous, narrow bands of higher intensity development along arterial roads, others may be more ‘nodal’, that is, a series of smaller centers at major intersections or other locations along the arterial which have high quality pedestrian environments, good connections to adjacent neighborhoods and good transit service. So long as the average target densities and uses are allowed and encouraged along the corridor, many different development patterns - nodal or linear - may meet the corridor objective.

- **Main Streets** Neighborhood shopping areas along a main street or at an intersection, sometimes having a unique character that draws people from outside the area. NW 23rd Avenue and SE Hawthorne Boulevard are current examples of main streets.

**Oregon Transportation Plan (OTP)**

The OTP is the State’s official intermodal transportation plan that sets priorities and state policy in Oregon for the next 40 years. The plan, developed by the Oregon Department of Transportation through the statewide transportation planning process, responds to federal Intermodal Surface Transportation Efficiency Act (ISTEA) requirements and Oregon’s Transportation Planning Rule.

- **Transit-Oriented Development** A mix of residential, retail and office uses and a supporting network of roads, bicycle and pedestrian ways focused on a major transit stop designed to support a high level of transit use. Key features include: a mixed-use center and high residential density.
Researcher Note:
Portland vs. Vancouver Analysis

Both Vancouver and Portland developed their policies based on citizen groups and the political tensions regarding freeways and future liveability. These cities created consensus frameworks and built trust in the early 90s, delivering long term growth management plans (50 year) with strong urban growth boundaries and recognising transport as central to achieving their urban development goals. Both cities established light rail line in 1986 and have been developing them over time.

There are some key differences between these cities - Vancouver used buses to first build capacity before implementing Light Rail, while Portland has focused on the development of rail, light rail and streetcar infrastructure without acknowledging the role their bus service plays in the networking of their transport. Portland has allowed freeways closer into the city area and has much of their public transit running along the freeway corridors making urbanisation of the corridors (human interface) lacking in some cases. Vancouver did not allow freeways into the city and now much of the corridor development is urban and reflects the human scale and journey along the corridor.

Significantly Portland has consistently followed TOD ideology since the late 1990s including typology and financing methods. This has influenced the urban design focus on station areas rather than urban corridors. Ridership statistics for Portland do not seem to be very impressive and as Jarvis (2003) discovered the complexity of household needs has meant that people still need to drive to get places. Additionally, transit in Portland is often competing with freeways as the most convenient means of mobility. Both Portland and Vancouver have very good mechanisms for community participation and decision-making through the use of advisory committees. Vancouver has aligned itself to sustainable transport values while Portland does not explicitly detail a definition of sustainable transport. The key measurement and focus is financing mechanisms.

Source: vintageportland.wordpress.com
When we walk out our front door, we should be able to choose a travel mode that suits our destination, our mood and our budget. A bike commute to downtown may become a bus ride in the early winter hours. Hauling seven boxes to the Rebuilding Center requires a car. Having transportation options make us feel smart and green and thrifty. Public investment in transit, sidewalks and bike lanes in our city centers or providing access to parks and open spaces knits people into a community.

Karen Frost, Executive Director
Westside Transportation Alliance, City of Portland website homepage, 2011

**Figure 6. Portland MAX Yellow Line route**
Source: Google Maps

**Description**
The Yellow Line is a 5.8 mile light rail corridor extending north from downtown Portland along Interstate Avenue and has 21 stations (Figure 6, below).

TriMet’s MAX Yellow Line light rail service connects the Expo Center, N/NE Portland, downtown Portland and Portland State University. This mature urban corridor combines residential and commercial areas served by a dense street network with industrial and open space areas served by a discontinuous street network. As such, this corridor serves as both a destination connector and commuter corridor as classified by CTOD (2010).

The TOD developments on the line are categorised under Infill and Enhance in the TOD Strategic Plan (2011), which identifies many of them as having all the attributes for continued and viable TOD development and funding. This light rail line forms a key part of the Metro mobility corridors and is part of what is identified as Mobility Corridor 1 within the Mobility Corridor Atlas - www.oregonmetro.gov/index.cfm/go/by.web/id=35555
Demographic Composition

The Interstate MAX Yellow Line is located in the heart of a racially and ethnically diverse community: Portland’s North and Northeast neighborhoods (TriMet 2005). While the Interstate area of Portland represents roughly 20% of Portland’s total population, it includes nearly 65% of the African American residents of the city (Collins 2007). The Corridor split the whites to the west and the blacks to the east. The freeway has also been a barrier to attract riders from the east (Owaza, 2004 p64)

Based on 2000 census data, 39% of the North and Northeast Portland population identified themselves as African American, Asian and Pacific Islander, American Indian and Native Alaskan, or Latino. The same groups comprised 21% of Portland’s city wide population in 2000.

Additionally, North and Northeast Portland have relatively high poverty rates; in 2000 the City of Portland’s poverty rate was 13% while the North and Northeast areas had a collective poverty rate of 22 % (TriMet 2005).

Network: Service Quality

- Trains run every 15 minutes or better most of the day, every day. Service is less frequent in the early morning, mid-day and evening. From 2004 more light rail extensions were built to achieve land use development not speed (Schiller 2010 p274).
- Slow runs at 35km per hour and has exclusive right of way.
- Questions have been raised if it should have been a rail corridor or a light rail that followed even more closely to the 15 Freeway route to allow for more speed – the proximity of the freeway makes this a speed issue.

Financing

- Managed by Portland, Oregon Tri-County Metropolitan Transportation District of Oregon (TriMet).
- Project Budget: $US350 million. Public Participation Budget: not available.
- Finance was coordinated by rezoning much of the corridor as an urban renewal district, which then made it eligible for Federal funding ($US30 million).
- 1% of the budget has been used for public art at each station to reflect local community and identity. The real-estate division of Tri met has funds to invest in property for affordable housing along the line.
Stage 2 Case Study - Portland

5. Transport Corridor Case Study 2 – The Portland Street Car

The Portland Street Car is an eight-mile continuous streetcar loop running through Portland’s central city, operating from the south waterfront, through Portland State University and north to nearby homes and shopping districts. This transportation and development project has been very successful with ridership three times higher than projected and the urban form and structure creating a vibrant and economically distinct area for community and businesses alike (Institute of Sustainable Communities, 2009). The Streetcar project was the critical mechanism to engage support of the community, business and developers in a revitalization project (Institute of Sustainable Communities 2009; Sustainability Victoria 2011).

Due to this success the Streetcar line will be adding an additional 3.3 miles of tracks on the east side of the Willamette River in March of 2012. The Portland Streetcar is a District Circulator as it is a shorter corridor that facilitates movement within an activity node with frequent all day service (CTOD 2011; Belzer 2011) (Figure 7).

**Researcher Note:** The main relevance this has to our study is with regarding to the funding mechanisms and the single line loop concept that links major destinations – possible idea given the proximity of the University, Hospital, City Centre and possible extension to airport.

**Governance: Community and Stakeholders**

The Portland Street car project was both a government and private-funded project, which was enabled via an innovative relationship with the commercial property sector using a model where surrounding landowners contributed to the overall cost of the project.

The City of Portland initiated the Streetcar Project and importantly, owns the streetcar. Despite initial barriers with the regional authority Metro not being in favour of the project, and the National funding arrangements at the time favouring bus transit, the project became a reality due to the exploration of alternative leverage mechanisms.

![Figure 7. Portland Streetcar Loop Project](source: portlandstreetcar.org)
A private not for profit corporation called Portland Streetcar Inc. implemented the project and provides the current management of the system, reporting directly to the Office of Transport, Metro. The regional transport authority TriMet is contracted to provide operators and mechanics.

The mandate for the project was secured with the support from community, business and developers who could see the long-term financial benefits the streetcar would attract by bringing life back to the area including mixed use development. With this crucial political support a Local District Tool was employed, which allowed for developer contributions to be collected based on proximity of landholdings adjacent to the planned street car route, and levied according to the value they would expect to gain. This city-level revenue allowed considerable local control and flexibility in planning and implementing the streetcar project (Institute of Sustainable Communities 2009; Sustainability Victoria 2009).

Due to the success of the project a City-wide Streetcar System Concept Plan (SSCP) was created that identified potential corridors for future expansions of the system. This process was managed by the Bureau of Transportation, in coordination with the Bureau of Planning & Sustainability, Metro, TriMet, the Portland Development Commission and ODOT.

This planning was integrated with the City’s land use plan and the regional High Capacity Transit System Plan, and administered by a System Advisory Committee appointed by the Commissioner-in-charge of Transportation, alongside significant input from citizen-led District Working Groups throughout the City (Institute of Sustainable Communities 2009).

**Design**

Streetcars are 66 feet long, which is 10 to 30 feet shorter than a typical light rail car, and is always operated as a single car. This design allows streetcars to follow regular traffic patterns, without being given priority over vehicle traffic or forcing an adjustment to traffic signals. This minimizes costs and limits disruption to the current traffic or parking set-up. The small size also helps reduce construction costs by allowing stations and stops to be smaller than light rail stations. But criticism of this is that it slow form of transport.

**Financial**

- The total project costs were US$103.15 million, including US$19.4 million (20% of total cost) collected from surrounding landowners.
- $28.6 million was raised via bonds backed by revenues from a 20¢ per hour increase in short term parking rates.
- The financial benefits have been attributed to the quality of the service and changed urban form, including fewer dead areas devoted to parking and businesses and community benefiting from the operational hours of the streetcar.
- Helped to create a new industry with all streetcars now manufactured in Portland, started with Portland securing a $4 million contract to build a prototype American streetcar (Institute of Sustainable Communities 2009).

**Network and Service Snapshot**

- 8 mile track
- Double tracks
- 46 stops
- Speed 10-15km per hour
- One way to allow for parking on one side of the street
- 12000 riders per day and over 10000 residential units
- Majority of Growth – Pearl District
- 12-minute intervals (less on Sunday).
- Every stop has real time electronic arrival time.
- Mixed traffic operation
- Tracks are the same gauge as the MAX light rail tracks

(http://www.portlandstreetcar.org/)
Stage 2 Case Study - Portland

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TriMet Yellow line and Mississippi Neighborhood, Portland Study Tour 4 http://niciskei.wordpress.com/2011/11/15/portlands-yellow-line/

TriMet Public Transport for the Portland Oregon Metro Area (website) http://trimet.org/

Stage 2 Case Study - Melbourne

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1. Melbourne Case Study Summary

A city of debate; power and institutional paralysis

Although Melbourne sits alongside Vancouver as one of the most livable cities in the world (The Economist 2011), this case study investigation of its transport system and land use planning provides for a different narrative. In the 10 years since the release of Melbourne 2030 – Planning for sustainable growth (2002) the notion of sustainable transport has deteriorated outside the CBD through disjointed network management; a seemingly negotiable land use plan and growth boundary; fears of increasing population and affordability; and a general community distrust in state government transparency.

Freeway construction has continued via the CityLink development of toll road projects within the Melbourne metropolitan region. It is considered that these projects are creating extra competition and pressure on a struggling franchised train and bus system, while adding more congestion on connector roads at freeway entry and exit points. The local media have also highlighted the growing evidence of cost overruns due to incorrect modeling projections and the efficacy of multiple policy objectives, with an increase in cycling injuries and fatalities as the public seek to embrace a healthy and more sustainable lifestyle.

This is from a city that loves its trams and trains and prides itself on two decades of successful revitalization projects of streets, public spaces and inner city living.

Most recently, 2012, there have been some decisive steps to align the management of the public transport system with kind of best practice identified in the literature. This includes the establishment of the Public Transport Development Authority, replacing the previous structure of multiple agencies. The intention is to increase efficiency and quality; improve the network with ‘supply’ building initiatives; establish a commitment to the upgrading of existing infrastructure to maximize frequencies and quality; and plans for separated bike lanes along Swanston Street and a proposed CBD bicycle freeway (Urbananalyst 2012; Davidson 2012; City of Melbourne 2012).

Despite these measures there is still uncertainty regarding the future urban form of Melbourne as the new metropolitan planning strategy and regional growth plans continue to be developed and urban growth boundary extended. Additionally there is still significant political will to push ahead with the new East-West Link PPP, despite public opposition and two studies by the previous government that failed to make a case for the link (Davidson 2012).

The significance of Melbourne as a case study is also to examine the Urban Growth Corridor Plan 2009 to identify the key theme areas working together and influencing the planning of urban transport corridors. On hold since the 2011 state elections, details an intensification of transport corridors along existing infrastructure and a compact and livable city, while coexisting with a dispersed leafy urban form – sustainable with good design. This ‘corridor plan’ was in response to Melbourne @ 5 Million (2008) (the update of Melbourne 2030), to help Melbourne grow sustainably to a population of 5 – 7 million and was advocated by a joint report compiled by the City of Melbourne (Rob Adams) and the Department of Transport (2009).
The State of Victoria has two levels of government - state and local - with no representative model for metropolitan governance at the state level. There are 79 councils across the state representing around 5 million people. The responsibility within each local council is small but diverse, including property, economic, human, recreational and cultural services. Councils enforce State and local laws relating to land use planning, environment protection, public health, traffic and parking and animal management.

The Local Government Planning Framework includes:

- Local Planning Policy Framework (LPPF);
- Municipal Strategic Statement (MSS); and
- Local Policy

The metropolitan area of Melbourne, as defined in Melbourne 2030, includes 31 councils and a population of 4 million (Dept. Planning and Community Development, 2011) (Figure 1) Metropolitan Melbourne.

Figure 1. Metropolitan Melbourne
Source: Melbourne 2030, 2002 p21

What is Melbourne?
Generally, the extent of metropolitan Melbourne, as understood in Melbourne 2030, is set by:

1. the combined catchment of Western Port and Port Phillip Bay
2. the boundaries of the total area governed by Melbourne’s 31 municipal councils – this includes some rural land at the city fringe
3. Melbourne 2030’s urban growth boundary, which confines urban use to the developed parts of Melbourne and the designated growth areas, the satellite areas of Melton, Sunbury and Hastings, and some bayside areas of the Mornington Peninsula

Figure 10. Definitions of ‘Melbourne’
Metropolitan Melbourne – combined 31 local government areas
Port Phillip and Western Port Catchment Boundary
Urban growth boundary
Land use and Transport Planning

Currently, land use planning is managed alongside environmental assessment within the State Department of Planning and Community Development. This includes managing the regulatory framework and providing advice on planning policy, strategic planning and urban design.

Under Victoria’s planning system, local councils and the State Government develop planning schemes to control land use and development, and to ensure the protection and conservation of land.

Of significance is the numerous departmental ‘relocations’ of land use planning within the organisational structure of the Victorian Government over the last 2 decades.

- Department of Infrastructure 1996-2002,
- Department of Sustainability and Environment (2003-2009)
- Department of Planning and Community Development (current)

A similar story exists for Transport Planning, which has been managed under:

- The Department of Infrastructure (with land use planning from 1996) overseen by a Minister for Public Transport and a Minister for Roads and Ports,
- The Department of Transport (current), which includes public transport and main roads and no longer land use planning.

