

STRATEGIES FOR SUSTAINABLE TRANSPORTATION PLANNING

In 2004, TAC's Sustainable Transportation Standing Committee initiated a project to encourage sustainable transportation planning in Canada. Workshops were held at TAC Annual Conferences in 2004 and 2005, and in 2005 the federal government funded a research project that examined the state of practice and future directions for sustainable transportation planning in Canadian urban areas.¹ This research was followed by a series of workshops across Canada to gather insights into the state of transportation planning in Canada, and to solicit feedback on a set of preliminary options for incorporating sustainable transportation principles into long-range urban transportation plans. Based on these efforts, this briefing presents a set of principles and related strategies for sustainable transportation planning.

This briefing is not a comprehensive guideline, but rather offers a checklist for agencies as they seek to create transportation plans that effectively contribute to more sustainable transportation. It can also help practitioners, elected officials and members of the public advance the state of debate on more cost-effective, environmentally conscious and socially responsible transportation solutions.

THE NEED FOR MORE SUSTAINABLE TRANSPORTATION PLANNING

Over the last decade, there has been rapid growth in the recognition by Canadian governments and stakeholders of the need for more sustainable transportation, particularly in urban areas. This shift has resulted from the efforts of many governmental and non-governmental organizations, including the Transportation Association of Canada (TAC) which published the widely recognized *New Vision for Urban Transportation* in 1993.² It has also resulted from the increasingly visible impacts of transportation on our economic, environmental and social systems, such as:

- An 11% increase in per-capita gasoline consumption (and resulting greenhouse gas emissions) in Canada's 27 census metropolitan areas between 1991 and 2001³
- Growing congestion, with an estimated annual cost of \$2.3 to \$3.7 billion in Canada's urban areas⁴
- A significant rise in Canadian obesity rates, attributed in part to auto-dependent lifestyles

The transportation plans of many Canadian urban areas envision and support sustainability. However, these plans' objectives have mostly not been met. Many factors have influenced this situation, including inconsistency of implementation as well as weaknesses in the plans themselves. More effective approaches to transportation planning could help those communities actually create the more sustainable future that they desire.

What is sustainable transportation?

The concept of sustainable transportation promotes a balance between transportation's economic and social benefits and the need to protect the environment. In further articulating this idea, the Centre for Sustainable Transportation has defined a sustainable transportation system as one that:

- Allows individuals and societies to meet their access needs 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 the sustainable yield level, reuses and recycles its components, and minimizes the use of land and the production of noise⁵

Within the context of transportation planning, the term "sustainable" can also refer to a plan itself – whether its objectives are achievable in view of the various financial, political and technical factors that will ultimately influence its success.

REFLECTING DIVERSITY

This briefing addresses a variety of contexts for long-range multimodal transportation planning. While virtually all urban areas have general plans (e.g. official plans, regional plans) that identify major land use patterns and infrastructure networks, those plans may or may not reflect a comprehensive, long-range view of transportation. In many communities where the general plan addresses transportation goals, policies and infrastructure at a high level only, a complementary and self-contained transportation plan frequently exists.

Some self-contained long-range transportation plans (referred to as transportation strategies, transportation master plans or integrated transportation plans, among other names) set out transportation facilities, programs and services in detail, with individual project costs and schedules. Others focus on high-level harmonization of transportation systems with land use, economic and environmental plans, and call for adjunct transportation plans to address specific modes (e.g. transit) or geographic areas (e.g. downtown).

This briefing has been written to respect this variety of transportation planning contexts, and the sometimes complex factors that shape them. It is also relevant to various scales of plan – from metropolitan growth strategy to town transportation plan—because the concept of promoting sustainable transportation through better planning is valid for them all.

PRINCIPLES AND STRATEGIES

This briefing presents **12 principles**, which can be grouped under three themes that reflect the links between transportation and community sustainability, the need to view transportation holistically, and the desire to enable successful implementation (see box, below). A number of **strategies** are suggested for each principle, to help develop more sustainable plans. Not every strategy is appropriate for every plan or community, and each offers distinct benefits and challenges.

