Urban Transit Projects Are Shaping The Growth Of Canadian Cities

White Paper

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For Canadian urban centres, developing public transit infrastructure is both an obligation and a great opportunity to shape growth, with significantly positive economic and social impacts. Recent projects, achievements and experience feedback show what works best and why.

The top winning condition: a user-centred approach enabling integrated end-to-end journeys delivered with an equal concern for global planning and tailored solutions.

Global trends

Growing urban areas are challenged by complex, fast-evolving factors regarding their transit system.

The world's population is increasingly city-based; 51%, or 3.5 billion, of the world's people currently live in urban areas. By 2050, this is expected to reach 70% of the population, or 6.3 billion people. Urban mobility is one of the toughest challenges that cities face. An extensive UN study shows that 64% of all kilometres travelled today are urban and that the amount of travel within urban areas is expected to triple by 2050.

Convergent reports show that existing mobility systems are generally close to breakdown, and this is more than just a pending case for extremely fast-growing cities in Asia or Latin America. Prospective models show that by 2050, the average time an urban dweller spends in traffic jams will be 106 hours per year (the time equivalent of three working weeks, triple what it is today).[1]

Anticipating this reality and re-thinking the pace of urban transit growth are not options but absolute necessities, and these global trends cannot be better illustrated and felt today than in Canadian cities and urban centres.

[1] Lerner, Wilhelm – The Future of Urban Mobility, Towards networked, multimodal cities of 2050 – Arthur D. Little, 2011

Canadian cities and urban areas

Current demographic growth in Canada (+1.2% a year) is greater than in the U.S. (+0.7%). Over a period of 25 years, population censuses show that populations in Canada's main metropolitan areas have averaged faster growth than their American counterparts.[2]

A recent economic review by the OECD determined that traffic congestion was costing Toronto's economy $3.3 billion per year, and that every major Canadian city is increasingly confronted with road congestion and "smog days."

Aging infrastructures, saturation of networks

A large majority of bus and metro lines were built during the 20th century—a global trend for cities—with some items of infrastructure also inherited from growth-accelerating events such as world exhibitions or the Olympics. Efforts are being made to upgrade and modernize infrastructure, bus and car fleets, and bus rapid transit (BRT). "Quick fix" solutions seem promising to a certain extent, although they are often limited in terms of coverage.

Over time, this aging and saturation phenomenon leads to what is known as the "urban transit vicious circle," once again convincing a growing number of people that, despite some inconvenience, car transit remains their most favoured option.[3]

[2] Statistics Canada – National Household Survey, Census, 2011

[3] Integrating public transport & urban planning: a virtuous circle breaking the vicious circle of car dependence, position paper, 2009

UITP – International Association of Public Transport

Smart cities, competition, disruption: an unprecedented evolution of the ecosystem

Successful infrastructure projects are not only about engineering. They must interact deeply with their time and societies. Over the last decade, the ways people think, learn, work, build a family, take care of their health, commute and consume have changed dramatically. Interconnectivity, information and options for citizens have progressed at every level.

When it comes to urban transit, for example, innovative or even disruptive solutions such as car-share, bike-share or alternate taxi models are emerging at a fast pace. The Millennial Generation, which grew up through times of economic dislocation and technological change, is increasingly and almost exclusively driving trends. Millennials are globalized, connected and multimodal; they choose the best transportation mode (driving, public transit, biking or walking) based on the trip they are planning to take.[4]

More than ever in this historic context, urban transit decisions and solutions cannot be adopted in closed silos, and public transit decision-makers must also deal with rapid evolution and take inevitable paradigm shifts into account.

› Investing in new transit infrastructures and solutions has become an absolute obligation for Canadian cities. But the good news is that transit infrastructures are the No1 growth factor for urban areas, in the coming decades.

As the Canadian Urban Transit Association has pointed out, "transit is playing a leading role in improving Canada's productivity through a range of economic, environmental, and health benefits, and is only growing in importance as fundamental economic changes are reshaping our major urban centres."

[4] Millennials and mobility: understanding the millennial mindset – APTA (American Public Transportation Association), 2013

Economic impacts

Canadian cities are increasingly competing with the world. They are having to deal with complex options to maintain and stimulate their growth. In the midst of complexity, the lever of public transit seems increasingly significant.

The total economic benefit of Canada's existing transit network is at least $12 billion annually and, between 2002 and 2010, federal capital investment in transit has totalled over $10 billion, which has produced nearly 140,000 jobs and generated nearly $21 billion in total economic output.[5] In Ontario, the Government's 2011 Ten-Year Infrastructure Plan included $35 billion of infrastructure investment in over a three-year period, or approximately $12 billion per year, including an average $2 billion per year for public transit.[6]

At local and street levels, new infrastructures also generate great social and commercial benefits in the short and medium run. When it comes to both economic and social impact on employment, one can only bear in mind that the transit industry in Canada currently employs some 45,200 persons, with a further 24,300 jobs in spin-off employment.

When every major infrastructure project is delivered, it generates sustainable jobs with an unmatched variety of specialties and responsibilities, as compared with other industries.