At present the Department of Transport is responsible for working within its divisions, in partnership with stakeholders and the community. The Department of Transport supports two Ministers and their portfolio areas including Minister for Roads and Minister for Public Transport; and Minister for Ports.

The responsibilities of the Department of Transport include:

- Overseeing Victoria’s transport systems, including train, tram, bus and taxi services through franchised arrangements with the private sector.
- Delivering infrastructure projects to the Victorian community from concept to completion.
- Ensuring the efficient movement of freight on Victoria’s roads, rail and ports systems.
- Ensuring Victorian infrastructure is safer and more secure.

Partner Agencies to the Department of Transport

Within this framework ‘partner agencies’ play a crucial role in the policy direction and resources for the provision of transport. Below is a description of the responsibilities under each agency, with considerable focus on road infrastructure; conflicting policy objectives with design; and development of on-road public transport infrastructure.

**Researcher Note:** There has been no authority for the management of Public Transport. The responsibility for the provision and integrated management for public transport has been privatised and franchised. The most successful transport systems in the world are all centrally managed.

**VICROADS** - manages the Victorian arterial road network and its use as an integral part of the overall transport system. VicRoads is a Victorian statutory authority whose objectives, functions and powers are outlined in the **Transport Integration Act 2010**. VicRoads also administers a number of other acts and regulations including the **Road Management Act 2004** and the **Road Safety Act 1986**. The VicRoads Chief Executive is accountable to the Minister for Roads, reporting through the Secretary of the Department of Transport.

Although the prime responsibility of VicRoads is ‘roads’, it also facilitates the design and coordination of on-road public transport i.e. bus and tram rapid corridor projects, interchange design under a program called **SmartRoads**.

**SmartRoads** uses a set of guiding principles to establish the priority use of roads by transport mode, time, and place of activity. These priority movements are then assigned to arterial roads across the network forming **SmartRoads Network Operating Plan (VicRoads 2011)**.

**VICURBAN** – ‘Places Victoria’ creates opportunities for the realisation of Victorian Government policy and private sector investment by making urban renewal sites development ready, including:

1. Master planning
2. Land preparation and site acquisition
3. Developing land
4. Partnering with land owners, developers and builders

Operates under the **Urban Renewable Authority Act 2003**.

**Researcher Note:** There exists a corporate management style of governance significantly focused on infrastructure provision and privatisation as opposed to integrated management.
VICTRACK is a ‘commercial organisation’ that funds its own operations through the delivery of services and by leasing land and buildings within its large property portfolio. VicTrack also aims to be a good corporate citizen by providing a range of benefits for communities, heritage and the environment, including providing hundreds of community leases at nominal rentals.

Although VicTrack is the legal owner of Victoria’s railway land and infrastructure, it has no active role in delivering public transport or rail freight services. Instead, these assets are leased to Victoria’s rail and tram franchisees and they control and maintain the infrastructure and land they lease.

LINKING MELBOURNE AUTHORITY – special purpose statutory authority responsible for managing complex road projects for the Government – EastLink; WestLink; Peninsula Link. Operates under the Transport Integration Act 2010. (Source – Vic Govt, 2011 - website links see reference section)

Key Guiding Documents

Each state or region has a suite of policy documents that provide a relevant background and insight into the focus of government. Below is a list of strategies and reports that have been superseded rapidly over the last 20 years in Victoria. They have been developed within ever changing governmental departments and under a heavy political environment, with the latest Victorian Transport Plan (2008) now obsolete and currently under review awaiting rewrite in 2012 by the Liberal Government.

- A Fairer Victoria 2010 – the ALP’s policy platform on welfare and disability policies includes new regulations to improve housing accessibility.
- Melbourne 2030 – Planning for Sustainable Growth (2002) Department of Sustainability and Environment
- Melbourne 2030 – a planning update - Melbourne @ 5 million (2008) – Department of Planning and Community Development
- The Victorian Transport Plan 2008 – Dept. of Transport – defunct policy- under review (Jan 2011)
- Transforming Australian Cities 2009 – City of Melbourne and the Dept. of Transport
- Transport Integration Act (2010) State Victoria
- Urban Design Charter for Victoria (2009) Dept. of Planning and Community Development
- Pedestrian Access Strategy (2010) – Dept. of Transport

Researcher Note: Policy documents and associated consultant research reports are not focused on providing data and argument regarding the key objectives of the overall spatial planning strategy. They lack comparable information and baseline data, yet are media savvy with astute imagery and contemporary language; they are largely infrastructure and figures focused.

Source: Creative Commons

Source: AHP Blake, Sarah, Professor
Population
Current population figures for Victoria are 5.5 million and 4 million for metropolitan Melbourne (Vic Govt, 2010) with 80% of the state’s growth occurring in the metropolitan region.

The original population growth estimates for Melbourne 2030 (2002) were for an additional million people in 2030 this was updated with the 2008 Melbourne @ 5million Strategy for the metro region, with newer estimates looking at figures closer to 7 - 8 million.

Demographics
Melbourne is one of the most multicultural cities in Australia, and Victoria one of the most urbanized states in Australia 90% of the population living in city or towns.

An additional 600,000 dwellings will need to be constructed over the next 20 years of which almost 316,000 dwellings are anticipated to be in Melbourne’s established areas where access to trams and other public transport services will be important. Over 284,000 dwellings are anticipated to be in Melbourne’s outer growth areas (Melb @ 5mil, 2008).

The information is focused more on the predicted share of households and does not show comparative diagrams with current dwelling figures.

Mode Share
The Melbourne metropolitan area has a polycentric dispersed urban form that grew out along the heavy rail lines at the beginning of the 20th century. Public transport modes include Heavy Rail, Tram and Light Rail, and Buses. It also has an extensive bike path network that runs along much of the green wedges of the city.

Researcher Note: Finding snapshot data regarding public transport is very difficult, both on the website and within the guiding strategy documents. The focus is on how much the growth projections are and not on providing data on what the current situation is. It was not until Page 87 of the Victorian Transport Plan 2008 before some mode share data was found – Figure 2 below. Figure 3, below, shows the clear drop in non-car trips (including public transport) for journey to work since the 1950’s.

Figure 2. Journey to work
Source: Victorian Government, 2008 p87

Figure 3. Journey to work
Source: Moriarty & Mees, 2006 p3
3. Key Themes Analysis

Governance: Politics and Community Participation

Historical Context – Institutional

The Melbourne Metropolitan Board of Works (MMBW), was formed in 1954 as a consequence of fragmented governance and management structure issues that arose out of the Town and Country Planning Act 1944. The MMBW was set up as an independent statutory body, and included experienced planning staff and access to significant resources and funding (Mees 2000).

The MMBW operated at ‘arms length’ from central governance and was accountable to a forum of elected delegates from each council. This allowed the focus of decision-making to be grounded in professional considered argument with long term benefits to the region and where necessary, politically unpopular decisions could be made (Spiller 2008). Because the MMBW was not a formal new tier of governance between state and local (with political aspirations) it was able to build a solid foundation of strategic and spatial planning outcomes. It has been widely argued to be the most effective model to coordinate land use planning and investment for infrastructure and social services (Buxton et al. 2003; Mees 2003; Gleeson et al. 2010).

Political issues between MMBW and Melbourne City Council and the State government led to the dismantling of the MMBW by the Cain Government in 1985 in order to concentrate planning power to the state (Spiller 2004 p5). By the end of the Cain Government in the early 1990s Victoria was in considerable financial debt. The Liberal Government led by Jeff Kennett (1992-99) started a neoliberal reform process, which had an emphasis on councils having their own independent planning authorities under the Planning and Environment Act (1992). The Victorian Planning system was further deregulated with the introduction of the Victorian Planning Provisions (1996). Planning became dominated by a market rules philosophy, weak public policy and an appeals process being reliant on residents to uphold local policy (Buxton 1999 p8).

The public transport system was dismantled and privatized with a franchise system becoming the major operation model. Significant public backlash to the high level of privatisation and the corporate management style saw the Bracks Labor Government defeat Liberal Kennett Government with a clear majority of seats in 1999. A lack of reconciliation between market led planning and governance remained however despite the hopes for a middle of the road approach between the market and centralised systems with the adopted Third Way ideology. However a flawed institutional framework led to more power being given to state and private interests (Jackson 2000).

Despite an environment of proactive, participatory planning processes and a resounding commitment to sustainability, the Growth Strategy document Melbourne 2030 – Planning for Sustainable Growth (2002), had an emphasis on freeway expansion (ring road connections) and increased the level of extension of the urban growth boundary. Also by this time the privatised train system MTrains and Connex had gone into recievership, requiring to be financially bailed out by the government.


Community Consultation, Individual champion, Stakeholders

The issue of roads and freeways was very important in the development of Melbourne 2030 (2002) as transport encompassed many of the key sustainability issues with the strategy. The vision being to plan for Sustainable Growth with a compact, livable city and sustainable transport agenda focus.

The development Melbourne 2030 was founded on a community consultation process that was heralded at the time for its extensive nature. However, it has been argued that this was not reflected in the final policy document, due to a preset agenda and pressure from the market and developers (Mees 2003). Melbourne 2030 was ultimately influenced by the dominating values of John Paterson (Minister for Planning) which included hostility to strong land-use planning, support for more freeways and contempt for public participation. Compounding this was a lack of leadership by senior government staff to champion sustainable transport, despite community support (Mees 2003; Buxton et al. 2003). Penny Coombes (2002) the consultant who managed the community consultation process, concluded that “the emphasis on freeways was the exact opposite of what the public asked for and was the single most important issue to emerge” (Mees 2003).

The VicRoads Authority has also played a very important role in the direction of government policy. The strength of its organisational arrangement and capacity, and the perceived economic importance of road building, established a direct line of communication to the Minister. It was this capacity to identify common and mutually beneficial interests which enabled it to effectively harness the support of others for its policy agenda (Low and Astle 2009). Following this success, another authority called the Linking Melbourne Authority has been created and is responsible for delivery of all the freeway linkage projects.
However, political power, competent road authority stakeholders and blurred institutional lines between local and state, resulted in much of the 2002 plan being linked with:

- Car dependent and privately run ‘activity centres’ (shopping centres);
- Car dependent housing developments on the edge of the city; and
- Inefficient public transport in certain freeway corridors, despite the intent of the plan being focused on creating activity centres along existing public transport lines (Mees 2003).

Figure 4 highlights the –‘Principle Public Transport Network’ - activity centres linked by transport network (Melb 2030, 2002).

Figure 4. Principle Public Transport Network
Source: Melbourne 2030, 2002 p147
Melbourne 2030 – A planning update:
Melbourne @ 5 million (2008) &
The Victorian Transport Plan (2008)

Melbourne @ 5 Million (2008)
The amendment to Melbourne 2030 and development of
an integrated Victorian Transport Plan (2008) document
was in part a response to previously discussed criticisms, but
largely to the high level of experienced growth and projected
population figures for 2036 of 5 million (now projected to 7 –
8mil). Employment corridors and precincts were added to the
plan and further emphasis included a more densely compact
city, while in contradiction, also expanding the urban growth
boundary. This has created a perception for stakeholders,
developers and the community that planning is negotiable and
strategic policy regarding the built environment can be altered
in an ad hoc manner by the market (Goodman 2009 p14).

Highlighted below is a summary of the key amendments
to land use policy with a focus on corridor development
and revised activity centres in the Melbourne @ 5 million
documents.

What’s new? Melbourne @ 5 million

A more compact city
- Designation of six new Central Activities Districts with
  CBD-like functions.
- Employment corridors to improve accessibility to jobs
  and services and reduce congestion on the transport
  network.
- Established areas to accommodate 53 per cent of new
dwellings.

Better management of growth
- Growth areas to accommodate 47 per cent of new
dwellings.
- Investigation areas in the north and west, with a small
  proportion in the south east, for potential extensions to
  the growth areas.
- More efficient use of greenfield land with a target of 15
dwellings per hectare.
- Amendment to the operation of the growth areas
  infrastructure contribution and the removal of the
  requirement for the contribution from land included in
  the Urban Growth Boundary prior to 2005.
- Consideration of the unique green wedge values in
  the investigation of changes to the Urban Growth
  Boundary.

Networks with the regional cities
- Efficient and effective links between Melbourne and
  Victoria’s regional centres.
- Regional blueprint to be released in 2009.

A greener city
- Creation of two grassland protected areas in
  Melbourne’s west.

Source: Melbourne @ 5 million (2008)

The Victorian Transport Plan (2008)
This plan did not include key guiding principles, mode share
targets, projections based on demand figures, and was
largely focused on regional centres and new infrastructure.

In brief key points and observations:
- The plan contained no mode share targets, definition of
  sustainable transport, mission statements or vision.
- It provides a population target of 2036 at 5 million but
does not state the present population.
- It is integrated with Melbourne @ 5 million Strategy,
  with regards to employment corridors and new
development on the Urban Growth Boundary. However
  neither plan presents useful mode share data or
  projected targets and how the plan intends to achieve
  this.
- The sustainability issues covered were concerned only
  with lower greenhouse gas emissions.

$6 million of taxpayers’ money was used to promote the
plan in 2 years, an approach that was heavily criticised by
community and key stakeholders (Lucas 2011). The political
backlash continued and resulted in local governments
being asked to perform a metropolitan role with regards
to planning and this has led to a resistance at the local
level. This process has only further developed an unhealthy
mistrust for planners and the process of planning within the
community (Gleeson et al. 2010).

Researcher Note: The Victorian Transport Plan 2008
– was placed under review in January 2011 following a
change in State Government.
Urban Consolidation and Transport - Current Situation

This urban frustration at the local level naturally has been played out at the state level as seen in the elections in November 2010 when the Bailleu Liberal Government was elected on a platform of urban consolidation, transport dysfunction and fears regarding how to manage population growth. In summary:

- The state has no clear mandate regarding urban form, transportation and sustainability.
- *Melbourne @ 5 Million* (2008) and the *Victorian Transport Plan* (2008) are both under review since the change of government in November 2010.
- There is a lack of effective mechanisms for the implementation of the ideals expressed in the compact city model. A good example of this is the current situation of ‘Mum and Dad’ developers subdividing and building double story housing without clear design guidelines or a coordinated city approach. This is only increasing development into the ‘green’ suburbs away from public transport and away from employment and services, further complicating the ability to deliver sustainable transport options that fit with where people live. It is also greatly affecting the moral of longtime residents who are watching their suburbs get built out (Newton et al. 2011).

