

Research Report



Transportation Sector



MARBEK
Resource Consultants Ltd.

TRANSPORTATION SECTOR RESEARCH

–Final Report–

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Prepared for:

Federation of Canadian Municipalities

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EXECUTIVE SUMMARY

The Federation of Canadian Municipalities (FCM) Green Municipal Fund (GMF) engaged the services of Marbek Resource Consultants to review the issues and trends related to sustainable transportation in municipalities and to document typical and best practices, as well emerging technologies.

The transportation sector includes the municipal functions of planning, roads, fleet management, transit, and mobility management. There are various definitions of sustainable development and sustainable transportation. Although they may differ somewhat, all emphasize the need to balance economic, social and environmental objectives over an extended planning horizon.

The Canadian best practices depicted in this report were selected through a comprehensive web-based review. The review involved various sources, including:

- Municipal, provincial, and federal awards that recognise sustainable transportation
- Municipal, provincial, and federal funding programs that provide financing to sustainable transportation projects
- Publications (including case studies) from organizations within the transportation sector
- Publications of recognized best practices from various sources (e.g., municipal boards and associations, municipal planning departments, consultants in the transportation field, conferences, etc.)
- Personal communications with municipal representatives and experts in the field

Issues

The key issues affecting sustainable transportation are shown in the following Table and described in the Report.

**Exhibit E.1
Sustainable Transportation Issues**

Environmental	Economic	Social	Technology	Governance
<ul style="list-style-type: none"> • Air pollution • Climate change • Habitat loss • Water pollution • Hydrologic impacts • Noise pollution 	<ul style="list-style-type: none"> • Traffic congestion • Mobility barriers (delays to walking and cycling caused by vehicle traffic) • Crash damages • Transportation facility costs • Consumer transportation costs • Depletion of non-renewable resources 	<ul style="list-style-type: none"> • Inequity (excessive impacts on disadvantaged groups) • Inadequate mobility for non-drivers • Human health impacts • Community cohesion • Community liveability • Aesthetics 	<ul style="list-style-type: none"> • Vehicles • Fuels • Infrastructure • Systems 	<ul style="list-style-type: none"> • Structure • Fiscal capacity • Pricing • Management • Regulations

Trends

Overall, there appears to be a lot of activity in the realm of sustainable transportation. This has moved beyond the larger municipalities and a few leading municipalities to encompass a wide range of municipalities in every region, of every size and of every type. Some of the key observations are:

- Comprehensive, integrated community planning is vital for sustainable transportation because it represents the most fundamental way to ensure accessibility and modal options. However, the implementation of best practices in this area is challenging because of the broad range of stakeholders with conflicting interests. Fortunately, there are some examples of partial success, including community-level integrated planning and transportation-oriented development in B.C. and Québec.
- A wide range of municipalities are experimenting with different road designs and layouts. In many cases, the driver is safety and quality of life in the communities that "host" the roads; however, there are also benefits in terms of reduced emissions and other environmental issues.
- There are relatively few examples of best practices to promote higher vehicle occupancy and system efficiency that have been documented. Similarly, the number of examples of multi-modal infrastructure planning is relatively small considering the need. These would appear to be clear gaps.
- Several municipalities have begun to integrate fuel efficient vehicles within their fleets. In most cases, the numbers involved remain small in relative terms. There are relatively few examples of best practices related to vehicle choice by function or fleet operations.
- Most large cities have developed major transit systems, though all of these require additional improvements to meet future demands and help achieve a truly sustainable transportation system. Vancouver is leading the way through its ambitious plans and recent route improvements, but others are also implementing key improvements and expansions.
- A few municipalities, such as Montreal, Vancouver and York, are implementing important improvements to traditional bus infrastructure, including priority signals, queue jump lanes, curbside lanes to bypass congested areas, as well ITS to allow buses to move more quickly through traffic.
- A few rural communities are demonstrating that some form of public transport is possible, provided that the services are adapted to the needs and that they remain flexible. Van pools are one approach. Others involve integration of rural transportation systems with nearby cities. Municipalities near Victoria provide examples, as does the Regional Municipality of Waterloo.
- ITS are being used in several municipalities, such as Vancouver, Saanich, York, Montréal, and Halifax, to provide better customer service. This includes automatic vehicle location, automated voice and digital next stop. Several municipalities are also

using smart cards to speed purchasing and fare payment and are attempting to link these across different systems. York, Montreal and St. Johns have been recognized for the visibility, safety, accessibility and convenience of their station stops.

- Mobility management includes a variety of strategies that change travel behaviour to increase transport system efficiency. They provide multiple benefits and support virtually all sustainability planning objectives. Many communities are implementing some of these strategies, but virtually no Canadian communities are implementing all of the mobility management strategies that would be cost effective or justified by sustainability principles. Increased mobility management is therefore a major opportunity for creating more sustainable transport systems.

Results and Financial Implications

Many sustainable transportation policies provide direct savings (such as reduced parking requirements), or provide revenues (such as parking pricing and taxes). Furthermore, strategies should not be evaluated individually, but rather as programs. For example, rideshare programs and public transit investments become much more cost effective if implemented in conjunction with support strategies, such as parking pricing and management, commute trip reduction programs, park & ride facilities, and more compact land use development patterns. The synergistic nature of such programs should be recognized.

Unfortunately, there is little information on actual measured outcome-level results, costs, or the cost-effectiveness of best practices adopted by Canadian municipalities. This is particularly true for best practices in the categories of municipal planning and governance and management, but is also true for operational practices and technology.

Implications for Municipal Transportation Management

The broad implications are as follows:

- **Measurement:** To effectively manage transportation functions, it is essential to develop measurements of costs and results. This requires development of analytical tools and capacity within municipalities to use them appropriately.
- **Full cost:** In order to make sustainable transportation investments cost-effective in comparison with typical roadway investments, the full cost of those investments needs to be considered, and governments (at all levels) need to adopt policies to allocate the full costs (including externalities as much as possible) to the users of each mode. Innovative approaches to financing and the greater use of financial instruments should be explored and considered by municipalities.
- **Integrated land use decision-making for sustainable transportation:** Although these are the most difficult best practices to justify and implement, they represent those with the greatest long-term potential. Moreover, the development decisions that are made today will be fixed for decades and possibly centuries, so it is hard to overstate the importance of getting the decisions right.

- ***Roadway operation and maintenance:*** Roadways typically represent the largest municipal transportation expense. Given the scale and potential for improved best practice, much more attention should be devoted to best practices in this area.
- ***Transit:*** There are many opportunities to make transit more efficient and more responsive. In large part these depend on integrating transit investments into a broader strategy of sustainable transportation investments, incorporating planning, roads, and mobility management.
- ***Mobility management:*** There is a vast array of opportunities for managing demand for motorized transport and the provision of other mobility options. So far, the few best practices that have been adopted only hint at the potential.

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APPENDICES

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Appendix C: Exemplary Community Profiles

Appendix D: Best Practice Profiles

Appendix E: Definitions of Sustainable Transportation

Glossary

Term	Definition
Accessibility	The ease of reaching desired goods, services, activities and destinations.
Active transportation	Active transportation is any form of human-powered transportation. It is any trip made for the purposes of getting yourself, or others, to a particular destination - to work, to school, to the store or to visit friends. As long as it is "active", you can choose the mode - walking, cycling, wheeling, in-line skating, skateboarding, ice skating (eg. on a canal). Walking and cycling are the most popular forms of active transportation.
Alternative fuel vehicle	As defined by the Energy Policy Act, any dedicated, flexible-fuelled, or dual-fuelled vehicle designed to operate on at least one non-petroleum based fuel.
Articulated buses	Buses with an “accordion” section in the middle allowing them to bend and flex; these buses have more passenger capacity than standard buses.
Battery electric vehicle	The battery electric vehicle, or BEV, is a <u>vehicle</u> that utilizes chemical <u>energy</u> stored in rechargeable battery packs, and electric motors and motor controllers instead of the internal combustion engine.
Biodiesel	Biodiesel is a type of biofuel made by combining animal fat or vegetable oil (such as soybean oil or recycled restaurant grease) with alcohol and can be directly substituted for diesel as a stand-alone fuel (called B100, for 100% biodiesel) or be used as an additive (called B20, for 20% bio-diesel). Biodiesel can be used in vehicles and is beginning to be used in on-site electricity generation and heating applications.
Brownfield	Abandoned, idled, or under used industrial and commercial facilities/sites where expansion or redevelopment is complicated by real or perceived environmental contamination. They can be in urban, suburban, or rural areas.
Complete streets	Complete streets are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and bus riders of all ages and abilities are able to safely move along and across a complete street.
Fused grid	The “Fused Grid” is a neighbourhood and district layout model. It combines the geometries of inner city grids and of the conventional suburbs. This fusion results in retaining the best characteristics of each and none of their disadvantages while raising the quality of the neighbourhood environment.
Green field	Greenfield land is a term used to describe a piece of undeveloped land, either currently used for agriculture or just left to nature.
Grey field	Land covered with former strip malls and low-lying commercial development.
Hybrid vehicle	A hybrid electric vehicle is a vehicle that uses two or more distinct power sources to propel the vehicle. Common power sources include on-board rechargeable energy storage system and a fuelled power source, such as an internal combustion energy or fuel cell.
Hydrologic cycle	The cyclical movement of water between the earth and the atmosphere through precipitation, interception, runoff, infiltration, percolation, storage, evaporation, and transpiration.

Term	Definition
Impervious surface	A hard surface which slows or prevents water from infiltrating the soil and/or causes water to run off the surface more rapidly or in greater quantities than under natural conditions, before development occurred.
Intelligent transportation systems	Intelligent Transportation System (ITS) is a surveillance system designed to monitor traffic flows on major freeways and to inform motorists or problem areas. Some ITS technology includes changeable message signs, cameras, and video detectors. ITS applications include: the integration of traffic control and transportation management systems; traffic signals which adapt to traffic and change control each cycle; highway advisory radio systems; changeable message signs; vehicle detectors; closed-circuit television; Global Positioning Systems and route guidance (currently used in some trucks, buses, and rental cars). An ITS may enable drivers to operate their vehicles more safely and with greater knowledge about existing traffic conditions.
New urbanism	An urban design and planning movement. New Urbanists combine traditional planning and modern technology to create places that break the conventional suburban mold of malls and highways. Instead, they strive for environmental balance, social integration and a true sense of community.
Road diet	Narrowing a roadway by reducing the number of lanes or lane width; a traffic calming strategy used to reduce vehicle speeds. Road diets are often conversions of four-lane undivided roads into three lanes (two through lanes and a centre two-way left turn lane). The row of the fourth lane may be used for bicycle lanes, sidewalks, and/or on-street parking.
Roadway level of service standards	Roadway level of service is a stratification of travelers' perceptions of the quality of service provided by a facility. Much like a student's report card, the level of service standard is represented by the letters "A" through "F", with "A" generally representing the most favourable driving conditions and "F" representing the least favourable.
Roundabout	A traffic calming device in which vehicles follow a circular path around a central island; upon approaching the roundabout, vehicles are expected to yield to traffic already in the circle.
Smart cars	The smart "Micro compact car" was designed primarily for urban use in European cities, where parking is scarce and fuel economy is of great importance. The smart car's length of only 8 feet allows as many as three of the vehicles to be parked in the space normally taken by one standard-length car. More information can be found on their website: http://www.thesmart.ca
Smart Growth	Environmentally-sensitive land development with the goals of minimizing dependence on auto transportation, reducing air pollution, and making infrastructure investments more efficient.
Smart Growth codes	The model codes are ordinances and regulations that advance smart growth objectives in towns, cities, and counties. These objectives include encouraging mixed uses, preserving open space and environmentally sensitive areas, providing a choice of housing types and transportation modes, including affordable housing, and making the development review process more predictable.

Term	Definition
Traffic calming	Transportation techniques, facilities, or programs designed to slow the movement of motor vehicles. Traffic calming typically involves changes in street alignment, installation of barriers and other physical measures to reduce traffic speeds and/or cut-through volumes in the interest of safety, liveability, and other public interests. Physical treatments may include speed tables, raised crosswalks, textured pavement, roundabouts, chicanes, curb extensions, partial roadway closures, diagonal diverters and median barriers.
Transportation demand management	Transportation Demand Management (TDM), which is also called Mobility Management, is a general term for strategies that result in more efficient use of transportation resources and a reduction in demand for motorized transportation.

1. INTRODUCTION

1.1 BACKGROUND AND OBJECTIVES

The Federation of Canadian Municipalities (FCM) Green Municipal Fund (GMF) engaged the services of Marbek Resource Consultants to review the issues and trends related to sustainable transportation in municipalities and to document typical and best practices, as well emerging technologies. The objective is to undertake comprehensive research to identify issues, trends, technologies, best practices, and Canadian examples related to *municipal* progress in sustainable community development within the transportation sector.

This is an important opportunity for municipal governments. Sustainable community planning provides a comprehensive analysis framework that can help identify the best way to achieve various economic, social and environmental objectives. It can help communities respond to a variety of demographic and economic trends that are changing transportation and land use demands, including aging population, increasing traffic congestion, rising fuel prices, increasing infrastructure construction and maintenance costs, increasing health and environmental concerns, and changing consumer preferences.

1.2 SCOPE OF THE TRANSPORTATION SECTOR

The GMF's transportation sector includes public transit or municipal fleet conversion to more energy-efficient or innovative green technologies; system-wide projects to optimize routes and enhance service; integrated and alternative transportation systems; and transportation demand management systems (e.g., car sharing, parking management programs, etc.).¹

1.3 DEFINITION OF SUSTAINABLE TRANSPORTATION

There are various definitions of *sustainable development* and *sustainable transportation*.² Although they may differ somewhat, all emphasize the need to balance economic, social and environmental objectives over an extended planning horizon. According to the Canadian Centre for Sustainable Transportation, a sustainable transportation system is one that³:

- Allows the basic access needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations
- Is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy
- Limits emissions and waste within the planet's ability to absorb them, minimizes consumption of non-renewable resources, limits consumption of renewable resources to

¹ Federation of Canadian Municipalities, *Tools and Resources for Building Capacity: Transportation*, 2008 (www.sustainablecommunities.fcm.ca/Capacity_Building/Sustainable_Transportation/default.asp – date accessed: April 2008)

² CST (2005), *Defining Sustainable Transportation*, Centre for Sustainable Transportation (http://cst.uwinnipeg.ca/documents/Defining_Sustainable_2005.pdf - date accessed: May 2008)

³ The Centre for Sustainable Transportation, *Welcome to the Centre for Sustainable Transportation*, 2006 (<http://cst.uwinnipeg.ca/> – date accessed: April 2008)

the sustainable yield level, reuses and recycles its components, and minimizes the use of land and the production of noise.

There are a variety of other definitions of sustainable transportation (see, for example, the list provided in Appendix E from the report: *Well Measured: Developing Indicators for Comprehensive and Sustainable Transport Planning*).⁴

1.4 ORGANIZATION OF THIS REPORT

In addition to this introductory section, this report contains the following sections:

- Section 2 provides an overview of the range of issues facing the municipal transportation sector
- Section 3 describes the municipal function of transportation planning, ideal, typical and current practices as well as best practices and trends towards sustainability in this area
- Section 4 describes the municipal function of governance and management in addition to identifying ideal, typical and current practices as well as best practices and trends towards sustainability in this area
- Section 5 describes the municipal function of operational practices and technology with respect to roads, ideal, typical and current practices as well as best practices and trends towards sustainability in this area
- Section 6 describes the municipal function of operational practices and technology with respect to fleets, ideal, typical and current practices as well as best practices and trends towards sustainability in this area
- Section 7 describes the municipal function of operational practices and technology with respect to public transit, ideal, typical and current practices as well as best practices and trends towards sustainability in this area
- Section 8 describes the municipal function of operational practices and technology with respect to transportation demand and mobility, ideal, typical and current practices as well as best practices and trends towards sustainability in this area
- Section 9 summarizes the results and financial implications
- Section 10 summarizes the trends, key messages, and the key opportunities for municipalities to implement or promote sustainable transportation sector practices.

The Appendices are organised as follows:

- Appendix A: List of Contacts
- Appendix B: Sources
- Appendix C: Exemplary Community Profiles
- Appendix D: Best Practice Profiles
- Appendix E: Definitions of Sustainable Transportation

⁴ Todd Litman (2005), *Well Measured: Developing Indicators for Comprehensive and Sustainable Transport Planning*, VTPI (www.vtpi.org/wellmeas.pdf – date accessed: April 2008)

1.5 METHODOLOGY TO IDENTIFY BEST PRACTICES

The Canadian best practices depicted in this report were selected through a comprehensive web-based review. The review involved various sources, including:

- Municipal, provincial, and federal awards that recognise sustainable transportation
- Municipal, provincial, and federal funding programs that provide financing to sustainable transportation projects
- Publications (including case studies) from organizations within the transportation sector such as the Canadian Institute of Transportation Engineers (CITE), the Canadian Urban Transit Association (CUTA), the Transportation Association of Canada (TAC), the Urban Transportation Showcase Program (UTSP), the Victoria Transport Policy Institute (VTPI), etc.
- Publications of recognized best practices from various sources (e.g., municipal boards and associations, municipal planning departments, consultants in the transportation field, conferences, etc.)
- Personal communications with municipal representatives and experts in the field.

The list of best practices included in this report is considered to be complete with respect to the category and type of best practice. However, if more than one community was identified to be employing the same best practice, a representative sample was selected. This was done to make the report more manageable and to avoid redundancies. Efforts were made to find applicable best practices from a range of community sizes, regions, and situations. These efforts were not always successful and as a result, the selection of best practices is weighted in favour of large urban communities. In fact, the gap in available best practices for use in small and remote communities is a constant thread running through the report and is reflected in the key messages and implications outlined in the final section.

2. KEY ISSUES, TRENDS AND DRIVERS

This section provides an overview of key issues as they relate to sustainable community development. These key issues represent the drivers for decision-making and challenges facing municipal governments wishing to implement sustainable practices and projects now and in the future.

2.1 DRIVERS AND TRENDS

Transportation takes place within a complex web of human and physical interactions and conditions. These are reflected in how we shape our environment, our economy and our society. Within these spheres of interest lie important broad characteristics and trends that have an impact on the nature and scale of transportation activity, the impacts of that activity, and our potential responses to those impacts.

Perspectives on municipal transportation are changing. In the past, transportation system quality was evaluated primarily in terms of *mobility* (physical movement). This justified transportation and landuse planning that favoured motor vehicle travel, with wide roads, generous (and generally unpriced) parking supply, and dispersed land use development patterns. In recent years, transportation planners have begun evaluating transport system quality based on *accessibility* (the ease of reaching desired goods, services, activities and destinations). Access is the ultimate goal of most transportation, excepting the small portion of travel in which movement is an end in itself, (e.g., cruising, historic train rides, horseback riding, jogging). This expands the range of options to be considered in transport planning. For example, it encourages consideration of mobility management programs, more accessible land use patterns, and mobility substitutes such as Internet services, to improve accessibility in ways that increase overall transport system efficiency and reduce overall mobility. These solutions tend to increase community sustainability because they help achieve a variety of planning objectives, including congestion reduction, road and parking facility cost savings, consumer cost savings, reduced traffic accidents, energy conservation, pollution emissions, improved mobility for non-drivers, and improved public fitness and health.

The main determinants of municipal transportation demand are population and demographics, consumer preferences, urban form, the state of transportation infrastructure, and the prices associated with the use of vehicles, fuels and infrastructure.

Population and Demographics

Canada has the highest population growth among the G8 countries, growing by an average of more than 1 percent per year.⁵ At the same time, Canada's population is aging and increasing numbers of immigrants are arriving. Retiring baby boomers are likely to have new and different travel needs, including destination (leisure vs. commuting), choice of mode, and demands for physical access. Meanwhile, new immigrants are major contributors to the growth of cities, and this preference is another factor in the ongoing urbanization of Canada, with its associated challenges for urban transportation.

⁵ Statistics Canada. 2006 Census.

Consumer Preferences

The issues concerning consumer housing expectations are complex. Although most consumers want to own a single-family home sometime in their life, particularly when they have young children, many want other types of housing at other points in their life, such as when they are young adults or seniors, and this portion of the population is growing while the portion of families with children is declining. Also, there is plenty of evidence that many households that currently choose automobile-dependent home locations would actually prefer more accessible, “new urban” type locations, if they have attributes such as security, quality public services and prestige. Thus, the preference for single-family housing does not preclude more sustainable development.

Consumer demands are shifting in a number of ways that affect community design and travel demand, due to population aging, increased health concerns, rising fuel prices and changes in consumer preferences.⁶ Although there continues to be strong demand for single-family detached homes, particularly for households with children (60% of those planning to purchase in Canada's six major urban centres), these represent a declining portion of total households.⁷ There is increasing evidence of rising demand for housing in “new urban” communities, where residents can walk and bicycle to local services and have access to quality public transit services.⁸

Consumer demand for automobiles is also shifting in important ways.⁹ Although the number of vehicles continues to rise, there has been a levelling-off of per-capita ownership in Canada at levels well below that of the U.S. The recent trend towards larger vehicles is also levelling-off and consumer preference for more fuel-efficient vehicles is increasing as a result of rising fuel prices and fuel efficiency regulations.

Urban Form

For most of the past thirty years, most new development has resulted in sprawl (dispersed, automobile-oriented land-use patterns), which tends to increase per capita automobile travel and reduce accessibility options.¹⁰ While current suburban development tends to have higher dwelling densities than historical suburban development, densities are far below those in the urban core and inner suburbs and the trend for development further from city centres continues. According to the 2006 census, the population growth rate of peripheral municipalities that surround the central municipality of Canada's 33 census metropolitan areas was double the national average between 2001 and 2006 (11.1% versus 5.4%). During the same period, the

⁶ Dowell Myers and Elizabeth Gearin (2001), “Current Preferences and Future Demand for Denser Residential Environments,” *Housing Policy Debate*, Vol. 12, Issue 4, Fannie Mae Foundation (www.mi.vt.edu/web/page/580/sectionid/580/pagelevel/1/interior.asp - date accessed: May 2008).

⁷ Canada Mortgage and Housing Corporation. *Consumer Intentions to Buy or Renovate a Home*. 2005.

⁸ Mark Eppli and Charles C. Tu (2000), *Valuing the New Urbanism; The Impact of New Urbanism on Prices of Single-Family Homes*, prepared for Urban Land Institute (www.uli.org - date accessed: April 2008).

⁹ Source: Desrosiers Automotive Consultants. Personal communication (2005).

¹⁰ Canadian Mortgage and Housing Corporation (2005). *Research Highlight: Smart Growth in Canada: A Report Card*. Socio-economic Series 05-036.

central municipalities grew more slowly than the average at a rate of 4.2 percent.¹¹ Low-density development continues to impede the ability of city-dwellers to engage in active transportation (e.g., walking and cycling to reach workplaces and services), and fragments communities by creating streets and boulevards with high traffic volumes and speeds which create barriers between residential blocks, commercial centres and work opportunities. Frequently, residential densities in suburban developments remain below those that would historically support a centralized transit system.

Recent trends towards decentralization of employment to suburban business parks have also presented a challenge. To the extent that they result in less distance between home and work, the effect is positive but this advantage may be outweighed by the difficulty in servicing these locations with transit.

State of Transportation Infrastructure

Transportation and transit infrastructure made up approximately 55% of Canada's infrastructure stock as of 2000.¹² Municipal transportation infrastructure is aging and deteriorating as is evident in the case of recent bridge collapses, poor road conditions and increasing costs of road maintenance. Aging infrastructure is apparent in all communities: rural, remote, and urban centres. A significant portion of existing public infrastructure requires significant renewal or replacement, due in part to the deferral of preventative maintenance. In addition, many communities are experiencing increased traffic congestion and the traditional response is road and parking facility expansion. New transportation (including transit) infrastructure is needed to accommodate current and forecasted increased demand (urban and suburban).¹³ The challenge of funding infrastructure renewal is compounded by the need for new infrastructure to service dispersed automobile-dependent developments.

Transportation Pricing

The key determinant has traditionally been the price of light-duty vehicles, which has been relatively stable in recent years. The fixed amortized vehicle price (combining purchase/lease, along with fixed costs such as insurance, registration and parking) has, until recently, far outweighed the variable costs associated with fuels, repairs, and the use of infrastructure (e.g., road tolls). In the last few years, rapid increases in the price of fuel appear to be having an effect. Perceptions of the scale of the increase along with the increased expectation that the increase will be permanent rather than temporary are slowly beginning to have an effect, both on the choice of vehicle and the prospects for reductions in demand, use of transit, and active transportation.

2.2 TRANSPORTATION ACTIVITY

During the last century, population growth and increased per capita vehicle travel have increased passenger travel demand. Nationally, urban transit ridership declined over the 1990-1996 period

¹¹ Statistics Canada. *2006 Census*.

¹² Mirza, Saeed. *Danger Ahead: The Coming Collapse of Canada's Municipal Infrastructure*, prepared for Federation of Canadian Municipalities, 2007.

¹³ Ibid.

and only returned to 1990 levels in 2004.¹⁴ Despite this increase in transit ridership, there were close to 1 million more drivers on the road in 2001 compared to 1996 due to overall population growth and declining vehicle occupancy. Carpoolers declined from 7.4% of commuters in 1996 to 6.9% in 2001. Personal travel has become more complex and dispersed, with more linked trips and more destinations in suburban leading to travel patterns that are increasingly difficult to serve through public transit. In 2001, more than 80 percent of Canadians reported using a car, truck or van to get to work (mostly as single occupants), while 10 percent used transit, and 8 percent walked or cycled.¹⁵

On the other hand, some of these trends appear to be shifting. Most of the factors that contributed to rising per capita vehicle travel (increased vehicle ownership, rising female employment rates, highway expansion, declining real fuel prices) have reached saturation levels and may even reverse somewhat, while demographic, economic and market factors are likely to increase the importance of alternative modes such as walking, cycling and public transit in the future.¹⁶ The Twentieth Century experienced the ascendancy of automobile transportation; the Twenty first Century is likely to require a more diverse and efficient transportation system to meet future travel demands.

2.3 ISSUES

Underlying many of the issues associated with urban transportation is a philosophical debate about the nature and purpose of transportation: is transportation a "good" in its own right, or is it merely a means to achieve mobility, or, even more fundamentally, access (to goods, places and other people). In the past, transportation planning was primarily concerned with improving motor vehicle travel. Sustainable transportation planning is concerned with a wider range of issues, including indirect and long-term impacts.

From a perspective of sustainable development, the issues related to transportation can be divided into three categories: environmental, economic, and social. This usual scope for sustainable development is expanded to include additional issues in technology and governance, as seen in Exhibit 2.1.

¹⁴ Canadian Urban Transit Association (2005). *Summary of Canadian Transit Statistics: 2004 Operating Data*.

¹⁵ Statistics Canada 2003. *Where Canadians work and how they get there*. 2001 Census.

¹⁶ Litman, Todd, *Changing Travel Demand: Implications for Transport Planning*, prepared for ITE Journal, Vol. 76, No. 9, September 2006, pp. 27-33 (www.vtpi.org/future.pdf – date accessed: April 2008)

Exhibit 2.1 Sustainable Transportation Issues¹⁷

Environmental	Economic	Social	Technology	Governance
<ul style="list-style-type: none"> • Air pollution • Climate change • Habitat loss • Water pollution • Hydrologic impacts • Noise pollution 	<ul style="list-style-type: none"> • Traffic congestion • Mobility barriers (delays to walking and cycling caused by vehicle traffic) • Crash damages • Transportation facility costs • Consumer transportation costs • Depletion of non-renewable resources 	<ul style="list-style-type: none"> • Inequity (excessive impacts on disadvantaged groups) • Inadequate mobility for non-drivers • Human health impacts • Community cohesion • Community liveability • Aesthetics 	<ul style="list-style-type: none"> • Vehicles • Fuels • Infrastructure • Systems 	<ul style="list-style-type: none"> • Structure • Fiscal capacity • Pricing • Management • Regulations

2.3.1 Environmental Issues

Transportation has a wide range of impacts on the environment. The adverse impacts are a function of the stresses associated with transportation, including: resource use (materials and energy), undesirable residuals (emissions, spills and leaks), noise and land use (including the construction of impervious surfaces). These stresses contribute to a variety of impacts, including climate change and smog; land, surface water and groundwater contamination; runoff; agricultural land conversion and habitat disruption. Burning fossil fuels in motor vehicles is one of the more significant contributors to air pollution. In fact, transportation is the largest contributor to the emissions of CO and NO_x, as well as a major contributor to VOCs. Both NO_x and VOCs react to form ground level ozone, which is the main component of smog.¹⁸ A summary of vehicle air emissions is provided in Exhibit 2.2.

Transportation consumes a large and growing share of energy, and produces a major share of climate changing emissions, as illustrated in Exhibit 2.3.¹⁹ This Exhibit illustrates climate change emission projections. Transportation is the largest and most rapidly growing sector.

In many situations, the energy used by residents or employees to travel to a building is greater than the energy used within that building.²⁰ As a result, transportation and parking management often provide greater energy savings and emission reduction benefits than building design improvements. In addition, improving mobility options and increasing

¹⁷ Litman, Todd and David Burwell, *Issues in Sustainable Transportation*, prepared for International Journal of Global Environmental Issues, Vol. 6, No. 4, pp. 331-347 (www.vtpi.org/sus_iss.pdf – date accessed: April 2008)

¹⁸ Transportation Association of Canada. *Briefing: Urban Transportation and Air Quality*. 2004.

¹⁹ NRC (2006), *Canada’s Energy Outlook: The Reference Case 2006*, Natural Resources Canada; at www.nrcan.gc.ca/inter/publications/peo_e.html.

²⁰ Alex Wilson (2007), “Driving to Green Buildings: The Transportation Energy Intensity of Building,” *Environmental Building News* (www.buildinggreen.com), Vol. 16, No. 9, Sept. 2007; at www.buildinggreen.com/auth/article.cfm?fileName=160901a.xml.

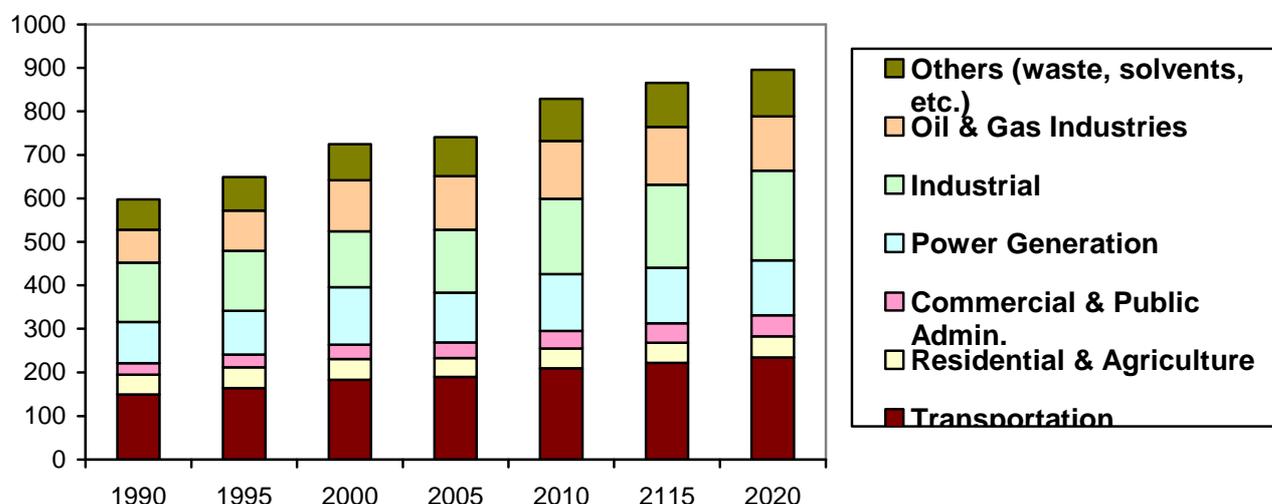
land use accessibility (for example, by creating communities where it is easier to walk or bicycle for local errands and to commute by ridesharing and public transportation) provides other economic, social and environmental benefits.

Exhibit 2.2 Vehicle Air Emissions

Emission	Description	Sources	Harmful Effects	Scale
Carbon dioxide (CO ₂)	A byproduct of combustion.	Fuel production and engines.	Climate change	Global
Carbon monoxide (CO)	A toxic gas that undermines blood's ability to carry oxygen.	Engine	Human health, Climate change	Very local
CFCs	Durable chemical harmful to the ozone layer and climate.	Older air conditioners.	Ozone depletion	Global
Fine particulates (PM ₁₀ ; PM _{2.5})	Inhaleable particles consisting of bits of fuel and carbon.	Diesel engines and other sources.	Human health, aesthetics.	Local and Regional
Hydrocarbons (HC)	Unburned fuel. Forms ozone.	Fuel production and engines.	Human health, ozone precursor.	Regional
Lead	Element used in older fuel additives.	Fuel additives and batteries.	Circulatory, reproductive and nervous system.	Local
Methane (CH ₄)	A gas with significant greenhouse gas properties.	Fuel production and engines.	Climate change	Global
Nitrogen oxides (NOx)	Various compounds. Some are toxic, all contribute to ozone.	Engine	Human health, ozone precursor, ecological damages.	Local and Regional
Ozone (O ₂)	Major urban air pollution problem resulting from NOx and VOCs combined in sunlight.	NOx and VOC	Human health, plants, aesthetics.	Regional
Road dust	Dust particles created by vehicle movement.	Vehicle use.	Human health, aesthetics.	Local
Sulfur oxides (SOx)	Lung irritant, and causes acid rain.	Diesel engines	Human health risks, acid rain	Local and Regional
Volatile organic hydrocarbons (VOCs).	A variety of organic compounds that form aerosols.	Fuel production and engines.	Human health, ozone precursor.	Local and Regional
Toxics (e.g., benzene)	VOCs that are toxic and carcinogenic.	Fuel production and engines.	Human health risks	Very local

Source: United States Environmental Protection Agency. *Indicators of the Environmental Impacts of Transportation*. (USEPA, 1999); Oak Ridge National Laboratory. *Transportation Energy Data Book* (ORNL, 2000); Litman, Todd. *Transportation Cost and Benefit Analysis*. (Victoria Transport Policy Institute, 2007).

**Exhibit 2.3
Climate Change Emissions²¹**



2.3.2 Economic Issues

Transportation is a key element in the economic life of communities, providing for the mobility of goods and people providing services. A well functioning transportation system is both a key enabler of trade in goods and services, as well as an important source of economic activity in its own right. At the same time, the economic costs of unsustainable transportation are large and rising. These include, for example, the lost productivity due to inefficient or unnecessary movements and congestion as well as the rising costs to municipalities of maintaining transportation infrastructure and public transportation services, the high cost of vehicle ownership, and accidents.

- **Congestion.** Transport Canada recently completed a detailed study of recurrent congestion in Canada entitled, “The Cost of Urban Congestion in Canada” which estimates total annual congestion costs for Canadian municipalities at \$3.7 billion.²²
- **Infrastructure Deficit.** The gap between current or projected public revenues and transport system maintenance and replacement costs has become known as the *infrastructure deficit*. In other words, the infrastructure deficit refers to the investment required to maintain and upgrade *existing* infrastructure. This deficit is projected to increase as the infrastructure systems continue to age. Current estimates place the transportation (including transit) infrastructure deficit at approximately \$44.5 billion.²³ Continued deferral of maintenance on the part of municipalities has led to rapid increases in the infrastructure deficit over the last ten years. There is also a

²¹ Ibid (2006), Table 21.

²² Transport Canada, *The Cost of Urban Congestion in Canada*, 2007 (www.tc.gc.ca/programs/Environment/EconomicAnalysis/docs/summary.pdf – date accessed: April 2008)

²³ Mirza, Saeed, *Danger Ahead: The Coming Collapse of Canada’s Municipal Infrastructure*, prepared for the Federation of Canadian Municipalities, 2007.

significant requirement for investment in new infrastructure to meet requirements for increased capacity. A study undertaken for the Federation of Canadian Municipalities places the required investment in *new* transportation infrastructure (including transit) at approximately \$36.2 billion.²⁴ As discussed above, sprawl also tends to impose significant economic, social and environmental costs.²⁵ Smart growth can reduce infrastructure costs by avoiding dispersed development, which costs more to serve, and reducing the need to expand highways to accommodate additional automobile travel. Similarly, transportation demand management can help reduce the need for new transportation infrastructure from existing communities.

- **Parking Facility Costs.** In addition to the costs to governments of providing roadways, automobile transportation requires businesses to provide parking facilities, which increases costs and reduces affordability. These costs can be reduced by transportation and parking management strategies.²⁶
- **Crash Costs.** Traffic accidents impose large cost to society, reducing productivity. They are a major cause of death and disability, and because they tend to harm people at a younger age than most other health risk, such as heart disease and cancer, they cause large losses of productive years of life. They also cause large property damages.
- **Vehicle Ownership.** Owning and operating motor vehicles is a large cost to consumers. Fuel and parking are a major cost (parking is actually a larger cost, but generally ignored in transport planning).
- **Market Distortions.** Current transportation and land use markets are distorted in various ways that tend to encourage automobile travel and sprawl. These include:
 - Many motor vehicle costs (depreciation, insurance, registration, residential parking) are fixed, not directly related to the amount a vehicle is driven during a particular time period (they are considered “ownership costs” rather than “operating costs”). This gives owners the incentive to maximize their vehicle use in order to “get their money’s worth” from their fixed expenditures.
 - Many motor vehicle costs are external, not paid directly by the individual motorist who imposes them. These include congestion delays and accident risks imposed on other road users, road and parking facility and service costs not charged directly to users, and environmental costs such as air and noise pollution.
 - Few communities charge development or utility fees that reflect the higher costs of providing public services to more dispersed locations, and so fail to reward households for choosing more cost effective home locations.

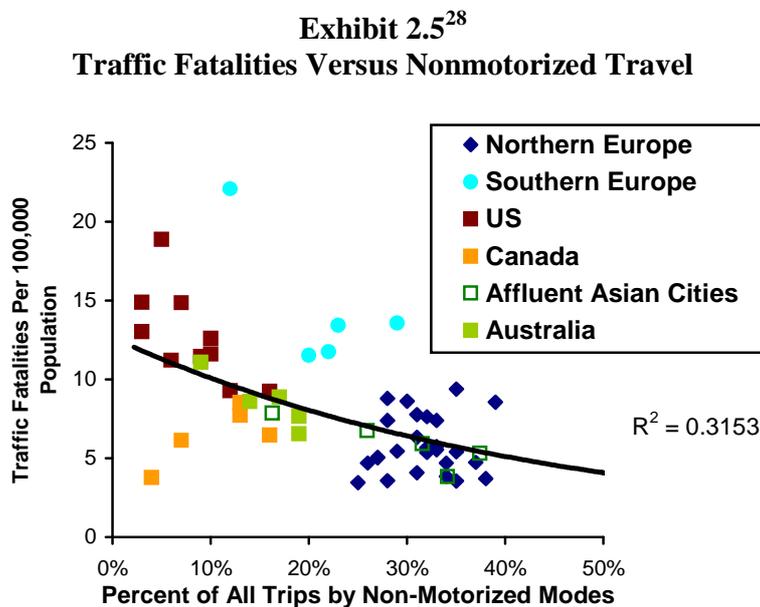
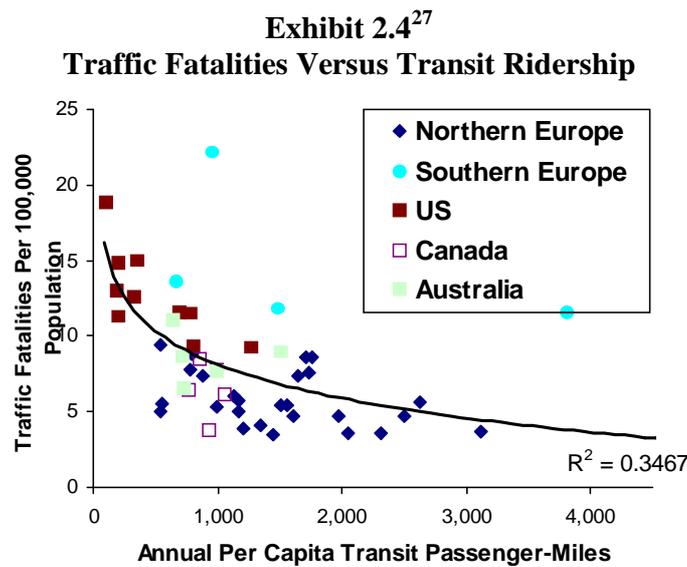
²⁴ Ibid.

²⁵ Burchell, Robert, Anthony Downs, Barbara McCann and Sahan Mukherji (2005), *Sprawl Costs: Economic Impacts of Unchecked Development*, Island Press (www.islandpress.org – date accessed: April 2008)

²⁶ VTPI (2008), *Online TDM Encyclopedia*, Victoria Transport Policy Institute (www.vtpi.org/tdm).

2.3.3 Social Issues

Transportation is also an important factor in determining the quality of life in communities. Mobility/accessibility is an important aspect of social interaction and allows residents to take advantage of a wide range of services, culture and leisure activities. At the same time, transportation is a leading cause of accidental injuries and fatalities. Communities with high transit ridership and high rates of nonmotorized travel tend to have lower per capita traffic fatality rates, as illustrated by the international data represented in exhibits 2.4 and 2.5.



²⁷ Jeffrey Kenworthy and Felix Laube (2000), *Millennium Cities Database For Sustainable Transport*, Institute for Sustainability and Technology Policy, Distributed by the International Union of Public Transport (www.uitp.com).

²⁸ Ibid (2000).

Transportation also contributes to the stress of daily life, and road infrastructure can be a significant barrier to community cohesion and to walking and cycling. Furthermore, some segments of society (e.g., elderly, disabled, disadvantaged) have insufficient access to important services, particularly in smaller or remote communities. Reliance on motorized transport also diminishes opportunities for active outdoor activity, and is a key factor in the development of unhealthy lifestyle, particularly for children. Smart growth community planning that reduces per capita vehicle travel and improves walking and cycling conditions tends to improve public health.²⁹

2.3.4 Technology Issues

Sustainable transportation tends to minimize the need for motor vehicle travel while maximizing overall accessibility. Technology can help achieve this by providing services that support mobility management (such as more convenient parking pricing systems), encourage use of alternative modes (such as transit priority traffic control systems), mobility substitutes (such as telecommunications that substitutes for physical travel). Technology can also increase the efficiency of vehicles, fuels and infrastructure and help reduce harmful emissions per vehicle-kilometre.

- **Light-Duty Vehicles.** Vehicle technology is improving, with significant gains in air pollution control for newer vehicles, and national availability very low sulphur gasoline and diesel fuel which are required for the control of nitrogen oxides and fine particulates. In addition, there is increasing availability of new vehicles with low fuel consumption, such as diesel and hybrid vehicles. Commercially-available electric vehicles with zero emissions are also appearing; albeit with speed and range limitations (these are sometimes termed "neighbourhood vehicles").
- **Transit Vehicles.** Transit vehicle technology is also improving. While visible smoke from diesel buses was once the norm, new buses operating on low sulphur fuel have particulate (smoke) emissions so low that they are mostly invisible. Hybrid and hydrogen buses are also becoming available. Best practice for transit vehicles include regular maintenance, reduction of unnecessary idling time and retrofitting older buses with particulate traps to reduce smoke emissions. It has been shown in recent research that bus emissions are greatest when idling.³⁰
- **Fuels.** Biofuels are being introduced to a greater degree, and biodiesel, in particular has applications in municipal fleets and transit. Biodiesel from seed oils can be used in blends with diesel fuel at up to 20% in warmer weather; at cold temperatures, blend levels are reduced to 2% to avoid waxing tendency of the biodiesel. Biodiesel at these blend levels increases the lubricity of the fuel which reduces wear in engines and fuel injection systems. In Canada, biodiesel blends can reduce greenhouse

²⁹ Frank, Lawrence, Sarah Kavage and Todd Litman (2006), *Promoting Public Health Through Smart Growth: Building Healthier Communities Through Transportation And Land Use Policies*, prepared for Smart Growth BC www.smartgrowth.bc.ca, (www.vtpi.org/sgbc_health.pdf – date accessed: April 2008)

³⁰ Experimental analysis of vehicle operation parameters affecting emission behavior of public transport buses operating on alternative diesel fuels, Vijayan, Kumar & Abraham, University of Toledo, Paper 2956 in the proceedings of the TRB 2008 Annual Meeting

emissions from buses somewhat, depending on the source of the biodiesel and the amount blended.³¹

- **System Technologies.** Emissions from transportation can be reduced by improvements in the efficiency of movements. This is the objective of Intelligent Transportation Systems (ITS), including those for transit. Examples include real-time information systems, transit priority signalling and others.

2.3.5 Governance Issues

Issues arise from the form of municipal government, the comparative lack of fiscal capacity of this level of government, structures associated with the operation of transportation systems, and the regulatory constraints of senior governments.

- **Governance Structure.** Decisions about roads and public transportation involve complex trade-offs which municipal councils are sometimes ill-equipped to debate and resolve. Municipal governance structure in Canada tends to favour a weak-mayor system in which the one individual elected by the entire municipality has the same effective power as individuals representing smaller constituencies. This can make moving forward on controversial decisions difficult resulting in long lead-times and postponed decision-making. The focus on re-election can result in councillors representing their constituencies more vigorously than the overall good of the municipality. In addition, while the trend towards amalgamated municipalities has increased the size of areas governed by single municipal governments, the concurrent trend away from regional municipalities has limited the capacity for integrated planning. The trend towards dispersion of economic development away from major city centres reduces the effectiveness of public transit and further exacerbates the problems associated with sprawl.³² A lack of strong regional transport and land use planning authority is a significant concern in many municipalities. Sustainable transport planning requires coordination among various agencies and jurisdictions, which is virtually impossible in regions that have many cities but no regional government with significant funding and/or authority to leverage cooperation.
- **Fiscal Capacity.** As noted above, the gap in infrastructure funding is a significant challenge. Overall, the ability of municipalities to fund services is limited by their high dependence on property taxes and the high pressure to avoid increasing those taxes. Even when other sources are available, decisions are often complicated by the

³¹ The use of biofuels, particularly ethanol, is the subject of controversy. Most observers now agree that ethanol from corn (the main source in Canada) has little environmental benefits and that the benefits to be gained from ethanol depend on the commercialization of technologies to produce it from lingo-cellulose. In the case of biodiesel, the situation is less clear. Some biodiesel used in Europe is produced from Indonesian palm oil, and this type has been shown to have negative environmental effects including indirect increases in GHG emissions compared to petroleum derived diesel fuel. Biodiesel in Canada, mostly made from seed oils and waste oils, yields net GHG reductions compared to diesel fuel.

M. Reaney, W.H. Furtan, and P. Loutas, *A Critical Cost Benefit Analysis of Oilseed Biodiesel in Canada*, March 2006, A BIOCAP Research Integration Program Synthesis Paper. (http://www.biocap.ca/rif/report/Reaney_M.pdf - date accessed: May 2008).

³² Cansult and TSI Consultants, 2005.

need to meet federal and/or provincial funding criteria and conditions. In recent years, the federal and provincial governments have begun to recognise the gap and have increased transfers to municipalities.

Federal funding sources include such programs as the Gas Tax Fund (GTF), Public Transit Capital Trust, Canada Strategic Infrastructure Fund, and the Infrastructure Canada Program. Each funding mechanism is generally tied to certain criteria or eligibility requirements. For example, the GTF provides funds to municipalities to address local needs such as public transit, water and sewers, solid waste, community energy systems, and local roads and bridges. Over the life of the funding agreement, the municipality must develop an Integrated Community Sustainability Plan in order to receive funding from the GTF. The Public Transit Capital trust, which has committed \$900 million over three years, requires that each municipality receiving funding must complete a Transit Strategy that includes Transportation Demand Management measures. The Canada Strategic Infrastructure Fund supports only large-scale projects that are strategic within the context of the province or territory. The threshold to define large-scale projects is based on the population of the province or territory.

