

Building a 21st Century Cycling City:

Strategies for Action in Toronto

—

by Trudy Ledsham and Dr. Beth Savan

Metcalf Foundation

The mission of The George Cedric Metcalf Charitable Foundation is to enhance the effectiveness of people and organizations working together to help Canadians imagine and build a just, healthy, and creative society.

Beth Savan

Beth Savan, Ph.D., an award-winning teacher, scholar and broadcaster, is appointed to the faculty of the School of Environment at the University of Toronto, where she served as the inaugural Sustainability Director at the St. George campus. Beth has led research and consulting projects on active transportation, sustainability and resource conservation, and has contributed to government, not-for-profit and foundation advisory committees. She also has broad experience in the popular media.

Trudy Ledsham

Trudy Ledsham is a sustainable transportation researcher and project manager currently working on her Ph.D. in Planning at the University of Toronto. Her primary research interest is how to spark change and enable people to choose sustainable transport options in areas/populations resistant to change. She is especially interested in how to increase bicycling for transportation in urban/suburban areas with low cycling participation. She has undertaken transportation projects in the Region of Peel and Scarborough as well as Toronto.

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Methodology

To develop, inform and refine the issues and recommendations in this report, a series of consultations with local, national, and international bicycling experts were carried out during the summer of 2015. Experts in the field including academic transportation researchers, academic and municipal planners, public health experts and active transportation advocates were invited to participate. We undertook a three-stage process: initially local experts were gathered for a discussion based on a series of questions (Appendix A) to stimulate thoughts and provide direction for the report. This wide ranging discussion led to detailed research and the draft of a paper that was distributed to national and international experts for comments, which were expressed both through conversation and written review. These comments led to further research, which was integrated into a new draft paper that was then circulated to both groups. Feedback from this wider review was then incorporated into the final report. Please see acknowledgements for the list of participants.

Note that participants are not individually referenced in this report and not all participants supported all recommendations. Any errors and omissions remain the responsibility of the authors.

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FOREWORD

The goal of the Metcalf Foundation's Environment Program is to help build a low-carbon, resource efficient, and resilient Canada. Given the scale and complexity of the task of envisioning and realizing such a transformation, the Foundation sought to elicit a multiplicity of views and opinions, with a particular focus on southern Ontario.

In 2014, Metcalf commissioned a series titled *Green Prosperity Papers*. The aim was to contribute to the emerging policy conversation by connecting Ontario's robust university-based research capacity to timely public policy challenges. We invited proposals from a select number of researchers at Ontario-based universities who have a track record of producing research for public dissemination.

The six resulting *Metcalf Green Prosperity Papers* all address intersections of the environment and economy while taking up a range of topics from social justice, to fiscal reform, to democratic governance.

Since we commissioned the papers, Canada's commitments to climate action and growing a green economy have advanced substantially. The Foundation hopes the ideas explored in this series will assist in the crucial work, that is now underway, toward building a low-carbon, resource efficient, and resilient Canada.

Sandy Houston,
President and CEO
Metcalf Foundation



INTRODUCTION

Urban mobility is a critical issue in cities around the world. Travel times and congestion have led to citizen discontent. In Toronto, the current population and methods of transport have resulted in streets being clogged with automobiles and our transit system being overcrowded. With the city's population expected to grow significantly over the next couple of decades, we will only be able to efficiently move a larger population by using less space, per person, on our roads. The situation is urgent and demands a new approach to urban mobility.

There is one approach that can, with political will, be implemented fairly quickly and inexpensively. Given that **half the trips taken in the city are short enough to be comfortably and quickly accomplished by bike,¹ we can liberate significant road space if a greater portion of people travel by bicycle for some or all of their trips.** Bicycling is the most energy efficient transportation choice. It allows people to easily access services and activities in an area **more than ten times greater than by walking,² and at least as quickly as by car or transit for distances of 5 km or less** in many urban areas.³

This report identifies issues and incorporates relevant best practices from other locales into recommendations to **increase bicycling for transportation⁴** in Toronto over the next five years. Our recommendations were developed through a three-stage process of consultation and research. We propose **tangible, achievable, and results-oriented ideas** and consider co-beneficial outcomes such as a healthy environment, cost savings, improved human health, equity, vibrant commercial districts, reduced congestion, and increased resiliency.

Cycling for transportation is always best facilitated through a combination of policy, infrastructure and programming, and a vision of a prosperous, healthy city. Our key proposals include: an integrated master transportation plan for the city with a clear vision of sustainable mobility and measurable mode share and safety goals; mode share goals for the province and country; a connected network of cycling infrastructure, policy, and programming investments; providing not-for-profit bike repair hubs in under-served areas of the city; provision of free bikes or bike share memberships to low-income individuals; implementing marketing and cycling uptake programs to promote benefits and combat fears associated with cycling; and many other practical, yet transformative recommendations.

WHY CYCLING?

Fifty-five years ago, Jane Jacobs articulated the accumulation of problems automobiles were bringing to cities. It was not any one aspect that was the overriding issue, but rather the cumulative impact of “traffic arteries, parking lots, gas stations and drive-ins” and the widening of a road in one neighbourhood leading to the need for more parking in another, that all together degraded the quality of urban life.⁵

Today one must add that transportation accounts for 24% of Canada’s greenhouse gas emissions and these transportation emissions continue to increase.⁶ Traffic congestion and the related community degradation caused by ancillary air, noise, and water pollution are damaging. Sedentary lifestyles encouraged and enforced by automobiles are a significant public health concern.⁷ Traffic congestion is estimated to cost the Greater Toronto and Hamilton Area between \$7.5 billion and \$11 billion per year.⁸

Toronto is situated on the north shore of Lake Ontario in a larger metropolitan region known as the Greater Toronto and Hamilton Area (GTHA), with a population of 6.5 million. Density within the City of Toronto varies from central wards with 9,000 to 10,000 people per square km, to outer wards with less than 3,000 people per square km.⁹ The population in the city is projected to increase from 2.6 million in 2011 to 3.6 million by 2041. Even if it were cost effective to do so, there is effectively no land capacity to increase private automobile volume within Toronto. Big-ticket infrastructure is contentious and transit expansion has been long delayed due to a series of highly politicized debates and decisions.

In the same way that an increase in cars results in a multitude of problems, there is no one aspect of bicycling that makes it an obvious part of the solution for improving Toronto’s urban transport. Rather, it is the synergistic impact of: **reduced congestion** because less road space is needed per traveller; **more efficient land use** because less road and parking space is needed per traveller; **lower infrastructure costs** than either transit or automobiles;¹⁰ **improved main street commercial activity**;¹¹ the **significant health benefits** of physical activity for bicyclists; and the significant health benefits available to all residents due to reduced emissions and pollution.¹²

A small reduction in traffic volume of 3% in vehicle miles travelled between 2007 and 2008 in the United States resulted in a 30% reduction in peak-hour congestion in urban America in the same period¹³ offering the hope that shifting only a portion of trips to active transportation will have a significant impact on congestion. Older cost/benefit analyses suggest that the benefits of increased bicycling are worth four to five times the cost of bicycling infrastructure,¹⁴ while the most recent studies suggest benefits 10 to 25 times greater than costs.¹⁵ Likewise, the health benefits of cycling outweigh the associated risks by lengthening lives and conserving health

care dollars.¹⁶ While walking also has these benefits, the area available to walkers within a travel-time budget of 20 minutes is less than one tenth that of bicycling, and thus limits options.

If the “point of cities is multiplicity of choice” and it is “impossible to take advantage of multiplicity of choice without being able to get around easily,”¹⁷ then increasing the ability of people to choose bicycling for some or all of their transportation needs is an elegant solution to urban accessibility challenges while advancing sustainable mobility.

SUSTAINABLE MOBILITY¹⁸

Low emissions, high accessibility, and high quality of life

Sustainable mobility is when people of all incomes and social groups are able to access destinations for work, study, shopping, and recreation in a reliable, timely, resilient, convenient, healthy, and enjoyable way with minimal emissions and costs.

Sustainable urban mobility includes:

- **Smart spending.** Sustainable urban mobility requires strategic spending on transportation and ongoing critical evaluation of the efficiency of resource allocation.¹⁹ Traditional measures of transportation effectiveness, primarily in terms of vehicle trips and throughput, minimize the importance of morbidity and mortality, environmental impacts, equity, and access. Smart transportation spending requires metrics to guide investment that encompass a wider range of impacts such as emissions, health outcomes, and equal access.²⁰
- **Mixed and efficient use of public space.** Accessibility is linked to urban and land-use planning policies favouring mixed use and dense street networks, with multiple intersections that increase opportunities for active travel and avoid the need for long distance travel.²¹ Complete streets are based on the principle of context sensitive design, safety, and improving accommodation for all users including people who walk, bicycle, use mobility scooters, take transit, or drive. Sustainable accessibility involves reclaiming streets as an important part of the public realm²² and prioritizing uses that demand less space and costs per person.
- **Equity, access, and safety.**²³ People in all parts of the city, from all ages and income groups, should be able to access destinations with transport choices that are reliable, timely, convenient, healthy, and enjoyable with minimal emissions and costs. No loss of life is acceptable and injuries are not a consequence of daily travel.

WHO CYCLES IN TORONTO?

TORONTO'S TRANSPORTATION PROFILE

Like most North American cities outside of New York City,²⁴ transportation in Toronto is heavily oriented towards the private automobile. While Toronto performs well in comparison to many North American cities, the automobile still accounts for 66% of trips (Figure 1).

FIGURE 1: City of Toronto mode share (2011)

Data Source: DMG 2014, TTS 2011

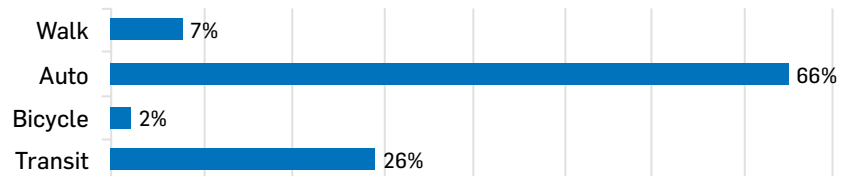


Photo courtesy of Kevin Konnyu

Transport mode varies throughout the city with walking, cycling, and transit being used more frequently in the city’s central wards and automobiles more frequently in the outer wards. Figure 2 shows the distinction between inner and outer wards; Figure 3 illustrates the differences in mode share.

FIGURE 2: Map of inner and outer wards

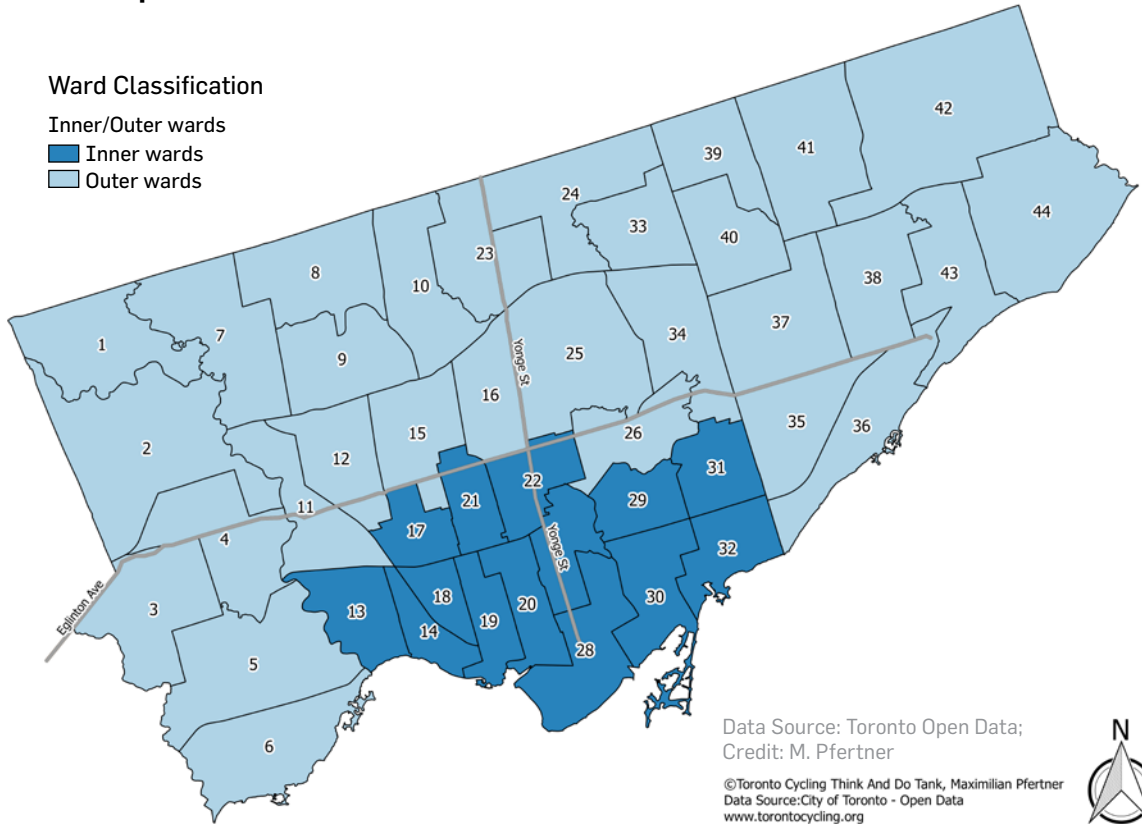
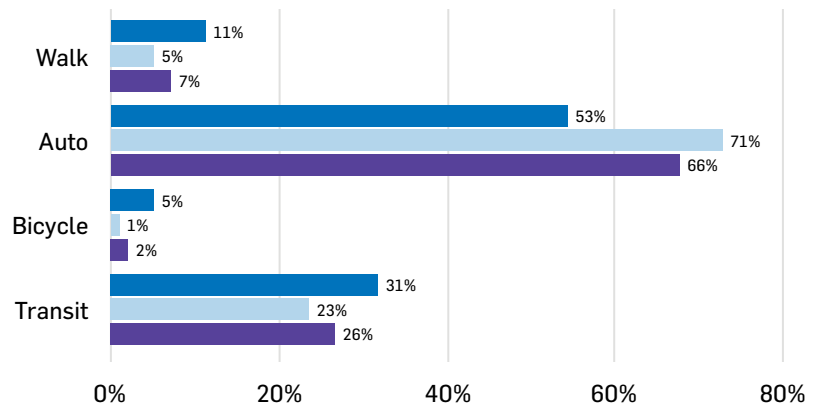


FIGURE 3: Mode share in the inner and outer wards (2011)

Data Source: TTS, DMG U of T

■ 14 Central wards
 ■ 30 Outer wards
 ■ City of Toronto (44 wards)



There is a striking difference between cycling participation in the inner and outer wards (see Figures 4 and 5). **Sixty-nine percent of all trips by residents originate in the 30 outer wards, yet these wards only account for 20% of cycling trips.**

FIGURE 4: Percent of *cycling* trips by location of trip origin

Data Source: Toronto 2011, DMG 2014, TTS 2011

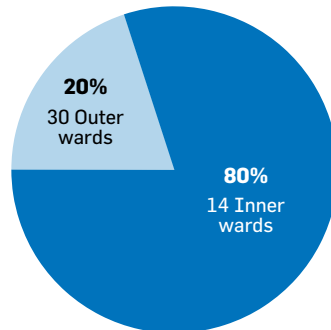
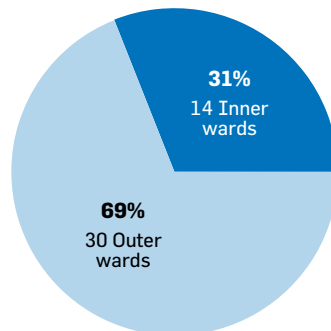


