



INCREASING CYCLING IN CANADA

A guide to what works

 the centre for
active transportation

a project of

 Clean Air Partnership

 UNIVERSITY OF
TORONTO



McGill



FACULTY OF
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(Photo: Mathieu Deshayes/APMJ)

Introduction

More Canadians are cycling today than twenty years ago. While overall rates of cycling for transportation are still low, many communities across Canada have seen their rates double, and in some places, over 20% of people cycle to work. This guide looks back over the past twenty years of efforts to increase cycling in Canada to determine what has worked. We provide ten recommended actions to increase cycling and advocate for a comprehensive approach that integrates both infrastructure projects and programming initiatives. Our goal is to help communities more effectively grow cycling as a viable transportation choice, so that they can capture more fully the diverse benefits that cycling brings.

About this Guide

Evidence for this guide comes from five years of Canadian-specific work by researchers from Toronto, Montréal, and Vancouver. Between 2014 and 2019, we analysed national demographic, geographic and transportation data sets, evaluated cycling programs,

conducted interviews with municipal staff and community organizations, and collected costing data for cycling programs and infrastructure projects across the country. We also carried out research on how to measure the cross-cutting benefits of cycling.

Funded by the Social Sciences and Humanities Research Council (SSHRC) and the Metcalf Foundation, we published our research in a series of academic papers and reports, which are linked throughout this guide.

This guide summarizes our findings and is intended primarily for practitioners working in municipal cycling programs and infrastructure. It may also be useful for cycling advocates and for those in related fields, such as health and environment. Every initiative is context-specific, and readers should consider the examples and recommendations within this guide in light of the conditions found within their own communities.

Ten Key Actions to Increase Cycling



Spark cycling adoption



Sustain life-long cycling



Tap into trends, but take an equity lens



Identify cycling potential



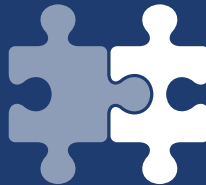
Use partnerships to build cycling culture where it does not exist



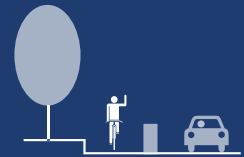
Use data to identify cross-cutting benefits



Make a plan



Pair up projects and programs



Make it safe



Address weather and hills

Where is cycling increasing?

Cycling is increasing across Canada in both small and large communities. Forty-two of Canada's 100 census subdivisions with populations over 50,000, saw rate of cycling to work increase between 1996 and 2016. Widespread growth occurred in British Columbia, where six of the top fifteen communities for cycling increase can be found (see figure 1). Montréal saw the highest growth, however; there, rates of cycling to work nearly tripled, from 1.4% in 1996 to 3.9% in 2016. Toronto's growth was nearly as high, with an increase of 146%, from 1.1% to 2.6%.

Although cycling rates are lower in suburban areas, these communities still show great promise. In the Greater Toronto and Hamilton

Area, for example, [one third of all trips, or 4.3 million trips a day, are 5 km or less](#), a distance that can be easily made by bicycle. Saanich, BC (see figure 2) is an example of a suburban community where a strong municipal vision for a greener city, coupled with a provincial grants program and growing interest in healthy, active lifestyles has led to a significant increase in cycling of 65% between 1996 and 2016.

In smaller towns, tourism often plays an important role in growing cycling for transportation, as is the case with both Canmore and Revelstoke, Alberta (see figure 2). In both places, a recreational mountain-biking culture has translated into more trips to work by bike.

Cycling Increase in Canada, 1996-2016

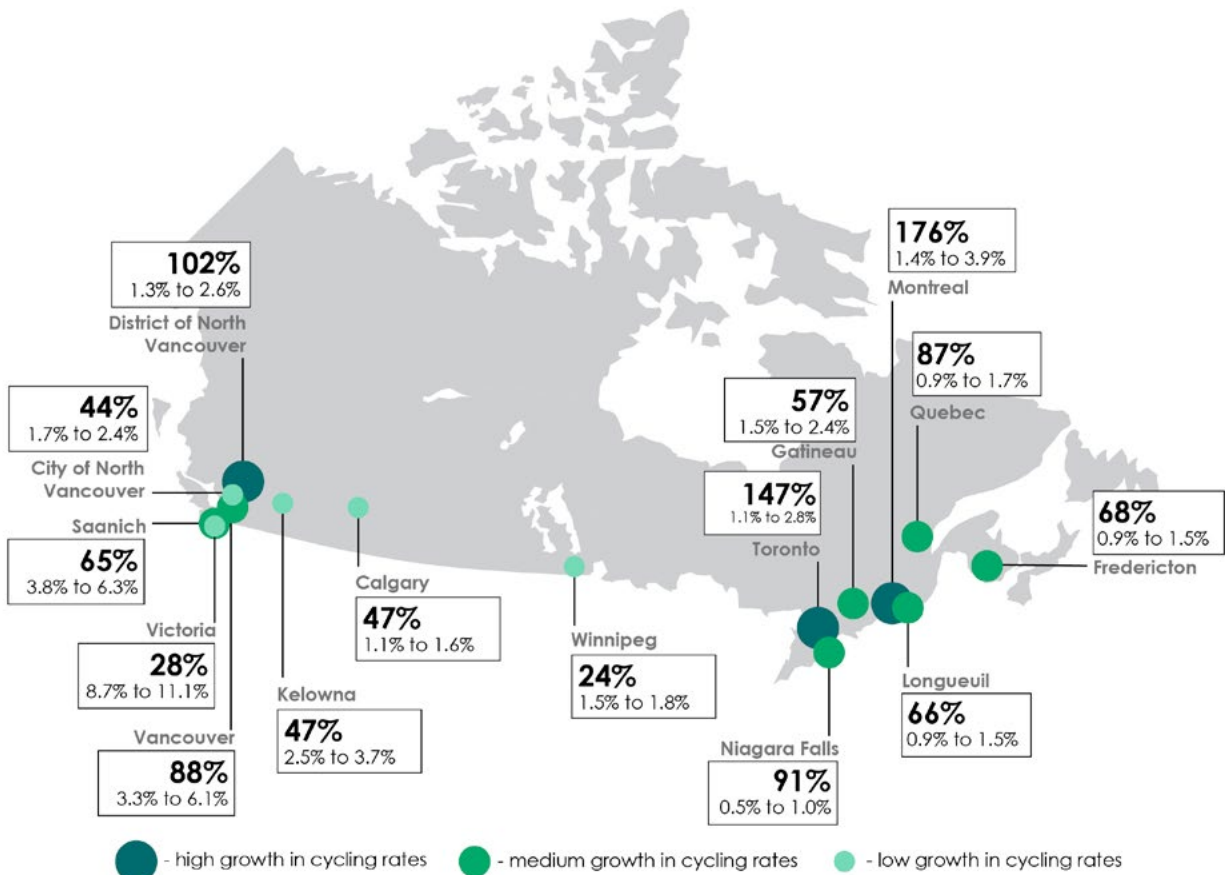


Figure 1: Highest Growth in Cycling to Work, 1996 to 2016, in census subdivisions (2016 boundaries) with populations over 50,000, and an absolute change in cycling mode share of at least 0.3% (Statistics Canada, 1996 and 2016)

Examples of small and suburban communities where cycling has increased

Community	Description	Trips to Work by Bike		% change
		1996	2016	(1996-2016)
Saanich, BC Population: 114,148 (2016)	Saanich is a suburban district of Greater Victoria, on Vancouver Island. Low-density, residential neighbourhoods consist mainly of single-family homes. The district of Saanich has a goal of reducing its greenhouse gas emissions by 30% by 2020, and the provincial BikeBC grant program was instrumental in developing its cycling network.	3.8%	6.3%	65%
Canmore, AB Population: 13,992 (2016)	A town on the eastern slopes of the Rocky Mountains, 106km west of Calgary. Canmore became a tourist hub for outdoor activities following the 1988 Calgary Olympics. It is one of Canada's prime destinations for recreational cycling, including mountain biking. The popularity of recreational cycling has been a key factor contributing to the large increase in trips to work by bike.	1.9%	6.8%	257%
Revelstoke, BC Population: 7,547 (2016)	In 2007, the four-season Revelstoke Mountain Resort opened. Its international reputation attracts outdoorsy people for long-term and seasonal stays. Mountain biking has been growing since the 1990s and exploded in popularity following the opening of the resort. The town received a 'Resort Community' designation in 2008, which opened up funding for developing mountain biking and transportation-related cycling infrastructure.	5.0%	14.4%	188%

Figure 2: Examples of small and suburban communities where cycling has increased ([Assunção-Denis & Tomalty, 2019](#))



Figure 3: The Legacy Trail, connecting Canmore to Banff (Photo: [Travel Alberta](#))

Within larger municipalities, levels of cycling vary widely, with some [neighbourhoods boasting cycling rates that are many times higher](#) than the municipality overall. The top neighbourhoods (or census tracts) for cycling to work are spread across the country (see figure 4). In 2016, the Toronto Islands, a unique, car-free community located across the harbour from Toronto's downtown, had the highest rate of cycling to work in Canada, at 27.3%. Other neighbourhoods with very high rates of cycling in 2016 include Montréal's La Petite-Patrie (22.6%), Victoria's Fairfield (18%), Vancouver's Grandview-Woodland (17.1%), and Old Ottawa South (16.9%).

These questions form the focus of the rest of this guide. Broadly, though, we have seen new plans and policies with a focus on cycling prompt significant investments in infrastructure improvements. These initiatives have taken place against a backdrop of changing social norms related to cycling, which municipalities can foster and shape through strategic programming.

Why has cycling increased in these places over the past twenty years? And how can we ensure it continues to grow in the future?