Provincial sources of funding for municipal transportation systems may include dedicated tax revenues, such as a provincial gas tax, and other revenues, such as property and economic development revenues, revenues from highway and bridge tolls, and federal contributions to essential services, such as ferries. Otherwise, public transit may be supported through general annual transfers of capital and operating funding. The amount of provincial funding provided to municipalities for transportation systems varies depending on factors such as population and whether the community is urban or rural and the services they provide. Provinces generally have a certain amount of funding earmarked for public transit and other transportation infrastructure for each year for its' various regions. In addition, it is possible that particular revenues are made available for specific transportation systems. For example, Ontario's provincial gas tax of 2 cents per litre is made available to municipalities explicitly for public transit.

- **Pricing Structures.** In addition to addressing the issue of consumer preference for single detached dwellings, municipalities often face (and participate in) pricing structures which provide infrastructure, automobile and housing subsidies and subsequently hide the higher costs associated with low-density, suburban development making it more attractive to consumers. In some cases, despite being less costly from a life-cycle perspective, more compact forms of development may result in increased municipal debt because of ineffective municipal revenue generation mechanisms. Price distortions also include subsidized parking and subsidized road networks.

Economic efficiency and equity require that consumers pay directly for the costs they impose, unless a subsidy is specifically justified. This suggests that transportation systems will be more sustainable if the following policies are adopted:

- User fees that reflect the full costs of providing roadway facilities and services.
- Congestion pricing, which involves higher fees for driving under congested conditions.

- Parking pricing that charges motorists directly for their use of parking facilities.
- **Transportation System Management Structure.** Typically there is no unified authority to manage the entire transportation system (including roads, sidewalks, paths, parking, public transportation, and mobility management) in an integrated fashion. The situation is further complicated when there is more than one municipality involved. Furthermore, the operation of transit systems is typically devolved to separate transit authorities or corporations and this creates its own dynamic as transit managers and transit unions often develop interests that are not always compatible with the larger public interest in sustainable transportation. Sidewalks and paths are often managed by both transportation agencies and parks departments.
- **Regulatory Issues.** Municipalities have limited authority over the transportation system. Typically, they have no control over major highways nor do they regulate vehicles or fuels. While they do have authority over land-use and the planning, design, operation and maintenance of roads, this is sometimes constrained by provincial regulation (e.g., provincial municipal boards).

2.4 SMALL, RURAL AND REMOTE COMMUNITIES

In addition to the problems described above, small and rural communities face additional transportation issues. Rural communities are dispersed, and so tend to be particularly automobile dependent. Many have aging and declining populations, with few young people or immigrants. Roads are often unpaved or poorly maintained. Public transportation, other than school buses, is at best infrequent and often non-existent.

In terms of environmental issues, there is often little concern about local air emissions, and more concern about the effect of roads on habitat loss and fragmentation, as well as patterns of resource extraction. There is generally little concern about congestion, and more concern about accident risks (rural areas tend to have per capita accident fatality rates that are two to ten times higher than urban areas) the financial costs of mobility (particularly with rising fuel prices), and inadequate mobility options for non-drivers. One main shared concern is the cost of maintaining transportation infrastructure and the accumulated infrastructure deficit. Smaller communities have much lower fiscal capacity and fewer options. As a result they are much more dependent on the support and guidance of provincial and territorial governments.

Sustainable transportation planning in rural communities usually involves establishing long-term cost-effective infrastructure maintenance programs, increased transportation safety, improved accessibility and mobility for residents (particularly those who are transportation disadvantaged), and improved environmental management to minimize pollution emissions and habitat damage.³³

³³ VTPI (2008), "Rural Community Transport Management," *Online TDM Encyclopedia*, Victoria Transport Policy Institute (www.vtpi.org/tdm).

3. TRANSPORTATION PLANNING

Transportation planning is related to community planning and ideally should be integrated with it. Transportation planning approaches are the methods and techniques used by municipal staff to identify what transportation infrastructure and services will be provided in the future. In the context of this report, planning approaches pertain to strategic level resource use decisions (land, energy, existing infrastructure, staff and community human resources, and economic resources). Strategic planning approaches establish what the functionality and layout of the community will be in the future, including municipal infrastructure and levels of service. Municipal planning approaches also influence the rates and charges established to provide community services. Examples of planning approaches include "smart growth" approaches, community planning for transportation, transit-oriented development, strategic and regional transportation planning, etc.

3.1 KEY ISSUES, TRENDS, AND DRIVERS

The following Exhibit provides an overview of the key issues for transportation planning.

**Exhibit 3.1
Overview of Key Issues for Transportation Planning**

Category	Issue	Applicability (Region/Province) (S,M,L) (Rural, Urban) (Remote/Northern)
Environmental	Air and GHG Emissions	M,L Urban
Economic	Full Costing	All
	Congestion	M,L Urban
Social	Community Liveability and Public Health	All
	Safety	All
Regulatory	Provincial Planning Processes & Zoning	All
	Federal/Provincial Funding Criteria	All
	Development Charges	All
Governance	Multiple Jurisdictions	All
Other	Development Pressure	M,L Urban

3.1.1 Air and GHG emissions

With respect to air and GHG emissions, sustainable transportation planning is concerned with increasing transport system efficiency. To address the issue of emissions, transportation planning should be carried out in an integrated manner to reduce the need for travel and encourage travelers to use the most efficient mode for each trip, as well as creating more accessible, multi-modal community development, where people can meet their needs with less automobile travel.

3.1.2 Full Costing

As discussed in Section 2, municipalities often face (and participate in) pricing structures which provide infrastructure, automobile and housing subsidies and subsequently hide the higher costs associated with low-density, suburban development making it more attractive to consumers. Life cycle costing during land use and transportation planning is important in order to incorporate all costs: economic, environmental, and social. Hidden costs may include environmental costs such as the emissions associated with increased motorized transportation, and the effect of stormwater runoff due to increased impervious surfaces. They may also include economic costs including losses in productivity due to congestion, costs of providing services such as roads, etc. Finally, they may also include social costs, such as traffic accidents, loss of quality of life, etc. The following sections elaborate on some of these hidden costs.

3.1.3 Congestion

Sustainable transportation planning must take into account the issue of congestion for both economic as well as environmental reasons. Transportation is a key element in the economic life of communities, planning and providing for the mobility of goods and people. At the same time, the economic costs of unsustainable transportation are large and rising. These include, for example, the lost productivity due to inefficient or unnecessary movements and congestion as well as the rising costs to municipalities of maintaining transportation infrastructure and public transportation services. As mentioned in Section 2, Transport Canada completed a detailed study of recurrent congestion in Canada, which estimates total annual congestion costs for Canadian municipalities at \$3.7 billion. On the other hand, congestion also has a desirable effect in providing a disincentive for travel (which reduces emissions and other environmental impacts) and especially at peak times, which reduces the cost of infrastructure.

3.1.4 Community Liveability and Public Health

Transportation planning decisions affect a community's liveability (the environmental and social quality of an area as perceived by residents, employees, customers and visitors) quality of life, and public health. Mobility/accessibility is an important aspect of social interaction and allows residents to take advantage of a wide range of services, culture and leisure activities. Improved travel options and more accessible land use patterns can reduce the amount of driving required to reach destinations and the need to chauffeur non-drivers, reducing stress and financial costs. Better roadway design can improve walking and cycling conditions, increasing opportunities for neighbourhood interaction (and therefore increasing community cohesion), and increasing public fitness and health, particularly for children.

3.1.5 Safety

Transportation is a leading cause of accidental injuries and fatalities. Sustainable transportation planning should consider the safety for both motorized and non-motorized

transportation activity.³⁴ All else being equal, traffic accidents tend to increase with per capita vehicle travel and sprawl. As noted in Section 2, communities with high transit ridership and high rates of nonmotorized travel tend to have lower per capita traffic fatality rates. Planning to reduce per capita vehicle travel and improve walking and cycling conditions can increase the safety of pedestrians, cyclists, transit users as well as motorists.³⁵

3.1.6 Provincial Planning Processes and Zoning

Municipalities have authority over most local land-use planning decisions, as well as roadway and pathway planning, design, operation and maintenance, although this is sometimes constrained by provincial regulation (e.g., provincial municipal boards) and inadequate regional transport and land use planning authority. Most provincial legislation does not have specific requirements for the content, sustainable or otherwise, of transportation plans. Exhibit 3.2 provides an overview of a selection of current legislation with regards to transportation planning.

Exhibit 3.2
Sample of provincial transportation planning requirements

Region	Transportation Plan Requirements
British Columbia	<p>The Local Government Act³⁶ sets out the required content of regional growth strategies, which includes actions proposed for the regional district to provide for the needs of the projected population in relation to transportation. In general, the regional growth strategy should work towards: “(a) avoiding urban sprawl and ensuring that development takes place where adequate facilities exist or can be provided in a timely, economic and efficient manner; (b) settlement patterns that minimize the use of automobiles and encourage walking, bicycling and the efficient use of public transit; (c) the efficient movement of goods and people while making effective use of transportation and utility corridors;”.</p> <p>Part 9 of the South Coast British Columbia Transportation Authority Act³⁷ sets out content requirements for specific transportation plans, including base, strategic, and supplemental plans. This act is only applicable to the regions under the jurisdiction of TransLink (officially South Coast British Columbia Transportation Authority).</p>
Alberta	<p>Part 1 of the City Transportation Act³⁸ states that a city, as defined by the Municipal Government Act, “shall prepare a comprehensive transportation study report for the development of an integrated transportation system designed to service the needs of the entire city.” There are no specific</p>

³⁴ Todd Litman and Steven Fitzroy (2005), *Safe Travels: Evaluating Mobility Management Traffic Safety Impacts*, VTPI (www.vtpi.org); at www.vtpi.org/safetrav.pdf.

³⁵ Lawrence Frank, Sarah Kavage and Todd Litman (2006), *Promoting Public Health Through Smart Growth: Building Healthier Communities Through Transportation And Land Use Policies*, Smart Growth BC (www.smartgrowth.bc.ca); at www.vtpi.org/sgbc_health.pdf.

³⁶ British Columbia, *Local Government Act* (www.qp.gov.bc.ca/statreg/stat/L/96323_00.htm - date accessed: April 2008).

³⁷ Bill 43 – 2007 Greater Vancouver Transportation Authority Amendment Act, 2007 (www.leg.bc.ca/38th3rd/1st_read/gov43-1.htm – date accessed: April 2008)

³⁸ Alberta, *City Transportation Act* (www.qp.gov.ab.ca/documents/acts/C14.cfm – date accessed: April 2008).

Region	Transportation Plan Requirements
	content requirements. The city develops and approves bylaws to establish a transportation system in accordance with the mandatory transportation study report.
Saskatchewan	There are no legislative requirements for municipalities to create transportation plans in Saskatchewan. The Municipalities Act ³⁹ states that “A municipality has a general power to pass any bylaws for the purposes of the municipality that it considers expedient in relation to the following matters respecting the municipality: (e) transport and transportation systems, including carriers of persons or goods;”. With respect to the planning of subdivisions, the Planning and Development Act ⁴⁰ states that standards may be prescribed for efficient transportation systems, including matters dealing with public transit.
Manitoba	There are no legislative requirements for municipalities to create transportation plans in Manitoba. The Planning Act ⁴¹ states that 4(3) “Provincial land use policies may contain a series of goals and policies that deal with: (b) the protection and enhancement of: (ii) the transportation system and other infrastructure”. 5(3) “A regional strategy may include: (b) policies and goals respecting the following matters in the region: (ii) transportation and infrastructure development”.
Ontario	<p>Part 6 (1) of the Greater Toronto Transportation Authority Act⁴², 2006 states that “the Corporation shall, (a) create a transportation plan for the regional transportation area and plan, co-ordinate and set priorities for its implementation.” Part 6 (2) sets requirements for the transportation plan. This act is only applicable to the regions under the jurisdiction of the GTTA (GTA and Hamilton).</p> <p>There are no legislative requirements for municipalities outside of the GTA to explicitly create transportation plans in Ontario. The Places to Grow Act⁴³ 2005 states that “A growth plan may contain (b) an assessment and identification of priority growth areas, emerging growth areas and future growth areas, over specified time periods; (c) growth strategies for all or part of the growth plan area; (d) policies, goals and criteria in relation to, (ix) transportation planning.” The Planning Act⁴⁴ states that “2. The Minister, the council of a municipality, a local board, a planning board and the Municipal Board, in carrying out their responsibilities under this Act, shall have regard to, among other matters, matters of provincial interest such as, (f) the adequate provision and efficient use of ..., transportation, ... systems; (q) the promotion of development that is designed to be sustainable, to support public transit and to be oriented to pedestrians.” And in terms of updating the official plan every five years “(a) revise the official plan as required to ensure that it, (ii) has regard to the matters of provincial interest</p>

³⁹ Saskatchewan, *Municipalities Act*, 2005 (www.canlii.org/sk/laws/sta/m-36.1/20080314/whole.html - date accessed: April 2008).

⁴⁰ Saskatchewan, *Planning and Development Act*, 2007 (www.canlii.org/sk/laws/sta/p-13.2/20080314/whole.html - date accessed: April 2008).

⁴¹ Manitoba, *Planning Act* (www.canlii.org/mb/laws/sta/p-80/20080314/whole.html - date accessed: April 2008).

⁴² *GTТА Act*, 2006 (www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_06g16_e.htm - date accessed: April 2008).

⁴³ Ontario, *Places to Grow Act*, 2005 (www.canlii.org/on/laws/sta/2005c.13/20080318/whole.html - date accessed: April 2008).

⁴⁴ Ontario, *Planning Act* (www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90p13_e.htm - date accessed: April 2008).

Region	Transportation Plan Requirements
	listed in section 2,”.
Quebec	An Act Respecting Land Use Planning and Development ⁴⁵ defines obligatory content with respect to the Land use planning and development plan, which must “describe and plan the organization of land transport and, for such purpose: a) indicate the nature of major existing land transport infrastructures and equipment as well as their location; (b) taking into account the adequacy or inadequacy of the infrastructures and equipment referred to in subparagraph a, the foreseeable demand in matters of transportation and the anticipated part of transportation having to be assured by the various means of transportation, indicate the principal improvements to be made to the infrastructures and equipment referred to in subparagraph a and indicate the nature of any planned major new land transport infrastructures and equipment, together with their approximate location;”.
New Brunswick	There are no legislative requirements for municipalities to create transportation plans in NB. The Community Planning Act ⁴⁶ states that if a regional plan is developed and unless it is deemed to be impracticable, then the plan shall contain “a statement of planning policies for the orderly economic, social and physical development of the region, including policies with respect to: (vii) the development of communication and transportation systems,”.
Nova Scotia	There are no legislative requirements for municipalities to create transportation plans in NS. Municipal Government Act, 1998 states that a council may make bylaws with respect to transport and transport systems.
PEI	There are no legislative requirements for municipalities to create transportation plans in PEI. The Planning Act ⁴⁷ states that the “Lieutenant Governor in Council may make provincial planning regulations applicable to any area except a municipality with an official plan and bylaws: (m) with respect to vehicular parking and in particular (ii) requiring the setting aside of land in a subdivision, building or development site for vehicular parking and loading including space for public transportation services”.
Newfoundland	There are no legislative requirements for municipalities to create transportation plans in Newfoundland. In the Urban and Rural Planning Act ⁴⁸ , “A plan may, with respect to a planning area: describe existing and proposed transportation networks and proposed networks of streets”.
Nunavut	There are no legislative requirements for municipalities to create transportation plans in NU. The Planning Act ⁴⁹ states that a General Plan “must be prepared on the basis of ..., the needs of the municipality relating to transportation, ...” In the Cities, Towns, and Villages Act ⁵⁰ , it is stated that “a council may pass by-laws for municipal purposes respecting the following matters: (d) local transportation systems;”.

⁴⁵ Quebec, *An Act Respecting Land Use Planning and Development* (www.canlii.org/qc/laws/sta/a-19.1/20080314/whole.html - date accessed: April 2008).

⁴⁶ New Brunswick, *Community Planning Act*, 1973 (www.canlii.org/nb/laws/sta/c-12/20080314/whole.html - date accessed: April 2008).

⁴⁷ PEI, *Planning Act* (www.irac.pe.ca/document.asp?file=legislation/PlanningAct.asp - date accessed: April 2008).

⁴⁸ Newfoundland, *Urban and Rural Planning Act*, 2000 (www.canlii.org/nl/laws/sta/u-8/20080314/whole.html - date accessed: April 2008).

⁴⁹ Nunavut, *Planning Act*, 1988 (www.canlii.org/nu/laws/sta/p-7/20070904/whole.html - date accessed: April 2008).

⁵⁰ Nunavut, *Cities, Towns and Villages Act*, 1988 (www.canlii.org/nu/laws/sta/c-8/20070904/whole.html - date accessed: April 2008).

Region	Transportation Plan Requirements
Northwest Territories	<p>There are no legislative requirements for municipalities to create transportation plans in NWT. The Planning Act⁵¹ states that a General Plan “must be prepared on the basis of ..., the needs of the municipality relating to transportation, ...”</p> <p>In the Cities, Towns, and Villages Act⁵², it is stated that “council may make bylaws for municipal purposes respecting: (d) transport, motor vehicles, pedestrians and local transportation systems;”.</p>
Yukon	<p>There are no legislative requirements for municipalities to create transportation plans in YK. The Municipal Act⁵³ addresses the content of Official Community Plans and states that an OCP “must address: (d) the development of utility and transportation systems;”.</p>

3.1.7 Federal/provincial funding criteria

Transportation planning decisions are often complicated by the need to meet federal and/or provincial funding criteria and conditions, although many of these conditions are meant to encourage best practices in transportation and community planning, and so may be beneficial overall. Federal funding mechanisms are generally tied to certain criteria or eligibility requirements. For example, the Gas Tax Fund requires a municipality to develop an Integrated Community Sustainability Plan in order to receive funding. The Public Transit Capital trust requires that each municipality receiving funding completes a Transit Strategy that includes Transportation Demand Management measures. The amount of provincial funding provided to municipalities for transportation systems varies depending on factors such as population and whether the community is urban or rural and the services they provide. In certain situations, particular provincial revenues are made available for specific transportation systems. For example, Ontario’s provincial gas tax is made available to municipalities explicitly for public transit. More information on funding is provided in Section 7.

3.1.8 Development Charges and Utility Fees

Current development charges, utility fees and taxes are flat fees that fail to reflect the higher costs of providing public services (roads, utilities, emergency services, school transportation, etc.) to more dispersed locations, and so tend to undercharge sprawled locations and overcharge more accessible, compact, smart growth development. Location-based fees can give developers, and therefore building occupants, incentives to choose more accessible locations and more compact, resource efficient building designs.

3.1.9 Multiple Jurisdictions

Typically there is no unified authority to manage the entire transportation system (including roads, sidewalks, paths, parking, public transportation, and mobility

⁵¹ Northwest Territories, *Planning Act*, 1988 (www.canlii.org/nt/laws/sta/p-7/20080314/whole.html - date accessed: April 2008).

⁵² Northwest Territories, *Cities, Towns and Villages Act*, 2003 (www.canlii.org/nt/laws/sta/2003c.22s2/20080314/whole.html - date accessed: April 2008).

⁵³ Yukon, *Municipal Act*, 2002 (www.canlii.org/yk/laws/sta/154/20060728/whole.html - date accessed: April 2008).

management) in an integrated fashion. The situation is further complicated when there is more than one municipality involved. The operation of transit systems is typically devolved to separate transit authorities, which may develop interests that are not always compatible with the larger public interest in sustainable transportation. Sidewalks and paths are often managed by both transportation agencies and parks departments. Improved regional transportation planning and service coordination is an important foundation for increasing transportation system efficiency and service quality, and achieving sustainable transportation objectives.

3.1.10 Development Pressure

In many cities, demographic pressures make growth inevitable. The question is where should this development occur? Many communities are experiencing population and economic growth. Where additional households and businesses locate can have a major impact on sustainability. The dispersed, automobile-oriented land use development pattern that became common during the last half-century, generally called *sprawl*, imposes various economic, social and environmental costs. Although many municipalities seek to concentrate development and increase density in core areas, the popularity of the single detached home with large backyards continues. In the face of this demand, municipalities find it difficult to resist the pressure to allow new subdivisions that contribute to suburban sprawl.

3.2 IDEAL PRACTICE⁵⁴

Ideal practice in transportation planning is well expressed through the concept of "smart growth". *Smart growth* refers to more compact, accessible development patterns. Exhibit 3.3 summarizes differences between sprawl and smart growth.

Because it is more accessible (less travel distance is needed to reach destinations), multi-modal (more destinations can be reached by walking, cycling and public transit) and resource efficient (less land use consumed per resident or employee), smart growth can provide a variety of benefits compared with serving the same number of people with sprawled development.

⁵⁴ These descriptions draw on the definitions contained in the TDM Encyclopedia, developed by the Victoria Transport Policy Institute (www.vtpi.org/tdm/index.php – date accessed: April 2008)

Exhibit 3.3 Comparing Sprawl and Smart Growth⁵⁵

	Smart Growth	Sprawl
Density	Compact development.	Lower-density, more dispersed development.
Growth pattern	Infill (brownfield) development.	Urban periphery (greenfield) development.
Land use mix	Mixed land use.	Homogeneous (single-use, segregated) land uses.
Scale	Human scale. Smaller buildings, blocks and roads. More detail, since people experience the landscape up close, as pedestrians.	Large scale. Larger buildings, blocks, wide roads. Less detail, since people experience the landscape at a distance, as motorists.
Public services (shops, schools, parks)	Local, distributed, smaller. Accommodates walking access.	Regional, consolidated, larger. Requires automobile access.
Transport	Multi-modal transportation and land use patterns that support walking, cycling and public transit.	Automobile-oriented transportation and land use patterns, poorly suited for walking, cycling and transit.
Connectivity	Highly connected roads, sidewalks and paths, allowing relatively direct travel by motorized and nonmotorized modes.	Hierarchical road network with numerous loops and dead-end streets, and unconnected sidewalks and paths, with many barriers to nonmotorized travel.
Street design	Streets designed to accommodate a variety of activities. Traffic calming.	Streets designed to maximize motor vehicle traffic volume and speed.
Planning process	Planned and coordinated between jurisdictions and stakeholders.	Unplanned, with little coordination between jurisdictions and stakeholders.
Public space	Emphasis on the public realm (streetscapes, pedestrian environment, public parks, public facilities).	Emphasis on the private realm (yards, shopping malls, gated communities, private clubs).

Exhibit 3.4 Smart Growth Benefits

Environmental	Economic	Social
Greenspace and wildlife habitat preservation. Reduced air pollution. Reduce resource consumption. Reduced water pollution. Reduced “heat island” effect.	Reduced development and service costs. Consumer transportation cost savings. Economies of agglomeration. More efficient transportation.	Improved transportation options, particularly for nondrivers. Improved housing options. Community cohesion. Increased physical activity and health.

A number of municipal policy and planning reforms can support smart growth. These include:⁵⁶

- Comprehensive Community Planning
- Location Efficient Development
- Location-Based Fees
- Smart Tax Policies

⁵⁵ George Galster, et al (2001), “Wrestling Sprawl to the Ground: Defining and Measuring an Elusive Concept,” *Housing Policy Debate*, Vol. 12, Issue 4, Fannie Mae Foundation (www.fanniemae.org/programs/hpd/pdf/HPD_1204_galster.pdf), pp. 681-717.

⁵⁶ Litman, Todd, *Smart Growth Policy Reforms*, 2006, prepared for Victoria Transport Policy Institute (www.vtpi.org/smart_growth_reforms.pdf – date accessed: April 2008)

- Locate and Design Public Facilities For Smart Growth
- Reform Zoning Codes
- Encourage Urban Redevelopment
- Growth Controls and Openspace Preservation
- Transport Planning Reforms
- More Neutral Transport Funding
- Educate Development Professionals
- Land Use Impact Evaluation Tools

The above reforms that are related to transportation planning are reviewed below.

Sustainable community development requires comprehensive community planning which emphasizes accessibility over mobility, provides viable travel options (including good walking and cycling conditions, and high quality public transit services), implements mobility management programs when they are cost effective, and supports “smart growth” land use policies. Among the key considerations of smart growth strategies is the concentration of economic development in the most suitable locations, such as redevelopment of existing urban areas, and creation of mixed use “urban villages,” where commonly-used services are located within convenient walking distance, allowing residents and employees to satisfy most of their daily needs without automobile travel. This also improves the economic feasibility of providing high quality public transit services. The integration of urban planning and transportation planning would occur concurrently at site, municipal and regional levels.

Several specific design practices can support smart growth. *Transit oriented development (TOD)* refers to residential and commercial centres designed to maximize access by transit and non-motorized transportation, and with other features to encourage transit ridership.⁵⁷ A TOD neighbourhood has a centre with a rail or bus station, surrounded by relatively high-density development, with progressively lower-density spreading outwards. Residents of such communities tend to own fewer cars, drive less and rely more on alternative modes than residents of more automobile-dependent communities. *Location efficiency* consists of residential and commercial development located and designed to maximize accessibility. This means that it has good walking and cycling conditions, mixed land use, and high quality transit services. Location efficiency is particularly important for lower-priced housing in order to provide true affordability (minimizing both housing and transportation costs), major employment centers, and commercial activities.

Brownfield redevelopment refers to new development in locations that have experienced environmental degradation, such as old industrial sites. Such redevelopment is often an opportunity for both environmental rehabilitation and compact, infill development, and so should be favoured over greenfield development, even if initial costs are higher. Such development often encounters various financial and regulatory obstacles, such as outdated infrastructure and cleanup costs, and so often requires special support by government agencies and other community organizations. Cost structures would be adjusted to reflect the real societal costs of each form of development and incentives would be provided where necessary to make brownfield redevelopment a financially viable alternative. Municipalities would have

⁵⁷ CALTRANS *California Transit-Oriented Development (TOD) Searchable Database*, 2004, prepared for California Department of Transportation (<http://transitorienteddevelopment.dot.ca.gov> – date accessed: April 2008).

brownfield databases detailing each site in their jurisdiction, and a development plan and corresponding marketing programs would be developed. A timeline would be established for the redevelopment of all historic brownfields.

In communities where brownfields are not a major factor (i.e. newer communities without an industrial legacy), other different forms of intensification may be appropriate, such as utilization of greyfields (former strip malls and low-lying commercial development), main streets, infill, adaptive reuse, secondary suites, etc.

Transportation planning reforms include the requirement for comprehensive transportation plans based on sustainability principles. Such planning should be integrated and multi-modal, with substantial consideration of nonmotorized modes. Transportation management should be undertaken from a whole-system approach, featuring integrated transportation and land use planning. Overall responsibility for the integrated transportation system should rest with one group and ultimately one overseeing manager to avoid the development of internal competition between transportation planning groups (e.g., there would not be separate road transportation and transit planning groups).

Planning mechanisms should be engaged to cluster freight facilities near ports, airports and rail terminals to allow for the most efficient use of all freight transportation modes and minimize the amount of intra-urban trucking required.

Planning should reflect *least cost* principles, which means that demand management strategies are considered equally with capacity expansion, with all options evaluated based on overall benefits to society, taking into account all benefits and cost. For example, before widening a highway or expanding parking facilities, least cost planning would consider potential demand management strategies that can avoid, reduce or defer capacity expansion requirements, taking into account indirect impacts, such as downstream congestion (for example, if widening a highway or increasing downtown parking supply increases surface street traffic congestion) and environmental impacts (such as increased traffic noise or habitat loss caused by wider highways) which could be avoided by demand management solutions.

The ideal suite of policy instruments would be primarily market-oriented and would provide direction to market activity (e.g., residential and economic development) based on the actual social costs (e.g., infrastructure, municipal service provision, environmental impacts, etc.). Tax shifting to user fees and consumption taxes would be employed extensively to provide a more progressive and socially equitable revenue generation scheme. Area / congestion charges as well as road pricing would be employed extensively to encourage alternative modes of transportation, to improve local air quality and to improve the overall quality of the urban experience. Location-based development charges, utility fees and taxes, which reflect the true cost of providing public infrastructure and services, including both hard and soft infrastructure requirements, can encourage more smart growth development. Property taxes should be reflective of the true cost of municipal service provision.

Official plans, zoning by-laws and site plans would encourage a variety of housing types and designs, mixed-use development (communities and buildings) and transit oriented development. Smart growth principles would be incorporated in the official plan and smart growth codes

would be developed to parallel existing conventional development codes.⁵⁸ Car free urban centres / nodes would be used in conjunction with these planning initiatives to encourage development of pedestrian-focused communities and mixed-commercial developments. Design standards for streets would ensure safety and mobility for pedestrian and non-motorized modes of transport. Official plan and zoning amendments that deviate substantively from the objectives outlined in the official plan would not be permitted.

Transportation policies, strategies and plans should reflect municipal strategic planning objectives, including economic, social and environmental objectives. Transportation elements would be the subject of ongoing discussion with an informed audience and progress would be regularly communicated to the public as a whole. Mechanisms for consultation and communication would be well-adapted to the issue, the message and the audience.

Sustainable infrastructure planning⁵⁹ emphasizes efficient management of existing infrastructure in order to avoid the need to continually increase system capacity. For example, sustainable community planning favours redevelopment of existing urban areas in order to make efficient use of existing public infrastructure (roads, utility lines, schools and other public facilities) before accommodating urban expansion into greenfields. Similarly, sustainable transportation planning emphasizes mobility management on congested corridors in order to reduce traffic congestion and avoid the need to expand roadway capacity. This may involve a combination of walking and cycling facility improvements, improved public transit service quality, high-occupant vehicle priority, parking management and community trip reduction programs. This approach redefines transportation planning objectives: rather than expecting everybody to arrive by automobile, sustainable transport planning offers travelers a variety of quality travel options and encourages them to use the most efficient mode for each trip.

3.3 CURRENT PRACTICE

Municipalities have prime responsibility for land use planning and exercise this responsibility via official plans, zoning by-laws and review and approval of development applications. And beyond zoning, by-laws can address a very wide range of issues and situations, as long as they are not in conflict with provincial or federal laws. Within these powers there is considerable scope for influencing development patterns and behaviour in favour of sustainability.

Municipalities can adapt development charges, impose or remove user fees, special levies and licensing fees, and offer grants to favour sustainable transportation. They can also establish other kinds of incentives such as accelerated review for approval of projects that meet established criteria.

Development charges are levies placed on developers in order to pay for services required by new developments such as streets, street lighting, sidewalks, sewers, parks and other public facilities and off-site costs. Development charges are typically based on average-cost pricing and do not take into account the variable nature of infrastructure costs as they relate to urban form and location (some municipalities do; however, this is not the norm). The result is that the

⁵⁸ DPZ (2005), *Smart Code; A Comprehensive Form Based Ordinance*, The Town Paper (<http://tndtownpaper.com>).

⁵⁹ Bochner, Brian S., *Smart Growth Tools for Transportation*, prepared for ITE Journal, Vol. 70, No. 11, November 2000, pp. 26-29.

costs of new infrastructure are spread over all new developments resulting in lower density developments generally being undercharged and higher density developments typically being overcharged. Furthermore, development charges do not necessarily cover all infrastructure costs. For example, in Ontario, the Development Charges Act prevents municipalities from incorporating costs associated with transit services. Few (if any) requirements are placed on developers with respect to providing rights-of-way for municipal transit infrastructure (e.g., grade-separated tramways, BRT lanes, light-rail tracks, etc.).

Current development patterns remain characterized by an expanding amount of urban land use and decreasing land use intensity. Development choices are driven by the availability of land and demand for single family dwellings and are primarily built to accommodate motorized transport. While transit needs are considered, these are usually an afterthought and are not integral to the design of communities. The use of official plans and zoning measures to encourage densification and restrict development to designated growth areas is increasing; however, a corresponding increase in the use of zoning amendments is substantially reducing the efficacy of such efforts.⁶⁰

Brownfield redevelopment has only recently become an active focus of urban renewal projects. It is estimated that Canada's brownfield market is approximately ten percent the size of the US market with between 12,500 and 60,000 brownfield sites.⁶¹ The National Round Table on the Environment and the Economy published a report suggesting that as many as 30,000 sites exist in Canada; this report is considered conservative in its estimation. While awareness is improving, financing remains a barrier to brownfield redevelopment in many municipalities.

Traditionally, the practice has been for politicians and staff to respond to the expressed need of the population for more transportation capacity and better service. To the extent that there was a vision and a plan, it typically involved reducing the effects of congestion and the building of more roads. There were rarely references to specific targets.

In terms of community involvement in transportation planning, typical practice has been to study transportation needs, develop a plan, hold a public consultation, make adjustments, and announce the result. Then, as each element of the plan moves through the stages of detailed planning, design and construction, additional consultations take place when controversies erupt. There is rarely provision for ongoing and meaningful dialogue with a range of interested parties.

⁶⁰ In the interest of balance, it is worth noting that there is a competing view by some that land-use planning and zoning restrictions are part of the problem rather than part of the solution. In the view of those who subscribe to this perspective (which appear to be in the minority), people and businesses would be more likely to build in efficient patterns if they were free to do so according to their own needs (i.e. commercial interests would naturally build as close as possible to their markets, and people would build houses as close as possible to their work).

⁶¹ About Remediation, *Brownfields Redevelopment Toolbox*, 2008 (www.aboutremediation.com/Toolbox/step2_canadianmarket.asp – date accessed: April 2008)

3.4 BEST PRACTICES

The following Exhibit provides an overview of the best practices in transportation planning.

**Exhibit 3.5
Overview of Best Practices in Transportation Planning**

Best Practice	Issue(s) Addressed	Applicability	Community Examples
Community design for sustainable transportation	<ul style="list-style-type: none"> All 	M, L, Urban	Vancouver – Southeast False Creek
			Victoria – Dockside Green
Transit Oriented Development (TOD)	<ul style="list-style-type: none"> All 	M, L, Urban, Suburban	Mont Saint Hilaire – Village de la Gare
			Toronto – Yonge and Eglinton
			Burnaby – Transit supportive land use
			Metro Vancouver – Development around Skytrain stations
			Saanich – Short Street Project
Strategic and/or regional transportation planning	<ul style="list-style-type: none"> All Multiple jurisdictions 	All	Metro Vancouver – Translink Strategic Plans
			Toronto – Metrolinx Regional Plan
			York – Integrated planning
			Kamloops – TravelSmart
Urban Growth Boundaries	<ul style="list-style-type: none"> All 	L, Urban	Greater Golden Horseshoe
			Ottawa
			London
			Metro Vancouver

There are relatively few examples of best practices in this area, particularly for smaller communities. In particular, there is a lack of examples of best practices in the use of bylaws and regulations to promote sustainable transportation planning.

For the most part these best practices are applicable to large and medium cities and suburban municipalities, as opposed to smaller and/or remote communities. Municipalities in BC, and to a lesser extent, Ontario and Québec are at the forefront of best practices in this area.

Examples are drawn from the database of best practices summarized in Appendix D.

3.4.1 Community Design for Sustainable Transportation

Vancouver (BC) and Victoria (BC) provide two examples of sustainable transportation for major new developments. The designs of Southeast False Creek in Vancouver and of Dockside Green in Victoria include high density residential development on brownfield sites, as well as roads designed to accommodate pedestrians and cyclists first, followed by transit, service vehicles and, lastly, automobiles. The surrounding neighbourhood is designed to provide a variety of services within walking distance and transit is easily accessible. There are few parking spaces provided and these are primarily allocated to car sharing.

3.4.2 Transit oriented development

Transit-oriented development (TOD) refers to residential and commercial centres designed to maximize walking and public transit accessibility, and with other features to encourage transit ridership. A typical TOD has a rail or bus station at its center, surrounded by relatively high-density development, with progressively lower-density spreading outwards one-quarter to one-half mile, which represents pedestrian scale distances.

Many older neighbourhoods and some newer neighbourhoods can be considered transit oriented. Mont-Saint-Hilaire (QC), Yonge & Eglinton development in Toronto (ON), which is part of a broader intra-urban nodal transit system, and municipalities within the Greater Vancouver area (e.g., Burnaby) and the Victoria area (e.g., Saanich) are providing examples of best practices in this area. Developments are being built around transit station hubs and corridors and are designed to provide easy access and enough residential density to ensure high ridership. This can create vibrant, mixed-use villages, providing pedestrian and bicycle access to key services. This type of development is occurring at various locations along the SkyTrain routes in Greater Vancouver and is showing how that transit system can be a catalyst for regional town centres. The result has been hundreds of millions of dollars in development and hundreds of thousands of square feet of new office and residential buildings, high population densities, and high levels of transit use. Some existing transit oriented communities are experiencing renovation and streetscape redevelopment (better transit station access and wayfinding, sidewalk improvements, traffic calming, better lighting and signage, more bike storage, and street furniture) in order to meet demand for this type of community.

3.4.3 Strategic and/or regional transportation planning

Many of the best examples of strategic transportation planning come from the larger cities that have the greater resources and the greater need for more sophisticated management approaches, but some smaller cities and towns are also achieving success.

In the Greater Vancouver Regional District (BC), the Transportation Plan is an integrated document, complete with financial plan and is based on a ten-year outlook, supporting the region's overall growth strategy (the Livable Region Strategic Plan). Implementation of the Plan is the responsibility of TransLink, a provincially-mandated corporation. In addition to the Strategic Transportation Plans, there are several transportation planning initiatives that TransLink will continue to lead, participate in, or coordinate with other agencies and levels of government, including: Area Transit Plans, the Access Transit Project, SkyTrain Plans, Rapid Transit studies, Cycling program, employer pass program, rideshare and car share. In early 2005, TransLink started the Access Transit Project, one of the most extensive reviews of transit accessibility undertaken in North America. The project reviewed every aspect of the transit system that affects people's travel choices, including physical barriers, information, training, service supply and the structure of Custom Transit. The 2008 Financial Plan forecasts the revenue and expenditures required to maintain existing service levels and implement the proposed initiatives. Proposed legislative amendments to the GVTA Act contemplate the development of a Ten- Year Strategic Plan and Long Term Strategy. The Ten-Year Strategic Plan will identify

TransLink’s annual transportation service levels, capital projects and other expenditures for the transportation system as well as its revenue measures and anticipated annual revenue.

In Toronto, Metrolinx is the name recently adopted by the Greater Toronto Transit Authority (GTTA), a public authority which manages transportation planning, including public transport. The GTTA was formed by the Ontario Government in 2006 and adopted the Metrolinx name in December 2007. Metrolinx is governed by a board consisting of representatives from the Government of Ontario and from each of the regions that make up the GTA and Hamilton Region. The authority is currently in the process of developing a comprehensive regional transportation plan that will involve the release of six discussion papers and gathering input from a wide range of stakeholders. Metrolinx has also become responsible for the implementation of the “Presto” one-fee payment system and the expansion of the GO Transit fleet.

The Regional Municipality of York approach of integrating land use planning, transportation system planning, and transportation demand management is a good example of systems integration. Key features include: a framework for road development and improvements to reflect the goal of an integrated regional transit system; adopting a “centres and corridors” high density development concept in the Official Plan; and maintaining close working relationships between the municipality, planning commissioner, and transportation authorities. In adopting this approach, York is managing strong population growth pressures by increasing transit ridership and adopting effective transportation demand-management approaches. Innovative use of private public partnerships is helping overcome financing constraints and a phased approach is allowing the region to demonstrate progress and success before investing further.

The city of Kamloops, British Columbia has introduced strategic and integrated transportation and land use planning in order to provide a cost effective and sustainable approach to accommodating population and economic growth.⁶² ⁶³ The resulting TravelSmart program launched in January 1997, includes these ongoing initiatives:

- **Land use integration:** Recognizing the strong links between transportation and land use, the city's official plan was revised to minimize the demand for car travel by influencing growth patterns. The plan now favours a compact form of development, situating accommodation close to employment and community services, and increasing density of the central area.
- **Less expensive road structure alternatives:** To avoid expensive improvements to road networks, the city has slowed or halted development in some areas and identified underutilized arterial corridors for access to the downtown core. Rather than building bypasses over the busy highway that runs through town, the city encourages residents to use alternatives to the highway.

⁶² Kamloops, *Transportation Plans*, Traffic & Transportation Department, City of Kamloops (www.kamloops.ca); at www.kamloops.ca/transportation/plans.shtml.

⁶³ www.kamloops.ca/transportation/travelsmart.shtml

- **Improved public transit:** A comprehensive travel plan was developed to improve the level of service and provide alternatives to the single occupant vehicle. Some improvements include increased frequency of service to outlying communities and the use of smaller buses that feed into the main system.
- **Bicycle transport promotion:** The Kamloops Bicycle Plan identifies \$6 million worth of additional cycle routes and initiatives for businesses to provide "end of trip" facilities to cyclists, such as showers and bike racks.
- **Education and encouragement programs:** Transportation alternatives, such as carpooling, biking and walking, are promoted through workshops and seminars in workplaces; the "Safe Routes to School" program in schools; "Go Green" billboards on commuter streets; and door-to-door neighborhood education by city staff. The plan recognizes the need for an ongoing awareness campaign and community involvement to sustain TravelSmart.

Total project planning costs \$300,000, of which \$245,000 was funded by the city and \$55,000 by the province. The full program is funded through city's general revenue, development cost charges, the B.C. Transportation Financing Authority, specific developers and BC Transit. TravelSmart will be updated every five years as one component of "Kamplan", the city's growth management strategy. After three years of operation, the program has improved air quality and reduced planned road expenditures by 75 per cent.

3.4.4 Urban growth boundaries

Urban growth boundaries and their variations, such as agricultural land preserves, are used in many communities to protect open space, although they can be controversial and their success is highly dependent on their design and circumstances. Because they significantly affect property values they are often challenged by urban fringe property owners who want permission to develop, and in some cases, they may contribute to further sprawl if developers are allowed to leap-frog the "green belt" and attract development to ever more remote areas. For this reason, implementation and careful selection of boundaries are key to achieving the desired outcomes.

The development of the Growth Plan for the Greater Golden Horseshoe including the implementation of an urban growth boundary under the *Places to Grow Act* is an example of provincial action that is supportive of Smart Growth and TOD. Urban growth boundaries are considered best practices and have been implemented in a number of communities including Ottawa, ON (introduced into the City's Official Plan), London, ON (introduced into the City's Official Plan), and Vancouver, BC (originally introduced as the Green Zone concept in the GVRD Liveable Region Strategic Plan, which is currently undergoing revisions to become the Metro Vancouver Regional Growth Strategy).

3.5 ANALYSIS

This sub-section describes trends observed among Canadian municipalities moving toward more sustainable practices and projects within the transportation sector. It identifies municipalities at the forefront within the transportation sector in terms of the implementation of sustainable practices, programs, and projects, as well as observed gaps in sustainable development within the transportation sector.

3.5.1 Trends, Leaders and Gaps

Comprehensive, integrated community planning is vital for sustainable transportation because it represents the most fundamental way to ensure accessibility and modal options. However, the implementation of best practices in this area is challenging because of the broad range of stakeholders with conflicting interests. Fortunately, there are some examples of partial success, and professional organizations (such as planning organizations and the Canadian Institute of Transportation Engineers) are providing guidance on how to implement such policies. The issues and trends concerning sustainable community planning are covered in more detail in the companion report on that subject. However a few observations are worth noting here:

- The main opportunities for fully integrated community design are in new developments (e.g., greenfields and brownfields). While these represent a relatively small proportion of the total population, they are of crucial importance because the development decisions made today cannot be reversed for several generations and they represent the only opportunities to demonstrate the viability of alternative approaches that promote sustainable transportation.
- Although good intentions are common, the number of best practices that have actually been implemented is small. In this respect, communities in B.C. have emerged as leaders. This may be due, in part, to the geographical constraints that cities in that province face, as well as the generally greater level of public concern in B.C. about environmental issues and greater support for aggressive environmental policies, as shown in recent polls and in the support for a carbon tax.⁶⁴
- Elsewhere, there are some early signs of progress, with proposed developments being touted as green and sustainable. These claims are now often made to counter the increasing awareness and opposition of surrounding communities to new developments that would add to transportation concerns. However, for the most part, the claims remain to be proven and the gap is evident.
- In the meantime, there are a greater number of examples of more specific projects dealing with transit-oriented development and re-development, involving the creation of enhanced density corridors along transit routes. B.C. is again a leader in this respect, but examples from other provinces, including Ontario and Québec are also

⁶⁴ Business in Vancouver, *Issue 959*, March 2008.

(http://www.bivinteractive.com/index.php?option=com_content&task=view&id=722&Itemid=30 – date accessed: May 2008).

instructive. Although there are some good examples, the potential for these types of approaches remains largely untapped.

- Most cities are struggling to develop new strategies for transportation planning. In part, this reflects progress made in appreciating the need for new thinking, a recognition of the issues, and the pressure from higher orders of government, associated with new funding for public transportation infrastructure. Many such plans have emerged on paper, but few have been tested in implementation.
- The use of urban growth boundaries is a long-standing practice that has recently gained more adherents among the larger cities. Whether this represents a best practice remains controversial with the answer depending on the specific circumstances, the details of implementation and the response to concerns about development that "leap-frogs" greenbelts. More research on this topic would be warranted.

3.5.2 Key Messages for Municipalities

The key messages can be summarized as follows:

- Of all the major municipal functions, transportation planning provides one of the greatest opportunities for promoting sustainability. However, it is complex because it involves many stakeholders and directly affects residents and businesses, and so requires a carefully developed planning process. Better planning is urgently needed because each poorly planned development represents a lost opportunity. At the same time, patience is required because the effects of better planned communities are cumulative and can take time to manifest themselves in improved overall outcomes, such as reduced transportation activity and reduced emissions.
- An integrated approach to planning, which considers transportation implications is needed. Because of the conditions attached to federal and provincial funding and the requirements of planning acts in a few provinces, municipalities are being encouraged to undertake this type of planning to a greater degree.
- Because of the long timeframes involved, and the challenges of overcoming the barriers to integrated community planning, demonstration projects at the scale of medium sized communities offers a realistic path forward. Examples of best practices in Vancouver and Victoria could be replicated elsewhere.
- Another practical approach is to focus on development along transit corridors. Examples of best practices in Saanich, Vancouver, Burnaby, Toronto and Mont-Saint-Hilaire could be replicated.
- When it comes to planning the transportation system itself, success depends on the integration of plans for all modes and infrastructure, across all municipalities in a region. In this respect, the plans developed by Metro Vancouver, the GTA and the regional municipality of York provide good examples.

- The advantages of increasing density to support public transportation and alternative forms of transportation are clear. Urban growth boundaries can be successful best practices if they are implemented carefully.
- Although a number of best practices are in use by Canadian municipalities, there are extensive opportunities which remain to be explored. These include greater application of the full costs of development as well as social marketing to promote the desirability of higher density living. The list of reforms provided in section 3.2 also represent significant opportunities.
- The nature of the challenges and issues in small and remote communities is quite different, and there is a gap in information about them, as well as the best practices to deal with them.

3.5.3 Implications for Municipal Transportation Management

- Municipalities considering Sustainable Community planning should incorporate best practices highlighted in this Report.
- There are opportunities to study and implement pilot integrated community and TOD projects.
- There is a need and opportunities to study and implement these issues in the context of smaller and remote communities.

4. GOVERNANCE AND MANAGEMENT

Municipal governance and management entails how municipalities make decisions (versus what those decisions are – See Section 3 above) and the methods and approaches used by municipalities to analyse problems and opportunities, identify goals, develop plans, and assess how close they are to achieving the goals established for the community. Governance and management therefore includes both human resource elements, such as leadership of key players (the Mayor, Council, key community leaders) and engagement of the public, as well as management elements, such as analytical tools and approaches, performance measures, reporting and budgeting.

4.1 KEY ISSUES, TRENDS, AND DRIVERS

Sustainability requires comprehensive analysis and decision making that considers all options and impacts, including those that are indirect and long-term.

The analysis and decision making process begins with an overall *vision* or *problem* statement (these are essentially the same thing from opposite perspectives), and general *goals*. These determine specific *objectives* and *evaluation criteria* that will be used for prioritizing *actions*, *programs*, *projects* and *tasks*.

Analysis and decision making is a social process that requires the involvement of people who are affected by the outcomes. An effective analysis and decision making process involves *stakeholders* in the development of goals, objectives and evaluation criteria, if possible. In some situations goals and objectives are already established by a legislative or executive body before an analysis and decision making process begins.