Principle 1

Integrate transportation and land use planning

- Conduct transportation planning and land use planning concurrently, to accommodate the effects of land use on transportation demand and supply, as well as the effects of transportation systems on the demand for, and patterns of, land development.
- Use transportation plan policies to encourage supportive land use form and design (e.g. compact, mixed-use, pedestrian-friendly).
- Highlight the importance of supportive land use policies to the achievement of transportation objectives (e.g. modal shifts, trip length reductions).

Many aspects of urban travel demand (e.g. origin and destination locations, trip lengths, modal choice) are shaped by land use patterns. The location and form of development are principal determinants of the potential for urban transportation systems to be sustainable. Yet it is equally true that transportation systems influence the form and nature of development, and for this reason land use and transportation are viewed as interdependent.

One challenge faced by transportation plans is that the mechanics of land use planning typically occur through a separate process. It is ideal, though, for the two planning processes to be integrated, consistent and mutually respectful. Land use plans may contain transportation goals, policies and programs; likewise, transportation plans may contain policies to favourably influence the location and form of development. Another challenge is that slow growth rates in many urban areas can limit the potential to bring about change in the status quo within the horizons (e.g. 20 years) typically considered in long-range plans.

This idea that concurrent land use and transportation planning is integral to community sustainability has led an increasing number of Canadian communities to create growth management strategies that direct development in ways that maximize overall benefits while minimizing overall costs.

Themes and principles for sustainable transportation planning

(A) *Transportation and community sustainability*

Principle 1

Integrated transportation & land use planning

Principle 2

Protect environmental health

Principle 3

Incorporate social objectives

Principle 4

Support economic development

(B) *A transportation system perspective*

Principle 5

Take a strategic approach

Principle 6

Consider all modes

Principle 7

Manage transportation demand

Principle 8

Manage transportation supply

(C) *The way ahead*

Principle 9

Provide implementation guidance

Principle 10

Provide financial guidance

Principle 11

Measure performance

Principle 12

Create a living plan with public involvement

Principle 2

Protect environmental health

- Recognize ways that transportation systems can help achieve environmental goals, and provide support in the plan's strategic directions.
- Use environmental criteria (e.g. emissions of greenhouse gases and other air pollutants, consumption of non-renewable resources) in the strategic evaluation of alternative land use or transportation scenarios.
- Identify strategies to "lead by example" and reduce the environmental impacts of government fleets, contractor operations, business travel and staff commuting.
- Identify strategies to mitigate the impacts of transportation activities on air quality (e.g. anti-idling campaigns, promotion of alternative fuels, economic incentives and disincentives).
- Identify strategies to mitigate water, land and ecosystem impacts of transportation activities (e.g. right-of-way minimization, stormwater run-off management, watershed impact assessment).

The construction and operation of transportation systems consume huge amounts of natural resources including fossil fuels, aggregates, greenspace, metals and rubber. They also emit a wide range of pollutants that contaminate our air, water and land, as well as greenhouse gases that are affecting the earth's climate.

These factors make environmental health a primary consideration in the pursuit of more sustainable transportation. Another contributing factor is the close linkage between environmental health and public health. In addition to issues such as obesity, which are discussed in the next section, there are direct links between transportation-related air, water and soil pollution and the growing demands on our health care systems. Through planning for more sustainability, we can help to create transportation systems that consume fewer natural resources and lead to less pollution, and in turn to better health.



Principle 3

Incorporate social objectives

- Recognize ways that transportation systems can help achieve social goals, and provide support in the plan's strategic directions.
- Identify strategies to maximize access to opportunity for disabled and low-income persons, recent immigrants, youth and the elderly, such as by reducing the need to travel and improving transit.
- Identify strategies to provide access and mobility for persons with disabilities, such as by making transit and pedestrian infrastructure barrier-free.
- Identify strategies to improve public health and safety, such as by encouraging active transportation, improving air quality, and reducing road collisions.
- Identify strategies to reduce negative "quality of life" impacts of transportation facilities and activities (e.g. traffic calming, noise attenuation measures, truck route designation).

Transportation systems have major impacts on several important quality of life determinants such as neighbourhood cohesion, individual access to employment, and the likelihood of injury and death from collisions. Transportation plans can therefore support key social objectives related to liveability, equity, health and safety.

It is important for transportation plans to recognize that a substantial proportion of Canadians do not have access to a private automobile due to financial, age or physical limitations. It is socially and economically desirable for urban transportation systems to provide affordable, accessible and effective mobility to all members of society.