Highest Cycling Neighbourhoods in Canada, 2016

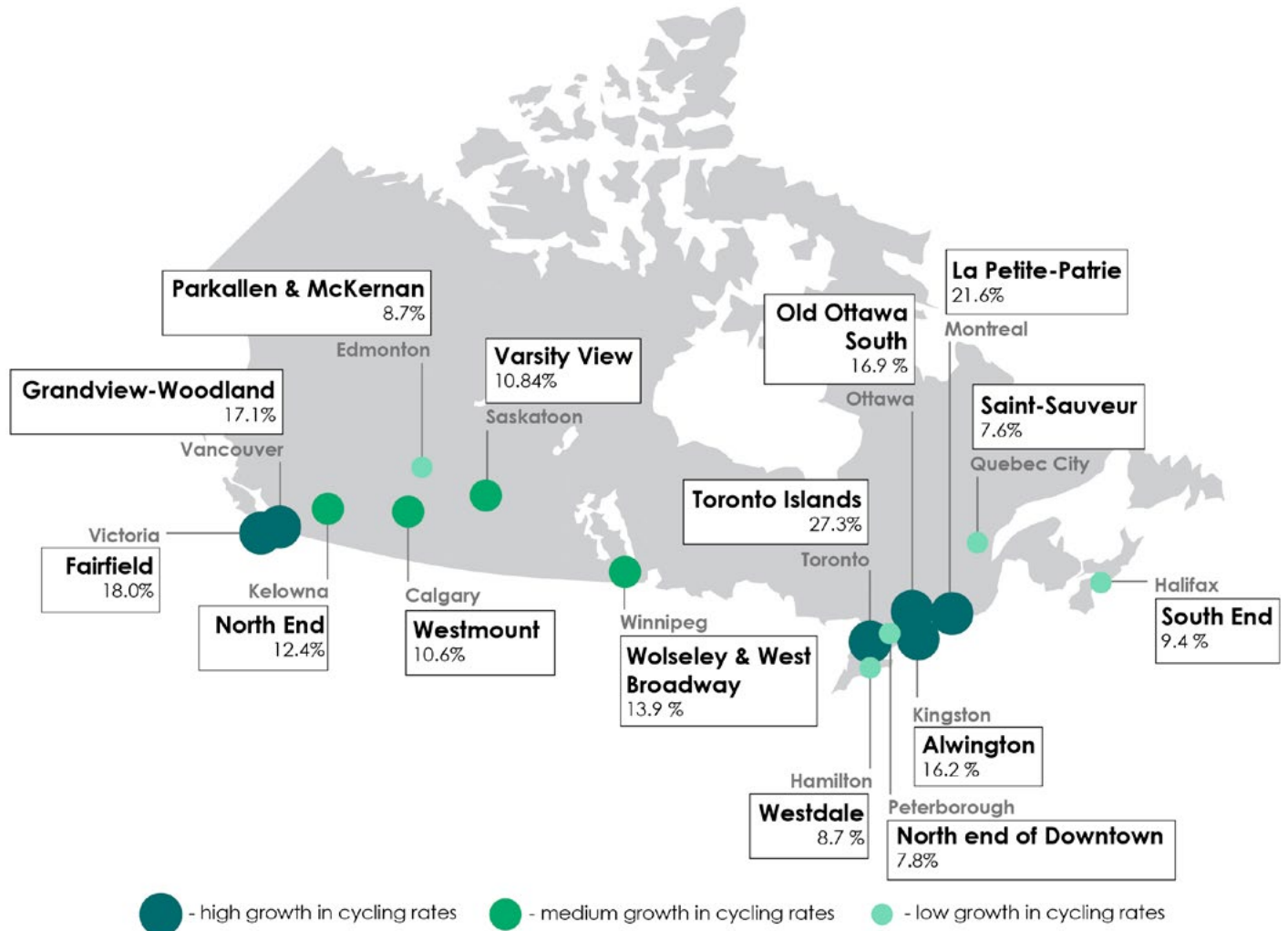


Figure 4: Census tracts with the highest rates of cycling to work in Canada, 2016 (Statistics Canada, [2016](#))

How can we increase cycling?

The conversation around increasing cycling tends to focus on cycling adoption, that is getting new people to start cycling for transportation, such as for trips to work, school, errands, or to visit friends. In fact, there are three different ways cycling can increase: new people start cycling, people currently cycling start cycling for more or longer trips, and people who are already cycling continue to cycle throughout life's transitions (see figure 5). The practice of cycling is flexible, and people can move in and out of it depending on their current circumstances.

Context drives practice, and whether or not a trip is biked is the result of a complex set of factors operating on different scales, or spheres of influence (see figure 6). On the largest scale, the physical environment, both natural and built, influences the feasibility of cycling through factors such as topography, climate, cycling infrastructure, mix and density of destinations and connectivity of the street network.

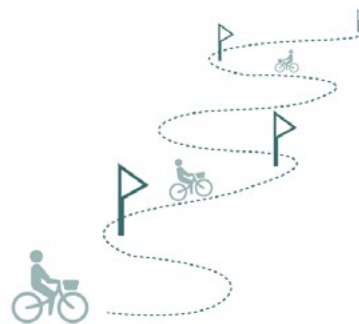
Adding to these factors is the existence of cycling supportive policies on topics such as cycling promotion, road safety, enforcement, land use planning, and motor vehicle restrictions. The societal context plays a role through existing social norms related to cycling, community support, and peer cycling behaviour.

On the smallest scale, decisions to bike are influenced by characteristics specific to each trip and each person, such as distance, the quality of the route, the need to carry bulky items or transport children, and the skill level and past experiences of the person making the trip. These factors are grouped under the 'Individual' sphere, but are also strongly influenced by the other four spheres. For example, the distance of a given trip is affected by land use planning decisions that determine the density and mix of destinations. Moreover, if safe routes with high quality, protected infrastructure exist, cycling becomes available as a transportation option to people with less skill and experience.

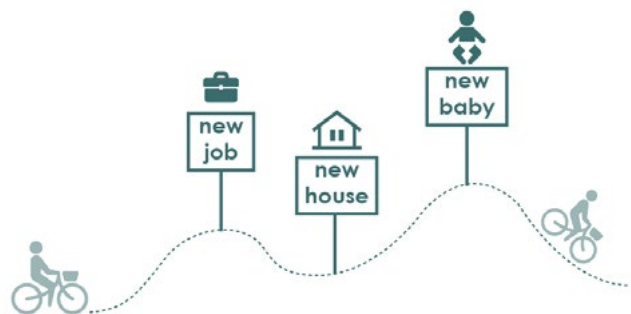
Three Ways Cycling Can Increase



1 New people start cycling



2 People who are already cycling start cycling for more or longer trips



3 People who are already cycling continue to cycle throughout life's transitions.

Figure 5: Cycling rates can increase through new people cycling, more and longer trips being cycled, and more people maintaining their cycling practice.

Factors Affecting the Feasibility of Making A Trip By Bike

Actions to Support Cycling Growth

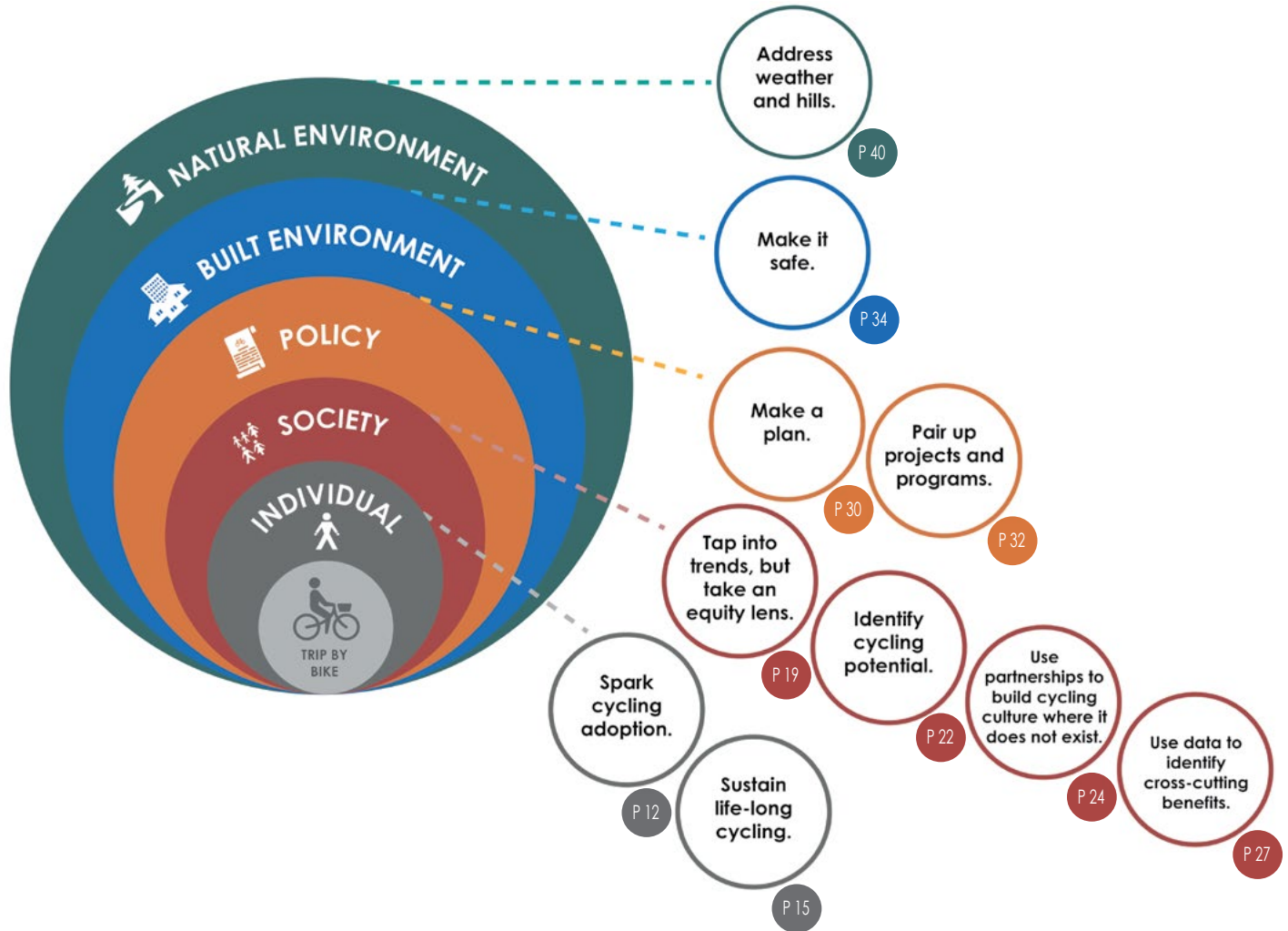


Figure 6: A socio-ecological model of factors affecting whether or not a trip is made by bike (adapted from Götschi et al., 2017), matched with ten actions municipalities can take to support cycling growth.