4.2 IDEAL PRACTICE

Effective analysis and decision making incorporates the following characteristics:

- Decision making should be integrated, so individual, short-term decisions are consistent with broader, long term strategic goals.
- Analysis should be comprehensive, reflecting all significant perspectives, impacts and objectives.
- Planners and decision makers should be objective, fair and respectful.
- Insure adequate public involvement. Stakeholders should be kept informed and have opportunities for involvement.
- The analysis and decision making process should be understood by all stakeholders, with a clearly defined vision or problem statement, goals, objectives, evaluation criteria and performance indicators.
- Consider a wide range of possible solutions, including some that may initially seem unrealistic but could be appropriate as part of an integrated program. Support innovation: try new strategies recognizing that some may fail since even unsuccessful experiments provide useful information.
- Identify resources, constraints, and conflicts. Draw attention to potential problems.

- Convey analysis results in ways that is comprehensible by the intended audience using suitable language and visual information (graphs, maps, images, etc.). Highlight differences between options.
- Identify and avoid token solutions which fail to really address a problem. Modest actions may be appropriate if it is the beginning but not the end of more substantial solutions.
- Be prepared for setbacks. An analysis and decision making process will sometimes initially fail, but succeed if repeated due to changing circumstances or more stakeholder understanding and commitment.
- Changes should be implemented as predictably and gradually as possible.
- When appropriate use contingency-based analysis and decision making, which identifies a wide range of potential solutions and implements the most cost-effective strategies justified at each point in time, with additional strategies available for quick deployment if needed in the future.

Decision making for sustainable transport requires integrated analysis. For example, it requires that congestion reduction planning consider pollution impacts and pollution reduction planning consider congestion impacts, so decision-makers can avoid implementing solutions to one problem that exacerbate others, and helps identify true *win-win* strategies, that is, solutions that help solve multiple problems. For example, integrated analysis helps identify congestion reduction strategies that also help reduce parking costs, accidents and pollution emissions, and avoid congestion reduction strategies that increases these problems.

The table below illustrates this concept. It identifies objectives achieved by various strategies. Expanding roads at best will help achieve one objective, congestion reduction (although even this may be temporary due to generated traffic which tends to fill the added roadway capacity within a few months or years). Similarly, shifting to more efficient or alternative fuel vehicles helps achieve only one or two objectives (reducing fuel consumption and pollution emissions). But mobility management strategies, which improve travel options, encourage use of efficient modes, and increase land use accessibility, tend to help achieve more objectives and so are often the most cost effective strategy overall. Only by applying integrated analysis is it possible to balance economic, social and environmental objectives, and therefore identify the most sustainable transportation improvement strategies.

**Exhibit 4.1
Integrated Analysis**

Objective	Roadway Expansion	Efficient or Alt. Fuel Vehicles	Mobility Management
Congestion Reduction	✓		✓
Road and Parking Cost Savings			✓
Consumer Cost Savings			✓
Reduced Traffic Accidents			✓
Improved Mobility Options			✓
Energy Conservation		✓	✓
Pollution Reduction		✓	✓
Physical Fitness & Health			✓
Land Use Objectives			✓

Integrated analysis considers a wide range of planning objectives and so helps identify truly sustainable transportation options, taking into account economic, social and environmental impacts.

Ideally, mayors and council members would lead by expressing a strong vision and by communicating that vision and building support for it. They, and the senior municipal staff, would be highly visible in championing the adoption of best practices, particularly in cases where these conflict with entrenched interests. Leadership would be expressed in the form of long term visionary goals, accompanied with well informed strategies and priorities, and accompanying short-term tactical targets, expressed in the form of outcomes.

In many municipalities, strong leadership is needed to overcome department fragmentation and silo mentalities; to resolve conflict between land use planners and transportation engineers; to make difficult investment decisions that favour sustainable transportation; and to adopt a regional vision as opposed to a parochial vision. A regional vision often requires multi jurisdiction cooperation. In order to achieve success in the area of sustainable transportation, ideally all jurisdictions involved, or affected by, land use and transportation planning would be involved in the analysis and decision making from the beginning planning stages through to implementation and monitoring. Furthermore, an important stakeholder to consider would be the general public, who would ideally be involved, albeit in a different capacity, from the initial analysis and decision making stages as well.

Ideal practice would entail appropriate financing determined through detailed lifecycle cost analysis (that is, taking into account total costs over each assets operating life) during planning and procurement, so options with the lowest overall long-term costs can be selected. It would also involve a variety of other initiatives, including: policy reforms to correct biases that favour new construction and capacity expansion over operations, maintenance and management of existing facilities; “Fix It First” policies, which mean that maintenance, operations and incremental improvements to existing infrastructure would be given priority over construction of new facilities; and the establishment and enforcement of restrictions on damage-causing activities, such as operation of overweight vehicles.

4.3 CURRENT PRACTICE

Typically, decisions have been made on the basis of short term needs and in response to the most vocal demands. Little attention has been given to the full cycle costs of transportation options or to the costs of social and environmental externalities. In many cases, the budgeting process for roads has been divorced from the process for transit and other modes of transportation (primarily because they tend to be separate organizations and because they are seen to operate in different timeframes).

In terms of financing projects, property taxes represent the primary source of municipal revenue in Canada, and provide funds for all municipal services. While property taxes are used to some extent as an income redistribution mechanism (in that owners of more expensive properties generally pay proportionately more), they also play a role in subsidizing costly development patterns. Property taxes are generally based on assessed property value and are not linked to the true cost of service provision (e.g., only indirect consideration of frontage width). Municipalities often have no influence over the property tax system as it is determined by provincial legislation. Due to necessity, alternate financing options are beginning to play more of a role in municipal decision making.

With respect to public involvement, increasing emphasis is being given to the need to engage citizens through all phases of the planning and implementation of sustainability directions. Education is also often critical to engagement, and to necessary behaviour changes.

4.4 BEST PRACTICES

The following Exhibit provides an overview of the best practices in governance and management.

The best practices in this section are drawn from the exemplary community profiles found in Appendix C.

Exhibit 4.2 Overview of Best Practices in Governance and Management of Municipal Transportation Functions

Best Practice	Issue(s) Addressed	Applicability	Community Examples
Long term vision with short term targets	<ul style="list-style-type: none"> • Full costing and economic efficiency • Public support for sustainable transportation policy and plans 	All	York Region
Appropriate financing	<ul style="list-style-type: none"> • Full costing and economic efficiency • Fiscal capacity 	All	Kamloops – Transportation infrastructure
Multi jurisdiction cooperation and public involvement	<ul style="list-style-type: none"> • Fiscal capacity • Public support for sustainable transportation policy and plans 	All	York Region – Transportation Master Plan
			Kamloops – TravelSmart
			Mont St. Hilaire – TOD
Policy reform	<ul style="list-style-type: none"> • All 	All	Kamloops - OCP
			York – Development charges

4.4.1 Long term vision with short term targets

York Region’s approach to planning and development has been creating long term visions with short term targets. The Transportation Master Plan (TMP) and the related Rapid Transit Plan (RTP) are two key elements of planning for a sustainable transportation future for the region. The vision and direction set in these documents is also reflected in the Region’s long-term strategic plan, Vision 2026 and will be incorporated in the update to the Regional Official Plan. York’s new Sustainability Strategy also requires that different transportation scenarios developed to meet growth demands be assessed against short term sustainability principles. York’s TMP is an evolving plan with a thirty year planning horizon, but the core is a focused five year action plan. In terms of the rapid transit system, there is a concerted focus on a short term action plan to quickly address the most pressing needs and achieve early success in order to create long term support.

4.4.2 Appropriate financing

Kamloops TravelSmart is an integrated land use and transportation system planning program that is incorporated into the city's Official Plan. The idea of TravelSmart was developed by City staff members who realised that the intended cost of transportation infrastructure was higher than it needed to be. The council agreed to finance a \$300,000 plan in order to address this issue. This enabled Kamloops to work with various departments, stakeholders, and the general public to determine how to maintain mobility levels while reducing the potential costs of infrastructure. As a result, the transportation infrastructure cost was reduced from \$120 million to \$14 million.

4.4.3 Multi jurisdiction cooperation and public involvement

York Region developed a Transportation Master Plan, which aims to: integrate land use and transportation growth management policies; address long term infrastructure needs in an affordable, efficient, and environmentally sustainable way; and provide a framework for future transportation decisions. One of the key features and successes of the regional master plan is the close working relationships between York Regional Rapid Transit Corporation, York Region Planning Commissioner, and local municipal officials on both strategic planning of the rapid transit system and of the region to advance transit oriented development. Public involvement was considered an important component of developing the rapid transit system itself and because of this deliberate, thorough, and thoughtful opinion gathering and marketing was carried out right from the beginning development stages through to implementation and beyond.

Under pressure from a growing population, Kamloops needed to develop a plan to reduce economic, environmental, and social impacts of increasing transportation demand; maintain mobility levels; and minimize increases in infrastructure expenditures. Kamloops is at the cross road of three highways, under the jurisdiction of the BC Ministry of Transportation, and two national railway lines, one owned and operated by CP and the other by CN. The plan therefore would be addressing areas outside the immediate jurisdiction of the city. In order to develop TravelSmart and achieve success in the area of sustainable transportation, it was critical that Kamloops work together with the multiple jurisdictions involved, including the Ministry of Transportation and Highways, CP, CN, as well as the Kamloops Indian Band. Further cooperation was required with other stakeholders, such as the BC Ministry of Environment, Lands and Parks, the Kamloops First Nation, BC Transit, and the Kamloops citizens. Specific public input was solicited through a Household Travel Survey regarding the mobility needs, acceptable travel delay times, kilometres travelled, neighbourhood design considerations, transit system operations, and approaches to modifying transportation behaviour.

The town of Mont St. Hilaire collaborated with the transit authority and a private developer to create the first master planned transit oriented development in Quebec, with the town leading the creation of the implementation plan. Multi jurisdiction cooperation was especially important for the town with regards to financing and seeing the project through to completion while maintaining the original vision to promote sustainable

growth, alternative modes of travel and an active, healthy lifestyle while maintaining the natural character of the town. Throughout the process, a strong emphasis was put on public engagement and support in order to ensure that this development was a success in the eyes of the residents as well as the town.

4.4.4 Policy reform

A key feature of Kamloops TravelSmart was its incorporation into the Official Community Plan, which ensures that the overall vision of integrating land use and transportation planning will remain despite changing council and administration. These same principles and policies are also being incorporated into operational, day to day activities to maintain ongoing commitment and consistency through an Environmental Management Strategy and an Asset Management System developed for the Transportation Department.

Under the provincial Development Charges Act in Ontario, development charges are tied to maintaining historic levels and types of servicing. This constrains municipalities from increasing development charges in order to shift the balance to new kinds of services (e.g., from roads to transit). The York Region is now doing an entire regional assessment of “total transportation level of service” so that the basis for development charges can be shifted from one particular mode (e.g., roads) to overall service. The York Region has developed a new framework for approval of development applications that favours intensification. Local municipal official plans are starting to move toward requirements over guidelines, looking at specific mechanisms, such as density bonuses and site-specific zoning bylaws that would reduce parking standards in new developments in exchange for transit, pedestrian and other amenities, as seen in Richmond Hill.

4.5 ANALYSIS

This sub-section describes trends observed among Canadian municipalities moving toward more sustainable practices within the transportation sector. It identifies municipalities at the forefront within the transportation sector in terms of governance and management, as well as observed gaps in sustainable development within the transportation sector.

4.5.1 Trends, Leaders and Gaps

The main observations are:

- Many communities have initiated comprehensive planning processes, incorporating long-term visions, but few have combined these with short term targets and fully articulated strategies, combining funding sources, multi-jurisdictional plans, and policy reforms to overcome barriers. Kamloops, York and Mont St. Hilaire provide three examples of medium sized communities that have taken such an integrated approach to transportation and community planning.
- York Region is one of the leaders in adopting targets to drive short term progress and in finding ways to overcome barriers in implementation. In particular, York's approach to promoting intensification provides a good model and its involvement of

other jurisdictions and partners is instructive. York also provides a good example of best practices in public consultation.

- Kamloops work on TravelSmart plan is a good example of how to use sustainable transportation planning to reduce costs. Like York, it's involvement of the public and other stakeholders and its willingness to make the necessary changes to policy are best practices.
- Mont St. Hilaire is a leader in integrating the objectives of different parties, including private sector developers, multiple jurisdictions, and the public and in forging a consensus on a community plan that supports sustainable transportation objectives.

4.5.2 Key Messages for Municipalities

The key messages can be summarized as follows:

- The basic principle of good planning is that specific, short-term decisions should reflect strategic, long-term goals. This is particularly important for sustainable transportation planning, because conventional transport planning considers a limited set of objectives and impacts, although transport decisions have so many indirect and long-term impacts. The combination of long term visionary goals and short-term targets is an important feature of successful strategies.
- More comprehensive analysis based on sustainability principles is likely to significantly change many transportation and land use planning decisions, away from roadway and parking facility capacity expansion toward more efficient management of existing resources, including the application of various mobility management strategies and smart growth policies.
- Although these require significant change from current policies and practices (such as the application of road and parking pricing, more emphasis on non-motorized transport, improved public transit services, and creating more compact, mixed communities), these changes can help solve a wide range of problems, providing many economic, social and environmental benefits, which will make most people significantly better off overall.
- The main barrier to sustainable transportation is resistance to change. Progress requires change agents who can help communities define a positive vision of the future and motivate people to overcome barriers to achieve it.⁶⁵
- There are a number of best practices that cut across municipal functions that are essential to the success of sustainable transportation approaches. First and foremost is the exercise of leadership and good planning on the part of municipal politicians and senior managers.

⁶⁵ VTPI (2008), "Change Management," *Online TDM Encyclopedia*, Victoria Transport Policy Institute (www.vtpi.org/tdm/tdm14.htm).

- Good transportation planning is not just needed for environmental sustainability, but for financial sustainability as well. Even though many costs remain hidden, there are significant opportunities for municipalities to reduce costs by thinking of transportation in an integrated way.
- Success requires cooperative approaches and partnerships both internally (between the different municipal functions) and externally, with adjoining municipalities, provincial regulators, and the private sector.
- Plans need concrete instruments to succeed. This means that municipalities must have the levers and the will to develop and enforce bylaws and charges.

4.5.3 Implications for Municipal Transportation Management

- There are opportunities to implement best practices in leadership, financial analysis, integrated and consultative planning.

5. OPERATIONAL PRACTICES AND TECHNOLOGY – ROADS

Operational practices and technologies are applied by municipalities to implement and deliver community services. There are literally hundreds of potential such topics for each service delivered by municipalities; in the context of this report, our focus is on best operational practices to move communities forward in terms of sustainable community servicing. The following sections deal with roads (section 5), municipal fleets (section 6), transit (section 7), and mobility management (section 8).

5.1 KEY ISSUES, TRENDS, AND DRIVERS

The following Exhibit provides an overview of the key issues related to roads.

Exhibit 5.1
Overview of Key Issues Related to Roads

Category	Issue	Applicability (Region/Province) (S,M,L) (Rural, Urban) (Remote/Northern)
Environmental	Road Vehicle Capacity	M,L Urban
	Air and GHG Emissions	M, L, Urban
	Accommodation for Transit and/or Active Transportation	M,L Urban
	Impact on Water Quality	All
Economic	Sustainable Asset Management	All
Social	Safety	All

5.1.1 Design – Effect on Vehicle Capacity/Use and Associated Emissions

Roadway expansion is a common solution applied to congestion problems and roads are typically sized to handle peak period capacity to reduce or avoid congestion. Increasing capacity of roads inevitably increases use, which leads to an increase in air and GHG emissions.⁶⁶

5.1.2 Design – Accommodation for Transit and Active Transportation

Road designs are usually focused on the automobile and little provision is made for transit and active transportation. This is an issue when roads are not designed to accommodate bus transit and service suffers. When buses are not more convenient than personal vehicle travel (i.e. stuck in the same traffic situations), this discourages people from using public transit and thus exacerbates the impact on the environment. Furthermore, when roads are not designed to accommodate active transportation with separated bike lanes, safety is a major concern for bikers sharing the road with vehicles

⁶⁶ Todd Litman (2001), “Generated Traffic; Implications for Transport Planning,” *ITE Journal*, Vol. 71, No. 4, Institute of Transportation Engineers (www.ite.org), April, 2001, pp. 38-47; at www.vtpi.org/gentraf.pdf.

and thus again people are discouraged and turn to personal vehicles, contributing to air and GHG emissions.

5.1.3 Maintenance – Salt Usage and Associated Impacts on Water Quality

The application of road salts as de-icing and anti-icing agents in the winter (as well as dust suppression in the summer) results in impacts to terrestrial and aquatic ecosystems. Aquatic habitat degradation occurs as a result of increased chloride concentrations in ground and surface waters leading to decreases in benthic, aquatic plant and animal populations.

5.1.4 Sustainable Asset Management

Many communities are failing to adequately fund basic transportation system maintenance and operations, resulting in inefficiencies, risks and rising future costs.

This gap between current or projected revenues and system maintenance and replacement costs has become known as the *infrastructure deficit*. In other words, the infrastructure deficit refers to the investment required to maintain and upgrade *existing* infrastructure. This deficit is projected to increase as the infrastructure systems continue to age. Continued deferral of maintenance on the part of municipalities has led to rapid increases in the infrastructure deficit over the last ten years. At the same time, the public and political reaction to increasing congestion is to call for more roads and the expansion of existing ones. This creates an unsustainable financial burden.

5.1.5 Safety

Transportation is a leading cause of accidental injuries and fatalities. Roadway design and management practices that reduce per capita vehicle travel and improves walking and cycling conditions tends to improve public health⁶⁷ and safety.⁶⁸

5.2 IDEAL PRACTICE⁶⁹

For maximum sustainability, roadway systems should be designed, constructed and maintained to be cost effective and cause minimal environmental and social damages. Roadway development should be minimized in ecologically sensitive areas. Pavement would be developed to better utilize waste materials, such as ground porcelain and waste aggregates from recycled concrete. Integrated preventive maintenance programs should be developed to protect assets and minimize negative impacts. Winter road maintenance should use de-icing practices that minimize environmental damages.

⁶⁷ Lawrence Frank, et al (2006), “Many Pathways From Land Use To Health: Associations Between Neighborhood Walkability and Active Transportation, Body Mass Index, and Air Quality,” *Journal of the American Planning Association*, Vol. 72, No. 1 (www.planning.org), Winter 2006, pp. 75-87.

⁶⁸ Gordon Lovegrove and Terek Sayed (2006), “Macro-level Collision Prediction Model For Evaluating Neighborhood Level Traffic Safety,” *Canadian Journal of Civil Engineering*, Vol. 33, No. 5 (http://pubs.nrc-cnrc.gc.ca/cgi-bin/rp/rp2_tocs_e?cjce_cjce5-06_33), May 2006, pp. 609-621.

⁶⁹ CITE (2005), *Canadian Guide to Promoting Sustainable Transportation Through Site Design*, Canadian Institute of Transportation Engineers (www.cite7.org); at www.cite7.org/Technical_Projects/sitedesignreview.htm.

Roadway system design and management can give priority to high-occupancy vehicles (HOVs, including carpools, vanpools and buses) use through dedicated lanes, traffic control systems and parking facilities. Grade-separated rail lines and busways can be particularly effective at encouraging shifts from driving to public transit, resulting in an overall reduction in traffic congestion and pollution emissions, in addition to direct benefits to transit users.⁷⁰ Integrated intelligent transportation systems would facilitate the collection of road / congestion charges, traffic control (e.g., through signalling), and information provision.

A range of guidelines have been developed to guide sustainable roadway design, including:

- *complete streets*⁷¹ – Streets designed with all users in mind that work for drivers, transit, pedestrians, cyclists, older people, children, and people with disabilities. Complete streets will often incorporate a combination of the following: sidewalks, bike lanes, wide shoulders, raised crosswalks, refuge medians, bus pullouts and lanes, audible pedestrian signals, and sidewalk bulb outs.
- *narrower streets*⁷² – Narrower streets allow for more compact development patterns as well as improving the safety of the street, as vehicle speed is reduced.
- *traffic calming*⁷³ – Traffic calming may involve education, enforcement, and engineering and can be defined in a number of ways, though despite the definition, the main goals are to reduce vehicle speed, improve safety, and enhance the quality of life. According to TAC, “Traffic calming involves altering of motorist behaviour on a street or on a street network. It also includes traffic management, which involves changing traffic routes or flows within a neighbourhood.”
- *good connectivity*⁷⁴ – Good connectivity refers to the connectivity for both pedestrians and vehicles. More connected roads, sidewalks, and paths allow relatively direct travel for vehicles, pedestrians, and cyclists. (see fused grid design on following page).
- *road diets*⁷⁵ - Typically, a road diet involves the reduction (narrowing) of a three or four lane road to a two or three lane road with the addition of pedestrian and cyclist amenities, such as separate bike lanes and wider sidewalks. The goals of a road diet may include increasing safety, reducing traffic, or creating more aesthetically pleasing communities.
- *roadway level of service standards*⁷⁶ – Level of service (LOS) standards refer to the travellers’ perception of the quality of service by the facility. In the case of roads and infrastructure, it can be defined by what level of mobility is acceptable to those using the transportation system, ranging from most to least favourable driving conditions.

⁷⁰ Todd Litman (2004), *Rail Transit In America: Comprehensive Evaluation of Benefits*, VTPI (www.vtpi.org); at www.vtpi.org/railben.pdf.

⁷¹ *Complete Streets* (www.completestreets.org)

⁷² Todd Litman (2007), *Pavement Busters Guide*, VTPI (www.vtpi.org); at www.vtpi.org/pavbust.pdf.

⁷³ Traffic Calming (<http://www.trafficcalming.org/definition.html> - date accessed: April 2008)

⁷⁴ Todd Litman (2007), *Pavement Busters Guide*, prepared for VTPI (www.vtpi.org/pavbust.pdf - date accessed: April 2008)

⁷⁵ Dan Burden and Peter Lagerway (1999), *Road Diets Free Millions for New Investment*, Walkable Communities (www.walkable.org – date accessed: April 2008). This discusses Traffic Calming projects on arterials.

⁷⁶ FDOT (2002), *Quality/Level of Service Handbook*, Florida Department of Transportation (www.dot.state.fl.us/Planning/systems/sm/los/default.htm - date accessed: April 2008)

- *woonerf and pedestrian destination streets* - Roads and infrastructure also have an impact on the social life of a community. Impacts of the greatest concern may include noise, safety, and amenities. Designing roads for the sole purpose of moving traffic quickly and efficiently, can lead to increased noise pollution and decreased safety for pedestrians and cyclists alike. Traffic calming and similar measures, such as road diets as discussed above, can greatly improve the noise and safety levels for pedestrians and residents, while improving the aesthetics and character of a street and community. A woonerf, popular in Europe, is a street in which pedestrians and cyclists have priority over vehicles. Similarly, a pedestrian destination street is designed to increase pedestrian activity and urban vitality.

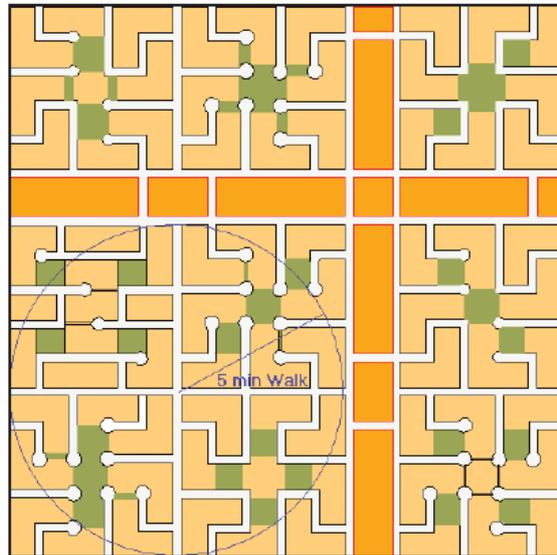
Street layout, integrated with transit planning, should provide increased accessibility and connectivity for pedestrians, increased mobility for vehicles and increased effectiveness of land-use. One approach is the use of fused-grid street layouts, which can harness both the clarity of organization and directness of pedestrian access associated with grid street layouts as well as the automobile efficiency of loop and cul-de-sac designs.⁷⁷

A fused grid street layout represents a combination of the traditional nineteenth century grid and the loop and cul-de-sac patterns of suburbia, as seen in Exhibit 4.3. The concept consists of a large scale (approximately 0.8km) grid of collector streets that encompass distinct neighbourhoods of approximately 40 acres (~16 ha). The residential streets within each neighbourhood are made up of crescents and cul-de-sacs to eliminate through traffic. There is also a system of pathways to enable a pedestrian to cross a neighbourhood in approximately 5 minutes while providing direct access to amenities, such as parks and public transit.⁷⁸ This is not to suggest that fused grid layout is the only, or even the best, design for all situations. In some situations, this layout can frustrate non-motorized travel and the long cul-de-sacs can favour vehicle use. Furthermore, it can lead to relatively higher traffic volume on the arterial grid which can present barriers to pedestrian crossing between neighbourhoods.

⁷⁷ Canada Mortgage and Housing Corporation, 2002, *Research Highlight: Residential Street Pattern Design*.

⁷⁸ Canada Mortgage and Housing Corporation, *Research Highlight: Applying Fused-Grid Planning in Stratford, Ontario*, 2004.

Exhibit 5.2
The Fused Grid Concept



Source: Canada Mortgage and Housing Corporation. 2004. Research Highlight: Applying Fused-Grid Planning in Stratford, Ontario.

5.3 CURRENT PRACTICE

Roadway construction and maintenance is a major municipal responsibility. Historically, large-scale investment in intra-urban highway infrastructure has encouraged automobile use and subsidized low-density suburban development.

Current infrastructure is generally not conducive to fluid, continual movement of vehicles in high traffic areas, though many large municipalities do have existing ring roads to divert through traffic away from these areas of congestion. High occupancy vehicle lanes do exist, but they often allow vehicles with as little as two people. The use of intelligent transportation systems is still relatively uncommon. The most common de-icing method across Canada is the excessive application of salt. Preventative maintenance is typically not carried out at an optimal level, and this is apparent in crumbling infrastructure (including bridge collapses) and constant major road work underway. Ecological systems are not always taken into consideration before the infrastructure is built, though this is beginning to change and environmental assessments for projects are becoming common (though not necessarily for programs or plans).

The current environmental impact of roads and infrastructure on the environment are vast. Following is a list of some of the more significant impacts:

- Air pollution and greenhouse gas emissions
- Impervious surfaces (hydrological impacts) – cause an increase in the velocity and volume of surface runoff and a corresponding reduction in the water infiltration rate leading to an adverse effect on watercourse quality
- Impervious surfaces (chemical impacts) – vehicle operation and wear leads to the emission of various pollutants, including heavy metals, PAHs, soot, carbonaceous

material, tars, brake fluid, antifreeze, coolants, engine oil, grease, rubber compounds, etc. These contaminants often adhere to dust on road surfaces and are washed off during precipitation events and thus are introduced to aquatic ecosystems.

- De-icing and anti-icing measures result in impacts to both terrestrial and aquatic ecosystems
- Disrupting wildlife movements and fragmenting habitats
- Wetland destruction and/or modification have both hydrologic and chemical implications for downstream aquatic ecosystems
- Construction related solids loading and sedimentation

In terms of prioritizing and funding of infrastructure projects, typically, decisions have been made on the basis of short term needs and in response to the most vocal demands. Little attention has been given to the full cycle costs of transportation options or to the costs of social and environmental externalities. In many cases, the budgeting process for roads has been divorced from the process for transit and other modes of transportation (primarily because they tend to be separate organizations and because they are seen to operate in different timeframes).

5.4 BEST PRACTICES

The following Exhibit provides an overview of the best practices related to roads.

Examples are drawn from the database of best practices summarized in Appendix D.

**Exhibit 5.3
Overview of Best Practices Related to Roads**

Category	Best Practice	Issue(s) Addressed	Applicability	Community Examples
Design	Street layout	<ul style="list-style-type: none"> • Accommodation for transit and active transportation • Road vehicle capacity 	M, L, Urban	Stratford – Fused grid
	Street design	<ul style="list-style-type: none"> • Safety • Impact on water quality 	M, L, Urban	Vancouver – Street design for water quality and conservation
	Traffic calming (including Road Diets)	<ul style="list-style-type: none"> • Accommodation for active transportation • Road vehicle capacity • Safety 	M, L, Urban	Vancouver – e.g., West End, Strathcona, Northeast Kitsilano
				Toronto – St. George Street
				Whitehorse – Fourth Ave., Quartz Ave.
Halifax – sidewalk café’s				
Infrastructure to encourage higher occupancy	<ul style="list-style-type: none"> • Road vehicle capacity 	M, L, Urban	Outaouais, Toronto, Vancouver, Montreal – 3+ (arterial) HOV lanes	

Category	Best Practice	Issue(s) Addressed	Applicability	Community Examples
	Infrastructure to improve efficiency (e.g., Intelligent Transportation Systems (ITS))	<ul style="list-style-type: none"> Road vehicle capacity Accommodation for transit Sustainable asset management 	M, L, Urban	Halifax – Adaptive traffic signal control
				York Region – Viva bus rapid transit
	Multi-modal infrastructure	<ul style="list-style-type: none"> Accommodation for transit and active transportation Safety 	All	Brampton – Road network developed to accommodate buses
				Moncton – Gunningsville Bridge
Maintenance	Road maintenance	<ul style="list-style-type: none"> Air and GHG emissions Sustainable asset management 	All	Calgary and Saanich – Warm mix asphalt
	Winter maintenance			<ul style="list-style-type: none"> Impact on water quality Sustainable asset management Safety
Waterloo – Smart About Salt Initiative				
North Bay – Integration of winter patrol and maintenance				
Caledon – Salt sand mix (improved operations)				
				Magnetawan – Ice blading

5.4.1 Street layout

Stratford (ON) has adopted this best practice in its Official Plan for development in the northeast portion of the city. Community facilities will be centrally located, including the community park and proposed schools; natural areas will be preserved; and pedestrian linkages will be provided through community trails throughout the neighbourhood, also providing connectivity to destinations outside of the community.

5.4.2 Street design

New infrastructure can also be better designed to minimize impact on the environment. One such example is Vancouver’s innovative model of best practices for street design, improving water quality and conservation. The street design is an alternative to the most common curb-and-gutter street, utilizing an experimental permeable road surface lined with vegetated swales to infiltrate storm water runoff and filter out pollutants. Vancouver has also examined the use of “Country Lanes” as a sustainable alternative to normal lane paving. These included permeable road surfaces, concrete driving strips, structural grass, and swales, all designed to improve natural infiltration, calm traffic, and improve aesthetics.

5.4.3 Traffic calming

The City of Vancouver provides numerous examples of traffic calming measures which slow the speed and/or reduce the volume of traffic in order to improve the safety and livability of a neighbourhood. Measures may include traffic circles, speed humps, corner bulges, partial diverters, diagonal diverters, right-in-right-out diverters, signs, street closures, and street narrowing.⁷⁹ Many neighbourhoods throughout Vancouver have completed Traffic Calming Plans and followed through with implementation. A few examples of neighbourhood-wide traffic calming plans include West End, Strathcona, Clinton Park, South Kerrisdale, and Northeast Kitsilano. The City has been successful in implementing traffic calming plans by involving the residents throughout the process and examining the neighbourhood as a unit in order to achieve balance between traffic calming measures and accessibility.

Toronto and Whitehorse provide examples at two different scales of the use of traffic calming and road diets. The Toronto St. George St. revitalization used a road diet to reduce a four lane road to two lanes, while widening the sidewalks and adding greenery. Whitehorse carried out two road diets, one on Fourth Avenue and one on Quartz Avenue. The four lane roads were reduced to two lanes, a centre two way left turn lane and bicycle lanes. A roundabout was also incorporated into Fourth Ave. to both reduce vehicle delay and slow the speed of traffic. Unfortunately, due to negative public reaction to one section of the Fourth Avenue road diet, just one month after it was complete, this section was reverted back to a four lane road. The separated bike lane was replaced with on-street bike logos and “Share the Road” signs, effectively cutting off the bike lanes for 200m. The updated plan for 2007 was to widen the roadway to keep the four lanes of traffic and have room to add proper dedicated cycling lanes. On the other hand, the program has led the City to develop a new zoning bylaw to reduce parking requirements and increase bicycle parking standards.

Saanich has also experienced the benefits of road diets. In some cases the city has successfully converted two lane roads with two parking lanes to two lanes, one parking lane and two bike lanes. These conversions were a very cost effective method of jump starting the creation of the Bicycle Commuter Network. The city has also converted West Saanich Rd. from a five lane corridor to three lanes plus bike lanes.

A woonerf, popular in Europe, is a street in which pedestrians and cyclists have priority over vehicles. In some cases (e.g., Netherlands and Germany), this is achieved through traffic laws that restrict vehicle speed to a pedestrian walking pace and pedestrians are permitted to use the entire street. In other cases (e.g., United Kingdom), these areas are not protected by law, but rely on community involvement. Halifax actively sought ways to increase pedestrian activity and urban vitality in the downtown core through the implementation of sidewalk cafes. The city successfully created destination streets to the benefit of pedestrians and local business owners, rather than using the street primarily for the movement of vehicle traffic.

⁷⁹ City of Vancouver, *Engineering Services* (<http://www.city.vancouver.bc.ca/engsvcs/transport/calming/>) (date accessed: April 2008)

5.4.4 Infrastructure to encourage higher occupancy

The Societe de Transport de l'Outaouais (STO) includes approximately 20km of reserved HOV lanes for 3+ passenger vehicles, bus, and taxi. Approximately 53,000 public transit riders benefit from these lanes every day. There are 65km of arterial 3+ HOV lanes on the city streets in the Greater Toronto Area.⁸⁰ Metro Vancouver also has arterial 3+ and 6+ HOV lanes.

5.4.5 Infrastructure to improve efficiency

Halifax Regional Municipality has adopted an Intelligent Transportation System (ITS) technology called SCOOT (Split Cycle Offset Optimization Technique) to increase operational efficiency and increase the capacity of the existing roads. SCOOT is a traffic control system that uses traffic adaptive control. It continuously monitors traffic flow and optimizes traffic signal operation based on a traffic flow model using the real-time data. The increased throughput on the road system has been estimated to provide a total fuel savings of \$2-3 million over a 3 year period, however, one concern is that the increased efficiency may also result in a "rebound" increase in vehicle use.

5.4.6 Multi-modal infrastructure

Brampton (ON) provides an example of best practice in this area. Brampton Transit staff participates in the road network development of all new subdivisions, and has input on the location of bus stops and pedestrian walkways. Brampton requires that transit be phased in and roads appropriately constructed for bus routes in all new subdivisions. Before any new development is approved, transit staff reviews the plans, makes recommendations on transit routes, bus stop pads and pedestrian walkways, and is actively involved in the overall transportation planning process. This participation involves driving through subdivisions as they are being built to determine the most appropriate routes.

Gunningsville Bridge strengthens the active transportation, transit and road links between the communities around Moncton (NB). The bridge was designed to maximize comfort and convenience for pedestrians and cyclists, who share a 4.0-metre wide pathway featuring observation platforms, low-level lighting and custom railings. Landscaped connections at either end of the pathway provide links to trail systems along the shores of the Petitcodiac River.

Saanich, BC has taken a unique approach to multi-modal infrastructure planning through the use of the Commuter Bicycle Network and the Bicycle Advisory Committee (BAC). The Community Bicycle Network, which is included in the Official Community Plan, helps to focus resources and define a vision for the bike path network as a whole, connecting commuter routes to key destinations, local connectors, and regional trails. The BAC, which is made up of engaged citizens, the Greater Victoria Cycling Coalition,

⁸⁰ Schijns, S. McCormick Rankin Corp. *Arterial HOV lanes: Where (and why) now?* Prepared for CITE annual conference, May 2006. (<http://www.mccormickrankin.com/pdf/CITE2006presentation.pdf> - date accessed: April 2008).

school boards, and municipal staff from engineering, public works, planning, and police, has become an indispensable resource for the staff in identifying cycling related issues and helping to prioritise streets that will eventually be modified to accommodate cycling. The BAC is now the Bicycle and Pedestrian Mobility Advisory Committee in order to incorporate more effectively pedestrian needs as well. Because the bicycle network itself was included in the Official Community Plan, it has been easy to secure funding from the municipality and the province as it showed serious commitment.

5.4.7 Maintenance

Road maintenance

Use of warm mix asphalt (WMA) as opposed to traditional hot mix asphalt could be considered a best practice for roadway repair, as it enables asphalt production and application to occur at lower temperatures thus reducing fossil fuel consumption and GHG emissions. Typical temperatures for hot mix asphalt production in Western Canada can range from 150 -165°C. WMA production temperature can be reduced to 115°C or less. Benefits of WMA may include the following: reducing energy consumption during production; improving paving performance; reducing emissions and odours at the plant and paving site; enabling cool weather paving; and improving cost efficiency at plants. The cost savings would be attributable to factors such as reduction in emission control costs, decreased wear on the plant, and decreased fuel consumption.⁸¹

The City of Calgary has completed a WMA demonstration project to compare three surfacing mix types: conventional and two WMA including warm-foam technology and Evotherm emulsion. Driven in part by the City's Corporate Environmental initiatives, the goal is to eventually implement WMA as a standard industry practice. Saanich is also currently testing warm mix asphalt. In the fall of 2007, five hundred tonnes of the asphalt was applied to a stretch of road, which will be monitored over one year. If the asphalt proves suitable for Saanich, the city will switch to this product.

Winter maintenance

Best practices for winter road maintenance include the reduction in road salt usage through a variety of methods such as pre-wetting and anti-icing techniques, use of Electronic Spreader Controls in the salt trucks, weather and road monitoring, and proper training of the drivers.⁸² Other best practices include reduction and re-use of road sand.

Examples of good examples include a range from large cities to small towns:

- Edmonton, which undertakes collection and re-use of road sand – the sand is collected, washed and recycled for re-use.
- Waterloo, ON, which includes initiatives to reduce salt use as described above.

⁸¹ Art Johnston (EBA Engineering), Ken Yeung (City of Calgary), Jim Bird (LaFarge), and Bob Forfyflow (LaFarge), *Initial Canadian Experience with Warm Mix Asphalt, Calgary, Alberta*, prepared for the Municipal Excellence Network, August 2007. (http://www.menet.ab.ca/bins/view_practice.asp?pid=929 – date accessed: May 2008).

⁸² Ontario Ministry of Transportation, *Road Salt Management* (<http://www.mto.gov.on.ca/english/engineering/roadsalt.htm> - date accessed: April 2008)

- Caledon, ON, which has adopted a mix of salt and sand that reduces the total application of chlorides to the roads, compared to previous practices.
- Magnetawan, ON, which uses ice blading for gravel roads – ice blading is used on packed snow, rather than snow plowing after each snow event and the application of de-icing chemicals. Ice blading leaves a grooved pattern on the road surface that provides good tire friction. Costs associated with plowing are reduced and there is a reduction in the application of de-icing chemicals.

5.5 ANALYSIS

This sub-section describes trends observed among Canadian municipalities moving toward more sustainable practices within the transportation sector. It identifies municipalities at the forefront within the transportation sector for projects related to roads, as well as observed gaps in sustainable development within the transportation sector.

5.5.1 Trends, Leaders and Gaps

The main observations are:

- A wide range of municipalities are experimenting with different road designs and layouts. In many cases, the driver is safety and quality of life in the communities that "host" the roads; however, there are also benefits in terms of reduced emissions and other environmental issues.
- There are relatively few examples of best practices to promote higher vehicle occupancy and system efficiency that have been documented. Similarly, the number of examples of multi-modal infrastructure planning is relatively small considering the need. These would appear to be clear gaps.
- In terms of maintenance, many communities are demonstrating best practices, particularly in dealing with winter maintenance.

5.5.2 Key Messages for Municipalities

The Key messages can be summarized as follows:

- The traditional approach to road design and maintenance, i.e. build to accommodate the peak needs, neglect preventative maintenance, and apply liberal amounts of salt, is unsustainable financially and environmentally.
- Roads need to be seen as part of the wider transportation system. As such, transportation corridors need to be designed, operated and maintained for use by a variety of modes. They also need to strike a balance between accommodating vehicle traffic, without making it so attractive that other modes cannot compete.
- There are a variety of best practices which are beginning to be used to put into practice a multi-modal approach and to provide disincentives to automobile use. These need to be monitored and replicated.

- There are also opportunities to use new technologies to make road travel more efficient but, so far, there is a gap in their implementation. Advances in these areas need to be tempered by the need to prevent a rebound in vehicle traffic.
- HOV lanes are becoming more common although the majority require only two passengers. To increase their cost effectiveness and benefits, HOV lanes should be implemented as part of an integrated TDM program that include commute trip reduction programs, parking pricing and management, and education and marketing activities to encourage use of alternative modes. See Section 8.
- There are a variety of best practices available to reduce the environmental impacts of road maintenance. These too should be monitored and replicated.

5.5.3 Implications for Municipal Transportation Management

Among other options for municipalities and roadways:

- There are opportunities to study and implement new street designs and layouts. There is also an opportunity to explore the potential of ITS technologies.
- Municipalities should consider opportunities for projects in the area of multi-modal street design, HOV lanes (more than two passengers), ITS, and sustainable road maintenance.

6. OPERATIONAL PRACTICES AND TECHNOLOGY – FLEETS

6.1 KEY ISSUES, TRENDS, AND DRIVERS

The following Exhibit provides an overview of the key issues related to municipal fleets.

Exhibit 6.1
Overview of Key Issues Related to Municipal Fleets

Category	Issue	Applicability (Region/Province) (S,M,L) (Rural, Urban) (Remote/Northern)
Environmental	Air and GHG emissions	All
Economic	Cost of maintaining / replacing fleet	All
Technology	Alternative Fuels & Low Emission Vehicles (LEVs)	All
	Trip Management	All
Governance	System management	All

6.1.1 Air and GHG emissions

Municipal fleets consist of a variety of vehicle types from fuel efficient compact cars to transit and heavy duty diesel vehicles. More stringent emission standards for heavy duty diesel vehicles were implemented for the 2007 model year. The new emission standards will substantially reduce future diesel exhaust emissions from on-road heavy duty vehicles. However, because of the long life of diesel engines, vehicles sold prior to 2007 will have significantly higher emissions and continue to contribute to air and GHG emissions at higher levels for many years (unless retrofit or rebuilt).⁸³ Light duty fleet vehicles tend to be replaced more often and therefore air and GHG emissions should be considered a major factor in both the maintenance and selection of replacement vehicles. Furthermore, air and GHG emissions can be addressed through improved fleet operation, including a change in driving behaviour and the use of new technologies.

6.1.2 Cost of maintaining/replacing fleet

The cost of maintaining and replacing fleets for municipal governments can be significant, as a municipal fleet is made up of a variety of vehicles from light duty cars to transit vehicles to heavy duty trucks. Vehicles perform more efficiently when well maintained, however the cost of properly maintaining a large fleet can be prohibitive for some municipalities. As mentioned above, heavy duty vehicles purchased prior to 2007 should ultimately be replaced with cleaner burning heavy duty vehicles, but again the cost of this is prohibitive. Furthermore, when replacing fleet vehicles with advanced technology vehicles, the cost may be increased beyond the perceived benefits for the municipality to justify or support the budget requirements.

⁸³ Ergudenler, A., Jennejohn, D., and Edwards, W., *Heavy-duty diesel vehicle emissions in Greater Vancouver*, prepared for the 14th International Emission Inventory Conference, April 2005.

6.1.3 Alternative fuels and low emission vehicles (LEVs)

The use of alternative fuels in municipal fleets can pose certain challenges. There may be a mistrust of performance associated with a high use of alternative fuels in a colder climate and concern regarding the availability and impact of certain fuels. Municipalities depend on their fleets to provide services to the public. Because of this, they would want to be certain that the vehicles be dependable and the fuel available. This may not be an issue for the municipal light duty vehicles; however, long-term testing of transit and heavy duty vehicles with complete or high blend levels of alternative fuels and advanced technologies continues. Regardless of the performance testing or life cycle impact analysis of these technologies, fuels, and vehicles, there is also the associated incremental cost, which would be an issue for many municipalities.

6.1.4 Trip management

Municipalities have the ability to contribute to a sustainable transportation system through the use of trip management. This can be as simple as selecting a job appropriate vehicle (or a non-motorized mode of travel) such as bicycles for local work and neighbourhood electric vehicles for use on non-public roads, to the implementation of a more complex intelligent transportation system (ITS). ITS is not widely used and gaining acceptance of the technologies for use within the fleet vehicles may be a challenge for municipalities.

6.1.5 System management

Typically there is no unified authority to manage the entire municipal fleet. This should be considered an issue when a municipality is attempting to optimize routes, trips, jobs, etc. Looking at the fleet system as a whole is a challenge, as there would be issues with coordination between departments and the lack of a system mentality, where the concern lies with an individual fleet rather than the entire municipal fleet as a whole.

6.2 IDEAL PRACTICE

Adoption of advanced technologies is one way to improve the environmental performance of municipal fleets but it is not necessarily the only way, or even the best way to do so. In most cases, optimizing the deployment of vehicles with existing technologies can provide the most benefit.

Municipal fleets should be managed to optimize efficiency and minimize environmental costs. Municipal vehicles be selected based on their intended use. Hybrid vehicles tend to be optimal in urban conditions with frequent stop-and-go traffic; diesel vehicles tend to be optimal for highway travel; low speed electric vehicles can be used in campuses and on neighbourhood streets⁸⁴; and when possible, bicycles can be used for applications such as parking enforcement

⁸⁴ British Columbia announced in November 2007 that they will allow the use of zero emission vehicles (ZEVs) on public roads, accomplished through a change in the Motor Vehicle Act Regulations. ZEVs will be allowed to travel (without activated hazard lights) on certain roads with a speed limit of 50km/h. The government will also work with municipal partners and industry stakeholders to explore the use of ZEVs in certain areas, such as parks, ferry terminals, university campuses, airport terminals,

and patrolling in campuses and commercial centres. Vehicles that require the continual use of auxiliary equipment, such as police cruisers, would be equipped with battery power to eliminate unnecessary, extended idling. The most fuel efficient model should be chosen for each application. Fleets should be managed to encourage users to select the most efficient vehicle for each trip.

Ideally, all municipal fleet drivers, including urban transit, would be trained for eco-driving as a “SmartDriver.” SmartDriver training equips drivers to consider and assess the condition of their vehicle, reduce fuel consumption, reduce wear and tear on breaks and tires, and embrace new techniques that can also be transferred to improve their driving habits in personal vehicles.⁸⁵

6.3 CURRENT PRACTICE

The majority of municipal fleets still consist of conventional internal combustion engine vehicles. Vehicles continue to be used for positions/functions that do not require the use of a vehicle, for example parking enforcement. There are very few anti-idling bylaws, therefore it is not uncommon to see municipal vehicles, police cruisers for example, idling for extended periods of time.

6.4 BEST PRACTICES

The following Exhibit provides an overview of the best practices related to municipal fleets.

and resort communities (http://www2.news.gov.bc.ca/news_releases_2005-2009/2007TRAN0054-001543.htm - date accessed: May 2008).

85 NRCan and the Office of Energy Efficiency have developed and provided driver training resources to improve fuel efficiency and reduce emissions. SmartDriver’s must learn new techniques to minimize fuel consumption, including pre-trip inspections. To ensure fuel efficiency, they use progressive shifting techniques and reduce idling and revving to a minimum.

Natural Resources Canada, *SmartDriver Program Information*.

(<http://www.oee.nrcan.gc.ca/transportation/business/smartdriver/sd-info.cfm?attr=16> – date accessed: April 2008).

Canadian Urban Transit Association, *SmartDriver*. (http://www.cutaactu.ca/en/smartdriver_0 - date accessed: April 2008).