The linkages between transportation systems and public health are growing in importance. Emerging issues include obesity due to physical inactivity, and the respiratory effects of air pollution. Road safety, while a vital public concern, rarely earns more than passing consideration in most Canadian transportation plans. These are key public health considerations that could be effectively addressed in a proactive manner.

Several less direct impacts of transportation systems on individual well-being could also be considered. Noise, vibration, vehicle speeding and high traffic volumes can all reduce quality of life. By establishing approaches to resolving the inevitable tensions between transportation system needs and residents' right to quiet enjoyment, transportation plans can manage expectations and lay the groundwork for smooth implementation.

Principle 4

Support economic development

- Recognize ways that transportation systems can support economic development, and provide support in the plan's strategic directions.
- Identify strategies to support effective and efficient goods movement to and from major gateways (e.g. ports, airports, border crossings) and in key corridors.
- Identify strategies to support development or re-development of priority areas such as downtowns, suburban town centres, brownfield sites and tourism nodes.
- Identify strategies to maximize the flexibility of the transportation system to respond to changes in energy supply or price.

Urban transportation systems and economic development are closely linked. Individual mobility provides access to employment opportunities, and freight mobility is a major influence on the ease and cost of doing business.

Freight issues are gaining prominence in urban areas across Canada. Rapid growth in trucking activity has added substantial pressure on highways in key trade corridors, and even on entire urban transportation systems near major gateways (e.g. in port or border communities like Vancouver and Windsor). Transportation plans represent an opportunity to consider the needs and impacts of the freight industry in a manner that benefits all stakeholders.

Another way that plans can support economic development is by considering the need for new facilities and services to revitalize or accelerate land development in strategic locations. Transportation system improvements can create a willingness among developers to invest in transit-friendly areas like downtowns and suburban town centres. They can also be a key part of a public investment strategy to boost tourism or bring contaminated brownfield sites back to life.

Finally, plans can protect a community's economic health by preserving flexibility to respond to short-term or long-term shifts in energy cost and availability. Such events could undermine the basic viability of auto-dominated communities, with severe economic impacts. Flexible transportation systems would ensure that as many residents as possible have options for getting around (e.g. public transit, cycling and walking) rather than requiring them to rely on automobiles.

Principle 5

Take a strategic approach

- Establish a comprehensive strategic framework with a vision, goals and other elements, and clearly show linkages to other community goals.
- Consider alternative futures for land use and transportation systems, and evaluate their requirements and implications.
- Set deliberate, realistic and quantitative objectives, identify conditions needed for their achievement, and show the implications of failing to achieve them.

While the notion of sustainability is relatively simple, the concept of sustainable transportation is not. In all likelihood, urban transportation systems will never be truly sustainable – but they can be *more sustainable* than what is currently considered acceptable, and they have a real role in improving community sustainability as a whole.

Sustainable transportation is a complex, multi-faceted goal that requires a wide range of actions. A strategic framework for planning can help in two key ways: (1) by guiding planners as they move from vision to action; and (2) by helping elected officials and stakeholders understand the rationale and linkages behind specific plan elements. A strategic framework might include elements such as a *vision* that describes a desired future state, *principles* to guide actions or decisions, thematic or qualitative *goals*, and more specific or even quantitative *objectives* or *targets*. The most appropriate form and content of such a framework will vary from one place and time to another, but an effective framework is comprehensive in scope, traceable in linking a hierarchy of elements, and articulate in expressing meaningful outcomes.

The creation of a vision is an important aspect of strategic planning. The role of planners extends beyond the traditional "predict and provide" formula – they can apply tools to manage demand and supply, and shape future conditions rather than simply respond to them. A typical result of this approach is the creation of quantitative objectives or targets, which can be key elements of the strategic framework discussed in the preceding paragraph.



Principle 6
Consider all modes

- Identify strategies to increase walking, cycling, transit, ridesharing and teleworking.
- Recognize synergies and tensions among different modes (e.g. seasonal shifts between cycling and transit, competition between transit and ridesharing), and their implications for transportation objectives.
- Identify strategies to make transit operations more sustainable.
- Identify strategies to make motor vehicle use more sustainable (e.g. incident management, signal optimization, traveller information).
- Identify strategies to achieve transportation goals through parking management.
- Identify strategies to make the intersection points between urban and intercity transportation systems more effective and efficient (e.g. transit service to airports, rail-road grade separations).
- Identify strategies to make freight activity more sustainable (e.g. modal shift from road to rail, efficient routing practices).