Municipalities can act in all five spheres to create a context that is conducive to cycling. Based on our research conducted between 2014 and 2019, we have developed ten recommended actions for municipal practitioners to support cycling growth in their communities. The following sections outline these actions and the evidence supporting them, and give examples of how they have been implemented. We start with the smallest scale, the individual, and move outwards. The order is not intended to represent a prioritization, nor are the spheres meant to be rigid. Strategies found under Society will also touch on the Built Environment and so forth. Certain critical themes, such as safety and equity, weave their way through multiple recommended actions.



(Photo: Dylan Passmore)

INDIVIDUAL

On an individual level, the feasibility of making a trip by bike is affected by the characteristics of both the trip and the person traveling. Long trip distances, poor route quality, and the need to carry bulky items or transport children can all deter cycling, as can inexperience, lack of access to a quality bicycle, and easy access to a vehicle. The context of society, policy and built and natural environments all play a role in shaping these factors. For example, urban planning decisions related to population density and the mix of residential, commercial, and employment uses affect the likelihood that destinations are close by and accessible by bike. Societal norms related to the appropriateness of cycling can impact whether an individual has learned to ride and has built up enough experience to ride with confidence under varied conditions. While addressing the larger factors are critical to helping individuals ride more, there are also actions at the individual level that municipalities can take to support cycling growth.



Spark cycling adoption

It is important that new or occasional cyclists are given [the opportunity to try out cycling in a safe, supportive and fun environment](#). Examples include mass community rides where the road is otherwise closed to traffic or a bike-to-work day with a breakfast. These large-scale initiatives provide a compelling, public reminder of cycling and reinforce evolving social norms. For participants, the initial 'ask' is small and achievable, giving them a chance to experience success. They learn about their own abilities ('I didn't think I could bike that far!') and discover the local cycling community. They may also make connections with neighbours or colleagues who cycle regularly. Organizers of these events can subsequently ask participants for a larger commitment, for example cycling to work for an entire month. Making a pledge to achieve a larger goal can generate excitement and catalyze action, particularly when done publicly.

A wide variety of programming can help people new to cycling sustain their behaviour, including

organized community rides, cycling mentorship, community bike hubs, 'do it yourself' bike repair, promotional packages, and small incentives. These programs can be tailored to attract specific groups who are currently under-represented in cycling. In particular, there is a significant opportunity to grow cycling among girls and women. In Canada, [46% of men reported cycling in the past year, compared to only 34% of women](#). Women were less likely to have cycled in urban centres and were more likely to cite excessive traffic as a barrier to cycling.

Initiatives should strive to [emphasize a welcoming atmosphere](#). Positive social connections based around cycling are critical to adopting and sustaining the change in behaviour. They help people stay motivated and provide opportunities for knowledge-sharing, modeling and social reinforcements. Meeting other people who cycle, particularly from your own social group, also helps normalize the behaviour and make it feel less niche.

ACTIONS

- **Take an inventory of group rides offered by community groups in your municipality and their target audiences to determine whether opportunities for new or occasional cyclists exist. Offer themed rides targeted to under-represented groups.**
- **Expand your cycling program offerings beyond education and training to include other socially-based encouragement activities, such as mentorship and community bike hubs.**
- **Organize the regular closing of a network of streets, particularly in areas where on-street and off-street infrastructure does not exist, to offer more opportunity for people to cycle. Invite politicians, key city staff, media, local celebrities and influencers to participate.**
- **Offer follow-up programming after a bike to work day event, promoting cycling for trips other than to work and asking for longer-term commitments to cycling.**
- **Offer a cycling loan and mentorship program to targeted sections of the population who might not otherwise try cycling (i.e.. women, newcomer, low income).**

EXAMPLES

1. [Ciclovías or Open Street events](#) close streets to cars and open them to walking and cycling on a weekly or monthly basis. Started in Bogota, Colombia, this initiative has now spread across North America. The majority of participants are able to meet recommended health guidelines for physical activity while at the event, and significant increases in daily activity can stick for those who attend multiple events.
2. [A study of two cycling mentorship programs](#) in Toronto and Brampton, Ontario, found that the program increased cycling. Participants were loaned a bicycle and matched with a local cycling mentor for three to four months. Together, the participants and their mentors explored their neighbourhoods by bike through a mixture of small group rides and larger special events. At the close of the program, 74% of participants did their shopping trips by bike at least some days of the week and 45% commuted by bike, compared with only 25% and 10% before the program. Cycling increased in suburban as well as more central areas. How much participants were willing to spend on a bicycle and accessories also increased.
3. In 2019, Vancouver's Bike to Work Week included two "[Bike to Shop Days](#)," with prizes, discounts at stores, and guided rides around neighbourhoods, to farmers' markets and to summer festivals.



Photo: Rima Momtaz

Figure 7: Participants in Bike Host, a bike mentorship program in Toronto

HOW MUCH DOES IT COST: Canadian Case Studies

No detailed guide on the cost of different types of cycling facilities and programs exists in Canada. This type of data would be useful, however, to both practitioners and advocates when they are proposing or considering new projects. With the goal of responding to this need, we gathered costing information from city staff and community organizations for forty sample projects from across the country and published them in a catalogue, [Costing of Bicycle Infrastructure and Programs in Canada](#).

On the infrastructure side, the catalogue includes examples of on-street cycle tracks, traffic calming, off-street facilities, and support features such as signage and bike parking. Under cycling programs, the catalogue includes cycling skills training, special events, repair and maintenance workshops, and other supports.

Each example includes the location, a description or design specifications, and the costs or resources required. The costs are specific to the projects or programs profiled and, while not a detailed costing guide, they provide an idea of the resources that might be involved in a similar initiative.

We have included condensed versions of a number of these short case studies throughout this guide, and we encourage you to download the full catalogue if you are interested in further examples.

Open Streets: Open Streets TO, Toronto, ON

Open Streets TO (OSTO) is a free and accessible recreation and social inclusion program that opens streets to people by closing them to cars. The first Toronto event was held in 2014, when OSTO was founded as a non-profit organization. Open Streets TO takes place on two of Toronto's most iconic streets, Yonge and Bloor.

Size: Route length of 5 – 10 km
300,000 participants

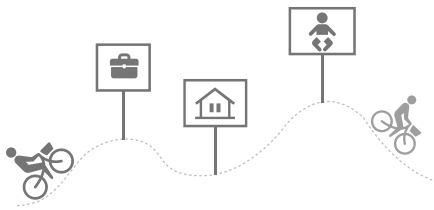
Total cost: \$150,000

Program specifications:

- Policing and barricades make up more than one third of the total budget.
- Open Streets TO secures the street permit and works with local community organizations to animate the street. They encourage businesses on the route to activate their storefronts on a voluntary basis.



Figure 8: Open Streets TO, Toronto, ON (Photo: 8 80 Cities)



Sustain life-long cycling

As an individual's circumstances change, for example with a new job, a new relationship, or a new home, so too do their transportation patterns and their openness to cycling. People can move in and out of cycling, depending on how it fits or does not fit in their lives at that moment in time. While these individual factors fall outside the purview of a municipality, practitioners can work to ensure that the social context and built environment support life-long cycling and make it attractive under more circumstances. An awareness of typical exit points can help practitioners address specific barriers that prevent people from maintaining their cycling practice.

Those traveling with children can find themselves limited in the types of trips they feel comfortable making by bike. When accompanied by children, they may feel more cautious and avoid riding with children on streets, even those that have bicycle facilities. They are disproportionately marginalized by substandard infrastructure.

People also tend to give up cycling as they age. In the United States, adults 70 years of age and older make only 0.4% of their daily trips by bike, and in the United Kingdom, only 0.9%. However, this same group makes 10% of their trips by bike in Denmark, 12% in Germany and Japan, and 23% in the Netherlands, demonstrating that cycling can remain a viable option for older adults, when conditions are favorable.¹ In fact, cycling offers low-impact, minimally weight-bearing exercise and independent mobility, both of which are beneficial to older adults' health and well-being.

Modified equipment, such as e-bikes, adult trikes, and cargo or longtail bicycles with extra seating for children can help individuals adapt their cycling to their changing life circumstances.

A growing number of cycling education and social programs are available for children and, increasingly, adults as well. Bike to school programs and cycling training in schools can introduce children to cycling from a young age and can help those raising them maintain their own cycling practice. [Mentorship programs](#) targeted to adults or other under-represented groups can increase cycling and build social connections around cycling.

Often these programs are community-based and few long-term evaluations exist. For cycling skills workshops, for example, some studies have reported [an increase in cycling frequency](#), in addition to [improved cycling skills](#). We found in a before and after study, however, that teaching skills and knowledge alone is [not enough to increase cycling](#). More supports are needed (infrastructure, social context, etc.) to overcome the significant environmental barriers that discourage people from cycling.

For both children and older adults, quality cycling facilities are crucial, with separation from motor vehicle traffic and enough space for faster cyclists to pass. Examples include traffic-calmed streets, off-road paths, and wide lanes separated from traffic with even surfaces and clear markings.

¹Garrard J, Conroy J, Winters M, Pucher J, & Rissel C. *Older Adults and Cycling*. City Cycling, MIT Press, Editors: John Pucher, Ralph Buehler, Publication pending.

ACTIONS

- **Evaluate your existing cycling infrastructure and determine what proportion is safe and comfortable for riders of all ages and abilities (“Triple A” infrastructure). Create standards that clearly describe this type of facility, and evaluate future projects against them.**
- **Work with your local school board to support bike to school programs and cycling training in schools.**
- **Start a local bicycle club targeted to seniors or other under-represented groups through your parks and recreation department.**
- **Offer a loaning and mentorship program for older adults and new parents that allows them to trial different types of bicycles (e-bikes, cargo bikes, etc.) and connects them with other cyclists at a similar life stage.**

E-Bikes

With technology advances, e-bikes are becoming common in cities and, increasingly, in suburban areas as well. Sales for pedal assisted e-bikes have exceeded those of regular bicycles in some parts of Europe. E-bikes can support riding for people of all ages and abilities, facilitating cycling in hilly terrain and enabling longer distance travel. E-bikes are especially popular for women, older adults, and both recreational and commuting cyclists. People switching to e-bikes report riding more often, and longer distances. E-bikes are now more readily available for purchase, and storage and charging opportunities are important considerations for cities to support widespread use.