Exhibit 6.2 Overview of Best Practices Related to Municipal Fleets

Category	Best Practice	Issue(s) Addressed	Applicability	Community Examples
Vehicle and Fuel Choices	Advanced vehicle technology	<ul style="list-style-type: none"> • Alternative fuels and LEVs • Air and GHG emissions • Costs of maintaining / replacing fleet 	All	Kelowna – Addition of LEVs to fleet
				Maple Ridge – Green Fleet Program
				Toronto – Green Fleet Transition Plan ⁸⁶
	Alternative fuels	<ul style="list-style-type: none"> • Alternative fuels and LEVs • Air and GHG emissions 	All	Brampton – Biodiesel
				Toronto – Green Fleet Transition Plan
	Appropriate vehicle selection by function	<ul style="list-style-type: none"> • Trip management 	All	Ottawa – Smart cars for bylaw services
Toronto – Bicycles for certain police services and parking enforcement				
Operation	Efficient fleet operation and Eco-driving training	<ul style="list-style-type: none"> • System management • Trip management • Air and GHG emissions 	All	Edmonton – Fuel Sense Program
				Toronto – Garbage trucks
Other	Public-private partnerships	<ul style="list-style-type: none"> • Full costing and economic efficiency • Fiscal capacity 	All	Vancouver – Taxi-City for fuel efficient vehicles

Best practices for greening a municipal fleet include⁸⁷: downsizing vehicles; optimizing vehicle use; incorporating efficiency into bid specifications; maximizing efficiency; eliminating fleet vehicles; buying vehicles that run on alternative fuels; and using transit, bike, walk, or telecommute. Examples are drawn from the database of best practices summarized in Appendix D.

⁸⁶ Since the writing of this report, the City of Toronto has implemented the Green Fleet Plan 2008-2011, which builds upon the Green Fleet Transition Plan 2004-2007. The plan outlines specific actions that the City will take in the following areas: Emission reduction targets; Vehicles; Fuels; Sustainable choices; and Maintenance and management practices. Buying green vehicles will be standard practice, new technologies and practices will be adopted over time, and new initiatives will be addressed, such as a focus on heavy-duty trucks. The plan focuses on the centrally managed fleet of approximately 4,700 vehicles and equipment. (http://www.toronto.ca/fleet/gfp_08_11.htm - date accessed: March 2009).

⁸⁷ International Council for Local Environmental Initiatives, *Green Your Fleet*, 2000. (http://www.greenfleets.org/Green_Your_Fleet.pdf - date accessed: April 2008).

6.4.1 Vehicle and fuel choices

Advanced vehicle technology

Best practices for municipal fleets include the replacement of fleet vehicles with advanced technologies, including light weight, aerodynamic, low emission vehicles, such as hybrid, battery electric, flex-fuel, and alternative fuel vehicles.

Kelowna (BC) has purchased 18 smart cars and two hybrids for their fleet. Maple Ridge (BC) took part in Smart Growth on the Ground and has implemented a green fleet program where they have purchased 12 hybrid vehicles, which is one-third of their fleet. Toronto has also adopted a Green Fleet Transition Plan, which is a sustainable and cost effective plan to reduce the negative impact of fleet operations through a transition to lower impact vehicles, such as Biodiesel, natural gas, and hybrid electric vehicles.

Alternative fuels

Brampton (ON) has committed to the use of biodiesel in heavy duty municipal fleet vehicles. The test vehicles used B20 biodiesel during the colder months and B50 biodiesel during the warmer months. Brampton is now expanding its use of biodiesel to most of its 415 diesel burning fleet vehicles. As mentioned above, Toronto is also exploring the use of and implementing alternative fuels within the city's fleet.

Appropriate vehicle selection by function

Ottawa (ON) is using Smart Cars for its' bylaw services. A further best practice would be the elimination of fleet vehicles for certain positions that do not require the use of motorized vehicles. For example, Toronto and several other municipalities use bicycles for certain police services and parking enforcement.

6.4.2 Operation

Efficient fleet operation

In Toronto, route optimization for garbage trucks enabled the reduction of fuel consumption (by 140,000 gallons a year) and thus reduced CO₂ emissions by 1,500 tons per year.⁸⁸ Edmonton's Fuel Sense program trains fleet and transit operators on how to achieve maximum fuel efficiency and has shown an increase in average fuel economy from 10% to 20%.⁸⁹

⁸⁸ International Council for Local Environmental Initiatives, *Green Your Fleet*, 2000. (http://www.greenfleets.org/Green_Your_Fleet.pdf - date accessed: April 2008).

⁸⁹ International Council for Local Environmental Initiatives, *Green Your Fleet*, 2000. (http://www.greenfleets.org/Green_Your_Fleet.pdf - date accessed: April 2008). FCM-CH2M Hill Sustainable Community Awards, *Municipal Governments and Sustainable Communities: A Best Practices Guide 2002*. ([http://www.sustainablecommunities.fcm.ca/files/Tools/Best_Practices_Guides/FCM-CH2M_BPG_2002\[1\].pdf](http://www.sustainablecommunities.fcm.ca/files/Tools/Best_Practices_Guides/FCM-CH2M_BPG_2002[1].pdf) - date accessed: April 2008).

6.4.3 Other

Public-private partnerships

Although not regarding a municipal fleet, this partnership represents a potential best practice that could be applied to municipal fleets. The City of Vancouver (BC) has established a partnership with taxi owners to encourage the purchase of EnerGuide Award winners (including hybrids) and top fuel efficiency vehicles. The City helps drivers become aware of the fuel savings available to them through these purchases.

6.5 ANALYSIS

This sub-section describes trends observed among Canadian municipalities moving toward more sustainable practices within the transportation sector. It identifies municipalities at the forefront within the transportation sector for projects related to municipal fleets, as well as observed gaps in sustainable development within the transportation sector.

6.5.1 Trends, Leaders and Gaps

The main observations are:

- Several municipalities have begun to integrate fuel efficient vehicles and alternative fuel vehicles within their fleets. In most cases, the numbers involved remain small in relative terms (one exception being the Toronto, Green Fleet Plan).
- Many municipalities are making greater use of biofuels, particularly when little or no changes are required to engines. Brampton has gone further than most in using higher percentages of biodiesel.
- There are relatively few examples of best practices related to vehicle choice by function or fleet operations.

6.5.2 Key Messages for Municipalities

The Key messages can be summarized as follows:

- There are significant opportunities to realize financial savings and environmental benefits from more efficient municipal fleets. This includes opportunities to better match vehicles to functions, to choose more efficient vehicles, and to improve fleet operations.
- Alternative fuels and new technologies should be carefully evaluated to ensure that they actually provide significant benefits.
- There are a few best practices which are beginning to be put into practice. These need to be monitored and replicated.
- But for the most part, these opportunities are not being realized.

6.5.3 Implications for Municipal Transportation Management

Among other options for municipalities and fleets,

- There are opportunities to better match vehicles to functions. There is also an opportunity to explore the potential of ITS technologies.
- The viability of more fuel efficient vehicles is proven but municipalities could benefit from additional efforts towards optimizing fleet operations and management.

7. OPERATIONAL PRACTICES AND TECHNOLOGY – TRANSIT

7.1 KEY ISSUES, TRENDS, AND DRIVERS

There are three key objectives to sustainable transit planning:

1. Attracting travelers who would otherwise drive (and therefore reducing the economic, social and environmental costs of automobile travel.
2. Providing affordable basic mobility to non-drivers, to achieve social objectives.
3. Operating the system efficiently.

These are generally complementary: efficient operation allows the agency to maximize service quality which provides basic mobility and attracts people out of cars. But they can also result in conflicts between equity objectives (providing basic mobility for non-drivers, even if they live in low-density areas or require expensive additional equipment such as wheelchair lifts) and efficiency objectives (attracting travelers out of automobiles, and therefore focusing service on major urban corridors, with extra amenities to attract wealthier travelers).

The key issues are outlined in Exhibit 6.1.

**Exhibit 7.1
Overview of Key Issues Related to Transit**

Category	Issue	Applicability (Region/Province) (S,M,L) (Rural, Urban) (Remote/Northern)
Economic	Lifecycle Costs	All
Social	Accessibility / Mobility / Equity	All
	Quality of life / Convenience / Health / Safety	All
Technology	Advanced vehicle technology (AVT)	M, L, Urban
	Information technology (IT)	M, L, Urban
Governance	Multiple jurisdictions – System management	All
	Fiscal capacity	All

7.1.1 Lifecycle Costs

Transit decisions are often based on an insufficient analysis of all categories of costs, an insufficient analysis of both capital, operating and other costs over the lifetime of assets, and inconsistent analysis of the different options to meet mobility needs. Sustainable transit planning should use comprehensive lifecycle cost analysis to identify the most cost effective options in system planning, vehicle selection and maintenance practices.⁹⁰

⁹⁰ Todd Litman (2001), *What's It Worth? Life Cycle and Benefit/Cost Analysis for Evaluating Economic Value*, Presented at Internet Symposium on Benefit-Cost Analysis, Transportation Association of Canada (www.tac-atc.ca); at www.vtpi.org/worth.pdf.

7.1.2 Accessibility, Mobility, and Equity

Basic Access refers to people's ability to access goods, services and activities that society considers particularly important (also called *essential* or *lifeline*). *Basic Mobility* refers to physical travel that provides Basic Access.⁹¹

Accessibility is an important aspect of social interaction and allows residents to take advantage of a wide range of services, culture and leisure activities. Some regions (e.g., rural, remote, low density) and segments of society (e.g., elderly, disabled, disadvantaged) have insufficient access to important services, including public transit.

7.1.3 Quality of Life, Affordability, Health, and Safety

Public transit systems can also play an important role in determining the quality of life in communities. Provision of an inefficient or unreliable public transit system can contribute to the stress of daily life. Similarly, if transit is not available at a reasonable cost, people will lack in access or will need to find alternatives. This can lead to reliance on motorized transport, which also diminishes opportunities for walking and cycling, and is a key factor in the development of an unhealthy lifestyle. Reducing per capita vehicle travel through well designed, convenient, and safe transit systems tends to increase multi-modal travel, which leads to improved public health. The convenience of transit should be considered with respect to the provision of efficient and effective service, especially regarding the use of ITS and real-time passenger communication.

7.1.4 Advanced Vehicle Technology

Transit vehicle technology is improving, especially with respect to diesel engines and the use of low sulphur fuel. Despite the increasing availability of advanced vehicle technologies for transit vehicles, such as hybrid or hydrogen buses, these types of solutions can often be too costly for many municipalities. As a stepping stone, lower cost solutions do exist for communities wanting to improve the sustainability of their transit systems, such as adding particulate filters to older diesel buses or rebuilding the engines.

7.1.5 Information technology

There are many information technologies available for use in a transit system which can provide benefits to both the riders and the transit system.⁹² These include new technologies such as vehicle navigation and tracking, electronic road and parking pricing, automated transit fare payment, real time transit vehicle arrival information, transit vehicle on-board wifi services (particularly for longer-distance commute trips) and other systems that improve transit user service quality. Information technology has the

⁹¹ VTPI (2008) "Basic Mobility and Accessibility," Online TDM Encyclopedia, Victoria Transport Policy Institute (www.vtpi.org/tdm).

⁹² Cisco (2008), *Connected Bus*, Connected Urban Development Program, Cisco Systems (www.cisco.com); at www.cisco.com/web/about/ac79/ps/cud/tcb.html.

potential to make the use of public transit more attractive, improve performance, reduce environmental impacts, and improve the affordability of the system.⁹³

7.1.6 Multiple jurisdictions – System management

Regional transit systems face the issue of control by multiple jurisdictions. Sustainable transportation planning should consider an entire region in order to ensure a seamless transit network. This is important to facilitate and encourage public transit use by minimising transfers, providing a single fare network, and also to optimize the efficiency and effectiveness of the entire system as a whole, for example routes and scheduling. System management is also an issue for public transit systems with respect to financing and prioritization.

7.1.7 Fiscal capacity

The quantity and quality of public transit service is usually constrained by the availability of public funding. Improving transit service quality therefore requires a reliable source of additional funding. Most other developed countries have various dedicated transit funding, often from several levels of government (federal, provincial/state, regional and local), including special taxes or levies. In contrast, Canada uses few of these funding sources and most transit systems rely primarily on user fees. In the last few years, the Federal Government and some provinces have begun to provide greater support for transit. Exhibit 6.2 provides some examples.

Exhibit 7.2
Examples of Federal and Provincial Funding for Transit

Fund	Activity	Description	Amount
Building Canada Fund (BCF)	Ongoing	To advance national priorities with economic, environmental, and social benefits while addressing local and regional infrastructure needs. Program operates through two components: Major Infrastructure Component (target larger, strategic projects of national and regional significance) and Communities Component (projects in communities with populations of < 100,000). Priority funding categories: core national highway system, drinking water, wastewater, public transit and green energy.	\$8.8 billion (2007-2014)
Gas Tax Fund (GTF)	Ongoing	Provides predictable funding in support of municipal infrastructure that enhances the environment and quality of life and for capacity building to support communities in	\$13 billion (2005-2014) \$2 billion / year thereafter

⁹³ Metrolinx, *Green Paper #1 - Towards sustainable transportation*, December 2007. (http://metrolinx-consult.limehouse.com/portal/review_green_paper_and_give_us_your_thoughts - date accessed: April 2008).

Fund	Activity	Description	Amount
		planning for long-term sustainability. Transportation project examples: rapid transit, transit buses, ITS technologies, active transportation infrastructure.	
Public Transit Fund	Fully committed	Transfer payment program designed to provide funding to improve public transit services in order to reduce GHG emissions and smog in urban areas (offering more flexibility in travel options). (Modelled after the GTF).	\$400 million (2005-2006)
Public Transit Capital Trust	Fully committed	To support capital investments in public transit infrastructure as a means to reduce traffic congestion and reduce CO ₂ and other emissions.	\$900 million (2006-2009)
Canada Strategic Infrastructure Fund	Ongoing	Investments are directed to large-scale projects of national and regional significance (in partnerships with any combination of municipal, provincial, territorial governments, as well as the private sector). Directed to projects in areas that are vital to sustaining economic growth and enhancing quality of life. Transportation project examples: infrastructure on national highway system, public transportation infrastructure in major urban centres.	\$5.2 billion (2002-present)
Infrastructure Canada Program	Virtually fully committed	Helps to renew and build infrastructure in rural and urban municipalities (in partnership with provincial, territorial and local governments, First Nations and the private sector). Aim to improve quality of life through investments that protect the environment and support long-term community and economic growth. Transportation project examples: local transportation infrastructure.	\$2.05 billion (2000-present)
Ontario – MoveOntario 2020	Ongoing	Rapid transit action plan for the GTA and Hamilton	\$11.5 billion
Ontario – ReNew Ontario Infrastructure Plan	Ongoing	Transportation infrastructure initiatives to develop an integrated public transportation system (provincial highways, local roads and bridges, public transit, and border gateways).	\$11.4 billion (2005-2010) [\$5.2 billion of which is for the Ontario highway network]
Ontario – Budget 2008	Fully committed	To provide funding for the Metrolinx recommended “Quick Win” projects.	\$744.2 million (Funding provided through a combination of the 2007 Ontario Economic Outlook and Fiscal Review, 2008 Budget, and ReNew Ontario)

Fund	Activity	Description	Amount
Ontario – Provincial gas tax	Ongoing	2 cents per litre of the provincial gas tax is made available to municipalities annually for public transit.	
British Columbia – dedicated tax revenues	Ongoing	Provides funding to TransLink for public transit in Metro Vancouver.	
British Columbia – dedicated fuel taxes	Ongoing	6.75 cents per litre for provincial highway renewal and expansion.	
British Columbia – grant programs	Fully committed	BC Transportation Financing Authority provides funding for grant programs including: the transportation partnerships program for cycling and the provincial contribution to the Canada Line rapid transit project.	\$133 million (2007-2008) [\$27 million of which is for transportation partnership program; \$21 million of which is for expanded cycling program]
British Columbia – New Transit Plan	Ongoing	The objectives of the new Transit Plan are to increase ridership, reduce GHG emissions and other air contaminants, support TOD, ease traffic congestion, and improve transit service. Major transit improvements will include new, clean technology buses, new and expanded rapid transit (rail) lines, and new rapid bus lines.	\$4.75 billion (estimated provincial contribution by 2020) \$2.75 billion (estimated TransLink contribution by 2020).
British Columbia – Ministry of Transportation Service Plan	Fully committed	Provincial investments in transportation systems.	\$3764 million (2008-2011) for transportation infrastructure \$774 million (2008-2011) for the Transit Plan

7.2 IDEAL PRACTICE

Ideally transit infrastructure would be multi-modal and fully integrated. It would be designed to be more convenient than a personal vehicle to encourage increased ridership. This may include train lines to highly populated suburbs, devoted bus lanes on major corridors, increased frequency with fewer stops, and extensive subway systems (including to the airports). The above ground transit infrastructure must also allow for fluid movement of the transit vehicles. This may include dedicated transit ways, advanced signals for buses, and the use of both express and local buses and trains.

Exhibit 6.3 provides as summary of the applicability of transit types by community characteristics.

Exhibit 7.3 Applicability of Transit Types

	Major urban corridor	Minor urban corridor	Suburb to city or activity center	Suburban routes	Rural
Heavy rail	X				
Light rail	X	X			
Express bus	X	X	X		
Conventional fixed-route bus	X	X	X	X	
Demand response bus			X	X	X
Shared taxi				X	X
Ridesharing			X		X

Transit operation should be fast and reliable. Transit schedules would be geared to mass movement. Intelligent transportation systems would be thoroughly embedded. Transit vehicles would be equipped with GPS systems to facilitate scheduling as well as allow real-time interaction between transit authorities and passengers (e.g., using wireless communication to cell phones/hand held devices). Rural public transit would be available and linked to urban transit operations. Operation of all transit modes would ideally be as energy efficient as possible, including the implementation of anti-idling regulations for all transit vehicles. Payment systems would be as unobtrusive as possible using smart card technology and automated billing where possible.

The ideal transit vehicle, whether public or private, would be a low emission vehicle allowing for high passenger density. The vehicle would be made of light weight materials, aerodynamic, and be modelled to optimize energy efficiency including auxiliaries. Alternative, advanced vehicle technologies would be employed to match the type of vehicle with the typical drive schedule, for example hybrid buses and taxis for stop and go traffic. Transit vehicles would be designed for maximum convenience and accessibility. All mass transit vehicles would provide adequate space for bicycles and there would be an increase in wheel-chair accessible transit. Where water bodies are present, there would exist pedestrian/cycle-only ferries (or with minimal vehicle space) with extensive public transit networks at each harbour.

The Transportation Research Board (TRB) in the U.S. has published a Guidebook on Transit Performance Measurement.⁹⁴

7.3 CURRENT PRACTICE

In 2006, there were 107 conventional transit systems reported to CUTA for their annual urban transit statistics report and 65 specialized transit systems were reported.⁹⁵ Active transit vehicles for the conventional systems included: 13,317 buses; 613 light rail vehicles; 1,437 heavy rail

⁹⁴ Kittleson & Associates (2003), *Guidebook for Developing a Transit Performance-Measurement System*, TCRP Web Document 88, Transportation Research Board (www.trb.org) (http://gulliver.trb.org/publications/tcrp/tcrp_report_88/intro.pdf - date accessed: April 2008)

⁹⁵ Canadian Urban Transit Association, Statistics (<http://www.cutaaactu.ca/en/node/135> - date accessed: June 2008). Data is gathered from the CUTA members, which includes a majority of the urban transit systems in Canada.

vehicles; and 629 commuter rail vehicles. Both large and small municipalities benefit from public transit systems, though larger cities support larger ridership levels per capita. For example, in 2000, ridership in the larger municipalities (> 400,000) ranged from 40 passenger trips per capita in Mississauga (ON) to 193 in Montreal (QC). For municipalities with a population of 150,000 to 400,000, the passenger trips per capita ranged from 13 in Vaughn (ON) to 80 in Montreal's South Shore (QC). For municipalities with a population of 50,000 to 150,000, the passenger trips per capita ranged from 6 in Richmond Hill (ON) to 52 in Sherbrooke (QC). And in the smallest population group considered (< 50,000), the ridership ranged from 4 passenger trips per capita in Corner Brook (NFLD) to 47 in North Bay (ON).⁹⁶

Current transportation infrastructure planning is typically reactive and supply-side oriented.⁹⁷ Little provision is made for transit infrastructure development in conjunction with other urban development plans. Roadway expansion is a common solution applied to congestion problems and roads are typically sized to handle peak period capacity. In the suburbs and smaller communities, population density is insufficient to support high-service-level transit; where there is sufficient demand, transit solutions such as light rail remain difficult and costly to implement due to land acquisition requirements. Few airports in Canada are connected to the downtown core by train/subway (or an equally convenient mode of public transportation) and the majority of urban transit systems in Canada are bus-based.

The majority of buses across Canada have relatively high levels of air pollutant emissions, typically higher than automobiles per vehicle-kilometre (although better than automobiles per passenger-kilometre). Electric trains and trolleys are not used as extensively as they could be.

Bus rapid transit (BRT) refers to a set of bus system design features that provide high quality and cost-effective transit service.⁹⁸ Some BRT systems exist including: the 98 B-Line bus that operates between Richmond city centre, the airport and downtown Vancouver (BC); OTranspo's Transitway in Ottawa (ON); Halifax Regional Municipality's (HRM) MetroLink linking Sackville, Cole Harbour and downtown Halifax; and, York Region's VIVA rapid transit system. Both the 98 B-Line and OTranspo's Transitway are grade-separated systems while MetroLink and Viva are mixed traffic systems with some dedicated laneways and transit priority signalling. The Ontario government also recently announced the MoveOntario 2020 Plan which includes 52 rapid transit projects. Rail (heavy and light) and subway systems are used in a number of urban centres including Montreal, Toronto, Vancouver, Calgary, Edmonton, and Ottawa. Streetcars or trams are used in Toronto all year round with historic tramways being used during the summer months in Calgary, Edmonton, Nelson (B.C.), Vancouver, and Whitehorse.

With current transportation systems, public transit travel is usually less convenient than using a personal vehicle. With the exception of grade separated systems in a few major cities, most transit vehicles must share road space with general traffic, so service is slow. In addition,

⁹⁶ McCormick Rankin Corporation, *Urban Transit in Canada – Taking Stock*, prepared for Transport Canada, January 2002 (<http://www.tc.gc.ca/programs/Environment/transitstudies/urban.htm> - date accessed: June 2008).

⁹⁷ PennDOT, *The Transportation and Land Use Toolkit: A Planning Guide for Linking Transportation to Land Use and Economic Development*, 2007, prepared for Pennsylvania Dept. of Transportation, PUB 616 (3-07) (<ftp://ftp.dot.state.pa.us/public/PubsForms/Publications/PUB%20616.pdf> - date accessed: April 2008).

⁹⁸ Lloyd Wright (2007), *Bus Rapid Transit Planning Guide*, Institute for Transportation and Development Policy (www.itdp.org); at www.itdp.org/index.php/microsite/brt_planning_guide.

connections from express lines to branch lines are often cumbersome and add to the inconvenience. Though more cities are adopting lanes that are specifically devoted to buses or trams, few have actual transit ways explicitly for them. Advanced signals for buses also exist, though they are not the majority.

Public transit is often slower and less reliable than automobile travel. Furthermore, there is little real-time interaction between the passenger waiting for the transit and the transit vehicle itself. Transit schedules are generally oriented toward peak hours and becoming inconvenient and untimely during off-peak hours. The inconvenience is compounded by the frequent need for transfers between express lines and branch lines. Rural public transit is not typically available as the areas are generally considered to have too low a population density to sustain conventional public transit services. Few transit systems train their operators in driving for fuel efficiency.

7.4 BEST PRACTICES

The following Exhibit provides an overview of the best practices related to transit.

Examples are drawn from the database of best practices summarized in Appendix D.

**Exhibit 7.4
Overview of Best Practices Related to Transit**

Category	Best Practice	Issue(s) Addressed	Applicability	Community Examples
Infrastructure	Designated transit infrastructure (bus and rail)	<ul style="list-style-type: none"> • Full costing and economic efficiency • Fiscal capacity • Quality of life 	L, Urban	Ottawa – Transit Ways
				York Region – Rapid Ways
				Halifax – Rapid transit bus corridors
				Montreal – Commuter trains
Infrastructure	Multi-modal access	<ul style="list-style-type: none"> • Quality of life 	All	Toronto – GO Transit
				Vancouver - #98 bus rapid transit; Canada Line
				Montreal, Toronto, Halifax, Ottawa, Vancouver – Bike racks; Bike and Ride
System Design	Rapid transit (bus and rail)	<ul style="list-style-type: none"> • IT • Quality of life / Convenience • Fiscal capacity • Accessibility / mobility 	L, Urban	Vancouver – Secure bike lockers
				York region – Viva
	Rural and low density transit		S, Rural	Vancouver - #98 B-Line
				Victoria – Rural vanpool service
				Salt Spring Island – Rural transit
				Regional Municipality of Waterloo – Transit network servicing 3 rural communities

Category	Best Practice	Issue(s) Addressed	Applicability	Community Examples
Operation	Intelligent Transportation Systems (ITS)	<ul style="list-style-type: none"> IT Electronic fare payment systems 	M, L, Urban	York, Vancouver, Saanich, Halifax, Montreal – for select bus routes
	Efficient / effective transit service	<ul style="list-style-type: none"> Accessibility / mobility Convenience Full costing and economic efficiency Quality of life 	All	York Region – Viva Rapid Transit
				Edmonton – Fuel Sense Program
				Kelowna and Okanagan Regional District – Smart Transit Plan
	Real time communication	<ul style="list-style-type: none"> IT Accessibility Convenience 	M, L, Urban	York – Viva bus stops
Montreal – Metro stops				
St. John’s – Metrobus text message system				
Fare structures	<ul style="list-style-type: none"> Full costing and economic efficiency System management Convenience 	M, L, Urban	Ottawa – EcoPass	
			Metro Vancouver, Halifax, Sherbrooke, Edmonton, Calgary, Toronto, Victoria, Guelph, Kamloops, North Bay, Hamilton, Kingston, London, Peterborough, St. Catherine’s – U-Pass	
Vehicles and Fuels	Advance vehicle technology	<ul style="list-style-type: none"> AVT Fiscal capacity 	M, L, Urban	Fort St. John, Saskatoon, Hamilton, Montreal, Halifax, Kelowna, CRD – Testing hybrid buses
	Alternative fuels and Renewable energy	<ul style="list-style-type: none"> AVT Full costing and economic efficiency 	All	Halifax, Brampton, Montreal – Use of biodiesel in buses
				Calgary – Ride the Wind
Increased passenger density	<ul style="list-style-type: none"> Full costing and economic efficiency 	M, L, Urban	Ottawa, Montreal – Articulated buses	
Other	Public-private partnerships	<ul style="list-style-type: none"> Full costing and economic efficiency Fiscal capacity 	All	York Region – York Consortium for Quick Start phase of Viva

7.4.1 Infrastructure

Designated transit infrastructure is generally practicable only in large cities and surrounding suburbs and only the larger cities can justify investments in subways and rail systems. On the other hand, smaller communities can still build high quality bus and train stations, provide park-and-ride facilities, and provide transit user information services.

Transit infrastructure that improves the speed and reliability of transit vehicles and increases the number of passengers it reaches can be considered best practice. This may include designated roadways (e.g., Ottawa Transit Ways) or designated lanes (e.g., York

Region Rapid Ways) as they facilitate the speed and reliability of transit vehicles. In addition, advanced signals at intersections for buses give transit vehicles priority over other vehicles. The Halifax rapid transit bus corridors to outlying communities include not only dedicated bus lanes, but stoplights that are controlled by the buses, giving the buses an advance green light.

Montreal's transit system (STM) is using best practices in the development of the transit infrastructure including bus routes and scheduling (frequency and reliability of service, 24-hour service for key routes), an extensive metro system, and five different commuter lines (run by AMT), all extending off the island of Montreal. They also expect to implement an increased number of priority signals. Toronto's GO trains are also quite extensive, serving the Greater Toronto Area.

The #98 bus rapid transit system linking Richmond and Downtown Vancouver provides a good example of a best practice for bus infrastructure. It includes dedicated lanes, queue jump lanes approaching bridges, and curbside bus lanes, passing chronic congestion areas, as well as extensive ITS elements (e.g., automatic vehicle location, traffic signal priority, real-time passenger information, and automated voice and digital next stop). Vancouver's expansion of the TransLink Sky Train has been a highly profiled rail system. The expansion which will, in part, help meet the transportation needs associated with the 2010 Olympics involves the extension of lines and stations, including the Canada Line that will connect downtown Vancouver to Richmond via the Vancouver Airport. The Canada Line will provide additional transportation capacity that is equivalent to 10 major road lanes.

Transit vehicles that accommodate bicycles may be considered best practice, including buses with bike racks and trains that allow passengers with bicycles. Montreal transit (STM) has also installed bicycle stands at most metro stations and allows bicycles in the metro at all times, except during rush hour. A number of other cities across Canada have implemented limited "bike and ride" type of programs, including cities such as Toronto, Ottawa, Vancouver, and Halifax. Vancouver also promotes multi-modal transport by offering secure bike lockers at a number of SkyTrain stations.

7.4.2 System design

Best practices in system design can be equally implemented in large urban municipalities (for example York and Vancouver) and small rural communities. Rapid transit systems (bus and rail) are considered best practice in system design as they provide for efficient and effective movement of the masses. However, the provision of rural and low density transit is also considered a best practice as it eliminates the need for personal vehicle use where otherwise, there would be no other option. Examples of this include:

- In the Regional Municipality of Waterloo, a new seamless network and fare structure across three separate cities (Cambridge, Kitchener, and Waterloo) and into three rural communities has improved service and convenience for passengers. The transit system also incorporates iXpress rapid bus routes in the Central Transit Corridor.
- An example for smaller communities is the vanpool program run by BC Transit in the area surrounding greater Victoria. The approximately 35 vanpools currently operating

are touted as “an alternative to transit service in areas too remote or with too low a density to support conventional transit service.” They also sponsor a web-based ride matching service for this area to help increase transit ridership and expand the public transit accessible region.

- Salt Spring Island has recently introduced public transit in partnership with BC Transit. The bus route is tailored to local transit needs, operating on fixed routes and schedules. However, as this is a small community, they also detour off of the regular routes to pick up and drop off passengers where and when possible.

7.4.3 Operation

Intelligent transportation system (ITS) elements include such technologies as automatic vehicle location, traffic signal priority, real-time passenger information, and automated voice and digital next stop. Several municipalities across Canada are making use of ITS technologies for select bus fleets, including Vancouver, Saanich, Montreal, York, and Halifax. For example, the #98 bus rapid transit system linking Richmond and Downtown Vancouver includes queue jump lanes with traffic signal priority, automated voice and digital next stop, and automatic vehicle location to communicate in real-time the next bus arrival time to passengers waiting at the bus stops.

Best practices in transit operation may also include the efficiency and effectiveness of transit service, and the accessibility and convenience for the riders. Examples include:

- The York Region Viva Bus Rapid Transit project.
- Edmonton *Fuel Sense* Program that trains fleet and transit operators on how to achieve maximum fuel efficiency.
- Convenient and accessible fare structures, such as the U-Pass (adopted by a number of municipalities) and the Ottawa EcoPass, which also offers payroll deduction purchasing. The advantages to transit authorities include the ability to capture a very high proportion of large populations. Purchasing tickets on-site may also be considered a best practice in terms of the convenience for riders, as seen at Montreal commuter train stations and York Viva bus stops.
- Best practices are seen when the stops/stations are highly visible, safe, and provide real-time data for the arrival of the next transit vehicle, as seen in the Montreal metro and York Viva bus stops. In St. John’s, NL, the Metrobus system tracks the location of the 50 bus fleet and enables real-time data transfer to passengers via text message. Passengers receive a text message when their bus is a few minutes away.

Several municipalities in BC have also adopted best practices in the area of transportation demand management with respect to transit. For example, Kelowna (BC), in partnership with the Okanagan Regional District, is implementing a region-wide Transportation Demand Management (TDM) program. The plan includes: transit oriented development; frequent, rapid and reliable, limited stop transit service; frequent, fixed route service linking the more central town centres; increased frequency of service on fixed routes during the off-peak periods; conversion of some fixed route services to demand-responsive community bus services; queue jump lanes; traffic signal priority; and left turn treatments.

7.4.4 Vehicles and fuels

Most examples in this category are from medium to large cities, though some smaller towns have also adopted approaches that qualify as best practices.

Hybrid (diesel-electric) buses are being or will be tested in several fleets including Fort St. John (BC), Saskatoon (SK), Hamilton (ON), Montreal (QC), and Halifax (NS). The Halifax Regional Municipality (HRM) has the entire MetroLink bus fleet operating on B5 biodiesel fuel, with plans to increase to B20 after further testing. Brampton has tested the use of biodiesel (B20 and B50) in their transit vehicles and is now expanding its use in up to 130 Brampton Transit buses. Montreal's transit system (STM) is also in the process of converting all buses to 5% biodiesel and incorporating 202 articulated buses to increase passenger density.

Calgary has developed a program, called "Ride the Wind" for their electric light rail train, which ensures low emissions by purchasing wind power.

Articulated buses are a best practice for increasing passenger density on high volume routes. Several municipalities, including Ottawa, ON and Montreal, QC have adopted this approach.

7.4.5 Other

Due to a shortage of public funds, many publicly operated transportation systems have started to involve private sector participation. For example, the York Region was the first municipality in Ontario to use a private public partnership for the implementation of a rapid transit system. The Quick Start, which consisted of the design and delivery of the first phase of the Viva rapid transit system, was made possible through a public private partnership with a group of companies known as the York Consortium.

7.5 ANALYSIS

This sub-section describes trends observed among Canadian municipalities moving toward more sustainable practices within the transportation sector. It identifies municipalities at the forefront within the transportation sector for projects related to transit, as well as observed gaps in sustainable development within the transportation sector.

7.5.1 Trends, Leaders and Gaps

The main observations are:

- There are important differences between cities depending on their size and development patterns. Most large cities have developed major transit systems, though all of these require additional improvements to meet future demands and help achieve a truly sustainable transportation system. Vancouver is leading the way through its ambitious plans and recent route improvements, but others are also implementing key improvements and expansions.

- For medium-sized cities and communities, bus rapid transit may be a more realistic approach. Communities such as York and Halifax are achieving some success. Ottawa has used this approach for many years, however the system is now reaching capacity and the city is struggling to determine how to improve it.
- A few municipalities, such as Montreal, Vancouver and York, are implementing important improvements to traditional bus infrastructure, including priority signals, queue jump lanes, curbside lanes to bypass congested areas, as well ITS to allow buses to move more quickly through traffic.
- A few rural communities are demonstrating that some form of public transport is possible, provided that the services are adapted to the needs and that they remain flexible. Van pools are one approach. Others involve integration of rural transportation systems with nearby cities. Municipalities near Victoria provide examples, as does the Regional Municipality of Waterloo.
- Many municipalities are making greater use of advanced vehicle technologies and alternative fuels for transit vehicles.
- ITS are being used in several municipalities, such as Vancouver, Saanich, York, Montréal, and Halifax, to provide better customer service. This includes automatic vehicle location, automated voice and digital next stop. Several municipalities are also using smart cards to speed purchasing and fare payment and are attempting to link these across different systems.
- York, Montreal and St. Johns have been recognized for the visibility, safety, accessibility and convenience of their station stops.
- Montreal, as well as Toronto, Ottawa, Vancouver and Halifax, have also made efforts to accommodate bicycles, through bike and ride type programs and more secure lockers.

7.5.2 Key Messages for Municipalities

The Key messages can be summarized as follows:

- Successful transit systems are designed to achieve the following outcomes: (1) attract travelers who would otherwise drive, thereby reducing traffic congestion, road and parking facility costs, consumer costs, accidents, sprawl, energy consumption and pollution emissions; (2) provide a catalyst for more accessible, multi-modal land use development; (3) improve overall quality of service, thereby providing direct benefits to users; and (4) improve operating efficiency by reducing delays, increasing load factors, increasing reliability, etc.
- Optimizing transit system efficiency and achieving maximum sustainability objectives requires more than simply building and operating transit systems; it requires support strategies such as parking pricing and management, commute trip reduction programs, transit oriented development, walking and cycling

improvements, etc. Many of these can be considered transit improvements, mobility management strategies and smart growth policies.

- Transit system design and infrastructure decisions for large cities are very complex. Although best practices have been documented, the situation of each large city is different and circumstances will dictate the applicability of those best practices.
- For medium and smaller cities, transit is more likely to be based on bus systems, and the best practices related to their use are more likely to be applicable to many situations.
- There are a variety of best practices applicable to buses which are beginning to be put into practice. These need to be monitored and replicated.
- In particular, opportunities to improve transit priority access, and service to customers should be pursued.
- Public transit improvements can do a lot to achieve most sustainable transportation objectives, particularly if implemented in conjunction with supportive mobility management and transportation management policies, such as parking pricing, improved walkability, and more compact development.
- Alternative fuels can provide modest benefits, but their use needs to be evaluated critically and presented as a minor issue in sustainable transit planning.
- Ridesharing (vanpooling and to a lesser degree, carpooling) is underutilized as a transportation alternative, and should be promoted and managed by transit agencies. Because they requires no paid driver or empty backhaul, vanpooling and carpooling are very cost effective and resource efficient, and are suitable for dispersed destinations where conventional bus service cannot be justified.

7.5.3 Implications for Municipal Transportation Management

Among other options for municipalities and transit:

- There are opportunities for municipalities to explore and implement improvements to bus-based transit and ITS investments.
- Municipalities should also consider projects in the areas of bus transit, focusing on the small changes in infrastructure and system operation that can make transit more convenient and attractive for customers.

8. OPERATIONAL PRACTICES AND TECHNOLOGY – MOBILITY MANAGEMENT

8.1 KEY ISSUES, TRENDS, AND DRIVERS

Mobility management (also called *Transportation Demand Management* or *TDM*), includes a variety of specific strategies that change travel behaviour in order to improve transportation options.⁹⁹ Exhibit 7.1 lists examples of these strategies.

**Exhibit 8.1
Mobility Management Strategies¹⁰⁰**

Improves Transport Options	Pricing Incentives	Land Use Management	Implementation Programs
Transit improvements Walking improvements Cycling improvements Rideshare programs Flextime Compressed workweek Car sharing Telework Taxi improvements Bike/transit integration Guaranteed ride home	Congestion pricing Distance-based fees Employee transportation benefits Parking cash out Parking pricing Pay-as-you-drive vehicle insurance Fuel tax increases	Smart growth New urbanism Location-efficient development Parking management Transit oriented development Car free planning Traffic calming	Commute trip reduction programs School and campus transport management Freight transport management Tourist transport management Transit marketing Nonmotorized encouragement

This table lists various mobility management strategies.

These strategies affect when, where and how people travel, for example, shifting trips from peak to off-peak, or from automobile to alternative modes. Although most individual mobility management strategies only affect a minor portion of total travel, their impacts are cumulative and synergistic (total impacts are greater than the sum of individual impacts). An integrated mobility management program can often reduce affected automobile travel by 10-30%, and even more if integrated with smart growth land use policies. Exhibit 7.2 summarizes the travel impacts caused by various strategies.

⁹⁹ Transportation Demand Management Resource Centre (www.tc.gc.ca/programs/Environment/utsp/TDMResources.htm)

¹⁰⁰ VTPI (2008), *Online TDM Encyclopedia*, Victoria Transport Policy Institute (www.vtppi.org/tdm).

**Exhibit 8.2
Mobility Management Travel Impacts**

TDM Strategies	Travel Changes
Commute trip reduction	Reduces automobile commute trips, shifts to alternative modes.
Flextime	Reduces peak-period vehicle travel on a particular roadway by shifting travel time.
Compressed workweek	Reduces commute trips.
Congestion pricing	Reduces peak-period vehicle travel on a particular roadway by shifting travel route, time, destination and mode.
Distance-based charges	Reduces overall vehicle travel.
Transit improvements	Shifts mode, increases transit use.
Rideshare promotion	Increases vehicle occupancy, reduces vehicle trips.
Pedestrian and bicycle improvements	Shifts mode, increases walking and cycling.
Telework	Reduced vehicle travel.
Carsharing	Reduces vehicle ownership and trips.
Smart Growth, New Urbanism	Creates more accessible land use, reduces trip distances, shifts modes (to walking, cycling and public transit) and reduces travel speeds. Increases traffic density.
Traffic Calming	Reduces traffic speeds, improves pedestrian conditions.

Mobility management can provide numerous economic, social and environmental benefits, including congestion reduction, road and parking facility cost savings, consumer savings, accident reductions, improved mobility options for non-drivers, improved community liveability, energy conservation, emission reductions, and increased public fitness and health. As a result, they can be considered “win-win” strategies, that is, they help achieve multiple planning objectives and so represent true sustainable transportation solutions.

**Exhibit 8.3
Overview of Key Issues Related to Mobility Management**

Category	Issue	Applicability (Region/Province) (S,M,L) (Rural, Urban) (Remote/Northern)
Economic	Congestion	M, L, Urban
	Correcting Market Distortions	All
Social	Quality of Life	All
Other	Marketing and Education	All

8.1.1 Congestion

Transportation is a key element in the economic life of communities, providing for the mobility of goods and people. Increased congestion reduces Canada’s ability to attract new investment and remain economically competitive, as it impacts productivity. As mentioned in Sections 2 and 3, Transport Canada completed a detailed study of recurrent congestion in Canada, which estimates total annual congestion costs for Canadian municipalities at \$3.7 billion. On the other hand, congestion also has a desirable effect in

providing a disincentive for travel (which reduces emissions and other environmental impacts) and especially at peak times, which reduces the cost of infrastructure.

8.1.2 Correcting market distortions

To be efficient and fair, markets must reflect certain basic principles, including consumer choice, cost-based pricing, and economic neutrality. Current transportation and land use markets tend to be distorted in various ways that favour mobility over accessibility and automobile travel over other modes. For example, although consumers generally have many options when they want to purchase an automobile and automobile-related services, there are often few options if people want to travel without an automobile. Automobile travel is underpriced, since most costs are either fixed (financing, insurance, registration fees, residential parking) or external (roadway costs not borne by user fees, congestion and accident risk imposed on other road users, most non-residential parking costs, pollution emissions). In addition, current planning practices are biased in various ways that tend to undervalue public investments in alternative modes (particularly walking and cycling facilities) and more accessible land use development. This results in economically excessive motor vehicle travel.

Correcting these distortions tend to increase transportation system efficiency and equity, making consumers better off overall, by improving their mobility and accessibility options, and reducing total costs. Exhibit 7.6 summarizes these distortions and corrections. Most of these transportation and land use market corrections are considered mobility management strategies.

**Exhibit 8.4
Transportation Market Distortions and Corrections¹⁰¹**

Market Requirements	Current Distortions	Potential Corrections
<i>Choice.</i> Consumers need viable transportation and location choices.	Consumers often have few viable alternatives to owning and driving an automobile.	Improve transportation options, and information about those options. Create more accessible communities.
<i>Cost-based pricing.</i> Prices should reflect costs as much as possible, unless a subsidy is specifically justified.	Transportation in general, and driving in particular, is significantly underpriced. Many costs are either fixed or external.	Charge motorists directly for roads and parking facilities. Offer distance-based insurance and registration fees. Emission fees.
<i>Economic neutrality.</i> Public policies (laws, taxes, subsidies, and investment policies) should apply equally to comparable goods and users.	Tax policies, regulations and planning practices tend to favor automobile traffic over demand management alternatives.	Least-cost transportation planning and investment practices. Charge general taxes on vehicle fuel. Charge rent and property taxes on road rights-of-way.
<i>Land Use.</i> Land use policies should not favor automobile oriented development.	Zoning laws, development practices and utility pricing tend to encourage lower-density, automobile-dependent land use patterns.	Reduce zoning and development requirements that limit density. Apply utility rates that reflect location-related costs of providing services.

¹⁰¹ Todd Litman (2006), “Transportation Market Distortions,” *Berkeley Planning Journal*; issue theme *Sustainable Transport in the United States: From Rhetoric to Reality?* (www-dcrp.ced.berkeley.edu/bpj), Volume 19, 2006, pp. 19-36; at www.vtpi.org/distortions_BPJ.pdf.

Current transportation and land use markets are distorted in various ways that tend to favour mobility over accessibility and automobile travel over other modes. Correcting these distortions would result in a more efficient and equitable transportation system. Most of these corrections are considered mobility management strategies.

8.1.3 Quality of life

Transportation demand management can improve community liveability and quality of life by reducing total vehicle traffic and improving affordable accessibility options, particularly neighbourhood walking and cycling.

8.1.4 Marketing and education

Marketing involves determining consumer needs and preferences, creating appropriate products, providing useful information about products to consumers, and promoting their use. Public knowledge and attitudes have a major effect on travel behaviour, so marketing and education are important components of mobility management implementation. Marketing is more than simply advertising to promote a product or activity. It is an ongoing dialogue between producers and consumers. The most effective marketing programs involve a variety of partners within a community, including public officials, community organizations and individuals who support transportation alternatives.

Most mobility management programs require some marketing activities, and some mobility management programs, such as TravelSmart program, are based on direct marketing to promote use of alternative modes.

8.1.5 Multiple Benefits

As shown in Exhibit 4.1, the advantages of mobility management become more apparent when evaluated in the context of multiple objectives. Mobility management can provide a variety of economic, social and environmental benefits, as summarized in Exhibit 8.5.

**Exhibit 8.5
Mobility Management Benefits**

Planning Objective	Definition
Congestion Reduction	Reduced road user delay, and associated reductions in energy consumption and pollution emissions due to reduced peak-period traffic volumes.
Roadway Costs Savings	Reduced costs to build and maintain roads due to reduced traffic volumes.
Parking Cost Savings	Reduced costs to governments and businesses to provide subsidized parking due to reduced vehicle ownership and use.
Consumer Costs Savings	Consumer cost savings due to reduced motor vehicle ownership and use.
Reduced Traffic Accidents	Reduced per capita traffic crashes.
Improved Mobility Options	Improved mobility and accessibility options (better walking, cycling, ridesharing, public transit, telework, delivery services, neighbourhood services), particularly for people who are economically, physically and socially disadvantaged, therefore providing “basic mobility” benefits.
Energy Conservation	Reduced per capita energy consumption due to reduced motor vehicle travel.
Pollution Reduction	Reduced air, noise and water pollution due to reduced motor vehicle travel.

Planning Objective	Definition
Physical Fitness & Health	Improved public fitness and health due to increased walking and cycling.
Land Use Objectives	Support for strategic land use planning objectives, such as increasing land use accessibility, redeveloping existing communities and reducing habitat loss.
Community Liveability	Improving the environmental and social quality of an area as perceived by residents, employees, customers and visitors, due to reduced motor vehicle traffic volumes and speeds, improved transport options and affordability, increased walking and cycling activity, and increased community cohesion.

Because they provide so many different types of benefits, mobility management policies and programs tend to be undervalued by conventional planning, which tends to focus on a limited set of objectives. For example, transportation agencies generally focus on congestion and accident problems, and so may fail to include other benefits, such as emission reductions, when evaluating a particular mobility management strategy. Similarly, environmental agencies tend to focus on emission reductions, and so tend to ignore benefits such as congestion and crash reductions when evaluating a particular mobility management strategy.

8.2 IDEAL PRACTICE

Sustainable transportation planning includes implementation of mobility management policies and programs to increase transport system efficiency.¹⁰² Aside from transit service improvement and location efficient development (covered in previous sections), this includes a variety of specific strategies to improve travel options and encourage use of efficient options:¹⁰³

- Efficient road and parking pricing (including efficient parking fees, parking cash out, road tolls, fuel taxes and pay-as-you-drive vehicle insurance and registration fees)
- Telecommuting, remote conferencing (tele / video conferencing)
- Alternative scheduling (e.g., flex-time, compressed work week, staggered shifts)
- Ridesharing (including car pooling and/or van-pooling)
- Active transportation (walking and cycling improvements and encouragement)

Parking management is a particularly effective means of transportation demand management.¹⁰⁴ This includes a variety of specific strategies that result in reduced parking supply, more efficient use of parking facilities, and rewards to use alternative modes.¹⁰⁵ Current parking policies tend to place the cost of parking facilities on land use development; efficient parking management shifts the burden to motorists through direct user fees as much as feasible.

Mobility management requires new institutional relationships, including public-private partnerships between government agencies and employers, development of commuter trip reduction programs, and incentives for developers to implement trip reduction programs as a reward for reducing traffic impacts.

