THE URBAN PROJECT | LE PROJET URBAIN

Transit, Mobility, and Road Safety in Canada

Urban Project Workshop
Framing Report | **February 2020**

Presented by FCM

Contents

1. Introduction 1
2. Mobility Trends 2
3. Challenges and Opportunities 6
4. Enabling Environment 11
5. Policy Solutions and Implementation Strategies 20
6. Next Steps 25

References 26
Appendix 32

About the Authors

Urban Systems is a professional consulting firm committed to supporting vibrant communities. Our interdisciplinary team works with governments, Indigenous communities, private industry, and non-profit organizations to help build communities that are safe, sustainable and prosperous. Urban Systems has broad and deep experience delivering transportation projects—we work with our municipal and regional clients to envision a better future; prepare strategic, multi-modal plans; and design and deliver high-quality, innovative infrastructure that moves communities towards their goals.

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Methodology

The research underlying this Framing Report comes from a best practices and emerging trends review, practitioner experience, and stakeholder interviews with a diverse cross section of municipalities and civil society groups, which helped to identify key challenges and opportunities of transportation across Canada.

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1. Introduction

1.1 Urban Project

The Urban Project is a national platform convened by the Federation of Canadian Municipalities (FCM) for city leadership to meet and strengthen relationships with government, civil society, and the private sector to address pressing urban challenges and identify common solutions.

Launched in 2018, the Urban Project examines urban issues through the lens of cross-cutting themes of city finance, governance, intergovernmental relations, and municipal autonomy. The events bring together decision makers to actively co-create solutions to urgent urban problems at a pan-Canadian level.

1.2 Core Themes

Over the past several years, cities across Canada have recognized the importance of optimizing transit service and promoting safe and sustainable transportation – including walking, rolling, cycling, and transit – as a way to reduce congestion and create vibrant, prosperous, and resilient communities.

However, despite investment levels in the billions of dollars, many cities still face the challenge of shifting behaviour towards sustainable transportation. Bold action and new approaches are required to see rapid, meaningful change to respond to urgent issues related to the climate emergency, a growing public health crisis, road safety concerns, and other challenges.

Transit, active transportation, and road safety have emerged as key focus areas for Canadian cities in addressing pressing mobility challenges. This Framing Report explores these themes, presenting innovative, cost-effective, and actionable solutions for municipalities.

2. Mobility Trends

Most big Canadian cities are still automobile-reliant, with all but Toronto, Montréal, and Vancouver seeing at least two-thirds of commute trips being made by motor vehicle.

This section summarizes mobility trends and the importance of transit, active transportation, and road safety.

2.1 Mobility in Canada

Urban mobility is influenced by a number of factors, including the size, layout, and land use of a municipality; design of, and level of investment, in the transportation network; trip purpose; weather; topography; and individual preferences.

Figure 1 shows the 2016 commuting mode share in 22 of Canada's biggest cities, sorted by the proportion of trips made using sustainable transportation modes.

While roughly half of all commute trips in Toronto, Montréal, and Vancouver involve sustainable modes of transportation (1), the national average remains at 19%, while some major urban centres are even lower.

Transit use consistently leads walking and cycling as the preferred mode of sustainable transportation in these cities, particularly in Toronto and Montreal (37% and 35% of all commutes, respectively).

Examining historic travel trends reveals that more work is needed in order to advance sustainable mobility. Over the past two decades, most Canadian municipalities have made relatively little progress in improving sustainable transportation mode shares. Sustainable transportation mode share in Canada's 22 big cities has seen an average absolute increase of only 0.1% and a relative increase of 5.4% since 1996. This mirrors nationwide trends seen in the United States (2).

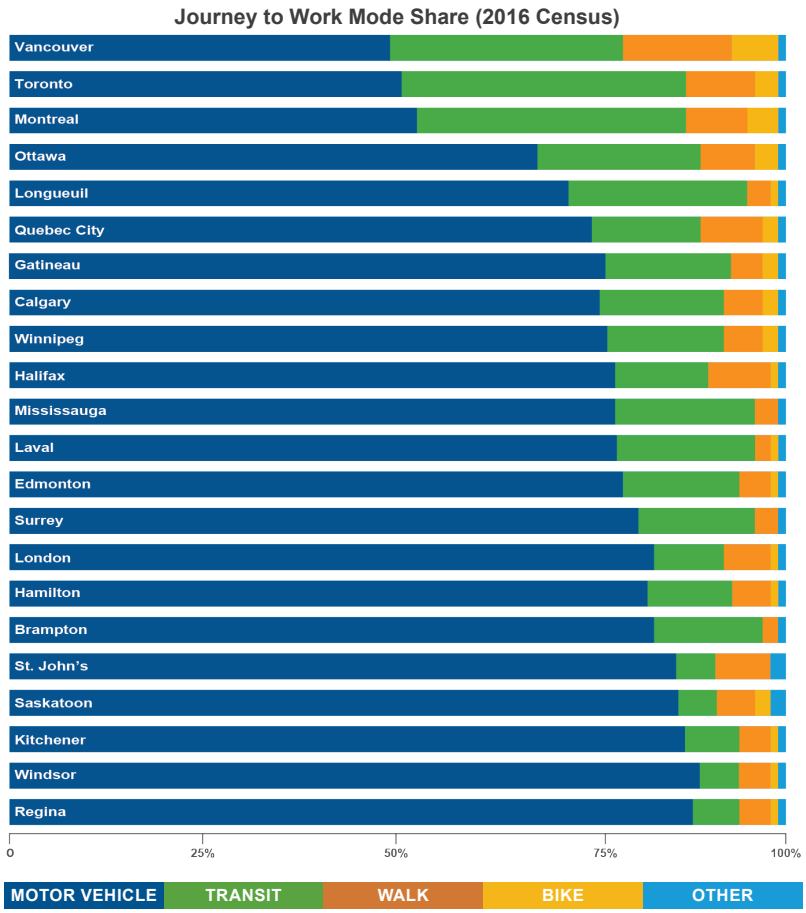

Figure 1 - Commute Mode Share in Canada's 22 Largest Cities (2016 Census)

2.2 Transit Optimization

Providing frequent, reliable, and accessible transit is crucial for enabling sustainable mobility and improving people moving capacity in Canadian municipalities. However, with the exception of a few standout transit systems, transit ridership has slowed, and in some cases declined, in most cities across North America since 2014 (3; 4).

There is no single explanation for this trend (5). Some factors could include gasoline prices, the growing popularity of bikeshare and ride-hailing services (e.g. Uber and Lyft), increasingly dispersed land uses (i.e. urban sprawl), and relatively high transit fares (4; 5). Regardless of the explanation, there is an urgent need to improve transit networks. Transit expansion is necessary but requires major capital expenditures and extensive design and construction periods, resulting in long-term benefits. Transit optimization includes a suite of transit priority measures, infrastructure enhancements, and operational policies that can better utilize existing transit resources by improving speed and reliability. These measures can produce short-term benefits with relatively low capital expenditures and can be implemented concurrently with expansion projects to provide service improvements during design and construction phases.

Many of the most effective tools for optimizing transit are under municipal jurisdiction, including dedicated transit lanes, traffic signals operation, managing curb uses, and enhancing roadway, intersection, and transit stop infrastructure (see **Figure 2**) (6). Multi-modal integration – including better connecting walking and cycling to transit – is also key to transit optimization (7).