EXAMPLES

1. Vancouver has created [transportation design guidelines](#) with 10 general rules for designing All Ages and Abilities cycling routes. Their goal is to make cycling safe, convenient, comfortable and fun for everyone, including families with children, seniors, and new riders.
2. In Calgary, the FLC Seniors Club, a non-profit organization, runs “[Old Spokes Cycling](#)” and offers three levels of rides ranging from 10km to 40km.
3. Three different programs in Vermont offer [free e-bike or cargo bike loans](#) for people interested in trying them out.
4. Manitoba Public Insurance, Seven Oaks School Division, Bike Winnipeg, Green Action Centre and WRENCH have partnered to offer annual cycling education to students grade 4 to 8. The program, called “BEST” for [Bicycles Education & Skills Training in Schools](#), trains teachers to deliver the sessions as part of their physical education and health classes.

HOW MUCH DOES IT COST: Canadian Case Studies

Cycling Skills Training for Youth: HUB Cycling, Vancouver, BC

HUB Cycling's Learn2Ride course, delivered in two sessions for grade 4 and 5 students, was started in 2012. It is provided in public schools across Metro Vancouver and is funded almost exclusively by municipal engineering departments in support of their active transportation goals.

Size: 112 students (4 classes of 28 students)

Total cost:

Capital costs:

- a fleet of 18 bicycles with a range of adaptive bikes for kids with disabilities
- instructional materials (e.g. street traffic mock-up)
- evaluation materials (e.g. surveys)

Operating costs:

- 27 total instructor hours
- 6.5 coordinator hours

Program specifications:

- Day 1 consists of a 45-minute introduction to cycling and helmet safety. Day 2 consists of an 80-minute session where the students learn cycling skills.
- Students bring their own bikes if available.
- Renting a van for transporting bicycles and a storage unit for bicycles is also required.



Figure 9: Learn2Ride, HUB Cycling, Vancouver, BC
(Photo: HUB Cycling)

Read more costing examples from across the country:
[Costing of Bicycle Infrastructure and Programs in Canada.](#)



(Photo: Dylan Passmore)

SOCIETY

The societal context in which we find ourselves greatly influences our view of cycling and its viability as a transportation option in our lives. Community support for cycling, norms surrounding cycling as an everyday practice rather than only sport, and social connections with others who cycle all make cycling more likely. Research has found that people who are surrounded by others who cycle are [more likely to consider cycling themselves](#). Without the necessary culture shift to make cycling an everyday - rather than niche - activity, new infrastructure implemented in low-cycling areas may not achieve its full potential in terms of attracting new people to cycling. There are many actions municipalities can take, however, to foster a cycling culture in their community.



Tap into trends, but take an equity lens

Macro cultural, social and economic trends related to cycling in Canada have greatly contributed to its increase. In the [case studies we conducted](#), no other category was cited as crucial in every one of the ten municipalities studied.

[These trends](#) include a change in cycling culture and how people perceive cycling. Cycling has become fashionable and media coverage of cycling is more positive. As a result, cycling is now more commonly viewed as a legitimate form of transportation. The social status of car ownership and use has declined among some groups, especially younger generations who are comfortable using shared mobility to meet their transportation needs. Particularly in urban settings, Canadians are becoming more aware of the benefits of cycling for health and the negative impacts of car travel.

At the same time, cycling in Canada has increased more in wealthier neighbourhoods and neighbourhoods located closer to a downtown core.¹ The association of cycling with gentrification and the attraction of hip, young professionals to central areas presents an equity challenge for practitioners. In particular, as downtowns gentrify and become more expensive and more exclusive, suburban areas are seeing their populations shift to include a greater number of low income and new immigrant residents, many of whom do not own cars. Cycling can offer an additional transportation option, but cycling investments in these areas are often lower than in the downtown. These patterns can be addressed by bringing an equity lens to cycling infrastructure and programming investments. There is much a municipality can do to make trends more inclusive and ensure that all groups have access to cycling.

ACTIONS

- **Establish a community identity as a place where people cycle. Create a program name, logo and brand elements to unify efforts to promote cycling and build a compelling and positive media and marketing presence.**
- **Promote diverse images of cycling through social marketing, including people of different races, genders and ages using different types of bicycles in both urban and suburban environments.**
- **Collaborate with public health authorities, community health centres, parks and recreation and environmental groups on programs that encourage cycling as part of a healthy, sustainable lifestyle.**
- **Recognize that cycling is increasing in popularity with populations outside of the young, urban professional category, and tailor programming to reach these groups, including women, older adults, newcomers and those living outside of downtown.**
- **Analyse your existing and planned cycling network through an equity lens to identify potential disparities in access based on income, race, neighbourhood, immigration status, etc.**
- **Provide programs to increase access to bicycles in lower income neighbourhoods.**

¹ *Manaugh & Winters, Publication pending.*

EXAMPLES

1. In Toronto, [a recent survey](#) found over 80% support for a safe cycling across the city, including in the inner suburban communities of Etobicoke, North York and Scarborough.
2. Copenhagen's "I Bike CPH" brand is recognized around the world, and has [helped define that city as a leader](#) in active transportation and liveability.
3. Hamilton's "[Everyone Rides](#)" initiative increases access to its bike share system through subsidized memberships, learn-to-ride lessons, free monthly group rides, training on the bike share system and translation for newcomers.
4. Cyclo Nord Sud, an advocacy group in Montréal, operates "[Vélorution](#)," a community bike hub that offers cycling lessons, bike rides, repair assistance, and workshops in Saint-Michel, a neighbourhood with a high number of immigrant and low income residents. The initiative started out as a mobile hub and opened the doors of its first permanent location in 2018. A second borough, Côte-des-Neiges Notre-Dame-de-Grâce, has hired Cyclo Nord Sud to start a similar project in their community.
5. In Toronto, CultureLink Settlement and Community Services, offers "[Bike Host](#)" to newcomers to Canada. The program loans them a bicycle and pairs them with a local cycling mentor. The program has been offered for over eight years and has expanded into surrounding suburban communities.
6. Calgary [actively tracks the age and gender](#) of people cycling through manual counts conducted annually with the goal of providing safe opportunities for Calgarians to bike more regardless of age, gender, income or ability. In 2018, 25% of people cycling were female, up from 21% in 2013, and 3% were children, up from 2% in 2013.
7. Toronto included equity as one of its nine areas of analysis for prioritizing projects in its [Cycling Network Plan Update](#) (2019). Projects that fell within Neighbourhood Improvement Areas or abutted key access destinations received a higher score.



Photo: Sobi Hamilton



Photo: Cyclo Nord Sud

Figure 10: TOP: Sobi Hamilton's Everyone Rides initiative
BOTTOM: Cyclo Nord Sud's Vélorution workshop

8. Portland had Portland State University conduct [an equity gap analysis](#) of its Portland Bicycle Plan for 2030, based on indicators of income, race, and age (children/youth and older adults). The report identified areas of high disadvantage and currently low access to cycling facilities, and recommended prioritizing certain projects to better serve these areas.

HOW MUCH DOES IT COST: Canadian Case Studies

DIY Bike Repair: Open Shop, BIKE, The Peterborough Community Cycling Hub, Peterborough, ON

Open Shop is BIKE's year round drop-in workshop with five repair stations. Each station consists of a bicycle repair stand and a set of tools. Additional tools are accessible on master tool boards. They also have two truing stands.

Size: In 2018, 3007 people used Open Shop for DIY bike repairs.

Total cost: Capital costs: \$7000
Operating costs: 2 Full Time equivalents (FTEs) year round
1 FTE for 6 months

Program specifications:

- In 2018, the program was available 40 hrs/week
- Use of the space is included in hub's membership fees.
- The space is rented at \$2000 per month.



Figure 11: DIY Bike Repair at Open Shop, BIKE Peterborough, ON (Photo: Alex James)

Cycling Mentorship Programs: Bike Host, Toronto, ON

CultureLink Settlement and Community Services has offered their "Bike Host" cycling mentorship program to their newcomer clients since 2011. The purpose of the program is to help newcomers to Canada get familiar with their new home in a healthy, sustainable way. Volunteer cycling mentors are matched with newcomer clients.

Size: 70 – 100 newcomer clients
Total cost: \$40,000 per year with approx. 1.5 FTE for 6 months.

Program specifications:

- The program is supported by staff from CultureLink's Community Connections program, which is funded by Immigration, Refugees and Citizenship Canada.
- Bicycles are shared with CultureLink's Bike to School Project or other program partners.
- Volunteers are not compensated.
- The ratio of newcomers to mentors is about 3:1.

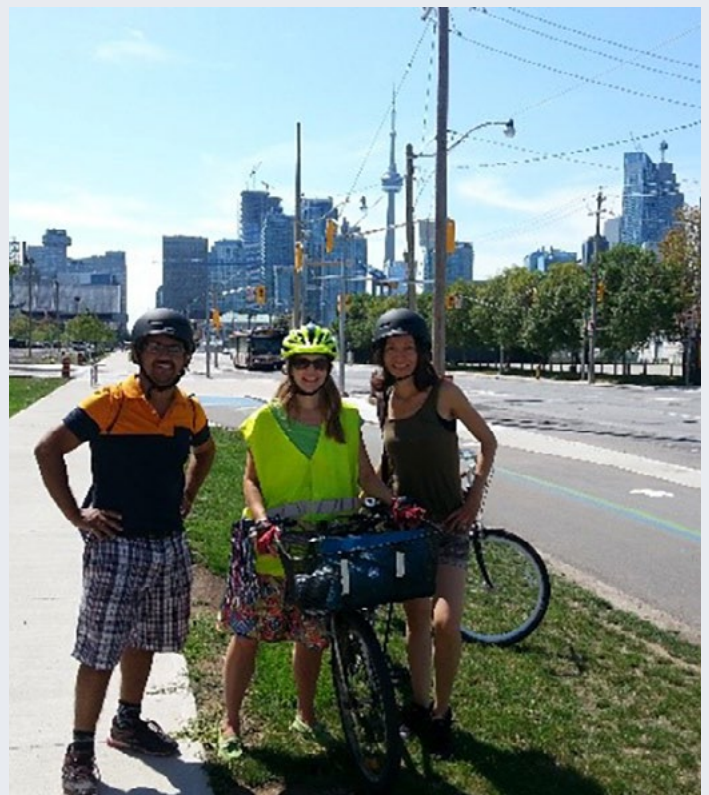


Figure 12: Bike Host Cycling Mentorship Program, Toronto, ON (Photo: Yvonne Verlinden)



Identify cycling potential

In suburban areas where few people currently cycle, the goal of increasing cycling can seem like a daunting one. Starting with a targeted approach in select neighbourhoods and expanding outwards is likely to be more effective than a broad, city-wide campaign. Mapping can be used to reveal differences between neighbourhoods and identify locations with built environment and transportation patterns that are more conducive to cycling. In a study we conducted of Toronto urban and

suburban neighbourhoods, factors such as the percentage of short trips, the average number of daily trips per person, and the average number of vehicles per adult in a household were associated with changes in cycling rates (see figure 15). By mapping these factors in areas where cycling is low, we can identify neighbourhoods where conditions are more supportive for cycling, and cycling programs and infrastructure may see greater success.