FIGURE 5: Percent of *all* trips by location of trip origin

Data Source: Toronto 2011, DMG 2014, TTS 2011

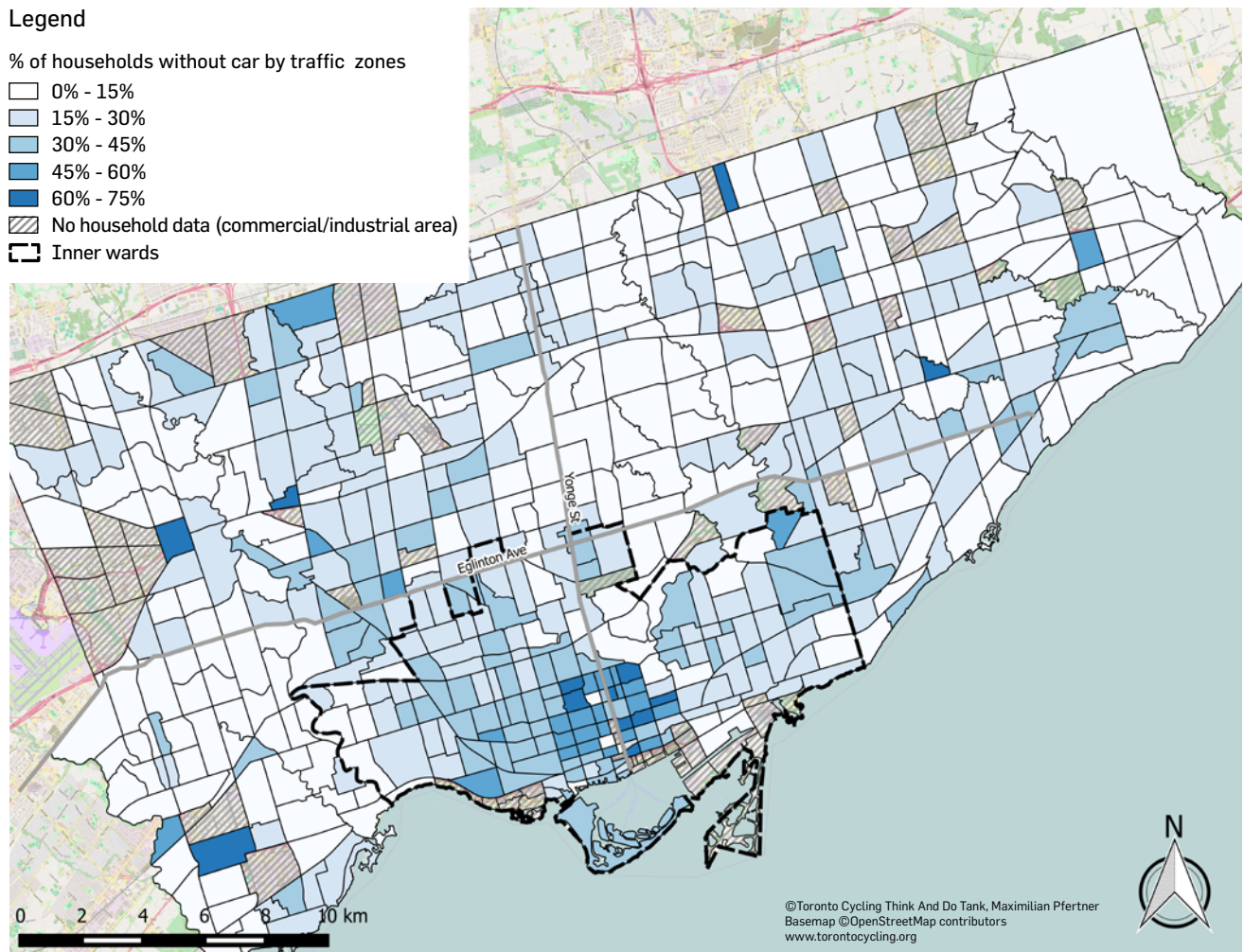


There are also strong differences in automobile ownership, with ownership higher in the outer wards. However, it is important to note that automobile ownership is not monolithic in the outer wards. Figure 6 shows that, in addition to the inner wards, there is a high proportion of car-free households in some outer wards.

FIGURE 6: Households without cars by traffic zone

Legend

- % of households without car by traffic zones
- 0% - 15%
- 15% - 30%
- 30% - 45%
- 45% - 60%
- 60% - 75%
- No household data (commercial/industrial area)
- Inner wards

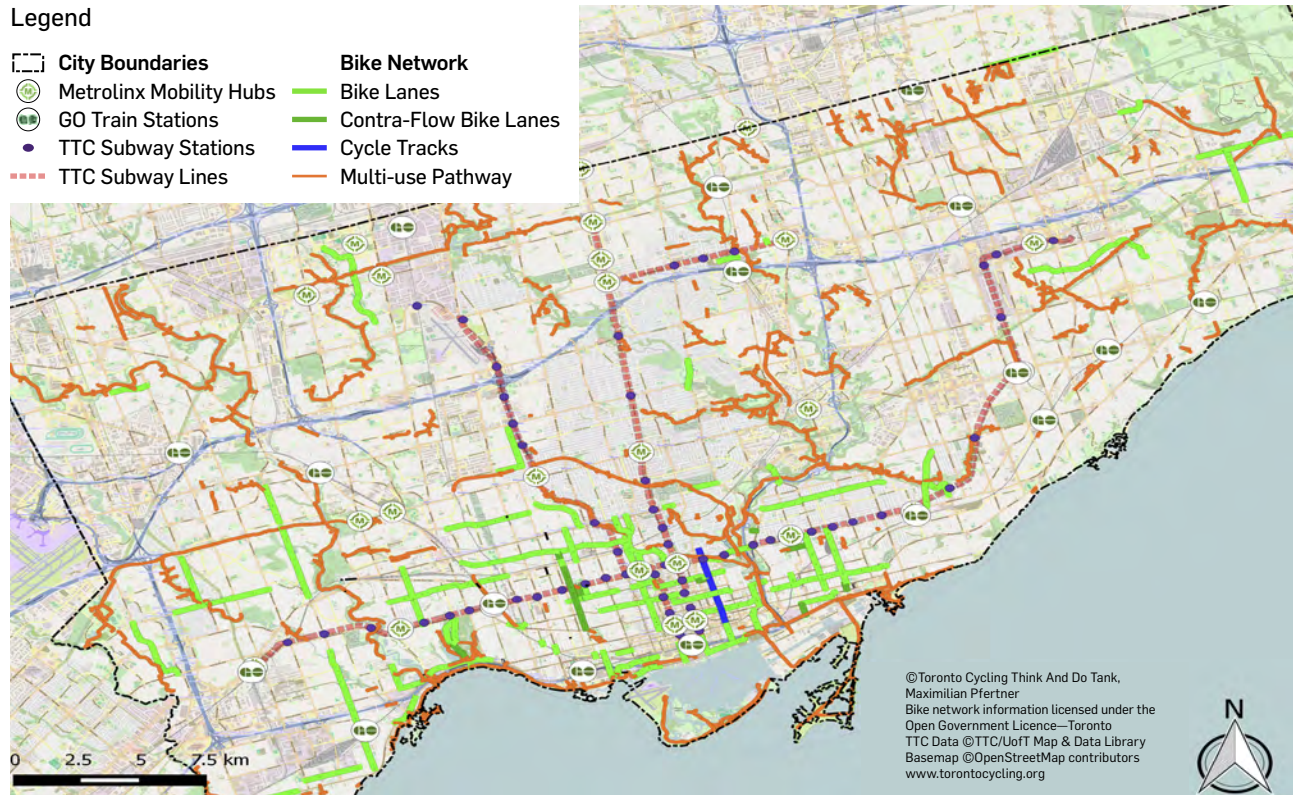


Data Source: Toronto 2011, DMG 2014, TTS 2011; Credit: M. Pfertner

©Toronto Cycling Think And Do Tank, Maximilian Pfertner
 Basemap ©OpenStreetMap contributors
www.torontocycling.org

Higher order transit services and on-road bicycle infrastructure (Figure 7) tend to be located in the inner wards leaving residents in outer wards dependent on cars and buses.

FIGURE 7: Map of Toronto bikeway network and transit stations (2015)



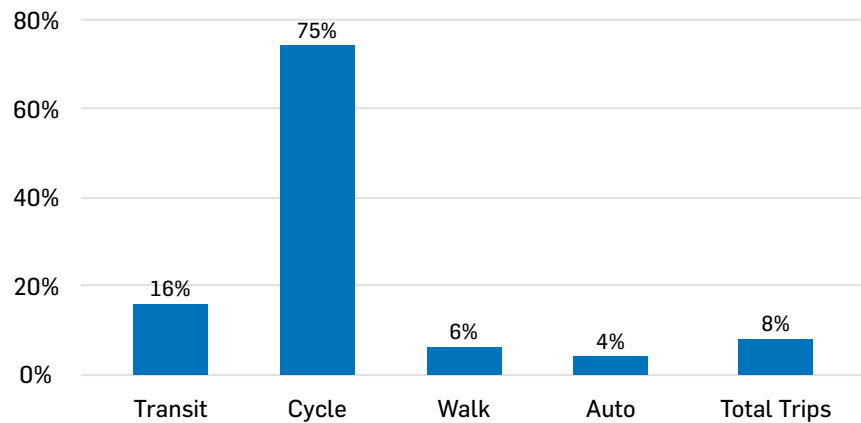
Credit: M. Pfertner

CYCLING IS ON THE RISE

Between 2006 and 2011 cycling trips increased by 75%, far outstripping the increase in trips in other modes and the 8% increase in all trips (Figure 8). In 2009, the City of Toronto's Cycling Study showed that 29% of Torontonians were utilitarian cyclists.²⁵ Share the Road's 2013 cycling survey found 7% of Torontonians bicycle daily. In September 2015, Cycle Toronto measured the number of cars and cyclists using College Street at Spadina Avenue during afternoon rush hour and found 571 cyclists and 666 cars and trucks travelling westbound on College Street.²⁶

FIGURE 8: Percent change in number of daily trips in Toronto (2006–2011) by transport method

Data Source: DMG 2014, TTS 2011



A comparison of peer cities shows that Toronto’s bicycling mode share is similar to Montreal and Melbourne, but dramatically trails European centres like Berlin and Amsterdam that have similar weather patterns and in the case of Berlin, are of a similar size and form²⁷ (Figure 9). Vancouver’s bicycling mode share of 4.4% represents only the city proper with a population of 603,502. This district is similar in population and geographic size to Toronto’s central 14 wards, which have a population of 804,925²⁸ and a similar cycling mode share of 4.9%.

FIGURE 9: Peer city bicycling mode share comparison (%)²⁹

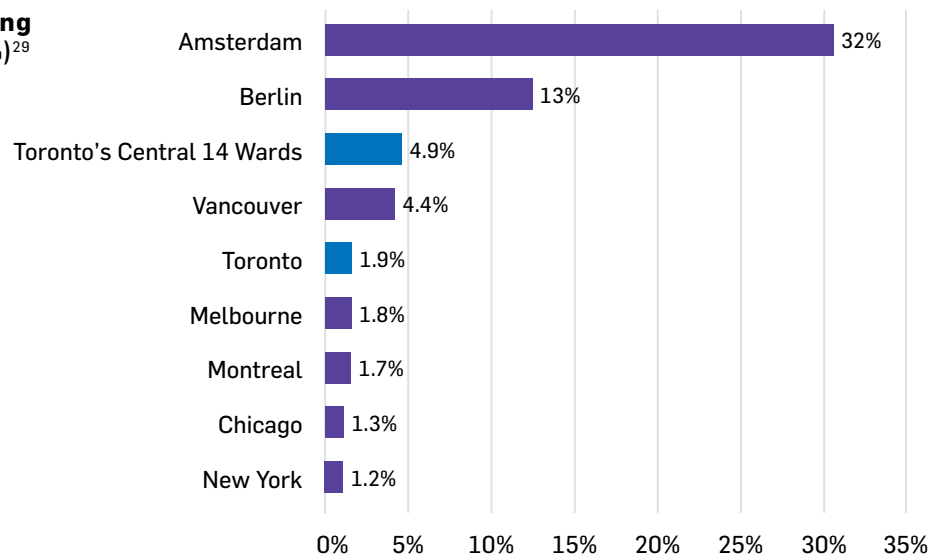


Photo courtesy of Kevin Konnyu

Bicycling in Toronto's central wards is increasing dramatically. 80% of bicycle trips originate in the 14 central wards, which account for just 31% of Toronto's population. This difference in participation rates (Figure 10) is a significant geographic divergence that has occurred over the past 20 years. In 1996, cycling mode share was similar across the city with the central wards having 1.3% share and the outer wards a 1.1% share. As the inner fourteen wards of the city experienced significant growth to 4.9% cycling mode share in 2011, the outer thirty wards experienced a decline to a half a percent. The five downtown lakeshore wards (where cycling is most prevalent) had a 7% cycling mode share in 2011 and have seen explosive growth over the last four years. Some element of social and spatial self-selection may be occurring, such as people interested in cycling for transportation move to these areas and people not interested in cycling move away.³⁰

FIGURE 10: Cycling mode share, inner and outer wards (1996–2011)

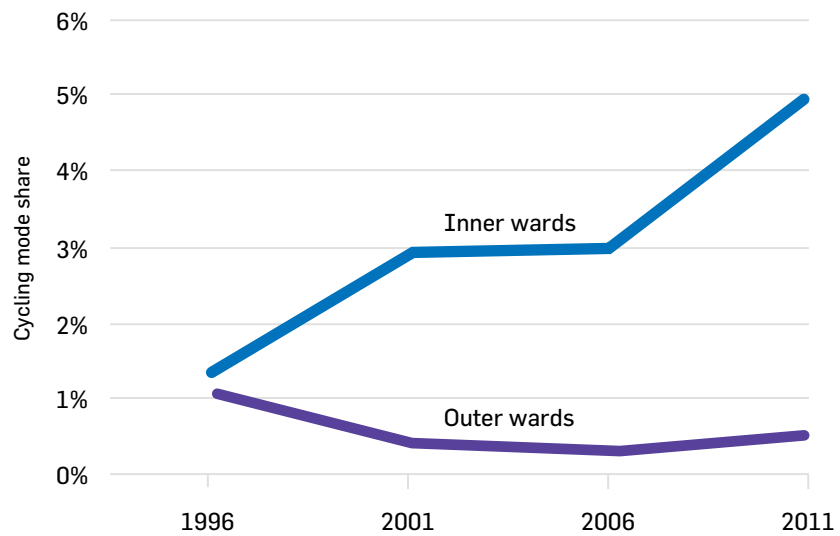
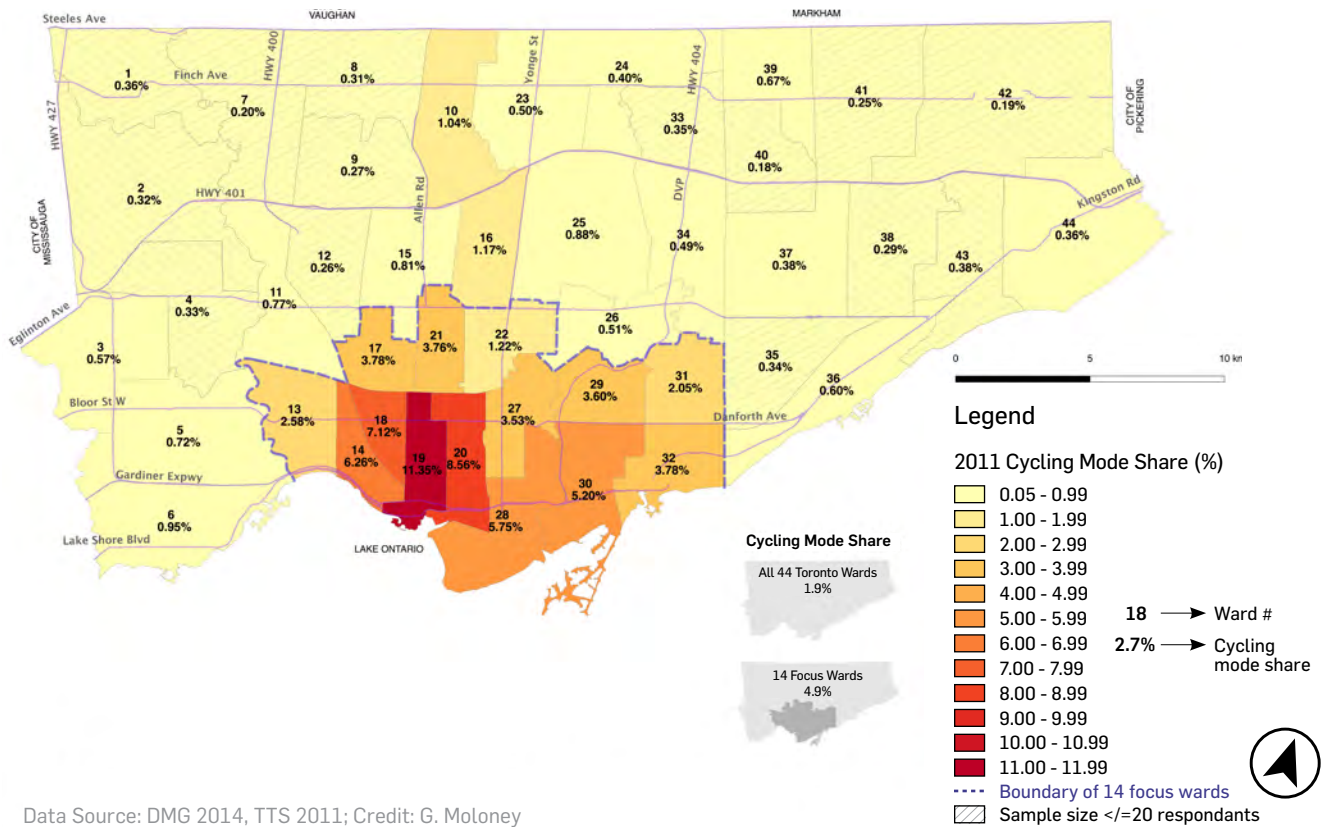


Figure 11 depicts mode share by ward and shows that Ward 19 is the epicentre of cycling within the city. Ward 19 has both the highest cycling mode share and the highest number of cycling trips. The proportion of women who cycle is higher, with women accounting for almost half (45%) of all cycling trips. The cycling mode share for women reaches 10% in Ward 19 and 13% for men.