At the heart of an urban transportation plan is typically a set of policies, programs and projects for various transportation modes that support the plan's overall goals. Modes like walking, cycling and public transit (and substitutes like telework) are fundamentally more sustainable than automobile travel. Plans generally aim to promote their use as a way to moderate the growth in automobile use. While automobiles are usually recognized as less sustainable, plans may identify ways to make their use more sustainable in a relative sense (e.g. through carpooling, vehicle technologies, parking management, or driver information and education).

Similarly, in the realm of goods movement, plans usually view rail and marine freight as more sustainable than trucking, but may also identify opportunities to make trucking more sustainable.

Finally, intercity travel modes (e.g. air, rail, bus) typically lie outside the jurisdiction of municipal authorities, but it is important to consider the sustainability of their physical or operational junctions with urban transportation systems.



Principle 7
Manage transportation demand

- Place strategic priority on transportation demand management (TDM) as a complement to managing transportation supply.
- Identify strategies for a range of TDM approaches in areas that include development approvals, pricing, incentives and outreach.
- Identify key stakeholders in TDM implementation along with their roles, responsibilities and resource requirements.

Starting in the 1950s, Canadian urban transportation plans were mostly concerned with serving growing population and automobile use through capacity expansion. But through the 1980s and 1990s, a potent combination of environmental awareness, fiscal constraints and public resistance to road expansion led to a realization of the need to manage transportation demand as well as supply. Over the last decade, there has been growing attention paid to transportation demand management (TDM) as a tool to influence why, when, where and how people travel.

At its broadest, TDM encompasses progressive land use strategies to limit trip lengths and encourage sustainable modal choices. More typically, however, TDM efforts focus on marketing, public education, innovative services and partnerships. Transportation pricing is another option that has the potential to be very effective, yet remains politically and economically sensitive.

Although TDM practice in Canada is a developing discipline, the need for it is crucial and should be emphasized in long-range plans. Transportation plans can also identify TDM policies, programs and services in a range of areas, as well as highlight the opportunities for participation by various governmental, non-governmental and private sector stakeholders. While TDM programs typically require far fewer resources than infrastructure projects, their smaller budgets and sometimes longer-term benefits make them vulnerable to neglect or deferral by decision makers. Transportation plans can maximize the likelihood of TDM implementation by emphasizing its benefits including the deferral or elimination of infrastructure needs, and by highlighting the need for resources to develop and enable key initiatives.

Principle 8

Manage transportation supply

- Identify strategies to maximize the multimodal capacity of current infrastructure (e.g. transit priority, access management).
- Identify a policy target for minimum roadway level of service standards based on an evaluation of alternative standards and their implications.
- Identify strategies to manage recurring and non-recurring congestion.
- Identify strategies to manage transportation assets (e.g. maintenance, repair, rehabilitation, renewal).

Just as TDM has gained prominence as a means of shaping demand to meet available supply, so too has the notion of supply management become important as a way to make the most of existing facilities and resources. Supply management strategies recognize that building infrastructure is just the first step toward a successful transportation system. Once built, facilities must be maintained and renewed, optimized for financial efficiency and effective service, and adjusted in response to changing demands. This life-cycle perspective, from construction through rehabilitation and renewal, allows for an integration of capital and operating costs that can minimize overall expenditures.

Supply management strategies view roads as complex multimodal facilities that carry people and goods, not just motorized vehicles. Maximizing their current capacity is vital to deferring or eliminating the need for new or wider roads. Maintaining a minimum level of service on major roads is important not as a convenience for drivers, but as a key lever to support individual opportunity and economic activity. As well, finding ways to prevent severe congestion, both during normal rush hours and following incidents like collisions or spills, is vital to limiting vehicular emissions and other social costs.

Component strategies include disciplines like asset management (i.e. optimizing the cost and useful life of physical assets like roads and fleets), congestion management, incident management, and traffic signal management.