Factors for evaluating neighbourhood cycling potential

Factor	Rationale
Short Trips % of trips below 4km % of trips 4-8km	Neighbourhoods with a higher percentage of short trips below 4 km and between 4-8 km are more likely to have a higher cycling mode share. Short trips that are currently not cycled indicate a potential for shifting modes.
Number of Trips Average number of trips per person	More trips may indicate more destinations close by. Individuals who make one more trip per day than average are 77% more likely to cycle.
Number of vehicles Average number of vehicles per adult (over 16 years old) in a household	Having convenient access to a vehicle reduces the likelihood of travel by other modes. Individuals living in a household with one more vehicle per adult than the average are 74% less likely to cycle.
Cycling Infrastructure Density of painted bike lanes and cycle tracks Density of recommended or signed on-street cycling routes	Safe places to cycle nearby are an important factor for cycling adoption. Neighbourhoods with a higher density of bike lanes and cycle tracks or a higher density of on-street cycling routes also have a higher likelihood of trips being made by bike.
Cycling Mode Share Average percentage of trips made by bike in adjacent neighbourhoods	Higher levels of cycling in the wider area indicate that it is a viable option and mean that people are more likely to perceive cycling as a normal activity. Higher cycling mode shares in adjacent traffic analysis zones corresponded with a higher likelihood of trips being made by bike in a particular neighbourhood.

Figure 13: Factors for evaluating neighbourhood cycling potential (Source: [Savan & Young](#), Publication pending)

ACTIONS

- **Use available transportation and built environment data to identify neighbourhoods with low rates of cycling, but good potential. Partner with local organizations to offer cycling programs in these neighbourhoods to start, and then look for opportunities to expand outwards.**

EXAMPLES

1. Ryerson University mapped cycling potential in the Greater Toronto and Hamilton Area for Metrolinx, and found that [one third of all trips](#) (4.3 million trips per day) are 5 km long or less and could be cycled. This pattern held true across the region, including more suburban municipalities. In particular, 22% of trips to suburban regional rail stations showed potential for being converted to cycling.
2. [Scarborough Cycles](#), a project in a suburban district east of Toronto's downtown, mapped built environment and transportation factors to identify neighbourhoods conducive to cycling. Two suburban community bike hubs were opened in promising locations to incubate cycling through concentrated cycling programming.

First and Last Mile

The 'last mile' refers to a common problem related to public transit: how to access one's final destination after reaching the closest transit stop (or, conversely, the 'first mile': how to get to transit from the point of origin). For cycling to be a viable solution, three issues must be addressed: 1) making the route to get from home to a station or from a station to a destination comfortable and safe, 2) allowing people to take bicycles on transit vehicles, and 3) providing adequate and safe bicycle parking at stations. Some North American transit agencies and municipalities have collaborated on [innovative projects](#) to address these issues, including station audits, transitways that include bike lanes, and bike hubs located in the station.

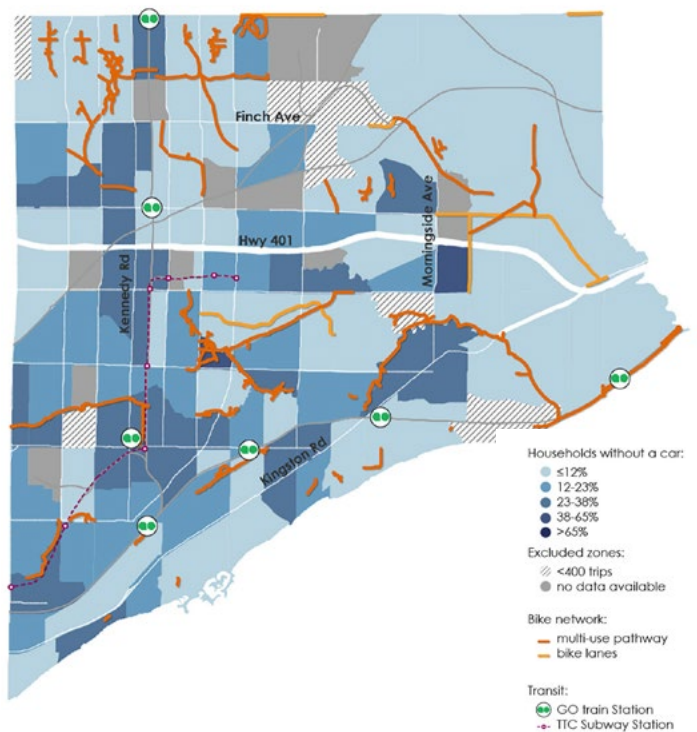


Figure 14: Map showing proportion of households without a car in Scarborough, ON (Source: Adapted from [Pfertner, 2015 in Ledsham & Verlinden, 2019](#))



Use partnerships to build cycling culture where it does not exist

In areas where few people currently cycle, it can be difficult to implement cycling programming or gain support for new infrastructure. A [partnership approach can be an effective way of reaching these communities](#) and building cycling culture. One example of this model is where an organization with cycling expertise works with a local partner to host cycling programming. The programming is tailored to the mission and goals of the host organization, so that cycling is used to meet their clients' needs. For example, neighbourhood rides and a bicycle loan program can increase physical activity among people with pre-diabetes, or a build-a-bike program can engage newcomer youth.

The benefits of this model flow both ways. The cycling organization gains community knowledge, presence and credibility that a stand-alone venture would lack. The host organization gains a new way to serve its clients. Through the partnership, cycling programming experience is passed from one organization to the other, with the long-term goal of having the host organization take ownership of the programming and continue it without the cycling organization's involvement.

A broad approach should be used to identify potential partners. Many local organizations will have goals that could be met through cycling, such as improved health, environmental action, community building, recreation, youth empowerment, newcomer settlement, and waste reduction. These unusual partners could be community organizations, but they could also be other municipal departments.

ACTIONS

- **Identify organizations in low cycling, suburban neighbourhoods which have goals related to cycling programming.**
- **Review the strategic plans of other municipal departments to see if cycling programming or infrastructure could help achieve any of their goals and approach them about possible collaborations.**

EXAMPLES

1. [Scarborough Cycles](#) is a community bike hub in a suburban district of Toronto. It began in 2015, as a partnership between four downtown organizations with cycling expertise and two local organizations without (a neighbourhood centre and a community health centre). In the second year of programming, responsibility for operations devolved to the community health centre, and they have continued to expand it in the years since.
2. Toronto's new Long-Term Waste Management Strategy (2016) includes renewed interest in fostering a culture of reduction, repair, reuse and sharing at a community level. In partnership with the Tower Renewal program, Waste Management has launched a [Community Reduce & Reuse Program](#) that includes opening bike repair hubs in community housing buildings in mostly suburban areas across the city, with the goal of diverting more bicycles from the landfill.



Photo: Marvin Macaraig



Photo: Marvin Macaraig

Figure 15: TOP: The Lawrence Orton Bike Hub, funded through Toronto Waste Management BOTTOM: The Scarborough Cycles bike hub at Access Alliance, a community health centre

HOW MUCH DOES IT COST: Canadian Case Studies

Community Bike Hubs: Scarborough Cycles, Toronto, ON

Scarborough Cycles is a collaborative project with partners from different sectors like health, research, advocacy and other community-based services. In 2016, the project launched two community hubs; the information below is for one hub in 2017.

Size: Bike Repair: 643 visits
Bike Maintenance Workshops: 10 participants
Earn Your Bike: 10 participants
Group rides: 406 participants total

Total cost: Capital Costs: \$13,435 - \$19,775;
Operating Costs: 1.25 FTE

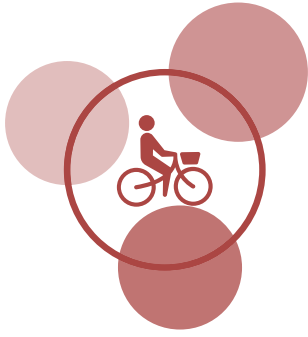
Program specifications:

- The bike hub offered access to bicycles and tools, as well as cycling programs bike maintenance workshops, earn-your-bike programs and group rides.
- Space was provided by Access Alliance Multicultural Health and Community Services, the local host partner.



Figure 16: Scarborough Cycles, Toronto, ON (Photo: Access Alliance and Multicultural Services)

*Read more costing examples from across the country:
[Costing of Bicycle Infrastructure and Programs in Canada.](#)*



Use data to identify cross-cutting benefits

The contentious nature of some cycling infrastructure projects, particularly those that re-allocate road space from driving to cycling, has necessitated increasingly rigorous and wide-ranging evaluations. Calgary's [downtown cycle tracks pilot](#) and Toronto's [Bloor Street bike lane pilot](#) are two recent examples. Indicators used to evaluate these projects included:

- Safety: through video analysis of near miss collisions, police collision data and online and telephone surveys
- Cyclist counts: through automated counters
- Cyclist demographics (age and gender): through manual counts
- Cyclist sidewalk and wrong way riding: through manual counts
- Motor vehicle delay: through GPS tracking
- Satisfaction: through online and telephone surveys
- Economic vitality: through merchant and street-intercept surveys, vacancy counts and point-of-sale transactional data

Such extensive evaluations are not feasible for every cycling infrastructure project, nor should they be necessary. However, they do point to the wide range of benefits expected from improved cycling infrastructure: a safe and economically vibrant street that moves people effectively and sustainably and where children, older adults and women feel comfortable riding.

Referencing the cross-cutting benefits of cycling can be a useful strategy when building support for increased funding or for a contentious project. They can also help identify the strategic goals of a comprehensive cycling plan. Some benefits can be easily quantified through existing data sets or data gathering tools. In

these cases, it may just be a matter of breaking down silos and collaborating with another municipal department. Other benefits are more difficult to calculate, and if undertaking the necessary research is not feasible, an estimate can be used instead, based on research done in similar jurisdictions.

Below (figure 23) are a number of cross-cutting benefits, for which local data may be available, such as the census (commute mode share) or regional travel surveys (such as the Transportation Tomorrow Survey in southern Ontario). These benefits have all been demonstrated through multiple research studies with rigorous methodologies and consistent results.