FIGURE 11: Bicycle mode share by ward (%) Toronto (2011)



Data Source: DMG 2014, TTS 2011; Credit: G. Moloney

Cyclist demographics

People who bicycle in Toronto are mostly men, between the ages of 25 and 55, living in the city’s 14 central wards (Figures 12, 13, and 14.) Those who bicycle are significantly less likely than non-bicycling Torontonians to live in a condominium, apartment, or co-op. Only 33% of utilitarian bicyclists live in condominiums, apartments, or co-ops while 41% of all Toronto residents live in similar housing.³¹

Young and old travellers are much less likely to cycle than are middle-aged ones (Figure 12). In 2011, 66% of Toronto’s bicycle riders were between the ages of 25 and 54. A higher proportion of people between the ages of 25 and 54 cycle, compared to what would be expected based on the total trip mode share. Torontonians over the age of 65 were the least likely to bicycle as a mode of transportation.

Gender impacts transportation choices. On average, only one in three cyclists in Toronto is a woman (Figure 13).

FIGURE 12: Toronto cyclist age distribution (2011)

Data Source: DMG 2014, TTS 2011

■ Age % of cycle (2011)
 ■ Age % of total trips other than cycling (2011)

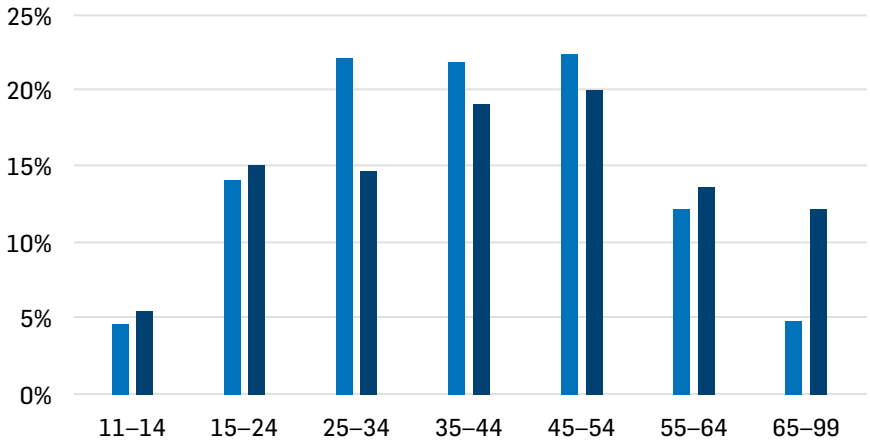
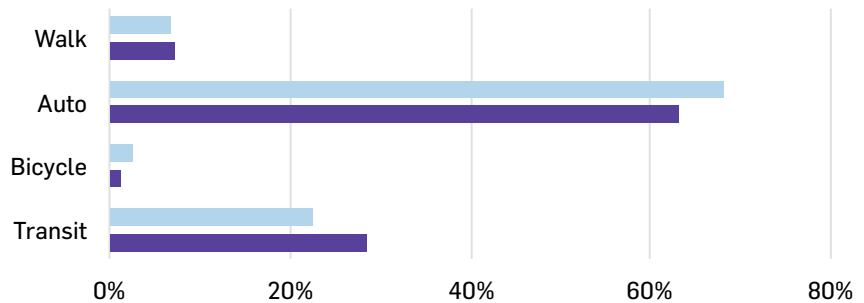


FIGURE 13: Gender and mode share, Toronto (2011)

Data Source: DMG 2014, TTS 2011

■ Male
 ■ Female

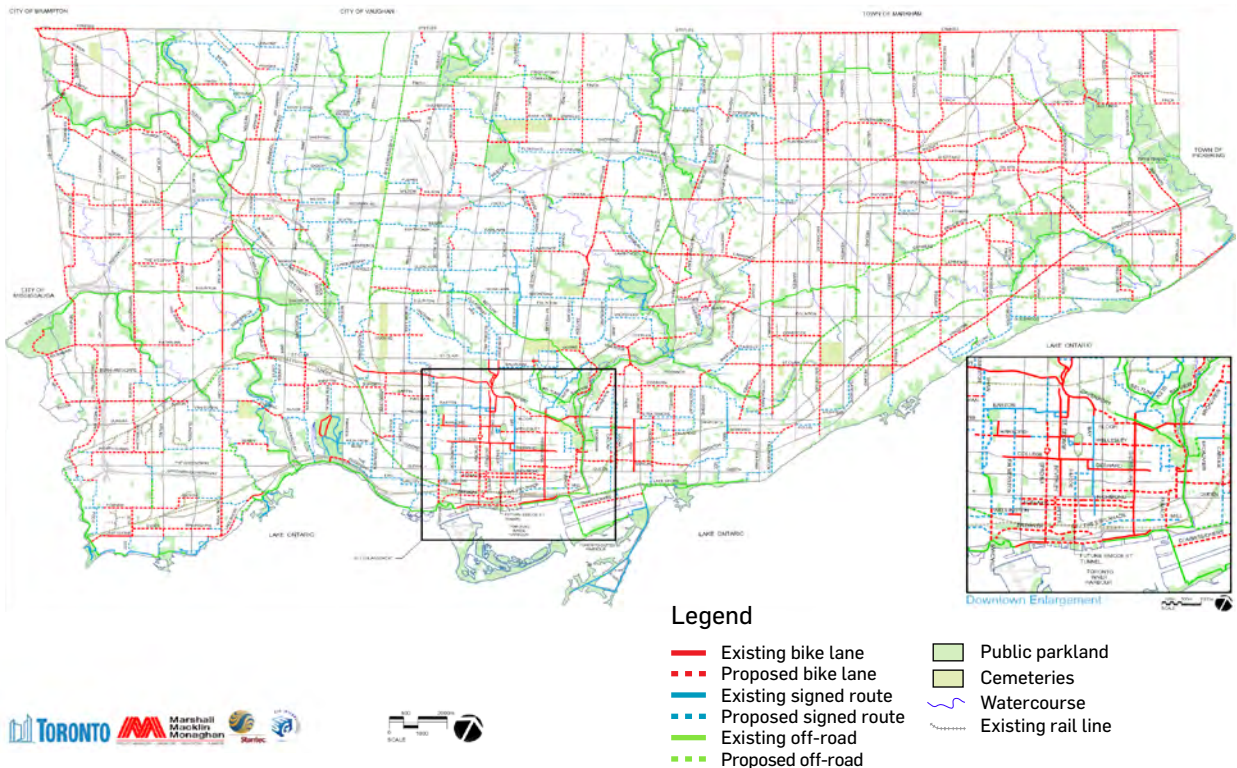


TORONTO'S CYCLING INFRASTRUCTURE: BACKGROUND & CONTEXT

Infrastructure

Toronto's bicycle plan is fifteen years old (2001). It was updated in 2016, but not replaced, with a new Cycling Network Plan. The **2001 Bike Plan** was an ambitious ten-year initiative and remains in place as a guiding document with admirable goals, many of which have not yet been met. It called for doubling of cycling trips by 2011, and an increase in bicycling infrastructure over ten years from 166 km to 1000 km of bikeways to create a strong network throughout the city (Figure 14). Bikeways included painted on-street bike lanes, off-road paths, and signed bike routes. These offer cyclists wayfinding guidance to preferred cycling streets with no actual infrastructure change. Separated on-street bike lanes—**cycle tracks**—were not part of the plan at the time as they were not available as a design option in Ontario. (Design standards have recently been upgraded through the *Ontario Traffic Manual: Book 18 Bicycle Facilities.*)

FIGURE 14: Toronto (2001) proposed bikeway network



Definition of classes:

Class I: On-road cycle tracks or contra flow lanes physically separated from motor vehicle and pedestrian traffic.

Class Ia: Off-road boulevard, greenways, corridor trails suited to transportation.

Class II: On-street bike lanes defined by a painted stripe.

Class III: Bike routes represented only by posted signed routes or sharrows. (A sharrow is a shared lane pavement marking that includes a bicycle symbol and two chevrons.)

Class IV: Off-road bike paths and multi-use trail infrastructure.

While cycling participation levels did increase from 1.2% to 1.9% of trips—less than the bicycle plan’s goal to double the number of bike trips³²—the planned infrastructure was not implemented in full. The city struggled to build on-street bike lanes and built approximately one-quarter of planned kilometres. Table 1 outlines achievements and shortfalls of the 2001 Bike Plan after 15 years and details the intended ten-year impact of the 2016 network plan update.

An increase in cycling has recently led the city to increase investment in on-road cycling infrastructure in the downtown core. Since 2013, Toronto has added 15 km of cycle tracks,³³ which are on-street and physically separated from automobile traffic. The cycle tracks have resulted in further increases in bicycling. On one route (Sherbourne) that previously had painted bike lanes, counts before and after installation of the separated cycle track (and removal of the parallel painted bike lane on Jarvis) revealed **a tripling in ridership** on that route although it is unknown what portion was new cyclists and which were cyclists drawn from less desirable routes.³⁴

TABLE 1: Comparison of infrastructure of bike plan

CLASS	DESCRIPTION	KILOMETRES*						
		2001 KM	2001 BIKE PLAN GOAL KM	MAY 2016 KM	% OF 2001 GOAL ACHIEVED IN 2016	2016 TEN YEAR BIKE NETWORK PLAN KM	2016 TOTAL KM (2016 ACTUALS AND PLAN)	% OF 2001 GOAL ACHIEVED IN 2026
I	Cycle tracks & contra flow lanes	0	0	18	46%	280	408	113%
II	On-street bike lanes	35	495	110				
Ia	Boulevards & corridor trails	0	0	98				
III	Signed bike routes/ share rows	0	260	150	58%	190	340	131%
IV	Off-road paths/ multi use trails	121	249	285	114%	0	285	114%
	TOTAL	156	1004	661	66%	525	1186	118%

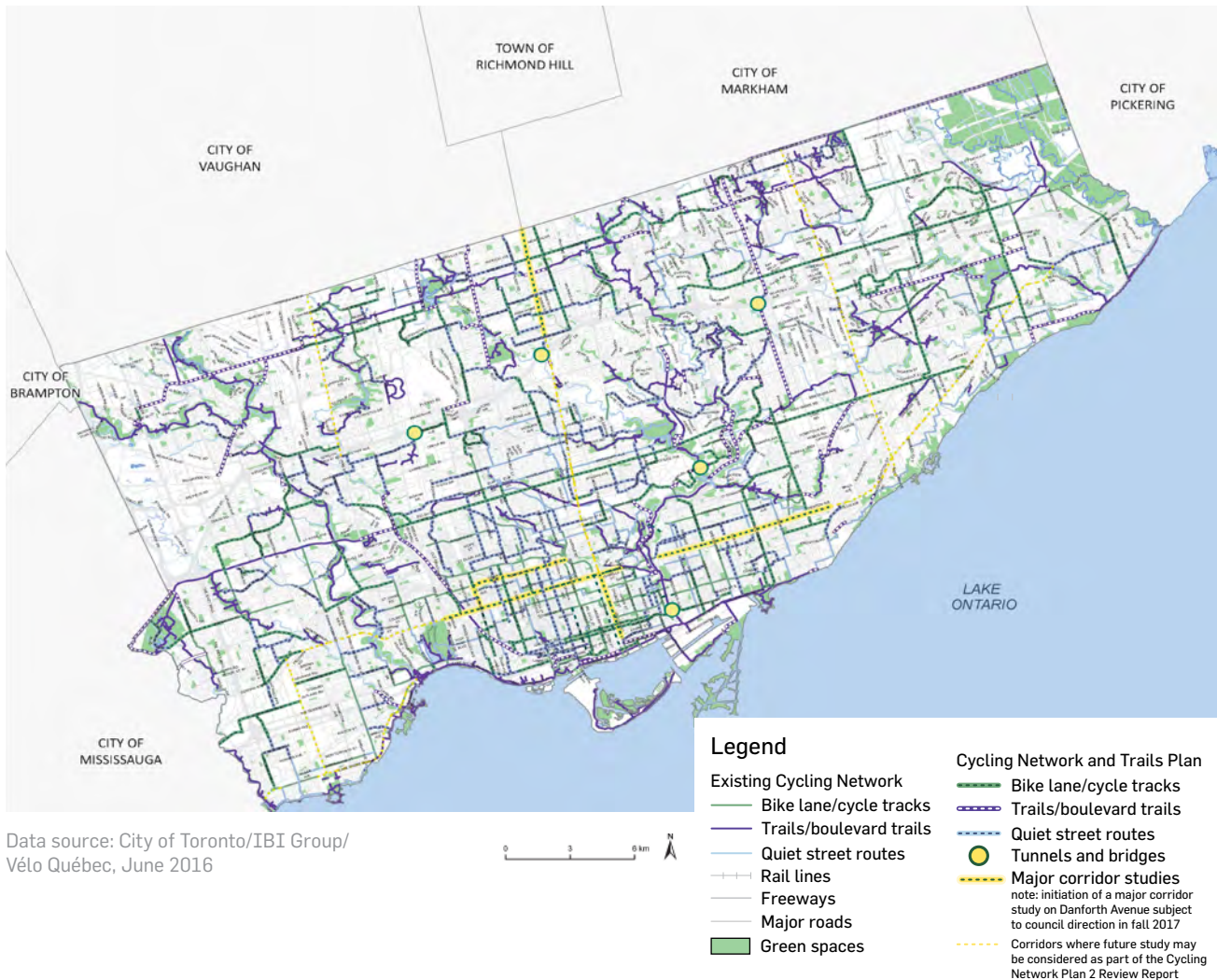
Data sources: City of Toronto, 2001; City of Toronto, 2016d,e; City of Toronto, 2016h

* Infrastructure in this report is measured in centreline kilometres rather than lane kilometres. A centerline km is the length of one km of roadway, regardless of the number of traffic lanes. A lane km is the number of lanes in one centreline km of road. A kilometre of road with bicycle lanes on both sides would have one centreline km of infrastructure and two lane km of infrastructure.

A recent redesign of the Martin Goodman Trail, along Queen’s Quay – a cross-town route along the lakefront – has resulted in 600 cyclists per hour using the route during peak rush hour times.³⁵ Piloted Class I infrastructure on Adelaide and Richmond Streets has been well received and the cycle tracks are now being extended to Parliament Street.

In spite of these recent successes, Toronto has struggled to build a network of well-connected, transportation-oriented, bicycle specific infrastructure. The **Cycling Network 10 Year Plan** was introduced in May 2016 and approved by City Council in June 2016.³⁶ The primary goals are 280 new centreline km of bicycle lanes or cycle tracks and 55 new centreline km of sidewalk level boulevard trails.³⁷ This will bring the total transportation-oriented cycling infrastructure to approximately 560 km by 2025. (Figure 15 and Table 1.)

FIGURE 15: Toronto (2016) bike network plan



Data source: City of Toronto/IBI Group/
Vélo Québec, June 2016

To understand the significance of the increased investment, we compared Toronto’s investment per capita to peer city investments. (See Figure 16.) It is difficult to capture exact investments from municipal websites as budgets are frequently combined with sidewalks and other transportation expenditures. We used government sources where available, but in their absence relied on media reports. (Please see Appendix C for details of sources and calculations.)

With its new investment, Toronto will come closer to low investing European cities such as Berlin but still remain far behind other jurisdictions that prioritize cycling such as Montreal, London, Paris, and Amsterdam. Historically, Toronto has invested less than Vancouver.

To provide perspective, we compared Toronto’s kilometres of bike infrastructure per 100,000 residents and by square km of space within the jurisdictions of peer cities. (See Tables 2, 3, and 4.) These are crude measures that do not address the critical issues of connectivity and access to destinations. However, even with these failings, the comparison does give a sense of where Toronto’s infrastructure is strong and where it is weak. (Please see Appendix B for methodology.)