The Victorian Transport Plan (2008) is now obsolete (Jan 2011) and under review until the newly created Public Transport Development Authority (PTDA) commences in 2012. This is a response to the criticism raised with regard to the lack of organisational strength of the fragmented public transport network. The PTDA will be an independent statutory authority and the primary liaison point with franchisees and agencies. It will integrate a number of public transport agencies and authorities and administer trains, trams and buses. The first role of the authority will be to audit all Victorian public transport assets and review the projects in the 2008 *Victorian Transport Plan* (Department of Transport website 2011).

The primary objectives of the PTDA will be:

- Ensuring the public transport system operates as part of an integrated transport system which seeks to meet the customer service needs of all users.
- Managing the public transport system in a manner which supports a sustainable Victoria.
- Contributing to social wellbeing by providing access to opportunities and supporting liveable communities.
- Promoting economic prosperity through efficient and reliable movement of public transport users while also supporting rail freight services.
- Improving the safety of public transport for passengers and staff.
Governance Summary

Institutional

- The debate around urban consolidation and transportation is a key example of the limitation of the governance arrangement between the state and local government. It has affected decision-making, planning, resource allocation and major strategic issues. (Buxton and Tieman 2005; Gleeson Dobson and Spiller 2010 p7).
- Land use planning and transport planning (both PT and roads) have not been integrated under the same department (since MMBW was broken up in 1985).
- The capacity of the roads agency to identify common and mutually beneficial interests enables it to effectively harness the support of others for its policy agenda. A very strong Road Authority (VicRoads) has excellent organisational arrangements and management. It also has a direct line of communication with the Minister and autonomy to carry out key objectives – including the continued construction of freeways.
- VicRoads is also responsible for the development of on-road public transport delivery and design – conflict of interest. It has been argued that Melbourne has been left to the engineers (Mees 2003).
- Privatisation and franchising of the public transport system since early 1990s eroded the overall effectiveness of the organisational (Departmental) ability to deliver – fragmented services. The limited synergy in the public transport sector and management mechanisms has made it difficult to leverage support and advocate successfully (Low and Astle 2009 p57).

Political

- A legislated urban growth boundary was meant to put a stop to the market determining land use policy. The UGB has been moved three times since 2002. Support for the policy has been ad hoc within government and under resourced. The 2008 amendments to the UGB by the State were not done in consultation with local government planners with many of them only reading about it in the paper after it was announced (Goodman 2009 p15).
- State ministers involved in local politics, and commonwealth’s fiscal power has affected local community governance and directive (Gleeson, Dodson and Spiller 2010 p9).
- There have been 20 years of departmental changes with regards to the management and strategic planning of transportation, spatial planning and sustainability.

Community

- The communities distrust in the transparency of the process has destabalised the professional argument (best practice) and the political environment resulting in a decade of inaction.
- Proposed local corridor developments are in limbo awaiting consensus; political direction; and community support.
Researcher Note: Local government transport policy is very basic, very local and has a limited role. For example education campaigns only encompass broad mission statements that support key concepts. Gleeson, Dodson and Spiller (2010 p13) advocate for the establishment of a metropolitan commission with clear responsibilities to facilitate public transport corridors, activity centres and economic nodes. This concurs with the Urban Growth Corridor Plan (City of Melbourne & Victorian Government 2009; Adams 2009).

Design and Place-making

Design Guidelines

VicRoads is responsible for the development of guidelines for the planning and operating of public transport on roads. ‘The guidelines are designed to help VicRoads and other organisations that provide for public transport, to integrate the needs of public transport into their day-to-day work’ (VicRoads website). The current guidelines are almost a decade old and are largely engineering standards for shelter and hard stand placement.

The guidelines include:
- Providing for cyclists at bus stops & bus lanes
- Tram and bus stop design
- Shoulder bus stop guidelines
- Bus and tram priority design.

VicRoads is also responsible for designing, communicating and consulting with the public regarding the development of new priority bus lanes. A recent example is the Bus Priority works on Doncaster Road, from Hender Street to the Park & Ride facility at High Street in Doncaster.

Activity Centre Design Guidelines

In 2005 the Department of Sustainability and Environment released Activity Centre Design Guidelines to assist councils and developers create designed centres that reflect key elements. This document includes many important components to guide the design process, however they are mainly ‘suggestions’ and open to interpretation as illustrated in ‘Element 2 Station design and public transport interchanges’ Figure 5 below.

Figure 5. Station and Interchange Environs
Source: Department of Sustainability and Environment, 2006 p16

<table>
<thead>
<tr>
<th>STATION AND INTERCHANGE ENVIRONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBJECTIVE 2.1 TO ENCOURAGE PUBLIC TRANSPORT USE BY PROVIDING CONVENIENT, PROMINENT AND ACTIVE STATIONS AND INTERCHANGES</td>
</tr>
<tr>
<td>Design Suggestion 2.1.1 - Integrate transit stops and interchanges into the design and layout of the activity centre, and locate them centrally</td>
</tr>
<tr>
<td>Design Suggestion 2.1.2 - Develop station forecourts as part of an activity centre’s public space system</td>
</tr>
<tr>
<td>This can be achieved by developing the entrances and approaches to stations and interchanges to enhance their appearance, and to make them function as arrival points in the activity centre and as public spaces in their own right. Entrance points that are generous in proportion and provide for safe, convenient access, will assist in this process</td>
</tr>
<tr>
<td>Design Suggestion 2.1.3 - Surround railway stations, transit stops and interchanges with active, ground level uses</td>
</tr>
<tr>
<td>In particular, convenience shops, cafes and other day-to-day services and uses that stay open for extended periods can enhance safety and contribute to the liveliness of the interchange</td>
</tr>
<tr>
<td>Minimise low-activity uses, large char parks and blank walls around railway stations and interchanges as they can make the interchange feel unsafe.</td>
</tr>
<tr>
<td>Design Suggestion 2.1.4 - Maximise the efficiency of railway stations/major bus stops as transport interchanges</td>
</tr>
<tr>
<td>For example, provide separate, direct bus access to interchanges to avoid conflict with parking and pedestrian routes</td>
</tr>
<tr>
<td>Design Suggestion 2.1.5 - Use development to fill gaps in and around railway stations</td>
</tr>
</tbody>
</table>
The Urban Design Charter (2010)

The Urban Design Charter (2010) Victorian Department of Planning and Community Development delivers a 12 principles of ‘good urban design’ for the establishment of what is described as ‘Good Public Environment’. The intention of the Charter is to implement twelve public environment objectives to ‘substantially improve the liveability of Victoria’s urban settlements’ (p8). The Charter is largely a statement of principles with very limited detailed guidance. The public environment objectives include:

- Organise places so their parts relate well to each other (STRUCTURE).
- Provide ease, safety and choice of access for all people (ACCESSIBILITY).
- Help people to understand how places work and to find their way around (LEGIBILITY).
- Stimulate activity and a sense of vitality in public places (ANIMATION).
- Support the intended uses of spaces while also allowing for their adaptability (FIT & FUNCTION).
- Integrate complementary activities to promote synergies between them (COMPLEMENTARY MIXED USES).
- Recognise and enhance the qualities that give places a valued identity (SENSE OF PLACE).
- Balance order and diversity in the interests of appreciating both (CONSISTENCY & VARIETY).
- Maintain a sense of place and time by embracing change yet respecting heritage values (CONTINUITY & CHANGE).
- Design spaces that minimise risks of personal harm and support safe (SAFETY).
- Create places where all people are free to encounter each other as equals (INCLUSIVENESS & INTERACTION).
- Create spaces that engage the senses and delight the mind (SENSORY PLEASURE).

Land Use Planning: Density and Urban Form

This section outlines the evidence in the Melbourne context, regarding the debate between urban form and structure, including the impacts of the market; land release; development focus; dwelling type and density.

- The Melbourne metropolitan area has an extensive foundation of rail network infrastructure which formed the basis of the suburban expansion in the first part of the 20th century.
- Melbourne metropolitan density is 16 people per hectare, about the same as Vancouver (Mees 2010), based on a calculation that takes into consideration the impacts of unhabituated land areas such as open space, industrial areas etc.
- The debate between urban form and the importance of urban structure is at the heart of the compact city and transport issue. Many advocate for improving the structure (networks) rather than having to increase density and urban form before being able to achieve an efficient and quality system (Dodson et al. 2011).
- Melbourne 2030 had no method for achieving the two aspirational aims of reducing ‘broad hectare developments in new UGB’ and ‘increasing density in activity centres’ (Buxton and Scheurer 2007 p13).
- The availability of land within urban growth boundaries has removed the incentive for the redistribution of investment from growth areas to activity centres to enable opportunities for efficiency and density (Buxton and Taylor 2010).
- Land release has not been determined by government policy aspirations but by developer conservatism and profit (Buxton 2007).
- Much of the planning advocates for a dwelling density of 15 people per hectare – but it is not mandated and is instead flexible and open to negotiation.
- There are high economic costs of a system with so much inbuilt discretion and negotiation and no enforcement capability (Goodman 2009 p16).
Network Planning

Network management and the quality of service of public transport in Melbourne has been in steady decline. This has been attributed in part to many larger system factors, including:

- Discrepancies between the density figures required for maintaining a quality public transport service in dispersed urban areas;
- A lack of political and community consensus regarding the structure of a compact urban form;
- Two decades of failed market based reform;
- Changes in household needs regarding public transport services.

More specifically within the public transport network, this has included:

- The fare system – While Melbourne was one of the first cities in Australia to implement a multi modal fare system, it was not adopted within a multi modal network. This was due to the fragmentation of management provided for by private operators, resulting in extended service delays; three years over time and $3 million over budget.

- The Victorian Transport Plan (2008) (now obsolete) describes the need for continued integration of bus and train timetables and services but there is no proposal for institutional or service planning reform. The network is managed on a ‘demand based system’ (Mees et al. 2011 p13).
- Melbourne does not have a frequent enough bus services to support the train system with poor interchange facilities.
- Many vital services have closed over the years due to lack of coordination. For example at Monash University the buses arrived at ten minutes to the hour which did not coordinate with lecture times and therefore the service was not heavily used (Mees 2010).
- Expensive - service fares are increasing greater than CPI or inflation.
- There is an increase in patronage due to continuing population growth resulting in over crowding on many services.
- The current focus is on building of new (privatised) infrastructure rather than the efficient use of the existing infrastructure.
Finance and Market Mechanisms

Melbourne followed a London style of market placed reforms and split the management of transport modes to different franchises. This resulted in increased competition for service and funding, and did not support coordination ultimately effecting supply. In three years 1999-2002 MTrain went into receivership and Connex into insolvency requiring massive state bailout packages. Labor inherited this approach yet maintained this model (Department of Infrastructure 2005; Mees 2010).

- There is path-dependency for the financing of roads and the development of the City Link network of freeways EastLink, WestLink, and Peninsula Link (also noted the proposed East-West Link, Davidson, 2012).
- The Victorian Transport Plan (2008) did not include performance indicators only timelines for project investment (p148).

Sustainable Development


The Department of Transport website (2011) states that it recognises that climate change is one of the greatest environmental, economic and social challenges of our time, with a focus on air pollution and greenhouse gases. It states that a sustainable transport system should:

- Meet the social and economic needs of the present without compromising future generations’ ability to meet their own needs.
- Protect the environment, locally and globally in the short and long term.
- Provide and promote lower carbon transport options.
- Be safe and support improved health and well-being.

Researcher Note: It makes no reference to other sources for the definition used or how the definition was developed.

The website states that it is moving towards a more sustainable transport system by focussing on three major areas:

1. Shaping a more efficient city, where people live closer to their work, schools, services and shops.
2. Making it easier for people to use more sustainable forms of transport.
3. Improving the environmental efficiency of transport activity and the transport fleet.

Researcher Note: The use of the term corridor in the glossary section of Melbourne 2030 (p147) is for both local and regional roads, public transport, cycling and conservation. There is no definition of ‘sustainable transport’ although it is one of the key terms used at the beginning of the document regarding the overall aim of the transport strategy document in the Ministers introduction (2002:iv).
In 2009 Professor Rob Adams - Director of City Design and Urban Environment with the Melbourne City Council - in conjunction with the State Government Department of Transport released a report called Transforming Australian Cities, which investigated ‘the missing links’ within Melbourne @ 5 million strategy between activity centres, employment corridors and TOD and the potential for intensification within existing tram and bus corridors. The research includes Melbourne case studies and presents a well-researched argument for strategic residential and employment intensification along public transport corridors. The study won the Australia Award for Urban Design 2009.

**Governance**

- Approach of the plan is to use exemplar projects to demonstrate efficiency, sustainability and livability.
- The plan recognises that unless parameters are clearly understood by affected parties, roll out gets bogged down, as was the case with Melbourne 2030 (2002).
- It acknowledges the needs to have the community onboard to be able to argue and debate alternatives, particularly when considering incentives and disincentives.
- The main argument is in the protection of much of the leafy green suburbia.
- Communication is the key, utilising images so that people understand what medium density along the corridors actually might look like in context with the metro area.
- It includes a simple one-page approach to design guidelines
- The plan advocates for prescriptive controls to avoid developers overbidding and to allow small-scale builders to be involved in the development of the urban corridors.

**Researcher Note:** As this Urban Corridor Plan is not a reality this case study will briefly examine the Plan under the theme headings (key points) and give a design analysis examining the corridor elements.

Of significance to this research is the issue of public participation and engagement; use of existing infrastructure; density thresholds; developable sites and capacity; TOD and urban design elements; building local economy; and the human interface behind the intensification of the urban environment along the transport corridors. This plan is yet to be implemented and now awaits political directive. This case study illustrates how important the alignment of the detail within the key themes is to the adoption of sustainable transport concepts.

**Researcher Note:** This is similar to a Vancouver type approach – across the areas of design, governance, community, best practice and sustainability. This document is using a sustainable transport language and approach.
Land use and Density

- The document discusses the history of land use planning and the effect of maintaining current BAU approaches on our cities of the future, considering population growth and climate change.
- The aim is to build upon existing infrastructure lines rather than continually developing the city in the same way that was required at Federation.

The Plan advocates for a change of city form and structure with the densification of residential and mixed-use development along existing transport corridors with tram and bus priority routes. This represents only 10% of the metropolitan area leaving green productive suburbs of 90%.

The plan advocates for between 200 - 400 people per hectare along the corridors with a 60% uptake of residential and a building height of between 6 - 8 stories maximum. Density is important as it brings lower consumption, more equitable social characteristics and access to services.