¹⁰² Transportation Demand Management Resource Centre (www.tc.gc.ca/programs/Environment/utsp/TDMResources.htm)

¹⁰³ VTPI (2008), *Online TDM Encyclopedia*, Victoria Transport Policy Institute (www.vtpi.org/tdm).

¹⁰⁴ FHWA (2007), *Advanced Parking Management Systems: A Cross-Cutting Study*, Report FHWA-JPO-07-011, Intelligent Transportation Systems (www.its.dot.gov), FHWA, USDOT; at www.its.dot.gov/jpodocs/repts_te/14318.htm.

¹⁰⁵ Litman, Todd, *Parking Management: Strategies, Evaluation and Planning*, 2006, prepared for Victoria Transport Policy Institute (www.vtpi.org/park_man.pdf - date accessed: April 2008).

Ideally active transportation would be every one's first choice for transportation. In order to achieve this, proper facilities would exist, such as bicycle centres or businesses that provide a secure storage area for bicycles along with shower facilities. There could be active policing against bike theft for bicycle parking areas that are not secure. Safe bike lanes and pathways would be extensive throughout the city. Every city would have a fleet of municipal share bikes. In an ideal urban scenario, there would be restricted access for vehicles in downtown cores in order to promote other modes of transportation, including active transportation.

As much as possible, bike lanes and pedestrian areas would be developed using existing infrastructure by converting parking and/or driving lanes and/or the streetscape appropriately. In central and designated pedestrian areas, sidewalks would be made wider, and grade separation of pedestrian, bicycle and automobile infrastructure (where it existed) would be eliminated (this is sometimes referred to as "Home Zones" or Woonerven and can extend to the elimination of all demarcation between carriageway and pedestrian footpaths).¹⁰⁶ The elimination of pedestrian / vehicular demarcation effectively reduces vehicle speeds to less than 16 kilometres per hour.

8.3 CURRENT PRACTICE

Mobility management is probably being implemented significantly less than justified by objective analysis of benefits and costs in Canada. Although many communities are implementing some mobility management programs, virtually none are implementing them to the degree that is justified, considering all benefits and costs.

Much of the mobility management activity undertaken to date involves employer parking management, transit pass subsidization (e.g., federal government), high-occupancy vehicle lanes, and information campaigns favouring active transportation and transit. Some communities are improving walking and cycling facilities.

Although many communities are starting to reform parking policies to encourage more efficient management, progress is less than economically justified. Parking facilities are expensive to provide, typically costing many hundreds of dollars in annualized cost per space, zoning codes and development practices result in generous supply in most locations, and most municipalities provide free parking on most street (outside of a few major commercial centres). As a result most parking is unpriced, most parking facilities are financed indirectly through taxes, rents, employee benefits or retail prices, while travelers who use alternative modes are generally offered no comparable benefit. This represents a market distortion that increases automobile ownership and use and stimulates sprawl.

Though infrastructure for active transportation has expanded, there are still many areas in most cities that are not safely accessible for pedestrians and cyclists. There are few or no blanket restrictions on vehicles in the downtown core and parking is generally sufficient, therefore, there are not many incentives for active transportation. In addition, not all public transit vehicles are equipped to carry bicycles.

¹⁰⁶ Land Transport, New Zealand. 2004. Pedestrian Network Planning and Facilities Design Guide: Chapter 5 – Approaches to Providing for Pedestrians. URL: <http://www.landtransport.govt.nz/consultation/ped-network-plan/chapter5.html>

8.4 BEST PRACTICES

The following Exhibit provides an overview of the best practices related to mobility management.

Examples are drawn from the database of best practices summarized in Appendix D.

**Exhibit 8.6
Overview of Best Practices in Transportation Demand and Mobility Management**

Category	Best Practice	Issue(s) Addressed	Applicability	Community Examples
Trip Reduction	Trip reduction programs	<ul style="list-style-type: none"> Congestion Quality of life 	M, L, Urban	Vancouver – Cambie Corridor Consortium
	Carpooling service	<ul style="list-style-type: none"> Congestion Education 	All	Calgary – Carpool ride matching service
	Incentives - carpooling, green vehicle	<ul style="list-style-type: none"> Education 	All	Montreal – Reserved / Preferential Parking Vancouver – EasyPark EasyGreen Kelowna – Eco-Pass Program
	Car share programs	<ul style="list-style-type: none"> Full costing and economic efficiency Quality of life Education 	All	Montreal, Sherbrooke, Quebec, Gatineau, Ottawa, Toronto, Waterloo, Edmonton, Vancouver, Vancouver Island – Various car share organizations
Active Transportation	Active transportation planning and promoting	<ul style="list-style-type: none"> Congestion Quality of life Education 	All	Halifax – Active Transportation Plan
				Saanich – Bike parking bylaw
				Edmonton – Ribbon of Steel
	Path networks	<ul style="list-style-type: none"> Congestion Quality of life Full costing and economic efficiency 	All	Ottawa-Gatineau – Bike path network Quebec – Green Route Montreal – City bicycle paths Capital Regional District – Galloping Goose and Lochside Trails
Other Mobility Management	Parking management – quantity	<ul style="list-style-type: none"> Full costing and economic efficiency 	M, L, Urban	Vancouver – Reduced number of parking stalls; Flexible parking requirements
				Victoria – Eliminated minimum parking requirements

Category	Best Practice	Issue(s) Addressed	Applicability	Community Examples
				Toronto – Maximum parking standards
	Parking management – appropriate fees	<ul style="list-style-type: none"> • Full costing and economic efficiency 	M, L, Urban	Kelowna – Pricing to encourage alternate modes Vancouver – Parking site tax Saanich – Parking cash out
	Pedestrian charter	<ul style="list-style-type: none"> • Education • Enforcement • 	All	Toronto, Waterloo, Sudbury
	Public info campaigns	<ul style="list-style-type: none"> • Enforcement • Education • Public support 	All	Kamloops – TravelSmart Vancouver – Cambie Corridor Consortium Waterloo – You Can Clear the Air Metro Vancouver – OnBoard Program Whitehorse – Wheel 2 Work Fort St. John – Walk to Whistler Sudbury - EarthCare

8.4.1 Commute Trip Reduction

Commute Trip Reduction (CTR) (also called *Employee Trip Reduction* or *Vehicle Trip Reduction*) programs give commuters resources and incentives to reduce their automobile trips.¹⁰⁷ These often include a variety of specific incentives and services to encourage commuters to choose more efficient travel options.

Examples of incentives for car pooling include reserved parking spaces for those who car pool. This is done in Montreal (QC) and, in that case, many of the parking spaces are actually located at transit stations, which further reduces the use of automobiles. In Vancouver (BC), the City offers a 25 percent discount for carpoolers (3+ occupants). While useful in a restricted pilot, programs that offer parking incentives run the risk of inducing more automobile traffic. Calgary is encouraging carpooling through a public private partnership. The city partnered with Commuter Connections to develop, implement, and promote an on-line carpool program, where confidential rideshare matches can be established quickly at no cost. With over 2000 active participants, this program is one of Canada’s most successful carpool programs.

Transportation Management Associations (TMAs) are non-profit, member-controlled organizations that provide transportation services in a particular area, such as a

¹⁰⁷ BC Transit (2003), *Travel Options Manual*, BC Transit (www.transitbc.com/traveloptions).

commercial district, mall, medical centre or industrial park. In Vancouver, a TMA was formed along the Cambie corridor, led by the Vancouver General Hospital. It provides a variety of commute trip reduction activities and services. Transit kiosks were erected at each member's work site where employees could easily obtain information on transit fares, shuttle bus schedules, and other information. A shuttle bus service was implemented and van pooling services were arranged. A payroll deduction program was implemented to allow employees to purchase bus passes at a 15% discount.

Car share programs are also an example of best practices in terms of trip reduction. Car share programs can reduce an individual's car usage by as much as 50% and one car share vehicle replaces four to eight privately owned cars.¹⁰⁸ Car share organizations are seen in many communities across Canada from CommunAuto serving Montreal, Quebec, Gatineau, and Sherbrooke to the Cooperative Auto Network serving Metro Vancouver and Vancouver Island.

8.4.2 Active Transportation

Best practices include the development of pedestrian/cyclist oriented infrastructure, specifically in high density areas, the expansion and improvement of safe bike lanes and paths, the implementation of bike racks, bike storage and improvement of bike accessibility on public transit, and linking bike paths to transit stations.

Saanich requires the provision of bicycle parking mandated through zoning bylaws. The number and type (Class I - secure weather protected or Class II - short-term facility) of bicycle parking spaces required depends on the building use. For example, for apartments and townhouses, one class I bicycle parking space is required per unit plus a six space rack at each entrance of an apartment building. For office buildings, retail, restaurants, and research establishments, the requirements include one space per 250m² gross floor area (GFA) for the first 5000m² and one space per 500m² GFA for any additional area. Furthermore, Saanich development guidelines allow for discussion with developers regarding the provision of bicycle parking and end of trip facilities. This is more of a negotiation process than regulatory. The Development Permit Areas Justification and Guidelines states that "design plans shall meet the intent of the standards set out in the Saanich Bicycle Parking Guidelines". The Bicycle Parking Guidelines state that as part of the development application, plans shall include details that indicate the size of Class I and II bicycle parking facilities and that similar details for showers, change rooms, and lockers may also be provided.

Best practices also require the participation of businesses and government alike to promote and facilitate active transportation. Pioneer Pacific Property Management (and Intrawest) showed the use of best practices when they developed the TravelChoices program during the planning stages of a business complex in order to promote trip reduction. The program includes showers and secure bike lockers for cyclists and the TravelBucks incentive program, which gives its members one TravelBuck for each day

¹⁰⁸ Eartheasy, *Ideas for environmentally sustainable living*. (http://www.eartheasy.com/live_car_sharing.htm - date accessed: April 2008).

they use alternative transportation to and from work with prizes that include free coffee, transit FareSaver Tickets, ski passes and rental car certificates.

Examples of infrastructure best practices to provide for active transportation include “road diets”, mentioned previously where the number of vehicle lanes is reduced with the addition of bicycle lanes, wider sidewalks, and/or green space, as seen on St. George St. in Toronto. Edmonton has created the “Ribbon of Steel” by converting abandoned CP Rail lands into an active transport corridor to promote physical activity and manage inner city traffic volumes. The Ribbon of Steel is a multi-modal transportation corridor with a trail for pedestrians and cyclists and a historic street car, serving the downtown core. There is access to the underground light rail transit station and it connects to existing well-used trail systems at either end.¹⁰⁹ Ottawa-Gatineau has one of the most extensive networks of bike paths in Canada, thanks in large part to the influence of the National Capital Commission. Montreal has developed over 300 km of bike routes and, with the urging of Vélo Québec has completed both a bikeway around the island and a bike route to downtown.

The Capital Region District (CRD) created a multi-use recreational corridor on an abandoned rail line. The Galloping Goose Regional Trail and the Lochside Trail form a major component of this Regional Trail System and bikeway network. The trails provide a relatively direct and low gradient connection from the core municipalities (including downtown Victoria) east-west to the Western Communities and north-south the Saanich Peninsula. This path network now carries more than 2000 commuters per day during the summer months, which is more people than most of the residential roads in the region. The volume of people using the corridor continues to grow.

8.4.3 Other mobility management

Parking Management

A number of municipalities have adopted best practices to restrict access to parking, thereby enhancing the attractiveness of alternatives to the automobile.

Victoria (BC) has eliminated minimum parking requirements for new buildings in the Harris Green neighbourhood. This has resulted in an increase in mixed residential and commercial development, improved walkability and more efficient management of public parking.

Toronto (ON) has proposed the adoption of a limit on the amount of parking supply to be provided by developers for growth areas of the city. Similarly, Vancouver (BC) is developing an approach that provides credits to Developers for reducing the number of parking stalls, providing parking spaces for car share vehicles, and providing annual transit passes to building occupants. In addition, TransLink has implemented a parking site tax on surface parking areas, parkades and underground parking. The parking site tax is the first of its kind in Canada. It is based on the size of parking areas located on non-residential properties throughout the region.

¹⁰⁹ FCM-CH2M Hill Sustainable Community Awards, 2004 (http://www.sustainablecommunities.ca/files/Program_Docs/fcm-ch2m-sustainable-comm-awards/2004sust-comm-award-winners-En.pdf - date accessed: April 2008)

Kelowna (BC) mandates that the minimum monthly parking charge in City-owned lots and facilities be 10% above the monthly cost for a transit pass.

Pedestrian Charter

Pedestrian Charters act to improve the walking experience of pedestrians making it a best practice for the promotion of active transportation. The Toronto Pedestrian Charter was one of the first and has become a model for many other cities.¹¹⁰ The Region of Waterloo and Sudbury implemented such charters. These involve principles such as accessibility, equity, health and well-being, environmental sustainability, personal and community safety, and community cohesion and vitality.

Public Information Campaigns

TravelSmart is an innovative personal transportation marketing program that encourages people to change their personal travel behaviour and increase their use of more sustainable travel modes (i.e. public transit, ridesharing, bicycling and walking) through a combination of personalized information, incentives and rewards.¹¹¹ This program was piloted in six neighbourhoods located in the inner, middle and outer rings of the Vancouver, British Columbia metropolitan region, each with varying degrees of access to transit and other travel options. A “before” survey was conducted to identify individuals interested in participating in the program and to establish baseline travel behaviour conditions. After the program was completed an “after” survey assessed *TravelSmart*-related behaviour changes. Control groups were used in both surveys to isolate the impact of any external factors.

The 13 month pilot project ended in November 2006 with more than 600 people participating through all of the stages in each of the six pilot communities. Program results indicate that use of more sustainable modes of transportation increased substantially with *TravelSmart* participants. Walking and public transit use increased by 9% and 12%, respectively, while car trips declined by 8%.

Public information campaigns involving education, promotion, and outreach are an important complement to TDM policies and programs to raise awareness and improve understanding of sustainable transportation options. Examples of programs include the Vancouver Cambie Corridor Consortium, which was the first transportation management association established in Canada. It is an alliance of business, government, and other groups that aims to reduce traffic in a certain area by providing alternative transportation solutions and information. An important component of the program was the transit kiosks where employees received a variety of information, including transit fares and shuttle bus schedules. The Kamloops *TravelSmart* planning process involved TDM measures such as the promotion of programs in schools and businesses. Waterloo has incorporated TDM information campaigns into the Grade 3 curriculum with an

¹¹⁰ Toronto Pedestrian Charter (www.city.toronto.on.ca/pedestrian)

¹¹¹ Vancouver *TravelSmart* Program (www.tc.gc.ca/Programs/Environment/utsp/travelsmart.htm)

educational resource unit that was developed to help raise awareness of more sustainable transportation choices and the impacts they have on the environment.

Further examples of educational programs include the Greater Vancouver Regional District's (GVRD's) OnBoard Program, which features an employer pass program; ride sharing; corporate car share; promoting and facilitating active transportation; parking management; guaranteed ride home; teleworking; and park and ride. In addition, TransLink promoted and marketed the OnBoard program through a variety of communications. Since the launch of the program, OnBoard has helped more than 300 companies in the GVRD to develop and implement trip reduction programs.

Whitehorse (YK) has a program entitled Wheel 2 Work that encourages residents to bike to work during the summer months. The program includes a marketing campaign and uses prizes as incentives. It is meant to complement recent investments (over \$2 million) in expanding and improving Whitehorse's bicycle network. Participants sign up to the program website and are able to log the distances they ride over the length of the five month program.

The Fort St. John (BC) Walk to Whistler program, launched in June 2004, challenges residents of Fort St. John, BC to walk the distance from their community to the site of the 2010 Olympics, a distance of almost 1,500 km. Residents are urged to buy a pedometer, track how much they walk each day, and log their results on the program website. Participants are eligible for prizes, including tickets to the opening ceremonies of the Olympic Games.

EarthCare Sudbury (ON) is a partnership between the city of Greater Sudbury and over 90 community organizations, agencies, and businesses, and several hundred individuals. The program includes an education and awareness campaign to encourage citizens to adopt the practices recommended in the provincial Drive Clean Program. These include regular vehicle tune ups, avoiding idling, maintaining proper tire pressure, observing the speed limit, efficient trip planning, and ride sharing.

8.5 ANALYSIS

This sub-section describes trends observed among Canadian municipalities moving toward more sustainable programs within the transportation sector. It identifies municipalities at the forefront within the transportation sector for initiatives related to mobility management, as well as observed gaps in sustainable development within the transportation sector.

8.5.1 Trends, Leaders and Gaps

The main observations are:

- Mobility management includes a variety of strategies that change travel behaviour to increase transport system efficiency. They provide multiple benefits and support virtually all sustainability planning objectives. Many communities are implementing some of these strategies, but virtually no Canadian communities are implementing all of the mobility management strategies that would be cost effective or justified by

sustainability principles. Increased mobility management is therefore a major opportunity for creating more sustainable transport systems.

- Current policies and planning practices tend to overlook and undervalue mobility management. Reforms are needed for mobility management strategies to be implemented to the degree justified by sustainability objectives.
- One of the most effective mobility management strategies suitable for municipal implementation is to improve parking management, including more sharing, pricing, taxing, regulations, and more flexible and accurate requirements. Many cities are implemented some reforms but progress is still slow overall.
- Carsharing services are growing substantially, particularly in Québec and B.C. Québec and B.C. are also leaders in the provision of car pooling incentives in general.
- Though infrastructure for active transportation has expanded, there are still many areas in most cities that are not safely accessible for pedestrians and cyclists. Most large cities, including Vancouver, Montreal, Ottawa, Edmonton, Victoria and Québec, now have a network of bike paths and most of these are expanding. In many cases, bike paths are incomplete and cyclists must still use city streets to reach their destinations. As noted in Section 5, several municipalities, including Vancouver, Saanich, Toronto and Whitehorse, are using new road designs to provide better accommodation for cyclists.
- Several municipalities have implemented programs to increase the availability of bicycle racks. Leaders include Saanich, who mandates the provision of bicycle racks in zoning bylaws and provides incentives for developers to include them through the publication of guidelines.
- A few municipalities have adopted pedestrian charters, and many provide multi-use trails (pedestrians and cyclists), however, most opportunities to make sidewalks, roads, and intersections more pedestrian-friendly have not been realized.
- Several municipalities are investing in education and awareness programs to encourage trip reduction. Those who have been successful, such as Vancouver and Kamloops, have adopted proven social marketing approaches and involved key community organizations such as schools and businesses. Unfortunately the results of these types of investments are difficult to measure.

8.5.2 Key Messages for Municipalities

The Key messages can be summarized as follows:

- Mobility management is one of the most effective ways to create more sustainable transportation systems.
- Parking policy reforms are some of the most effective ways that municipal governments can support sustainable transportation and land use development.

Parking pricing is an ideal municipal revenue source, since it increasing parking and transportation system efficiency while providing potentially significant revenues.

- Car sharing programs provide a significant opportunity to reduce car travel. Although these are not municipal programs, there is an opportunity for municipalities to facilitate their creation and development.
- Municipalities need to continue to seek out opportunities to improve and expand paths and trails for cyclists and pedestrians. More importantly, they should find ways to make streets more bicycle- and pedestrian-friendly, and provide incentives for the installation of bicycle infrastructure.
- Municipalities need to be bolder in considering reforms.

8.5.3 Implications for Municipal Transportation Management

Among other options for municipalities and transportation demand management:

- There are opportunities for municipalities to explore and implement car sharing programs, and parking reforms, and to develop ways of measuring the results of social marketing programs.
- Municipalities should also consider projects in the areas of road design (as mentioned in Section 5).

9. RESULTS AND FINANCIAL IMPLICATIONS

Many sustainable transportation policies provide direct savings (such as reduced parking requirements), or provide revenues (such as parking pricing and taxes). Furthermore, strategies should not be evaluated individually, but rather as programs. For example, rideshare programs and public transit investments become much more cost effective if implemented in conjunction with support strategies, such as parking pricing and management, commute trip reduction programs, park & ride facilities, and more compact land use development patterns. The synergistic nature of such programs should be recognized.

Unfortunately, there is little information on actual measured outcome-level results, costs, or the cost-effectiveness of best practices adopted by Canadian municipalities. This is particularly true for best practices in the categories of municipal planning and governance and management, but is also true for operational practices and technology. The available information is summarized in Exhibit 9.1.

**Exhibit 9.1
Summary of Available Cost-Effectiveness Information**

Type	Best Practice - Examples	Cost	Results	Cost-Effectiveness
Infrastructure Planning	Bus-Oriented Infrastructure – Brampton, ON	Not Available	Bus ridership grew by over 40% between 1996 and 2000, double the increase in Brampton’s population and double the national transit ridership increases for the same period.	The city’s cost recovery has increased from 62% in 1996 to 74% in 2000. Net operating costs decreased from 98¢ per passenger in 1996 to 62¢ per passenger by 2000.
Community Engagement	Trip Reduction Programs – Metro Vancouver, BC – OnBoard Program	Not Available	In 2006, the employer pass program helped eliminate 700,000 single occupancy vehicle trips. Since the launch of the OnBoard program, Jack Bell Ride-Share eliminated more than 1,000,000 single occupancy vehicle trips.	Not Available
	Incentive Programs/Challenges – Whitehorse, YK – Wheel 2 Work Program	Approx. 35 total work days and about \$12,000 for program marketing and incentives per year	The participants who tracked their traveling distances logged almost 40,000 km of bike to work.	Not Available
	Incentive Programs/Challenges – Fort St. John, BC – Walk to Whistler Program	Not Available	As of February 2008, participants within Fort St. John have logged over 355,000 km.	Not Available

Type	Best Practice - Examples	Cost	Results	Cost-Effectiveness
	Partnerships – Calgary, AB – City-Commuter Connections partnership	Not Available	As of January 2005, there were over 2000 active participants registered with carpool.ca. This makes it one of Canada's most successful carpool programs.	
Road Infrastructure	Road Diet – Toronto St. George St.	The total cost of the project was \$6 million	The results of the road diet included a reduction in the speed and number of traffic collisions (by 40%); however, the number of cars travelling the road did not change. A 10% increase in bicycle traffic was also noted.	Not Available
	Road Diet – Whitehorse, YK Fourth Avenue and Quartz Avenue	The cost of the 4th Avenue road diet was \$530,500. The cost of the Quartz Avenue road diet was \$63,000.	Limited vehicle monitoring capacity and significant seasonal changes prevent any significant data on the effect of the road diets on changes in transportation choices.	Not Available
	Collection and re-use of road sand Edmonton, AB	Not Available	Approximately 101,000 tonnes (88%) of material collected from the City's streets will be diverted from the landfill, most of it for use in winter sanding operations.	Not Available
Transit Infrastructure	Richmond to Downtown Vancouver, BC - #98 B-Line Bus Rapid Transit System	Capital Cost: approximately \$51.8 million, including: - 28 Bus Fleet: \$18 million - Infrastructure: \$27.8 million - Maintenance facility: total \$30 million (\$6 million of which is from this project)	- 20% reduction in travel time compared to previous local bus service - "On time" performance improved significantly - Increased ridership (~14,000 in 2001 to ~18,000 in 2002) - Approximately 8 million vehicle km per year reduction by private vehicle - Net reduction in emissions: - CO ₂ : 1192 tonnes/yr - PM: 0.01 tonnes/yr - NO _x : 4.9 tonnes/yr - CO: 59.36 tonnes/yr - HC: 5.09 tonnes/yr	- Estimated operation savings due to 20% reduced travel time for the 28 fleet vehicles, is \$1.8 million per year - An additional \$360,000 in operating cost savings is estimated due to the AVL and TSP systems - Benefit/cost ratio is estimated at 1.3 (annual benefits (operating savings, revenues, and travel time savings) exceed costs by approximately \$3 million)

Type	Best Practice - Examples	Cost	Results	Cost-Effectiveness
Transit Operation	Regional Municipality of Waterloo, ON – Regional Transit System	Not Available	After one year, amalgamation led to: <ul style="list-style-type: none"> - a four per cent ridership increase on the new transit service (360,000 additional trips); - a 12 per cent ridership increase in the Cambridge service area alone, or 141,000 more trips than in the previous year. 	Not Available
	Edmonton, AB – Fuel Sense Program	The Fuel Sense program’s first-year start-up costs were \$60,000. Annual program related costs are estimated at \$45,000.	<ul style="list-style-type: none"> - Over 1200 drivers trained; - 350 tonnes (estimated) of GHG emissions avoided annually - Fuel volumes consumed per kilometre dropped overall by approximately 5.5%, or a gain in fuel efficiency of 1.8 litres/100 km; 	Not Available

As Exhibit 9.1 shows, the information is generally insufficient to draw conclusions concerning the financial viability of best practices. The one exception is the information provided on the bus rapid transit route from Richmond to Vancouver. However, this case is so specific; it is hard to use it to make any general claims about the financial viability of best practices, even in the specific area of transit infrastructure.

One of the significant challenges is that the cost for many initiative are fractured across several functional areas, so that the apparent cost are in fact not the actual costs. One of the solutions would be to implement a more rigorous ‘true cost accounting’ process, or ‘whole cost accounting’ process at least for key areas. For example, costs for many component of transportation infrastructure are shared, coming from several sources including senior government grants, development charges, developer contributions and, of course, municipal taxation. The taxation costs are sometimes the only ones that are formally recognized in Municipal financial statements, meaning that there is not a true picture of the costs.

While in many cases it is likely that some information on costs and benefits was developed but not reported, this gap in information points to the importance of: (1) preparing realistic estimates of costs and benefits prior to undertaking initiatives; (2) measuring costs and results (at the outcome level) on a regular basis; and (3) reporting on costs and benefits, and on the financial implications of best practices, both for transparency and in order to facilitate the dissemination of best practices.

In examining costs and benefits of sustainable transportation initiatives, municipalities will need to consider both their internal costs, as well as a variety of externalities, some of which are borne by other levels of government, other users or providers, and some of which are borne by society as a whole. To calculate the overall economic cost-benefit of an initiative, the overall societal perspective should be adopted but distributional effects (including the financial impact on the

municipality) also need to be considered. To evaluate the costs and benefits, the analysis and the measurement needs to go beyond conventional analysis designed to assess roadway investments. Instead, a method that considers multiple benefits and costs is needed. This should include, for example¹¹²:

- Congestion reduction
- Roadway cost savings
- Parking cost savings
- Consumer cost savings
- Transport diversity
- Traffic safety
- Energy conservation
- Reduced pollution
- Efficient land use
- Improved fitness and health.

Overvaluing roadway expansion and undervaluing mobility management can have large impacts due to *leverage* effects. For example, a million dollars spent to expand roadways may stimulate vehicle travel and sprawl that adds tens of millions of dollars in direct travel costs and hundreds of million of dollars in indirect costs. Spending the same amount on mobility management programs can provide millions of dollars in direct savings and much greater total economic, social and environmental benefits. Exhibit 9.2 illustrates the steps translating a mobility management initiative into costs and benefits.

**Exhibit 9.2
Steps Between Policy or Program and Ultimate Benefits**



Source: Victoria Transport Policy Institute (www.vtpi.org)

¹¹² Todd Litman (2007), *Guide to Calculating Mobility Management Benefits*, Victoria Transport Policy Institute (www.vtpi.org) – date accessed: April 2008).

The challenge is that many of the costs and benefits change over time. Highway capacity expansion tends to reduce traffic congestion in the short-term, but this benefit declines over time due to generated traffic (additional vehicle travel resulting from roadway improvements). On the other hand, mobility management benefits are often slow to develop but increase over several years as people take these changes into account when making decisions such as where to locate and whether to purchase another vehicle. Shorter-term analysis therefore tends to favor highway capacity expansion, while longer-term analysis tends to support more mobility management.

From a financial perspective, the difficulty is that some of the longer term benefits of sustainable transportation investments are considered uncertain and are often heavily discounted. If, as is often the case, the costs are borne by the municipality whereas the benefits largely accrue to others, there is a financial barrier to be overcome. This is where innovative mechanisms to redistribute costs and benefits (e.g., road user fees) are needed. In the case of longer term sustainable planning and development approaches, the estimation of costs and benefits is fraught with uncertainty, which makes that much harder to conduct a traditional financial analysis. However, the necessity of an informed analysis of costs and benefits remains.

10. MOVING FORWARD

This section summarizes key conclusions and implications for municipalities.

10.1 SUMMARY OF TRENDS, GAPS, AND RESULTS

Overall, there appears to be a lot of activity in the realm of sustainable transportation planning. This has moved beyond the larger municipalities and a few leading municipalities to encompass a wide range of municipalities in every region, of every size and of every type. Unfortunately, to date, most of the activity relates to the adoption of principles and plans, and examples of tangible progress are harder to find. Nevertheless, there are some:

- In the area of planning, real progress in implementing holistic principles is being made by municipalities such as York and Kamloops. At the sub-municipal (community) level, Vancouver, Victoria and Mont-Saint-Hilaire have provided good examples of integrated, transit-oriented developments. Communities like Stratford are pioneering design approaches such as fused grid planning.
- In the area of governance and management, the bigger cities are all, to varying degrees, adopting analytical approaches and procedures that are promising. Smaller municipalities are often constrained by resources and are therefore experimenting with more streamlined methods.
- In the area of mobility management (and transportation demand management), there are a few examples but given the potential of these approaches, the number of documented examples is relatively small.
- With a few exceptions, there are very few examples of best practices in the use of policy instruments such as regulation and economic instruments to promote sustainable transportation goals. Some of this may reflect a reluctance to impose additional costs on automobile users and indicates that part of the challenge is to undertake parallel social marketing work to enable some of the necessary policy changes. Some of the lack of progress may also be due to the lack of municipal authority in some areas, pointing to the need for other levels of government to assist municipalities by providing them with the tools they need.
- In operational aspects, there are examples of best practices in a variety of areas. In this respect, it is important to distinguish the larger cities that are able to make large investments in public transportation. Among the larger cities, it is difficult to identify transit best practices, as each one has its own situation and has taken a direction that responds to the local opportunities and constraints. With respect to transit and municipal fleets, there are a variety of examples of best practices to incorporate lower emission vehicles and fuels. With respect to roads, there are some examples of best practices in the area of traffic management and maintenance, but given the potential, there are many ideal practices that have yet to be translated into reality. In the case of transit operation, there are some examples of the adoption of new technologies and best practices in the use of fare payment systems but no best practices have emerged in Canada to tackle some of the more fundamental gaps between passenger expectations and transit experience and/or

to make the management of public transportation more efficient and business-like. There are a number of specific examples of limited infrastructure being provided for active transportation, but examples of systematic best practices to facilitate this mode of transportation are rare.

- The most significant gap in the adoption of best practices seems to be the lack of attention to the analysis, measurement and reporting of costs and benefits. As noted in Section 7. Information on these is essential to the development of the business case for investment and for the dissemination of the best practices.

10.2 SUMMARY OF KEY MESSAGES

This section recaps the key messages identified in previous sections.

Planning

- Of all the major municipal functions, transportation planning provides one of the greatest opportunities for promoting sustainability. However, it is complex because it involves many stakeholders and directly affects residents and businesses, and so requires a carefully developed planning process. Better planning is urgently needed because each poorly planned development represents a lost opportunity. At the same time, patience is required because the effects of better planned communities are cumulative and can take time to manifest themselves in improved overall outcomes, such as reduced transportation activity and reduced emissions.
- An integrated approach to planning, which considers transportation implications is needed. Because of the conditions attached to federal and provincial funding and the requirements of planning acts in a few provinces, municipalities are being encouraged to undertake this type of planning to a greater degree.
- Because of the long timeframes involved, and the challenges of overcoming the barriers to integrated community planning, demonstration projects at the scale of medium sized communities offers a realistic path forward. Examples of best practices in Vancouver and Victoria could be replicated elsewhere.
- Another practical approach is to focus on development along transit corridors. Examples of best practices in Saanich, Vancouver, Burnaby, Toronto and Mont-Saint-Hilaire could be replicated.
- When it comes to planning the transportation system itself, success depends on the integration of plans for all modes and infrastructure, across all municipalities in a region. In this respect, the plans developed by Metro Vancouver, the GTA and the regional municipality of York provide good examples.
- The advantages of increasing density to support public transportation and alternative forms of transportation are clear. Urban growth boundaries can be successful best practices if they are implemented carefully.

- Although a number of best practices are in use by Canadian municipalities, there are extensive opportunities which remain to be explored. These include greater application of the full costs of development as well as social marketing to promote the desirability of higher density living. The list of reforms provided in section 3.2 also represent significant opportunities.
- The nature of the challenges and issues in small and remote communities is quite different, and there is a gap in information about them, as well as the best practices to deal with them.

Governance and Management

- The basic principle of good planning is that specific, short-term decisions should reflect strategic, long-term goals. This is particularly important for sustainable transportation planning, because conventional transport planning considers a limited set of objectives and impacts, although transport decisions have so many indirect and long-term impacts. The combination of long term visionary goals and short-term targets is an important feature of successful strategies.
- More comprehensive analysis based on sustainability principles is likely to significantly change many transportation and land use planning decisions, away from roadway and parking facility capacity expansion toward more efficient management of existing resources, including the application of various mobility management strategies and smart growth policies.
- Although these require significant change from current policies and practices (such as the application of road and parking pricing, more emphasis on non-motorized transport, improved public transit services, and creating more compact, mixed communities), these changes can help solve a wide range of problems, providing many economic, social and environmental benefits, which will make most people significantly better off overall.
- The main barrier to sustainable transportation is resistance to change. Progress requires change agents who can help communities define a positive vision of the future and motivate people to overcome barriers to achieve it.
- There are a number of best practices that cut across municipal functions that are essential to the success of sustainable transportation approaches. First and foremost is the exercise of leadership and good planning on the part of municipal politicians and senior managers.
- Good transportation planning is not just needed for environmental sustainability, but for financial sustainability as well. Even though many costs remain hidden, there are significant opportunities for municipalities to reduce costs by thinking of transportation in an integrated way.
- Success requires cooperative approaches and partnerships both internally (between the different municipal functions) and externally, with adjoining municipalities, provincial regulators, and the private sector.

- Plans need concrete instruments to succeed. This means that municipalities must have the levers and the will to develop and enforce bylaws and charges.

Roads

- The traditional approach to road design and maintenance, i.e. build to accommodate the peak needs, neglect preventative maintenance, and apply liberal amounts of salt, is unsustainable financially and environmentally.
- Roads need to be seen as part of the wider transportation system. As such, transportation corridors need to be designed, operated and maintained for use by a variety of modes. They also need to strike a balance between accommodating vehicle traffic, without making it so attractive that other modes cannot compete.
- There are a variety of best practices which are beginning to be used to put into practice a multi-modal approach and to provide disincentives to automobile use. These need to be monitored and replicated.
- There are also opportunities to use new technologies to make road travel more efficient but, so far, there is a gap in their implementation. Advances in these areas need to be tempered by the need to prevent a rebound in vehicle traffic.
- HOV lanes are becoming more common although the majority require only two passengers. To increase their cost effectiveness and benefits, HOV lanes should be implemented as part of an integrated TDM program that including commute trip reduction programs, parking pricing and management, and education and marketing activities to encourage use of alternative modes. See Section 8.
- There are a variety of best practices available to reduce the environmental impacts of road maintenance. These too should be monitored and replicated.

Fleets

- There are significant opportunities to realize financial savings and environmental benefits from more efficient municipal fleets. This includes opportunities to better match vehicles to functions, to choose more efficient vehicles, and to improve fleet operations.
- Alternative fuels and new technologies should be carefully evaluated to insure that they actually provide significant benefits.
- There are a few best practices which are beginning to be put into practice. These need to be monitored and replicated.
- But for the most part, these opportunities are not being realized.

Transit

- Successful transit systems are designed to achieve the following outcomes: (1) attract travelers who would otherwise drive, thereby reducing traffic congestion, road and parking facility costs, consumer costs, accidents, sprawl, energy consumption and pollution emissions; (2) provide a catalyst for more accessible, multi-modal land use development; (3) improve overall quality of service, thereby providing direct benefits to users; and (4) improve operating efficiency by reducing delays, increasing load factors, increasing reliability, etc.
- Optimizing transit system efficiency and achieving maximum sustainability objectives requires more than simply building and operating transit systems; it requires support strategies such as parking pricing and management, commute trip reduction programs, transit oriented development, walking and cycling improvements, etc. Many of these can be considered transit improvements, mobility management strategies and smart growth policies.
- Transit system design and infrastructure decisions for large cities are very complex. Although best practices have been documented, the situation of each large city is different and circumstances will dictate the applicability of those best practices.
- For medium and smaller cities, transit is more likely to be based on bus systems, and the best practices related to their use are more likely to be applicable to many situations.
- There are a variety of best practices applicable to buses which are beginning to be put into practice. These need to be monitored and replicated.
- In particular, opportunities to improve transit priority access, and service to customers should be pursued.
- Public transit improvements can do a lot to achieve most sustainable transportation objectives, particularly if implemented in conjunction with supportive mobility management and transportation management policies, such as parking pricing, improved walkability, and more compact development.
- Alternative fuels can provide modest benefits, but their use needs to be evaluated critically and presented as a minor issue in sustainable transit planning.
- Ridesharing (vanpooling and to a lesser degree, carpooling) is underutilized as a transportation alternative, and should be promoted and managed by transit agencies. Because they require no paid driver or empty backhaul, vanpooling and carpooling are very cost effective and resource efficient, and are suitable for dispersed destinations where conventional bus service cannot be justified.

Mobility Management

- Mobility management is one of the most effective ways to create more sustainable transportation systems.

- Parking policy reforms are some of the most effective ways that municipal governments can support sustainable transportation and land use development. Parking pricing is an ideal municipal revenue source, since it increasing parking and transportation system efficiency while providing potentially significant revenues.
- Car sharing programs provide a significant opportunity to reduce car travel. Although these are not municipal programs, there is an opportunity for municipalities to facilitate their creation and development.
- Municipalities need to continue to seek out opportunities to improve and expand paths and trails for cyclists and pedestrians. More importantly, they should find ways to make streets more bicycle- and pedestrian-friendly, and provide incentives for the installation of bicycle infrastructure.
- Municipalities need to be bolder in considering reforms.

10.3 SUMMARY OF IMPLICATIONS FOR MUNICIPAL PROGRAMS

This section recaps the key implications identified in previous sections.

Planning

- Municipalities considering Sustainable Community planning should incorporate best practices highlighted in this Report.
- There are opportunities to study and implement pilot integrated community and TOD projects.
- There is a need and opportunities to study and implement these issues in the context of smaller and remote communities.

Governance and Management

- There are opportunities to implement best practices in leadership, financial analysis, integrated and consultative planning.

Roads

- There are opportunities to study and implement new street designs and layouts. There is also an opportunity to explore the potential of ITS technologies.
- Municipalities should consider opportunities for projects in the area of multi-modal street design, HOV lanes (more than two passengers), ITS, and sustainable road maintenance.

Fleets

- There are opportunities to better match vehicles to functions. There is also an opportunity to explore the potential of ITS technologies.
- The viability of more fuel efficient vehicles is proven but municipalities could benefit from additional efforts towards optimizing fleet operations and management.

Transit

- There are opportunities for municipalities to explore and implement improvements to bus-based transit and ITS investments.
- Municipalities should also consider projects in the areas of bus transit, focusing on the small changes in infrastructure and system operation that can make transit more convenient and attractive for customers.

Mobility Management

- There are opportunities for municipalities to explore and implement car sharing programs, and parking reforms, and to develop ways of measuring the results of social marketing programs.
- Municipalities should also consider projects in the areas of road design (as mentioned in Section 5).

10.4 CONCLUSIONS

The broad implications are as follows:

- **Measurement:** To effectively manage transportation functions, it is essential to develop measurements of costs and results. This requires development of analytical tools and capacity within municipalities to use them appropriately.
- **Full cost:** In order to make sustainable transportation investments cost-effective in comparison with typical roadway investments, the full cost of those investments needs to be considered, and governments (at all levels) need to adopt policies to allocate the full costs (including externalities as much as possible) to the users of each mode. Innovative approaches to financing and the greater use of financial instruments should be explored and considered by municipalities.
- **Integrated land use decision-making for sustainable transportation:** Although these are the most difficult best practices to justify and implement, they represent those with the greatest long-term potential. Moreover, the development decisions that are made today will be fixed for decades and possibly centuries, so it is hard to overstate the importance of getting the decisions right.

- **Roadway operation and maintenance:** Roadways typically represent the largest municipal transportation expense. Given the scale and potential for improved best practice, much more attention should be devoted to best practices in this area.
- **Transit:** There are many opportunities to make transit more efficient and more responsive. In large part these depend on integrating transit investments into a broader strategy of sustainable transportation investments, incorporating planning, roads, and mobility management.
- **Mobility management:** There is a vast array of opportunities for managing demand for motorized transport and the provision of other mobility options. So far, the few best practices that have been adopted only hint at the potential.



APPENDIX A

List of Contacts

Contact List

Name	Position & Organisation	Location & Contact Info	Related Websites
Study Contact			
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Sustainable Community Plans			
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Sustainable Neighbourhood Plans			
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Other			
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APPENDIX B

Resources

(Sustainable) Transportation Resources:

California Department of Transportation, California Transit-Oriented Development (TOD) Searchable Database
<http://transitorienteddevelopment.dot.ca.gov>

Canada Mortgage and Housing Corporation – Research Highlights
<http://www.cmhc-schl.gc.ca/en/inpr/rehi/index.cfm>

Canada Mortgage and Housing Corporation – Sustainability
<http://www.cmhc-schl.gc.ca/en/inpr/su/>

Canadian Institute of Transportation Engineers
<http://www.cite7.org/>

Canadian Urban Transit Association
<http://www.cutaactu.ca/>

Canadian Urban Transit Association, Transit Action Centre
<http://www.transitaction.ca/>

Community Research Connections, Sustainable Community Development – Case Studies
<http://www.crcresearch.org/casestudies/home>

Complete Streets
www.completestreets.org

Federation of Canadian Municipalities – Green Municipal Fund
<http://gmf.fcm.ca/Home/>

Federation of Canadian Municipalities– InfraGuide
<http://gmf.fcm.ca/Infraguide/>

Institute for Transportation and Development Policy
<http://www.itdp.org/>

Institute of Transportation Engineers
<http://www.ite.org/>

Intelligent Transportation Systems Society of Canada
<http://www.itscanada.ca/english/index.htm>

International Council for Local Environmental Initiatives (ICLEI)
<http://www.iclei.org/>

ICLEI, Green Fleets
<http://www.greenfleets.org/>

Ontario Centre for Municipal Best Practices
<http://www.amo.on.ca/ocmbp>

Smart Growth Canada
<http://www.smartgrowth.ca/>

The Centre for Sustainable Transportation
<http://cst.uwinnipeg.ca/>

Traffic Calming
<http://www.trafficcalming.org/definition.html>

Transport Canada, Urban Transportation Showcase Program
<http://www.tc.gc.ca/programs/environment/utsp/menu.htm>

Transport Canada, Moving on Sustainable Transportation
<http://www.tc.gc.ca/programs/environment/most/menu.htm>

Transport Canada, Transportation Demand Management Resource Centre
www.tc.gc.ca/programs/Environment/utsp/TDMResources.htm

Transportation Association of Canada
<http://www.tac-atc.ca/>

Transportation Research Board
www.trb.org

Urban Land Institute
<http://www.uli.org//AM/Template.cfm?Section=Home>

US Department of Transportation, Intelligent Transportation Systems
<http://www.its.dot.gov/>

Victoria Transport Policy Institute
www.vtpi.org

Walkable Communities, Inc.
<http://www.walkable.org/>

West Coast Environmental Law, Smart Bylaws Guide
<http://www.wcel.org/issues/urban/sbg/>

Sustainable Transportation Planning – Canadian Examples:

City of Edmonton, Transportation Master Plan
<http://www.movingedmonton.ca/>

City of Halifax, Active Transportation Plan
<http://www.halifax.ca/TDM/activetransportation/index.html>

City of Kamloops, Transportation Planning
<http://www.kamloops.ca/transportation/plans.shtml>

City of Kamloops, Transportation Plans, TravelSmart
<http://www.kamloops.ca/transportation/travelmart.shtml>

City of Montreal, Bicycle Path Network
<http://www.velo.qc.ca/english/index.php>

City of Toronto, Green Fleet Transition Plan¹¹³
http://www.toronto.ca/fleet/green_fleet_transition.htm

Greater Toronto Area and Hamilton, Metrolinx, Regional Transportation Plan
<http://www.metrolinx.com/NonTabPages/1/Regional%20Transportation%20Plan/Plans.aspx>

¹¹³ As noted, The Green Fleet Transition Plan has been replaced with the Green Fleet Plan 2008-2011, available at:
http://www.toronto.ca/fleet/gfp_08_11.htm

Metro Vancouver, TransLink
<http://www.translink.bc.ca/Plans/default.asp>

Toronto Pedestrian Charter
www.city.toronto.on.ca/pedestrian

Town of Mont-Saint-Hilaire, QC
<http://www.crcresearch.org/hilaire>

Waterloo Pedestrian Charter
[http://www.region.waterloo.on.ca/web/Region.nsf/0/88379BBFEDEA6C6D85257184004DB222/\\$file/Pedestrian_Charter.pdf?OpenElement](http://www.region.waterloo.on.ca/web/Region.nsf/0/88379BBFEDEA6C6D85257184004DB222/$file/Pedestrian_Charter.pdf?OpenElement)

York Region, Transportation Master Plan
http://www.york.ca/Services/Regional+Planning/Infrastructure/TMP_2002.htm

York Region, Transportation Master Plan Update
http://www.york.ca/Services/Regional+Planning/Infrastructure/TMP_Overview.htm

Sustainable Transportation Programs:

BC Transit, Travel Options
http://www.transitbc.com/traveloptions/introduction_new/index.htm

Better Environmentally Sound Transportation (BEST)
<http://www.best.bc.ca/>

Cisco, Connected Urban Development - The Connected Bus
www.cisco.com/web/about/ac79/ps/cud/tcb.html

Creative Communities International
<http://www.lesstraffic.com/index.htm>

Greater Vancouver Area, TravelSmart
http://www.translink.bc.ca/Plans_Projects/Urban_Showcase/TravelSmart/default.asp

Natural Resources Canada, SmartDriver
<http://www.oe.nrcan.gc.ca/transportation/business/smartdriver/sd-info.cfm?attr=16>

Smart Commute
<http://www.smartcommute.ca/>

Federal/Provincial Funding Opportunities:

Federation of Canadian Municipalities, Green Municipal Fund
<http://gmf.fcm.ca/Home/>

Infrastructure Canada
http://www.infrastructure.gc.ca/ip-pi/index_e.shtml

Legislation of note (with regards to transportation planning):

Alberta, *City Transportation Act*
www.qp.gov.ab.ca/documents/acts/C14.cfm

Bill 43 – 2007 *Greater Vancouver Transportation Authority Amendment Act*, 2007
www.leg.bc.ca/38th3rd/1st_read/gov43-1.htm

British Columbia, *Local Government Act*
www.qp.gov.bc.ca/statreg/stat/L/96323_00.htm

Greater Toronto Transportation Authority (GTTA) Act, 2006
www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_06g16_e.htm

Manitoba, *Planning Act*
www.canlii.org/mb/laws/sta/p-80/20080314/whole.html

New Brunswick, *Community Planning Act*, 1973
www.canlii.org/nb/laws/sta/c-12/20080314/whole.html

Newfoundland, *Urban and Rural Planning Act*, 2000
www.canlii.org/nl/laws/sta/u-8/20080314/whole.html

Northwest Territories, *Cities, Towns and Villages Act*, 2003
www.canlii.org/nt/laws/sta/2003c.22s2/20080314/whole.html

Northwest Territories, *Planning Act*, 1988
www.canlii.org/nt/laws/sta/p-7/20080314/whole.html

Nunavut, *Cities, Towns and Villages Act*, 1988
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APPENDIX C

Exemplary Community Profiles

Profiles of some leading communities

Although many communities have adopted sustainable transportation objectives, there are relatively few examples of successful approaches that have been implemented. Three examples of communities that have used sustainable transportation approaches in systems planning are:

- York Region
- City of Kamloops
- Ville de Mont-Saint-Hilaire

The practices of these communities are profiled in Exhibits C1-C3.