FIGURE 16: Per capita cycling infrastructure investment peer cities

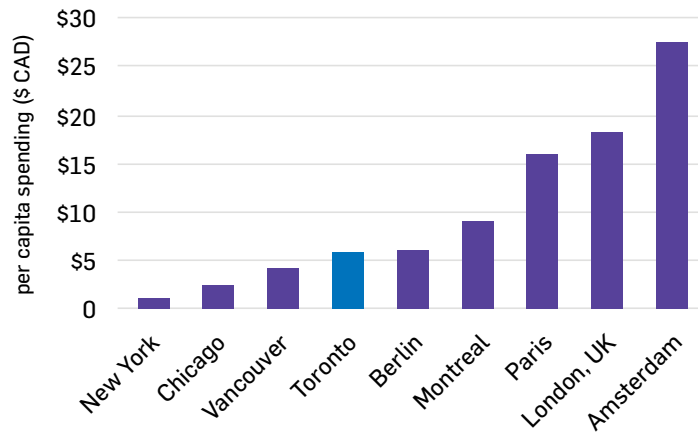


TABLE 2: Peer city total km of bicycle infrastructure

CITY	CENTERLINE KM OF CYCLING INFRASTRUCTURE					
	CLASS I	CLASS Ia	CLASS II	CLASS III	CLASS IV	TOTAL
Vancouver	40	26	39	185	0	290
Montreal	78	188	214	182	86	747
New York	91	262	454	255	0	1063
Chicago	174	0	142	76	0	392
Berlin	712	0	174	80	100	1066
Amsterdam	–	–	–	–	–	500
Toronto	18	98	110	150	285	661

TABLE 3: Peer city km of infrastructure per 100,000 residents

CITY	CENTERLINE KM OF CYCLING INFRASTRUCTURE PER 100,000 RESIDENTS					
	CLASS I	CLASS Ia	CLASS II	CLASS III	CLASS IV	TOTAL
Vancouver	6.67	4.33	6.50	30.83	0.00	48.33
Montreal	4.70	11.38	12.95	11.04	5.22	45.29
New York	1.07	3.09	5.35	3.01	0.00	12.52
Chicago	6.40	0.00	5.22	2.79	0.00	14.41
Berlin	20.00	0.00	4.89	2.25	2.81	29.94
Amsterdam	–	–	–	–	–	61.73
Toronto	0.69	3.74	4.20	5.73	10.88	25.23

TABLE 4: Infrastructure comparison peer city km of infrastructure per km²

CITY	LAND AREA [KM ²]	CENTERLINE KM OF CYCLING INFRASTRUCTURE PER KM ²					
		CLASS I	CLASS Ia	CLASS II	CLASS III	CLASS IV	TOTAL
Vancouver	114.97	0.35	0.23	0.34	1.61	0.00	2.52
Montreal	365.13	0.21	0.51	0.59	0.50	0.24	2.05
New York	789.4	0.12	0.33	0.58	0.32	0.00	1.35
Chicago	588.3	0.30	0.00	0.24	0.13	0.00	0.67
Berlin	832	0.86	0.00	0.21	0.10	0.12	1.28
Amsterdam	167	–	–	–	–	–	2.99
Toronto	630	0.03	0.16	0.17	0.24	0.45	1.05

Toronto is far behind peer cities in Class I, Ia, and II cycling infrastructure whether measured against population or square km.

On the other hand, **Toronto far exceeds other cities in terms of km of bike and multi-use trails with a recreation focus (Class IV).**

This is a result of a focus on building infrastructure that raises no political controversy and the leveraging of provincial funding that was available for recreation but not transportation. Class IV trail infrastructure is the only category for which Toronto met its 2001 Bike Plan goal. In fact, it exceeded its goal. In comparison to peer cities, Toronto lacks a network of on-road transportation-oriented physically separated bike lanes and painted bike lanes. In Toronto, most off-road trails either lack connections to the larger bicycle network or have steep access and egress due to their location in river valleys.

Vast swathes of the city have little or no cycling infrastructure and no cycling service supports such as bicycle parking, bicycle shops, or community cycling hubs. The outlying areas—as we'll see with Issue 6: Lack of cycling infrastructure in the outer wards—tend to only have Class IV cycling infrastructure. In many jurisdictions, such as Minneapolis and Vancouver, these types of paths have been fully integrated into the transportation system with safe transitions to on-street cycling infrastructure and transit hubs to allow people cycling to reach their destinations safely.

In Toronto, however, this integration is largely absent, particularly in the outer wards. The paths have a heavy recreational emphasis, are disconnected from each other and on-street infrastructure, are not associated with transit hubs, and are associated with few destinations (Figure 7). Moreover, many of these paths are in ravines, requiring steep ascent to join roadways. A 2009 Ipsos Reid study found that 75% of bicyclists did not use the trails for commuting while only 20% did not use them for recreation. **Like other city residents, those in the outer wards are most interested in on-road cycling infrastructure that provides direct routes to their destinations. Transportation-oriented, on-street cycling infrastructure is rare to non-existent in the outer wards.**

Planning and modelling

Toronto lacks a transportation master plan and, as a result, transportation issues are often dealt with on an ad hoc basis with political pressures significantly influencing decisions (for example the recent Scarborough Subway/LRT debate, the Gardiner Expressway debate, as well as the removal of cycling infrastructure from Jarvis Street, Pharmacy Avenue and Birchmount Road). Frequently, individual projects are subject to council debate and approval and Toronto City Council sometimes makes decisions, and overturns prior decisions, with little regard for efficiency of the overall transportation system.

The city's official planning guidelines ("Toronto Official Plan") sets the goal to "create a safe, comfortable and bicycle friendly environment that encourages people of all ages to cycle for everyday transportation."³⁸ Amendments to the plan in 2014 strengthened the commitment to change by emphasizing the importance of mutually supportive land use and transportation policies to maximize accessibility and make walking, cycling, and transit increasingly attractive and to move towards a more sustainable transportation system.³⁹ The Official Plan also mentions that over time an objective is to include: "a transportation plan to set priorities for new transit investment; a pedestrian master plan to create a safe comfortable and attractive pedestrian environment throughout the city; and a bicycle master plan that identifies improvements to the bicycle path and lane system throughout the city." These are articulated as three separate strategies (on different parts of the page) rather than as an integrated transportation plan.⁴⁰

The City does not set concrete numerical goals for reducing automobile traffic volumes and collisions and fatalities, nor for increased mode share for walking, cycling, and transit. The plan does, however, recommend the use of Travel Demand Management (TDM) measures to "reduce car dependency and rush-hour congestion"⁴¹ by increasing transit, walking, and cycling trips while reducing demand for vehicular traffic. Recent Official Plan amendments, based on the "Feeling Congested" initiative, also relate to cycling policies.⁴² The new Cycling Network Plan, approved by City Council in June 2016, is primarily oriented towards cycling routes, and largely ignores policies, programming, and cycling economy issues, for which the 2001 Plan remains the reference document.

The focus of Toronto’s current regional traffic modelling system (GTA model version 2 based on the 1996 TTS data structure) is efficiency of cars and transit and the a.m. peak period time; it does not include separated data for walking and bicycling—they are lumped together as “other.” The system is a coarse representation rather than a granular look at movement and focused on vehicles rather than people. **A new regional modelling version is in development. It will separate walking and cycling data as well as include trips at all times in the day.** In order to analyse local projects, the city makes extensive use of meso and micro simulation models. These smaller meso and micro local models include analysis of pedestrian and cycling volumes and interaction between automobiles and pedestrians. Cordon counts are used to measure both bicycle and automotive traffic in some neighbourhoods. However, collectively, these data and models do not permit the city to simulate the integration of the most sustainable and efficient modes (cycling and walking) into wide scale future scenarios.⁴³

The Province recently released its **Proposed Growth Plan for the Greater Golden Horseshoe, 2016**. Key provisions include a focus on compact and complete communities. If adopted, municipalities will be directed to “prioritize active transportation, transit, and goods movement over single-occupant automobiles” and a complete streets approach will be implemented to improve the needs and safety of all road users. **The proposal mentions increasing the modal share of transit, but not of walking and cycling.** Mode share targets are not set although the plan allows municipalities to set mode share targets.⁴⁴ The Provincial Policy Statements that guide local planning do not require that municipalities implement complete streets when planning and making local infrastructure changes. The Chief Coroner’s Review of Cycling and Pedestrian Deaths recommended such an approach.⁴⁵ Provincial policy explicitly supports transit, and provincial *Transit-Supportive Guidelines* suggest complete streets.⁴⁶

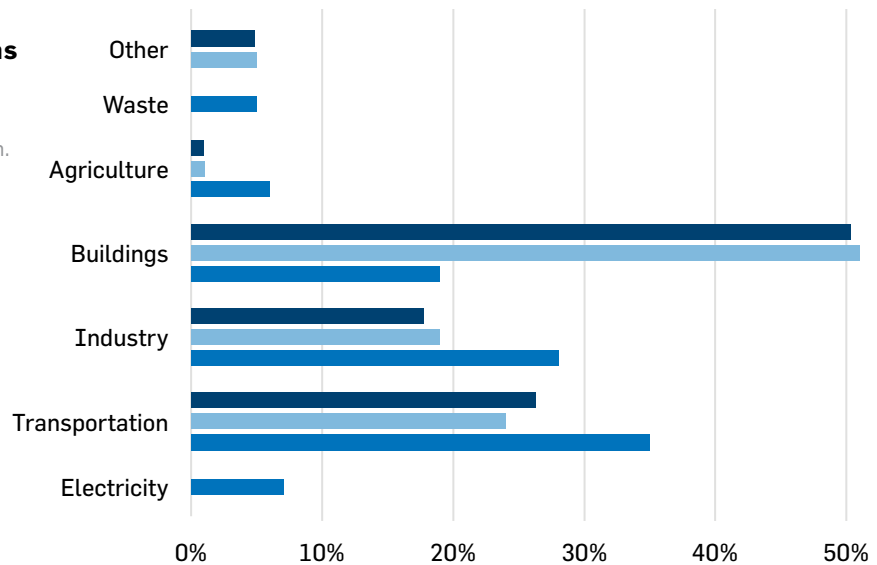
Greenhouse gas emissions

In Ontario (2013), greenhouse gas emissions (GHG) from road passenger transportation accounted for 32.7 MT CO₂e or more than half of all transport emissions (60.1 MT CO₂e). This is double Ontario’s emissions from manufacturing (16.1 MT CO₂e) and equal to all emissions from buildings within the province (32.6 MT CO₂e).⁴⁷ Road passenger GHG emissions are a large, serious, and growing problem. Increases in sustainable transportation trips offer great potential for reversing this trend and cycling trips in particular could replace a large minority of current automobile trips within the city.

FIGURE 17: Ontario Climate Change Action Plan: Emissions and planned funding (June 2016)

Data Source: www.applications.ene.gov.on.ca/ccap/products/CCAP_ENGLISH.pdf

- % CCAP funding (high)
- % CCAP funding (low)
- % GHG emissions by sector (2013)



Ontario recently released its Climate Change Action Plan (CCAP). Figure 17 compares the percentage of emission by sector with Ontario’s planned funding for reductions. (There are high and low investment scenarios and details are lacking.) It is clear however that the contribution of transportation to emissions is not aligned with planned investments. The province is placing a much higher percentage of its investments in buildings than it is in transportation. As part of its \$5.9 billion to \$8.3 billion CCAP investment, the **Ontario government recently announced spending of between \$37.5 million and \$56.25 million per year on cycling infrastructure across the entire province.** (The City of Toronto accounts for approximately 20% of the province’s population.) Details of how expenditures would be made and measured were unavailable at the time of writing.⁴⁸

Public Bike Share

In the summer of 2016, Metrolinx and the Toronto Parking Authority (TPA) doubled the size of Toronto's Bike Share network by adding 1000 new bicycles and 120 new stations bringing the total within the city to 2000 bikes and 200 stations.⁴⁹ Most are located in the downtown core with a few stations further out along the east-west subway line. While the doubling plan sounds bold, in relation to other cities and need, Toronto's system is still small (Table 5).

TABLE 5: Bike share peer city comparison

BIKE SHARE COMPARISON			# BICYCLES IN SHARE SYSTEM			# BIKE SHARE STATIONS		
JURISDICTION	POPULATION	KM ²	# OF BICYCLES	BICYCLES PER 100,000 PEOPLE	# PER KM ²	# OF BIKE STATIONS	STATIONS PER 100,000 PEOPLE	# PER KM ²
Toronto (June 2016)	2,615,060	630	1000	38.24	1.59	80	3.06	0.13
Toronto (2016 expansion)	2,615,060	630	2000	76.48	3.17	200	7.65	0.32
Berlin (combined)	3,562,166	892	1950	54.74	2.19	193	5.42	0.22
New York	8,550,405	1214	6000	70.17	4.94	332	3.88	0.27
London, UK	8,538,689	1572	10,000	117.11	6.36	700	8.20	0.45
Chicago	2,720,546	606	4760	174.96	7.85	476	17.50	0.79
Paris	10,550,350	2845	20,000	189.57	7.03	1800	17.06	0.63
Montreal	1,886,481	499	5200	275.65	10.42	460	24.38	0.92

Data Sources: CBC 2016, Statistics Canada 2011B, City of Toronto 2016F, Bixi Montreal 2016, U.S. Census Bureau 2015, C40 Cities 2015, Divvy Bike 2016, Office for National Statistics 2011, Transport for London 2016, Index Mundi 2010, NYC DOT 2016, Institut national de la statistique et des études économiques 2012, Velib 2016, Amt für Statistik Berlin Brandenburg 2014, European Law Society 2016, Visit Berlin 2016, Next Bike 2016.⁵⁰

The current pricing structure for Bike Share, prioritizes short trips. This pricing structure needs to change to accommodate trips away from the bike share stations. Hubs at suburban stations will not replace the need to accept personal bikes on transit during peak hours unless the system accommodates overnight borrowing, as is the case in some European situations.⁵¹ For many users, the cost of a multi-modal trip using a personal bike (from home), transit, and then finally a bike share membership in the core (to work or school) is prohibitive, yet this would relieve pressure on transit last mile trips which are the most expensive to service. Additionally, including cargo bikes in a wide range of locations would greatly increase the usefulness of Bike Share to participants who don't own a car.⁵²

HOW CAN WE INCREASE CYCLING IN TORONTO?

In this section we identify issues and provide recommendations. Some recommendations are directed towards the provincial and federal governments and would support active transportation across both Ontario and Canada. We reference critical areas of policy and physical infrastructure, and also focus on behaviour change and social infrastructure, as well as the cycling economy necessary to support cycling. It should be noted that actions in one area might not prove fruitful without supporting actions in the other areas. At the end of this section there is a “Summary of recommendations with roles and timelines.”

Policy and infrastructure

ISSUE 1: Toronto lacks an integrated transportation plan

Local and international experts, consulted during the writing of this report, consider the lack of strong positive messaging by the city—relating to concrete goals and the context and benefits of active transportation—to be a significant barrier both to the development of new projects and the implementation of approved projects. Experts emphasized their experience with other jurisdictions where integrated transportation/official plans⁵³ containing concrete transportation mode share and infrastructure goals were effective tools for fostering change. They allow staff and elected officials, as well as the community of residents and businesses, to understand how individual decisions fit into an integrated and detailed larger vision.

RECOMMENDATIONS

- A. **Create a concrete and visionary sustainable transportation plan for Toronto affirming that streets are for people and that congestion is decreased when people move using active transportation and public transit.** Access, equity, and choice are key principles that should be applied both to modal choice and neighbourhood planning. The plan should recognize that active transportation promotes competitive and healthy cities⁵⁴ with a high quality of life. Transportation should be reliable, timely, convenient, healthy, and enjoyable, providing access to work, study, commercial and recreational destinations with minimal emissions and costs. The plan should ensure that residents throughout the city have transportation choices that include safe and effective bicycling infrastructure and realistic options for multi-modal trips. Cycling infrastructure can be scaled up and implemented more easily and economically than can transit and automobile-oriented infrastructure projects⁵⁵ and thus should be prioritized for action within the plan. A focus on integrating cycling with transit and on enabling multiple sustainable options through disproportionate investment in active transportation, especially in areas of the city currently lacking feasible transportation choices, should be a priority. Filling gaps in the downtown network of separated bike lanes would further grow cycling in the city core, attracting the many citizens interested but currently fearful of cycling on the roadway.