TransLink Control	OPERATIONS	Stop Relocation or Consolidation	Boarding Policy	Route Design
Municipality and MOTI Control	SIGNALS	Turn/Movement Restrictions	Queue Jumps	Transit Signal Priorities
		Bus-only Signals	Signal Phase Modification	
	INFRASTRUCTURE	Bus Platform Design	Bus Bulges	Boarding Islands
		Roadway Channelization	Parking Removal	Turn Radii Improvements
	TRANSIT LANES	Curb-side Bus Lanes	Interior/Offset Bus Lanes	Median Bus Lanes
		Contraflow Bus Lanes	Queue Bypass/Transit Approach Lanes	

Figure 2 - Transit Optimization Measures (Source: TransLink Bus Speed and Reliability Report)

2.3 Active Transportation

Municipalities recognize the myriad benefits of active transportation, including improved public health, air quality, accessibility, and road safety in addition to decreased greenhouse gas emissions and capital expenditures on roadway maintenance. Additionally, active transportation and transit represent a highly efficient use of road space, as shown in **Figure 3**.

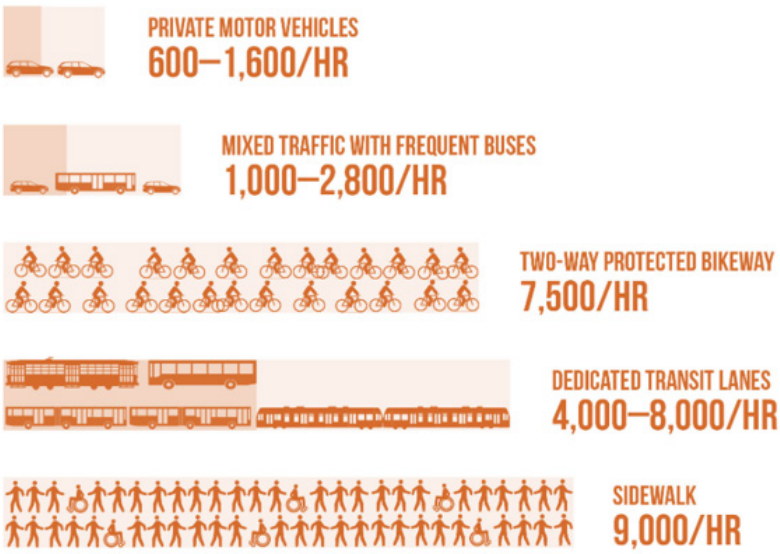

Figure 3 - People Moving Capacity by Mode (Source: NACTO Transit Street Design Guide)

Active transportation mode share remains relatively low in Canada, with mixed results across the country. Between 1996 and 2016, cycling mode share increased an average of 15.2% among the 22 big cities, with Gatineau (109% relative change), Montréal (99%), and Vancouver (88%) leading the way. However, cycling in 10 of the 22 big cities decreased in the same period.

Meanwhile, walking mode share decreased an average of 18.2% between 1996 and 2016. The only cities that saw increases in walking in this same period were Gatineau (68% relative change), Vancouver (28%), and Mississauga (3%).

2.4 Road Safety

Road safety continues to be a major concern for Canadian cities, with motor vehicle collisions being one of the leading causes of accidental death in the country. Each year, nearly 2,000 people are killed and a further 165,000 are injured (10,000 seriously) while using the transportation network in Canada (8). It is estimated that motor vehicle collisions cost Canadians $37 billion annually (8).

Improvements to road safety play an outsized role for sustainable transportation users, as pedestrians and cyclists are significantly more vulnerable to suffering death or serious injury in a collision. While pedestrians and cyclists combined only account for approximately 7% of commuter trips, they account for nearly 20% of traffic fatalities in Canada (9). Further, pedestrian deaths in Canada have actually increased 6% since 2014, consistent with the trend in the USA (9; 10).

Governments around the world have begun implementing Vision Zero strategies, which aim to prioritize human health and safety by eliminating all traffic-related fatalities and serious injuries. Vision Zero represents a paradigm shift in the approach to road safety and can have significant positive results (11; 12).

3. Challenges and Opportunities

Canadian municipalities face significant challenges to enabling a meaningful shift towards sustainable transportation and eliminating traffic-related fatalities and serious injuries, but there are many opportunities for improvement.

This section touches on these challenges and opportunities.

3.1 Land Use

Transportation and land use planning are inextricably connected, with land use patterns dictating how people move around cities and regions.

Challenges

- More than two-thirds of Canadians live in suburbs, and the vast majority of population growth is occurring in these areas (13). Suburbs are typified by low-density, automobile-oriented development.
- Jobs have been moving away from the city centre in large metropolitan areas, leading to longer commutes to, within, or between suburbs (14). Long commutes have negative impacts on personal health, productivity, congestion, greenhouse gas emissions, and roadway infrastructure (15).

Opportunities

- The “Five Ds” of the built environment – Density, Diversity, Design, Destination, and Distance to transit – have been found to promote walking, cycling, and transit while reducing motor vehicle trips, especially when multiple measures are combined (16; 14).
- Planning on a regional basis and creating compact, transit oriented ‘Urban Centres’ to accommodate growth and combat urban sprawl (e.g. Metro Vancouver) (17).
- Designing interesting and attractive neighbourhoods with a range of pedestrian-scale amenities can encourage people to get out of motor vehicles and experience the street on foot or by bike (18).

3.2 Demographics

Canada's population is rapidly growing and ageing, which presents challenges in servicing growth and development, impacting mobility patterns and accessibility.

Challenges

- Between 2018 and 2068, Canada's population is projected to increase from 37.1 million in 2018 to 55.2 million people (19).
- The proportion of seniors (aged 65 and over) is set to increase from 17.2% in 2018 to between 21.4% and 29.5% by 2068 (19).
- Seniors and older adults travel less for commuting purposes, have more mid-day and shorter-distance travel patterns, and may be more reliant on alternatives to driving motor vehicles. They are also overrepresented in traffic fatalities and serious injuries (9).

Opportunities

- Directing population growth to communities with land uses conducive to sustainable transportation.
- Designing universally accessible transit and active transportation networks that function for people of all ages and abilities. This can help seniors maintain a greater level of mobility, increase their access to services, social networks, and recreation, and increase their physical activity (20).

3.3 Public Health

Canada is facing a public health crisis, with increasing levels of overweight and obese Canadians – and public health costs – over the past several decades. In 2009, the estimated total health care cost of physical inactivity in Canada was $6.8 billion (21).

Challenges

- Only 20% of adults and 10% of children and youth meet the Canadian Physical Activity Guidelines for physical activity per day or week (22). Seniors have also been found to be less physically active than adults (23). Physical inactivity is one of the main leading risk factors for global mortality and is an underlying factor for many chronic diseases (24).
- Long commutes have been shown to negatively impact physical and mental health, safety (due to increased risk of collision), family relationships, and social capital (15). People commuting by motor vehicle are more likely to be negatively impacted than people with long transit commutes (15).

Opportunities

- Improving active transportation networks has been shown to improve both physical and mental well-being and to prevent weight gain and obesity (25; 26). These benefits far outweigh the dangers posed by exposure to air pollution and risk of collision (27).

- Implementing transportation demand management (TDM) and Active School Travel (AST) programs can help to develop healthy travel behaviours, especially when combined with infrastructure improvements (28; 29).
- Partnering with health agencies and other stakeholders to research, promote, and fund improvements to transit, active transportation networks, and community design.

3.4 Climate Emergency

Governments around the world – including many Canadian municipalities – have declared a climate emergency (30; 31). The transportation sector is the second largest emitter of greenhouse gases, contributing 24% of Canada's greenhouse gas emissions in 2017 (32).

Challenges

- Between 1990 and 2017, transportation-related greenhouse gas emissions have increased by 43% (32)[1]. Total passenger vehicle emissions made up 54% of transportation-related emissions in 2017 and have increased by 32% since 1990 (32).
- Climate change is contributing to an increase in severe weather events, which have significant economic impacts a significant impact on the Canadian economy (33; 34).