New Data – Opportunities and Issues

With rapidly emerging technologies, new data sources are emerging. The proliferation of sensors, smartphones, fitness apps and route planners are creating massive quantities of data about the way people travel. Some of these data streams are being used by cities to fill the gaps on where and when people are cycling. Still, questions remain. Are the people using these tools and apps representative of all cyclists, either demographically or in travel behaviour? Do cities and towns have the analytic resources to use and benefit from this 'big data'? Is this open data? Who owns this data, and what privacy issues may arise?

Cross-Cutting Benefits of Cycling

Benefit	Research Example	Actions
<i>Economic:</i> Increased Location Desirability	In Montreal, sales data between 1996 and 2012, indicate that having a Bixi bike-sharing station within 800m increases a home's value by \$709 .	Track sales data over a number of years to evaluate the impact of new cycling infrastructure on property values.
<i>Economic:</i> Increased Local Business	Cyclists spend more at restaurants, bars, and convenience stores. Overall, they spend less per trip but make more trips . In Toronto, customer counts, as reported by merchants, increased after pilot bike lanes were installed along a commercial main street. Point-of-sale data for debit and credit card transactions obtained from Moneris indicated a 4.45% growth in sales in the pilot area, which was higher than two nearby control sites, but slightly lower than the city overall.	Demonstrate this finding in your own context using a street intercept survey along a local main street, perhaps one where cycling infrastructure is planned. Evaluate the economic impact of installing bike lanes along a commercial main street by tracking before and after customer counts, vacancy rates, point-of-sale data or tax data if available. Compare with a similar control site where bike lanes were not installed.
<i>Economic:</i> Increased Tourism Spending	In 2015, Vélo Québec reported that cycling tourism spending was \$700 million per year , including 1.6 million overnight stays. These visitors spend \$242 per family per day, 6% more than the average traveller.	Add a question about cycling to an existing tourism survey and compare the length of stay and spending characteristics of visitors who cycled with those who did not.
<i>Environmental:</i> Reduced Transportation Emissions	Data on cycling and driving trips and cycling infrastructure expansion in Montreal, from 1998 to 2008, indicate that increasing the length of the cycling network by 7% results in a 2% reduction in GHG emissions .	Use a standard GHG emissions factor (for example, with the average car, 1km of driving creates 0.25kg of CO2 emissions), and calculate the emissions savings of converting a percentage of short trips in your community from driving to cycling.
<i>Social:</i> Increased Equity	Increased cycling safety leads to greater participation by those who are less likely to cycle (e.g. children, older adults, women).	Count the number of children, older adults and women using a particular route before and after safe cycling infrastructure is installed.
<i>Social:</i> Increased Transportation Access	Replacing a car trip with a bike trip is estimated to save a traveller \$2.73 per mile .	Use this finding to help people calculate the cost savings of a shift in mode choice for a specific trip (e.g. their commute to work).
<i>Social:</i> Combined Benefit	Each kilometre driven by car incurs a cost to society of 16 cents, while one kilometre of cycling creates 28 cents of benefits .	Calculate the social benefits that current rates of cycling are bringing to your community.
<i>Health:</i> Reduced Health Care Costs and Mortality	In Toronto, 2006 levels of walking and cycling were estimated to prevent 120 deaths per year , translating into savings of \$130 to \$478 million. A further benefit of \$110 to \$160 million is estimated from reduced medical costs. In Portland, it is estimated that by 2040, investments of \$138 to \$605 million in cycling infrastructure will result in health care cost savings of \$388 to \$594 million .	Use the World Health Organization's Health Economic Assessment Tool (HEAT) for walking and cycling to estimate the value of reduced mortality resulting from current rates of cycling in your municipality or from future, aspirational goals for cycling rates.
<i>Health:</i> Reduced Absenteeism	Regular cycle commuters have one day less sickness absence per year than people commuting by other modes.	Calculate the number of sick days your municipality saves, based on the number of people who report commuting to work by bike.

Figure 17: Examples of the economic, environmental, social and health-related benefits of cycling, with recommended actions for measuring them.



(Photo: Dylan Passmore)

POLICY

Public policy plays an important role in creating conditions that are conducive to cycling by setting targets, creating a road map and coordinating diverse efforts. Topics such as cycling infrastructure and programs, built environment and land use planning, and restrictions on car use can [all form part of cycling-supportive policy](#). An integrated approach will have a greater impact than any single policy action undertaken on its own.



Make a plan

Transportation plans, including cycling plans and active transportation plans, are instrumental for increasing cycling. Over the past twenty years, many municipalities across Canada have for the first time [created plans with a focus on cycling](#). These plans typically identify a recommended cycling network, a time frame for installation, and the length in kilometres of the different kinds of infrastructure to be built (e.g. protected bike lanes, trails, designated routes, etc.). They often also set out objectives regarding cycling promotion, education, and parking. Mode shift targets are included less frequently, but are a helpful tool for accountability.

Establishing a cycling plan puts cycling on the table and makes it a legitimate transportation mode that is part of the transportation planning discussion. These plans can also spark major investments in cycling infrastructure and programming, as well as changes within local transportation departments. Dedicated staff are often allocated to cycling for the first time soon after a plan is put in place.

Smart Growth

Smart Growth is a policy approach in Canada and the US that envisions communities that are designed specifically to support transit and active forms of transportation. By building neighbourhoods and communities that are more compact, have a range of destinations within walking or biking distance, and have streets that are pleasant for walking and cycling, Smart Growth aims to gradually create feasible alternatives to the (over)use of private vehicles in our daily lives. The Greater Golden Horseshoe around Toronto is being planned using Smart Growth principles, as is Metro Vancouver, although progress is gradual. At the neighbourhood level, we see these principles being applied in places like Bois Franc in Montreal, Garrison Woods in Calgary, Cornell Village in Markham, and South East False Creek (the Olympic Village) in Vancouver.

ACTIONS

- **Create a transportation plan with clear objectives for amount of infrastructure to be built within a specific timeline and how it is to be funded.**
- **Dedicate staff to the implementation of the cycling plan and make use of community resources, such as cycling advisory committees and community groups.**
- **Collaborate with regional and provincial levels of government, and look for funding from outside of transportation, such as health, tourism, and economic stimulus.**

EXAMPLES

1. Ottawa followed up the publication of its first cycling plan in 2008 with the creation of its [first ever Cycling Unit](#), responsible for overseeing the plan's implementation. In the early 2000s, Montréal [increased the number of people working on cycling](#) from two to 14, and its 2008 transportation plan led to major infrastructure expansion.
2. In 2007, the B.C. government [designated Revelstoke a 'Resort Community'](#), leading to major funding opportunities for the town that allowed them to invest in cycling.
3. In Winnipeg, [post-recession stimulus funding](#) from the provincial government was instrumental in the development of cycling infrastructure.
4. Small municipal administrations can benefit from collaborating with community groups interested in cycling. In Canmore, there was no staff person specifically dedicated to cycling, and as a result, the municipality [depended on community groups](#), who took the lead in the organization of events and have been instrumental in the process of developing cycling infrastructure.

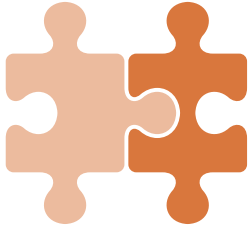


Photo: [Black Press Media](#)

Figure 18: Bike to Work Week, Revelstoke

Vision Zero

An approach to road safety originating in Sweden, Vision Zero is based on the ethical vision that serious injuries or fatalities while travelling on the road network are unacceptable and preventable. Adoption of this policy is growing worldwide and across Canada, including Edmonton, Vancouver, and Toronto. Its distinguishing feature is a focus on a system design framework where designers are ultimately responsible for the level of safety within a transport system and for taking necessary steps to improve outcomes in the event of a crash. This framework has the potential to make cycling much safer and more comfortable.



Pair up projects and programs

Cycling infrastructure projects and programming can [have the greatest impact](#) when they act synergistically in a coordinated policy of strategies to increase cycling. Cycling is sensitive to context, and [programs on their own are not sufficient to overcome the broader barriers](#) of built environment or social context. They can, however, amplify the impact of infrastructure projects. Salt Lake City and Chicago provide [a telling example](#): although both cities invested in cycling infrastructure between 1990 and 2000, Chicago also invested in programming to promote commuting by bike, while Salt Lake City did not. Cycling rates in Chicago doubled (from 0.28% to 0.50%), but went nearly unchanged in Salt Lake City (1.52% to 1.49%).

ACTIONS

- **Dedicate a portion of your cycling funding to encouragement and education, particularly in areas targeted for new cycling infrastructure.**
- **Amplify the impact of new cycling infrastructure through other cycling-friendly policies, such as traffic calming on local residential streets and bike parking requirements.**
- **Pair the opening of new cycling facilities (cycle tracks, off-road path, bike share, etc.) with a community-based campaign to encourage cycling in that neighbourhood. Activities could include themed rides with local elected officials, school-based cycling events, a bike loan program, and incentives for cycling to work.**

EXAMPLES

1. The City of Vancouver has developed an [Active Transportation Promotion and Enabling Plan](#), with the goal of using cycling promotion efforts most effectively and leveraging existing cycling infrastructure.
2. Barcelona's cycling rates more than doubled in only two years (from 0.75% in 2005 to 1.76% in 2007), thanks to a [coordinated package of infrastructure projects and programs](#). The bike lane network grew from less than 10 km in 1990 to 155 km in 2008, and four traffic-calmed zones with 30km/hr speed limits were introduced. A public bicycle sharing program was started in 2005, and bike parking was increased across the city. Extensive marketing campaigns took place in schools and a city-wide bike week was launched.

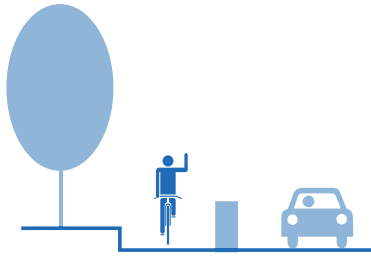


(Photo: Dylan Passmore)

BUILT ENVIRONMENT

The built environment includes access to cycling infrastructure, as well as the synergistic effect of [density, design and diversity](#) of land uses in a neighbourhood on people's travel choices. [High cycling neighbourhoods](#) are often older and tend to be arranged in a grid pattern of smaller blocks, with higher population densities, a mix of land uses, and greater transit access. These characteristics have an influence on trip length, which plays a role in determining whether a trip is cycled or not. People who commute by bike tend [to live closer to their place of work](#) than other types of commuters, and as trip distance increases, [the likelihood of cycling decreases](#).