A series of 11 steps have been developed in identifying the developable sites and development capacity along the urban corridors. These steps involve the identification of tram and bus priority routes and then the removal of particular sites to leave an indication of potential development areas. Sites that are removed include (Figure 6):

- Newly developed sites
- Areas in parks
- Public use and industrial zones
- Sites without rear laneway access
- Heritage listed
- Sites with frontage less than 6 metres
- 50% of sites within the heritage overlay

Some of the requirements for this to work successfully are as follows:

- All the existing and future major trunk public transport corridors need to be clearly identified, so that there can be no confusion as to the extent of the key development areas.
- All heritage buildings and public open spaces along these routes need to be protected.
- The extent of the footprint for redevelopment needs to be easily measured.
- The appropriate level of development, 4 to 8 storeys, needs to be determined up front and be as of right.
- Clear principles around the transition and overlooking conditions in relation to the properties running along the back boundaries of the designated sites need to be established.
- All new development will be required to provide no less than 80% active frontages along all street frontages. Vehicle access to sites should preferably be from rear lanes or side streets.
- All developers will be required to provide a percentage of affordable housing in any residential redevelopment (ie. a form of value capture).
- All new development will be required to meet high environmental standards, including integrated energy/water/sewer systems.
- Streets will be modified to favour rapid public transport, bicycles and pedestrians over motor vehicles

(Adams 2009 p29)
Figure 6. Station and Interchange Environs
Source: City of Melbourne and Victorian Government 2009 p21-23

1. Identify cadastral parcels
   Melbourne metropolitan cadastral parcels: 1,571,532

2. Remove special building zones
   (CBD, Southbank, Docklands, St Kilda Rd)
   Total Melbourne metropolitan sites = 1,569,116

3. Then select parcels along tram and priority bus routes
   Potential sites (tram routes) = 27,156
   Potential sites (bus routes) = 98,132
   Total = 125,288

4. Remove areas in parks
   Potential sites (tram routes) = 23,505
   Potential sites (bus routes) = 95,450
   Total = 118,955

5. Remove public use and industrial zones
   Potential sites (tram routes) = 23,202
   Potential sites (bus routes) = 91,252
   Total = 114,454

6. Remove sites without rear laneway access
   Potential sites (tram routes) = 18,188
   Potential sites (bus routes) = 22,440
   Total = 40,628

Steps in calculating developable sites along Urban Corridors

1. Identify cadastral parcels
   Melbourne metropolitan cadastral parcels: 1,571,532

2. Remove special building zones
   (CBD, Southbank, Docklands, St Kilda Rd)
   Total Melbourne metropolitan sites = 1,569,116

3. Remove heritage register buildings
   Potential sites (tram routes) = 17,726
   Potential sites (bus routes) = 22,038
   Total = 39,764

4. Remove sites without rear laneway access
   Potential sites (tram routes) = 18,188
   Potential sites (bus routes) = 22,440
   Total = 40,628
As outlined here, urban design criteria were applied to identify the developable sites adjacent to Melbourne's transport infrastructure (tram line, priority bus line) with a view to calculating the potential developable sites along urban corridors.

### Adjacent to tram lines

- **Developable sites – as per urban design criteria:** 13,439
- **Area of developable sites (ha):** 1,418
- **Current population of developable sites:** 42,540

### Adjacent to bus lines

- **Developable sites – as per urban design criteria:** 21,038
- **Area of developable sites (ha):** 5,275
- **Current population of developable sites:** 158,250

#### Development capacity of Urban Corridors

The number of developable sites was then used to calculate the development capacity of the urban corridors if two alternative density scenarios are applied.

- **Low density (180 people per hectare):** 1,003,950
- **High density (400 people per hectare):** 2,476,410

In summary, this demonstrates that Melbourne's Urban Corridors could accommodate a potential population increase of up to 2,476,410 people.

Disclaimer: Data has been collected from a variety of sources including VicRoads, Department of Planning and Community Development (DPCD) and Department of Transport. Each dataset has been collected to various levels of accuracy, completeness and currency. Where data is not available it has been derived. For example, rear laneways have been derived based on gaps between cadastral parcels.
Design and Place-making

The approach is for Transit Oriented Development style with urban corridor development that focuses on the urban design elements of place-making, building local economy and sustainability.

Design guidance has been kept to a minimum of one page design development overlay. Includes 6 key principles - mixed use; density; connectivity; high quality; public realm; local character; adaptability (Adams 2009 p 10)

An example of a visual representation of this process is provided below, in addition to potential end states (Figure 7 over page).

In response to the political backlash experienced due to policy aimed at the intensification of existing urban areas Woodcock & Dovey (2011; 2012) conducted research into the role that two urban design scenarios/visions play in public acceptance of intensification of transit corridors with activity centres of varying sizes in Melbourne (two types of images were used). In brief the research demonstrated the powerful impact on perception and cynicism that current visual tools evoked, in particular regarding a lack of a sense of character or identity, a key concern to local residents (p76).

In conclusion the research stated:

‘The poetic licence of an ‘artist’s impression’ does not sit easily within the discourse of planning law or democratic process. Without this integrity, planning for the intensified Australian city of the future will remain open to manipulation and increasingly contested by residents unable to trust the images used to justify policy’.

Researcher Note: This emerging research is important for the Sunshine Coast and SEQ region given the known political and community negativity to increasing density. Much of this uncertainty is attributed to a lack of information but also the method in which this information is communicated and advocated. The Vancouver case study illustrated some success approaches in this area to be considered also.
Stage 2 Case Study - Melbourne

Figure 7. Urban Corridors - possible futures
Source: City of Melbourne and Victorian Government 2009 p19

Financing
Not much detail with regard to financing was available in the advocacy document, however the key points included:

- Keeping cost lower through better construction methods.
- Expected economic productivity benefits along these corridors which will offset investment.
- The cost/benefit of only changing 10% of existing footprint and harnessing positive market forces of the private system.
- Smaller distributed solutions – not just set up for large-scale developers, and economies of scale.

Sustainable Development
This plan adopts much of the sustainable transport language, definitions and approach as seen in the best practice literature. The purpose of the plan is as a response to climate change and creating new ways to respond to issues of sustainable development.

Corridors are addressed as both urban and transport-oriented. The plan uses innovative methods to create an economically viable and sustainable future, whilst protecting the majority of the existing suburbs.
5. References


Victorian Government website and documents:
Stage 2: Case Study - Auckland

STAGE 1
LITERATURE REVIEW

STAGE 2
CASE STUDY INVESTIGATION

STAGE 3
FRAMEWORK DEVELOPMENT
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5 Transport Case Study 2 - The Ellerslie-Panmure
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This case study will include a partial examination of the Auckland’s transport system and focus on the historical governance framework and financial approach that has influenced Auckland’s position as one of the most car dependant cities with the lowest public transport use in the world (Newman and Kenworthy 1999; Mees and Dodson 2006; Mees 2010). Auckland, New Zealand provides a very good example of the influence that unclear definitions and policy intent has on the development of sustainable transport.

The use of the term ‘corridor’ to identify roads, highways and public transport has distorted the policy intent of a hierarchy of modes and has served to further emphasise the objectives of road building. The establishment of a compact and sustainable region, and the development of a community advocated public transport system, has been hindered in Auckland by a lack of policy packaging, incentives and disincentives.

In the 1950s Auckland was a city with high levels of public transport patronage facilitated by an extensive rail system. However, over time it established a road building highway agenda, and also followed the neoliberal reforms that saw the privatisation of publicly managed central services and a move away from public transport. This has been driven by path dependency of financing, reinforced by a biased modelling approach used for motorway development where methods for traffic forecasting distorted predicted performance figures. Bus transit has now become the dominant mode of public transport.

Auckland Region has a small overall population, and while it has a perceived dispersed form with a majority of single detached housing this is misleading, with the urban form actually reflecting a compact form and population density figures similar to Sydney. This case study may be seen to partially dispel the myth regarding required population and density thresholds for the provision of successful public transport and instead points to a lack of management.

These kinds of governance issues which could potentially affect the economic base of New Zealand were examined in a Royal Commission into Auckland’s Governance (2008). This inquiry resulted in the development of One Plan for the Auckland region (One Plan), a new regional governance framework which includes mechanisms to better enable spatial planning and improve participatory processes. Policy strategies are in the process of being developed to guide the future planning of the region.
2. Case Study Context Review

One Plan for the Auckland region (One Plan) ‘addresses how the region plans to achieve its aspirations for sustainable development’ (Wilson et al. 2008 p47). It is a regional based unitary plan and is the responsibility of the Regional Sustainable Development Forum. One Plan is a collaborative political forum with the aim of improving decision-making and implementation to create a resilient region that can adapt to change (ARC 2010). This new governance framework was introduced in December 2010.

The administration structure includes a first tier which is composed of the Mayor of Auckland and twenty (20) councilors nominated on a ward basis with a focus on the big picture and strategic accountability. The second tier will be made up of twenty-one (21) local boards with members elected by area and the responsibility focused on local community engagement only.

This move has been advocated as an important change in governance mechanisms to enable the economic centre and fastest growing region in New Zealand to build the organisational capacity to deliver more considered outcomes for strategic planning (Memon et al. 2007; Le Heron 2009).

The main policy, planning and funding authority for all public transport services in the region is Auckland Transport (AT), which is a Council Control Organisation (statutory entity) of the Auckland Council. The central government, through the New Zealand Transport Agency, funds approximately half the total PT subsidy.

The new organisation combines the transport expertise and functions of eight local and regional councils and the Auckland Regional Transport Authority (ARTA). The establishment of Auckland Transport marks the first time in Auckland’s history, that all transport functions and operations for the city, have come under one organisation. Auckland Transport is responsible for all of the region’s transport services (excluding state highways) - from roads and footpaths, to cycling, parking and public transport (Auckland City Council 2011).

The purpose of Auckland Transport includes:

- To design, build and maintain Auckland’s roads, ferry wharves, cycleways and walkways.
- Co-ordinate road safety and community transport initiatives such as school travel.
- Plan and fund bus, train and ferry services across Auckland.

The leading strategic transport document for the region is the Auckland Regional Land Transport Strategy 2010 -2040 (ARLTA). Figure 1 illustrates the regional area of Auckland and the Projects of high regional significance outlined in Auckland Regional Land Transport Strategy (2010).

Further guiding documents include (select):

- The Auckland Regional Growth Strategy (1999) has been under review since 2008.
- Auckland Sustainability Framework (2007) It provides the direction that the region’s local authorities and central government agencies need so that they can work together to develop a sustainable future for the region.
- The Auckland Regional Land Transport Strategy 2010-40 The purpose of the strategy is to identify what is needed to achieve an affordable, integrated, safe, responsive, and sustainable land transport system that can cope with population growth and the changing economic environment. It does this by setting regional objectives and policies.
Figure 2. Projects of High Regional Significance
Source: ARLTS 2010 p95
Population

Auckland’s population has grown two or three times faster than the rest of New Zealand over the last century. The greater Auckland Region has a population of 1,337,000, whilst metropolitan Auckland has a population of 447,000 and is projected to be home to 40 per cent of New Zealanders by 2050, approximately 2 million people (currently 30 per cent).

Auckland has high migration levels and the population is characterised by strong ethnic and cultural diversity (ARC 2006; Greer and van Canpem 2011). The Auckland metropolitan area is comparable to Sunshine Coast when considering growth and the size of the south-east Queensland area is similar to that of the entire OnePlan region.

Density Figures

Interestingly Auckland has about the same density as Sydney (20.4) and is more dense, than both Vancouver 17.6 and Perth 12.3, with a mountainous European style urban form (Mees 2010). Comparatıve figures regarding mode share and economic growth are difficult to establish. Given the differences in methods of calculating density, figures have ranged from 1420-2395 people per square kilometre and between 20-40 people per hectare (Auckland Transport 2011). This highlights the argument that Mees (2010) makes regarding the use of such data for decision-making given the discrepancy in the figure due to the arbitrary nature of urban boundaries.

Use of such figures in infrastructure decision-making dates back to early planning professionals who, in the 1956 Masterplan for Auckland, used deliberately misleading figures to promote highway development agendas. Consequently their method gave Auckland a density figure of 4 people per acre in instead of 15. This was a crucial time when public transport use and the quality of train infrastructure and service were high (Mees 2010 p25).

Figure 3 below is from the Auckland Passenger Transport Performance Benchmark Study (2011a) which examines select Australian, New Zealand, Canadian and US cities and confirms the current figures of low PT and high car use in Auckland.

Mode share

As briefly mentioned above public transport use in Auckland was the dominant mode to work at 58% in 1950 and equivalent to European cities at the time. Since then there has been a steady decline with Auckland’s transport planning adopting motor vehicle based highway systems, resulting in the current patronage figures falling to only 2% in 2000 (Coleman 2010). Bus is the dominant public transport mode in Auckland with a fleet of 1030 diesel powered vehicles.

Figure 3. Public Transport Statistics

Source: Auckland Council 2011 p19
3. Auckland Transport - Key Theme Analysis

**Governance**

Like the United States Auckland in the 1950’s adopted a highway building agenda that pushed out development and reduced the quality and service efficiency of any subsequent public transport investment. Auckland is described as having a strong path dependency for the financing of roads (Newman and Kenworthy 1999; Mees and Dobson 2006; Coleman 2010).

The literature does not suggest a local political hero or the issue of freeways as being a catalyst for the engagement of a community agenda or the forming of an agreed consensus for the planning of the city in these early years. There has been a history of misinformation given to the public regarding density, form and comparative cost analysis of transport and urban structure choices. Over time it may be argued that this culture erodes the ability of the political or community debate on spatial planning issues and creates mistrust and uncertainty within the wider community of and agreed direction long term planning.

New Zealand followed a neoliberal approach to planning of transport from 1989, resulting in the privatisation of buses and ferries to nine different operators. Privatisation affected the coordination and affordability of bus services and resulted in: reduced service levels; vehicle standards declining; the disappearance of integrated service; and the overall PT system became less legible (Mees and Dodson 2006 p13).

Despite subsequent land use and transport plans (1999 & 2003) seeking to reflect a transit oriented principles of development (and strong community support for increasing public transport provision) business as usual approaches have continued to dominate the policy and funding.

Flaws within the institutional framework may be recognised as the lack of a National Agency responsible for planning of public transport. However, there was a single road agency with a direct line of access to the Minister of Transport. The establishment of the Auckland Regional Transport Authority in 2004 partially addressed this shortcoming with a new prioritisation to provide public transport services.

Another important change to the community representation and level of recent debate has been the adoption of a Mixed Proportional Voting System since 1996. This is a very important representation measure that operates with a party vote and an electoral vote and allows a party to win a seat in government based on the percentage of the votes allocated. This has been argued to make central government more responsive to Auckland’s needs (Memon et al. 2008 p46).

These issues combined with low economic growth figures, acknowledgment of the need for more sustainable systems; and many youth leaving for opportunities overseas, led to the Royal Commission into Governance in 2008.

Key points regarding the change in governance include:

- **One Plan**, the responsibility of The Regional Sustainable Development Forum (RSDF), is a collaborative political body comprising representatives from central, regional and local government. This includes a leadership role in the ongoing stewardship of the Auckland Sustainability Framework, Regional Growth Strategy and is overseeing the development of One Plan for the Auckland region. Members consist of eight (8) councils including the Auckland Regional Council and the Auckland City Council.