Opportunities

- Funding and designing sustainable transportation networks will help meet climate goals by reducing vehicle kilometres driven and greenhouse gas emissions.
- Active transportation users have approximately one-tenth the ecological footprint of a person who commutes by motor vehicle (35).
- Transit optimization makes transit a more attractive and efficient transportation mode, attracting people to switch from motor vehicles. The electrification of transit vehicles will make an already efficient transportation mode even more sustainable.

3.5 Cost of Congestion

With a growing population and continued reliance on motor vehicles, congestion is becoming a significant environmental and economic issue that impacts the efficient and reliable flow of people, goods, and services.

Challenges

- The direct annual costs of congestion amount to $7 billion in Toronto, $1.7 billion in Greater Montréal, and $1.4 billion in Metro Vancouver (36). Costs in Toronto are projected to rise to $15 billion annually if no action is taken (36).
- Hidden costs imposed by forgone trips have comparable economic impacts to direct congestion costs in major Canadian cities (36).

[1]This increase is due to more vehicles on the road, an increase in total trips, and changes in vehicle fleet composition. Improvements in fuel efficiency have been unable to keep pace with the increasing preference for light trucks and sport utility vehicles (32).

- Over 90% of Canadian consumer goods transported by truck, and goods movement is severely impacted by congestion (36).
- Congestion impacts the frequency and reliability of transit, necessitating significant increases in operating costs just to maintain existing service levels. For example, TransLink estimates that over $75 million in costs per year (12% of annual bus operating costs) are attributable to congestion (6).

Opportunities

- Mobility pricing – a coordinated approach to paying for mobility that includes road usage or decongestion charging – can help to manage congestion, encourage the use of transit and active transportation, and generate revenue for the transportation system while improving travel times and reliability for people who continue to drive. Successful mobility pricing systems have demonstrated 15-20% reductions in traffic and approximately 33% reductions in congestion (37).

3.6 Equity

Certain groups tend to be more negatively impacted by inequities in the transportation system, including children, youth, seniors, single parents, women, people with low incomes, ethnic minority populations, and people with disabilities (38; 39). A lack of access to transportation services can limit individual economic development and cause social exclusion (40; 38).

Challenges

- Transportation costs are second only to housing as a percentage of household spending in North America (41). Transportation spending is disproportionately high among low- and moderate-income families.
- The annual cost of owning and operating vehicle can be a barrier for many groups (42; 43), children and youth are not yet allowed to drive motor vehicles, and seniors have reduced abilities to drive.

Opportunities

- Designing transportation networks using the Gender-Based Analysis Plus (GBA+) lens, which considers sex, gender, race, ethnicity, age, religion, and mental or physical disability (44).
- Providing subsidized transit (concessionary fares) for youth, students, and people with low incomes can help gain ridership and increase mobility.

3.7 Emerging Trends

Transportation systems are undergoing a revolution thanks to the introduction of 'new mobility' options, including shared mobility systems, the electrification of transportation, the advent of autonomous technology, and Mobility-as-a-Service (MaaS) platforms.

Challenges

- The implementation of autonomous technology carries significant uncertainty regarding timelines, the extent of automation, and whether ownership will be shared or private. Thoughtful policy making is required in order to avoid negative externalities.
- There is evidence that ride hailing is contributing to congestion in urban centres. For example, San Francisco experienced a 60% increase in congestion between 2010 and 2016 (45; 46). Studies also show that up to one-third of ride hailing trips would otherwise have been taken using transit or active transportation (45).
- The majority of 'new mobility' services are operated by private companies, which exposes municipalities to market fluctuations and private business decisions (e.g., Share Now pulling out of North America (47)). Municipalities need to create regulatory policies to manage private partnerships and integrate emerging modes into the sustainable transportation network.
- There is increasing competition for curb space in urban environments, with on-street parking, bicycle facilities, goods and service delivery, ride hailing, and pedestrian facility improvements all vying for space.

Opportunities

- Shared mobility systems, including bikeshare, scootershare, and carshare, can be used as a first- and last-mile solution to help connect users to transit.
- The growth in electric bicycles (e-bikes) for personal transportation and goods movement has opened up new markets for active transportation.
- On-demand transit service has the potential to provide flexible service that can be booked using an app, website, or phone. Example projects include Oakville Region, York Region, Halifax, and TransLink.
- Municipalities can partner with transit agencies, researchers, and other organizations to innovate the transportation network. Examples include electrifying transit and experimenting with integrated payment systems (48; 49).
- Innovations in monitoring and data collection enable the more advanced planning and management of transportation networks and infrastructure, including parking and mobility pricing.

4. Enabling Environment

Each municipality operates within a unique environment created by the interplay of programs, policies, and politics at all levels of government. This environment influences the planning, funding, and implementation of transportation projects.

This section describes the enabling environment for transportation policy and programs.

4.1 Supportive Policies and Incentives

National Level

Canada has a national transportation plan called "Transportation 2030," a broad strategic plan covering all aspects of the transportation network (50). However, numerous advocates and municipalities – including a FCM members' resolution approved in 2018 – have called for a more detailed National Active Transportation Strategy or Policy, which would help direct increased funding and attention to active transportation projects across the country, update policies and available data and address coordination challenges (51; 52; 53).

A number of other countries have similar strategies, such as:

- Australia: National Cycling Strategy (2011-2016) (54)
- France: National action plan for active mobility (Plan d'action mobilités actives – PAMA) (55)
- Finland: National strategy for walking and cycling 2020 (Kävelyn ja pyöräilyn valtakunnallinen strategia 2020) (55)

The European Union has a number of urban mobility policies, programs, and funding opportunities available to their member states, with a strong focus on clean transportation and road safety (56). Specific funds include EU structural and investment funds (ERDF, ESF, Cohesion Fund) as well as technical/advisory services for grants and loans. Cohesion funds are similar to equalization payments in Canada, where richer member states help support projects in poorer member states.

Provincial Level

The level of support and funding for transportation at the provincial level varies widely across Canada. Some examples of provincial sustainable transportation policies are provided below:

- Québec: Québec is at the leading edge of sustainable transportation policy, having adopted a Sustainable Mobility Policy in 2018. This integrated mobility policy covers all aspects related to passenger and freight

mobility and sets ambitious targets for access to mobility, travel times, road safety, GHG emissions, and costs for individuals and businesses (57). The 2018-2023 action plan is based on this policy and includes added funding to improve transit operations, with a target of increasing the public transit service offering by 5% per year. A variety of provincial funding programs support the implementation of this policy, including SOFIL (Société de financement des infrastructures locales du Québec), which is currently supporting the electrification of buses in Québec.

- British Columbia: BC recently adopted "Move. Commute. Connect. B.C.'s Active Transportation Strategy," is the first strategy of its kind in BC. Released in 2019, the strategy sets out to double BC's province-wide active transportation mode share by 2030 and work towards Vision Zero by identifying a number of short-, medium-, and long-term actions (58). One action was to provide additional funding opportunities through the redesigned Active Transportation Grant Program. This program supports municipalities of all sizes and is set up to provide a larger proportion of cost-share funding for rural and Indigenous communities, to help them improve their networks.

- Ontario: The Dedicated Ontario Gas Tax Funds for Public Transit Program supports both capital and operating expenses, giving municipalities much-needed flexibility. The fund is formula-based – 70% based on ridership and 30% on population – which rewards high ridership but also allows for transit expansion in growing communities. The Ontario Gas Tax for Transit program had been scheduled to be doubled from two to four cents per litre starting in 2019. However, in the 2019 Ontario Budget, the Ontario Gas Tax expansion was cancelled by the provincial government (59).