- B. Adopt staged targets over 5, 10, 15, and 20 years for travel mode shares within the plan, with increasing levels of walking and cycling and decreasing levels of automobiles.**
- C. The vision for Toronto’s sustainable transportation plan should embrace the city’s recently adopted Road Safety Plan goal of no road fatalities or serious injuries based on the concept of Vision Zero⁵⁶ and focus on the disproportionate mortality and morbidity experienced by active travellers.⁵⁷**
Committing to **Vision Zero** through a Road Safety Plan should be a central component of a larger transportation plan. Increasing numbers of cyclists should be accompanied by risk-reduction actions.⁵⁸ **Speed management is a key piece of the safety picture and acts as “hidden infrastructure.”⁵⁹** Speed limits should be reduced throughout the city.
- D. Since land use planning is a key component of sustainable travel⁶⁰ and Toronto is embedded in a regional transportation system, the sustainable transportation plan should be integrated with Toronto’s Official Plan, Ontario’s Growth Plan, and the Metrolinx Big Move plan, as well as secondary plans/projects such as TOcore, Toronto’s Complete Streets Guidelines, and Feeling Congested.** A transportation plan offers the opportunity to integrate all the thinking that went into these documents into an actionable and operational guiding force.
- E. Provincial policy statements should require complete streets measures, ensuring that instruments like Class Environmental Assessments (EAs) would also need to comply with this approach.**
- F. Outreach and consultations with Business Improvement Associations and Residents Associations on anticipated community, business, and property value benefits will be needed, within a positive community consultation framework.**

ISSUE 2: Toronto needs significant cycling infrastructure investment

In 2016, Toronto adopted the **Cycling Network Ten Year Plan**. It proposes an additional 280 km of bike lanes or cycle track and 55 km of boulevard trails over ten years. This represents an increase in funding from \$9.5 million per year (or \$3.62 per person per year) to **\$15.3 million per year (or \$5.85 per person per year) over 10 years. This will still result in an incomplete network with limited connections between the multi-use trail system and the streets and limited infrastructure in much of the city.**

RECOMMENDATIONS

- A. **Invest in Class I and II cycling infrastructure and strategically align transportation infrastructure investment with mode share and safety goals and with areas with strong latent demand.**⁶¹ Investing based on targeted mode share and accessibility and safety *goals* will provide planners, policy makers, and politicians with guidelines to build future capacity and enable the comparison of investment with outcomes. Particular attention should be paid to investing in cycling infrastructure in areas throughout the city with larger proportions of trips less than 5 km in length to ensure that the greatest possible proportion of potentially cycleable trips is accommodated. In addition, cycling infrastructure should be a required component of road reconstruction projects, incorporating intersection treatments, enhanced parking facilities, and lanes at a time when these upgrades are least expensive. Provincial policy statements and Class EA guidelines should require these complete streets measures.
- B. **Establish safe and consistent connectivity between the extensive system of off-road trails and the on-road system so trails can be used more easily for transportation allowing the city to leverage the investment made in recreational trails.**
- C. **Target areas with high densities of multi-unit housing,** given the lower levels of car ownership in these housing types (Figure 6) and the need for alternate transport options to both facilitate mobility and reduce future automobile demand. Anecdotally, much current multi-unit housing lacks bicycle parking and also forbids bicycles in elevators so it is almost impossible for residents to bicycle. A program endorsed by the city to **encourage and support landlords to develop weather protected, safe, secure, well-lit, on-site bicycle parking for residents is an important intervention** particularly in high-density tower neighbourhoods. **Buildings that lack secure bicycle parking should be required to allow bicycles on elevators** so residents may safely store their bicycles in their apartments. This is, however, the least preferred option as most apartments lack space for bicycles.
- D. **Significantly increase the geographic coverage and the station count in the current catchment area of the bike share system. System expansion needs to coincide with installation of other bicycling infrastructure and transit integration so that there is a ready source of bicycles to be used by new bicyclists on new infrastructure at trip origin and destination.**

- E. The province should invest heavily in cycling infrastructure in Toronto and throughout the province in order to meet both health and environmental goals in a cost effective manner. Using funds from the recently introduced carbon cap and trade system, the Climate Action Plan should invest heavily and proportionally in transportation, particularly cycling infrastructure—an area ripe for change that has significant public support.**⁶² The government is planning on investing between \$37.5 million and \$56.25 million per year over four years across the province in cycling infrastructure. Per person per year, this is \$2.73 on the low end and \$4.10 on the high end. Road passenger transportation accounts for more than half of all transportation sector emissions and should be appropriately targeted for investment. Current investment plans are a start, but they are not proportional to emissions.
- F. Make active transportation mode share goals mandatory and fundamental to municipal integrated sustainability plans. Ensure that the Government of Canada’s Gas Tax Fund as well as other federal transportation and climate change funds, are used to create sustainable transportation networks.** The Gas Tax Fund pays \$2 billion to Canadian municipalities each year. It was intended to be used for sustainable infrastructure and to reduce GHG emissions and result in cleaner air and water. Communities are required to have an integrated sustainability plan in order to access the fund. Roads and bridges have accounted for roughly one-third of total spending. However, there is no category for active transportation infrastructure in reporting and no indication that the funds have been used to improve sustainable transportation options. In fact, overall monitoring of the funds has been lacking with no evidence to suggest sustainability has been improved.⁶³

ISSUE 3: No framework to measure and monitor transportation investments

Toronto has no formal measurement and monitoring framework for transportation investments related to transportation outcomes such as mode share and safety, so evaluation of outcomes and impact is next to impossible. Consequently, decision makers lack data and multi-billion dollar decisions are made in the absence of an overarching financial context and transport plan. This problem exists for all three levels of government.

Toronto also lacks a framework to evaluate transportation infrastructure investments as they relate to larger societal issues such as health, prosperity, environment, equity, and access. Toronto is by no means alone in this, but in an age of constrained public spending multiple societal goals need to be achieved through transportation investments, and monitoring and evaluation is critical to providing officials with effective guidance.

RECOMMENDATIONS

- A. Link transportation infrastructure investments in Toronto to enhance decision-making, monitoring, and evaluation.** Identify the economic costs and subsidies associated with automobile, transit, walking, and bicycling infrastructure and maintenance services. Ideally, investment decisions would be based on a wide range of metrics per individual traveller including key factors such as mode share and morbidity, and mortality by type and location of infrastructure. However, a much wider range of metrics should also be included: accessibility by age, gender, and income level; portion of household budgets devoted to transport; portion of GDP devoted to transport; per capita transport energy consumption; per capita transport emissions of greenhouse gases and pollutants; access to education and employment; access to bicycling infrastructure (also in relation to lack of transit options); proportion of intersections with cyclist-oriented signs and signals; kms of infrastructure per capita by mode by traffic zone; environment and health concerns; time-focused local monitoring to capture outcomes and impacts (including changes in trips and economic impacts) of new interventions; comparisons of cyclist demographics on arterials with and without cycling infrastructure, and winter bicycling accommodation and mode share.⁶⁴ Commercial outcomes for main streets should also be considered and measured when planning and implementing transportation investments. Better data and funding for improved active transportation modeling/simulation are also needed.
- B. Improve data collection by federal and provincial governments.** Data on personal transportation is collected infrequently—the National Household Survey and the Transportation Tomorrow Survey collect data every five years—or in the case of Transport Canada, focuses on automotive travel only.⁶⁵ The Transportation Tomorrow Survey lacks critical demographic data such as income and health status, while the National Household Survey contains limited trip information. These data sets should be evaluated together and a recommendation for improved data sets should be developed and implemented.

ISSUE 4: Road users are vulnerable

Toronto’s cyclist collision rate per 100,000 of population is the highest among major Canadian cities.⁶⁶ Toronto ranks well compared to other Canadian cities on its fatality rate per 100,000 of population (2.26) (comparable data on collisions is not available). However, by virtue of its larger population, fatalities in Toronto are the highest in the country (63 deaths in 2013).

In comparison with people using cars or transit, cyclists (along with pedestrians) are “more likely to be injured or killed per trip or per distance travelled.⁶⁷ The rate of injuries and fatalities per million trips for both pedestrians and cyclists has decreased between 2003 and 2012 (see Figure 18 for Cyclist Injuries/Fatality per 1 million trips).⁶⁸ Trends are encouraging, but there remains room for significant improvement.

Traffic deaths are not spread equally throughout the city. In fact, **86% of fatalities occur on major and minor arterials**, which account for just 20% of the total kilometres of city roadways (see Figure 19), although they experience a much higher percentage of motor vehicle volume and the highest speeds. **86% of all collisions involving cyclists also occur on arterial roads.** While the percentage of bicycle kms travelled on arterial roads is unknown, it is likely that this represents a disproportionate minority of bike travel, as cyclists are known to prefer routes with less traffic, lower speeds, and more separation,⁶⁹ possibly rendering arterial roads even more risky for cyclists than the data here indicate. Major and minor arterial roads have multiple lanes of traffic designed to move large quantities of motor vehicles quickly. Speed limits are higher than on local roads, and the design of the roads encourages drivers to travel faster than the speed limit.

FIGURE 18: Toronto cyclist collisions (2003–2012)

Data Source, Toronto Public Health 2015A, City of Toronto Police Motor Vehicle Collision Reports 2003-2012, TTS 2006, 2011

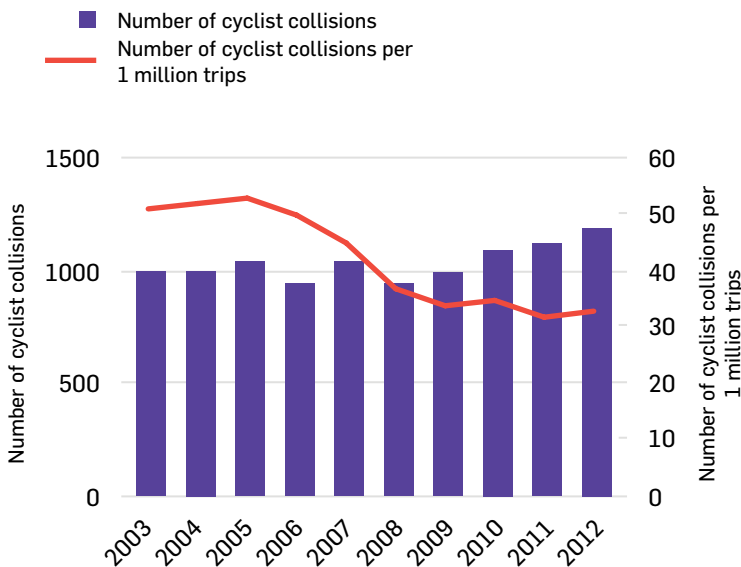
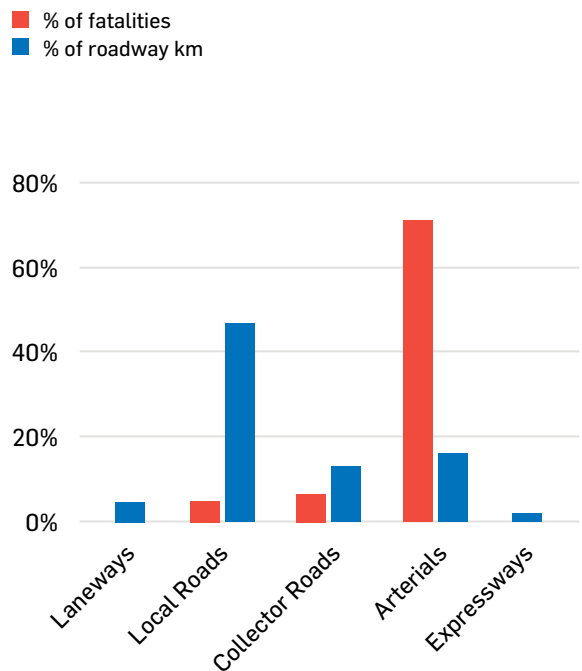


Figure 19: Fatalities by road class, Toronto (2013)

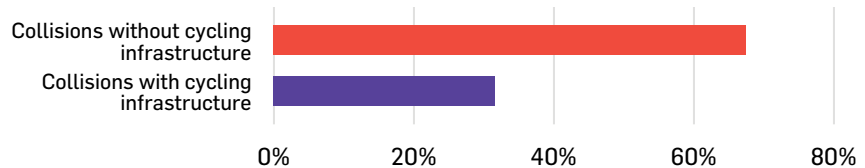
Data Source: City of Toronto 2013A, 2014B



The Pedestrian and Cyclist Safety report by the City of Toronto's Public Health Department showed that two-thirds of all cyclist collisions over a five-year period (2008–2012) occurred on streets without any bike infrastructure, though the exposure rate is again unclear (Figure 20).

FIGURE 20: Cycling infrastructure and cycling collisions (Toronto 5-year average)

Data Source: Toronto Public Health 2015



Bike lanes are an effective way to increase road safety for cyclists. Sharrows, however, are ineffective. The average number of collisions per kilometre of cycling infrastructure was highest for on-street sharrows, which do not separate the cyclist from motor vehicles. There were 1.9 collisions per km of sharrows over a 5-year average, which is similar to the rate for roadways with no cycling infrastructure at all. The collision rate was less than half that on streets with painted bike lanes (0.7 collisions/km over a 5-year average).⁷⁰ **Although intersections account for only a small portion of the overall roadway, they are the most dangerous points for bicyclists, accounting for 49% of bicycle collisions over a five-year period.**⁷¹ The city has begun to improve some intersections with the provision of chevron markings, bike boxes, green pavement markings, and cycle specific signals. Recent changes to the highway traffic act in Ontario have increased the penalties for dooring to reflect the severity and frequency of this occurrence (12.5% of collisions—a five-year average).⁷² A 1-metre passing regulation has also been instituted, but no similar measures by the Province have been implemented to make intersections safer for bicyclists.

RECOMMENDATIONS

- A. **Introduce vulnerable road users' legislation and adopt Vision Zero within the province and the city. Include specific targets to reduce morbidity and mortality among vulnerable road users.** This is the area most resistant to change over the last decade.⁷³ In addition, adoption of Vision Zero for Canada by the federal government is recommended.
- B. **Adopt speed reduction measures including lower speed limits and rigorous speed limit enforcement. Road diets, in the form of narrower or fewer lanes of traffic, to reduce speeds on arterials are urgently needed.** Low speed neighbourhood street signs should have bicycle indicators to both identify safe routes and remind other road users of the legitimacy of cycling as a transportation option.

- C. Increase regulations relating to vulnerable road users' safety.** For example, require truck side guards.
- D. Adopt Ontario Traffic Manual (OTM) Book 18: Cycling Facilities guidelines regarding the best bicycling infrastructure for various kinds of roads based on automobile traffic speed and volume.**
- E. Prioritize arterials and intersections for cycling infrastructure.** Class I separated bike lanes for arterials and intersection protocols including bicyclist specific signals, advanced flashing lights for bicyclists and pedestrians, lane markings, extended corners, and protective corner barriers for bicycle lanes could be prioritized at these locations. Cyclist-oriented intersection signage is particularly effective, as it captures the attention of travellers going in all four directions. It clarifies routes and protocols in spaces where cyclists and motorists often don't know how to traverse traffic.
- F. Price car parking appropriately** (under or behind buildings and buffer with greenery) **to meet safety and mode share goals. Where it remains, on-street parking should always encourage turnover and be the most expensive choice, as it increases congestion⁷⁴ as well as mortality and morbidity for cyclists. and creates challenges for winter maintenance of adjacent bike lanes.**

ISSUE 5: Integration between transit and bicycling is weak

Transit in Toronto is a two-tier system. The Toronto Transit Commission (TTC) is responsible for operating subways, streetcars, and buses within the city. Metrolinx is responsible for regional train and bus service in the GTHA. Despite early leadership in the 1960s and 1970s, the transit system in Toronto struggled to attract government investment from the mid 1980s until 2010.⁷⁵ The Toronto Transit Commission receives the lowest per rider subsidy in North America.⁷⁶ Capital investments in expanded subway services have been over budget and under performing in terms of ridership. In spite of this, ridership was 534 million in 2015, one of the highest rates in North America.⁷⁷

While there are bike racks on all TTC and GO buses, there is a **lack of bicycle access to subway stations**. Subway stations are located on busy arterials with almost no bike lanes or signals. Additionally, **bicycles are prohibited on TTC subways and GO trains during key week-day travel periods and bicycle parking is lacking at many TTC stations**. Consequently, the commonly desired multi-modal choice of subway/train and bike is rendered almost impossible for people with typical working hours.

Integration with the Toronto land use and transportation planning departments appears to be limited. No one within either transit system has specific responsibility for accommodating and developing their bicyclist customer base. Nor does it appear to be anyone's specific responsibility to increase bicycle access to TTC stations. The TTC is showing some movement towards cycling support: bike repair units will be installed in 10 stations this year and there are plans for increased bicycle parking. GO Transit has installed extensive covered bicycle parking at most stations although without strategizing which stations would most likely support cycling. These are important signals but will not result in significant levels of multi-modal travel without better station access.