Efficient, up-to-date public transit attracts new businesses and investors. A large-scale study conducted in the U.S. found that high-growth business clusters are rife with examples of firms choosing locations in proximity to other firms and actively seeking ways to get people to these places.[7]

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Social impacts

Fact: Transit reduces vehicle operating costs for Canadian households by about $5 billion a year. According to Transport Canada, when parking fees and the social costs of congestion and air pollution are factored in, public transit commuting is a third to a half as expensive as the automobile in 10 major Canadian cities. It both provides an economically efficient mode of transportation and affords those Canadians who cannot use a personal vehicle a significant improvement in their quality of life. Accordingly, there is a growing awareness of the positive impact of transit investments to fight the "transit desert" effect in some urban areas, where residents who are the least able to afford a car have to depend on one because of the lack of choice.

[5] Canadian Urban Transit Association – The Economic Impact of Transit Investment: A National Survey, 2010

[6] Haider, Crowley & Di Francesco, Investing in Ontario's Infrastructure for Economic Growth and Prosperity – Independent study, 2013.

[7] The role of transit in support of high growth business clusters in the U.S. – APTA (American Public Transportation Association), 2013

For “captive market” users of rail or road transit, easy access means a broader range of options in terms of food, education, employment and daycare.8

The relative aging of populations is imminent, with an increasing proportion of people over 70 who will be more active and in control of their health but with specific needs and habits. On a broader scope, public health is an obvious part of the urban transit equation. Active means of transport are great contributors to healthy life habits. Quoting a University of British Columbia study, the Journal of Public Health Policy finds that “people who take public transit are three times more likely than those who don't to meet the Heart and Stroke Foundation of Canada's suggested daily minimum of physical activity.” The same research quantified extensive health care cost savings associated with the use of public transit. Also worthy of note is the fact that accident-related costs cause major social and financial impacts. Canadian estimates show that public transit reduces accident-related costs by about $2.4 billion annually.[9]

Consensus on the major winning conditions

Every great advance in successful infrastructure for growing major cities is highly documented. Political vision and will, financial commitment, multiple-issue stakeholders, integrated processes and extended, cutting-edge know-how and expertise are the essential “macro ingredients” of sustainable, growth-stimulating, popular and successful public transit projects. Even then, there are other factors that need to be taken into account.

At the core of successful infra projects: end-to-end commitment and more…

- Since the beginning of the millennium, the most successful transit projects in Canada have also had other features in common:
  - An uncompromising user-centred approach: In users’ expectations, service punctuality and reliability are a given. But if commuters are also offered improved information, comfort and, above all, convenience, their interest may well be brought to another level. The appeal of public transit would then extend to new categories of users who hesitate to let go of the car as their main mode of transport.
  - Integration The “Smart City Factor”: Every transit solution must be interconnected so all citizens have access to real-time information on their transit options, whether they are commuting by rail, bus, taxi, car share or bike share. And the intermodality options must be as varied and fluid as possible.[10]

[8] De Silva, Jan – Let’s build a city that’s prosperous for all (Editorial) – Toronto Star, Oct 26 2015

[9] Lachapelle, Hugo & Franck Lawrence D. – Transit and Health: Mode of Transport, Employer-Sponsored Public Transit Pass Programs, and Physical Activity. Journal of Public Health Policy, 2009.

[10] Public Transport: creating green jobs and stimulating inclusive growth, position paper, 2013 - UITP – International Association of Public Transport

Example: Canada Line, Vancouver

- This 19-kilometre high-speed train line is an extension of the Vancouver Skyline. It was launched in 2009 and has already celebrated its 200 millionth passenger in 2014.
- Since its opening, the line has surpassed original expectations, now carrying more than 122,000 people on any given weekday, which is the equivalent to more than ten lanes of highway.

Process	Results
Deep integration into the existing transit and SkyTrain network.	Trip time from downtown to airport (23 minutes) has been cut by 3.5 times.
User-oriented design has allowed tailored features such as great space for luggage, bicycle-friendly accommodations and a network of hub stations with bus loops and attractive, $2 a-day parking areas.	Developers have contributed millions in private funds towards stations and nearby residential properties, ensuring a truly transit-oriented community. Office spaces and commercial spaces have followed the residential densification. Local and international commercial activities have boomed along the line.
Reporting to a central-operating platform, smart, “health-monitoring” systems and technologies give real-time information, in order to increase the optimization of traffic (temperature, door operations etc.).	Airport growth: airport passengers, employees and the community have now direct access to Richmond and Downtown Vancouver. Workers, business people, and tourists can move more seamlessly around the Vancouver region.[11]
One of the largest Public-Private Partnerships (P3) in Canadian history.	

[11] Devlin, Marc – The Canada Line – Infrastructure at its Best – Presentation for the Toronto 2015 Global AirRail Conference, SNC-Lavalin

Example: Calgary West Light Rail Transit extension

This eight-kilometre light rail train extension includes six stations and opened on time and on budget on December 10, 2012. The city's Southwest district was previously served by city buses, but steep grades made wintertime bus travel challenging.