Exhibit C1
Profile of York Region Integrated Transportation Systems Approach

York Region, ON -- TRANSPORTATION	
Overview of Why This Community is Exemplary	The Regional Municipality of York (York Region) is aligning land use planning, transportation system planning, and transportation demand management toward the goal of doubling transit ridership and creating a more sustainable future for the region. York Region won the Transportation Association of Canada (TAC) Sustainable Urban Transportation Award in 2002 for its first Transportation Master Plan and in 2006 for the first phase of the rapid transit system, successfully implemented via a public-private partnership. The second phase is now being implemented.
General Community Description	<ul style="list-style-type: none"> • <u>Type of municipality</u>: Urban/Suburban -- 1,776 square kilometres <u>Population size</u>: 892,71 <u>Density</u>: 506.7 per km² • <u>Growth rate</u>: 22.4% from 2001 to 2006 – fastest growing census division in Canada • <u>Primary economic base</u>: Mixed, residential with many small businesses and some industry (previously agricultural)
Jurisdictional Context	<ul style="list-style-type: none"> • York Region is responsible for both roads and public transit (since 2002) throughout the region, comprising 9 municipalities. Responsibility for land-use planning and development approvals is shared between regional and city governments. TDM-related by-law powers (e.g., related to parking) generally reside with the cities. Relationships between the region and the municipalities are very good at both the political and staff levels. • Municipalities in the Golden Horseshoe must bring their official plans into conformity with the Province’s Places to Grow Act. The higher growth than envisioned in previous York Region plans cannot be accommodated solely through intensification, and York will have to support development in areas beyond those previously identified.
Conditions and Challenges Relevant to Sustainability in Sector	<ul style="list-style-type: none"> • York Region is very spread out and therefore car-oriented. It is one of 5 regions in the Greater Toronto Area. • Overall challenges¹¹⁴: Growth management; Traffic congestion; Air pollution; Funding; Regional integration • Challenges pertaining to transportation: Controlling sprawl and encouraging/enforcing TOD; designing a system that serves the entire region and integrates with existing GTA public transit (TTC and GO)
Vision, Scope, Objectives, and Anticipated Benefits of Plan/Approach	<p>York Region’s <i>Transportation Master Plan</i> (TMP) and the related <i>Rapid Transit Plan</i> (RTP) are two key elements of planning for a sustainable transportation future for the region. The vision and direction set in these documents is also reflected in the Region’s long-term strategic plan, <i>Vision 2026</i> and will be incorporated in the update to the <i>Regional Official Plan</i>. York’s new <i>Sustainability Strategy</i> also requires that different transportation scenarios to meet growth demands be assessed against sustainability principles.</p> <p><u>TMP Vision statement</u> <i>To create a transportation system and supportive land use design that will effectively accommodate growth by doubling transit use, and provide more travel choice in order to better cope with traffic congestion while slowing the degradation of our environment caused by excessive automobile use.</i>^{115, 116}</p>

¹¹⁴ York Region, *York Region Master Plan Update Studies*, Presentation November 6, 2007 (<http://www.york.waterwastewatermasterplan.ca/files/Presentation-Nov-6-2007.pdf> – date accessed: April 2008)

¹¹⁵ York Region, *Transportation Master Plan* (2002) (http://www.york.ca/Services/Regional+Planning/Infrastructure/TMP_2002.htm – date accessed: April 2008)

¹¹⁶ York Region, *Public Consultation Process* (http://www.york.ca/services/regional+planning/infrastructure/tmp_overview.htm#05 – date accessed: April 2008)

York Region, ON -- TRANSPORTATION

	<p>This vision and the effort put towards translating it into action reflect consistent and vigorous championing by the regional chair.</p> <p><u>Scope and Key Objectives of Plan/Approach</u></p> <p>The TMP aims to¹¹⁷:</p> <ul style="list-style-type: none"> • Integrate land use and transportation growth management policies • Address long term infrastructure needs in an affordable, efficient, and environmentally sustainable way • Provide a framework for future transportation decisions <p>There are many supporting objectives that reflect environmental, economic and social sustainability principles.¹¹⁸ The TMP is an evolving plan and is currently going through its 5 year update. The planning horizon is thirty years, but the core is a focused 5 year action plan.</p> <p>The cost of development of the TMP was in the order of \$350,000, funded entirely through tax levy. (Feasibility studies were funded in part through the FCM.) The current update, since it involves significant re-working to address the provincial Place to Grow requirements, will be a similar order of cost. The planning costs are relatively modest because York does not carry out environmental assessments of each proposed project for planning purposes. These kinds of studies happen prior to implementation.</p>
<p>Defining Features of Plan/Approach</p>	<p>Some defining features of the RT system development are:</p> <ul style="list-style-type: none"> • Creation of the regionally-owned share-capital York Regional Rapid Transit Corporation to work on planning/design, with separate day-to-day management of operations by York Rapid Transit • Design and delivery of the first (“Quick Start”) phase of the RT system via a public private partnership (P3) with a group of companies known as the York Consortium^{119,120} (York Region is the first municipality in Ontario to use a P3 for a RT system.) • A strong social marketing component to create identity and draw new RT users (e.g., women, professionals) <p>Some other key features of the larger TMP are:</p> <ul style="list-style-type: none"> • Development of the framework for road development and improvements to reflect the goal of an integrated regional transit system, with the Viva rapid transit system at its core. • Strengthening of the “centres and corridors” development concept of the Regional Official Plan, with four municipal centres targeted for high density development. • A concerted focus on a short-term (Phase 1 or “Quick Start”) action plan to quickly address the most pressing needs and

¹¹⁷ York Region, *Public Consultation Process* (http://www.york.ca/services/regional+planning/infrastructure/tmp_overview.htm#05 – date accessed: April 2008)

¹¹⁸ York Region, *York Region Transportation Sustainability – Principles, Objectives, and Example Performance Indicators*, 2007

¹¹⁹ York Region, *York Region Master Plan Update Studies* (<http://www.york.waterwastewatermasterplan.ca/files/Presentation-Nov-6-2007.pdf> – date accessed: April 2008)

¹²⁰ Marshall Macklin Monaghan, *Best Practice Review*, prepared for York Region, 2007 (http://www.york.ca/NR/rdonlyres/xht6ue4ymudj4ab262bt2neuag5qc4v6meur7xec7h2bp2xr2ef3ibqxf3cr4sj2lzooffpvwj3i6iwqfqreq2zjig/%28IP%29+TMP_Best+Practices_Apr07.pdf – date accessed: April 2008)

York Region, ON -- TRANSPORTATION

	<p>achieve early success.</p> <ul style="list-style-type: none"> • Close working relationships between the YRRTC the York Region Planning Commissioner and municipal officials on strategic planning not only of the RTS, but also of the region to advance TOD • An emphasis on TDM
<p>Implementation and Current Status of Key Operational Elements</p>	<ul style="list-style-type: none"> • <u>Status of implementation</u>¹²¹ • The “Quick Start” phase of the Viva RT system (bus-based) has been implemented and the second phase is under active development. • Savings in travel times in 3 of the 4 corridors have substantially exceeded targets (savings of up to 25%), and ridership targets have also been exceeded (with a total boarding increase for the system of 28% in one year and a revenue ridership increase of over 12%). • A TDM coordinator has been hired and three Smart Commute Associations (business associations mandated to look for ways to meet transportation needs in their areas) are formed. They are meant to become self-sustaining. • The EA for the subway expansion and rapid transit service has been completed and the first subway is moving into construction phase. • TOD guidelines have been adopted. • A Draft Pedestrian and Cycling Master Plan are completed (2007). • A transit-focused 10 year road capital plan has been completed. • • <u>Mechanisms in place to align development with intensification/TOD objectives</u> • TOD guidelines are included in an Official Plan amendment and there is a new framework for approval of development applications that favours intensification/TOD. There is also a move towards minimal density requirements along corridors. • Developers in designated key development areas have an advantage over Greenfield developers. The latter have to front-end finance infrastructure projects if analysis indicates that existing and planned capacity will not meet need. • In allocating new water supply to municipalities, the Region requires that a specified proportion of the growth in each municipality be met with existing capacity via intensification.¹²² • A proposal is going forward to Council in March for an incentive program to encourage sustainable residential developments that meet specific criteria, including TOD criteria. • Local (municipal) official plans are starting to move to requirements vs. guidelines, and municipalities are looking at specific mechanisms (e.g., density bonuses). Richmond Hill already has a site-specific zoning bylaw reducing parking standards in new developments in exchange for transit, pedestrian and other amenities.¹²³

¹²¹ There was no overall monitoring program for the TMP, but one is planned for the update. The Quick Start performance measures were travel time and ridership.

¹²² Report No. 9 Of The Planning And Economic Development Committee Regional Council Meeting Of November 15, 2007 -- Servicing Allocation And Future Regional Conditions For Draft Plan Of Subdivision Approval

¹²³ Tomalty, Ray and Ross Cantwell, *Municipal Land Use Policy and Housing Affordability*, March 2004, prepared for Halifax Regional Municipality (http://www.halifax.ca/qol/documents/Municipal_Landuse_Housing_Affordability.pdf – date accessed: April 2008)

York Region, ON -- TRANSPORTATION

	<ul style="list-style-type: none"> • A TOD advisory task force has been created for the Spadina subway extension to ensure that developer proposals are consistent with the regional and City of Vaughn TOD planning objectives “and that all measures have been taken to reduce the reliance on the automobile and maximize the use of transit in the subway corridor.”¹²⁴ The subway extension will drive much of the high-density development that will occur in York Region. • In a pilot project for a large development area in Vaughn (12 sq km), developers are being asked to development TDM and pedestrian/cycling plans to address the gap in existing and planned road capacity. • • <u>Costs of implementation</u> • Phase 1 capital costs for Viva were in the order of \$165 million, funded by the federal (strategic infrastructure fund) and provincial governments and the region (tax levy, DCs). Largest categories of expense were the vehicles, the transit stops and terminal, and the Intelligent Transportation System and roadwork. Total costs will be in the order of several billion dollars. • Rapid transit capital budget for 2008 is \$169 million, versus \$98.5 million for roads. Prior to 2002 (when transit was turned over to the region), the entire regional transportation budget was spent on roads. The 2008 operating budget for transit is \$154 million, and for roads \$47 million. • The subway extension to Vaughn is being cost-shared with the City of Toronto and the federal and provincial governments. (Provincial funding through the new Move Ontario initiative.) York Region is funding its portion through a combination of development charges, tax increment financing and debt financing.¹²⁵ This is a pilot project for TIF in Ontario, made possible by recent provincial legislation.¹²⁶ TIF involves funding up-front capital expenditures on new infrastructure by temporarily capturing projected new tax revenues that will come from increased property values resulting from the improvements in a defined district.
<p>Key Barriers and How They Were Addressed</p>	<ul style="list-style-type: none"> • Financial support from provincial government was not adequate to allow the Region to move ahead. The solution was the previously described P3. MoveOntario 20/20 was a significant watershed and will help with future phases. • Lack of a well-articulated provincial road and transit plans makes regional planning more challenging. • Existing zoning rights (e.g., allowing for free-standing facilities) can limit ability to promote intensification in places where there is already high infrastructure investment. Land use intensification measures are one way to address this challenge. • Under the provincial Development Charges Act, DCs are tied to maintaining historic levels and types of servicing. This constrains municipalities from increasing DCs in order to shift the balance to new kinds of services (e.g., from roads to transit). The Region is now doing a whole regional assessment of “total transportation level of service” so that the basis for DCs can be

¹²⁴ York Region, Report No. 5 of the Rapid Transit Public/Private Partnership Steering Committee Regional Council Meeting of June 21, 2007, 3 – Spadina Subway TOD Advisory Task Force Draft Terms of Reference (<http://www.york.ca/NR/rdonlyres/yi7hy6zj5fqovu4h5rk2f5q3fykvaas5sw2x3mbkegmqu4kusxv7jsq2zlgj7bez2754yhmfgfwbyiek354vz4q37rmg/rpt+5+cls+3.pdf> – date accessed: April 2008)

¹²⁵ York Region, York Regional Council approves cost share arrangement with City of Toronto for subway extension, September 231, 2006 (<http://www.york.ca/Publications/News/2006/Sept+21+2006+York+Region+subway+arrangement.htm> – date accessed: April 2008)

¹²⁶ Tax Increment Financing Act, 2006 S.O. 2006, CHAPTER 33, Schedule Z.7

York Region, ON -- TRANSPORTATION	
	<p>shifted from one particular modes (roads) to overall service.</p> <ul style="list-style-type: none"> • Low density development will continue to prevail given market demands. The situation is changing, but there is still not enough in place to shape the proposals put forward by developers. Ultimately, hard density targets should be established in the OP. For now, the Region works to maintain constructive relationships with the development community, which generally does recognize that opposing TOD, TDM, transit will not work in the long run, since the Region does not have the budget to continue to build new roads. • Water and wastewater infrastructure planning has been done separately from transportation planning, but there is now an effort to tie them together as part of the growth management initiative (Planning for Tomorrow). Infrastructure can be used as a way to control development rather than being driven by development.
Lessons Learned	<ul style="list-style-type: none"> • The phased approach with a targeted initial priorities and a focus on building ridership paid off. • Deliberate, thorough, thoughtful opinion gathering and marketing, right from the beginning, was worth the expense. • It was important that Council understood the required investment needed to ensure Viva got a strong start.
Specific Best Practices	<ul style="list-style-type: none"> • The Viva motto is “right technology, right time, right cost”. Continuous comprehensive scanning ensures good knowledge of current state of the art. Strong emphasis was then put on testing options with current and potential transit users and this drove many decisions (e.g., no advertising, more comfortable seating, off-board fare collection). Along with a strong emphasis on social marketing, this approach has helped meet ridership targets and build a new client base (business class, women).
Moving Forward and Upcoming Trends	<ul style="list-style-type: none"> • TMP implementation is ongoing. Beyond implementation of Viva Phase 2, initiatives under consideration include:^{127,128} • Development of a TOD BP Handbook • Planning of major rapid transit nodes/mobility hubs for urban intensification • Designation of “fare free zones” in major regional centres and 2+ HOV lanes on all 6 lane roads • Further social marketing to promote sustainable transportation services and encourage TDM planning • LEED transit facilities and conversion of YRT buses to LEVs (low emission vehicles) • Assurance of priority on roads for high volume transit services • Implementation a region-wide cycling network • Development of Parking Management Strategies to assist in managing transportation demands

¹²⁷ Marshall Macklin Monaghan Ltd., Best Practice Review, prepared for the Regional Municipality of York, 2007 (http://www.york.ca/NR/rdonlyres/xht6ue4ymudj4ab262bt2neuag5qc4v6meur7xec7h2bp2xr2ef3ibqxf3cr4sj2lzooffpvwjj3i6iwqfqqeq2zjig/%28IP%29+TMP_Best+Practices_Apr07.pdf – date accessed: April 2008)

¹²⁸ York Region, *York Region Master Plan Update Studies*, Presentation November 6, 2007 (<http://www.york.waterwastewatermasterplan.ca/files/Presentation-Nov-6-2007.pdf> – date accessed: April 2008)

Exhibit C2
Profile of Kamloops TravelSmart Integrated Transportation Planning

Kamloops, BC - TRANSPORTATION	
Overview of Why This Community is Exemplary	TravelSmart is an integrated land use and transportation system planning program. It is incorporated into the City's Official Plan and guides growth management while directing the establishment of a multi-modal transportation system. By blending supply and demand management approaches, the aim is to reduce economic, environmental, and social impacts of increasing transportation demand, maintain mobility levels, and minimize increases in infrastructure expenditures.
General Community Description	<ul style="list-style-type: none"> • Type of municipality: Rural Population: 80,376 Density: 270.4 per km² • Population Dynamics: Growing 4% (2001 to 2006) with anticipated 35% increase over 20 years • Geographic setting: Arid, mountainous • Primary economic base: Mixed – tourism, agriculture, forestry/wood products, mining, manufacturing, high tech¹²⁹
Jurisdictional Context	<ul style="list-style-type: none"> • Kamloops is at the cross-road of three highways, under the jurisdiction of the Ministry of Transportation, and two national railway lines, one owned and operated by CP, the other by CN. • Kamloops worked together with these three entities as well as the Kamloops Indian Band to develop the plan.
Conditions and Challenges Relevant to Sustainability in Sector	<ul style="list-style-type: none"> • One challenge Kamloops faced was a reduced budget for transportation infrastructure. • Further challenges include growth management, traffic congestion and maintaining acceptable mobility levels, and air pollution.
Vision, Scope, Objectives, and Anticipated Benefits of Plan/Approach	<p><u>Vision</u></p> <ul style="list-style-type: none"> • “The plan establishes a direction for developing a multi-modal transportation system and is instrumental in guiding the preferred growth management strategy for the city's Official Community Plan”¹³⁰ • The idea of TravelSmart was developed by City staff members who realised that the cost of transportation infrastructure (current and future proposed) was higher than it needed to be. They approached council with the idea of developing a plan to maintain mobility levels while reducing potential costs of infrastructure. Despite having to finance a ~\$300,000 plan, council supported the idea. And with good reason, as the transportation infrastructure budget was reduced from \$120 million to \$14 million. <p><u>Scope and Key Objectives of Plan/Approach</u></p> <ul style="list-style-type: none"> • To reduce the number of vehicle trips per person during peak afternoon hours by 5% from 1995 levels.¹³¹ • To integrate land use and transportation system planning by managing future development patterns to minimize increases in travel demand. • To provide clear direction for updating land use planning policies in the OCP.¹³²

¹²⁹ City of Kamloops, *Demographics* (<http://www.kamloops.ca/business/selectorcriteria.shtml#demographics> – date accessed: April 2008)

¹³⁰ City of Kamloops, *Transportation Plans* (<http://www.kamloops.ca/transportation/travelmart.shtml> – date accessed: April 2008)

¹³¹ Transport Canada, *TravelSmart: Planning for Sustainable Urban Transportation – Kamloops, British Columbia* (<http://www.tc.gc.ca/Programs/Environment/utsp/travelmartplanningforsut.htm> – date accessed: April 2008)

Kamloops, BC - TRANSPORTATION	
	<ul style="list-style-type: none"> To maintain mobility levels through a multi-modal, affordable transportation system while addressing TDM. To take into account environmental, economic, and quality of life goals. <p><u>Planning Costs and Anticipated Implementation Costs and Benefits</u></p> <ul style="list-style-type: none"> \$245,000 was budgeted for development of TravelSmart.¹³³ Funded through City general revenue fund, contributions from developers, BC Transportation Financing Authority (\$55,000) and the federal infrastructure fund. Ministry of Transportation also provided \$50,000 toward developing the plan. The initial idea was raised in 1991. TravelSmart was implemented and became official in 1999. <p><u>Anticipated Benefits</u></p> <ul style="list-style-type: none"> Reduced spending on infrastructure. Improved air quality (reduced transportation related emissions). Reduced energy consumption from transportation. Maintained mobility despite growing population.
Defining Features of Plan/Approach	<p><u>Development of Plan</u></p> <ul style="list-style-type: none"> Development of TravelSmart involved a wide range of community stakeholders and agencies, including the City, the BC Ministry of Transportation and Highways, the BC Ministry of Environment, Lands and Parks, the Kamloops First Nation, BC Transit, University College of the Cariboo, Urban Systems, and Kamloops residents.¹³⁴ The plan was developed using Canadian software (EMME/2 from INRO) to model different growth scenarios to identify land use scenarios that would minimise demands on transportation system ensuring its efficient, sustainable evolution.¹³⁵ Public input was solicited, through a Household Travel Survey, regarding mobility needs, acceptable travel delay times, kilometres travelled, neighbourhood design considerations, transit system options, and approaches to modifying transportation behaviour. This input was used in two ways: to develop performance measure indicators based on a scale of acceptable mobility levels (along with energy consumption due to transportation and traffic flow volume); and to update and recalibrate the model as travel patterns and mobility change with a growing population. <p><u>Relationship to Other Major Municipal Policies/Plans</u></p> <ul style="list-style-type: none"> Preferred land use scenario identified by TravelSmart was adopted in Kamloops Official Community Plan in 1999.

¹³² City of Kamloops, *TravelSmart Project Summary Report*, October 1999 (<http://www.kamloops.ca/pdfs/plans/travelmart/tsintro.pdf> – date accessed: April 2008)

¹³³ Transport Canada, *TravelSmart: Planning for Sustainable Urban Transportation – Kamloops, British Columbia* (<http://www.tc.gc.ca/Programs/Environment/utsp/travelmartplanningforsut.htm> – date accessed: April 2008)

¹³⁴ City of Kamloops, *TravelSmart Project Summary Report*, October 1999 (<http://www.kamloops.ca/pdfs/plans/travelmart/tsintro.pdf> – date accessed: April 2008)

¹³⁵ Ibid

Kamloops, BC - TRANSPORTATION	
	<ul style="list-style-type: none"> TravelSmart (1999) has been supplemented with an Official Transit Plan (2000), a Pedestrian Master Plan (2002) and a Bicycle Master Plan (2002). <p><u>Key Features of Implementation</u></p> <ul style="list-style-type: none"> A key feature of TravelSmart was its incorporation into the Official Community Plan. This takes it out of the hands of just the supportive council and staff and ensures that it will be respected/enforced by all through the OCP.
Implementation Status	<ul style="list-style-type: none"> <u>Status of implementation and outcomes</u> The City slowed/stopped development in some areas and identified under-utilised arterial corridors. Changes were made to public transit such as new routes and increased frequency. The transit, bicycle, and pedestrian plans indicated priority measures. The City is using these priority lists to implement projects and they are on target with respect to indicated timelines to a certain extent (given regular setbacks and delays). Traffic calming measures were implemented. A trip reduction program was implemented by two major employers. Planned future costs of transportation infrastructure were reduced from \$120 million to \$14 million.¹³⁶ <u>Steps taken to ensure any necessary behaviour-change/compliance</u> Promotional programs, developed in 2000, have been implemented in schools and businesses. TDM programs include being a member of carpool.ca, where the number of people registered has continually increased each year since implementation three years ago. Kamloops also hosts a Ride-Share week, which is a week long campaign involving articles in the paper and programs at city hall to raise awareness of TDM measures and sustainable transportation in general. The City offers a variety of discount transit passes, including: U-Pass for university students; 4 month pass pack for high school students; and they are currently negotiating the Pro-Pass for employees of major employers (such as the University). <u>Costs of implementation</u> Annual budget of \$250,000¹³⁷ In the 5 year Capital Plan (2008-2011), \$500,000 is allocated to each of bicycle and pedestrian upgrades, based on priorities identified in the respective Master Plans. (The actual amount may vary slightly depending on budget each year). <u>Source(s) of funding</u> Funded through City general revenue fund and development cost charges funds,¹³⁸ with funding for additional network improvements from BC Transit and the Ministry of Transportation and Highways

¹³⁶ Transport Canada, *TravelSmart: Planning for Sustainable Urban Transportation – Kamloops, British Columbia* (<http://www.tc.gc.ca/Programs/Environment/utsp/travelsmartplanningforsut.htm> – date accessed: April 2008)

¹³⁷ City of Kamloops, *TravelSmart Project, 5.0 Implementation* (<http://www.kamloops.ca/pdfs/plans/travelsmart/tsimplement.pdf> – date accessed: April 2008)

Kamloops, BC - TRANSPORTATION

	<ul style="list-style-type: none"> • <u>Steps to ensure long-term viability</u> • TravelSmart’s inclusion in Kamloops Official Community Plan means that the overall vision of integrating land use and transportation planning will remain despite changing council and administration. • In this way, each department has a role to play to achieve the goals indicated in TravelSmart and thus the OCP. It is each department’s responsibility to see it through. • TravelSmart is currently undergoing an update process, where the computer model is being recalibrated for the change in driving behaviour, traffic flows, growth patterns of the City, and so on. • In recalibrating the computer model, indicators must be identified along with infrastructure requirements. • The data collected from the 2007 Household Survey of 1000 homes, which reflects existing behaviour, will be used in the model update as well as in developing further TDM programs. • Further information is collected from the data acquisition systems installed at traffic lights and highway ramps, which work on a day-to-day basis adjusting the timing of the lights to improve traffic flow and efficiency. This data will help them to identify issues that need to be addressed in the update of TravelSmart.
<p>Key Barriers and How They Were Addressed</p>	<ul style="list-style-type: none"> • Cross jurisdictional challenges. Due to the fact that TravelSmart addresses areas outside of the City’s immediate jurisdiction all entities involved must approve the plans and work together to see them through. • For example, cyclists from the east have to pass through the Valleyview interchange, which is unsafe for cyclists. The Bicycle Master Plan budgeted \$400,000/year to go toward infrastructure and facilities for major bike crossings, such as Valleyview. However, this interchange involves four parties: the City, the Ministry of Transportation, CP, and CN. Cooperation was required from all parties involved to plan and complete this project, therefore causing delays in implementation. It will have taken approximately five years, by the time it is completed in the next couple of years. This type of challenge is overcome, as seen here, when all stakeholders work together. • There may also be challenges in addressing issues that concern strong unions, such as parking demand at Hospital facilities.
<p>Lessons Learned</p>	<ul style="list-style-type: none"> • Incorporate principles and policies that support the integration of land use and transportation system planning into both high level plans (OCP) and low level plans (Operational plans, day-to-day activities) to maintain ongoing commitment and consistency. • Motivated and committed staff (administration and council) and developing a succession plan in the event that the staff changes. • Use of an incremental, learning-by-doing planning approach. • Budget for public awareness/education campaigns and resources.¹³⁹ • Involve all stakeholders from the initial planning stages to implementation. For Kamloops, this includes the general public (especially with respect to acceptable mobility levels) and other jurisdictions including the Ministry of Transportation, CP and CN Rail Lines, and the Kamloops Indian Band.

¹³⁸ Transport Canada, *TravelSmart: Planning for Sustainable Urban Transportation – Kamloops, British Columbia* (<http://www.tc.gc.ca/Programs/Environment/utsp/travelsmartplanningforsut.htm> – date accessed: April 2008)

¹³⁹ Ibid.

Kamloops, BC - TRANSPORTATION	
	<ul style="list-style-type: none"> • Important to receive input from everyone and then to work as a team toward reaching the goals.
Specific Best Practices	<ul style="list-style-type: none"> • Integrating land use and transportation system planning and incorporating into the OCP. • TDM measures such as use and promotion of carpool.ca and discounted transit passes for university and high school students. • U-Pass was adopted pro-actively by council in 2004 as they realised that the cost benefit of supporting a discount pass program for university students far outweighed the cost of tackling the infrastructure that would be required in the university area, which is rapidly developing and already has high traffic volumes. Ridership increased 20% from 2004-2005 based mostly on the increased student volume.
Moving Forward and Upcoming Trends	<ul style="list-style-type: none"> • Must bring the policies and principles of TravelSmart down from the OCP level to the operational, day-to-day level using an Environmental Management Strategy and an Asset Management System developed for the Transportation Department.¹⁴⁰ • TravelSmart has actually helped the Ministry of Transportation address issues regarding the highways passing through Kamloops. As the Level of Service has deteriorated, there are plans to construct a bypass for one section of the highway, thus helping to minimize congestion at traffic lights due to the through traffic. • The city promotes infill and high density developments mainly through the Planning department and the OCP. Currently under consideration, is to incorporate a reduction of parking requirements in the development application for a multi-family development, in favour of offering free transit passes to the residents and a car-share program.
How Does Current Approach/Practice Differ from Previous (and/or from other municipalities)?	<ul style="list-style-type: none"> • Previous transportation planning exercises (prior to TravelSmart) called for more road network improvements before reaching a population of 100,000. This would have lead to a drastically increased expenditure. For example, the 1991 transportation plan would have required \$120 million in capital costs; using TravelSmart (1999), integrating land use and transportation systems and optimizing the use of existing road networks and potential new infrastructure, the capital cost required to achieve similar and acceptable mobility was reduced to \$14 million.¹⁴¹ • Part of the success of TravelSmart was the ability to defer capital costs to when population is larger, whereas before, certain infrastructure projects, such as certain bridges, were thought to be needed for mobility at a much lower population level. • Because all decisions are based on the OCP and thus, TravelSmart, there is more attention paid to sustainable transportation initiatives than there was before.

¹⁴⁰ Ibid.

¹⁴¹ City of Kamloops, *TravelSmart Project, 4.0 Transportation Network Management* (<http://www.city.kamloops.bc.ca/pdfs/plans/travelsmart/tsnetmanagement.pdf> – date accessed: April 2008)

Exhibit C3
Profile of Mont Saint Hilaire Transit Oriented Development

Mont-Saint-Hilaire, QC - TRANSPORTATION	
Overview of Why This Community is Exemplary	The Village de la Gare in the Town of Mont Saint Hilaire is the first, master-planned transit oriented (TOD) development in Quebec. In 2002, a commuter train service was established between Montreal and Mont Saint Hilaire. This instigated the development of the TOD project, which is a unique collaboration between the Town, the transit authority, and a private developer.
General Community Description	<ul style="list-style-type: none"> • Type of municipality: Rural • Population: 15,720 Density: 354.9 per km² Dynamics: Growing 10.2 % (2001 to 2006) • Geographic setting: Situated at the base of Mont Saint Hilaire, a UNESCO World Biosphere Reserve
Jurisdictional Context	<ul style="list-style-type: none"> • Municipality not in direct control of transportation infrastructure: <ul style="list-style-type: none"> • Highways owned, planned, maintained by the Quebec ministère des Transports • Roads (urban and rural) owned, maintained by the Town • Rail line run by the Agence métropolitaine de transport (AMT) • Inter-municipal bus routes run by the Conseil intermunicipal de transport de la Vallée du Richelieu (CITVR)
Conditions and Challenges Relevant to Sustainability in Sector	<ul style="list-style-type: none"> • The existence of a commuter rail line into downtown Montreal establishes a basis for Mont Saint Hilaire's TOD approach.
Vision, Scope, Objectives, and Anticipated Benefits of Plan/Approach	<p><u>Vision</u></p> <ul style="list-style-type: none"> • Transit Oriented Development (TOD) to promote sustainable growth, alternative modes of travel and an active, healthy lifestyle while maintaining the natural character of the Town. • Leadership for the project came from within the community to protect the small town feel and the mountain (Mont Saint-Hilaire).¹⁴² • AMT, the Town, and the private developer worked together to create a TOD. • The Town lead the creation of the Plan d'implantation et d'integration architecturale (PIIA), which established zoning and land-use conditions, architectural guidelines, and transit oriented strategies for the site, such as bike and pedestrian movement, setback requirements and lot sizes that encourage neighbourly interaction.¹⁴³ <p><u>Scope and Key Objectives of Plan/Approach</u></p> <ul style="list-style-type: none"> • TOD in a Montreal suburb to offer a more sustainable way of living. • Provide ~1000 residential units within walking distance (max. 750m) of the station. • Brownfield redevelopment (former industrial site, sugar refinery). • Create a multifunctional district centred around public transit systems, walking and bicycle paths. • Preserve the Town's natural character, promote conservation (14% of site will remain green space), reduce development pressure around the mountain (Mont Saint-Hilaire), which is a UNESCO World Biosphere Reserve.

¹⁴² Sustainable Community Development, *Community Research Connections* (<http://www.crcresearch.org/hilaire> – date accessed: April 2008)

¹⁴³ CMHC, *Transit-oriented development Case Study, Ville de la Gare, Mont-Saint-Hilaire, Quebec* (<http://www.cmhc-schl.gc.ca/en/inpr/su/sucopl/upload/65514EnW.pdf> – date accessed: April 2008)

Mont-Saint-Hilaire, QC - TRANSPORTATION	
	<p><u>Anticipated Outcomes</u></p> <ul style="list-style-type: none"> • Reduction in vehicle use; Better quality of life; Maintain small town rural feel within close proximity to large, urban municipality. • Town will also benefit from an increased tax base.
Defining Features and of Plan/Approach	<ul style="list-style-type: none"> • Strong emphasis was put on public engagement/support. • Rezoning and by-law changes (official plan amendments) were made to accommodate the plan. • The plan includes clear milestones and targets. • Implementation involves numerous partnerships between the town, other governments bodies and private agencies. <ul style="list-style-type: none"> • Cost of developing the infrastructure was shared between the Town, the Quebec ministère des Transports, the Agence métropolitaine de transport (AMT) and the private developer.¹⁴⁴ • The Revi-Sols program of the Quebec ministère de l'Environnement covered part of the cost of decontaminating the land that was previously occupied by the sugar refinery.
Implementation and Current Status	<ul style="list-style-type: none"> • <u>Status of implementation</u> • Village de la Gare is being constructed over a ten year period¹⁴⁵: <ul style="list-style-type: none"> • 2002 – start • 2003 - 2012 – construction of 100 residential units per year • 2005 – development of parking area (park and ride lot) with trees, sidewalks, and streetlights • Train station is complete • Detailed planning for the commercial area was expected to begin in 2007 • <u>Steps taken to ensure any necessary behaviour-change/compliance</u>¹⁴⁶ <ul style="list-style-type: none"> • Modification of the town plan incorporating sustainable development principles, especially the role of public transit. • Zoning modifications to accommodate high density near the station and lower density toward the river and the rest of the town to blend into older established sectors and the rural nature of the area. • Bylaw and construction permitting changes to support sustainability. • • <u>Costs of development</u> <ul style="list-style-type: none"> • Total investment required is estimated at \$150 million. • Approximately \$6 million for construction of the roadway network within the development, including lighting and sidewalks (\$2 million), landscaping and tree planting (\$300,000), and underground infrastructure. • \$400,000 required for Brownfield rehabilitation (site decontamination).¹⁴⁷

¹⁴⁴ Transport Canada, Urban Transportation Showcase Program, Village de la Gare: Transit Oriented Residential Development, Mont Saint Hilaire, Quebec (<http://www.tc.gc.ca/Programs/Environment/utsp/villagedelagare.htm> – date accessed: April 2008)

¹⁴⁵ Ibid.

¹⁴⁶ Sustainable Community Development, *Community Research Connections* (<http://www.crcresearch.org/hilaire> – date accessed: April 2008)

Mont-Saint-Hilaire, QC - TRANSPORTATION

	<ul style="list-style-type: none"> • <u>Source(s) of funding</u> • Financial input from AMT, who runs the commuter train line. AMT purchased the land (from the developer) for the station and parking area and paid for construction of the parking and train platforms. • Financial input from Revi-Sols program of the Quebec ministère de l'Environnement. A subsidy was provided to developer as part of cost of decontaminating land. • Financial input from the Town. They completed the roads to link Village de la Gare with neighbouring communities and paid for construction of the train station. • Financial input from Quebec ministère des Transports. • No other incentives were offered to the developer.¹⁴⁸ • Private developer was responsible for roadway network within development including underground infrastructure and cleanup of site to avoid delays with construction¹⁴⁹ (\$6 million for roadway network, \$400,000 for decontamination).¹⁵⁰
Key Barriers and How They Were Addressed	<ul style="list-style-type: none"> • Project raised some concerns among neighbours due to: potential effects of soil contamination and site remediation; the size (30% of Mont Saint Hilaire's developed area); and potential traffic implications due to the mixed-use nature and addition of the train station. However, these concerns were alleviated through public consultation and sharing of information. • Municipality challenge was to bring the stakeholders together and resolve cost-sharing issues. • The developers' main challenge was site negotiations and cost distribution. This was addressed through the PIIA and division of costs among the three partners.¹⁵¹
Lessons Learned	<ul style="list-style-type: none"> • Need to create a detailed, integrated, long-term plan and stick to it.¹⁵² • Need ongoing, long term cooperation of community, council, administration, transit authority, other levels of government, and developers. • Important to take into account the current situation. In Mont Saint Hilaire's case, this refers to the UNESCO site, and the agricultural and historical nature of the town and surrounding area.
Specific Best Practices	<p><u>Best practices reviewed for current report</u></p> <ul style="list-style-type: none"> • TOD – Transit Oriented Development • PIIA - Plan d'implantation et d'integration architecturale

¹⁴⁷ CMHC, *Transit-oriented development Case Study, Ville de la Gare, Mont-Saint-Hilaire, Quebec* (<http://www.cmhc-schl.gc.ca/en/inpr/su/sucopl/upload/65514EnW.pdf> – date accessed: April 2008)

¹⁴⁸ Ibid.

¹⁴⁹ Sustainable Community Development, *Community Research Connections* (<http://www.crcresearch.org/hilaire> – date accessed: April 2008)

¹⁵⁰ CMHC, *Transit-oriented development Case Study, Ville de la Gare, Mont-Saint-Hilaire, Quebec* (<http://www.cmhc-schl.gc.ca/en/inpr/su/sucopl/upload/65514EnW.pdf> – date accessed: April 2008)

¹⁵¹ Ibid.

¹⁵² Sustainable Community Development, *Community Research Connections* (<http://www.crcresearch.org/hilaire> – date accessed: April 2008)



APPENDIX D

Best Practice Profiles

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Best Practice	Case Examples
<i>Community design for sustainable transportation</i>	<p>Vancouver, BC – Southeast False Creek Southeast False Creek, the future athlete's village, has been designed using sustainable transportation strategies. The roads are designed to accommodate pedestrians and cyclists first, followed by transit, service vehicles and, lastly, automobiles. The surrounding neighbourhood will be designed to provide all of the residents' daily and weekly services (community centre, school, groceries, etc.) within walking distance from any point in the community. Commuting will be made easier with two nearby rapid transit lines, a cross-town bus route, streetcars and ferries. It is also the first community in Canada that will provide car sharing spaces as part of the development process. There will be no single-family lots, but rather apartment buildings and townhouses to ensure a high-density, compact neighbourhood.</p> <p>The multitude of sustainable transportation strategies should decrease GHG emissions by 25% - 50% compared to similar urban neighbourhoods (and by 66% compared to low density, suburban development). Cars are expected to be involved in a maximum of 40% of the resident's trips in Southeast False Creek, resulting in fewer cars on the road and safer streets for driving, cycling, and walking.</p> <p>Source: http://www.sustainablecommunities.fcm.ca/files/Tools/Best_Practices_Guides/FCM-CH2M_BPG_2006[1].pdf</p> <p>Victoria, BC – Dockside Green Dockside Green, a brownfield redevelopment project in the City of Victoria, has implemented a transportation demand management strategy in their Master Agreement with the City. In the agreement the developer, Windmill West, has committed to providing a car share program, a mini-transit service, subsidized public transit passes and bicycle storage facilities. The car share program will involve a minimum of 10 vehicles that will be a mixture of neighbourhood electric vehicles (using 100% electricity with speeds around 50 to 60 km/h) and smart cars. The mini-transit service will focus on transportation to the downtown core and the developer will have to purchase the vehicle. Furthermore, the developer agreed to offer subsidized transit passes to all residents and to provide bus route information via the developer's website. Bicycle storage facilities are to be provided for 15% of the residents, and bicycle racks and shower facilities for 5% of commercial, office and industrial users. In support of minimising car use, only one parking spot will be available for each unit and a regional greenway path for walking and cycling has been designed to offer key linkages to the city centre.</p> <p>Source: http://www.victoria.ca/cityhall/pdfs/currentprojects_dockside_masterdev.pdf http://www.docksidegreen.com/sustainability/eco-friendly/alternative-modes-of-transportation.html</p>
<i>Transit oriented development (TOD)</i>	<p>Mont Saint Hilaire, QC – Village de la Gare The Town of Mont-Saint-Hilaire is undertaking development based on the principles of active transportation and transit-oriented development. Village de la Gare is considered to be the first, master-planned, transit-oriented development project in Quebec. The project was started in 2002 after commuter train service was introduced linking Mont-Saint-Hilaire to Montréal. The project is the result of a unique collaboration between the municipality, the metropolitan transit authority and a private developer. At its completion in 2012, the project will include 1,000 residential units, commercial space, a primary school, public open space and landscaping, bicycle routes and pedestrian pathways, all within 750 metres of the train station. Nearly 15 per cent of the land area will be used for parks and public open space.</p>

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See Mont Saint Hilaire transportation profile for further details.

Source: <http://www.cmhc-schl.gc.ca/en/inpr/su/sucopl/upload/65514EnW.pdf>

Toronto, ON – Yonge-Eglinton Centre

The Yonge-Eglinton Centre in Toronto has been designated an Urban Growth Centre in the Places to Grow Act – Growth Plan for the Greater Golden Horseshoe 2006. As an urban growth centre, it will be planned: as a focal area for investment in institutional and region-wide public services, commercial, recreational, cultural, and entertainment uses; to accommodate and support major transit infrastructure; to serve as a high density, major employment centre (minimum of 400 residents and jobs combined per hectare by 2031); and to accommodate a significant share of population and employment growth. Pedestrian amenities, such as links, connections, and sidewalks in this TOD shall be designed to provide a high quality pedestrian area with particular attention to ease of movement and travel to/from transit facilities.

Sources: <http://www.niagara-gta.com/pdf/Growth%20Plan%20for%20the%20Greater%20Golden%20Horseshoe.pdf>
http://www.toronto.ca/planning/yonge_eglin/pdf/yongeeeglinleaflet_crop_screen.pdf
http://www.toronto.ca/planning/pdf/yonge_eg_final_report_june06.pdf

Burnaby, BC – Transit supportive land uses

Transit-supportive land use refers to zoning and policies that intensify land uses along transportation corridors. These areas are designed for transit and non-motorized transportation, while also creating a vibrant mixed-use hub. Transit-supportive land uses require a minimum of 25 residential units per hectare (10 units per acre) in residential areas and 70 employees per hectare (28 employees per acre) in commercial centres. Burnaby is developing areas around SkyTrain stations, such as the Holdom Station Area and Brentwood Town Centre.

Consistent with OCP designations for the plan area, this guide plan provides a framework for the transformation of the Holdom Station Area into an urban village and business centre in support of the development of the new Millennium Skytrain station at the intersection of Holdom Avenue and Lougheed Highway. The plan would include the replacement of lower density manufacturing, warehousing and distribution operations with higher density residential development and more intensive office, high-technology, specialized production and ancillary commercial uses. As a transition between the urban village and business centre, the land use concept includes an option to build live/work developments. A commercial node will serve residents, business centre employees and transit users, creating a vibrant focal point for the area.

The Brentwood Town Centre is the designated town centre for the north-west sector of Burnaby. The town centre is intended to be a focus of higher-density and higher-intensity residential and commercial opportunities, public transit and supporting leisure facilities. The revised town centre Development Plan is an important element in the City's response to transportation initiatives establishing the Lougheed Corridor for a light rapid transit (LRT) extension to Coquitlam as the next priority with its resultant opportunities for additional focused growth.

Source: <http://www.wcel.org/issues/urban/sbg/Part3/transitsupportive/>

Metro Vancouver, BC – Development around SkyTrain Stations

Similar to Burnaby, there is a push for multi-use development around SkyTrain stations throughout Metro Vancouver. In a 1996 report by Parson Brinkerhoff, Quade and Douglas, Inc (PBQD), they describes how SkyTrain transit stations have been a catalyst for regional town centers in Vancouver, British Columbia. Each centre is intended to

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serve 100,000 to 200,000 people living and working in the area. Development within each centre is controlled by local governments. There is a strong emphasis on pedestrian orientation with the centres, resulting in buildings with limited or no setbacks and minimal surface parking. Governments encourage commercial, employment and residential development within the centres by leasing office space, and by addressing developers needs, such as building parks. The result has been hundreds of millions of dollars in development and hundreds of thousands of square feet of new office and residential buildings, high population densities, and high levels of transit use.

As part of an Urban Showcase, TransLink, the Federal Government and Metro Vancouver municipalities are partnering on six innovative transportation projects that will make it easier, cleaner and quicker to get around. One such project is the development of "Transit Villages." A Transit Village is an attractive, compact, mixed-use community, centred around a transit station, enabling residents, workers, and shoppers to drive less and take transit, walk and cycle more. Transforming the areas around Surrey Central, Metrotown, Edmonds, and Broadway/Commercial SkyTrain stations into Transit Villages involves both immediate improvements and the development of a long-term plan for the area. Immediate enhancements will include better station access and wayfinding, sidewalk improvements, traffic calming, better lighting and signage, more bike storage, and street furniture. Longer term improvements to the areas will involve design and development plans for community services, retail, residential, and commercial developments that bring positive activity to the area and enable people to live, work, and shop in a vibrant centre.

Sources: <http://www.vtpi.org/tm/tm45.htm>
http://www.translink.bc.ca/Plans_Projects/Urban_Showcase/default.asp

Saanich, BC – Short Street Project

Building on an action plan developed by the municipality to target redevelopment of the blocks around Short Street, this is an innovative, mixed-use project that features 72 residential units and three commercial retail units. Its close proximity to several transit stops and a large commercial centre and the mid-rise form make the project one of the first transit-oriented developments in Saanich. The project is notable for a number of innovative strategies aimed at increasing public transit ridership and reducing the amount of parking. The strategies include a co-op vehicle, free transit passes to residents for two years, shared parking with the commercial units and secure bicycle storage. These strategies were developed co-operatively by the developer, municipality and the transit authority.

The project required a zoning bylaw amendment and development permit that was approved by the District of Saanich. The developer worked closely with planners from the District of Saanich, who were very supportive of the project, which was considered appropriate for the location and innovative. The planners made several creative suggestions during the design phase regarding transit oriented design at the building/street interface and parking requirements. These suggestions were largely embraced by the developer and the project is considered a win for the developer, the municipality and residents. The municipality also worked closely with BC Transit to develop the innovative bus pass system for residents, which was the first of its kind in North America. This project is a pilot for the system that will likely be applied in other situations should it prove successful. The municipality supported the requested parking variance on the strength of this and the other initiatives aimed at increasing public transit use. The high level of co-operation between the developer, transit authority and municipality proved to be very effective in overcoming the challenges of designing a project that was transit-oriented and reduced automobile dependency.

Source: <http://www.cmhc-schl.gc.ca/en/inpr/su/sucopl/upload/65510EnW.pdf>

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Strategic and/or regional transportation planning

Metro Vancouver, BC – Strategic Transportation Planning

The 2008 Transportation and Financial Plan is Metro Vancouver's Strategic Transportation Plan. It is based on the major actions identified in the Ten-Year Outlook for 2008 and supports the region's growth strategy, the Livable Region Strategic Plan (LRSP), air quality objectives and economic development of the GVRD. In April 2007, the Province of British Columbia proposed amendments to the GVTA Act that involve significant changes to TransLink's planning, funding and governance framework. The amendments contemplate the creation of new Ten-Year Strategic Plans commencing in 2009.

In order to meet its current statutory requirement to have a Strategic Transportation Plan, TransLink is developing a "bridging" STP for 2008, the 2008 Transportation & Financial Plan. This one year STP will allow the development of a new Ten-Year Strategic Plan to commence in 2009. Consultation on the service, financial and capital plan initiatives identified in the 2008 Plan has been conducted with public, stakeholders interest groups, municipal and regional government committees. The plan has been shaped by input from a series of open houses, public and stakeholder group presentations as well as telephone and internet-based public opinion research (and remains consistent with the Ten-Year Outlook).

TransLink is responsible for the regional transit system and shares responsibility for the Major Road Network with municipalities. TransLink is also responsible for regional Cycling, Commuting Options, AirCare and Intelligent Transportation System programs. The 2008 Plan will continue to make progress on implementing initiatives in these program areas. In addition to the Strategic Transportation Plans, there are several transportation planning initiatives that TransLink will continue to lead, participate in, or coordinate with other agencies and levels of government. TransLink's involvement with large scale, multi-jurisdictional and multi-agency work is directed at ensuring that these initiatives and potential resulting improvements are coordinated with the MRN and the regional transit system, and generally contribute to improving the movement of people and goods. Further planning and program activities include: Area Transit Plans, the Access Transit Project, SkyTrain Plans, Rapid Transit studies, Cycling program, employer pass program, rideshare and car share. In early 2005, TransLink started the Access Transit Project, one of the most extensive reviews of transit accessibility undertaken in North America. The project reviewed every aspect of the transit system that affects people's travel choices, including physical barriers, information, training, service supply and the structure of Custom Transit and was concluded in 2007.