Regional Level

Regional-level planning can be hugely advantageous for coordinating transportation across large, linked regions. Regional governance structures vary widely across the country. TransLink is an excellent example of regional planning and integration. TransLink's service area covers all of Metro Vancouver, which is home to nearly 2.5 million people across 21 municipalities, one Electoral Area, and one Treaty First Nation. TransLink is overseen by a Mayors' Council composed of representatives from each of the 23 member communities and works in parallel with Metro Vancouver to coordinate regional land use and transportation planning.

TransLink also has a multi-modal mandate, making it distinct from many other transit agencies. In addition to transit, it coordinates regional planning for the major road network, active transportation, and goods movement, and provides funding support for building and maintaining regionally significant infrastructure. The funding is contingent on providing high-quality infrastructure in strategic locations, helping to ensure a coordinated and consistent multi-modal transportation network.

This regional, multi-modal approach has proven effective in other jurisdictions as well. In London, England, Transport for London (TfL) has authority over the region's rail-based transit, streets, bicycle facilities, and pedestrian infrastructure, and is in charge of implementing the city's congestion charge (60). The San Francisco Municipal Transportation Agency (SFMTA) also has authority over the majority of the streets, sidewalks, and rails in the city, including parking and taxi services (60).

While regional coordination is often seen in larger urban areas, it can also be beneficial for smaller communities. In Germany, small and mid-sized cities often form regional associations to share in cost of planning and operating transportation networks. The largest alliance is the Rhein-Neckar-Verkehr GmbH, an alliance of five transit agencies operating in three middle sized cities (Heidelberg, Mannheim and Ludwigshafen) and the surrounding urban region (61).

4.2 Transportation Funding

Funding Considerations

A lack of consistent, stable, and predictable funding for transportation, is a major challenge and can be a barrier to advancing priority projects while simultaneously meeting state of good repair needs of the existing transportation network.

At the municipal level, capital project funding typically comes from general revenue and is allocated through a 5- to 10-year capital planning process that sets priorities for all areas of municipal responsibility including but not limited to transportation. Funding also comes from provincial and federal contributions, advertising revenues, and fares in the case of transit.

Federal contributions take the form of annual transfers through the permanent federal Gas Tax Fund, which provides $2.2 billion annually in predictable transfers for municipal capital projects across a variety of assets including local roads and transit, and project-specific grant funding through the Investing in Canada Plan. Many Canadian cities apply federal Gas Tax Fund transfers towards transit in particular fleet renewal and state of good repair. The $20.1 billion Public Transit Infrastructure Stream of the Investing in Canada Plan, ending in 2027-28, supports a range of capital projects with a focus on major rapid transit expansion projects with predictable funding provided to all transit systems. Improvement and rehabilitation of public transit infrastructure, and active transportation projects are also eligible. The Public Transit Infrastructure Fund announced in Budget 2016 invested another $3.4 billion in transit and active transportation projects.

Provincial contributions vary by province, but typically include capital grants including matching funding for federal funding under the Investing in Canada Plan. Many provinces provide some form of operating funding for transit systems in additional to supporting capital projects. The federal government does not provide any funding for transit operating costs.

The predictability and overall level of funding have a significant impact on long-range planning and implementation. For example, an examination of public transit in Scandinavia found that the region's higher levels of revenue for transit has contributed to high quality service and high ridership (62), underlining the importance of adequate funding.

The level of investment in each transportation mode is also important to consider. Traditionally, the vast majority of municipal transportation budgets go towards roadway projects, and in large cities, transit expansion and state of good repair, with only a small portion dedicated to transit optimization and active transportation. Increased funding for active transportation can go a long way, as walking and cycling infrastructure can be relatively cost-effective compared to road projects (63; 64).

Because infrastructure plays such a large role in increasing mode share, the level of investment is often directly related to mode share. For example, British Columbia spends approximately $1.50 per person each year on active transportation, which has resulted in a province-wide cycling mode share of only 2.5% (65). By comparison, the Netherlands invests $48 per person annually on active transportation programs and has cycling and walking mode shares of 27% and 18%, respectively (65; 66). Meanwhile, Denmark spends $34 per person annually and has an overall cycling mode share of 16%, and 26% of all trips under five kilometres are completed by bicycle (65; 67).

Another consideration is the difference in funding support for capital costs compared to operating and maintenance costs. When capital projects are approved, there is not always an accompanying increase in the operations and maintenance budget. This can be exacerbated by federal and provincial funding programs that focus on capital projects while leaving municipalities fully responsible for lifecycle operating and maintenance costs. This can put a strain on municipal budgets that now may need to operate and maintain an expanded transportation network with no additional funding if not properly planned for.

The Canadian Urban Transit Association (CUTA) has reported that there is a direct relationship between operating funding, revenue service hours, and ridership: for every 10% increase in service operating budget, ridership is expected to increase by 5.5% (68).

Alternate Funding Mechanisms

There are a number of strategies that can help to increase funding predictability and cover both capital and operating costs. CUTA released a report in 2015 detailing a number of alternate funding mechanisms, including user-based charges, vehicle ownership charges, land value capture, land-based charges, non-user-based charges, and other charges (69). A few examples are briefly outlined below.

- Dedicated reserve funds: allow municipalities to be proactive, rather than reactive, when planning and implementing transportation projects. Toronto's City Building Fund is an example of a property tax levy that raises funding for major transit and

housing capital initiatives (70). Quesnel and Port Moody, in BC, also have tax levies set aside for asset renewal work, including roadwork and sidewalks (71; 72).

- Taxation revenue: Taxation represents an effective and consistent form of revenue but can be very challenging to implement from a political perspective. TransLink, for example, receives approximately 50% of total revenue from a regional fuel tax, a property tax, and levies on hydro and parking (73). Value capture strategies – capturing location-based value accrued by transportation systems – can also be used under the taxation umbrella to fund transit expansion and operations (60). San Francisco gets 25% of its operating budget from parking revenues and also imposes a value capture based impact fee on development that is projected to raise $1.2 billion over 30 years for transit vehicles, transit optimization, and active transportation infrastructure (74). The Halifax Local Transit Tax applies to all residential and resource properties within a one kilometre walk of a transit stop to fund Metro Transit's conventional services, including adding new routes and service schedules, and it covers roughly 30% of the annual conventional transit service expenses (69). Paris, France has a transport tax on income (Versement Transport), which supports both capital and transit operating expenses, providing 40% of the Paris Transport Authority (STIF) budget (69).
- Mobility Pricing: is a suite of fees for using transportation services, such as transit fares, road/bridge tolls, road usage charges (i.e. congestion pricing), and any other fees associated with moving people or goods. The fees collected can be invested into improving the transportation system. Stockholm's congestion tax was implemented in 2007 and covers both capital and operating costs, with annual revenues estimated to be around $131 million CAD (69; 75). Canadian municipalities and transit agencies are currently studying the implementation of congestion pricing (37).
- Development-related Charges: (e.g. Development Charges, Development Cost Charges (DCCs), impact levies, and off-site levies) can be put towards transportation projects, although not all transportation infrastructure and costs are eligible. For example, in BC, DCCs can fund capital costs for a range of projects (e.g. transportation planning, sidewalks and other pedestrian facilities, bicycle infrastructure, and transit provisions), but neither operating costs nor equipment such as buses may be funded.
- Matching Capital and Operating Increases: As noted above, new capital projects can often strain operating and maintenance budgets. Policies can be created at the municipal level to ensure that operating budgets increase proportionally with capital projects. For example, Coquitlam, BC has a standing policy stating that anytime council approves a new capital expense, the operating budget must be increased by a certain percentage to accommodate the growth.