Metrolinx touches on the need for changes to active travel with Strategy #2 of the Big Move (its regional transportation plan), defined as Enhance and Expand Active Transportation.⁷⁸ **Metrolinx sets a goal of 20% of trips being walked and bicycled by 2033 in the GTHA.**

Applied to Toronto this would essentially double the 2011 level of walking and cycling from the current 9%. In 2008, the Big Move committed to at least \$20 million per year to GTHA municipalities for walking and cycling programs, but this funding program has not yet been put in place.⁷⁹ In 2012, Metrolinx released a 25-year \$2 billion per year transit expansion plan which recommended: "Up to 5 percent (of total funding) for other transportation and mobility initiatives, including walking and cycling infrastructure, fare integration, mobility hubs, urban freight movement, intelligent transportation systems and user information systems."⁸⁰ The exact level of financial commitment for active transportation in this massive mix of investment recommendations has not been clearly articulated. **Investment strategies need to align with mode share goals and walking and bicycling require separate mode share goals and strategies.**

Toronto lacks strong connections between its transit and cycling systems. International experts identified integration of trains/subways with bicycling as a key overlooked ingredient in the success of both bicycling and trains within the Netherlands.⁸¹ Kager et al⁸² suggest the bicycle softens the “rigid nature” of transit and transit dramatically expands the bicycles’ spatial reach.

RECOMMENDATIONS

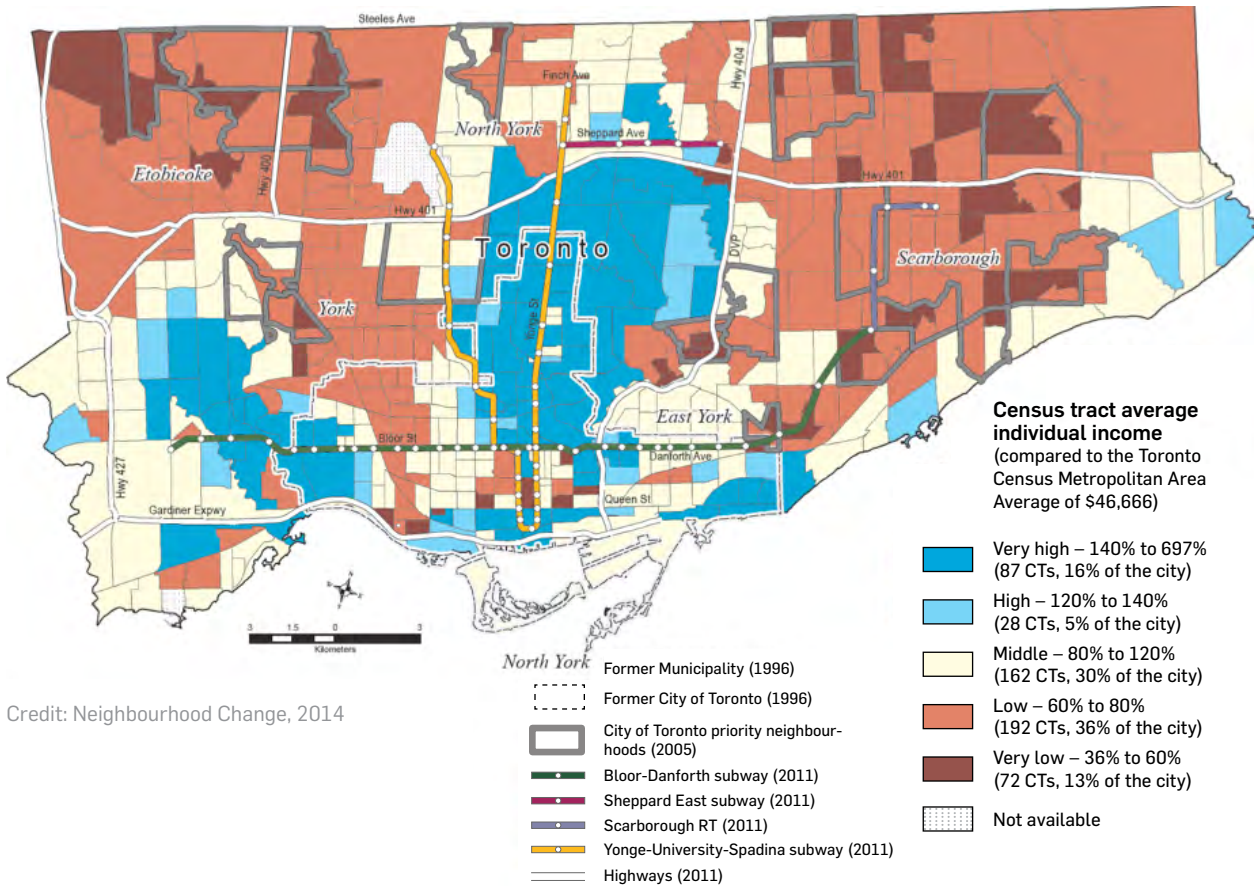
- A. Transit stations should be treated as mobility hubs with cycling lanes and cycling friendly intersection protocols radiating into 5 km catchment areas.** This could be a staged implementation with a graduated focus of 1 km, 2 km, etcetera in order to deal with the immediate and highest impact catchment area first. Investment should include bike parking, ramps, and turnstiles at transit stations, reduction or elimination of bike bans on subways/ trains during high use periods, and investment in increased capacity of subways/trains to carry bikes. Widespread secure bicycle parking, fix-it stations (already planned and installation begun) and fare-integrated bike share rentals would provide enhanced service to customers.
- B. Start fully integrating bicycling with trains and subways through establishment of a multi-agency integration task force (City of Toronto, Metrolinx, TTC and GO, Bike Share/ Toronto Parking Authority).** Transit operators should be encouraged to see cyclists as key customers, particularly in outlying wards where multi-mode commutes are more common. Encouraging bicycling will reduce congestion around transit stations and increase access. Any new plans for Regional Express Rail (like Smart Track) represent a unique opportunity to integrate cycling access to stations and plan for trains that can carry bicycles during commuting hours and could represent a first step towards full integration of bicycle and train/ subway planning with on-street cycling infrastructure and bike share.
- C. Explicitly link Metrolinx’s active transportation investment to their mode share targets.** Walking and cycling require different approaches.⁸³ This should be reflected in both strategies and investments.

ISSUE 6: Lack of cycling infrastructure in the outer wards

Toronto is a city with growing economic divides and income polarization between the suburbs and downtown.⁸⁴ The Neighbourhood Change Research Partnership, which mapped income levels in the city in 2014, showed that the outer wards tend to be of lower income. They also house a greater concentration of youth, children, and seniors than the inner wards, as well as higher proportions of immigrants.⁸⁵ People are pushed to these areas by a lack of affordable housing. (See Figure 21.)

In the outer wards, where housing is more affordable, block sizes tend to be large. Many neighbourhoods are hemmed in by curvilinear rather than grid streets. There are few access points to wide, arterial roadways due to indirect routes built to discourage cut-through automobile traffic. This presents a barrier to pedestrians and cyclists. This pattern is more pronounced further outside the core, and yet people in these neighbourhoods rely on bus transit with low service levels and walking and cycling with poor to non-existent infrastructure. Automobiles ease access to work, school, shopping, and activities and yet car ownership levels are inconsistent due to disparities in income.

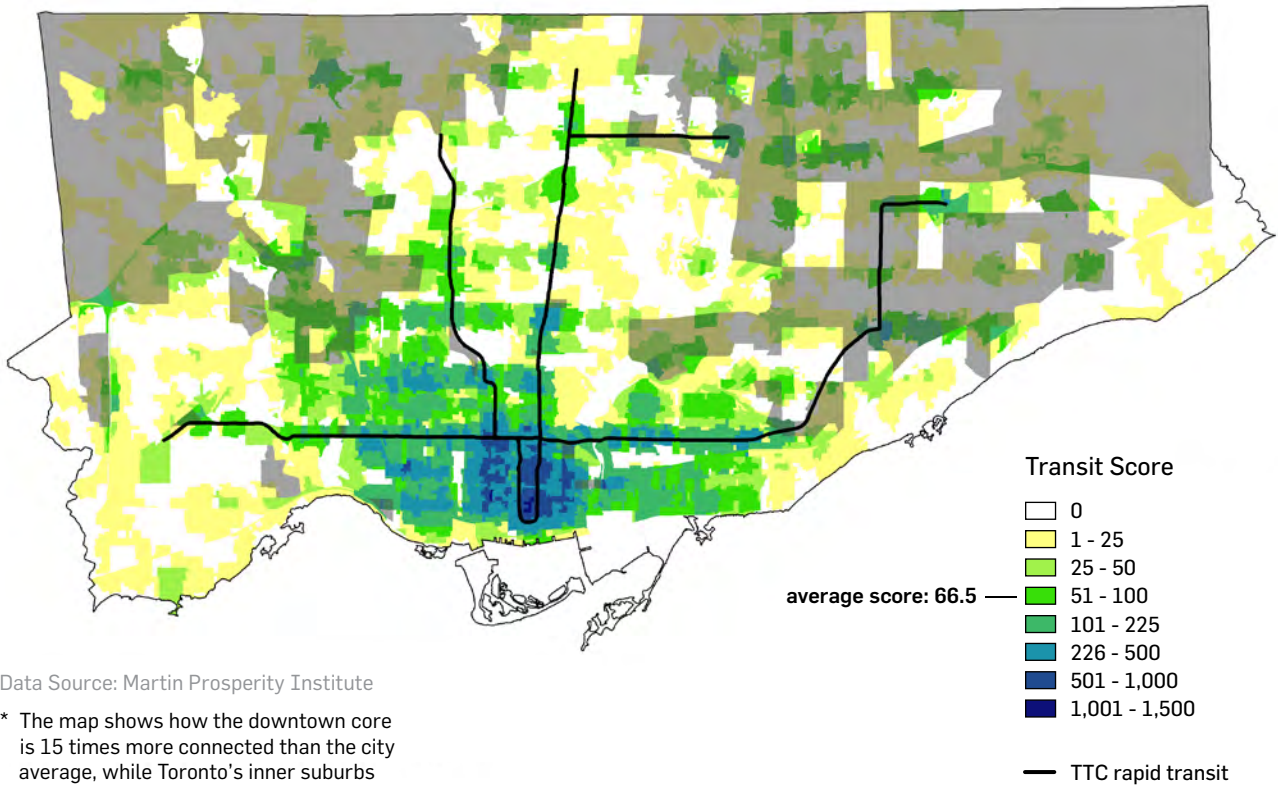
FIGURE 21: Average individual income, Toronto (2012)



Credit: Neighbourhood Change, 2014

The outer wards contain large transit deserts—areas lacking transit services and connectivity. The Martin Prosperity Institute found that the downtown core is 15 times more connected than the city average (see Figure 22).⁸⁶ The lack of both cycling and transit accessibility in the outer wards is a significant factor affecting economic, environmental, and social sustainability for Toronto. The contrast with the more central areas of the city points to transportation related difficulties affecting equity, inclusion, and social mobility. This same study found the highest household incomes have the greatest connectivity and the lowest household incomes have the poorest connectivity,⁸⁷ resulting in a situation where those most in need of affordable transportation choices have the fewest options.

FIGURE 22: Transit deserts*



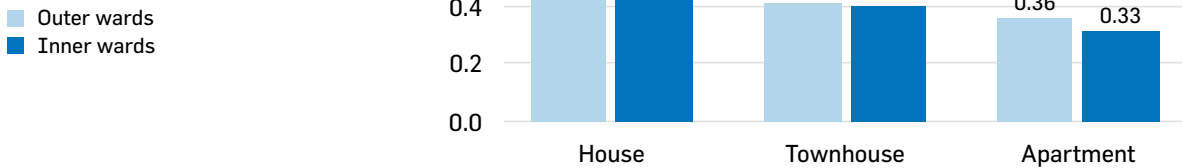
Data Source: Martin Prosperity Institute

* The map shows how the downtown core is 15 times more connected than the city average, while Toronto's inner suburbs are underserved by the transit system.

The ongoing narrative of private automobiles as the dominant transportation “choice” for people living in suburban areas neglects important distinctions and nuances. Some areas in the city’s outer wards have surprisingly low automobile ownership rates (Figure 6) given the lack of higher order transit, transit connectivity, and cycling infrastructure in these same areas. Housing type is a more important correlate of car ownership than is geographic location (Figure 23). There are more vehicles per person in households living in single-family homes than in households living in apartments regardless of their location within the city.

FIGURE 23: Number of vehicles per person by housing type

Data Source: DMG 2014, TTS 2011



Residents in the outer wards experience a combination of lower incomes (Figure 21), a lack of transit and connectivity (Figure 22), little cycling infrastructure (Figure 7) and higher rates of diabetes.⁸⁸ The people least able to afford automobiles may be the most dependent on them.

RECOMMENDATION

Strategically invest in cycling in the outer wards building support for change through a combined approach of programming, infrastructure, and policy. In particular, it would be useful to pilot investment in locations in the outer wards with high residential density within five kilometres of important destinations like transit hubs and employment, commercial and academic centres. A series of policy, infrastructure, and programmatic interventions should be aligned. Currently these different kinds of strategies are not implemented together.

ISSUE 7: Lack of a reliable en route cycling wayfinding system

Bicycle wayfinding includes all the ways bicyclists are able to find paths and routes to access their destinations safely and efficiently. Toronto's bicyclists have access to maps produced by the city and numerous smartphone applications. However, en route signage—making simple undistracted navigation easy and accessible to all bicyclists while travelling—is lacking. Toronto's bicycle signage is inconsistent in both design and placement. Routes are numbered rather than identified by accessible origins and destinations. Gaps in the bike network are large and signage is not in place to direct cyclists to rejoin the network.

Wayfinding is particularly important for visitors to the city and new resident riders. Wayfinding systems are important legitimizers of travel choices as well as guides to safe route choices. For inexperienced bicyclists, the absence of street signage directing them to safe bicycling routes, in a city without a cohesive network, may be enough to discourage them from cycling.

A new overarching system for bicycle wayfinding (as part of the larger Toronto 360° Wayfinding Strategy) is planned and a pilot was undertaken on the Pan Am path in 2015. However, details regarding plans for cycling are sparse. The guiding document only mentions bicycles once and cycling four times, two of which came from open house public comments. Timelines for full implementation are uncertain.

RECOMMENDATION

Prioritize fast-track implementation of the planned Toronto 360° Wayfinding Strategy for cyclists ensuring that signage can be read by cyclists without dismounting.

ISSUE 8: Shortage of bicycle parking

Toronto has a strong system of post and ring parking stands with over 17,000 currently available on sidewalks and boulevards. Toronto is frequently considered a leader in this regard in North America. **The public or businesses are able to suggest new locations, although there is a backlog and it can take the city up to a year to process a request.**⁸⁹

Toronto also has at least eight seasonal bicycle corrals that use a 24-hour car parking spot for up to 14 bicycles. An on-sidewalk bicycle locker program accommodates 232 bicycles in rented enclosed single lockers costing \$10 per month (there is a waiting list for this service). Additionally, there are two secure indoor bicycle parking stations at transit locations with two others underway and plans for new bicycle parking stations at several new Eglinton Crosstown interchange/hub LRT stations. **Parking is lacking at most transit stops and stations outside the downtown core, yet the majority (74%) of bicyclists say that they would combine cycling and public transit more often if secure bike parking were available at subway stations.**⁹⁰

A 2013 bicycle parking study in the west end of the central wards found 98% of respondents agreed there is a shortage of secure bicycle parking in the city. Security is a particular concern for overnight parking as 82% of respondents felt uncomfortable locking their bikes overnight. This number declines to 34% during the day. This suggests a high level of daytime anxiety over bicycle theft. Use of unofficial parking spots (trees, sign posts etc.) is driven by lack of availability of more appropriate purpose built parking; 94% of those not using a bike locking stand do so because they are not available when needed.⁹¹

A 2013 report by the city focused on parking in multi-unit residential buildings and resulted in changes to development by-laws requiring bicycle parking based on use and square footage in commercial, residential, and institutional facilities. These new regulations will come into force for building permits issued from 2016 and on.⁹² They do not apply to current housing stock. **Recognizing that demand for bicycle parking remains high, the city is undertaking a new bicycle parking strategy budgeted for initiation in 2016.**⁹³ The investment strategy of \$1 million per year includes replacing substandard stands, increasing the supply of post and ring bicycle parking, and having staff develop longer term priorities.⁹⁴

RECOMMENDATION

Prioritize the development and implementation of the new bicycle parking strategy. Build on the success of the post and ring system by resourcing it appropriately to eliminate the backlog of applications. Develop a long-term strategy for dealing with significant increases in the need for cycle parking including new forms of parking that can accommodate higher numbers of bicycles.

ISSUE 9: Lack of winter maintenance

Winter maintenance of bicycle infrastructure and routes is critical to keeping all those Torontonians who bicycle in spring, summer, and fall on the road, and safe, in the winter. But snow clearing creates challenges. Ploughs push snow into bike lanes where it frequently remains for long periods. Many bike lanes are adjacent to on-street parking, and ploughs have trouble clearing around cars. Further, Toronto uses salt rather than sand on its streets, which produces slippery slush.