The Transit system represents TransLink's largest operating expenditure, budgeted at \$595.3 million in 2007. TransLink provides an integrated network of transit services throughout the region, including frequent bus network, rapid transit network, express transit, and local transit. The 2008 Financial Plan forecasts the revenue and expenditures required to maintain existing service levels and implement the proposed initiatives. A projection to 2013 confirms the affordability of the 2008 Strategic Transportation Plan. Proposed legislative amendments to the GVTA Act contemplate the development of a Ten-Year Strategic Plan and Long Term Strategy. The Ten-Year Strategic Plan will identify TransLink's annual transportation service levels, capital projects and other expenditures for the transportation system as well as its revenue measures and anticipated annual revenue.

Sources: 2008 Transportation and Financial Plan. June 2007. TransLink.
TransLink news,
http://www.translink.bc.ca/About_TransLink/News_Releases/news05160701.asp

Toronto, ON – Metrolinx

Metrolinx is the name recently adopted by the Greater Toronto Transit Authority

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	<p>(GTTA), a public authority which manages transportation planning, including public transport. The GTTA was formed by the Ontario Government in 2006 and adopted the Metrolinx name in December 2007. Metrolinx is governed by a board consisting of representatives from the Government of Ontario and from each of the regions that make up the GTA. The authority is currently in the process of developing a comprehensive regional transportation plan that will involve the release of six discussion papers and gathering input from a wide range of stakeholders. Metrolinx has also become responsible for the implementation of the “Presto” one-fee payment system and the expansion of the GO Transit fleet.</p> <p>Metrolinx is the final piece in a three-part approach by the Provincial government to prepare the Greater Toronto and Hamilton region for growth and sustained prosperity. Building on the work of the Greenbelt, which protects more than 1.8 million acres of environmentally sensitive and agricultural land in the heart of the region, and Places to Grow, a plan that coordinates population and job growth, Metrolinx will develop a world-class transportation system. Metrolinx and its board committed to working with stakeholders, municipal partners and the public to help build a transportation system that will contribute to a robust economy, sustain the environment and improve quality of life in the Greater Toronto and Hamilton region. Metrolinx has several initiatives planned, such as Move Ontario 2020, National Transit Strategy, Trip Planner and Carbon Footprint Calculator, and a Capital Planning and Investment Strategy Framework.</p> <p>Source: http://www.metrolinx.com/NonTabPages/1/Regional%20Travnsportation%20Plan/Plans.aspx</p> <p>York Region – Integrated Planning (Transportation Master Plan) See York Region transportation profile for details and information sources.</p> <p>Kamloops, BC – TravelSmart Program In response to rapid population growth and cost concerns about developing additional road capacity, the City of Kamloops launched an integrated land use and transportation planning program called TravelSmart. TravelSmart was officially adopted by the City in 1999 as one component of Kamloops’ revised Official Community Plan, Kamplan. It includes the following key components and initiatives: Less expensive road structure alternatives; Improved public transit; Promoting bicycle use; and Promotional programs.</p> <p>See Kamloops transportation profile for further detail and information sources.</p>
<p><i>Urban Growth Boundaries</i></p>	<p>Greater Golden Horseshoe, ON - Greenbelt The Greenbelt Plan and boundary were established under the Greenbelt Act, 2005, which allows only the Minister of Municipal Affairs and Housing to propose amendments to the Plan (Ontario Cabinet approves the proposals). The Greater Golden Horseshoe Greenbelt includes the Oak Ridges Moraine, Niagara Escarpment, and land known as “Protected Countryside”, thus protecting 1.8 million acres. The Greenbelt is key to the Growth Plan for the area and it identifies where major urban growth cannot take place, namely environmentally sensitive areas and prime agricultural areas. Municipalities are required to align the official plans and other planning documents with the Greenbelt Plan. This means that planning applications must also conform to the Greenbelt Plan. The Greenbelt plan policies are reviewed every 10 years and this must be coordinated with reviews of the Oak Ridges Moraine Conservation Plan and the Niagara Escarpment Plan.</p> <p>Source: http://www.mah.gov.on.ca/AssetFactory.aspx?did=5145 http://www.mah.gov.on.ca/Page5275.aspx</p>

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Ottawa, ON – Urban Growth Boundary

Ottawa's urban growth boundary is written into the Official plan (adopted in 2003). The boundary was planned to accommodate 20 years of projected urban growth. The policy states that the City will accommodate the growth within the boundary by directing it to urban areas already serviced or to areas (within the boundary) where services can be efficiently provided. The boundary is designed to maintain good quality agricultural lands and the rural countryside, while minimizing impacts of urban growth on the natural environment.

Source: http://ottawa.ca/city_hall/ottawa2020/official_plan/index_en.html

London, ON – Urban Growth Boundary

In the Official Plan of 1996, London introduced a range of policies designed to manage growth, including the implementation of an urban growth boundary. It was planned to accommodate the industrial and residential growth over 20 years in a manner which will both contain and provide logical, pre-planned growth sequence on affordable and practical lands.

Source: http://www.clear.london.ca/Urban_Planning_Improve.html
http://www.london.ca/EarthHour/d.aspx?s=Official_Plan/default.htm

Metro Vancouver, BC – Green Zone

The Green Zone was introduced in the GVRD (now Metro Vancouver) Livable Region Strategic Plan in 1996. Municipalities within the regional district nominated lands to be included in the Green Zone. These submissions comprised two thirds of the regions total land base, including half of the developable lowlands. The zone protects Metro Vancouver's major parks, watersheds, ecologically important areas, and resource lands (including agricultural land), while establishing a long term urban growth boundary. An important complement to the Green Zone was a plan to accommodate urban growth within the remaining area. The strategy for establishing defined areas for urban growth is currently under review and will be revised in the new Regional Growth Strategy.

Source: <http://www.gvrd.bc.ca/growth/lrsp.htm>
<http://www.gvrd.bc.ca/growth/strategy-review.htm>
http://www.gvrd.bc.ca/growth/pdfs/RGSIssues_Options2007.pdf

Chapter 4. GOVERNANCE AND MANAGEMENT	
Best Practice	Case Examples
<i>Long term vision with short term targets</i>	York Region, ON – Planning approach See York Region transportation profile (Appendix C) for details and information sources.
<i>Appropriate financing</i>	Kamloops, BC – TravelSmart See Kamloops transportation profile (Appendix C) for details and information sources.
<i>Multi jurisdiction cooperation and public involvement</i>	York Region, ON – Transportation Master Plan See York Region transportation profile (Appendix C) for details and information sources.
	Kamloops, BC – TravelSmart See Kamloops transportation profile (Appendix C) for details and information sources.
	Mont St. Hilaire, QC – Master planned transit oriented development See Mont St. Hilaire transportation profile (Appendix C) for details and information sources.
<i>Policy reform</i>	Kamloops, BC – Official community plan See Kamloops transportation profile (Appendix C) for details and information sources.
	York Region, ON – Development charges See York Region transportation profile (Appendix C) for details and information sources.

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DESIGN

Best Practice	Case Examples
<i>Street layout</i>	<p>Stratford, ON – Fused-Grid Planning</p> <p>Community design that meets objectives such as low environmental impact and affordability includes identifying principles that improve the suburban quality of life, creating a balance between pedestrian and automobile movement, and developing opportunities for public open space. This has led to an investigation of residential development plans based on looped streets and cul-de-sacs organized in a modified-grid format design. The aim of this approach is to provide connectivity and ease of orientation which are often missing in conventional, suburban, curvilinear streets and to rationalize the hierarchy of streets for traffic efficiency. This kind of plan is called a fused grid. The fused grid represents the synthesis of two common North American approaches to residential neighbourhood planning: the traditional, nineteenth-century grid, and the conventional curvilinear pattern of looped streets and cul-de-sacs of modern suburbia. The goal of the fused grid is to provide a balance between vehicular and pedestrian movement, and to create safe, sociable streets and easy connectivity to community facilities. These attributes are achieved while retaining the land use and infrastructure advantages of conventional suburban plans, compared to the traditional grid advocated by New Urbanism.</p> <p>The fused grid consists of a large-scale grid of collector streets, linking local traffic to the arterials. Four areas of roughly 40 acres in size form four distinct neighbourhoods. Within each neighbourhood, the layout of residential streets in the form of crescents and cul-de-sacs eliminates through traffic. In addition, a continuous, open-space pedestrian path system provides direct access to parks, public transit, retail and community facilities.</p> <p>The plan development, evaluation, and approval led to the production of a report to the Stratford City Council. The report provided an overview of the urban development that will occur in the years to come as the northeast community becomes an integral part of the City of Stratford. It described the design principles of the fused grid, noting that the lands will generally be developed into 40-acre blocks, which will be divided internally by crescents and cul-de-sacs with direct pedestrian access to parkland. Community facilities would be centrally located, including the community park and proposed schools; natural areas would be preserved; and pedestrian linkages would be provided through community trails throughout the neighbourhood and provide connectivity to destinations outside of the community. The implementation of these principles will follow the Council's adoption of "Official Plan Amendment No. 11" to the Official Plan of the City of Stratford. Through subsequent subdivision and site planning processes and ultimately, build-out, it will be possible to monitor the evolution of the urban development of this growth area and assess the attributes of the fused grid design and its influence on efficiency, quality and environmental impact.</p> <p>Source: CMHC Research Highlight. 2004. Applying Fused-Grid Planning in Stratford, Ontario. http://www.cmhc-schl.gc.ca/odpub/pdf/63760.pdf</p>
<i>Street design</i>	<p>Vancouver, BC – Country Lanes</p> <p>The street design is an alternative to the most common curb-and-gutter street, utilizing an experimental permeable road surface lined with vegetated swales to infiltrate storm water runoff and filter out pollutants. Vancouver has also examined the use of "Country Lanes" as a sustainable alternative to normal lane paving. These included permeable road surfaces, concrete driving strips, structural grass, and swales, all designed to improve natural infiltration, calm traffic, and improve aesthetics.</p> <p>Sources:</p>

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	<p>http://www.tc.gc.ca/programs/Environment/utsp/greeninglocaltransportation.htm http://vancouver.ca/engsvcs/streets/design/enviro.htm</p>
<p><i>Traffic calming (including Road diets)</i></p>	<p>Vancouver, BC – Traffic Calming There are two processes for implementing traffic calming measures: a neighbourhood-wide traffic calming plan funded by the city; and the Local Improvement Program whereby property owners can petition to pay for a traffic circle or corner bulge traffic calming device.</p> <p>The City has implemented a number of neighbourhood-wide traffic calming plans (e.g., West End, Strathcona, and more recently Clinton Park, South Kerrisdale and NE Kitsilano neighbourhoods). This process has been successful in that it examines the neighbourhood as a unit, thereby achieving a balance of traffic calming measures and neighbourhood accessibility. It is also highly interactive, building neighbourhood understanding and consensus.</p> <p>Sources: http://vancouver.ca/ctyclerk/cclerk/991102/tt3.htm http://www.city.vancouver.bc.ca/engsvcs/transport/calming/</p> <p>Toronto, ON – St. George St. Road Diet Toronto St. George St. revitalization used a road diet to calm traffic, increase the pedestrian and cycling amenities and to create a more pleasant area. St. George St. was a four lane busy thoroughfare through the campus of the University of Toronto. The road diet reduced the road to two lanes, while widening the sidewalks and adding greenery.</p> <p>The total cost of the project was \$6 million provided by the City of Toronto Public Works and the Planning departments, the University of Toronto Campus and Facilities Planning department, a private benefactor, and a grant from the Canada Ontario Infrastructure Works Program.</p> <p>The results of the road diet included a reduction in the speed and number of traffic collisions (by 40%); however, the number of cars travelling the road did not change. A 10% increase in bicycle traffic was also noted after the completion of the road diet.</p> <p>Source: http://www.tc.gc.ca/programs/environment/UTSP/st.georgestreerevitalization.htm</p> <p>Whitehorse, YK – Road diet Whitehorse has a city-wide integrated GHG reduction strategy, which includes infrastructure changes, public education, and TDM, which were all components of The Whitehorse Driving Diet from the Urban Transportation Showcase Program. The Whitehorse Alternative Road Allocation projects were part of this initiative. Whitehorse carried out two road diets, one on Fourth Avenue and one on Quartz Avenue. The four lane roads were reduced to two lanes, a centre two way left turn lane and bicycle lanes. A roundabout was also incorporated into Fourth Ave. to both reduce vehicle delay and slow the speed of traffic.</p> <p>The City used various measures to determine the number of people commuting by alternative transportation to the downtown core, including vehicle counts (using on-street tube counts), intersection loop counting systems, visual traffic counts, trail intercept surveys, trail counters, and surveys. The surveys have shown an increase in both cycling and walking in and to downtown. The survey indicated that 77% of residents believed that walking and cycling in the downtown core was good to excellent in 2006 (after the road diets), compared to 49% in 2002. Stop time and delay counts were used to measure travel time changes. It was observed that minor time savings</p>

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	<p>occurred for vehicles. However, limited vehicle monitoring capacity and significant seasonal changes prevent any significant data on the effect of the road diets on changes in transportation choices. Bicycle travel time to downtown was reduced 3 to 6 minutes.</p> <p>Due to negative public reaction to one section of the Fourth Avenue road diet, just one month after it was complete, this section was reverted back to a four lane road. The separated bike lane was replaced with on-street bike logos and “Share the Road” signs, effectively cutting off the bike lanes for 200m. The updated plan for 2007 was to widen the roadway to keep the four lanes of traffic and have room to add proper dedicated cycling lanes. The program has lead the City to develop a new zoning bylaw to reduce parking requirements and increase bicycle parking standards.</p> <p>The budget for the entire showcase was \$2.4 million divided into four components: infrastructure to support active transportation (\$2.3 million); public education and outreach (\$0.035 million); TDM (\$0.035 million); and monitoring and reporting (\$0.025 million). The cost of the 4th Avenue road diet was \$530,500 shared by the City of Whitehorse, Yukon Electric and Yukon Energy, and Transport Canada UTSP. The cost of the Quartz Avenue road diet was \$63,000 shared by the City and UTSP. The roundabout on 4th Avenue was an additional \$110,000 funded by the City and UTSP.</p> <p>Sources: http://www.ccresearch.org/node/345 http://www.tc.gc.ca/programs/environment/UTSP/whitehorse.htm http://www.tc.gc.ca/programs/environment/UTSP/progressupdatewhitehorse06.htm</p> <p>Saanich, BC – Road diets</p> <p>Saanich has converted two lane roads with two parking lanes to two lanes, one parking lane and two bike lanes. These conversions were a very cost effective method of jump starting the creation of the Bicycle Commuter Network. The creation of the bike lanes served as a formal acknowledgement of the city’s commitment, as well as creating an early bump in cycling use. This made it easier to secure funding and political support for subsequent (more costly and disruptive) additions to the cycling network.</p> <p>West Saanich Road was also reduced from 5 lanes to three lanes plus bike lanes. This enabled further development to the bicycle commuter network but also addressed an issue of safety. The 5 lane road previously had sections of 2 lanes only. In the 5 lane sections, there would inevitably be speeding and dangerous passing, as vehicles jockeyed to get ahead before reaching another 2 lane section.</p> <p>Halifax, NS – Sidewalk Cafes</p> <p>Halifax actively sought ways to increase pedestrian activity and urban vitality in the downtown core through the implementation of sidewalk cafes. In 1995, the Halifax community supported the first sidewalk cafés in downtown Halifax, which were launched on Argyle Street. Sidewalk cafés continue to thrive on Argyle Street and in the rest of downtown Halifax, contributing to the success of vibrant pedestrian oriented streets. Business owners lease portions of sidewalks, and incur related expenses and offer creative designs to the operation of boardwalk cafés on Argyle Street. The HRM recognizes the importance of sharing financial and creative responsibility and providing a comprehensive sidewalk café application process and design guidelines to business owners. The city has successfully created destination streets to the benefit of pedestrians and local business owners, rather than using the street primarily for the movement of vehicle traffic.</p> <p>Sources: http://www.tc.gc.ca/programs/environment/UTSP/sidewalkCafes.htm</p>
<p><i>Infrastructure to encourage higher occupancy</i></p>	<p>Outaouais, QC – HOV Lanes</p> <p>The Societe de Transport de l’Outaouais (STO) includes approximately 20km of reserved HOV lanes for 3+ passenger vehicles, bus, and taxi. Approximately 53,000</p>

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	<p>public transit riders benefit from these lanes every day.</p> <p>Source: http://www.sto.ca/autres_services/voies_e.html</p> <p>Toronto, ON – HOV Lanes There are 65km of arterial 3+ HOV lanes on the city streets in the Greater Toronto Area.</p> <p>Sources: http://www.mccormickrankin.com/pdf/CITE2006presentation.pdf http://www.mrc.ca/Canada%20HOV.html</p> <p>Metro Vancouver, BC – HOV Lanes Metro Vancouver also has arterial 3+ and 6+ HOV lanes.</p> <p>Sources: http://www.mccormickrankin.com/pdf/CITE2006presentation.pdf http://www.mrc.ca/Canada%20HOV.html</p> <p>Montreal, QC – HOV Lanes Montreal also has HOV lanes on the city streets.</p>
<p><i>Infrastructure to improve efficiency (e.g., Intelligent transportation systems (ITS))</i></p>	<p>Halifax, NS – Adaptive Traffic Signal Control System The HRM realised that increasing road capacity was not a feasible option to address increasing congestion problems. HRM decided to use an ITS solution, SCOOT (Split Cycle Offset Optimization Technique), to increase operational efficiency and increase the capacity of the existing roads. SCOOT is a traffic control system that uses traffic adaptive control. It continuously monitors traffic flow and optimizes traffic signal operation based on a traffic flow model using the real-time data. The increased throughput on the road system has been estimated to provide a total fuel savings of \$2-3 million over a 3 year period.</p> <p>Source: Atlantic Provinces Regional Intelligent Transportation Systems Strategic Planning Study, http://www.gnb.ca/0113/its/ITSstudy-e.asp</p> <p>York Region, ON – Viva Bus Rapid Transit System See York Region transportation profile for details and information sources.</p>
<p><i>Multi-modal infrastructure</i></p>	<p>Brampton, ON – Transit influenced road network Brampton’s proactive approach introduced transit routes to new subdivisions as early as possible. Brampton Transit staff participated in the road network development of all new subdivisions, and had input into subdivision plans on features, such as the location of bus stops and pedestrian walkways. Subdivision agreements include a requirement to phase in development so that transit servicing can be provided in an affordable manner, and roads are wide enough and have appropriate turnaround areas for buses.</p> <p>Brampton requires that transit be phased in and roads appropriately constructed for bus routes in all new subdivisions. Before any new development is approved, transit staff reviews the plans, makes recommendations on transit routes, bus stop pads and pedestrian walkways, and is actively involved in the overall transportation planning process. This participation involves driving through subdivisions as they are being built to determine the most appropriate routes.</p> <p>Brampton’s original target was a 65% return on investment. By carefully planning transit infrastructure as subdivisions are built, the city’s cost recovery has increased from 62% in 1996 to 74% in 2000. Ridership grew by over 40% between 1996 and 2000, double the increase in Brampton’s population and double the national transit ridership increases for the same period. Net operating costs decreased from 98¢ per passenger in 1996 to 62¢ per passenger by 2000.</p>

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Source:

[http://www.sustainablecommunities.fcm.ca/files/Tools/Best_Practices_Guides/FCM-CH2M_BPG_2002\[1\].pdf](http://www.sustainablecommunities.fcm.ca/files/Tools/Best_Practices_Guides/FCM-CH2M_BPG_2002[1].pdf)

Greater Moncton, NB – Gunningsville Bridge

Gunningsville Bridge strengthens the active transportation, transit and road links between the communities of Moncton, Riverview and Dieppe. The bridge was designed to maximize comfort and convenience for pedestrians and cyclists, who share a 4.0-metre wide pathway featuring observation platforms, low-level lighting and custom railings. Landscaped connections at either end of the pathway provide links to trail systems along the shores of the Petitcodiac River.

Source: <http://www.tc.gc.ca/programs/environment/UTSP/multimodalbridges.htm>

Ottawa, ON – Rideau Canal Pedestrian Bridge

When it opened in 2006, the new Rideau Canal pedestrian bridge improved Ottawa's transportation networks in three important ways. First, the bridge provides a safe and pleasant connection between the heavily used recreational pathways on the banks of the Rideau Canal, on the south edge of Ottawa's downtown core. Second, it provides a direct walking and cycling link between land uses on the east side of the canal (the University of Ottawa campus and Sandy Hill neighbourhood) and the west side (the residential and commercial hub of Centretown). Third, it cuts several hundred metres off the shortest walking route to rapid transit for many Centretown residents living across the canal from the Transitway station at the University of Ottawa. Despite being in city plans for two decades, the bridge had to overcome several challenges to get built. Many residents and elected officials were skeptical of the bridge's value, relative to its \$5-million cost. The design process was also complex, because the federal government was an important stakeholder and aesthetic expectations were high. Twelve alternative designs, with different heights and materials, were developed to satisfy the design parameters.

Source: <http://www.tc.gc.ca/programs/environment/UTSP/multimodalbridges.htm>

Saanich, BC – Commuter Bicycle Network

Saanich, BC has taken a unique approach to multi-modal infrastructure planning through the use of the Commuter Bicycle Network, which identifies and prioritizes streets that will be modified to accommodate cycling. The Community Bicycle Network, which is included in the OCP (and is part of the Bicycle Master Plan), helps to focus resources and define a vision for the bike path network as a whole. In developing the network, the city used technical data (bike counts, etc.) and "real-life" data from cyclists (part of the Bicycle Advisory Committee) who were able to identify deficiencies and priorities. The Bicycle Advisory Committee, which is made up of engaged citizens, the Greater Victoria Cycling Coalition, school boards, and municipal staff from engineering, public works, planning, and police, was created to provide effective input with respect to all cycling related issues.

Working with the Bicycle Advisory Committee, Saanich completed a Bicycle Master Plan that identified the municipal bicycle network and prioritized on-street and off-street improvements, such as bike lanes, improved crossings, off street trails and mid-street refuges. Through the Bicycle Master Plan, both local connector routes and commuter routes have been identified and signed. Local connector routes are located on low traffic volume streets and link neighbourhood amenities such as parks, schools and other institutions and services, or link to regional trails or other external destinations. Local connectors are identified in the Local Area Plans when they are updated. Commuter bicycle routes, on the other hand, provide for direct access within and through the

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municipality to link major employment destinations. They have higher volumes of vehicle traffic. They are also signed and include pavement striping and warnings for automobiles.

Projects have been funded through regular departmental capital budgets, including streets and streetscape improvements. Some projects were cost-shared (50/50) under the BC Cycling Network Program which provided \$1.4-million in funding between 1995 and 2001 (this program no longer exists). Additional funding has been provided through the provincial Ministry of Transportation and the Provincial Capital Commission Greenways Fund which was cancelled in 2001.

Original bike infrastructure was very low cost (~ \$100,000 / year) and quick to implement (e.g., 2 – 3 km road conversions through painting). This brought out a latent demand for cycling infrastructure, a committed user group and support for further (more expensive) conversions to follow. An example of a more recent road conversion, which required concrete removal, relocation of utility poles, and the purchase of property cost ~ \$500,000 for 400m of bike lane.

Sources:

<http://www.tc.gc.ca/programs/environment/utsp/activetransportationprogram.htm>

MAINTENANCE

Road maintenance

Calgary, AB – Warm mix asphalt

The City of Calgary has completed a WMA demonstration project to compare three surfacing mix types: conventional and two WMA including warm-foam technology and Evotherm emulsion. The conventional mix is a surface course mix predominantly used for all light traffic applications, representing the vast majority of hot mix asphalt produced, and was thus chosen, as an alternative to this would have the greatest potential overall impact. Driven in part by the City's Corporate Environmental initiatives, the goal is to eventually implement WMA as a standard industry practice.

In order to carry out the demonstration, a Project Team was established with industry stakeholders who were collectively committed to delivery of the WMA Project. The team included representatives from the City of Calgary, as agency leader, Lafarge Canada, as process facilitators and constructors, and EBA Engineering Consultants Ltd., as project consultant. The Roads Business Unit is charged by Council with the responsibility to oversee pavement initiatives. Long term implementation would require input from the Industry and may require approval by City Council. The City of Calgary Roads Construction Specifications will have to be updated to incorporate specifications and guidelines for WMA.

The demonstration project was completed in September 2005. The research showed potential reductions as follows: 25% CO2 Emissions; 40% Fuel Consumption; 78% Dust Emissions. The costs of the pilot project was: Research \$15,000; Design \$50,000; and Accessories \$15,000.

A new WMA project is currently being considered using an emulsion in order to expand the database for comparison purposes. This together with ongoing monitoring of the existing WMA pavements will serve to complete data gathering for finalization of a long term implementation plan.

Source: http://www.menet.ab.ca/bins/view_practice.asp?pid=929
<http://international.fhwa.dot.gov/pubs/pl08007/>
<http://www.warmmixasphalt.com/Default.aspx>
<http://www.fhwa.dot.gov/pavement/asphalt/wma.cfm>

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	<p>Saanich, BC – Warm mix asphalt Saanich is the first municipality in BC to test out warm mix asphalt, which can cut GHG emissions in half compared to hot mix asphalt. A stretch of Maplewood Road between Tattersall Drive and Ocean View Road was covered in 500 tonnes of the asphalt in the fall of 2007, and will be monitored over one year to see how it wears. If it does well, as studies have said it has in other parts of Canada, Saanich will switch to the product. The asphalt takes less energy to make and emits less greenhouse gas when it's applied because it is made at a lower temperature. Capital City Paving, the only company in BC currently making warm mix asphalt, states that rather than being cooked at 140 C, as conventional hot asphalt is, it is mixed at 100 C. This is the first application of the asphalt west of Calgary, although it's been used in the US, Europe and several other Canadian cities. Several universities have studied the effectiveness of warm mix asphalt, as opposed to hot, and found it reduced greenhouse gas emissions by about 50 per cent.</p> <p>Source : http://canadianstalk.ca/viewtopic.php?f=19&t=5083</p>
<p><i>Winter maintenance</i></p>	<p>Edmonton, AB – Collection and re-use of road sand Edmonton Winter Road Maintenance includes the collection of sand used through out the winter. The sand is collected, washed and recycled for re-use. In Edmonton, more than 165,000 tonnes of sand and salt are applied annually to the city's roads. In the past, almost all of these materials were swept up in the spring and disposed of in a landfill. In 2003, the City of Edmonton Transportation and Streets Department and the Edmonton Waste Management Center of Excellence formed a partnership, to investigate the feasibility of recycling street sweepings. The winter street sand recycling pilot project, partially funded by a grant from the Federation of Canadian Municipalities Green Fund, had dramatic results. The pilot project was able to recover and recycle 80% of the collected street sweepings for re-use as winter street sand. Based on this success, the Winter Street Sand Recycling Program was developed. This unique corporate initiative demonstrated the City of Edmonton's on-going commitment to the protection of the environment and the conservation of Alberta's natural resources. Based on the results of the pilot project, of the roughly 115,000 tonnes of material collected annually from Edmonton's streets, approximately 92,000 tonnes (80%) can be recovered through the Winter Street Sand Recycling Program. Around 2,300 tonnes (2%) will be aggregate-sized material that is too large for street sand. It will be diverted to the City of Edmonton aggregate recycling operation. Approximately 6,900 tonnes (6%) will be washed fine sand that is too small for use as street sand. This material is available for use as a fine aggregate for fillcrete applications. In total, roughly 101,000 tonnes (88%) of material collected from the City's streets will be diverted from the landfill. This diversion of material represents a saving of landfill capacity, which significantly prolongs its life.</p> <p>Based on the success of the pilot project, the City of Edmonton and the Edmonton Waste Management Center of Excellence have entered into an agreement to recycle more than 900,000 tonnes of street sweeping in Edmonton over 6 years. The agreement also commits to conduct further research and development of the technology. The benefits of the Winter Street Sand Recycling Program are long-term, as demonstrated by the corporate and financial commitment made by the City of Edmonton. It will also fit well with the City's initiatives to develop an Environmental Management System and become an ISO 14001 registered organization.</p> <p>Sources: http://edmonton.ca/CityGov/Policy/C409E.doc http://www.tac-atc.ca/english/pdf/conf2005/s5/donovan.pdf</p> <p>Waterloo, ON – Smart About Salt Initiative The Region of Waterloo's Smart About Salt initiative is one of the first comprehensive winter salt management programs in Canada. It ensures both winter safety and the protection of drinking water. Without question, salt can be used more efficiently and</p>

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effectively with the help of residents, organizations, snow removal contractors, and the municipal government. The Region of Waterloo has an important role to play in reducing use of salt on roads. As a result, five key initiatives were put in place: 1. work with the local cities and townships to find new, innovative solutions to reducing the volume of salt used. 2. new 'Winter Maintenance Policy and Procedures' sets out guidelines to reduce salt use by 25 per cent. 3. equip trucks with liquid salt to pre-wet rock salt and help it stick to the road. 4. equip trucks with tracking devices. 5. continue to explore advanced salt application methods and alternative products.

The program provides a number of opportunities and incentives for residents and organizations to participate, as it provides the tools and resources to help use salt more effectively and efficiently while keeping sites safe. The program also provides an opportunity to demonstrate leadership and commitment. The program holds orientation sessions to become Smart About Salt Certified. Program benefits including: Potential reduction in insurance costs; Access to detailed weather forecasts and real-time data; An ability to highlight and promote participation in the program with the exclusive Smart About Salt logo; Co-branded advertising in local media; Featured profile on the Smart About Salt website; On-site signage identifying Smart About Salt participants.

Source:

<http://www.region.waterloo.on.ca/web/region.nsf/8ef02c0fded0c82a85256e590071a3ce/d1157d15470f9be7852573640049f32d!OpenDocument>

North Bay, ON – Winter patrol integrated with maintenance

Winter road patrol is integrated with sanders, salters, and transit vehicles. North Bay operates a sander 24/7 for the entire winter season. The sander travels the entire road system, over three shifts. The operators of the sanders are trained to perform winter patrol and document their observations. They observe the road and roadside conditions and communicate to their supervisor all conditions that may require immediate attention (apart from the sanding). In the same manner, the transit drivers are trained to monitor the roads and similarly report ice conditions, snow drifts, snow bank sightline issues, and any other hazardous conditions. Both reporting mechanisms (from continuous sanders and transit drivers) allow Public Works to respond in a more timely fashion. This practice saves North Bay approximately \$50,000 per year that would otherwise be spent on two winter patrol personnel per season.

Source:

http://www.amo.on.ca/AM/Template.cfm?Section=What_s_New5&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=10134

Caledon, ON – Improved operations for winter maintenance

The Town of Caledon mixes salt (25% by weight), sand (75% by weight), and liquid calcium chloride (2%) during stockpiling. A single truck load of this mix is sufficient for a complete route, eliminating the need for trucks to return for a second load mid-route. The mix also reduces truck loading time. The practice reduces the total application of chlorides to the roads, compared to previous practices. Adding the liquid calcium chloride during stockpiling has also eliminated the need for vehicle retrofits to the equipment fleet for onboard material wetting units that would otherwise be required. This saves the Town several thousands of dollars from the spreader costs as well as the required storage tanks and pumps.

Source:

http://www.amo.on.ca/AM/Template.cfm?Section=What_s_New5&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=24953

Magnetawan, ON – Ice blading on gravel roads

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On low volume gravel roads susceptible to the formation of ice lenses, ice blading is used on packed snow, rather than snow plowing after each snow event and the application of de-icing chemicals. Ice blading leaves a grooved pattern on the road surface that provides good tire friction. Costs associated with plowing are reduced and there is a reduction in the application of de-icing chemicals.

Source:

http://www.amo.on.ca/AM/Template.cfm?Section=What_s_New5&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=10146

Chapter 6. OPERATIONAL PRACTICES AND TECHNOLOGY – FLEETS	
VEHICLE AND FUEL CHOICES	
Best Practice	Case Examples
<i>Advanced vehicle technology</i>	<p>Kelowna, BC – Addition of LEVs to the municipal fleet Purchased 18 Smart Cars and 2 hybrid vehicles for their fleet.</p> <p>Source: http://www.greencityawards.gov.bc.ca/media/award_nominees.html</p> <p>Maple Ridge, BC - Addition of LEVs to the municipal fleet Purchased 12 hybrid vehicles, replacing one third of their fleet, for the Green Fleet Program.</p> <p>Source: http://www.greencityawards.gov.bc.ca/media/award_nominees.html</p> <p>Toronto, ON – Green Fleet Transition Plan¹⁵³ In 2004, Toronto City Council adopted the Green Fleet Transition Plan 2004-2007, a sustainable and cost effective plan that aimed to reduce the negative environmental impacts of City fleet operations. The Plan set out to transition the City's vehicles and equipment to lower impact alternatives such as biodiesel, natural gas and hybrid electric vehicles. The City reduced CO₂ emissions from the fleet by 5,000 tonnes over the past four years. Overall, Toronto reduced emissions from its fleet operations by a minimum of 4% using green vehicles and clean fuels. The Transition Plan targeted emission reductions of 15% to 23% over 2004-2007 depending on the biodiesel feedstock. The City's actual emission reductions for 2004-2007 are estimated at 25% for green vehicles (based on 122 of the green vehicles) and 4% for green fuels. This would result in overall City fleet emission reductions of approximately 4%.</p> <p>Source: http://www.toronto.ca/fleet/green_fleet_transition.htm</p>
<i>Alternative fuels</i>	<p>Brampton, ON – Biodiesel in fleet vehicles Brampton is using biodiesel in most of its 415 diesel burning fleet vehicles. The City of Brampton is working to protect the environment by reducing harmful emissions. It is the first municipality in Canada to use biodiesel fuel, an environmentally friendly mix of diesel and soybean oil, for its fleet of trucks, buses, and small-engine machines. From June to September in 2002, the City used a B50 blend of biodiesel – 50 per cent soybean oil and 50 per cent diesel – which reduced vehicle emissions by 50 to 60 per cent. From October until April the City switched to a B20 blend (20 per cent soybean oil, 80 per cent diesel) to avoid the fuel gelling in the cold. In 2003, during the smog alert months of July, August and September, the City planned to use B100 fuel (100 per cent soybean oil).</p> <p>Sources: http://www.tc.gc.ca/programs/Environment/utsp/biodieselintransitandmunicipalfleets.htm http://www.brampton.ca/headlines/Review/report16.html</p> <p>Toronto, ON – Green Fleet Transition Plan See above.</p>
<i>Appropriate vehicle</i>	Ottawa, ON – Smart Cars

¹⁵³ Since the writing of this report, the City of Toronto has implemented the Green Fleet Plan 2008-2011, which builds upon the Green Fleet Transition Plan 2004-2007. The plan outlines specific actions that the City will take in the following areas: Emission reduction targets; Vehicles; Fuels; Sustainable choices; and Maintenance and management practices. Buying green vehicles will be standard practice, new technologies and practices will be adopted over time, and new initiatives will be addressed, such as a focus on heavy-duty trucks. The plan focuses on the centrally managed fleet of approximately 4,700 vehicles and equipment. (http://www.toronto.ca/fleet/gfp_08_11.htm - date accessed: March 2009).

Chapter 6. OPERATIONAL PRACTICES AND TECHNOLOGY – FLEETS

<i>selection by function</i>	<p>Ottawa is using Smart Cars for its' bylaw services.</p> <p>Toronto, ON – Municipal fleet bicycles A certain number of City police, parking control and auxiliary officers use bicycles on patrol from May to November.</p>
OPERATION	
<i>Efficient fleet operation and Eco driving training</i>	<p>Edmonton, AB – Fuel Sense Program The development of Edmonton's Fuel Sense program was created in response to the City's commitment to reduce corporate greenhouse gas (GHG) emissions and its desire to reduce fleet operations costs, particularly fuel expenses.</p> <p>Fuel Sense is a four-hour training program on fuel efficiency practices that combines practical and classroom training to realize fuel efficiency gains in the City of Edmonton's fleet and transit operations. The program instructs drivers to operate vehicles for maximum fuel efficiency while considering operational needs. Participating drivers learn techniques such as reducing idling time and planning more efficient routes. A computerized fuel dispensing system tracks the fuel usage of individual drivers to allow Fuel Sense to measure results at regular intervals. Fuel Sense targets municipal employees who log the highest fuel consumption in City vehicles.</p> <p>The Fuel Sense program quickly achieved most of its objectives after only its first year of operation. A more comprehensive review conducted in June 2004 confirmed the following results: Over 1200 drivers trained; 350 tonnes (estimated) of GHG emissions avoided annually; Fuel volumes consumed per kilometre dropped overall by approximately 5.5%, or a gain in fuel efficiency of 1.8 litres/100 km; Driver fuel consumption savings of up to 15%, regardless of the type of vehicle. As more drivers are trained in Fuel Sense principles, it is estimated that annual fuel cost savings could well be over half a million dollars. Fuel Sense training is considered as a supplement to the normal driver training courses that all City operations employees undergo. As a result, all program costs were absorbed by the Fleet Safety section. The Fuel Sense program's first-year start-up costs were \$60,000. Annual program related costs are estimated at \$45,000.</p> <p>Sources: http://www.sustainablecommunities.fcm.ca/files/Tools/Best_Practices_Guides/FCM-CH2M_BPG_2002[1].pdf http://www.tc.gc.ca/programs/environment/utsp/fuelsense.htm</p> <p>Toronto - Garbage Truck Fleet Route optimization for garbage trucks enabled the reduction of fuel consumption (by 140,000 gallons a year) and thus reduced CO₂ emissions by 1,500 tons per year.</p> <p>Source: http://www.greenfleets.org/Green_Your_Fleet.pdf</p>
<i>Public private partnerships</i>	<p>Vancouver, BC – Taxi-City partnership A local partnership between taxi owners and the city is voluntary, but strongly encouraged. The City has established a policy to strongly encourage the replacement of older taxi vehicles with EnerGuide Award winners (including hybrids) and top fuel efficiency vehicles. They have had very good results thus far, which is evident in the number of hybrid taxis visible on the streets of Vancouver.</p>

Chapter 7. OPERATIONAL PRACTICES AND TECHNOLOGY – TRANSIT	
INFRASTRUCTURE	
Best Practice	Case Examples
<i>Designated transit infrastructure (bus and rail)</i>	<p>Ottawa, ON – OC Transpo Transitway OC Transpo bus rapid transit is serviced mainly by the Transitway. It consists of 27km of dedicated bus-only roadways in three main corridors. In addition, there are 11.5km of dedicated lanes on the highway and 4.5km of dedicated bus lanes on city streets. The Transitway uses passenger information systems, traffic signal pre-emption and AVL. As of 2006, the average passenger ridership per day on the Transitway was 200,000. Ridership increased 2.6% from 2005 to 2006.</p> <p>Source: http://www.octranspo.com/about_index.asp?lang=E&page=DFACTS_STATS</p> <p>York Region, ON – Viva Bus Rapid Transit System See York Region transportation profile for details and information sources.</p> <p>Halifax, NS – MetroLink Bus Rapid Transit Background: Nova Scotia partnered with HRM and TRAX to provide two new rapid transit bus routes, from downtown Halifax to outlying communities. There are 20 buses that service the new routes, which include bike racks for encouraging multi-modal transportation. The rapid transit corridors include bus queue jump lanes, exclusive right turn lanes, dedicated bus lanes, priority control systems and bridge transponder devices, and priority signalling controlled by the buses. The network uses ITS systems, park and ride lots and limited stops to provide a fast, reliable travel option for residents. The total cost of implementation was \$12.3 million, \$4.1 of which was funded by the Urban Transportation Showcase Program from Transport Canada. For one corridor, ridership increased 19% (~700 new riders), of which, a majority previously occupied single passenger vehicles. Further evidence of increased ridership was the required increase in park and ride capacity.</p> <p>Sources: Bronson Consulting Group. <i>Report on Road Transportation Energy Efficiency Initiatives and Opportunities for Inter-Jurisdictional Collaboration</i>. December 2006. http://www.itscanada.ca/newsletters/March2006.htm#Halifax http://www.tc.gc.ca/programs/environment/UTSP/docs/2004AnnualReview.pdf</p> <p>Montreal, QC – AMT Commuter Lines The Agence metropolitaine de transport operates 5 commuter rail lines that extend off the island of Montreal, passing through a number of suburban communities. The AMT also organizes the annual event In town, without my car! in order to promote public transit and Allego, which delivers TDM services to workplaces.</p> <p>Source: http://www.amt.qc.ca/index.asp http://www.allego.amt.qc.ca/</p> <p>Greater Toronto, ON – GO Train Go Transit is an interregional transit system, created and funded by the Province of Ontario. There are seven train lines, which run 181 train trips daily through 58 stations over a distance of 390km. The train system (which consists of both the trains and the connecting buses) carry approximately 170,000 passengers per weekday. The trains are run by diesel electric locomotives.</p> <p>Source: http://www.gotransit.com/PUBLICROOT/default.aspx</p> <p>Richmond (or Metro Vancouver), BC - #98 B-Line Bus Rapid Transit System See profile above.</p>

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	<p>Metro Vancouver, BC – SkyTrain and Canada Line The TransLink SkyTrain consists of two lines (Expo and Millennium) with a total of 33 stations and 49.5km of track. It is a light rail electric, energy efficient system. The trains run every 2 to 8 minutes and bicycles are permitted at all times except during peak hours in the peak direction. To facilitate use of the SkyTrain system, each station is equipped with ticket vending machines.</p> <p>Canada Line is a new rail rapid transit system currently under construction, which will use electric propulsion and an Automatic Train Control system. It will connect downtown Vancouver to Richmond via the Vancouver Airport. The Canada Line will provide additional transportation capacity that is equivalent to 10 major road lanes. The Richmond-Vancouver corridor is one of the busiest in Metro Vancouver and expanding roads and bridges is not feasible or practical. The Canada Line will consist of 16 stations, with the possibility of 3 additional stations to serve growing neighbourhoods along the busy corridor. The rail line will connect with the Expo and Millennium rapid transit lines, the commuter rail line (WestCoast Express) and the SeaBus.</p> <p>Canada Line is being implemented by a subsidiary of TransLink, the Canada Line Rapid Transit Inc. (CLCO). The total cost of the project is \$1.9 billion and is being funded by the federal and provincial governments, the Greater Vancouver Transportation Authority, the Vancouver Airport Authority, the City of Vancouver (supported by the City of Richmond), and a private sector partner.</p> <p>Sources: http://www.translink.bc.ca/Transportation_Services/SkyTrain/ http://www.canadaline.ca/index.asp</p>
<p><i>Multi-modal access</i></p>	<p>Halifax, NS – Bike and Ride The entire MetroLink (HRM bus rapid transit) fleet are equipped with bike racks.</p> <p>Source: http://www.halifax.ca/metrotransit/MetroLinkBikeRackGuide.html</p> <p>Ottawa, ON – Rack and Roll OC Transpo's Rack & Roll program lets you take your bike with you. More than 200 buses are equipped with front-mounted bike racks. Rack & Roll racks are available on buses from mid-April to October 31. However, bicycles can be brought on the O-Train year-round.</p> <p>Source: http://www.ottawa.ca/residents/onthemove/travelwise/cycling/cy_8_en.html</p> <p>Toronto, ON – Rack It and Rocket The TTC Rack It and Rocket program puts bike racks on buses so that cyclists can take their bikes with them – currently on selected routes. The program's expansion plan includes bike racks on the entire bus fleet by the end of 2010. The City is also undertaking a bike locker pilot program to provide more secure storage for bicycles. Bicycle lockers provide excellent, secure bicycle parking by improving protection from theft, vandalism and inclement weather. The lockers are designed to hold one bicycle each as well as bicycle gear such as panniers, locks, lights, etc.</p> <p>Source: http://www.toronto.ca/ttc/bike_racks.htm http://www.toronto.ca/cycling/locker.htm</p> <p>Montreal, QC – Bike and Ride Bikes are allowed on the Montreal Metro.</p> <p>Source: http://www.stm.info/English/metro/a-velo-met.htm</p> <p>Vancouver, BC – Bike and Ride and Bike Lockers</p>

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	<p>Vancouver provides bike racks on buses. Bicycles are also allowed to be taken on the Skytrain, Seabus, and West Coast Express. Vancouver also provides secure bike lockers at some Skytrain stations.</p> <p>Source: http://www.translink.bc.ca/Transportation_Services/Bikes/Cycling_OnTransit.asp</p>
SYSTEM DESIGN	
<i>Rapid transit (bus and rail)</i>	<p>York Region, ON – Viva Bus Rapid Transit System See York Region transportation profile for details and information sources.</p> <p>Richmond (or Metro Vancouver), BC - #98 B-Line Bus Rapid Transit System The #98 B-Line is 16km long, with stops distanced 400m apart in high density areas to 2km apart in low density areas. The buses run up to 22 hours per day, 7 days a week, every 5 to 6 minutes in peak periods and 15 minutes in off peak periods. The #98 B-Line rapid transit system is a best practice, especially regarding the use of dedicated lanes and ITS elements.</p> <p>The dedicated lanes consist of: no. 3 road reconstructed for median bus lanes with funding from Federal government, TransLink, and City of Richmond; queue jump lanes approaching bridges; and curbside bus lanes through Vancouver (passing chronic congestion areas). The ITS elements include: transit management using Automatic Vehicle Location (AVL); traffic signal priority (TSP) - used when running behind schedule; real-time passenger information –provides next bus arrival time information; and automated voice and digital next stop.</p> <p>The benefits include the following: a 20% reduction in travel time compared to previous local bus service; “On time” performance improved significantly; increased ridership (~14,000 in 2001 to ~18,000 in 2002); and approximately 23% of riders were former car drivers or passengers (based on rider survey) - resulting in approximately 8 million vehicle km per year reduction by private vehicle. Deducting the annual bus km, the following estimates were made for net reduction in emissions (from the shift from private vehicle to public transit)</p> <ul style="list-style-type: none"> ○ CO₂: 1192 tonnes/yr; PM: 0.01 tonnes/yr; NO_x: 4.9 tonnes/yr; CO: 59.36 tonnes/yr; HC: 5.09 tonnes/yr. <p>The capital cost was approximately \$51.8 million broken down into the following:</p> <ul style="list-style-type: none"> ○ 28 Bus Fleet: \$18 million ○ Infrastructure: \$27.8 million ○ Maintenance facility: total \$30 million (\$6 million of which is from this project) <p>Estimated operation savings due to 20% reduced travel time for the 28 fleet vehicles, is \$1.8 million per year. An additional \$360,000 in operating cost savings is estimated due to the AVL and TSP systems. Benefit/cost ratio is estimated at 1.3 (annual benefits (operating savings, revenues, and travel time savings) exceed costs by approximately \$3 million).</p> <p><i>Note of interest:</i> Technical complexity can also arise from the number of departments or agencies involved. In Vancouver’s 98 B-Line, there were four jurisdictions controlling the traffic signals. Developing a common understanding of the definition of priority and how to implement it was a significant challenge. Cities or Regions with one centralized level of government may find fewer inter-agency obstacles and greater cohesion in terms of strategic direction. (Ref: http://sustainablecommunities.fcm.ca/files/Infraguide/Transit/strategies_implementing_rapid_priority.pdf)</p> <p>Sources: http://novax.com/products/media/98B-Line%20Final%20Report.pdf</p>