Process	Results
Integration to the city's local C-train system, in a larger, user-oriented sustainable and integrated approach: system design and integration, quality, environmental, traffic and public communications management. Fast-track project delivery with a schedule of 38 months. A variety of innovations were used, for example some sections being designed while others were being built. Enhanced coordination between the design-build contractors, the owner, the owner's engineer and the ultimate LRT operator also played a major role in the project's success.	44,000 commuters have switched to the LRT, cutting journey times and greenhouse gas emissions in the process. Sustainable design led to LEED certification. The train plays a key-role for the city to anticipate and prepare its projected growth of 120,000 residents over the next 20 years. With the east-west alignment of stations, passengers are sheltered from wind and direct summer sunshine. Shades on the stations' windows help regulate indoor temperatures by blocking high-angle summer sun rays, but letting in the lower-angle winter sun. A four-storey LEED Gold-certified office building is located above one of the stations and showcases the sustainable approach to building design that was applied across the board. The building's proximity to public transit, along with its bicycle storage and changing facilities, as well as water-use reduction and optimized energy performance design features, all contributed to its LEED designation.[12]

[12] WWW.SNCLavalin.com: Calgary West Light Rail Transit

Example: The Confederation Line

It will convert the existing Ottawa Bus Rapid Transit corridor into a full LRT system, and widening and rehabilitating a four-kilometre section of Ontario's Highway 417. It is the largest infrastructure project awarded in the history of the city.

Process	Results
An end-to-end approach and one of the largest public-private partnership rail transit initiatives ever undertaken in North America. In the first phase, 12.5 kilometers of guideway, 10 above-ground stations, three underground stations and a 2.5-kilometer tunnel beneath the downtown core.	Fast, efficient and green line getting passengers to their destinations more quickly, while significantly relieving existing traffic congestion in Canada's capital, especially its bus transit network. Positive environmental impact: transitioning from diesel-powered buses to an electric mode of transportation means burning 10 million fewer litres of fuel each year and, therefore, reducing carbon dioxide emissions by approximately 94,000 tonnes by 2031.[13]

[13] Shepers, Nancy – Design, build, finance and maintenance of Ottawa's Light Rail Transit (OLRT) project, 2012, and Report to Finance and Economic Development Committee, 29 June 2015 and Council 8 July 2015.

Living example: The Crosslinx project, Toronto

In Toronto, the Crosslinx project - a 19-kilometre light rail line with up to 25 stations that will run along Eglinton Avenue, with about half the distance running underground - will link to bus routes, three subway stations and various GO Transit lines, with an expected opening in late 2020. Crosslinx is the largest transit investment in the history of Toronto, a role-model in a time were all large Canadian cities and urban areas, and provincial and federal governments seem aligned to realize that public transit new infrastructures are keys to creating growth.

While macro-factors are essential for successful new transit solutions, integrating a customer-centred approach in an end-to-end assessment is also key for planning, building and operating what matters most to people.

Urban systems are always part radial (in the case of commuting) and part network (in the case of complex business and leisure travel). Accordingly, all relative obstacles to efficient generalized commuting time (interchanges, waiting at platforms, delays, ticketing) must be driven out by exceptional performance, high frequency, and ease of ticket purchase and transfer.[14]

[14] Hall, Tim – Lessons from developing London's Mass Transit and Light Rail – TH Interactive, 2013. Crossrail 2: regional and national benefits – September 2015

Conclusion and guidelines

Creating new transit systems and infrastructure is now an obligation for Canadian cities; most of them are aware that postponing investments any longer will lead to breakdowns and loss of competitiveness in the very short term. It's also a historic opportunity to shape growth by creating jobs and businesses, and by laying the groundwork for activities yet to come, inasmuch as the best examples and practices are followed. In a context of global uncertainty and fast changes, it is one of the safest medium- or long-term social and economic investments.

More specifically:

- Transit systems must be planned with a view to not only follow or anticipate demographic or economic growth, but to actually trigger, create and shape new growth.
- "End-to-end" planning is the major key for optimizing any transit system. End-to-end planning must first address the user's commute, providing convenient interchange both physically (in terms of infrastructure planning) and as per the "smart city" factor (in terms of information/ticketing/fares). Any eventual plan has to be designed with the user in mind, and delivering customer convenience is key.
- Strategic macro-level reflection and planning (economic planning) must be matched with its micro-level counterpart (commuting times and service).
- Having optimized transit systems influences even more car drivers to adopt them, creating strong confidence and making car use a less favoured option. This is the "virtuous circle" of urban transit, and steady development of public transit solutions will maintain that cycle over the years.

Overview

The creation of this white paper was made possible thanks to the contribution of SNC-Lavalin's experts and several independent sources, which are referenced in the text.

While offering a global overview, this white paper focuses on urban transit solutions in Canada. The information is based on major projects executed around the globe, field-related studies, and recent examples of end-to-end transit and infrastructure solutions in urban areas in Canada.

To learn more about this white paper, please contact comm.externe@snclavalin.com.