- **OnePlan** was built on policy trajectories from trans-boundary issues of neoliberal governance and stakeholder community participation including the Growth and Innovation Framework that led to the Metro Auckland Project (MAP); and the Sustainable Action Plan in part associated with the Mayoral Taskforce on Sustainable Development (Le Heron 2009 p137). Murray (2010, p 2) advocates that this move toward a coordinated approach of spatial impacts to other sectorial policies has achieved a more effective and even distribution of economic development within a given territory than would otherwise be created by market forces, and offers the opportunity to integrate these differing theories.

This new governance arrangement has been well supported by professional and academics alike to enable the planning and management of an integrated transport system as part of the overall spatial planning strategy (Wilson et al. 2008; Murray 2010; Maclennan 2009).

**Researcher Note:** The change over to a unitary plan and regional framework for Auckland has only been in operation since 2011. The building blocks that make up the plan should enable a move away from the BAU practice in governance and policy direction. Strategies are in the drafting process.
Land Use Planning

The Auckland region has developed along a polycentric growth model, and despite claims to be a low density and dispersed city region Auckland is actually quite a compact area and has the same density figures as Sydney, and higher than Melbourne. The *Auckland Growth Concept* (1999) and *One Plan* (Version 1, 2008) promote a more compact urban environment, through the intensification of centres and corridors within the existing urban area.

‘Their spatial vision focuses on accommodating growth primarily in a network of highly accessible centres, from the neighbourhood level up to the regional CBD. Concentrating growth and high trip generating activities in particular, in centres and corridors linked by high frequency public transport corridors and good walking and cycling connections where appropriate, allows people to access opportunities with less need for travel, and improves the feasibility of public transport’ (ARLTS 2010 p47).

However the development of the urban structure through centre and corridor plans sits within an ‘Arterial Plan’, which again focuses on private transport. This is discussed in further detail under section Sustainable Development.

Network Planning

The only mention of network planning in the Auckland Regional Land and Transport Strategy was regarding a road network combining all modes into the key points (Sustainable Development Section ARLTP 2010).

A number of initiatives have been started in recent years to increase speed and service quality including the Northern Busway; the Central Connector Scheme and provision of real time information. There is a current resolution to find solutions to network issues associated with having different operators within the same area (ARC 2011 p75).

Finance

*The idea of spending more on public transport than roads – a stance which is bipartisan policy in cities such as Perth, Vancouver and Portland – was so radical that it could not be evaluated even as an unpublished ‘extreme’ scenario!* (Mees and Dobson 2006 p47).

The literature regarding path dependency of road funding in Auckland is built upon by the evidence in two research papers which have focussed on numerous case studies of city and traffic demand models used by Flyvberg et al. (2003; 2006). These publications showed the methods for traffic forecasting distorted predicted performance figures. Essentially, despite the large amounts of funds spent on infrastructure projects, there was little empirical evidence to demonstrate how well these projects performed in terms of actual costs, benefits and risks.

In the case of Auckland, Mees and Dobson (2006); and further in Mees (2010) established:

- That the Auckland Regional Council Transport Model – utilised an out of date database using a ‘fixed trip matrix’ which is a model that has been known to be biased for motorways, by transport planners for over a decade.
- The model totals the amounts based on the assumption that travel between different parts of Auckland are determined solely on demographic factors such as population and employment levels and not influenced by provision of additional infrastructure. Therefore the model predicts that congestion will not reduce the number of length of trips and that building or extending high speed motorways will not encourage people to travel further (Mees and Dobson 2006 p12).
- The model also assumes that people do not like to transfer from rail to bus resulting in large transfer penalties incorporated into the ‘mode split’. Given this scenario the model bias predicts that none of the rail improvements would increase patronage (ARC 2005; Mees and Dodson 2006 p5).

Researcher Note: This was a replication of model errors that were used in Perth in 1988, which determined that the now very successful Northern Suburbs would be a failure.

Financing & The Auckland Regional Land Transport Strategy (2010)

- Roads have historically been funded via fuel excise and road user charges.
- The strategy remains focused on the majority of infrastructure being roadway focused as it continues to try to fulfil the objectives of the original 1954 plan.
- There forecast funding gaps for public transport projects and local roads, but not in highway infrastructure.
- Alternative funding arrangements are mentioned as ‘possible’ (private partnerships, tolling) however these new financial mechanism are not clear or mandated methods.
- Interestingly when listing ‘supply’ policies, transport choice is mentioned (and not increasing PT mode supply), safety and sustainability management is mentioned and increasing capacity of road network (p77).
• There is some acknowledgement of path dependency and governance bias of BAU in the policy under economic measures. However the language remains ‘demand’ focused rather than on building supply (ARLTS 2010 p87).

Researcher Note: The Auckland Land and Transport Strategy (2010) remains focused on highways, and private motor vehicle as the primary means of getting to work and recreational trips. This is despite public preference for better access and supply of public transport modes, and policy speak talking up increasing density and compact corridors.

Researcher Note: The Auckland Council commissioned a 2011 Auckland Passenger Transport Benchmark Study, which will be used in the formulation of policy directions to improve Auckland’s public transport performance.

Researcher Note: A further implication for this research is that planning scholars need to more rigorously interrogate the technical assessment methods that transport planners and engineers deploy in predicting and evaluating future transport patterns. A model is only useful if it provides a valid approximation of the reality to which it is applied (Mees 2010 p14).

Sustainable Development: Definitions
‘There remains a lack of quantitative guidance as to the actual conditions and levels of service that will be acceptable (or achievable) in consequence. As a result decision-making may be based on existing perceptions or past experience with little or no thought of how, or indeed whether the decision is even compatible with the desired strategic outcomes’ (Rutherford 2011 p14).

Sustainable Transport
Auckland provides a good case study when considering unclear definitions and policy intent regarding sustainable transport and corridor development. An examination of the policy documents and strategies indicates continued private car and highway dominance within the hierarchy of: transport modes, clarity of policy direction, and incentives and disincentives - all of which is further entrenching BAU practice.

Neither the Auckland Land and Transport Plan (2010) and One Plan – for the Auckland Region (Version 1 2008) makes reference to a definition of sustainable transport, while the Auckland Sustainability Framework (2004) uses the term sustainable transport throughout the document. The newly released Regional Land Transport Strategy 2010-40 incorporates the term sustainable transport system, however does not provide a definition in the glossary or any other section of the report. The only additional explanation is shown in the following objective on page 31, which describes the ‘integration of sustainable transport to growth projections, density and corridor development’. Integrated transport planning is defined but does not include the term sustainable transport see below.

Objective: Integrate transport and land use supportive of the Auckland Regional Growth Strategy (ARGS) and Auckland Regional Policy Statement (RPS)

A sustainable transport system is integrated with the land use pattern it serves and is served by. While Auckland continues to expand at the edges is is also becoming denser. The RGS aims to manage the majority of future growth into well-designed urban growth centres and corridors as identified in the ARPS (incorporating Plan Change 6). The successful development of these centres and corridors will require transport infrastructure that supports public transport and active modes.

This outcome involves ensuring that the transport system supports the RGS by improving public transport, roads and walking and cycling links to and between high density growth centres, as well as supporting the development of corridors.

Source: Regional Land and Transport Plan 2010 p29

Corridors
In 2007, a study, Establishing a Classification for Auckland’s Centres and Corridors, was undertaken by the Auckland Regional Council, which identified the need for developing a classification of centres and corridors as a lack of consensus was affecting planning (ARC 2007 p16). The explanation and definitions that were proposed included:

• Establishing a hierarchy of centres and corridors which provide:
  • A consistent understanding of the role of centres and corridors across the region;
A leading practice framework for sustainable transport corridors

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Stage 2 Case Study - Auckland

- A basis to set appropriate targets for future population and employment growth; and
- Clear directions to infrastructure and service providers on the focal areas for growth and change (ARC 2007 p3).

The following definitions for corridors were also established (ARC 2007 p19):

- Distinguishing between those appropriate for residential growth and those suited to employment activities.
- Corridors for housing renewal are those areas within approximately 1km from a road with less than 80,000 vehicles per day. The corridors connect local centres, that are focused off the main roads, with quality public transport services.
- Corridors for employment activity are those busy roads in generally low amenity areas. Businesses may include showrooms, niche retail and low cost commercial space. These corridors generally connect larger sub regional centres and specialised business areas.
- Corridors for transport – facilitate inter-suburban travel, high speed routes for road and freight.

The Auckland Regional Land Transport Strategy 2010 - 2040 includes a ‘catch all’ definition for corridors: ‘A corridor encompasses single or multiple transportation routes or facilities such as a motorway, arterial road(s), public transport (bus or rail), cycleway and pedestrian facilities, the adjacent land uses and the connecting network of streets (and rail lines)’ (p148). The definition is contained with the explanation of ‘Corridor Management Plans’ which are the mechanisms for implementing Liveable Arterial Plans as they relate to roadway and route planning. The corridor management plans must identify and take into account the existing and future demands for scarce road space for the different transport modes - cars, trucks, public transport, cycles and pedestrians (Rutherford 2011).

The use of the term ‘arterial’ clearly suggests roads remaining at the top of the hierarchy, which is also supported in the network definition (outlined in the network section) and the language observed throughout the 2010 Strategy. This is supported by Rutherford (2011) who concluded that the corridor plan process faces key challenges in meeting public transport and town centre intensification as there is no clear policy mandate for stakeholders to move from BAU in their professional business specification toward a higher prominence of public transport, walking and cycling (Rutherford 2011 p13).

Researcher Note: This direction and lack of policy packaging and incentives and disincentives is further reinforced in the following definitions from the plan, which demonstrate a lack of a hierarchy for sustainable transport modes and further emphasises the objectives of road building.

Quality transit network (QTN) Provides a network of high-frequency, high-quality public transport. The majority of these are bus services operating bus priority measures between key centres and over major corridors. The QTN complements the RTN by connecting at key hub locations.

Rapid transit network (RTN) A RTN provides fast, high-frequency service in its own right of way, unaffected by traffic congestion. It aims to provide longer-term support for the more intensive growth proposed by the ARGS and to improve the region’s transport system. The RTN is shown in Map 3.

Transport network The national strategic and regional arterial roads and the passenger transport networks are shown on Maps 4. The network comprises the parts of the current and future transport network that are essential for moving people, goods and services around the region, and in and out of the region.

Transit orientated development (TOD) Transit orientated development is compact, mixed use development near new or existing public transportation infrastructure that serves housing, transportation and neighbourhood goals. Its pedestrian and cycle oriented design encourages residents and workers to drive their cars less, ride mass transit more and includes appropriate treatment of car parking.

Travel demand management (TDM) The term used to describe initiatives aimed at modifying travel behaviour in order to maximise the efficient use of transport systems. Examples of TDM measures include tele-working, ride sharing, more flexible work and educational hours, road pricing, parking constraints, cycling, walking and land use policies that support intensive mixed-use development. Such measures can avoid more costly expansion of the transport system by relieving the need to construct roads or provide more public transport.

Source: Auckland Regional Land and Transport Strategy (2010 p30).
4. Transport Corridor Case Study 1 Auckland Central Connector Corridor

The Central Connector is a fully operational bus rapid transit link built in 2008 linking Britomart Transport Centre in the Auckland CBD and the commercial suburb of Newmarket. (Figure 4).

- Six kilometres long
- 2,600 bus trips per day and services more than 65,000 commuters (meaning cars) daily
- Route - City Centre, linking the Newmarket shopping precinct, Auckland Hospital and Universities (Auckland and AUT) with the Downtown Britomart Rail Transport Hub.
- Time saving of 14 minutes

The corridor upgrade included:

- Street widening.
- Construction of bus lanes.
- Pavement reconstruction.
- Upgrading footpaths.
- Sewer separation.
- Street furniture renewal.
- Significant services relocation and renewal.

Of significance to our study is the coordination of works completed with no opportunity to effectively separate the work site from daily travel and business, which has been described as an intensively populated and extremely busy section of Auckland’s transport network (Cunningham 2011).

Governance

The project was part of the long-term strategic ‘roading programme’ for Auckland City where bus road and rail links are designed to provide a free flow of people to and from major city destinations.

A traditional tender model was used however the NZ $37 million dollar project was constructed by the The Alliance, now known as the Newmarket Alliance which comprised of the NZ Transport Agency (NZTA) as both client and Alliance participant, along with Fulton Hogan, Leighton Contractors, Beca Infrastructure, VSL New Zealand, URS New Zealand, Tonkin & Taylor, and Boffa Miskell (Figure 5).

Researcher Note: The Alliance has been mentioned in other reports when highlighting the model of a successful PPP project.
Engagement

The planning and consultation phases took place 3 months before construction commencement and included partnering workshops, stakeholder strategy and project programming. Stakeholder challenges included resident satisfaction, business continuity, health and education facilities and historic buildings, trees and cemeteries.

The shared vision for the Central Connector project was agreed by the project team together and utility company representatives: (no mention of other community input)

- Create a high quality, efficient, sustainable Transport Corridor that people want to use.
- Establish a Services Infrastructure within the corridor that supports future needs, so that people can enjoy living and working.
- A memorable project we can all be proud of, which enhances the environment and preserves the city’s heritage along the route.

Key to the success of the project was the Auckland City Council’s requirement of the Project Partnering Charter, which includes Partnering principles aligned to the key outcome deliverables within the contract. The Auckland City contact remained part of the project team with daily onsite input.

To facilitate this relationship a shared site office was established where the contractors, client and engineers were all co-located. This initiative fostered close and respectful relationships, which avoided extensive correspondence and greatly sped up decision-making processes. Whilst this approach is frequently observed in Alliancing projects, it is innovative for a traditional form of contract (Cunningham, 2011).

Researcher Note: The self-written document claims that it is an award-winning project. However, I cannot seem to find a single Council case study report regarding the success of the project. It talks about the urban design and integration with the corridor but does not provide the detail. I have been unable to find any other independent analysis of the project that has not included one of the contractors.
Rutherford and Munroe’s (2011) study investigated the process behind the decision-making of proposed bus lanes on The Ellerslie-Panmure Highway Corridor Plan (Figure 6). This case study provides a good example of an approach to move away from BAU by building professional relationships to deliver best practice and context focused designs that reflect new policy.

- Total distance 6.3 km
- Carries between 25000-40000 vpd
- 4 lane undivided arterial
- Intersections uncontrolled
- Proposed to have on road cycle lanes
- Part of quality bus network
- Traffic modeling predicted bus demand up to 80,2041
- Desire for better bus interchanges
- Intersections had alignment and access deficiencies

**Corridor Plan**

The design concept was for a 4-lane road plus bus lanes at intersection approaches, with footpaths, cycle lanes, a median (flush or kerbed), plus enhanced landscaping and street trees along the road edge. Managed under the Livable Arterials Plan (2007), the corridor includes the following planning classifications:

- General vehicle emphasis; and an
- Intermittent passenger transport emphasis; and with
- Select locations also having a community emphasis (p8)

**Design**

Tension between professional staff i.e., engineers and planners regarding public policy interpretations and priorities regarding the private car, freight, PT, walking and cycling could have resulted in a BAU style solution (edge bus lane) for the positioning of bus lanes along this corridor.