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	<p>http://www.tc.gc.ca/programs/environment/utsp/intelligenttransportationsystems.htm</p>
<i>Rural and low density transit</i>	<p>Greater Victoria, BC – Rural vanpool BC Transit provides a non-profit-run vanpool program in the area surrounding greater Victoria. The approximately 35 vanpools currently operating are touted as “an alternative to transit service in areas too remote or with too low a density to support conventional transit service.” They also sponsor a web-based ride matching service for this area.</p> <p>Source: Bronson Consulting Group. Report on Road Transportation Energy Efficiency Initiatives and Opportunities for Inter-Jurisdictional Collaboration. December 2006.</p> <p>Salt Spring Island, BC – Rural transit The CRD Board approved a bylaw introducing public transit on Salt Spring Island, in partnership with BC Transit. Salt Spring Island Transit began service with two 20-passenger minibuses on January 7, 2008. The CRD will also establish the Salt Spring Island Transit and Transportation Commission which will serve as a Transit Advisory Committee. As part of an overall commitment to reducing car use on Salt Spring Island, the committee will undertake other transportation-related initiatives such as constructing sidewalks and bike lanes.</p> <p>The route is tailored to local transit needs, linking to ferries and along community routes. The buses run between Fulford, Ganges and Vesuvius, and in and around Ganges Mondays through Fridays, with some weekend service during the summer months. While the buses operate with fixed routes and schedules, they will detour off regular routes to pick up and drop off passengers where and when possible. The minibuses are lift-equipped to provide service for passengers using mobility aids such as wheelchairs and scooters.</p> <p>The budget for the first year of operation has been set at \$180, 000, with contributions from the CRD, BC Transit and user fares. BC Transit will provide core annual funding as well as the minibuses, planning and marketing. The CRD Board will determine service levels and establish fares based on consultation and input from Island residents.</p> <p>Source: http://www.crd.bc.ca/saltspring/ssitransit.htm</p> <p>Regional Municipality of Waterloo, ON – Regional Transit System The Regional Municipality of Waterloo has developed a regional transit system with the goal of increasing transit ridership. It provides a seamless network and fare structure across three separate cities (Cambridge, Kitchener, and Waterloo) and into three rural communities. The transit system also incorporates iXpress rapid bus routes in the Central Transit Corridor. This component of the rapid transit system includes transit signal priority and conveniently connects to bike paths, the regional transit system, and in the future will connect to GO and Via train stations. Planning for the region’s future growth, further development of the Rapid Transit Initiative will ensure protection of the environment and rural areas, while enhancing the transit link between business, residential (including rural), and commercial areas.</p> <p>By the end of 2000, one year after GRT launched its conventional service, amalgamation led to: a 4 per cent ridership increase on the new transit service (360,000 additional trips); a 12 per cent ridership increase in the Cambridge service area alone, or 141,000 more trips than in the previous year. In part, this is because customers in the Cambridge area made more than one third of these trips using the 60-minute transfer</p>

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	<p>fare, which GRT expanded to include Cambridge. The 60-minute transfer system allows riders to reach their destination and get back onto the bus within 60 minutes without paying an additional fare. Three routes were also added in areas that previously had no service, including two routes that link Cambridge and Kitchener. These services would not have been possible under the previous transit structure because of provincial legislative and licensing restrictions. It has improved mobility for those who rely solely on public transportation and increased safety in the area by encouraging a mode of transportation that is safer than automobile travel.</p> <p>Eventually, the region expects that increased transit ridership will lead to a decrease in spending on road infrastructure by avoiding the costs associated with road system expansion, such as the widening of roads and the construction and design of new roadways.</p> <p>Source: http://www.sustainablecommunities.fcm.ca/files/Tools/Best_Practices_Guides/FCM-CH2M_BPG_2001[1].pdf</p>
OPERATION	
<p><i>Intelligent transportation systems (ITS)</i></p>	<p>York Region, ON – Viva Bus Rapid Transit System See York Region transportation profile for details and information sources.</p> <p>Richmond (or Metro Vancouver), BC - #98 B-Line Bus Rapid Transit System See profile above.</p> <p>Saanich, BC – Transit queue jumper lanes Transit queue jumper lanes with transit priority signals are used at key intersections throughout the city, as permitted under the BC Motor Vehicle Act. The use of the queue jumper lanes is part of a larger vision for transportation in Saanich, where an incremental approach is being used to push change.</p> <p>Halifax, NS – MetroLink Bus Rapid Transit See profile above.</p> <p>Montreal, QC – Transit system ITS is used in select transit operations and traveller information systems. For example, transit queue jumper lanes, priority signals, and real-time data displays.</p>
<p><i>Efficient / effective transit service</i></p>	<p>York Region, ON – Viva Bus Rapid Transit System See York Region transportation profile for details and information sources.</p> <p>Edmonton, AB – Fuel Sense Program See profile in Chapter 6 table.</p> <p>Kelowna, BC – Central Okanagan Smart Transit Plan To maintain livability and community mobility, the City of Kelowna forged a unique partnership with the Regional District and was later joined by Westbank First Nations to develop and implement a region-wide Transportation Demand Management (TDM) program. The Central Okanagan Smart Transit plan includes: transit oriented development; frequent, rapid and reliable, limited stop transit service; frequent, fixed route service linking the more central town centres; increased frequency of service on fixed routes during the off-peak periods; conversion of some fixed route services to demand-responsive community bus services; queue jump lanes; traffic signal priority; and left turn treatments.</p> <p>Source: http://www.kelowna.ca/citypage/docs/pdfs/Transportation%20Division/Smart%20Transit%20Plan%20-%20Report.pdf</p>

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<i>Real time communication</i>	<p>York Region, ON – Viva Rapid Bus Transit System Bus stops are highly visible, well lit, safe, and equipped with “next bus” arrival time displays and on-site ticket vending machines. Next bus arrival time requires the use of ITS elements including AVL. Ridership has increased 10% since 2001.</p> <p>Source: http://www.vivayork.com/</p> <p>Montreal, QC – Metro Some Metro stations have real-time data displays for arrival of next train.</p> <p>St. John’s, NFLD – Metrobus Metrobus AVL tracks the location of the 50 bus fleet and enables real-time data transfer to passengers via text message. Passengers receive a text message when their bus is a few minutes away. This increases the safety and comfort of passengers. The Metrobus website is also equipped with a bus time track which displays if the bus is on time or behind or ahead by a certain amount of time. Passengers can also physically locate their bus through time track. Metrobus Transit also uses a smart card system, eliminating the need for individual tickets or tokens. The card can be recharged online or at select outlets.</p> <p>Source: http://www.metrobus.com/index.htm</p>
<i>Fare structures</i>	<p>Ottawa, ON – EcoPass for employees The ECOPASS is a transit pass derived through a payroll deduction program. This pass offers up to a 15% yearly savings in comparison with using a monthly pass. EcoPass was first implemented at the University of Ottawa and over time has grown to include many other organisations in the fields of high-tech, banking, government and hospitality. The cost of the EcoPass (as well as dependents transit pass) can be claimed as a tax deduction starting with the 2007 tax year. In 2007, the non-refundable tax credit was 15.5% of the cost of the EcoPass.</p> <p>Source: http://www.octranspo.com/fares/ECOPASS/Fares_Ecopass.htm</p> <p>Universal Transit Pass (U-Pass) programs give students enrolled in participating post-secondary institutions unlimited access to local transit. Programs are typically funded through mandatory fees that eligible students pay in each term in which they are registered. Fees are transferred to the local transit authority to fund the required transit service. Because fees are collected from a large participant base, U-Pass prices are lower than the amount students would otherwise pay for monthly passes or tickets over the course of a term. The U-Pass price charged to students depends on a variety of factors which differ among municipalities, transit systems and post-secondary institutions.</p> <p>U-Pass programs offer students a way to lower their transportation costs while at school and also benefit the local community and the environment. U-Pass programs can facilitate: transit service improvements to the institution; reduced traffic congestion around the campus and local community; contribute to fewer emissions; and reduce demand for parking facilities.</p> <p>U-Passes are currently being used in the following municipalities: Metro Vancouver, Halifax, London, Edmonton, Calgary, Toronto, Victoria, Kamloops, Guelph, Hamilton, Kingston, North Bay, Peterborough, Sherbrooke, and St. Catherine’s.</p> <p>Sources: http://en.wikipedia.org/wiki/Universal_Transit_Pass http://www.cutaactu.ca/sites/cutaactu.ca/files/U-PassToolkit.pdf</p>
VEHICLES AND FUELS	
<i>Advanced vehicle</i>	Kelowna and CRD, BC – Hybrid bus

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<i>technology</i>	<p>In 2005, BC Transit purchased six hybrid buses to evaluate environmental and economic benefits of operating hybrid electric buses in Kelowna and the Victoria regions. Three buses were operating in Kelowna and three in the Victoria region. Under the transit agreement, each local government cost-shared vehicle operating and debt retirement expenses with the provincial government through BC Transit.</p> <p>Source: http://www.busonline.ca/regions/kel/news/hybrid_electric.cfm</p> <p>Hamilton, ON – Hybrid bus In 2007, Hamilton purchased a fleet of hybrid buses. The fleet is composed of 12 diesel/electric hybrid buses, including seven 60 foot articulated buses – the first in Canada. The new buses are intended to help lower greenhouse gas emissions, improve air quality and increase capacity for public transit users in Hamilton.</p> <p>Source: http://www.myhamilton.ca/myhamilton/CityandGovernment/NewsandPublications/NewsReleases/2007News/April/07-04-03ph.htm</p> <p>Saskatoon, SK – Hybrid bus The city will purchase four hybrid buses, two of which will be tested with the use of biodiesel.</p> <p>Source: GMF Annual Report 06-07 http://www.city.saskatoon.sk.ca/org/transit/biobus.asp</p> <p>Fort St. John, BC – Hybrid bus The city will purchase a hybrid electric transit bus to prove the efficiency of the technology in severe northern climates.</p> <p>Source: GMF Annual Report 06-07</p> <p>Halifax, NS – Hybrid bus The HRM has partnered with Conserve Nova Scotia to order two hybrid buses that will be delivered in late 2008. This hybrid bus technology will address issues such as emissions and noise generated by conventional diesel buses and will contribute to a cleaner environment.</p> <p>Source: http://www.drivewiser.ca/default.asp?mn=1.181.233</p> <p>Montreal, QC – Hybrid bus The STM is planning to purchase eight diesel-electric hybrid propulsion buses as early as 2008. This will lead to a fuel savings of 20% and a potential reduction of 330 tonnes of GHG emissions, equal to the emissions produced by 65 individual cars running 20 000 km a year. The province will pay half the cost of the eight hybrid buses that are to be road-tested throughout 2008, using some of the money it receives on Montreal's behalf from a cut of the federal gasoline tax.</p> <p>Source: http://www.stm.info/English/en-bref/a-environnement_projets.htm http://www.articlediscovery.com/articledetail.php?artid=10554&catid=194&title=Green+Buses+To+Hit+Montreal</p>
<i>Alternative fuels and renewable energy</i>	<p>Brampton, ON – Use of Biodiesel in Bus Fleet The City of Brampton was Canada's first municipality to commit to the ongoing use of biodiesel in both transit and heavy duty fleet vehicles. Beginning in 2002, the municipality began testing the alternative fuel in 16 of its vehicles. The test vehicles were fuelled with B20 biodiesel during the colder months and B50 biodiesel during the warm summer months. Tests conducted during that time indicated that exhaust</p>

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emissions were reduced by about 27 per cent with the B20 blend and by 50 to 60 per cent with the B50 blend. Vehicle operators also reported back that the biodiesel fuelled vehicles operated more smoothly and more responsively than conventionally powered vehicles. The city is currently expanding its use of biodiesel to most of its 415 diesel burning fleet vehicles and up to 130 Brampton Transit buses.

During the pilot, diesel-related GHG emissions were lowered by 24 per cent using the B20 blend. As of June 2003, city council had committed to the permanent use of B20 biodiesel fuel for its fleet of 130 transit buses. Biodiesel significantly reduces GHG emissions from municipal operations, making it a ready alternative for municipal fleets, especially in communities with poor air quality. Any municipality that has a diesel fleet and access to a convenient supply of biodiesel fuel could convert its municipal fleet to biodiesel. A number of Canadian companies offer biodiesel as a fuelling option. In addition to exploring the advantages of biodiesel, municipalities may want to consider the benefits of other alternative fuels, such as ethanol and natural gas. Biodiesel costs slightly more than diesel, because it is more expensive to produce. However, the Ontario government has exempted biodiesel from the 14.3 cents-per-litre Ontario fuel tax, making biodiesel competitively priced. No additional capital costs were incurred with the switch to biodiesel, as it works interchangeably with traditional diesel in combustion-ignition engines.

Sources:

<http://www.tc.gc.ca/programs/Environment/utsp/biodieselintransitandmunicipalfleets.htm>

<http://www.mah.gov.on.ca/Page1308.aspx#Case%20Study%204>

Halifax, NS – Use of Biodiesel in Bus Fleet

In partnership with Wilson Fuels, the entire MetroLink fleet uses biodiesel, at the B-5 mixture. As product testing continues, the mixture will be increased to B-10, and eventually B-20 once the rest of the fleet comes on board.

Source: <http://www.halifax.ca/metrotransit/Biodiesel.html>

Montreal, QC – Use of Biodiesel in Bus Fleet

Montreal performed biodiesel testing in the bus fleet under the Biobus project. The goals of the project are to gain practical experience in the use of biodiesel under real-life conditions, particularly in cold weather, and to demonstrate the feasibility of supplying biodiesel to a mass transit company like the STM. The Biobus project demonstrated, under actual operating conditions, that using biodiesel is viable in a region like Montreal where winter temperatures can plummet to -30°C and that it is feasible to continuously supply an urban transit company the size of the STM. The project also assessed the economic and environmental impact of using this fuel, which is made from recovered and recycled sub-food-grade vegetable oil or animal fat. STM now has a fleet of eight hybrid – biodiesel buses in use.

Sources: <http://www.stcum.qc.ca/English/info/a-biobus.htm>

<http://www.stm.info/English/info/a-autobus-hybride.htm>

Calgary, AB – Ride the Wind! C-Train

Commencing in September 2001, Calgary Transit entered into a partnership with ENMAX and Vision Quest Windelectric Inc. to develop a program (Ride the Wind) that uses wind-generated electricity to power the CTrains. There are 12 windmills located in Southern Alberta that generate the wind-power. The equivalent amount of power used by the CTrain is sent to the main power grid from the windmill generated power. Although the CTrain itself does not produce CO₂ emissions, the supply of electricity used for CTrain traction power used to originate from coal or natural gas powered

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	<p>facilities that do produce greenhouse gases. Using wind-generated power currently reduces CO₂ emissions by 26,000 tonnes annually. As the CTrain lines are extended, the savings in emissions will also increase. It is expected that the "Ride the Wind" program will increase power costs by less than one-half of one cent per passenger.</p> <p>Source: http://www.calgarytransit.com/environment/ride_d_wind.html</p>
<i>Increased passenger density</i>	<p>Montreal, QC – Articulated buses The STM expects to add 202 articulated buses to its fleet of vehicles beginning in 2009, in the hope of increasing ridership by 10%. If that goal is reached, it is estimated that its environmental impact would be equal to removing 2000 cars from the road, which would further reduce CO₂ emissions by 10 658 tonnes. Moreover, 8 diesel-electric hybrid propulsion buses will be purchased by the STM as early as 2008, which will lead to fuel savings of 20% and a potential reduction of 330 tonnes of GHG emissions, equal to the emissions produced by 65 individual cars running 20 000 km a year.</p> <p>Source: http://www.stm.info/English/en-bref/a-environnement_projets.htm</p> <p>Ottawa, ON – Articulated buses OC Transpo uses number of low floor articulated buses.</p>
OTHER	
<i>Public private partnerships</i>	<p>York Region, ON – York Consortium See York Region transportation profile for details and information sources.</p>

**Chapter 8. OPERATIONAL PRACTICES AND TECHNOLOGY –
TRANSPORTATION DEMAND AND MOBILITY MANAGEMENT**

TRIP REDUCTION

Best Practice	Case Examples
<p><i>Trip reduction programs</i></p>	<p>Vancouver, BC – Cambie Corridor Consortium Cambie Corridor Consortium (CCC) was the first transportation management association (TMA) established in Canada. A TMA is an alliance of business, government, and other groups that aims to reduce traffic in a particular area by pooling resources and expertise. Cambie's aim is to reduce the number of single occupancy vehicles commuting to the Cambie/Broadway area of Vancouver and improve air quality by providing alternative transportation solutions and information. Approximately 25,000 employees are represented through CCC's 21 members. The TMA was initiated by the Vancouver General Hospital. A transportation consultant and other staff at the hospital had been meeting with various partners for several years, and in 1995, they decided to form the Cambie Corridor Consortium to address some of their transportation problems. From those meetings, a trip reduction expert developed a transportation management plan that was used as the basis for the CCC's programs and services. The partners in the CCC include the following: B.C. Cancer Agency; B.C. Teachers' Federation; B.C. Rehab Hospitals; B.C. Centre for Disease Control; Children's and Women's Health Centre of B.C.; City of Vancouver; Insurance Corporation of B.C.; Providence Health Care Society (includes Brock Fahrni Holy Family Hospital Mt. St. Joseph Hospital St. Paul's Hospital St. Vincent's Hospitals - Heather, Arbutus, and Langara, and Youville Residence); VanCity Savings; Vancouver Hospital and Health Sciences Centre; Vancouver Police Department; and Vancouver School Board.</p> <p>The program provides a variety of TDM activities and services. Transit kiosks were erected at each member's work site where employees could easily obtain information on transit fares, shuttle bus schedules, and other information. A shuttle bus service was implemented to transport hospital staff between sites. The bus makes approximately 2,100 trips per month carrying 9,000 passengers. The CCC also uses the shuttle bus to transport equipment, supplies, and documents between sites, saving member hospitals approximately \$200,000 each year in courier costs. Van pooling services were arranged and are used by approximately 200 employees. Another 500+ staff members carpool. A payroll deduction program allows employees to purchase bus passes at a 15% discount. To respond to the needs of employees, and address some of the barriers expressed in the initial surveys, an emergency ride home has been implemented. CCC has a contract with a local taxi company and employees are given vouchers if they need to leave work in case of illness or emergency. Also in response to employee requests, additional shower and change facilities, and secure bike cages were installed at some of the members' work sites.</p> <p>Since 1994, single occupancy vehicle drivers had dropped by 1.6%, transit use had increased by about 25%, and cycling had increased to 5.5% from 4.5%. The number of walkers had increased tremendously since 1994. Previously, employees who lived a short distance away would drive to work so that they would have a car available during the day to make trips between sites. Almost 10% of all survey respondents said that they regularly walked to work. In addition, of the people responding to the 1998 survey, 85% said they no longer brought their car to work because the shuttle bus allowed them to travel between sites. Environment Canada provided a grant of \$60,000 with the provision that the CCC's members contribute an equal amount in in-kind donations. Each new member was given a one-year exemption from any fees, but the CCC was planning to solicit annual dues based on the number of employees from current and future members. The Cambie Corridor Consortium initiated the shuttle bus service. Before the service was implemented, hospitals were paying parking fees and mileage to</p>

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	<p>employees who drove their cars between sites. These savings paid for the new shuttle service for their employees.</p> <p>Sources: http://www.vtppi.org/tdm/tdm44.htm http://www.toolsofchange.com/English/CaseStudies/default.asp?ID=100</p>
<p><i>Carpooling service</i></p>	<p>Calgary, AB – City-Commuter Connections partnership In the spring of 2002, the City of Calgary partnered with Commuter Connections to develop, implement and promote an Internet-based carpool program for the Calgary area. The web-based ride matching service takes advantage of the speed and anonymity of the web. Confidential rideshare matches can be established, at no cost to the participants in just a few minutes. By providing access to the ride matching services available at carpool.ca and promoting carpooling to commuters, awareness of the benefits of carpooling were raised. This increased the number of commuters choosing to carpool at least some of the time, increased auto occupancy, and reduced traffic demand on roadways during peak hours.</p> <p>The City of Calgary and Commuter Connections hosted an alternative transportation workshop to demonstrate the benefits of carpooling and other travel alternatives to driving alone. The first phase of Calgary's carpool program was well received with 29 of the city's largest employers committing to participate. By the end of March 2003 nearly 1,000 Calgarians had registered with Carpool.ca to take advantage of the ride matching service. Surveys conducted by Commuter Connections indicated that 143 carpools were formed in the first few months, taking approximately 250 cars off the road each day.</p> <p>Calgary's carpool program reached a milestone in January 2005 with over 2000 active participants registered with carpool.ca. This makes it one of Canada's most successful carpool programs. The City of Calgary continues to advocate carpooling as a smart commuting alternative to driving alone. And now with the innovative regional carpool program, more and more Calgarians can choose to carpool to get to work.</p> <p>Source: http://content.calgary.ca/CCA/City+Hall/Business+Units/Transportation+Planning/Transportation+Solutions/Sustainable+Transportation/Regional+Carpool+Programs/Regional+Carpool+Program.htm</p>
<p><i>Incentives – carpooling, green vehicles</i></p>	<p>Montreal, QC – Car poolers reserved parking at ATM park and ride lots In the fall of 2005, AMT started a new project to provide reserved spaces in its parking lots for users who car-pool. The project's originality is that the car-pooler's vehicle is parked at a modal transfer point rather than at a destination. In this way, the project aims to improve multi-modal transfers at little cost.</p> <p>This project is geared toward two types of car-poolers: those who meet downstream from the parking site and travel to it in a shared vehicle and those who use the site as a meeting point and continue by car. The first provides reserved parking spaces close to bus and train boarding areas as well as to metro entrances for car-poolers who use public transportation. The second type provides reserved parking spaces close to access roads in order to facilitate pairing units of car-pools on site, to continue the trip by car, and limit single passenger transportation.</p> <p>Source: http://www.tc.gc.ca/programs/environment/UTSP/TACNominees2005.htm#AMT</p> <p>Vancouver, BC – EasyPark EasyGreen Discounted Parking EasyPark supports a transport system that minimizes congestion and air pollution.</p>

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	<p>Individuals are encouraged to support these goals through the 50% discount for “very efficient vehicles” as well as a 25% discount for carpoolers (minimum 3 people) at all attended lots.</p> <p>EasyPark, which is jointly owned by the City of Vancouver and Downtown Vancouver Association, offers a 50% discount for specific fuel efficient vehicles at participating EasyPark lots. Registration is required for the program at the EasyPark head office with proof of vehicle registration (e.g., original insurance papers). Once approved, the vehicle owner receives a sticker with the license plate number identified on it. The sticker must be displayed in the windshield. The 50% discount applies to daily parking rates at attended lots as well as to monthly rates. At unattended lots, the vehicle owner must be registered as an EasyGreen Member to pay by cell phone and get the 50% discount. There are no fees associated with the application process; however, if a sticker is lost/stolen/damaged, there is a \$10 replacement fee.</p> <p>The City of Vancouver wanted to promote fuel efficient vehicles for <i>city driving</i>, therefore only the city fuel consumption ratings are taken into consideration when determining eligibility. Gasoline vehicles (including hybrids) must have a city fuel consumption rating of less than 5.3L/100km. (<i>However, the smart fortwo is eligible for this program, but does not meet this standard</i>). Diesel vehicles must have a city fuel consumption rating of less than 4.6L/100km.</p> <p>Source: http://www.easyparkvancouver.com/easygreen.aspx</p> <p>Kelowna, BC –Eco-Pass Program The Eco-Pass Program rewards drivers of hybrid vehicles with free parking at any on-street parking meters in downtown Kelowna for a one-year period. Program participants must register their vehicles with the city to be eligible and are subject to regular parking restrictions.</p> <p>Sources: http://www.kelowna.ca/CM/Page369.aspx http://www.kelowna.ca/CityPage/Docs/PDFs/Transportation%20Division/ECO%20pass%20parking.pdf</p>
<p><i>Car share programs</i></p>	<p>Car share organizations Montreal, Gatineau, Sherbrooke, Quebec, Ottawa, Toronto, Waterloo, Edmonton, Vancouver, and Vancouver Island all have successful car share organizations. Advantages of car sharing include: reduction in the overall number of vehicles on the road; reduction in the use of the automobile in general; and decreased pollution from car emissions, and other harmful effects associated with the automobile. In addition, car sharing contributes to a net reduction in the number of parking spaces required. Car sharing is particularly suited to densely populated urban centres where limited space only makes problems associated with the proliferation of the automobile worse.</p> <p>Communauto, Quebec’s (including Montreal, Sherbrooke, Quebec, and Gatineau) car share organization, also has a unique program ‘Duo auto + bus’, where the membership provides both a discount for a public transit pass and access to the car share vehicles.</p> <p>Sources: Communauto – Montreal, Quebec, Sherbrooke, Gatineau http://www.communauto.com/index_ENG.html</p> <p>Cooperative Auto Network – Metro Vancouver, Vancouver Island http://www.cooperativeauto.net/</p> <p>Victoria Car Share Co-op – Victoria</p>

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	<p>http://www.victoriacarshare.ca/</p> <p>Car-Sharing Co-op of Edmonton – Edmonton http://www.web.net/~cce/</p> <p>The People’s Car Cooperative – Waterloo http://www.peoplescar.org/</p> <p>AutoShare, Zipcar – Toronto http://www.autoshare.com/ http://www.zipcar.com/</p> <p>Vrtucar - Ottawa http://www.vrtucar.com/</p>
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ACTIVE TRANSPORTATION

<p><i>Active transportation planning and promoting</i></p>	<p>Halifax, NS – Active Transportation Plan</p> <p>The Active Transportation Plan was approved in November, 2006 by Halifax Regional Council. The Active Transportation Plan is a comprehensive document that provides policy direction for the development of an Active Transportation network within HRM. As well, technical guidelines have been created for the planning and design of the network. It is anticipated that promotion and education will be fundamental to increase the number of residents using active modes of transportation for their day-to-day activities.</p> <p>The goals of the Active Transportation Plan include the following: improve conditions and reduce risk for all modes and all users; build upon existing and proposed active transportation and transit initiatives; double the number of trips made by active modes; achieve the goals and vision of the plan in 20 years; and adhere to the overall intent of the regional plan.</p> <p>Sources: http://www.halifax.ca/TDM/activetransportation/index.html http://www.actcanada.com/EN/Conference2007/Presentations/4B2%20Active%20Transportation%20in%20Halifax%20%20Roxane%20MacInnis.ppt#263,7,AT%20Plan%20Goals</p> <p>Saanich, BC – Bike Parking Bylaw</p> <p>Saanich requires the provision of bicycle parking mandated through zoning bylaws. The number and type (Class I - secure weather protected or Class II - short-term facility) of bicycle parking spaces required depends on the building use. For example, for apartments and townhouses, one class I bicycle parking space is required per unit plus a six space rack at each entrance of an apartment building. For office buildings, retail, restaurants, and research establishments, the requirements include one space per 250m² gross floor area (GFA) for the first 5000m² and one space per 500m² GFA for any additional area. The Development Permit Areas Justification and Guidelines states that “design plans shall meet the intent of the standards set out in the Saanich Bicycle Parking Guidelines”. The Bicycle Parking Guidelines state that as part of the development application, plans shall include details that indicate the size of Class I and II bicycle parking facilities and that similar details for showers, change rooms, and lockers may also be provided.</p> <p>Sources: http://www.saanich.ca/municipal/clerks/bylaws/zone8200.pdf#page=32 http://www.saanich.ca/business/development/laps/dpguide/dev_guidelines_text.pdf http://www.gov.saanich.bc.ca/business/development/laps/dpguide/bikeparkguide.pdf</p>
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	<p>Edmonton, AB – Ribbon of Steel</p> <p>The City of Edmonton created the “Ribbon of Steel” by converting abandoned CP Rail lands into an active transport corridor to promote physical activity and manage inner city traffic volumes. The Ribbon of Steel is a multi-modal transportation corridor with a trail for pedestrians, cyclists, and skaters and a historic street car, serving the downtown core. There is access to the underground light rail transit station and it connects to existing well-used trail systems at either end. It is the main multi-use trail corridor for the downtown area and connects previously existing unconnected trails. Edmonton is developing a 62km multi-use trail corridor.</p> <p>Benefits included reducing congestion on the roads, which lead to reduced maintenance and rehabilitation required on the roadways. Improving the health of the citizens can also be correlated to financial benefits in long term health care system savings. Funding allocated to the project was \$2.3 million from the Infrastructure Canada-Alberta Program.</p> <p>Sources: http://www.sustainablecommunities.fcm.ca/files/Program_Docs/fcm-ch2m-sustainable-comm-awards/2004sust-comm-award-winners-En.pdf http://tac-atc.ca/english/pdf/conf2004/stock.pdf</p>
<p><i>Path networks</i></p>	<p>Ottawa, ON/Gatineau, QC – Bike Path Network</p> <p>Ottawa-Gatineau has one of the most extensive networks of bike paths in Canada, thanks in large part to the influence of the National Capital Commission. Ottawa also hosts Sunday bike days where the parkways are closed to motor vehicles every Sunday morning from May to September, providing more than 50km for recreational use.</p> <p>Source: http://www.canadacapital.gc.ca/bins/ncc_web_content_page.asp?cid=16297-16299-9970&lang=1</p> <p>Quebec Green Route and Montreal, QC – City Bicycle Paths</p> <p>Vélo Québec is a non-profit organization that works to promote cycling in Quebec for both leisure and commuting purposes. They oversee the development of La Route Verte, a cycling network linking Quebec end to end through 4300km of bike paths. Vélo Québec is actively involved in public education and outreach and provides many resources including bicycle route maps for the island of Montreal. The City of Montreal has an extensive bicycle path network, which they are continually expanding and improving to make it easier and safer to commute by bicycle. There are over 300km of bike routes and paths on the island. Vélo Québec was instrumental in promoting cycling as a top transportation priority. This led to the adoption of two actions to implement in Montreal: completing the bikeways that circle the island along the river’s edge; and making downtown accessible by bicycle.</p> <p>The City initiated the process of facilitating and encouraging bicycle access to downtown in cooperation with Velo Quebec, which responds to a specific need to improve the safety and reflects a growing concern about promoting the use of alternate modes of transportation. This work was consistent with Montréal’s Master Plan and the Transportation Plan, both of which aim to reduce dependence on cars by encouraging the increased use of mass transit, walking, and cycling. The proposals formulated by Vélo Québec were based on guiding principles that included: improving the comfort and safety of cyclists; making cyclists a legitimate presence downtown; ensuring the continuity, homogeneity, and efficiency of bicycle routes; respecting the priority of pedestrians and public transportation; and minimizing the impact on automobile traffic and parking.</p> <p>The plan included bike lanes on major arteries, wide bus/bike reserved lanes, contra-</p>

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flow bike lanes on residential one-way streets, and use of chevron and bicycle markings. To address the shortage of bicycle parking, the plan proposed that racks be installed in numerous locations, including on sidewalks, on streets and at public and private buildings.

According to the 2008 Business Plan: “To promote active transportation, the city will double the size of its bike path network over the next seven years. This effort will involve the addition of 400km of new pathways.” The budget is as follows:
2007: \$9.3 million has been earmarked for the extension of the bike path network, particularly along Boulevard De Maisonneuve.
2008: \$10.3 million has been earmarked for the installation of 60 km of additional bike paths.
An amount of \$33.3 million has been earmarked for bike paths under the 2008-2010 Three-Year Capital Works Program.

Sources: <http://www.velo.qc.ca/english/index.php>
<http://www.canadatrails.ca/biking/qc/montreal.html>
<http://www.tac-atc.ca/english/pdf/conf2005/s9/Jolicoeur.pdf>
http://ville.montreal.qc.ca/pls/portal/docs/page/service_fin_en/media/documents/budget_2008_2_planaffaires_a.pdf

Capital Regional District, BC – Regional Trail System and Bikeway Network

The 55 kilometre Galloping Goose Regional Trail was inaugurated for use in 1989, converting a former rail line into a non-motorized multi-use recreational corridor. CRD Parks, who manages the trail, obtained a recreational lease from the Province in 1989 for the abandoned CNR rail line located in the Western Communities with additions in 1992 extending the ‘Goose’ into the District of Saanich and City of Victoria on two spur lines. Depending on the section of the trail and trail surface, the ‘Goose’ is typically used by cyclists, walkers, hikers, joggers, roller bladers, horseback riders, and people in wheelchairs. The Galloping Goose in combination with the Lochside Trail form the backbone of the Regional Trail System as well as the regional bikeway network. These corridors provide a relatively direct, low gradient, and scenic east-west connection between the Core municipalities (including Downtown Victoria) and the Western Communities and a north-south connection between the Core municipalities and the Saanich Peninsula respectively. The Goose is managed by the Capital Regional District Parks. From the Galloping Goose, the Lochside Trail through Saanich is jointly managed by CRD Parks and Saanich. The trails offer an alternative transportation choice and safe recreation opportunities. There are over 1000 daily trips made on the Lochside Trail. As many as 2,000 commuter trips are made on the Galloping Goose. CRD Parks and the municipality are continuing to develop and enhance the regional trail network.

The estimated replacement costs for infrastructure improvements and associated facilities between 1990 and 1998 is \$8.7 million. The Galloping Goose has very much been a partnership from the outset, and agencies funding the improvements include the Provincial Capital Commission, Ministry of Transportation and Highways, BC Heritage Trust, BC 21, the BC Cycling Network Program, the Trans-Canada Trail Foundation, City of Victoria, District of Saanich, and CRD Parks. Many other individuals and organizations representing various users of the ‘Goose’ have also contributed their time and energy, including the Greater Victoria Cycling Coalition, which has provided input into the design of many of the facilities along the trail to ensure that the needs of cyclists are met. These infrastructure investments have improved safety for users through the separation of portions of the trail from roadways using bridges and tunnels, and have also improved route continuity. Consequently, the appeal and utility of the ‘Goose’ for commuter and recreational cycling has increased.

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Sources:
 Status of Cycling in the Capital Region, 1998.
[http://www.crd.bc.ca/reports/regionalplanning/_generalreports/_transportation/_cycling/_archivebackgroundinf/_statusofcyclinginthe-1/StatusofCyclingintheCapitalRegion\(1998\).pdf](http://www.crd.bc.ca/reports/regionalplanning/_generalreports/_transportation/_cycling/_archivebackgroundinf/_statusofcyclinginthe-1/StatusofCyclingintheCapitalRegion(1998).pdf)
 North Quadra Local Area Plan, District of Saanich, 2003.
http://www.gov.saanich.bc.ca/business/development/laps/north/nquadra_lap.pdf

OTHER MOBILITY MANAGEMENT

*Parking management
- quantity*

Vancouver, BC – Flexible, more accurate parking requirements
 Vancouver is developing a more flexible approach to parking requirements for multi-family dwellings to support efficient transportation, smart growth and housing affordability objectives. The program is loosely based on the LEED Green building rating system. Developers receive credits for reducing the number of parking stalls, providing parking spaces for car share vehicles, and providing annual transit passes to building occupants.

Source: http://www.sightline.org/daily_score/archive/2006/04/07/parking-paradigm-shift/?searchterm=founder

Victoria, BC – Eliminated minimum parking requirements
 Victoria eliminated minimum parking requirements for new buildings in a particular area, the Harris Green neighbourhood. This has resulted in an increase of mixed residential and commercial development, where walkability and more efficient management of public parking are apparent/emphasized. The parking is determined by demand and has resulted in few spots required per unit (0.5 compared to 1 to 2 in conventional multi-family buildings).

Source: Litman, Todd. 2006. Parking Management Best Practices. American Planning Association, Chicago.

Toronto, ON – Maximum parking standards
 Toronto has maximum parking standards, as well as provisions for cash in lieu of parking, shared parking, and off-site parking in their zoning by-laws. A lack of maximum parking standards indirectly allows for parking oversupply by not restricting inappropriately high levels of parking. Parking maximums, in particular, are seen as an important mechanism for allowing reasonable parking supply ratios that facilitate business activities and site development, while: improving street amenity for pedestrians and cyclists; curbing practices observed in Toronto regarding the oversupply of parking; potentially allowing parking pricing to come into play with associated transportation demand management benefits (e.g., increased transit use); and allowing the City to have input on how all parking is built, which enhances its ability to help create well-designed urban areas.

Overall, the use of maximum parking standards in Toronto provides an enforceable tool to limit the demand for automobile trips into specific areas. The use of parking maximums is considered to be most applicable to existing Downtown, Centres, and Avenues.

Sources: http://www.toronto.ca/zoning/pdf/ibi_parking_2007.pdf
<http://www.toronto.ca/legdocs/mmis/2007/pg/bgrd/backgroundfile-2399.pdf>

*Parking management
– appropriate fees*

Central Okanagan (Kelowna), BC – Parking fees greater than transit passes
 The TDM group works carefully to ensure that parking supply and pricing policies are compatible with regional TDM goals and objectives, particularly in the City of

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	<p>Kelowna. In the city, a parking policy has been adopted that sets the minimum monthly parking charge in City owned lots and facilities at 10% above the monthly cost for a transit pass to give a financial incentive to commute via transit.</p> <p>Source: http://www.tc.gc.ca/Programs/Environment/utsp/centralokanagan.htm</p> <p>Metro Vancouver, BC – Parking site tax In January 2006, TransLink implemented a parking site tax on surface parking areas, parkades and underground parking. The tax is projected to raise \$20 million a year to help fund a three-year, \$1.9 billion expansion of roads and transit services outlined in TransLink’s Three Year Capital Plan. Some of the capital projects outlined in the plan include, eight major new roads, a portion of a new Fraser River bridge crossing, a more modern and expanded bus fleet and an upgraded cycling-path network. The parking site tax is the first of its kind in Canada. It is based on the size of parking area located on non-residential properties throughout the region. The parking tax rate was set by bylaw for 2006 at \$0.78 per square metre. TransLink allocated \$6 million for implementation of the parking site tax. The majority of costs to date have involved BC Assessment’s creation of the parking site roll. For 2006, the first full year of the tax, TransLink has estimated \$3 million in expenses (not in addition to the \$6 million total project budget) to manage the tax roll, fully implement the tax, and administer the appeal process. The appeal and tax roll administration costs (post 2006) are estimated to be under \$1 million after the initial reaction to the tax has subsided and appeal volumes stabilize.</p> <p>Source: http://www.tc.gc.ca/programs/environment/UTSP/translinkParkingTax.htm</p> <p>Saanich, BC – Parking cash-out The parking cash out is currently on hold. However, the idea was intended to be an aid to moving from free parking to market rate parking for municipal employees. The intent was to simultaneously implement a \$30 monthly parking charge and provide a \$30 monthly transportation allowance. Every current employee would receive the monthly transportation allowance and could either put it back to the parking fee or it would provide an incentive to carpool, use public transit, walk, or bike to work and thus retain the value of the parking in cash. All new employees would not receive the transportation allowance and would therefore have to pay the monthly parking fee. This would eventually lead to a pay parking mindset. This has not been implemented to date as there does not seem to be a broad enough acceptance of pay parking in the area.</p>
<p><i>Pedestrian charter</i></p>	<p>Toronto, ON – Pedestrian Charter Toronto was the first city in North America to sign a pedestrian charter and approve and incorporate it into its Official Plan in 2002. The Charter sets out six principles necessary to ensure that walking is a safe and convenient mode of urban travel. The principles include: accessibility, equity, health and well-being, environmental sustainability, personal and community safety, and community cohesion and vitality. The Charter reflects the principle that a city's walkability is one of the most important measures of the quality of its public realm, and of its health and vitality. The Charter was intended to serve as a reminder to decision-makers, both in the City and in the community at large, that walking should be valued as the most sustainable of all forms of travel, and that it has enormous social, environmental and economic benefits for the city.</p> <p>Sources: http://www.tc.gc.ca/programs/environment/UTSP/st.georgestreetrevitalization.htm http://www.toronto.ca/pedestrian/ http://www.toronto.ca/pedestrian/pdf/charter.pdf</p> <p>Waterloo, ON – Pedestrian Charter</p>

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	<p>The Pedestrian Charter serves as a set of principles to foster awareness and support for pedestrian activity. It was adopted by Regional Council on July 5, 2005. An urban environment that encourages and facilitates walking supports community health, vitality and safety. It increases use of public transit; decreases car dependence; reduces conflict between vehicles and pedestrians; leads to cleaner air and more green public space and supports green tourism. Such an environment creates opportunities for the informal social interaction that is one of the main attributes of a vibrant, livable urban community.</p> <p>The Charter presents six principles to ensure that walking is a safe, comfortable and convenient mode of urban travel. It also puts forward 11 areas for action that encourage and support walking.</p> <p>Sources: http://www.region.waterloo.on.ca/web/Region.nsf/0/88379BBFEDEA6C6D85257184004DB222?OpenDocument http://www.region.waterloo.on.ca/web/Region.nsf/0/88379BBFEDEA6C6D85257184004DB222/\$file/Pedestrian_Charter.pdf?OpenElement</p> <p>Sudbury, ON – Municipal Pedestrian Charter The Pedestrian Charter is to be used in the stages of planning and development in order to ensure that walking will be promoted, safety and accessibility will be improved, vehicle use will be reduced, and the overall health of the citizens of Sudbury will be improved. It is the first Charter in north eastern Ontario.</p> <p>Source: http://www.city.greatersudbury.on.ca/content/div_councilagendas/documents/Pedestrian%20Charter%20%20June%202006%20final_documentation.pdf</p>
<p><i>Public information campaigns</i></p>	<p>Kamloops, BC – TravelSmart Program See profile in Chapter 3 table.</p> <p>Vancouver, BC – Cambie Corridor Consortium See profile above.</p> <p>Waterloo, ON – You Can Clear the Air You Can Clear the Air is an educational resource unit targeted toward elementary Grade 3 students to create awareness about more sustainable transportation choices and the impacts that transportation choices have on the environment. The resource is also intended to encourage teachers, parents and the larger community to become more sustainable in their travel choices. The project was developed through a unique partnership involving an inter-departmental municipal government team (including Transportation Planning and Grand River Transit staff), two local School Boards, an educational consultant, teachers and children from pilot classes.</p> <p>Source: http://www.tc.gc.ca/programs/environment/UTSP/youcancleartheair.htm http://www.region.waterloo.on.ca/web/transit.nsf/0/0A75DB3F34997A5685256DB300625C45?OpenDocument</p> <p>Metro Vancouver, BC – OnBoard Program <i>(Note: “Metro Vancouver” and “GVRD” are used interchangeably in this write-up)</i> The Greater Vancouver Regional District's (GVRD's) Employee Trip Reduction Program, OnBoard, took an integrated, multi-modal approach. By supporting the use of all modes of alternative transportation, a higher rate of employee buy-in could be obtained. To further increase staff participation, a flexible transit incentive program was</p>

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developed and was pilot-tested in the winter of 2002. The program provided a 25% total discount on various transit pass options. In this case, the municipality first developed a trip reduction program for its own employees and then used it as a model for other employers.

The program was initiated by the GVRD Employee Environmental Awareness Committee. The partners involved were as follows: GVRD; BC Transit; Jack Bell Foundation (Vanpools); and Better Environmentally Sound Transportation (BEST). While the program was adopted as a corporate initiative supported by all of GVRD's departments, the Communications and Education Department and the Air Quality Department with assistance from BC Transit, were primarily responsible for implementation. The program aimed to promote a variety of commuting option initiatives, including: employer pass program; ride sharing; corporate car share; promoting and facilitating active transportation; parking management; guaranteed ride home; teleworking; and park and ride. In addition, TransLink promoted and marketed the OnBoard program through a variety of communications.

Initial results indicated success in reducing the number of daily single occupancy vehicle (SOV) trips by 42 and increasing the average vehicle ridership from 1.56 to 1.78. This resulted in a reduction of 63,031 kg CO₂ and 4,728 kg ground level contaminants (including smog) annually. Since the launch of the program, OnBoard has helped more than 300 companies in the GVRD to develop and implement trip reduction programs. The OnBoard program has been very successful in working with employers to offer commuting alternatives for employees. By 2007, the employer pass program saw an increase from 108 to 240 in participating companies. The number of participating employees rose from 6,000 to over 14,000 participants. In 2006 alone, the employer pass program helped eliminate 700,000 SOV trips from the region's roads. Ridesharing also experienced increased success, eliminating . more than 1,000,000 SOV trips in Metro Vancouver since the launch of the program.

The OnBoard program helped provide commuting options at a lower cost. It reduced commuting hassles and stress, promoted commuting choices that enhanced the quality of life, and helped employers attract and retain good employees. It also reduced congestion on the region's roads, as well as GHG emissions.

Source: <http://www.toolsofchange.com/English/CaseStudies/default.asp?ID=28>
Jack Bell Ride-Share www.ride-share.com

Whitehorse, YK – Wheel 2 Work Program

First implemented in 2006, the Wheel 2 Work program has encouraged residents to bike to work during the summer months. The program includes a marketing campaign and uses prizes as incentives. It is meant to complement over \$2 million worth of investments in the expansion and improvement of Whitehorse's bicycle network. Participants who sign up to the program website and are able to log the distances they ride over the length of the five month program. To develop the program, a City partnership with Recreation Parks Association of the Yukon was required.

Approximately 2% of Yukon workers rode to work in 2001, on par with residents of BC. In 2006, the program had 210 participants. The 108 who tracked their travelling distances logged almost 40,000 km. Costs per year include approximately 35 total work days and about \$12,000 for program marketing and incentive prizes. Incentive prizes and positive marketing helped draw people to the program. Marketing has to be context specific (i.e. Whitehorse has ample free parking and minimal to no traffic congestion). Longer programs can be more effective. The program was continued in 2007 but only partial results were available. Future program considerations may include new rider

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categories, establishing partnerships with major employers or specific neighbourhoods, and implementing a similar winter challenge program.

Sources: <http://www.tc.gc.ca/Programs/Environment/utsp/wheel2work.htm>
http://www.city.whitehorse.yk.ca/index.asp?Type=B_BASIC&SEC=%7BFF1EF2EA-8E18-417F-A37F-C097A9889B6C%7D

Fort St. John, BC – Walk to Whistler Program

The Walk to Whistler program, launched in June 2004, challenged residents of Fort St. John to walk the distance from their community to the site of the 2010 Olympics, a distance of almost 1,500 km. Residents are urged to buy a pedometer, track how much they walk each day, and log their results on the program website. Participants in the program are eligible for prizes, including tickets to the opening ceremonies of the Olympic Games. The challenge has been extended to communities across North America. The program was implemented by the city as part of the province's goal to increase physical activity levels by 20% by 2010. It also supports the 2010 Winter Olympic Games. As of February 2008, participants within Fort St. John had logged over 355,000 km. Currently almost 200 participating cities (over 1,800 participants) have logged almost 1.7 million km. The impacts on transportation are unknown.

Sources: <http://www.walktowhistler.com>
<http://www.activecommunities.bc.ca/success-stories-media/FortStJohn.htm>

Sudbury, ON – EarthCare

Launched in 2000, EarthCare Sudbury is a partnership between the city of Greater Sudbury and over 90 community organizations, agencies, and businesses, and several hundred individuals. The program aims to improve the overall sustainability and economic outlook of the community through the implementation of initiatives related to things such as carpooling, anti-idling, and clean air. A local action plan was completed in 2003 in order to help guide the program in its future expansion. The target for the transportation sector is to reduce GHG emissions by 10% by 2015. Thus far a carpooling network has been established and an anti-idling campaign was run in school grounds and elsewhere.

Sources: http://www.greatersudbury.ca/cms/index.cfm?app=div_earthcare&lang=en
<http://www.city.greatersudbury.on.ca/content/earthcare/documents/EarthCareLocalActionPlanENG.pdf>



APPENDIX E

Definitions of Sustainable Transportation

Excerpt from the report: *Well Measured: Developing Indicators for Comprehensive and Sustainable Transport Planning*¹⁵⁴

There is no universally accepted definition of sustainability, sustainable development or sustainable transport (Beatley, 1995). Below are examples:

Sustainable development “*meets the needs of the present without compromising the ability of future generations to meet their own needs.*” (WCED, 1987)

“*Sustainability is equity and harmony extended into the future, a careful journey without an endpoint, a continuous striving for the harmonious co-evolution of environmental, economic and socio-cultural goals.*” (Mega and Pedersen, 1998)

“*The common aim [of sustainable development] must be to expand resources and improve the quality of life for as many people as heedless population growth forces upon the Earth, and do it with minimal prosthetic dependence.* (Wilson, 1998)

“...sustainability is not about threat analysis; sustainability is about systems analysis. Specifically, it is about how environmental, economic, and social systems interact to their mutual advantage or disadvantage at various space-based scales of operation.” (TRB, 1997)

Sustainability is: “*the capacity for continuance into the long term future. Anything that can go on being done on an indefinite basis is sustainable. Anything that cannot go on being done indefinitely is unsustainable.*” (Center for Sustainability, 2004).

Environmentally Sustainable Transportation (EST) is: *Transportation that does not endanger public health or ecosystems and meets needs for access consistent with (a) use of renewable resources at below their rates of regeneration, and (b) use of non-renewable resources at below the rates of development of renewable substitutes.* (OECD 1998)

“*The goal of sustainable transportation is to ensure that environment, social and economic considerations are factored into decisions affecting transportation activity.*” (MOST, 1999)

¹⁵⁴ Todd Litman, *Well Measured: Developing Indicators for Comprehensive and Sustainable Transport Planning*, Victoria Transport Institute February 2008. (www.vtpi.org/wellmeas.pdf – date accessed: May 2008).