4.3 Asset Management

Asset management is an integrated, collaborative business approach involving planning, finance, engineering, maintenance and operations by which municipalities manage their assets to achieve an optimal balance between the community's service

expectations and their willingness and capacity to pay for the infrastructure and land assets that underpin these services.

Proper asset management is integral in the expansion and maintenance of a transportation network. Municipalities that have managed their assets according to asset management best practices tend to have increased flexibility and capacity for expanding transportation services, creating a more positive enabling environment. Asset management is key for not only preserving existing levels of service on all types of transportation infrastructure, but also for being able to expand that level of service to better serve the community.

Additionally, proper asset management is necessary for managing risk associated with municipal infrastructure, including planning ahead for potential negative impacts that could affect the transportation network. For example, municipalities should consider the impact of climate change-induced sea level rise and storm surges with respect to the construction of waterfront pathways. Committing to asset management at a municipal level ensures that cities are properly set up to enable safe, sustainable transportation.

4.4 Common Standards and Design Guidelines

A wealth of additional design guidance exists at the local, national, and international levels for building active transportation facilities, optimizing transit, and improving road safety. However, no design or accessibility standards exist at the national level in Canada, and it can be challenging for designers to access available and relevant resources that meet the unique needs of their city or project. This lack of standardization results in inconsistent user experiences in transportation networks across the country.

The Transportation Association of Canada (TAC) has produced a suite of national guidelines, including the Geometric Design Guide for Canadian Roads and the Manual of Uniform Traffic Control Devices for Canada, that serve as the primary resource for Canadian planners and engineers. TAC guidelines provide an excellent starting point for designing transportation infrastructure, but do not cover all of the nuances of active transportation and transit design.

Other groups such as CSA Group and Transport Canada also provide national-level guidance on a diverse range of topics, including accessibility, rail crossings, safety for cyclists and pedestrians around heavy vehicles; however, no comprehensive national active transportation or transit design guidance currently exists.

At the local, regional, and provincial levels, there are a range of designs that have been developed by municipalities, regional districts, provincial governments, transit agencies, and civil society groups. While some of this design guidance is broadly applicable across Canada, other elements have been written for specific regulatory and geographic contexts, including:

- British Columbia Active Transportation Design Guide

- British Columbia Community Road Safety Toolkit
- Ontario Traffic Manual Book 18: Cycling Facilities (current version and update in progress)
- Vélo Québec: Aménager pour les piétons et les cyclistes (Planning and Design for Pedestrians and Cyclists) (2010 edition – English; 2019 edition – French only)

In the United States, the Americans with Disabilities (ADA) Act and ADA Standards for Accessible Design set a high bar for accessibility, helping provide consistency and accessibility in the pedestrian transit networks in particular. Additionally, the Federal Highway Administration (FHWA), American Association of State Highway and Transportation Officials (AASHTO), and other groups provide national-level guidance for the development of transit and active transportation facilities.

The National Association of City Transportation Officials (NACTO) provides guidance at a North American level with publications such as the Global Street Design Guide, Transit Street Design Guide, Urban Bikeway Design Guide, Designing for All Ages & Abilities, and Guidelines for Regulating Shared Micromobility, among others.

Internationally, there are examples of both local and national-level guidelines and standards that help to provide a consistent experience for transit and active transportation users. The Netherland's CROW Design Manual for Bicycle Traffic is considered international best practice. The Cycling Embassy of Denmark released the Collection of Cycle Concepts 2012, while the City of Copenhagen published the Focus on Cycling: Copenhagen Guidelines for the Design of Road Projects. Other cities, including London, Auckland, Melbourne, Boston, and many others, have their own transit, active transportation, and complete streets guidance that can serve as examples for Canadian municipalities.

4.5 Transportation Data

Data collection and analysis is crucial for enabling transportation professional to make informed decisions, monitor progress, and share results with the public and decision makers. Transportation data collection methods include:

- Census Data: Statistics Canada conducts the Canada Census every five years. An important limitation of census data is that it only includes commute trips to work or school and does not include any other types of trips (e.g. shopping, recreation, accessing services, etc.). Census data can be used to determine the effectiveness of transportation-related investments at a city-wide or neighbourhood-scale but cannot be used to monitor use on individual corridors. Civic censuses are also undertaken by some municipalities and can include transportation data.
- Travel Diary Surveys: Conducted in many communities to gather travel patterns and behaviour data, typically over a 24-hour or longer period. The data collected includes transportation mode, origins and destinations, trip purposes, trip start and end points, and day of travel. Examples include the TransLink Trip diary, the City of

Vancouver Transportation Panel Survey, and the Transportation Tomorrow Survey in southern Ontario.

- Cordon and Corridor Counts: Involves establishing a cordon around a designated area and collecting data on how people travel into and out of the cordon during a set period. This technique can examine entire areas (e.g. a downtown core) or can be corridor- or location-specific. Count techniques include manual counts, video and infrared detection, radar sensors, and physical detection (e.g. piezoelectric strips or pneumatic tubes).
- Big Data: There have been significant technological advancements in collection and storage of data. Data from smart transit cards, GPS-based applications, mobile phone positioning, social media data, image data (e.g. satellite imagery and land-based video), and shared transportation services such as bike share, car share, and ride hailing can all be useful for transportation professionals (79). However, there remain questions regarding the application and ownership of this data, with much of it coming from private individuals and businesses.

Additionally, municipalities can partner with external partners such as health districts, insurance, and police to secure data on motor vehicle collisions and health outcomes. This data is especially crucial for identifying ways to improve road safety and underlines the importance of developing strong multi-disciplinary partnerships.

Internationally, there are other examples of data sharing that could benefit Canadian municipalities (80), including:

- CitiesACT: an online database providing access to climate change, Air quality, transportation, and energy data and indicators for Asian cities and countries, with data compiled from international and national statistical sources, national and local statistical yearbooks, surveys, secondary data sent by network partners, and correspondence with national ministries. Learn more at citiesact.org.
- European Platform on Mobility Management (EPOMM) – TEMS Modal Split Tool: An online tool allowing access to transportation mode share data from over 250 cities across Europe. Users can select a city from the map or compare a group of cities using the search options in the menu. Learn more at epomm.eu/tems/.
- Korea Transport Database: National system that comprehensively manages and analyzes transportation statistics and surveys to help inform national plans and policies. Includes transport demand forecasts and a “KTDB Lab Platform” that utilizes big data to bring together data from a number of sources. Learn more at ktdb.go.kr/eng/index.do.

4.6 Public Support

As noted in **Section 2.0**, most big Canadian cities are still automobile-oriented, with all but Toronto, Montréal, and Vancouver seeing at least two-thirds of commute trips being made by motor vehicle. This reliance on the motor vehicle results in a pervasive driving culture in most Canadian cities. Encouraging a shift to sustainable forms

of transportation is not only behavioural change but can also be a difficult cultural change that is often perceived as a challenge to the status quo. Furthermore, relatively short political cycles can make the implementation of long-term transportation plans challenging, especially when a change in government occurs and priorities and funding are shifted.

The preference for driving can lead to public, political, and media pushback against transportation measures with actual or perceived negative impacts on motor vehicle travel. Installing bicycle infrastructure can be particularly contentious, with many examples of municipalities struggling to gain support for projects or seeing bicycle facilities being removed retroactively due to pushback (e.g. Saskatoon and Edmonton).

The implementation of dedicated transit lanes has proven to be just as challenging in many jurisdictions, from Vancouver to Saskatoon to Montréal. Furthermore, transit use is still stigmatized in many cities, especially outside of Vancouver, Toronto, and Montréal in cities with lower transit mode share.