However, an innovative workshop was held which aimed to reduce the potential conflicts between the different specialisations. Rutherford and Munroe (2011), make the point that this inflexibility is not only the domain of engineers and planners, but is an issue across the board when disciplines lack best practice knowledge.

The following points regarding edge vs. centre bus lanes were concluded:
Edge bus lane disadvantages:
- Safety issues as vehicles entering or leaving the road at driveways and side roads must enter and / or cross the priority lane.
- Safety issues (notably for pedestrians and cyclists in-between lanes, such as during an informal crossing) due to the potential for a relatively large speed differential between vehicles in the priority lane and vehicles in the adjacent general traffic lane.
- Permanent bus lanes require the removal of kerbside parking through the day.
- Conflicts with cyclists (especially where a bus crosses a cycle lane to stop / start).
- Land use and other edge amenity impacts particularly at bus stops.

Central bus lane disadvantages:
- Bus stops are located in the centre of the road meaning all embarking or disembarking passengers must cross one direction of traffic (a common and accepted situation with trams / light rail).
- Road space is required to accommodate bus stops (as these are not located within the footpaths or berms).
- For safety reasons a kerbed median should be provided between the central bus lanes. This has implications for the management of access to fronting properties and side roads and requires appropriate provision for u-turns.
- It is noted that in the case of EPH, access management was already deemed desirable to maximise the efficiency of the single travel- lane (per direction) stretches of the corridor.

Central bus lane advantages:
- Sends a clear message that public transport, cycling and walking are attractive and desirable travel modes.
- Provides footpaths and cycle lanes that are least affected by high frequency bus effects (physical intimidation / intensity, acceleration, fumes, idling noise and wind shear);
- Helps promote and establish a positive branding for public transport. It also gives a message that buses are the most important users of the available road space not cars.
- Can minimise conflict with turning vehicles subject to right turn needs.
- A major advantage of central bus lanes over tram / light rail lines is that they can be introduced one section at a time, or can be limited to individual sections of a corridor, depending on road space and frontage development constraints. A design was pursued that would allow staged implementation of a central busway. This was coordinated with the edge bus lane option, so that one could evolve into the other as bus frequencies increased over time.

Figure 7.
Bus lane examples
Source: Rutherford & Munroe, 2011 p17
Figure 7 shows both options in a road with a 25m reserve width. The kerbside bus lane option has a 3.5m footpath, 4.5m bus/bike lane, 3.2m general traffic lane in each direction plus and a 2.0m raised median. The central busway cross-section has a 3.0m footpath, 1.5m kerbside cycle lane, 3.2m wide general traffic lane, and a 3.2m wide bus lane in each direction plus a 3.2m wide raised median.

Figure 8 shows a central bus stop at a traffic signal controlled intersection. Each platform is located at the departure side of the intersection. This off-setting minimises the overall road width required. It also enables right-turning traffic to share space with the bus lane where there is insufficient width to accommodate a separate right-turn traffic lane, and a right-turn ban is not feasible.

Final decision-making

The central bus lane was considered to be the more attractive option where permanent bus lanes are required. The major motivation for this to occur was the policy directive to have greater emphasis placed on walking and cycling. However the researchers note that no matter what configuration is ultimately used in the future, the exercise helped advance the debate on how available road space could be prioritised differently to meet policy objectives.

Rutherford and Munroe (2011) suggests that further work is required at the level of how built environment experts communicate with each other and prioritise outcomes against integrated filters that take into account technical criteria or indicators from other disciplines, which our literature review would concur.

‘To be successful, it was felt that those modes would need facilities of a quality that could attract new users and the development of a mix of land uses, rather than just supporting general patterns and levels of existing use. In a scenario where up to 40 high speed buses moved along the edge in the peak hour, it was felt that walking and cycling, even where provided with their own priority lanes, would not be appealing to marginal users and thus fail to attract the mode shift aspirations underpinning the policy approach. The constrained corridor width and lack of berm separating a footpath from (often fenced) property boundaries likewise meant cycle lanes could not be safely provided ‘off road’ and away from buses at the road edge.’

Rutherford and Munroe (2011 p13).

The case study demonstrates a valuable process oriented outcome regarding corridor design of bus lanes and it is important to note that preferred designs are context specific.
6. References


Stage 3: Framework Development
Sustainable Urban Transport Corridors

STAGE 1
LITERATURE REVIEW

STAGE 2
CASE STUDY INVESTIGATION

STAGE 3
FRAMEWORK DEVELOPMENT
Contents

Research findings under key theme areas:

1. Governance - Institutional, Political & Community. .......................... 138
2. Land Use Planning - Urban Form, Structure & Density .................. 145
3. Design and Place-making - Accessibility, Urban Design & TOD ........ 148
4. Network Planning - Management, Quality of Service & Travel Behaviour . . . . 150
5. Finance and Market Mechanisms - Principles, Approach & Indicators . . . . 154
6. Sustainable Development - Sustainable Transport & Transport Corridors . . 158
The intention of the Sustainable Urban Transport Corridor Framework is to provide an informative structure that may assist a multidisciplinary approach to identifying the requirements for successful and sustainable transport and urban corridors. This Framework recognises a range of interdependent issues at a variety of spatial contexts – regional, local, corridor and site – and provides new knowledge and perspectives based on Stage 1 Leading Practice Literature Review and Stage 2 Leading Practice Case Study Investigation.

The following Framework is designed to facilitate individual and joint actions at the State, Regional and Local government level, and by the private sector, non-government agencies and community organisations. The Framework seeks to disentangle the complex, integrated and multifaceted key themes of Governance, Land Use Planning, Design and Place-making, Network Planning, Financial and Market Mechanisms, and Sustainable Development through the use of interdependency tables.

Reviewing the Framework

Under each of the key themes a complete synopsis of the best practice literature and case study research investigations are detailed at regional, local, corridor and site contexts. Adjacent to each outcome the interdependent nature of that finding, to all other key themes, is highlighted.

A practical example

If you are a Network Planner you could go directly to that section of the Framework and review the research findings as they relate to your discipline and jurisdiction. You will immediately be able to recognise where individual Network Planning research findings are considered to impact or influence any of the other key themes. It is then possible to review those research theme findings to gain a clearer interpretation of key leverage mechanisms to target gaps and opportunities at a range of scales, and identify stakeholders for future collaboration. The Stage 2 Case Study Investigations may then be referred to for greater detail about best practice examples and initiatives including links to further reading and websites aligned to each key consideration.

The framework is not designed to provide specific developmental solutions, but to act as a guide for all stakeholders in moving towards sustainable, context driven transport and urban corridor solutions.
**Governance**  Institutional, Political & Community

At the regional level the research was concerned with highlighting historical governance arrangements; level of decision-making; the influence of the market and politics; and the factors (citizen and stakeholder participation) that create strong spatial planning documents to guide sustainable transport and corridors.

<table>
<thead>
<tr>
<th><strong>Sustainable Urban Transport</strong></th>
<th>Governance - Regional and Local Scale</th>
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<tbody>
<tr>
<td><strong>Transport Management - Regional</strong></td>
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<tr>
<td>R A transport authority needs to have responsibility as a lead organisation for the planning of both urban and transport policy, including the overall management of all transport modes.</td>
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<td>R Central governance and management of public transport system is required – contractors for public transport modes must be retained as wholly owned subsidiaries.</td>
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<td>R A decentralised and privatised/franchise arrangement for private contractors and the management of public transport creates competition that is counter to running an integrated network based on increasing supply.</td>
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<tr>
<td>R Transportation needs to be included as an integral component of city building and regional planning, not as an additional goal. Public transportation greatly influences the quality and economic vitality of a region. Politics and private corporations play a significant role in the development; realisation; and success of sustainable transport systems and corridors.</td>
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<tr>
<td>R Successful regions are guided by strong spatial planning documents. These are facilitated by transparent political forums which embrace debate and participatory processes around key issues like freeway development and urban growth boundaries.</td>
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<tr>
<td>L C S The involvement of higher educational institutions has been key to the long-term success of public transport corridor projects with regards to advocacy, ongoing research and patronage. An example includes financial support to boost supply as part of a policy packaging process.</td>
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<td>R L C A strong policy focus and intent is required in order to change behaviour towards a certain mode of transport (website, newspaper, public events, university, and government staff initiatives). A current example of this is with cycling in Vancouver.</td>
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<tr>
<td>R L Both regional and local government have key role to act as a nonpartisan political body and create a political forum to engage, create, debate and educate community on contemporary issues.</td>
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<tr>
<td>R L Regional and city areas need to be able to work together when considering growth management plans and local area requirements for urban corridors. Cooperative development and inclusion of issues such as: growth targets and affordable housing; small business provision and rents; density minimums; parking maximums and street connectivity for walking and cycling connecting with transit.</td>
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### Sustainable Urban Transport

#### Governance - Regional and Local Scale

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<th>Transport Management - Regional &amp; Local</th>
<th>GOVERNANCE</th>
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<th>SUSTAINABLE DEVELOPMENT DEFINITIONS</th>
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<tr>
<td>R L The research has shown strong evidence of path dependency for the funding of road infrastructure embedded by strong institutional organisations (ie VIC ROADS)</td>
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<td>R L The use of ‘total’ dollar figures in policy documents and as a tool in the political argument to support the provision of one mode over another is very powerful and persuasive for decision-making. Quoting simplified numeracy is easily interpreted, but often meaningless without interpretation and analysis of underlying causal factors.</td>
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<tr>
<td>R L The literature, and history, shows us that the methods used for modelling roadway demand and analyses are often dubious. Even when implementation demonstrates the modelling is incorrect - such as much higher patronage – these outcomes are considered as measures of success and evidence of need. <strong>There is a strong research basis for arguing that increasing supply serves to increase demand.</strong></td>
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<td>R L Economic and transport modelling are based on a mathematical representation of linkages between selected elements and are thus limited in the representation and transparency. They may also be used to inaccurately promote and justify certain projects and the expected future benefits (i.e. Clem Tunnel Toll, Brisbane and City Link Freeway, Melbourne).</td>
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<tr>
<td>R L There is a global and national preference for light rail to be used along key corridor lines and circular connector routes, with buses mainly being used as the feeder mode as part of a network. This is in part due to the reliability of service and revenue and importantly the benefits of the associate urban development it attracts.</td>
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<tr>
<td>R L Light rail is also a preferred public transport travel mode (perceived quality, smoother ride, less disruptive, more direct and faster, design) and may be shown as a catalyst for patronage and local and regional investment and development along the corridor. Centre median running emphasising the perception of ‘first class citizen’.</td>
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<td>R L Practitioners working within a policy directive created via open political and public forum of ideas establish an environment where actions and progression of initiatives occur.</td>
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Collaborative processes between stakeholders and decision-makers are important to successful transport planning and policy outcomes. These processes need to include partnerships between transport providers, land use planners, engineers and transport agencies across all jurisdictions (state, regional and local).

Cross-departmental communication (i.e. engineers, planners and economists) was highlighted as a clear gap within, and between, Local and State Government departments.

Leadership and clear direction needs to be provided by senior bureaucrats to champion the sustainable transport approach.

The use of marketing by government as a tool to engage the community has shown two differing results. If it undertaken to ‘sell’ bad policy or a failing initiative or system (bad management/lack of transparency/ saying and doing two different things) it generates further distrust and contempt. If it is used to be informative and consultative it can be very powerful means of gaining public support for new projects and sustainable living policy directions.

Sustainable transport requires a strong regional growth strategy that is not influenced by the market or development – non-negotiable. It requires a strategy which directs development to reflect the goals of the plan (along corridors and centres and not on the fringe/ UGB where there are limited resources and infrastructure) – and in the long term creates the urban form desired.

Legislative frameworks and rules that govern how a city operates have had success by the inclusion of a Charter rather than only a Local Government Act. A Charter can create a stepping-stone between the non-recognised Local Government in the Constitution. The Vancouver Charter is a unique statute that incorporates the City of Vancouver, British Columbia and Canada. This has granted the city more powers than any other region in British Columbia. Portland Oregon also has a formal regional planning tier of metropolitan governance with powers to deliver collective services and engage with urban planning (a unique arrangement within USA).
**Governance**  
Institutional, Political & Community

At the local scale the consideration was focused on the role of policy development and professional best practice across the institutional framework. Identification of examples includes the importance of political debate and citizen and stakeholder participation.

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<tr>
<th><strong>Sustainable Urban Transport</strong></th>
<th><strong>GOVERNANCE</strong></th>
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<th><strong>SUSTAINABLE DEVELOPMENT DEFINITIONS</strong></th>
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<tr>
<td><strong>Decision-making committees for transport initiatives need to</strong> be made up of a wide section of the community including end users and the broader community, politicians, business owners and professional practitioners. Methods for selecting members need to be transparent and not predetermined. Committees require clear expectations and opportunities for meaningful input (funds, powers and roles), with membership of on-going committees to be rotated every three years.</td>
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<tr>
<td><strong>Gifted and committed politicians, industry professionals, and committed community with shared ethos create outcomes.</strong> When the community view the local government staff as trustworthy, it provides the environment to get on with planned and responsive objectives.</td>
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<tr>
<td><strong>Mechanisms to mediate power issues (between disciplines and hierarchies) are important in the planning and design process to ensure best practice and policy directions are realised.</strong> This is also important considering the levels of influence that individuals (Councillors) may have on the decision-making process (i.e. What they think, rather than what the community they represent wants). It is important to also provide the political forum for that discussion and debate to occur in an authentic way. Good context information – clear argument for decision-making.</td>
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<tr>
<td><strong>A level of local government autonomy has been noted to have benefits both with regards to decision-making and exploring innovative ways of enabling projects (financially) that regionally may not have been initially supported. Local level revenue generation allows for considerable local control and flexibility in the planning and implementation of projects.</strong></td>
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<tr>
<td><strong>Success at the local corridor level encourages greater interest and participation for subsequent projects by regional government bodies, research centres and University support. Local level successes have been shown to drive broader formal policy integration.</strong></td>
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<td><strong>Direct Local Government access to funding from National/Federal funding streams can enable greater opportunity for public transport initiatives to become a reality (Portland Street Car). The ability to access National funding to directly consult with households to illustrate density/housing community examples has been successful (Vancouver).</strong></td>
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<td><strong>A mandate for corridor projects can become a reality by exploring alternative leverage mechanisms, such as developer contributions and city level revenue.</strong></td>
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A successful model to expand PPP funding models across other institutions and organisations is demonstrated in Portland where the City Council who initiated the project also manages the system as a not for profit-corporation. This management corporation reports to the Regional Office of Transport and the regional transport authority remains responsible for operators and mechanics (network coordination). This also enabled local manufacturing industry to be created designing and building Street Cars (light rail).