Toronto recently committed to clearing a priority network of bicycle routes (including the waterfront trail) in the city centre to the same standard as the adjacent roads. The \$650,000 cost amounts to 1% of the city's snow clearing budget (compared to a cycling mode share of double this figure). Other on-street routes will be cleared 48 to 72 hours after a snow event.⁹⁵

RECOMMENDATION

Snow clearing should prioritize vulnerable road users including pedestrians. Offer winter maintenance of the entire network of on-street bike lanes and off-street bike boulevards as a basic service. In progressive jurisdictions in Europe such as Denmark, sidewalks, then bike paths, then transit corridors are prioritized for snow removal, after which car roadways are cleared.



Photo courtesy of Kevin Konnyu

Behavioural factors

Advocacy

Toronto has a strong bicycle advocacy group: **Cycle Toronto**. This membership-based group has close to 3,000 members and 21 active ward groups advocating for a healthy, safe, cycling-friendly city. Cycle Toronto has been pivotal in raising the profile of bicycling in Toronto, partnering with other organizations to deliver grassroots programming, services, and events, and developing a positive political profile within Toronto City Council. Cycle Toronto has helped to drive the current increased investments in cycling infrastructure and maintenance. Toronto also benefits from a number of cycling and active transportation staff advocates within the city planning and transportation departments as well as within transit agencies. The city also has a number of supportive city councillors.



Photo courtesy of Kevin Konnyu

Programming

The City of Toronto runs some programming to support bicycling. **Learn to Bike** and **CAN-BIKE** courses are offered in parts of the city through Parks, Forestry & Recreation. Cycling Canada's CAN-BIKE program is a series of cycling courses from beginner to instructor level. The city also supports partners to deliver programs such as **Bike Month** and **Bike to Work Day**. Bike to Work Day involves people riding to City Hall for a pancake breakfast. While a wonderful celebration of cycling, it is not very inclusive since most people do not work nearby. During Bike Month, Cycle Toronto runs commuter stations around the central core but no commuter outreach occurs in the outer wards. Bike Month involves partners from both Toronto and the GTHA and allows partners throughout the region to list events on a central calendar and produce branded materials for their events. This work is coordinated by Cycle Toronto. The city also supports the **Toronto Bike Awards** and awards an annual **Bicycle Friendly Business Award**. Advocacy and community groups run small bicycle-oriented programs and group rides, and several bike stores host group events and rides.

Cycling education is not mandatory curriculum in Ontario schools. The Toronto District School Board (TDSB) adopted a Charter for Active Safe and Sustainable Transportation and declared the first bike-to-school day in 2014, which in 2015 became a **Bike to School Week**. The TDSB has begun to pilot small bicycling programs. Most recently, CultureLink has been funded by the Ontario Trillium Foundation (OTF) to increase cycling programs in Toronto schools through their **Bike to School Program**. It will reach 22,000 students in approximately 160 to 200 schools over three years. There are 666 schools and 289,000 students in the TDSB system. (There are an additional 86,000 students in the Toronto Catholic District School Board.) The Bike to School Program also has a program worker and funds dedicated to supporting clubs and extracurricular activities at 10 schools every year and will run a Bike to School Leadership Camp for two years of the OTF Grant.

ISSUE 1: Lack of promotion of multi-modality and bicycling

Toronto has a strong cycling advocacy group, but it does not currently have a high profile political champion of the multiple economic, cultural, and quality of life benefits bicycling can bring to the city.⁹⁶

Toronto also does not have a comprehensive marketing program promoting cycling as a mainstream transportation choice as recommended by many experts⁹⁷ and needs to build a wider consensus and more comprehensive vision to capture the multiple benefits of sustainable accessibility.

RECOMMENDATIONS

- A. **Promote multi-modality and bicycling through a high profile bicycle marketing program highlighting bicycling as a mainstream, legitimate transportation option. The message should address multi-modality: bicycles are used by many people for some trips but not all, and this type of choice should be encouraged.** Use lessons from other jurisdictions that have been successful in mainstreaming cycling.⁹⁸ Use current electronic transit and road messaging boards as well as stationary billboards, web, and print, to craft and share pro-bicycling messages. For example statistics showing that bicyclists (and walkers) enjoy their commute more than others.
- B. **Create conspicuous role models by, among other things, expanding Toronto Police Service and Emergency Management Services use of bicycles. Uniforms add legitimacy to bicycling.** This is a low-cost option with multiple community benefits.⁹⁹ Identify other service agencies, such as home care, that could benefit from the police and EMS fleet experience. A forum should be developed where those with bicycle fleet experience in Toronto can share knowledge and expertise in order to help launch new agency bicycle fleets. These fleets are cheaper to establish and maintain than automobile fleets. Some taxpayer-funded automobiles for senior executives and traffic and roadway engineers at the city and the Province, and their agencies, should be replaced with good quality, city-branded, commuter bikes. Some of these should be specifically adapted for load-bearing, to counter the objection that automobiles facilitate carrying materials that are difficult to accommodate on a bicycle. The savings from reduced automobile programs should be used to fund bicycles for a wider range of employees.
- C. **Establish bike corrals at city events.** There is currently a policy that every city event must have a place to fill up water bottles. In a similar fashion, the city could require that all events have bike corrals for bicycle parking. This immediately makes cycling more convenient and signals to residents that bicycling is a legitimate choice.

ISSUE 2: Risks of cycling are overestimated

Media reports on bicycling in Toronto commonly only highlight the risks associated with bicycling rather than the more profound benefits of economic prosperity, healthy and enjoyable lifestyles, extended lifespan, reduced pollution, reduced congestion, and lower costs to develop and maintain systems compared to alternate choices of transportation.

RECOMMENDATIONS

- A. **Transportation and Public Health departments should work together to heavily promote the net health, community prosperity, fun, and longevity benefits of bicycling, through targeted campaigns in schools, community centres, family doctors' offices and accompanying community based bicycling uptake programs.** (See also Recommendation 3C, below.) Emphasize positive lifespan impacts of cycling,¹⁰⁰ demonstrated air quality improvements and congestion relief, and the fun, freedom, independence, social capital, and travel time benefits of cycling for the roughly 50% of trips under 7 km.
- B. **Reduce levels of fear associated with the perceived and actual safety of bicycling through publicizing investments made to improve unsafe spaces and protect vulnerable road users.**¹⁰¹

ISSUE 3: Not enough cycling programming in Toronto

Bicycle programming has been shown to have great success in creating new commuters, at a relatively lower rate of investment than infrastructure required. Toronto has little in the way of bicycle skills and cycling adoption programming.

RECOMMENDATIONS

- A. **Fund and develop a wide range of community-based bicycle programming throughout the city, particularly where transportation options are limited, by partnering with local bicycling professionals, community groups, and advocates.** This can include mentorship, bike to school, and bicycle mechanic programs, and fix-it stations at community events. To maximize their impact, initially they would be best planned in areas that are transitioning to cycling rather than areas that are already quite engaged or not engaged at all. **Create a city-wide program to encourage adults to take up bicycling for transportation.** Embed it within community centres and other community organizations. Have bicycling mentors and bicycles to borrow.¹⁰² Important barriers to commuter cycling include access to bicycles, street riding training, route planning, mechanical knowledge, and capacity for carrying groceries and children, particularly for women for whom “trip-chaining” of several short trips is routine. Conspicuous examples and role models showing how to overcome barriers are needed.¹⁰³
- B. **Expand Open Streets or Ciclovía programs.** These low-cost celebratory events have proven extremely popular and effective around the world.¹⁰⁴ In 2014, 2015, and 2016, Toronto had two Sunday morning open street events. These events encourage new

cyclists to try cycling in a safe, community-supported fashion. They are fun and highlight the enjoyment that cycling brings to people's lives. Toronto should stagger an expansion of Toronto's Open Streets program from two Sunday mornings in the summer to four, to eight, then sixteen, so that Sunday morning open streets become established as part of the city's rhythm. Expand its range from the central wards into the outer wards in coordinated events to expose cycling to a wider range of residents.

- C. **Expand Toronto's Bike to Work Day.** Vancouver has expanded and decentralized their program and located "celebration stations" throughout their city, so that bicyclists can participate on their way to work without needing to participate in a ride to a specific destination. This would be a good model to help expand the impact of Bike to Work beyond the central wards and open cycling and the related celebrations to more residents. In Vancouver in spring 2015, over 10,000 cyclists – including over 2,000 new cyclists—registered on the website to log their cycling hours.¹⁰⁵ This compares to approximately 3,000 registered for Bike to Work Day in Toronto in 2016.¹⁰⁶
- D. **Invest in Bike to School programs and bicycle skills programs for all school-aged children to counter the decline in active transportation to school.**¹⁰⁷ Establish bicycle training in schools by building on the current TDSB Charter for Active Safe and Sustainable Transportation and their pilot bicycling programs.¹⁰⁸ The province should add bicycling to the school curriculum. This will help both those who bicycle, and those who will eventually drive, by ensuring all students understand the rules associated with bicycling. Bicycling education is an established part of school curricula in countries such as the Netherlands where all 12 year olds must pass a 6 km road cycling skill test.
- E. Create and fund development of a bicycle club framework for high schools to support and guide teachers interested in bicycle clubs.
- F. **Add bicycle mechanic courses to Specialist High Skills Major programs in secondary schools.**¹⁰⁹ A pilot bicycle mechanic program has run successfully for several years at Central Commerce Collegiate Institute though lack of funding may result in closure.
- G. **Support this work through provincial and city funding for bicycle training and support hubs.** Schools can act as bike hubs (especially needed in outer wards) if mechanic and cycling skill programming are combined. The recently announced Ministry of Transportation Cycling Training Fund program was a good step forward, but the one-time allocation of \$380,000 for the entire province fell far short of needs.

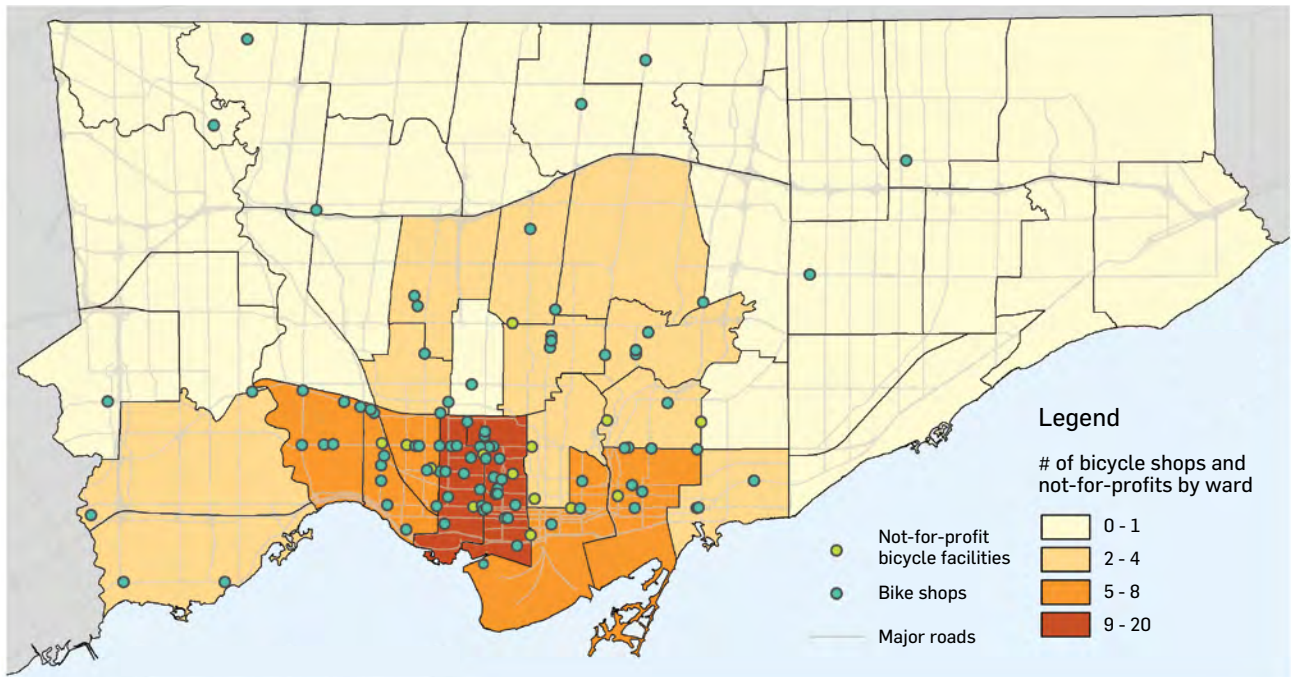
The cycling economy

Traffic congestion is the largest single economic impact of over-reliance on private automobiles for transportation and is estimated to currently cost the GTHA \$15 billion.¹¹⁰ Increased cycling reduces congestion by using less space per person on public roads and can increase the vibrancy of commercial areas. Nonetheless, opposition to cycling infrastructure in Toronto is common: from businesses convinced that bike lanes replacing some on-street parking will negatively impact their trade, to homeowners who perceive trails as a source of crime and intrusion.

Toronto traffic is also seriously impacted by delivery services illegally parking on streets. Periodic ticketing blitzes temporarily reduce impacts but the problem quickly rebounds.¹¹¹ **While Toronto has a dense core of business activity and multiple bicycle courier and food delivery services, the major package delivery companies in Toronto such as Canada Post, UPS, Purolator, and DHL have no bicycle fleets for local delivery, adding to congestion and reducing traffic flows.**

Cycling service facilities are necessary for cyclists in the same manner that gas and battery charging stations are for those driving cars. For those who cycle in the outer wards, accessing maintenance and repair facilities is challenging. For example, **in Scarborough, which represents 30% of Toronto's landmass and houses 24% of Toronto's residents, and where over half a million trips per day are less than 5 km, there is only one bicycle service facility open on a regular basis. (See Figure 24.) A few Canadian Tire stores in the area provide bicycle service once per week for the bikes they sell but they don't generally advertise this service.**

While many argue that bicycling is an inexpensive mode of transport, the risk of being stranded due to a flat tire or other mechanical issue is a strong deterrent. This is particularly true for those on constrained budgets, for whom a good used bicycle represents the equivalent of two or three months of transit costs. For the 15% of the city's residents with household incomes below \$20,000 per year, transit passes are an expensive option but so is the investment required to bicycle.

FIGURE 24: Cycling service facilities, Toronto (2012)

Data Source: Toronto Cycling Think and Do Tank; Credit: E. Watt

ISSUE 1: No robust understanding of economic benefits created by cycling

Recent debates surrounding separated bike tracks on arterial streets demonstrate that evidence of the economic benefits of cycling has not been understood or accepted by politicians, business owners, or residents.

RECOMMENDATIONS

- A. Broadly promote the economic benefits of bicycling for city residents and businesses.** Research indicates that increases in bicycling and bicycling infrastructure in North America are associated with net benefits to local businesses and residents through increased sales, increases in commercial and residential property values, and decreases in commercial vacancy rates.¹¹²
- B. Create a business-based advocacy group for businesses interested in reliable, safe, and healthy transportation for their employees.** Toronto has many employers who support cycling. Their support would be more effective if harnessed. In London (UK) an advocacy group, CyclingWork, has enlisted 180 employers to advocate for cycling with the government. Sustainable mobility is seen as a competitive advantage in employee recruitment.
- C. Target neighbourhoods due for road construction with well-designed and coordinated education campaigns**

regarding the positive economic impacts of bicycling in neighbourhoods. Focus on local economic development for neighbourhoods including reduced commercial vacancies and improved property values. Engage Business Improvement Associations, Resident Associations, and Condominium Boards.

- D. Monitor and measure the economic benefits of cycling by studying areas with plans to increase bicycling.** Measuring should involve a standardized and shared framework to assess the societal effects of interventions. For example, the 2012 installation of cycle tracks on Sherbourne Street could have been accompanied by a long-term economic impact and bicyclist count studies. Sherbourne was distinct from adjacent north-south routes (Parliament, Church, or Jarvis) by virtue of having far fewer restaurants and commercial establishments. Monitoring of commercial lease rates, vacancy rates, business types, business and employee counts, property assessments, and business surveys would have provided insight into the potential of bike lanes to revitalize streetscapes. Since this was the first significant cycling infrastructure on the east side of downtown, its impact on the entire east side could have been evaluated. A recent newspaper story describes the east side as the “hot” new area. While the bike lanes aren’t mentioned, they are surely part of the equation.¹¹³

ISSUE 2: Parcel delivery services are not proactively moving to bicycle delivery

Urban freight operations have a strong impact on air quality and traffic congestion.¹¹⁴ Operators suffer difficult conditions including traffic congestion, inadequate space for legal parking resulting in heavy fines, late deliveries, wasted fuel and time, and associated greenhouse gas and air pollutant emissions.¹¹⁵

RECOMMENDATIONS

- A. Develop a program to research regulatory barriers and changes needed for major carriers to pilot widespread small package delivery by cargo bike** (see European Cycle Logistics Federation 2015 Conference Presentations). A number of European cities are using cargo cycles as the last link in parcel movement and also for local delivery. Both physical and regulatory conditions vary by jurisdiction. UPS, FedEx, and DHL all have bicycle delivery fleets in Europe. DHL Express NL has replaced 10% of their truck fleet with bicycles and approximately 60% of inner city routes are bicycle based.¹¹⁶ New York City has undertaken a thorough investigation of the possibilities of expanded bicycle cargo delivery.¹¹⁷
- B. Include cargo bikes in the Green Commercial Vehicle Program in Ontario’s Climate Change Action Plan (2016).**

ISSUE 3: Limited access to cycling materials, accessories, and repairs outside of the downtown core

For-profit cycling service and repair facilities will not move into areas where there is not yet a clearly profitable market. However, a market cannot develop where people do not have the facilities to support cycling.