The removal or redistribution of motor vehicle parking is often necessary in order to reallocate road space for sustainable transportation. This process is highly contentious amongst residents and businesses. Business owners tend to overestimate the number of customers that arrive by motor vehicle (81).

There are signs of culture change occurring. North American studies suggest younger generations have lower car ownership rates than previous generations. Additionally, the rise of a new generation of Canadians who are demanding increased government action on the climate crisis, and who desire seamless multi-modal transportation options, will make it easier to gain political support for bold transportation initiatives. Municipalities can engage this group to build and spread support for projects.

5. Policy Solutions and Implementation Strategies

Implementing transportation measures that improve transit, active transportation, and/or road safety can be extremely challenging, as outlined throughout this report. However, there are many examples of successfully implemented transportation plans, policies, and strategies that can inspire meaningful change in Canadian municipalities.

The following section summarizes overarching lessons from national and international research and outlines specific lessons learned for each of the three mobility themes. A summary of select case studies is provided in the **Appendix**.

5.1 Overarching Lessons

A number of common elements emerged through the jurisdictional scan, bridging the different topics and projects. The following underlying lessons have proven to be effective in creating bold, meaningful change to transportation networks across the world.

Pilot Projects

Pilot project have proven effective across all types of transportation projects examined. Pilot projects can be used to implement new transportation enhancements in a rapid, cost-effective, and temporary manner, without requiring the same level of capital investment or public support. This minimizes political risk and allows municipalities to showcase the benefits of a project in real life, helping to win over skeptics. Additionally, pilot or promotional programming – such as free bikeshare signup or free transit to and from special events – may be offered to attract new users.

Data Collection (Monitoring, Evaluation, and Adaptation)

Data collection is a crucial component of transportation planning and design. When implementing both pilot and permanent projects, municipalities are most successful when they monitor the impact of their projects by collecting data. This data must then be analyzed, with the results shared publicly to share successes and ensure transparency. Once the project is evaluated, it should be adapted as needed to improve performance. This is especially relevant for pilot projects and can make the difference for ensuring that they become permanent.

Coordination of Transportation and Land Use Planning

The interconnectedness of land use and transportation was evident across all projects. Transit and active transportation projects are most successful where land use and transportation planning have been coordinated, creating environments that are conducive to multi-modal transportation.

Meaningful Multi-Disciplinary Partnerships

Transportation planning is by nature a multi-disciplinary exercise that cannot be carried out in a silo. Municipalities that are able to partner with a wide range of stakeholders, including different levels of government as well as civil society groups, health districts, law enforcement, business improvement districts, the general public, and others, have had the most success in creating positive impacts.

Long-Range Vision and Execution

Transportation systems do not improve overnight – it can take time, patience, and determination to see meaningful system-level change. To be successful, municipalities must execute a long-range vision, which can be challenging across changing governments and capital budget cycles. It is important to identify small successes along the way, using them to build momentum and applying those lessons on a system-wide scale.

5.2 Transit Optimization Lessons

- Specific transit corridors and networks that provide efficient, comfortable, and reliable service have seen major ridership growth, while many transit systems as a whole are struggling to maintain ridership.
- Giving transit priority over passenger vehicles along key corridors creates conditions that lead to increased transit ridership. Reallocating existing right-of-way to transit priority through dedicated transit lanes or other transit priority measures is the most cost-effective way to increase the overall capacity of the corridor and leads to more reliable travel times. Creative approaches can be used to reallocate existing right-of-way (e.g. Gatineau Rapibus BRT case study in **Appendix**).
- Minimizing motor vehicle traffic and turning movements improves pedestrian conditions along transit corridors and creates a more attractive pedestrian environment.
- Data collection and analysis is essential to finding opportunities to optimize bus transit corridors and networks.
- Policies that target youth and students can expand transit ridership by attracting new users and creating sustainable transportation habits.

TRANSIT OPTIMIZATION CASE STUDIES IN THE APPENDIX:

Click the titles to jump to the case study in the Appendix

1. **City of Gatineau: Rapibus Corridor**

   A dedicated, 12 km. BRT corridor that makes use of an underutilized rail right of way.

2. **City of Toronto: King Street Transit Pilot**

   A streetcar priority corridor in downtown Toronto, created by implementing motor vehicle movement restrictions, reallocating on-street parking, and upgrading and repositioning transit stops.

3. **City of Kingston: Transit Route Optimization**

   Dramatic shift in transit ridership after making a number of changes to the transit network.

4. **City of New York: B44 Bus Line**

   Improved speed and reliability of a major north-south route in Brooklyn by implementing off-board fare collection and dedicated bus lanes, consolidating bus stops, and rerouting of the northbound routes.

5.3 Active Transportation Lessons

- A complete and connected network of bicycle facilities is required to see a significant increase in cycling mode share.
- Cities that have focused on infrastructure in the areas of highest demand (such as downtown cores) have seen greater success than investments in lower density suburban areas, particularly if those facilities do not have broader connections to the active transportation network.
- Focusing on safe, comfortable, convenient, and connected networks of All Ages and Abilities bicycle facilities can see significant gains in ridership and encourages more diverse cyclists.
- Physically separated facilities are required on corridors with high traffic volumes. Best practice guidance on when physical separation is required varies between provincial, national, and international design guidelines.
- Rapid implementation at a network level is more effective in increasing ridership than building projects in isolation. Pilot projects are an effective way to reduce the implementation time of on-street protected bicycle lanes and can help build support for changes to the street design.
- Robust active transportation networks connected to an efficient transit network leads to people making multi-modal trips, linking walking, cycling and transit.
- Transit-oriented development hubs provide a major opportunity for large walking and biking mode share on a neighbourhood level. Ensuring mixed-use land use and high-quality active transportation facilities creates an inviting environment.
- Winter maintenance is essential to creating an environment that supports and encourages walking and biking throughout the year.
- Implementation costs for a network of protected bicycle facilities is orders of magnitude smaller than other transportation infrastructure capable of moving similar volumes of people, such as mass transit or road widening.

ACTIVE TRANSPORTATION CASE STUDIES IN THE APPENDIX:

1. **City of Calgary: Centre City Cycle Track Pilot**
   Click the titles to jump to the case study in the Appendix

   18-month pilot project that installed four on-street cycle track corridors that created a grid network 6.5 km in length through downtown Calgary.

2. **City of Montréal: Protected Bicycle Network**

   The City of Montréal more than doubled the number of kilometres of the network since 2009 from 400 km to over 875 km, with more than 400 km maintained through the winter.

3. **City of Seville: Protected Bicycle Facilities**

   Rapid implementation of a protected bicycle network, with an 80 km grid built in 18 months for a total of 180 km.

5.4 Road Safety Lessons

- Vulnerable road users, such as people walking and cycling, are disproportionally killed and injured by traffic collisions and need special consideration when looking at street design.
- Data is crucial to understand the causes and locations of KSIs, and to learn if interventions are leading to safer streets. Strategic partnerships, ongoing communication, and data sharing between various stakeholders is essential.
- Bold changes are required to see significant reductions in KSI collisions. This can require making difficult trade-offs, such as prioritizing human safety over convenience (e.g. removing on-street parking to install protected bicycle infrastructure).
- Reducing motor vehicle travel speeds and limiting the amount of traffic is the most effective way to improve road safety for all road users.
- Road pricing has been effective at reducing traffic volumes and leading to safer streets.
- Pilot projects to improve road design at problematic locations is an efficient way to quickly improve the safety of dangerous locations without requiring extensive public consultation and slow implementation times. Examples range from corridor wide improvements to temporary traffic calming curbs like used in Calgary to create curb extensions with a physical barrier in an affordable and quick manner.
- Adequate funding is essential to making meaningful change. Vision Zero plans are a good starting point, but without sufficient budget to implement the plans and construct infrastructure improvements, these plans will have limited success.