The built environment also affects the comfort and quality of cycling routes, both in terms of the provision of dedicated, protected cycling infrastructure, and the availability of quiet, low-speed, shared streets. Installing cycling infrastructure can improve cyclist safety dramatically. [A study in Vancouver and Toronto](#) found that cycle tracks protected by raised curbs, bollards or concrete barriers on roads without parking are 89% safer than roadways with parked cars and no cycling infrastructure.



Make it safe

Many Canadian towns and cities witnessed a [cycling infrastructure boom](#) towards the late 2000s and early 2010s, and these communities are now seeing the results of that investment. Over the past twenty years, cycling has seen larger increases in places which have invested in on-street bicycle infrastructure. The top neighbourhoods for cycling in Canada in 2016 had almost four times more cycling infrastructure per km² than neighbourhoods with less cycling.¹ Additionally, a regular grid pattern of streets

can supplement a dedicated cycling network by providing quiet, low-speed alternatives to the main road. Canadian cities and towns that have more four-way intersections have seen larger increase in cycling.² In places with circuitous street patterns, multi-use paths can provide more direct active transportation connections between neighbourhoods. The intensification of suburban neighbourhoods can present opportunities to incorporate more of these connections.

ACTIONS

- **Install good quality, protected, on-street cycling infrastructure.**
- **Start with a pilot – use temporary materials installed quickly to test a design and address concerns.**
- **When planning new districts or retrofitting and intensifying suburban shopping centres and big box store complexes, break up block size and ensure there are convenient active transportation connections.**

Complete Streets

Complete Streets are streets that are designed to be safe for everyone: people who walk, cycle, take transit, or drive, and people of all ages and abilities. A Complete Streets policy is the cornerstone of achieving Complete Streets as it ensures that transportation planners and engineers consistently design and operate the entire street network for all road users, not only motorists. Instead of fighting for safer streets block by block, the aim is for this approach to become the norm rather than the exception. The term was coined in the United States in 2003 by the National Complete Streets Coalition. In Canada, the first policy was adopted in 2009, and in a relatively short time frame both countries have experienced exponential growth in Complete Streets adoption. The Centre for Active Transportation (TCAT) launched the Complete Streets for Canada website in 2012, which has tracked over 100 policies, guidelines and examples from across the country. While there is no cookie-cutter design or template for Complete Streets and the label is not always used, streets that have been re-designed to be more 'complete' are becoming more commonplace.

¹ and ² Manaugh & Winters, Publication pending.

EXAMPLES

1. In 2014, Calgary's City Council voted 8-7 in favour of [piloting a 6.5km network of cycle tracks](#) in the city's downtown for 18 months. The project was implemented in 2015, and evaluated against over 80 performance measures, including safety, bicycle volumes, motor vehicle travel times, economic vitality, and user demographics (age and gender). At the completion of the pilot, council voted 10-4 in favour of making the cycle tracks permanent.
2. Mississauga's [Downtown21 Master Plan](#) breaks up large city blocks and parking lots around Canada's third largest shopping centre to make a more walkable and bikeable community.
3. With the construction of a light rail transit line along Eglinton Ave in Toronto, Scarborough's Golden Mile neighbourhood is being re-imagined. Currently consisting of big box stores, surface parking lots, low rise commercial and industrial buildings, the area is expected to grow rapidly with a mixture of low, mid and tall buildings being added. The City's [Secondary Plan](#) outlines how new streets and active transportation connections will break up the large blocks into a finer grid pattern to facilitate walking and cycling.
4. Between 1996 and 2016, Montréal saw cycling increase by 176%, the highest in Canada. Between 2010 and 2015, the City [built 200km of cycling infrastructure](#), including the first separated cycle track to go through a major downtown.

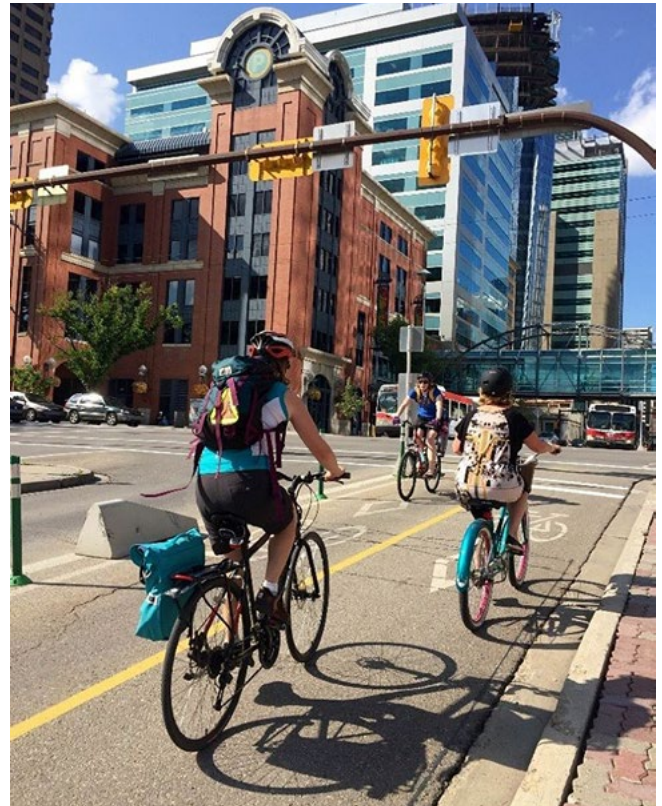


Photo: City of Calgary

2.2 NEW STREET FRAMEWORK

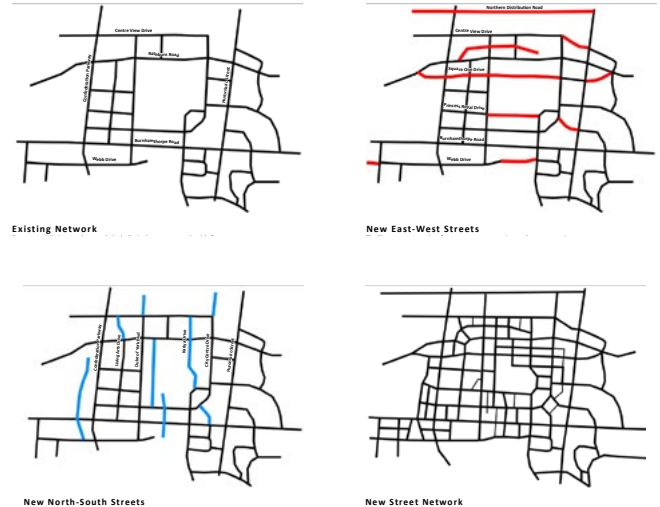


Photo: City of Mississauga

Figure 19: TOP: Calgary's downtown cycle tracks
 BOTTOM: The new street network planned for Mississauga's downtown.

HOW MUCH DOES IT COST: Canadian Case Studies

At-grade, adjustable, concrete barrier protected cycle track: Sherbrook St, Winnipeg, MB

In 2017, the City of Winnipeg installed pre-cast concrete barriers along two streets on two existing painted bike lanes, Sherbrook Street and Bannantyne Avenue. The barriers are termed adjustable as they can be easily moved and removed. The barriers were installed on a trial basis to determine their technical feasibility.

Size: Barriers are 244cm x 30cm x 15cm
Total cost: \$15,000
Cost/metre: \$115

Design specifications:

- Adjustable curbs were installed on 30 m of Bannantyne Avenue between King Street and Albert Street and 100 m of Sherbrook Street south of Cumberland Avenue.
- The barriers were pinned into the road with rebar.
- Bollards and bike lane signage were installed on top of the barriers (additional cost).

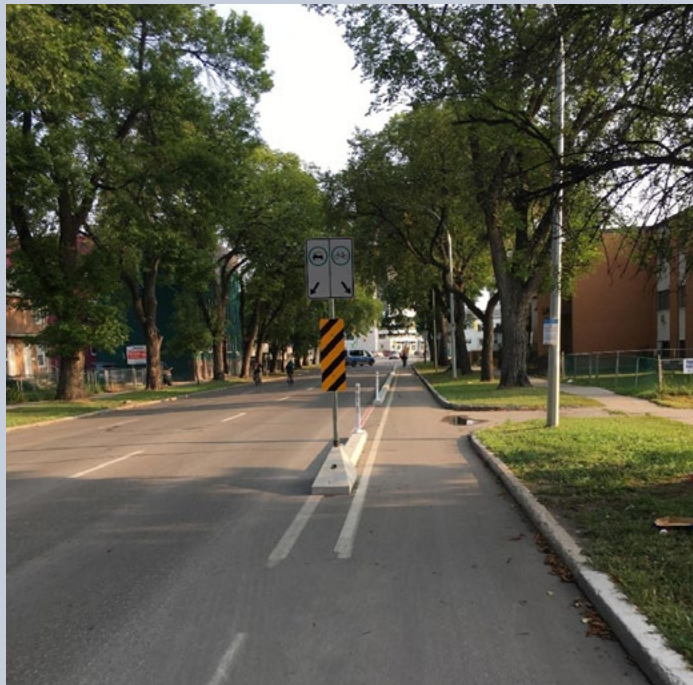


Figure 21: Adjustable concrete barrier protected cycle track at Sherbrook St, Winnipeg, MB (Photo: City of Winnipeg)

At grade, modular planter protected cycle track: Cannon Street Pilot, Hamilton, ON

The 3 km, bi-directional protected cycle track was built in 2014, along Cannon Street in Hamilton as a three-year pilot. Approximately 32 planters provide protection along half of the cycle track. Where roadway space was more limited, 430 adjustable rubber curbs/ bumpers and 300 bollards were used instead. Planters are removed each fall and re-installed in the spring to allow for winter maintenance. In 2018, the cycle tracks were made permanent.

Size: 3 km
Total cost: \$461,993
Cost/metre: \$154

Design specifications:

- Approximately fifteen traffic signals were added for cyclists riding in the opposite direction of traffic on the one-way street. Vehicle signal green time was modified at two intersections.



Figure 20: Modular planter protected cycle track: Cannon Street Pilot, Hamilton, ON

At grade, concrete curb/ median protected cycle track: Pandora Ave, Victoria, BC

In 2016, the City of Victoria, BC built a 3 m wide, 1.2 km bi-directional cycle track protected by 1 m of hatched paint and bollards (60%) and a 1 m concrete median (40%). Intersections were outfitted with green conflict paint indicating cyclist right of way (also known as crossrides) and existing signalization was retrofitted to prioritize cyclist movements.