Principle 9

Provide implementation guidance

- Identify a long-range implementation strategy that is based on desired outcomes and explains key facility, service, program and policy priorities.
- Identify a short-term implementation strategy that prescribes early actions to build momentum and lay the foundation for long-term change.
- Identify criteria for ongoing refinement of the implementation strategies (e.g. operational reasons to accelerate or defer projects, principles to guide budget decisions).
- Identify subsequent planning efforts that are needed to guide implementation (e.g. area or modal plans, facility plans, management strategies).

Transportation planning documents that consist mainly of a strategic framework (e.g. a vision, goals and objectives) may serve a purpose, but do not offer sufficient guidance to lead directly to more sustainable transportation systems. Effective transportation plans also need to identify actions that support the vision, such as decision-making policies, programs to be developed and specific projects. Without this guidance, decision makers can only guess at the actions required of them, leading inevitably to *ad hoc* and arbitrary actions. It is helpful if recommended facilities or services are accompanied by an identification of their location, timing, desired outcomes, and responsible parties.

Transportation plans can effectively guide implementation using two different time horizons. A long-range implementation strategy can identify and explain actions that are key to the plan's eventual success, without necessarily including explicit detail. A short-term implementation strategy can focus on the "early actions" that will enable the plan's remaining elements to unfold as desired, and may be viewed as the initial version of a "rolling" strategy that can be updated regularly (e.g. every two years).

Planners can identify criteria to help guide refinements in the implementation strategies over time, such as principles to guide regular updates of a rolling short-term implementation strategy. Such principles could also help decision makers create annual budgets, for example by specifying a desirable balance of spending on roads and transit. It is also important to inform decision makers of what changes in circumstance might prompt a change in implementation priorities or schedules, such as unexpected funding opportunities or changes in travel demand, and what reactions might be appropriate (e.g. acceleration or deferral of specific initiatives).

Plans should also clearly identify any planning initiatives that will be needed to fill the gaps in current knowledge or analysis, such as more detailed corridor studies or management strategies. These future efforts may be relied on to specify the detailed nature, timing and cost of individual projects or activities.

Principle 10
Provide financial guidance

- Identify expected future transportation revenues and capital and operating costs (including the cost of programs, services, fleets, facility construction and maintenance).
- Identify expected funding gaps, and illustrate implications by contrasting a “fiscally constrained” scenario (costs limited to revenues) and a “fiscally unconstrained” scenario (costs exceed revenues).
- Identify options for overcoming funding gaps.
- Identify principles for balanced spending to maximize results from available funds.

Over the last 15 years, the cost of building, operating and maintaining transportation systems has become a dominant concern for Canada’s communities. Financial support from federal and provincial governments has fluctuated unpredictably, and municipal budgets have been pressured by the downloading of service responsibilities and by rapidly rising costs.

More than ever, transportation plans and programs face the unpleasant reality of financial constraints. Cities can no longer assume that facilities will be built or services provided just because they are identified in a plan. While capital costs are always a concern, it is also crucial to understand the expected costs of operations, maintenance and TDM programs. Life-cycle cost analysis is one way to capture and compare the overall cost implications of alternative systems and their components.

An understanding of costs is most meaningful when complemented by an understanding of expected revenues from development charges and levies, reserve funds, property taxes, government grants, borrowing or other sources. While future revenues can never be known with certainty, it is reasonable to ask how far current circumstances or trends, if continued, would go toward paying for planned transportation facilities and services. One very helpful way to highlight the major implications of cost and revenue projections is to compare two future transportation scenarios:

- A “fiscally constrained” scenario including only initiatives that are affordable within the limits of expected or known revenue sources
- A “fiscally unconstrained” scenario including all initiatives needed to achieve the plan’s objectives, without consideration of available revenue

Several key questions can be answered by defining and contrasting these scenarios. If a funding gap exists, how big is it? Can additional revenue sources be found? If not, what are the possible responses (e.g. project deferral or cancellation, land use changes) and outcomes (e.g. increased user costs and emissions, reduced transit ridership targets)?

Principle 11
Measure performance

- Highlight the need for a performance measurement program to monitor progress toward planning goals.
- Identify a performance measurement framework that is tied to the plan’s strategic framework and monitors outputs, outcomes and external influences.
- Identify a reporting strategy to effectively communicate performance measurement results.

Most transportation plans start to become obsolete soon after they are approved: external conditions change, action plans are adjusted, costs rise or revenues fall, and early initiatives shift the playing field for later ones.

