



Complete Street Transformations

in the Greater Golden Horseshoe Region

Principal Investigators

Nancy Smith Lea

Director, Toronto Centre for Active Transportation, Clean Air Partnership

Dr. Raktim Mitra

Assistant Professor, School of Urban and Regional Planning, Ryerson University

Dr. Paul Hess

Associate Professor, Department of Geography and Planning, University of Toronto

Research Associates

Neil Loewen | Brandon Quigley

Lead Designer

Anna Ingebrigtsen

Design Assistance

Neil Loewen + Clara Romero



Clean Air Partnership (CAP) is a registered charity dedicated to improving air quality, minimizing greenhouse gas emissions and reducing the impacts of air pollution and climate change. The Toronto Centre for Active Transportation (TCAT), a project of CAP, advances knowledge and evidence to build support for safe and inclusive streets for walking and cycling, and believes that active transportation plays a critical role in creating environmentally and economically sustainable cities.

This work was generously supported by the Government of Ontario through the Places to Grow Implementation Fund.

Reference: Smith Lea, N., Mitra, R., Hess, P., Quigley, B. & Loewen, N. (2016). Complete Street Transformations in the Greater Golden Horseshoe Region. Toronto: Clean Air Partnership. For more information: www.tcat.ca

**Ryerson
University**



UNIVERSITY OF
TORONTO



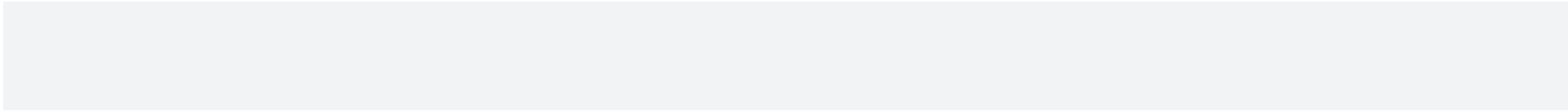
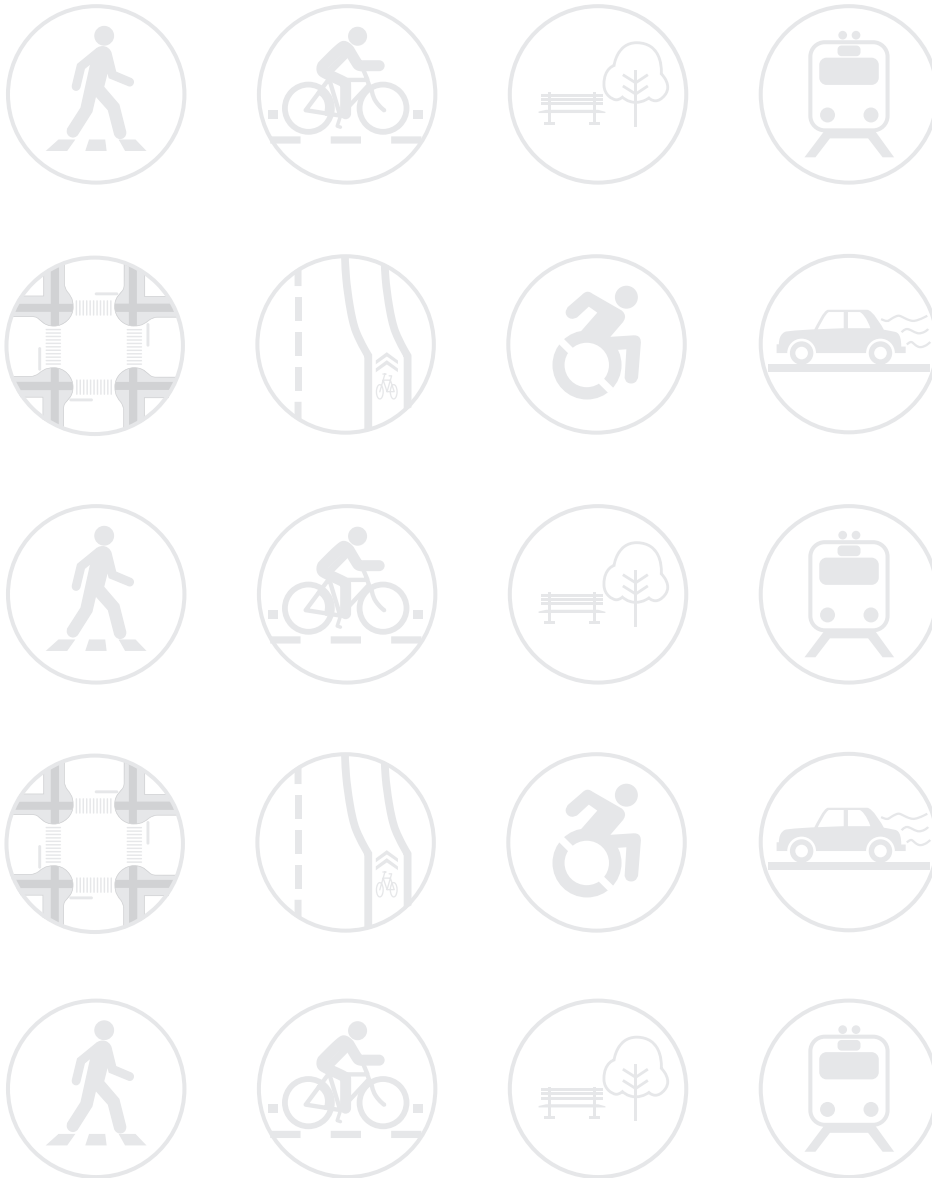