ROAD SAFETY CASE STUDIES IN THE APPENDIX:

Click the titles to jump to the case study in the Appendix

1. **City of Edmonton: Vision Zero**

   Traffic-related fatalities decreased by 41% in the first three years after adopting Vision Zero, while serious injuries decreased by 17%.

2. **City of Oslo: Vision Zero**

   Political support for road safety initiatives and major changes to the street network led to a single recorded motor vehicle fatality in 2019, and no pedestrian or cyclist fatalities.

3. **City of Montréal: Vision Zero**

   Road safety improvements from Montréal's 2008 transportation plan led to a 50% reduction in KSI collisions between 2008 and 2014, and the city recently adopted a Vision Zero action plan with the target of eliminating all traffic-related fatalities.

6. Next Steps

This Framing Report will be used to facilitate and spark conversation at the upcoming Urban Project event in Gatineau, Québec on February 7th, 2020. Following the Urban Project event, a Summary and Action Report will provide an overview of the event and outline the most promising solutions identified. The intent is to provide city leaders and decision-makers with a toolkit of solutions that will help to enact change in their communities, including creating safe, sustainable, inclusive, efficient, and cost-effective transportation systems.

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Appendix A: Case Studies

Transit Optimization Case Studies

City of Gatineau: Rapibus Corridor (79)

The City of Gatineau's Rapibus is a dedicated, 12 km. BRT corridor that runs through Gatineau, making use of an underutilized rail right of way to provide a connection from the eastern neighbourhoods through the city and to Ottawa (80),

Over the first five years, Rapibus successfully increased ridership by 17%, improved service reliability, and eased congestion on city roads.

Key Takeaways:

- Partnerships between municipal, regional, and provincial governments key to future development and corridor connectivity.
- Repurposing existing underused rail right of way can be an efficient way to create a dedicated transit corridor.
- Corridor focused on new service areas instead of improving existing service on current routes.
- Route modifications since the launch of Rapibus during off peak times and in suburban areas with less congestion improved service by creating more direct routing and quicker travel times during off peak hours.

Figure 1 - Rapibus Route (Source: STO)

Learn more at:
sto.ca/index.php?id=467

City of Toronto: King Street Transit Pilot

The King Street Transit Pilot created a streetcar priority corridor in downtown Toronto by implementing motor vehicle movement restrictions, reallocating on-street parking, and upgrading and repositioning transit stops. The pilot became permanent in 2019 (81). This pilot successfully led to a 17% increase in all-day weekday ridership and 80% reduction in traffic volume, improved reliability, reduced trip times, and created 45 new curbside public spaces.

Key Takeaways:

- Introducing this major shift as a pilot project was key in achieving implementation
- Robust data collection using GPS, Bluetooth, and video analytics, along with detailed reporting, helped showcase the benefits of the pilot project and made the case for permanent adoption
- Creating side benefits, such as public realm improvements and improved cycling environment, helped drive support
- Partnering with business along the corridor to waive the fee typically associated with parklet implementation generated buy-in from the business community

Learn more at:
toronto.ca/city-government/planning-development/planning-studies-initiatives/king-street-pilot/

City of Kingston: Transit Route Optimization (82)

The City of Kingston has seen a dramatic shift in transit ridership over the past 10 years after making a number of changes to the transit network and policies that support transit ridership.

These changes included:

- Four express routes that led to annual double-digit percent increase in transit ridership
- A tiered discount transit pass to employees of businesses enrolled in the Employer Transpass program
- Youths under the age of 14 ride for free without a pass or ID and a free transit pass to students in 9th grade
- Increased the cost of downtown parking to exceed the cost of a monthly transit pass
- A future program that will improve the speed and reliability of bus service with the implementation of bus bypass lanes.

Key Takeaways:

- Modified direct primary transit routes create shorter travel times with fewer stops that are more attractive to transit users.
- Developing programs and policies that support reduced concessionary fares for students and youths can have a major impact on current and future ridership.
- Alternative funding sources and / or external partnerships may be required to ensure concessionary fares are sustainable.

Learn more at:
https://rdn-pub.escribemeetings.com/filestream.shx?DocumentId=11403

City of New York: B44 Bus Line (83)

New York City Transit and the New York City Department of Transportation worked together to improve the speed and reliability of a major north-south route in Brooklyn. Changes to the corridor included off-board fare collection, dedicated bus lanes, consolidation of bus stops, rerouting of the northbound route, and traffic improvements.

Key Statistics:

- Dedicated transit travel lane
- 15-31% improvement in travel times
- 10% increase in ridership on the route from 2014 to 2015, compared to a 1% decrease in overall bus ridership in Brooklyn during the same period
- 37% reduction of traffic injuries at intersections where crossing distances were shortened
- Passenger vehicle traffic speeds were maintained with a small reduction in traffic volume during the peak periods

Key Takeaways:

- Dedicated bus lane with improved speed and reliability led to major ridership growth along the corridor while network ridership decreased.
- Fare machines at transit stops reduced delays caused at stops with high number of boardings such as at mass transit transfer stations.
- Pedestrian safety improved by reducing the crossing distance, number of travel lanes, and through geometric improvements such as curb extensions.
- Overall travel time along the corridor was not impacted, due to improved design street that increased the efficiency of the remaining motor vehicle lanes.
- NACTO Transit Street Design Guide principles for a one-way transit corridor followed.

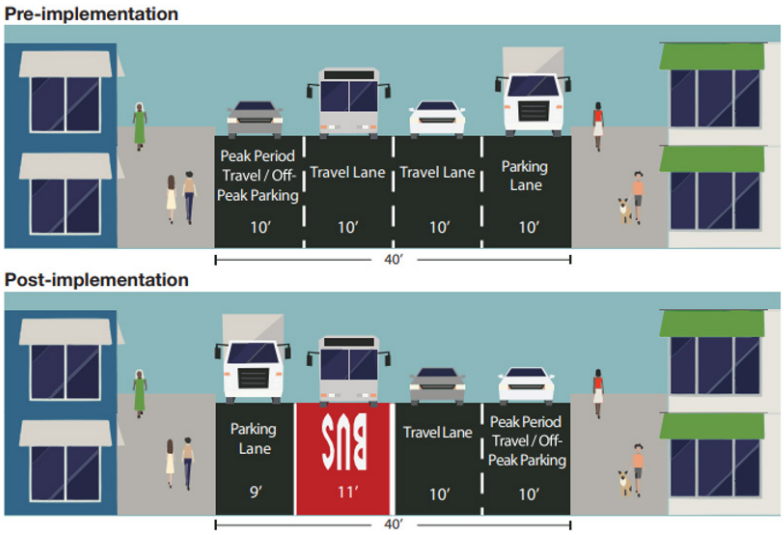

Figure 2 - Nostrand Avenue Cross Section (Source: B44 SBS Progress Report)

Learn more at:
nyc.gov/html/brt/downloads/pdf/brt-nostrand-progress-report-june2016.pdf

Active Transportation Case Studies

City of Calgary: Centre City Cycle Track Pilot

Calgary installed the Centre City Cycle Track Network Pilot Project in 2015 and demonstrated that AAA bicycle facilities can increase ridership and improve safety. The 18-month pilot project led to the rapid implementation of four on-street cycle track corridors that created a grid network 6.5 km. in length through downtown Calgary.

Even as the number of cyclists increased 142% between 2014 and 2016 (84), there was a 12% decrease in the number of collisions involving cyclists (84).