Given this fact, one way to provide decision makers with continuously relevant guidance is to follow a rigorous performance measurement process. This process would focus on actions taken and progress made toward strategic objectives (both qualitative and quantitative), but could also identify changes in analytical assumptions, shifts in social or economic circumstances, and updated financial positions. The major elements of a thorough transportation plan performance measurement strategy include key targets and indicators to be monitored, data collection activities and schedules, reporting parameters and frequencies, and required resources.

Reporting is a key aspect of performance measurement, because the knowledge generated by monitoring and analysis is only useful if decision makers and stakeholders are aware of it. Reports presenting readable information in a way that effectively communicates successes and ongoing challenges can capture the attention of community groups and the media, helping to raise public awareness of results achieved and the need for continued action.



Principle 12

Create a living plan with public involvement

- Involve the public in the transportation planning process, and identify ways for public involvement to enhance future program and project implementation.
- Identify a minimum frequency to review or update the plan (both may occur in tandem with parallel community plan processes), as well as key criteria that could trigger a plan review (e.g. based on development activity or performance measurement results).
- Identify a process for regular updates to the implementation program, as an extension of the plan.
- Identify other processes (e.g. area plans, modal plans, management strategies) that will represent extensions or updates to the plan, and whether/how they will be integrated into the plan through future updates.

Ideally, transportation plans enjoy a high degree of support among government staff and elected officials, external organizations, and the public. In the pursuit of sustainability, plans can act as agents of change – but change is only realistic if key stakeholders are willing to

follow through on their responsibilities. The process by which transportation plans are developed can be an avenue for building this kind of public support. Plans themselves can ensure ongoing involvement and maximum success. They can do this by requiring consultation as a routine part of project implementation, by recommending outreach and education to build awareness of problems and solutions, and by calling for active partnerships with community associations and other groups in areas like TDM and area traffic management.

Provincial planning legislation usually requires municipalities to revisit their general plans (e.g. official plans, municipal development plans) on a regular basis—every five years, for example. However, transportation plans are neither required nor governed by legislation for most communities. Transportation planners may wish to specify a timeline to review the need to update or renew their plan, taking into account the degree of confidence in the plan's assumptions and analysis. The parallel timeline for land use plan review is another factor that may be considered.

Other factors can also lead to the need to revisit a transportation plan. These could include performance measurement results indicating unexpected changes in circumstances, and significant variations in land use policies or development activities that shift a plan's very foundation.

MOVING FORWARD...

The ideas in this briefing offer a starting point for application and refinement by Canadian practitioners. They are offered in hope that they, and the growing awareness of the linkages among transportation, energy supply, climate change, air quality and public health, will motivate more sustainable transportation planning.

Of course, more than advice is needed. Discipline among professionals and decision makers is required to ensure that plans are realistic and that they are implemented.

Transportation planners need improved data and tools to more accurately project the complex interactions between transportation and a community's environmental, economic and social dimensions. They also need assistance in gathering and sharing information on successes and best practices, an area in which the federal government's Urban Transportation Showcase Program has shown recent leadership.⁶

ENDNOTES

- 1 Transport Canada, *Strategies for Sustainable Transportation Planning: A Review of Practices and Options*, prepared by IBI Group and Noxon Associates Limited, 2005 (www.tc.gc.ca/utsp)
- 2 Transportation Association of Canada, *A New Vision for Urban Transportation*, 1993
- 3 Transportation Association of Canada, *Urban Transportation Indicators – Third Survey*, 2004
- 4 Transport Canada, *The Cost of Urban Congestion in Canada*, prepared by Delcan, iTRANS and ADEC, 2006
- 5 Centre for Sustainable Transportation, 2003
- 6 See www.tc.gc.ca/utsp for more information

Acknowledgements and Disclaimer

TAC gratefully acknowledges the financial support provided by the Government of Canada during the research and consultation phases of this project. The printing and distribution of this briefing were enabled by financial support from the Government of Canada, Stantec Consulting Ltd. and Lee-Gosselin Associates Limited. The briefing was prepared by the Sustainable Transportation Standing Committee of the TAC Urban Transportation Council. The principal authors were Brian Hollingworth, IBI Group, and Geoff Noxon, Noxon Associates Limited, with input and support from many Council and Standing Committee members in the preparation of both the English and French documents. The opinions in this briefing are those of the contributors.

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