Projects need to be driven and ‘owned’ by the mix of local community, government stakeholders and professional practitioners. Developing trust between these groups allows action to take place and results are shown to include significant achievements in mode share, sustainability and economic prosperity.

Community participation creates a strong direction and a mandate for policy packaging that supports long term goals and influences funding pathways. Less time is spent reinventing and rewriting and more energy and funding is able to be directed toward action. When a community distrusts the transparency of a process it destabilises professional argument and the political environment.
**Governance**  Institutional, Political & Community

At the locat and corridor site scale the governance considerations were focused on the importance of political debate, and citizen and stakeholder participation in the formulation of policy and corridor plans.

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<tr>
<td>C S The provision of public transport (light rail in particular) is a significant means to engage support from community, local business and the market for urban revitalisation projects. There is value in exploring alternative leverage mechanisms, including developer contributions and city level revenue. A ‘corridor community’ can be a powerful force as they are often enthusiastic for the investment benefits that PT may bring.</td>
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<td>R L C S Transport corridor development requires an action plan – identifying key priorities, outcomes and evaluation criteria. Performance criteria should reflect the policy position of spatial and transport planning and the wider principles of sustainable transport.</td>
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<tr>
<td>R L C S Corridor development requires cross-organisational support from all levels of government, transport management, industry and academia.</td>
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<tr>
<td>C S Transport corridors require favourable institutional and political factors – e.g. Does the corridor fit with the wider city building goals - transportation, energy and land use? Does it match federal, state and local policy frameworks and priorities?</td>
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<tr>
<td>L C S There is a need to ensure corridor policy principles are written to facilitate desired outcomes, avoiding competing and conflicting statements that lead to different interpretations by different disciplines. Differing interpretation often results in BAU due to lack of information, resources and power hierarchy.</td>
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<tr>
<td>L C S Governance models of planning and administration at the local corridor level improves local (place) economics, urban design and builds place identity – place-making. This may include a model of two-way communication between local area committee(s); councillors; corridor place-managers; and Council professional staff (IAP2 Spectrum).</td>
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<tr>
<td>L C S Project workshops may help to reduce potential conflict between different stakeholders and specialist practices – engineering, planning, urban design – outsourced facilitator. This cooperative engagement allows opportunities and access to best practice information in order to debate and collectively deliver the best design solution for the corridor - a process oriented outcome.</td>
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<tr>
<td>L C S Communication between all stakeholders is the key and the use of imagery allows for clearer interpretations of issues and outcomes. For example, a visual indication of what is meant by ‘medium density’ along the corridor in the context of a particular location.</td>
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</table>
## Sustainable Urban Transport

### Governance

<table>
<thead>
<tr>
<th>Partnering principles, such as a shared site office, may foster closer relationships via formal and informal opportunities for ‘in the moment’ correspondence and may speed up the decision-making process.</th>
<th>GOVERNANCE</th>
<th>LAND USE PLANNING</th>
<th>DESIGN &amp; PLACE MAKING</th>
<th>NETWORK PLANNING</th>
<th>FINANCE &amp; MARKET MECHANISMS</th>
<th>SUSTAINABLE DEVELOPMENT DEFINITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>The use of typologies to define a TOD investment framework is useful. They may operate as part of a categorised TOD cluster (see Portland) that identifies attributes before and after development of urban areas and corridors. It also allows for new programs and activities to be introduced where appropriate to maximise future TOD potential.</td>
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<tr>
<td>Prescriptive controls may be required to avoid developers overbidding and to allow small-scale builders to be involved in the development of urban corridors. The ‘economics of place’ is very important.</td>
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<tr>
<td>Singular ownership of large land parcels along a corridor may greatly influence development style and set a market price which controls the type of tenants. This may be avoided with clear performance criteria and provisions made for small time developers, builders and architects. This also supports the future success of the corridor – i.e. local businesses and opportunity for innovative industry to grow.</td>
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<tr>
<td>One of the roles of a local councillor should be to articulate the local needs and provide a mechanism for the professional argument to be debated (for example why a certain approach is the best option and process). Their role is not to control the direction of the debate between experts and community.</td>
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</table>
Land Use Planning  Urban Form, Structure & Density

This section of the research is concerned with how urban form and structure, including population distributions, affect the establishment of high quality transport systems. Issues concerning integrated transport and land use management; policy packaging; and the influence of the market are highlighted.

### Sustainable Urban Transport

**Land Use Planning - Regional and Local Scale**

#### Urban Form and Structure

- **R** For much of the 20th Century public transport infrastructure was the catalyst for determining urban form and settlement patterns in most Australian cities. However it is often argued otherwise.

- **R L** All case study regions examined are pursuing a compact city form using a ‘centres and corridor’ spatial planning approach and growth strategy.

- **R L** The debate between urban form and the importance of urban structure is at the heart of the compact city and transport nexus. Advocates have demonstrated the value in improving the structure (networks) rather than having success and viability determined by density and urban form thresholds.

- **R** Viable public transport can be facilitated within low-density urban form (in the short term) while moving towards a more compact urban form utilising corridors as part of a long-term strategy.

- **R L** Public transport and rapid transit corridors in particular influence economic development, human settlement patterns, urbanisation and sustainability.

- **R L** Transport corridors need to be guided by strong strategic and spatial planning documents and integrated infrastructure planning. Public and private transport is central to land use planning and should not be considered as a separate goal.

- **R** Market driven land use planning and development often determines urban form and function, despite strong spatial planning documents. Land release needs to be determined by government policy aspirations and not by developer conservatism and profit. Policy that advocates for a dwelling density needs to be mandated and not open to negotiation (Melbourne case study).

- **R** There is high economic cost in planning systems with large amounts of inbuilt discretion, negotiation and no enforcement capability.

- **R** The availability of land in urban growth boundaries removes the incentive for the redistribution of investment from growth areas back to activity centres, which could enable opportunities for efficiency and density.
There is a growing body of advocates for building upon existing infrastructure lines (corridor intensification) rather than continually developing the city or region in the same way that was required at Federation (extending out - BAU). There is a need to engage in new ways of planning based on the different challenges of our time – population growth, climate change, and resource depletion – utilising the technological innovations available.

Density figures and a dispersed urban form are strong factors in the decision making of transport corridors and provision of public transport investment. While density is important the research demonstrates that policy and management of the system (network is more influential).

State, local and regional documents all use conflicting density figures and methods. For accurate interpretations a ‘Density Profile Chart’ needs to be developed including mesh blocks. The methods used in the calculation of population density greatly impact the final density figures.

Public transport requires appropriate land use zoning (and density targets) to support precincts and stations along public transport corridors. There is often limited political will change planning schemes which support infill and not greenfield development.

Public transport corridors play a key role in achieving local and regional targets in ridership, walking and cycling. Corridors are also important for achieving Greenhouse gas emissions targets and increasing local economic development and employment.

Planning at this level needs to ensure that services are offered that meet human needs along the corridor – mixed use, quality environments – and maintain the mantra ‘that every transit trip starts and ends with your feet’.

Urban intensity is important along corridors - 800 metres is the most that a percentage of people will walk to a corridor/station area. The success of corridors is also determined by the legibility and opportunity to walk and cycle, this requires Local Area and Corridor Strategies.
Corridors need to work as part of a bigger transport network when considering intermodal choice – the corridor cannot be expected to do it all. For example, there is no point painting bicycle lanes into the design of a corridor if they are too unsafe to use and will only attract a small part of the population.

A corridor hierarchy (based on scale and function) can be a useful tool in the identification of attributes for development and funding (TOD approach see Portland case study).

The Melbourne urban corridor plan (2009) provides a valuable example of the use of key principles to establish and calculate the percentage of developable sites and development capacity along existing urban corridors.

Corridor plans that sit within road strategy documents create a conflict of interest and affect decision-making process within and across disciplines.

Clear policy to drive land use and design of corridors needs to reflect best practice and not BAU.

Freeway and motorway development that exists to link inner urban areas directly with regional or fringe areas place too much competition on public transport modes (speed) undermining its viability. The same is true for the linking of urban ‘centres’ with direct private transport routes.

Running public transport along existing freeway infrastructure can be successful on a regional level (Perth Mandra Rail) however it affects the type of urban corridor and human interface possible. Eg. A TOD station style development – Portland Tri MET.

Freeways can separate the haves and have-nots by creating a strong edge divide between people and their connection to resources and places. In addition, motorways may push property prices up on the beach side (connective communities) and lower them on the other.
### Design and Place-making  Accessibility, Urban Design & TOD

At the regional and local scale this section of the research is concerned with the identification of the underlying design principles for the development of sustainable transport corridors and surrounding catchment. Further analysis was included within the assessment of the case studies at the local corridor scale.

#### Sustainable Urban Transport

<table>
<thead>
<tr>
<th>Accessibility, Urban Design and TOD</th>
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<tbody>
<tr>
<td><strong>R</strong> Transport and infrastructure networks are important in creating a framework of ‘place’ by establishing the relationships between built form, activity centres, environment and open space at the macro level. At the micro (human scale) scale – intersections, street furniture, footpaths, bus stops and public convenience facilities are all significant infrastructures.</td>
</tr>
<tr>
<td><strong>R</strong> The economic success and sustainability outcomes of urban corridors are influenced by consideration of broader social goals, such as housing affordability, health, social cohesion and cultural diversity.</td>
</tr>
<tr>
<td><strong>L</strong> Delegated independent technical excellence and the establishment of incentives for high quality design may alleviate community fears of higher density/intensity living. Design and place-making initiatives need to be presented to the community in a language that easily describes the design benefits and increased human experience within the corridor.</td>
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<tr>
<td><strong>R</strong> Identifying the functions of the parts of the corridor to match urban and transit context, allows for a continuance of the place history and maintains community connectivity to design outcomes.</td>
</tr>
<tr>
<td><strong>R</strong> The design of the transport mode (light rail, bus, heavy rail) does not have to be at one level. Corridor designs within the case studies highlighted success at many levels – street, underground and elevated depending on the context. This is also the case with the design of pathways for cycling – separated and on-road designs depending on the section – allowing context based design to prevail.</td>
</tr>
<tr>
<td><strong>R</strong> The language and details in urban design and TOD guideline documents for activity centres and corridors needs to be proactive and clear – not suggestive. Supported by considered argument and overall corridor vision and detailed solutions. This has been evidenced in the successful case study areas and general literature. Principles are not enough – detailed guidance for application and evaluation are required.</td>
</tr>
<tr>
<td><strong>R</strong> Community and stakeholder consultation is necessary to develop shared vision and authentic mechanisms at the outset of corridor projects. From this basis illustrative and detailed design options may be developed that outline the benefits according to the overall corridor principles, section by section (Vancouver).</td>
</tr>
</tbody>
</table>
Technology can play a greater role in articulating design outcomes to the community. The use of real time simulations of three-dimensional environments may assist in expressing a more reliable sense of urban futures.

Design guidelines need to be managed by an integrated transport authority not a road authority to avoid a conflict in policy directive. This includes communicating and consulting the public.

Process mechanisms need to be employed to facilitate new sustainable transport policy interpretations and priorities for design.

Innovative workshops between multidisciplinary professionals improve potential conflicts and inflexibility and access to best practice knowledge.

Urban design principles (charters) need to be more than a set of guiding attributes and embedded practically within design process and justification of decision-making.

Strengthening the legibility of footpaths and separate cycle paths is crucial for increasing supply and patronage to the corridor and to public transport. The majority of the users live within an 800 metre radius of the corridor. Within the literature and successful case studies footpaths and cycle paths are evidenced as playing an important role in the success of the function of the corridor and as a precursor to achieving patronage levels.
### Design and Place-making  Accessibility, Urban Design & TOD

In addition to the establishment of key design elements, this section examined the practical and intuitive nature of context-based urban design; pedestrian prioritisation and place-making opportunities at the site scale.

<table>
<thead>
<tr>
<th>Sustainable Urban Transport</th>
<th>GOVERNANCE</th>
<th>LAND USE PLANNING</th>
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<th>SUSTAINABLE DEVELOPMENT</th>
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<tr>
<td><strong>Accessibility, Urban Design and TOD</strong></td>
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<tr>
<td><strong>L</strong> Local council initiatives are crucial for place-making. They need to play a key role in engendering the perception and function of the street as a public space within both the local and business community.</td>
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<tr>
<td><strong>L</strong> Good design equals successful and sustained corridors – economically, socially, culturally and environmentally – and this spills over into the wider community. Increasing the quality of the built environment allows for more frequent and enhanced community interaction and encourages short distance travel – from home to the bus stop. Quality fittings and features within station and pathway design increase user comfort and experience.</td>
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<tr>
<td><strong>LCS</strong> High quality urban design plays a key role in the success of public space and is too important to be determined by the market alone. Quality urban environments are not provided through afterthought landscaping solutions, but are part of an overall context sensitive strategy for public space provision.</td>
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<tr>
<td><strong>LCS</strong> Community involvement and ownership of the urban design process is vital to ongoing economic, social and cultural success, creating a safe, active and resource rich place.</td>
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<tr>
<td><strong>LCS</strong> The Local Government Urban Design Toolkit (Portland). The case study analysis illustrated the importance of such guiding strategies to be proactive resources that enable context-based outcomes. This includes the development of more pedestrian-scaled urban environments, with a mix of uses; density and use transitions; parking management; neighbourhood involvement and visualisation tools. Each local area must acknowledge the specific political, regulatory and financial conditions in order to assess the mix of tools and model approach that will best serve their conditions.</td>
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<tr>
<td><strong>LCS</strong> Corridor assessment tools, for use by the range of stakeholders and decision-makers, may provide a clearer interpretation of how a particular corridor fulfils leading practice urban design and TOD principles as they relate to people and place.</td>
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Network Planning  Management, Quality of Service & Travel Behaviour

A network planning approach is an important guiding framework for sustainable transport systems and has been a key feature within the successful case study areas examined.