Size: 1.2 km
Total cost: \$3,447,552
Cost/metre: \$2,873

Design specifications:

- Landscaping and new bike racks installed in median in select places.
- Select sidewalk reconstruction (15% of corridor).
- New mid-block pedestrian crossings and floating bus pads with raised pedestrian crossings on cycle track.



Figure 22: Concrete curb/median protected cycle track: Pandora Ave, Victoria BC (Photo: Dylan Passmore)

Bicycle detection: 136th Street, Edmonton, AB

In 2016, the City of Edmonton outfitted the intersection of 102nd Avenue and 136th Street with two north-south bicycle detection loops in order to facilitate bicycle passage through the intersection. The intersection features a pedestrian signal as well as a blue bicycle acknowledgement light with accompanying 'Bike detected' sign.

Size: Loop is the width of the roadway lane x 2-4 m long; pedestrian signal poles are 5 m high.
Total cost: \$106,063

Design specifications:

- An informational sign in advance of the intersection indicates to cyclists that they are entering bike detection zone. The blue light illuminates once a bicycle is detected, which then triggers the pedestrian/cyclist phase.

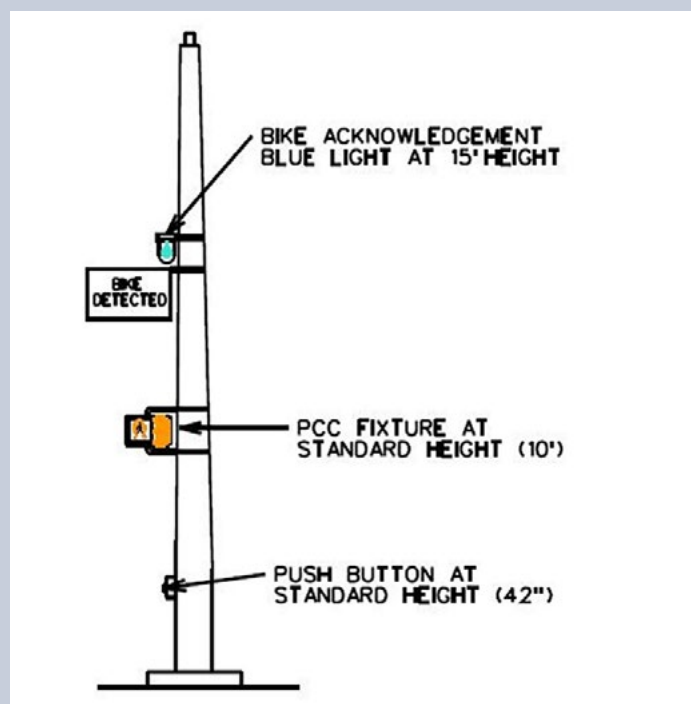


Figure 23: Bicycle detection: 136th Street, Edmonton, AB (Photo: City of Edmonton)

Bike-through median: Père Marquette St, Québec City, QC

In 2011, Québec City installed a bike-through median on Père Marquette Street at the intersection of Cardinal Bégin Avenue as part of a large bicycle boulevard initiative for Père-Marquette Street.

Size:

Long medians: approx. 12 m long x 1 m wide

Short medians: approx. 3 m long x 1 m wide

Total cost: \$158,972

Design specifications:

- A total of four planted medians run across Père Marquette Street, two longer ones on each end and two shorter ones towards the middle of the roadway.
- A space of roughly 1.7 m is left between the medians on each side to accommodate pedestrian crossings, and an approximately 3.6 m space allows bicycle through traffic.
- Six bollards indicate the presence of the median and separate the bi-directional bicycle traffic.



Figure 24: Bike-through median: Père Marquette Street, Québec City, QC (Photo: Google Maps)

Read more costing examples from across the country:
[Costing of Bicycle Infrastructure and Programs in Canada.](#)



(Photo: City of Calgary)

NATURAL ENVIRONMENT

Cold winters and hilly topography both present challenges for travel by bike. Cycling increases are more likely in places with mild winter temperatures and fewer hills. At the same time, Montréal has recently seen substantial increases in cycling, despite being very snowy, demonstrating that while municipalities cannot change the weather or the landscape, they can mitigate against the impacts of these factors on cycling uptake.



Address weather and hills

While cold, snowy weather and hills can make cycling challenging, some Canadian cities are successfully overcoming these obstacles. Figure 7 compares climate and topographic features of the ten Census Metropolitan Areas (CMAs) with the highest cycling rates in Canada. Metro Vancouver has a cycling mode share of over 2%, despite being very hilly. Greater Montreal and Ottawa-Gatineau are both at 2% or higher, despite each receiving an average of 54 days of snow a year and average January temperatures of -10°C. Winnipeg, despite being very cold, is almost entirely flat and has

a mode share of nearly 2%. Halifax presents an opportunity, with cycling rates that are currently lower than Montreal, Ottawa and even Winnipeg, despite being considerably warmer and less snowy.

Municipalities can address the challenges of hilliness and weather through a combination of infrastructure and programming to make cycling a more attractive option throughout the year for people of all fitness levels.

A Comparison of Climate, Topography and Cycling Rates

Census Metropolitan Area (CMA)	Overall Cycling to Work for CMA (2016)	Highest Neighbourhood (2016)	Elevation Range (Difference between highest and lowest point)	Average January Temperature	Days of Snow (> 2mm)
Victoria	6.8%	18.0%	445m	5°C	1
Ottawa-Gatineau	2.4%	17.0%	411m	-10°C	54
Metro Vancouver	2.2%	17.1%	1982m	4°C	2
Greater Montreal	2.0%	21.6%	198m	-10°C	54
Kingston	2.0%	16.2%	131m	-7°C	42
Winnipeg	1.7%	14.0%	60m	-16°C	54
Quebec City	1.4%	7.6%	641m	-12°C	51
Calgary	1.4%	10.6%	692m	-8°C	54
Greater Toronto	1.4%	27.3%	455m	-4°C	42
Halifax	1.0%	9.4%	199m	-5°C	25

Figure 25: Climate and Topography of the Ten CMAs with the Highest Cycling Rates in Canada, 2016 (Source: Manaugh & Winters, Publication pending)

ACTIONS

- Target a grade of 3% or less for cycling infrastructure, and consider mitigation measures (short, steep sections followed by a flat or a wider path) when a steeper grade is necessary.
- Give cyclists a hand through an elevator, an uphill bus shuttle, or an e-bike share service.
- Provide sufficient space and protection so cyclists can travel slowly uphill without worrying about motor vehicle traffic.
- Designate a network of cycle tracks and bike lanes as year-round routes and maintain them throughout the winter. De-ice and clear these routes more frequently than roadways, as cyclists are more sensitive to ice and snow accumulation.
- Develop a marketing campaign to encourage and normalize winter cycling.

EXAMPLES

1. Vancouver's [Transportation Design Guidelines for All Ages and Abilities Cycling Routes](#) provides guidance on designing for hills.
2. Hamilton's [Mountain Climber](#) program allows cyclists to ride the bus for free up or down its steep escarpment.
3. Quebec's free [Ascenseur de Faubourg](#), is an elevator which connects the lower town neighbourhood of St Roch with the upper town St-Jean-Baptiste. Bicycles are welcome.
4. Montreal's [Four Season Bike Network](#) was begun in 2014, with 260km of bike lanes maintained. In 2018-2019, the year-round network encompassed 595km, or 76% of the city's total bike infrastructure.
5. [Calgary](#)'s "Who bikes in the winter?" and Winter Bike Photo Booth campaigns collect and share stories and images of everyday Calgarians choosing to bike in the cold weather. Also, the City's [dockless bike share pilot project](#) includes a fleet of electric pedal-assist bicycles, operated by Lime.

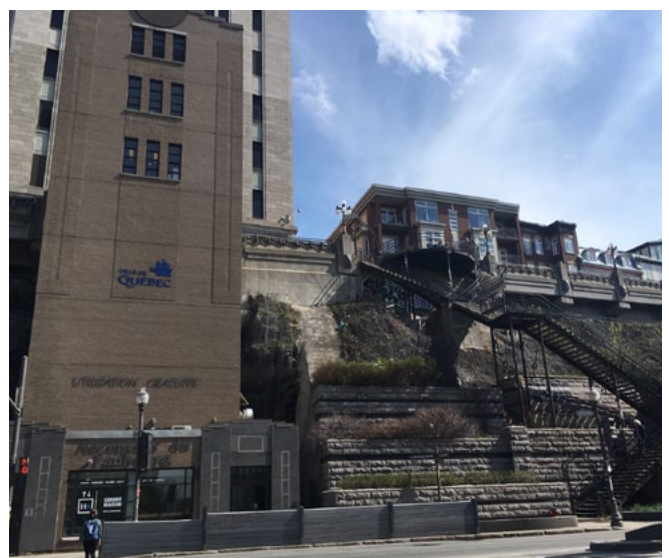


Figure 26: TOP: An example of Calgary's "Who bikes in the winter?" campaign MIDDLE: Hamilton's Mountain Climber program BOTTOM: Quebec's Ascenseur de Faubourg

Conclusion

The actions and examples contained in this guide are illustrative of the many creative and innovative ways municipalities are sparking and sustaining cycling. Over the past twenty years, significant progress has been made in developing cycling plans, infrastructure, and programs. These investments, made against a backdrop of larger, cycling-supportive societal trends, have led to increased cycling in communities across the country. Challenges remain; for example, how can we ensure that cycling growth is equitable? And how can we encourage cycling in areas outside of the urban core? These two questions are both addressed in this guide; however, others were barely on the horizon when we started our research, for example, dockless bikeshare, scooters, and e-bikes. The rapid growth of these new mobilities present challenges in terms of sharing already scarce street, curb and sidewalk space and determining how different users can interact safely. At the same time, they also offer many exciting opportunities to improve transportation in our cities and towns and make cycling a viable, accessible option for more people. As the landscape evolves, municipalities have an important role to play in supporting and promoting the shift to cycling. The recommended strategies contained in this report, such as making it safe, pairing up projects and programs, and taking an equity lens will continue to be critical to growing cycling effectively and capturing the diverse benefits this wonderful form of travel can bring.



(Photo: Marvin Macaraig)



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