Key Takeaways:

- Pilot project approach allowed the updated street design to gain community and political support prior to requiring full approval from Council.
- Extensive before and after data allowed many of the benefits and impacts to be quantified
- Implementation of adjustable infrastructure allowed the City to modify the design where safety or operational challenges were identified.
- The proportion of women cycling downtown increased from 22% to 30% after the protected bicycle lane network was implemented showing the importance of building safe and comfortable facilities.
- Physical separation identified as important on roads with volumes over 8,000 ADT (average daily traffic).

Learn more at:
calgary.ca/Transportation/TP/Documents/cycling/City%20Centre%20cycle%20track/cycle-track-summary-report-nov-2016.pdf

City of Montréal: Protected Bicycle Network

The City of Montréal focused on expanding its cycling network and more than doubled the number of kilometres of the network since 2009 from 400 kilometres to over 875 kilometres, with more than 400 kilometres maintained through the winter. Montréal intends to continue to improve cycling infrastructure with the plan to develop a network of over 180 kilometres of express bikeways (réseau express vélo or REV) on 17 corridors throughout the city.

Key Statistics:

- Over 875 kilometres of bike facilities and counting
- More than 430 kilometres of bike facilities cleared through the winter months
- Bike share system with 6,200 bicycles, 540 stations and over four million trips annually
- 15% bicycle mode share target by 2032
- $15 million annually allocated to cycling facilities

Key Takeaways:

- Building a connected, safe, and comfortable cycling network takes consistent and considerable funding to develop new corridors and maintain the entire network year-round.
- Physically protected bike lanes provide improved winter level of service with space for snow storage.
- Designs need to consider snow removal and maintenance to minimize service hours required for clearing.
- Winter maintenance should be priority-based to clear entire routes and give people cycling winter options.

Learn more at:

https://ville.Montréal .qc.ca/portal/page?_pageid=8957,143276111&_dad=portal&_schema=PORTAL

City of Seville: Protected Bicycle Facilities

The City of Seville rapidly built protected bicycle facilities in 2007, with an 80 km. grid built in 18 months for approximately €32 million (~$47 million CAD) and a total of 180 km. now. At the same time, the City introduced a public bike share system with 2,600 bikes throughout the City.

Key Statistics:

- Cycling mode share grew to nearly 9% of all trips
- Cost of the first 80 km. of the network compared to the cost of 5 or 6 km. of highway
- Approximately 23% of daily trips are taken using bike share bikes.
- 5000 parking spaces removed to create space for the protected bicycle lanes
- Frequency of cycling collisions per trip has decreased

Key Takeaways:

- Political will allowed rapid implementation of extensive protected bicycle lane network.
- Public bike share system with 260 stations allows short trips to be conveniently made by bicycle.
- Significant funding committed to ensure a connected and protected network built quickly.
- Increase in cycling mode share directly responded to implementation of protected bicycle lane network.
- Seville built facilities quickly allowing designs to make some shortcuts to ensure the projects get built.
- Free public bikes provide to university students and at the main bus station.

Figure 3 - Cycling Trips and Collisions (Source: R. Marquis & Hernandez-Herraador)

Learn more at:
theguardian.com/cities/2015/jan/28/seville-cycling-capital-southern-europe-bike-lanes

Road Safety Case Studies

City of Edmonton: Vision Zero

In 2015, Edmonton adopted Vision Zero through the implementation of its Road Safety Strategy (2016-2020), with a goal to reduce traffic fatalities and serious injuries to zero by 2032 (88). In the first three years since the adoption of Vision Zero Edmonton has seen success by tackling a wide range of engineering, engagement, enforcement, and education initiatives.

Key Statistics:

- Traffic-related fatalities decreased by 41% in the first three years after adopting Vision Zero, while serious injuries decreased by 17%.
- Major capital investment with nearly $80 million allocated to road safety in 2018 alone.
- Comprehensive Safe Systems approach that focuses on Engineering, Education, Engagement, Enforcement, and Evaluation to create safe roads

Key Takeaways:

- City-wide road safety improvements take a multi-disciplinary approach to see continued progress.
- Community involvement and engagement is essential to create a culture of road safety.
- Many technological enhancements exist that can be leveraged to improve road safety.

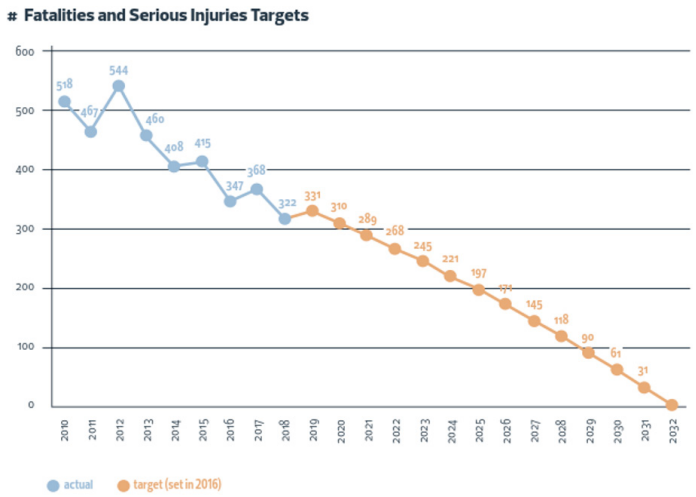

Figure 4 - Fatalities and Serious Injuries Targets (Source: City of Edmonton)

Learn more at:
edmonton.ca/transportation/PDF/2018VisionZeroEdmontonAnnualReport.pdf

City of Oslo: Vision Zero

Oslo has made tremendous progress towards the Vision Zero goal of no traffic fatalities, with only one motor recorded vehicle fatality in 2019 and no pedestrian and cyclist fatalities.

Key Statistics:

- Decrease from 41 fatalities recorded in 1975 to 1 in 2019
- City of 673 000 people
- Major driving restrictions in the city centre and other downtown areas
- Removal of hundreds of on-street parking space to build 60 kilometres of improved cycling facilities.
- Carefree “heart zones” established around each primary school

Key Takeaways:

- Major changes to the street network to prioritize safety and people walking and cycling have made a significant impact.
- Separating different road users limits possibility of human mistakes causing major traffic collisions.
- Street pricing is a powerful tool to limit traffic volumes and create safer streets.
- Political buy in from all parties for road safety initiatives removes uncertainty of political support.
- Areas without any motor vehicle traffic have very few major traffic safety risks.

Learn more at:

https://usa.streetsblog.org/2020/01/03/vision-zero-norwegian-capital-completely-quashes-road-deaths/

eltis.org/discover/news/oslo-experiments-car-free-heart-zones-around-schools

City of Montréal: Vision Zero

Road safety improvements identified in the City of Montréal's 2008 transportation plan led to a 50% reduction in KSI collisions between 2008 and 2014. To further reduce KSIs, Montréal adopted a Vision Zero action plan in 2019 with the target of eliminating all traffic-related fatalities.

Key Takeaways:

- Traditional road safety approach showed limited citywide results and stalled reductions in traffic fatalities and serious injuries in 2014.
- Focus on improving cycling infrastructure, with 79 km. of new bicycle facilities since 2014 alongside directional closures, permeability measures, and dedicated bike signals.
- Fatal Collision Monitoring Team (FCMT) collects data from every fatality site, verifying infrastructure conditions and identifying common factors in order to make improvements at related sites across the City, not just at the collision site.
- Heavy emphasis on partnerships, with three Thematic Task Forces (TTFs) on street crossings, heavy vehicles, and speed management.

Learn more at:
https://ville.montreal.qc.ca/visionzero/en/