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<thead>
<tr>
<th>Sustainable Urban Transport</th>
<th>Governance</th>
<th>Land Use Planning</th>
<th>Design &amp; Place-making</th>
<th>Network Planning</th>
<th>Finance &amp; Market Mechanisms</th>
<th>Sustainable Development Definitions</th>
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<tr>
<td>Network Planning - Regional and Local Scale</td>
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<tr>
<td>R The case study areas examined support and reflect the network planning principles as outlined in Dodson et al.(2011).</td>
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<tr>
<td>• Transport corridors need to be coordinated within the local and regional public transport network, including line design, timetable coordination and fare structures.</td>
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<tr>
<td>• The design of intermodal connections affects the speed and effectiveness of the corridor.</td>
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<td>• The optimum integrated transport systems show the network overlay as a grid.</td>
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<td>• Knowing the spatial and temporal connectivity of the network is all that passengers need in order to navigate themselves within the public transport system. This requires simplicity and legibility of the network structures, their connectivity and the time for travel along and between network links (Dodson et al. 2011).</td>
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<tr>
<td>R Key design principles for the public transport network effect are outlined in Dobson et al. (2011) please refer to paper for further detail</td>
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<tr>
<td>• Simple and direct network structures.</td>
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<td>• Plan a hierarchy of lines into the network.</td>
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<td>• Plan for speed, consistency and reliability of the modes of transport</td>
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<td>• Coordinate convenient transfers between modes.</td>
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<tr>
<td>• Provide clear, ubiquitous and consistent information</td>
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<tr>
<td>R Metropolitan land use plans that integrate with transport plans tend to focus on the infrastructure development and not on the opportunities available in the management of the network, service quality and connectivity. This creates the perception that increased funding and new infrastructure are the only solutions to improving service and patronage levels.</td>
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<tr>
<td>R The research shows that improvements to public transport network planning and coordination will reduce car dependence and improve patronage numbers across the system.</td>
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<tr>
<td>R Suburban public transport can offer a viable alternative to private motor cars even in highly dispersed cities.</td>
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<tr>
<td>R Network planning could be argued as a possible solution to the job / housing mismatch and the growing internal complexity of households, all of which affects mode share and patronage levels.</td>
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</table>
Transport management requires a public body with broad powers – not privatised and franchised operators.

Evidence has shown that decreasing service frequency and quality of service in areas that have a strong PT base, in order to provide additional services to new areas, has affected community support and caused hostility (Portland). This often affects the ‘middle ring’ areas as transport and urban investment most often occurs in inner and outer areas.

No fare zones have had mixed success. While they have been used to increase supply it creates a management issue when moving beyond free zones. As many ticketing systems utilise a quasi-honesty approach this makes enforcing payment on outer services that run into the no fare zone problematic, as has been the case with the Portland Street Car. Vancouver on the other hand has used a different approach and provided incentives (discounted ticketing) for newly developed areas and University Pass funding (Sunshine Coast University UPass approach and new Greenfield development - Caloundra South, Palmview).

Network planning within the region and within the local area facilitates the coordinated success of urban transport corridors. This includes consideration of the function of the corridor as a commuter, destination connector and district circulator (CTOD 2011). This can also determine the coordinated approach to corridors that provide a complimentary network of mode choice (Vancouver).

Quality of service: waiting times and inter-connections are crucial. For example, negotiating with the University to stagger start times allows for greater patronage numbers to access services that coordinate with lecture times. This kind of coordination maintains high levels and develops a higher frequency, which necessarily encourages more people to rationalise the service over private transport. Some examples of quality of service in case study corridors: transit frequency of 12-15 minute intervals or better every day; 35km per hour exclusive right of way for buses; and real time electronic arrival time.

All public transport rides start and end with your feet. Therefore the other vital side of this ‘network’ is in the coordinated legibility of public spaces and urban systems along the entire corridor.

Services are often closed due to low patronage which is caused by a lack of coordination rather than a lack of need i.e. not coordinated with University timetable and requiring a lengthy wait for next service, or general services not running to timetable (Sunshine Coast).
### Sustainable Urban Transport

**Network Planning - Regional and Local Scale**

<table>
<thead>
<tr>
<th>R</th>
<th>L</th>
<th>The literature has shown the importance of increasing supply of public transit as a process of increasing demand, including incentives and discounts for certain population cohorts and locations.</th>
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<tbody>
<tr>
<td>LCS</td>
<td>Use of Real Time Technology - Trip planner Widgets, Buzzer blog and Next Bus SMS is the most important next step in creating a responsive public transport system that allows the user to have more control and freedom. This technology will revolutionise how the public interacts with, perceives and uses all forms of public transport.</td>
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</table>
### Finance and Market Mechanisms

The research focuses on examining the approaches used with the modelling, forecasting and decision-making behind infrastructure investment. This includes identifying issues around transparency, professional best practice across disciplines; and the use of economic ($) figures as a political tool.

At the local and corridor scale the focus includes the identification and examination of performance indicators and measures used (including examples of a wider set of principles) to address policy frameworks and the true cost of public transport investment.

<table>
<thead>
<tr>
<th>Sustainable Urban Transport Finance and Market Mechanisms</th>
<th>GOVERNANCE</th>
<th>LAND USE PLANNING</th>
<th>DESIGN &amp; PLACE-MAKING</th>
<th>NETWORK PLANNING</th>
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<tr>
<td><strong>Regional and Local Scale</strong></td>
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<tr>
<td><strong>Corridors should be considered as both serving local and regional areas, broadening the political base for the project and allowing for a greater combination of markets to financially support the project.</strong></td>
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<td><strong>Timing of investment is an important factor in the development of new infrastructure and has implications for cost recovery, urban settlement patterns, the market, and sustainability.</strong></td>
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<td><strong>Evidence suggests inaccurate forecasting of travel demand and the method of financing and cost recovery analysis used, affects the decision-making of the public transport corridor(s) as compared to the development of a freeway or other road projects.</strong></td>
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<tr>
<td><strong>Methods for traffic forecasting can distort predicted performance figures due to the variables used. For example interchanges options, trip destinations and demographic assumptions create the overall big picture scenario and inbuilt criteria bias that the model uses to predict.</strong></td>
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<tr>
<td><strong>Economic and transport modelling are based on a mathematical representation of linkages between selected elements, with methods that are not easily accessible. This may make them problematic to explain to the wider population and cross professional disciplines. The use of numbers to argue a predicted benefit or loss is a very powerful political tool because it is derived from a ‘complex’ process (often externally).</strong></td>
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<tr>
<td><strong>Cost analysis needs to account for externalities and market distortions including the whole cost of car use and acknowledge the benefits of transit to non-users. Wider variables include pollution, health, safety/accidents and cost to the community. This influences projected patronage of rapid transport systems and therefore decision-making for infrastructure upgrades and provision.</strong></td>
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<tr>
<td><strong>There are high economic costs of a planning system with large amounts of inbuilt discretion, negotiation and no enforcement capability.</strong></td>
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<tr>
<td><strong>The availability of land in urban growth boundaries removes the incentive for the redistribution of investment from growth areas to activity centres to enable opportunities for efficiency and density.</strong></td>
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</table>
## Incentives and disincentives used in policy and investment are key drivers of creating a system that has viable patronage levels and financial support by a range of stakeholders. If you want to attain a goal you have to have policy and investment that is bias toward that goal. An example of this is in Vancouver with suite of Sustainable Funding Strategies – policy packaging that provides incentives and disincentives for desired land use, transport and sustainability outcomes (Vancouver).

## Analysing the cost recovery of each mode assists with decision-making for the distribution of funding. More reliable modes (trunk) can be used to supplement the feeder routes (often the buses) that have greater variables. Increasing supply through additional services on routes within the network (both feeder and trunk) has been shown to increase demand. This needs to be done a part of a network scheduling frequency. The system is as good as the number of its users.

## A majority of the funding of public transport in the past has been from taxes on fuel and patronage fares. More recently revenue has been generated via the use of system wide road pricing, land value capture, development charges and additional parking taxes.

## An alternative leverage mechanism by local government has been to secure a percentage of the funding backed by bonds from an increase in parking rates. In this example from Portland, an additional 20% of the costs were collected from surrounding landowners using a public private partnership model. This was supported by the stakeholders as they could see the long term financial benefits the streetcar would bring back to the area. Portland has also established a very practical Financial Incentives Toolkit for local governments and other community and business stakeholders.

## The most significant new funding model has been with the use of PPP or joint development.

## Planning and investment of TOD in the United States uses PPP and is backed by federal administration mandates (Portland case study). In large TOD style corridor development the transit agency must regain control over the joint development (important point given the failed private arrangement in London and Melbourne/Auckland and the evidenced need for public central control).

## Highest and best use is an approach used in Portland (and other cities) with TOD where financial return is balanced with other benefits such as increasing ridership, strengthening connections between trips or reducing trip durations that improve the value of the trip development to transit. Funding contracts need to be drawn up that adequately express this value. I.e. that taps into the entire corridor not just the TOD /station area.
Local and Corridor Considerations

New corridors increase the overall efficiency of the transit system. How it integrates with other corridors (network) – supply and economic development of other corridors. Conditions for transport investment to produce growth include:

- Mixed use centres and key job service
- Investment opportunities for developers and investors with increasing TOD and walkable complete communities.
- Favourable political and institutional factors

Community needs to be able to share in the broader economic benefits of transport corridors not just transit agency and private parties involved in PPP.

Funds raised need also to be used to help shape the community (place making) that is being served by the transit system.

Where a percentage of the budget is used to go toward public art and place-making projects it is essential that there is a process in place that ensures that it does not just become token ‘art plonk’ that is added to a landscape budget. This can undermine the purpose as a place-making tool and local artist initiative.

Development within TOD requires the unbundling of housing and driving costs for parking space to maintain affordability. Non-drivers in TOD eligible for tax incentives (Portland case study).

There are opportunities to leverage urban corridor outcomes with PPP/joint venture development. Financial benefits have been attributed to the quality of service and fewer dead areas devoted to parking – and an increase in operation hours due to public transport timetabling along corridor. Portland highlights the ability for PT initiatives to help create new industry in region to support the public transport infrastructure through manufacturing (Portland Street Car).

Further contextual investigations should consider the cost/benefit of using existing infrastructure lines; new construction methods; and smaller distributed solutions with provisions for small-scale developers.
Broader key performance indicators are needed to measure the implementation outcomes and areas for improvement of sustainable transport.

The evaluation criteria for the redevelopment of new or existing transport corridors, requires a wider set of principles and measures to address policy frameworks and the true cost of public transport options, including private transport investment. These need to reflect the guiding principles from state and regional strategies to inform local and regional corridor criteria for both the design development and public participation as means for evaluating success. An example of this from Vancouver includes Economic Development, Environment, Financial, Social and Community, Transportation, Urban Development and Deliverability (Cambie and Broadway Corridor Plan).

Portland case study – investment and evaluation criteria based on mobility, accessibility, equity and the environment. This case study incorporates simple measurement metrics and statements to set targets i.e. increase in and decrease of.

Rezoning of land to comply for eligibility of federal funding (where available) can be a useful mechanism to enable direct funding and influence for local and regional governments.

Highly accessible data and the inclusion of the arguments and reasoning behind strategy documents (what approaches are being taken and what performance measures will be used) has been an indicator in the case studies of the quality and success of public transport systems. The research indicates a link between the best public transport systems (economy, community, and sustainable future) and the cities that have transparent and accessible strategic documents.

The use of public funding to pay for the marketing of new transport plans and infrastructure that have not been based on best practice argument and community consultation have been unsuccessful and have created hostile public reaction. In other words saying one thing and continue to facilitate another (BAU).
# Sustainable Development

Sustainable Transport & Transport Corridors

The literature review highlighted the importance of a clear definition of sustainable transport and transport corridors including function and scale. The case study findings illustrated how such definitions affect policy, community participation and interdisciplinary best practice.

<table>
<thead>
<tr>
<th>Sustainable Urban Transport</th>
<th>Governance</th>
<th>Land Use Planning</th>
<th>Design &amp; Place Making</th>
<th>Network Planning</th>
<th>Finance &amp; Market Mechanisms</th>
<th>Sustainable Development</th>
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<td><strong>Sustainable Transport</strong></td>
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<td>R L C The definition of sustainable transport informs the decision-making process at both the state/regional and local level.</td>
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<td>R The most widely accepted definition of sustainable transport and used by the European Union and North America, have been adopted by both Vancouver and South East Queensland. Portland includes elements of this definition in their land use and transport planning documents. Melbourne and Auckland have yet to formalise a definition for ‘sustainable transport’ into key guiding strategies and policy.</td>
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<td>R While sustainable transport is evidenced in the planning documents of Portland, Transit Orientated Development is the mandated approach. It is supported by policy and drives the overall values for land use and transport planning decisions. Melbourne has included the term ‘sustainable transport’ in its planning documents since 2002 however it does not include a definition of sustainable transport as part of the land use and transport strategy documents. New Zealand has an overarching sustainable development framework but does not make reference to a ‘sustainable transport’ definition in land and transport strategy. Future documents that are being developed for Melbourne and Auckland indicate possible inclusion of this definition.</td>
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<td>R L C S Key national, state and local planning policies in Australia have demonstrated a commitment to sustainable transport (especially in the last 5 years) however practice often remains business as usual. I.e. expanding roads based on forecasted demand, whilst offering limited provision for community participation and agenda setting.</td>
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<td>R L Practice in Australia is currently BAU in part because many states including Queensland have only recently adopted policies that reflect sustainable transport principles, and best practice knowledge is not fully acknowledged across the planning and engineering disciplines. There is also a lack of recognition of this gap and its influence with the decision-making hierarchy. Greater mechanisms for inclusion of best practice information is required within multi-disciplinary practice.</td>
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### Sustainable Urban Transport

#### Sustainable Development

<table>
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<th>Transport Corridor</th>
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<td><strong>R</strong> A corridors and centres land use planning approach has been adopted by all</td>
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<td>the regions in the case study examination as they seek to achieve goals of a</td>
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<td>more compact and sustainable city.</td>
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</table>

| **R L** The definition and interpretation across disciplines of the term          |
| transport corridor varies within strategic land use and transport planning        |
| documents. This has been connected to the outcomes with regards to sustainable   |
| transport along those corridors.                                                 |

| **R L** The definition of transport corridors in areas that have recently         |
| adopted sustainable transport principles is important to guide practice with     |
| greater certainty.                                                               |

| **R L C S** Using the term ‘corridor’ to describe a multitude of functions        |
| including public transport, roads, highways and conservation increases the        |
| opportunity for:                                                                 |
| 1. Conflict between planners and engineers in the approach and design of         |
| sustainable corridors.                                                          |
| 2. Established path dependency for roads to prevail.                             |
| 3. Misleading representation of mode share results and funding distribution.     |
| 4. Community and stakeholder understanding (confusion).                          |

| **R L** This is an important distinction for spatial planning documents,          |
| as it enables urban transport corridor development not to be confused with       |
| highway or road development in both political rhetoric and pathway dependence     |
| for funding and policy development.                                              |

| **R L C S** The decision to define TOD to inform the default strategic approach   |
| seems less important in the success of urban transport corridors than the need to |
| define the function of corridors – urban/infrastructure and connector/circulator |
| for example.                                                                     |

| **R L** Both a TOD and urban transport corridor approach are each of value and    |
| have been used interchangeably in Vancouver depending on the context of the     |
| corridor.                                                                       |

| **L C S** This allows the design and human interface of a corridor to align it    |
| not just based on station segments but on the context as related to individual  |
| sections along the corridor.                                                    |