RECOMMENDATIONS

- A. Create city-wide access to bicycling service and repair by seeding not-for-profit bike hubs in underserved areas to support cycling in the absence of for-profit commercial facilities.** Provide underserved areas with consistently funded community-based bicycle hubs offering instruction, repair, and bicycle fleets as well as training and mentorship programs.
- B. Engage the Province’s Community Hub initiative to incorporate cycling hubs and facilities throughout underserved areas in Toronto.**¹¹⁸
- C. Create universal access to bicycles including child seats, trailers, or cargo bikes, bicycle parking, repair facilities, and orientation programs, by dramatically spreading a variety of short- and long-term bike share/bike library programs and providing subsidized access to high needs populations.** This should include free bicycle provision to low-income residents and students making a commitment to cycle for transportation.¹¹⁹



Photo courtesy of Kevin Konnyu

SUMMARY OF RECOMMENDATIONS WITH ROLES AND TIMELINES

Policy and infrastructure

MAJOR RECOMMENDATION	SUB RECOMMENDATIONS	IMPLEMENTATION METHOD	ROLES	PRIORITY (HIGH, MEDIUM, LOW)	TIME FRAME (SHORT: 1–4, MEDIUM: 5–10, LONG: 10 + YEARS)
1 Implement a visionary transportation plan	A. Create a concrete and visionary sustainable transportation plan	Policy Directive	City	H	Short
	B. Adopt mode share targets	Policy Directive	City, Province	H	Short
	C. Adopt Vision Zero	Policy Directive	City, Province	H	Short
	D. Integrate transportation plan with land use plans	Policy Directive	City, Province	H	Short
	E. Provincial Policy Statement should require complete streets approach	Policy Directive	Province	H	Short
	F. Outreach to business and residential communities	Policy Directive	City	H	Short
2 Invest in Class I and II cycling infrastructure (see Appendix B for definitions)	A. Invest in Class I and II cycling infrastructure and align transportation infrastructure investment with latent demand, mode share, and safety goals	Financial Supports/Policy Directive	City, Province, Federal	H	Short/Medium
	B. Establish safe and consistent connectivity between the extensive system of off-road trails and the on-road system	Policy Directive & Financial Supports	City	H	Short
	C. Multi-unit housing focus —develop program to help landlords increase bicycle parking	Policy Directive & Financial Supports	City	M	Short
	D. Multi-unit housing focus —develop program to help landlords increase bicycle parking	Financial Supports	City	M	Short/Medium
	E. Increase provincial investment in cycling infrastructure using funds proportionally from recently introduced Cap & Trade System	Financial Supports	Province	H	Short/Medium
	F. Federal Investment—ensure gas tax funds are used for sustainable transportation infrastructure especially active transportation	Policy Directive/Financial Supports/Monitoring	Federal	H	Short/Medium

Policy and infrastructure continued...

3	Develop linked monitoring framework	A. Link all transportation infrastructure investments in Toronto to enhance decision-making, monitoring, and evaluation	Policy Directive/ Research	City, Province, Federal	H	Short/ Medium
		B. Improve data collection by federal and provincial governments	Policy Directive/ Financial Supports	Province, Federal	H	Short/ Medium
4	Protect vulnerable road users	A. Introduce Vulnerable Road Users' Legislation and adopt Vision Zero	Legislation & Policy Directive	Province	H	Short
		B. Adopt speed reduction measures including lower speed limits, rigorous speed limit enforcement, and road diets	Policy Directive	City	H	Short
		C. Include specific targets in Canada's Road Safety Strategy to reduce morbidity and mortality among vulnerable road users and also adopt Vision Zero	Policy Directive	Federal	H	Short
		D. Adopt Ontario Traffic Manual Book 18: Cycling Facilities guidelines	Policy Directive	City	H	Short
		E. Prioritize arterials and intersections for cycling infrastructure	Policy Directive	City	H	Medium
		F. Price car parking appropriately to meet safety and mode share goals	Research & Policy	City	H	Medium
5	Integrate transit and cycling	A. Transit stations should be treated as mobility hubs with cycling lanes and cycling friendly intersection protocols radiating into 5 km catchment areas	Policy Directive	Province, City	H	Medium/ Long
		B. Develop multi-agency task force (City, Metrolinx, TTC, Bike Share/Toronto Parking Authority)	Policy Directive	City, Metrolinx, TTC, Bike Share/TPA	M	Medium
		C. Metrolinx should link their investments to their active transportation mode share goals	Policy Directive	Metrolinx	H	Short
6	Prioritize outer ward investment	Strategically invest in cycling in the outer wards building support for change through programming, infrastructure, and policy	Financial Supports	City	H	Short/ Medium
7	Implement on-route cycling wayfinding	Fast-track implementation of the planned Toronto 360° Wayfinding Strategy for cyclists ensuring that signage can be read by cyclists without dismounting	Financial Supports/Policy Directive	City	H	Short
8	Prioritize bicycle parking strategy	Prioritize development and implementation of the new bicycle parking strategy	Financial Supports/Policy Directive	City	H	Short
9	Improve winter maintenance	Offer winter maintenance of the entire network of on-street bike lanes and off-street bike boulevards as a basic service	Financial Supports/Policy Directive	City	H	Short

Behavioural factors

MAJOR RECOMMENDATION	SUB RECOMMENDATIONS	IMPLEMENTATION METHOD	ROLES	PRIORITY (HIGH, MEDIUM, LOW)	TIME FRAME (SHORT: 1–4, MEDIUM: 5–10, LONG: 10 + YEARS)
1 Promote multi-modality and bicycling	A. Create a high profile bicycle marketing program	Financial Supports	City	M	Short
	B. Create conspicuous role models through expansion of Toronto Police Service and Emergency Management Services bicycle fleets and use their expertise to develop agency fleets for other services	Financial Supports	City, Province	M	Short
	C. Establish bike corrals at all city events	Policy Directive	City	M	Short
2 Promote net health and benefits	A. Through a partnership between Transportation and Public Health broadly recognize the co-benefits of bicycling especially as they relate to health	Financial Supports	City	H	Short
	B. Publicize investments made to improve unsafe spaces and protect vulnerable road users	Financial Supports	City	M	Medium
3 Increase bicycling programming	A. Invest in community-based bicycle programmings	Policy Directive & Financial Supports	City, Province, Community Groups, Foundations	H	Short/ Medium
	B. Expand Open Streets and Ciclovias	Policy Directive & Financial Supports	City, Community Groups, Foundations	H	Short
	C. Expand Bike to Work Day	Financial Supports	City, Community Groups, Foundations	M	Short
	D. Invest in school-based bicycle programming for all students	Policy Directive & Financial Supports	Province, City, TDSB/ TCSB, Foundations	M	Short/ Medium
	E. Create and fund development of a bicycle club framework for high schools	Financial Supports	Province, City, Foundations	M	Short
	F. Add bicycle mechanic courses to specialist High Skills Major transportation programs in secondary schools	Policy Directive & Financial Supports	Province, City, TDSB/ TCSB	M	Medium/ Long
	G. Fund bicycle training & support hubs	Financial Supports	City, Province, Community Groups, Foundations	H	Short/ Medium

Cycling economy

MAJOR RECOMMENDATION	SUB RECOMMENDATIONS	IMPLEMENTATION METHOD	ROLES	PRIORITY (HIGH, MEDIUM, LOW)	TIME FRAME (SHORT: 1-4, MEDIUM: 5-10, LONG: 10+ YEARS)
1 Promote the economic benefits of cycling	A. Develop a broad-based understanding of the economic benefits of cycling for business and city residents	Financial Supports	City, Community Groups, Foundations	M	Short
	B. Create a business based advocacy group for businesses interested in reliable, safe and healthy transportation for their employees and customers	Financial Supports	Community Groups & Business	M	Short
	C. Target neighbourhoods due for road reconstruction with a coordinated education campaign regarding the positive economic impacts of bicycling	Financial Supports	City	M	Short
	D. Monitor and measure the economic benefits of cycling by studying areas with planned interventions to increase bicycling	Research & Financial Supports	Business, City	M	Short/ Medium
2 Research and pilot cargo bikes for last mile small parcel delivery	A. Develop a program to research regulatory barriers and changes needed for major carriers to pilot widespread small package delivery by cargo bike in order to improve economic efficiency, traffic congestion and air quality in the core	Research	Business, Province, City	M	Short/ Medium
	B. Include cargo bikes in the Green Commercial Vehicle Program in the Climate Change Action Plan	Policy Directive	Province	H	Short
3 Provide cycle service & repair facilities in low-cycling neighbourhoods	A. Create city-wide access to bicycling service and repair by seeding not-for-profit bike hubs in underserved areas to support the cycling public in the absence of for-profit commercial facilities	Financial Supports	City, Community Groups, Foundations	H	Medium
	B. Engage the Province's Community Hub initiative to incorporate cycling hubs and facilities	Policy Directive & Financial Supports	Province, City	M	Medium
	C. Create universal access to bicycles by spreading a variety of short and long term bike share/bike library programs and providing subsidized access to high needs populations	Financial Supports	City, Province, Foundations, Community Groups	H	Short/ Medium

CONCLUSION

Cycling for transportation is a key strategy to advance community sustainability. Shifting travellers from vehicles to cycling results in a myriad of health, social, environmental, and economic benefits for travellers and their communities. Recommendations regarding policy and infrastructure, behavioural factors, and the cycling economy should be combined in constellations of actions, in order to have the optimal impact. Pursued individually, they might not realize their goals of creating choice and change. For example, bike lanes in the outer wards might not be used if local facilities do not exist to repair and maintain bicycles for local cyclists. And even if these facilities do exist, without behavioural programs to normalize cycling, latent demand might not be realized. Nonetheless, obstacles to change in one area should not preclude progress in others.



Photo courtesy of Kevin Konnyu

APPENDIX A: CONSULTATION QUESTIONS

I. Policy and infrastructure

- How can we best create a common Vision of Sustainable Travel in Toronto? Who needs to be on board? How do we get them to participate in a cohesive meaningful way? How do we create public and political support for this vision?
- How can we move the city towards creation of a Transportation Master Plan? Is this the appropriate planning framework for Toronto?
- What key steps can be taken to integrate transit and cycling?
- How can we increase expenditures on cycling infrastructure to an effective level?
- How can we best move cycling infrastructure into outer wards?

II. Behavioural factors

- How can we create conspicuous role models?
- How can we best establish citywide cycling skills programs?
- What is the most effective avenue for promoting net health and longevity benefits as well as economic and financial benefits?
- How can we reduce fear?

III. Cycling economy

- How can we create equitable access to bicycles?
- How can we increase availability of secure bicycle parking across the city?
- How can we create equitable access to service facilities in under-served areas?

APPENDIX B: METHODOLOGY FOR PEER CITY INFRA-STRUCTURE COMPARISON

Data Sources:

Toronto: <http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=d-7c3970aa08c1410VgnVCM10000071d-60f89RCRD>

Vancouver: <http://data.vancouver.ca/datacatalogue/bikeways.htm>

Montreal: <http://donnees.ville.montreal.qc.ca/dataset/pistes-cyclables>

New York City: <http://www.nyc.gov/html/dot/html/about/datafeeds.shtml#bikes>

Chicago: http://chicagocompletestreets.org/wp-content/uploads/2013/06/YearEndReview_2015_April11_REDUCED.pdf

Berlin: http://www.stadtentwicklung.berlin.de/verkehr/politik_planung/zahlen_fakten/download/Mobilitaet_dt_komplett.pdf

Amsterdam: <http://www.iamsterdam.com/en/media-centre/city-hall/dossier-cycling/cycling-general-information>

The cities Toronto, Montreal, Vancouver and New York provide a GIS shapefile containing the city's bike infrastructure. In order to make these datasets usable for the Peer City Comparison, the following methodology was applied:

1. Downloading and extracting the zipped GIS shapefile
2. Loading the file into a GIS software
3. Adding an Open Street map base in order to check the shapefile for accuracy, validity and to make sure the data is in the form of centerlines
4. Adding a new field to the attribute table: "length (km) and calculating the length of the single features using the 'Calculate Geometry' Tool"
5. Exporting the attribute table to Microsoft Excel
6. Summarizing the total length of all elements by bikeway types in the shapefile
7. Classifying the local bikeway types into our Class I to IV system

DEFINITION OF CATEGORIES

The classification is based on the New York System, as described here:

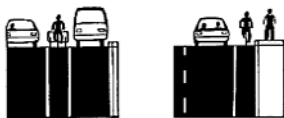
<https://www.transalt.org/files/resources/blueprint/chapter4/chapter4b.html>

In order to allow a fair comparison among the variety of peer cities, we decided to make the following amendments to the scheme:

- We added category "IV" for non-utilitarian, recreational trails in parks, ravines, in the backcountry etc.
- We added category "1a" for greenways or park trails, that serve utilitarian purposes. This is used for commuter routes such as the Lachine trail in Montréal or boulevards and corridor trails in Toronto.



Class I: Bike paths are physically separated from motor vehicle and pedestrian traffic.



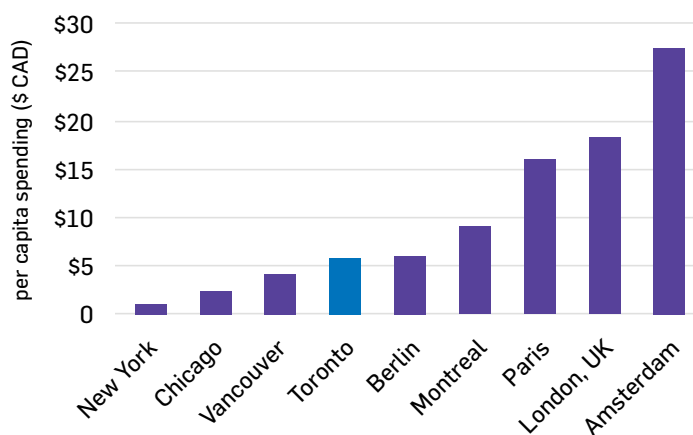
Class II: On-street bike lanes are defined by a painted stripe.



Class III: Bike routes are represented only by posted route signs.

APPENDIX C: CYCLING INFRASTRUCTURE EXPENDITURES ACROSS PEER CITIES

Annual per capita cycling infrastructure investment in peer cities



* The population for each city is for its census metropolitan area.

	POPULATION*	FUNDING	YEAR	NUMBER OF YEARS	CAD \$/ PERSON
New York	8,550,405	\$26,976,496	2014-2017	3	\$1.05
Chicago	2,720,546	\$25,708,000	2011-2015	4	\$2.36
Vancouver	603,502	\$25,000,000	2010-2020	10	\$4.14
Toronto	2,615,060	\$153,000,000	2016-2026	10	\$5.85
Berlin	3,562,166	\$21,497,408	2015	1	\$6.03
Montreal	1,650,000	\$15,000,000	2016	1	\$9.09
Paris	2,240,621	\$215,157,188	2015-2020	6	\$16.00
London, UK	8,538,689	\$1,559,498,760	2013-2023	10	\$18.26
Amsterdam	779,808	\$21,497,408	2015	1	\$27.57

Data Notes:

All funding has been converted to Canadian dollars for comparability. It is based on conversion rates as of July 4, 2016.

All funding numbers are for the 2015-2016 year period. Where the 2015-2016 year budget is based on a longer term cycling funding plan, the longer term cycling plan's budget is used and is averaged across the number of years that the plan is effect.

For Vancouver, the plan is 25,000,000 over 10 years from 2010-2020.

For Paris, the plan is 215 million over 6 years from 2015-2020.

For London, the plan is 1.5 billion over 10 years from 2013-2023.

For New York, the plan is over 3 years from 2014-2017.

For Chicago, the plan is over 4 years from 2011-2015.

For Toronto, the plan is over 10 years from 2016-2026.

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