Table of Contents



1. OVERVIEW

- 1.1 Background
- 1.2 Methodology
- 1.3 Evaluating Project Outcomes
- 1.4 Project Locations Map
- 1.5 Project Outputs Checklist

2. FEATURED COMPLETE STREETS

Major Arterial Streets

- 2.1 Cannon Street, Hamilton
- 2.2 Highway 7 East, Markham + Richmond Hill
- 2.3 Brealey Drive, Peterborough
- 2.4 Richmond & Adelaide Streets, Toronto

Minor Arterial Streets

- 2.5 Shellard Lane, Brantford
- 2.6 College Avenue West, Guelph
- 2.7 Queens Quay, Toronto

Collector Streets

- 2.8 King Street, Kitchener
- 2.9 Davenport Road, Waterloo

3. CONCLUDING REMARKS

4. GLOSSARY OF KEY CONCEPTS

5. BIBLIOGRAPHY

6. PHOTO CREDITS

1.0 Overview

1.1 BACKGROUND

In this publication, we identify and document recently implemented Complete Street transformation projects within the Greater Golden Horseshoe (GGH) Region. Our goal was to understand the types and characteristics of transportation projects that the GGH municipalities are identifying as Complete Streets, as well as to explore current municipal efforts relating to the evaluation of the impacts of these capital projects.

Complete Streets, which are designed for all ages, abilities, and modes of travel, is a concept that is gaining traction throughout North America. There is a growing demand to ensure that pedestrians, cyclists, people with disabilities, and transit users - as well as motor vehicle occupants - are all accommodated safely and comfortably. These principles closely align with the provincial policy goals relating to the GGH Region, as outlined in Section 2.1 of the Growth Plan for the Greater Golden Horseshoe (2006): “The Plan is about building *complete communities*, whether urban or rural. These are communities that are well-designed, offer transportation choices, accommodate people at all stages of life and have the right mix of housing, a good range of jobs, and easy access to stores and services to meet daily needs.” (Ontario Ministry of Municipal Affairs and Housing, 2013) Complete Streets are an important component of complete communities.

In the GGH Region, and throughout Canada, we are now seeing Complete Streets moving from concept to reality within a planning context that enables such developments. GGH municipalities are becoming denser and more diverse, and working to promote walking, cycling, and transit ridership in keeping with the Places to Grow Act (2005) and the Growth Plan for the Greater Golden Horseshoe (2006). Individual municipalities have also been implementing their own policies to support Complete Streets, whether within Official Plans, Transportation Master Plans, or as design guidelines.

These changes to policy and practice are laying the groundwork for more balanced shares of travel modes. However, for much of the past half-century North American street design has primarily prioritized the fast, efficient movement of cars above all other modes. This means that, in practice, creating Complete Streets involves transforming and redesigning existing streets in order to create more space, amenities, and new standards to support pedestrians, bicycles, and public transit, and improved safety for all modes. These street transformations are still the exception rather than the norm, are typically not well documented, and the outcomes are not yet well evaluated or understood.

Since 2014, Nancy Smith Lea at the Toronto Centre for Active Transportation (TCAT), Dr. Raktim Mitra at Ryerson University, and Dr. Paul Hess at the University of Toronto have worked together to investigate Complete Streets in the GGH Region through the development of a series of publications. The Complete Streets Catalogue: Understanding Complete Streets in the Greater Golden Horseshoe Region (Smith Lea, Mitra, & Hess, 2014) featured a broad overview of projects in growth centres within the GGH Region. Complete Streets Evaluation: Understanding Complete Streets in the Greater Golden Horseshoe Region (Smith Lea, Mitra, & Hess, 2015) conceptualized the results of a Complete Street in terms of *outputs* and *outcomes*. The document proposed a framework to evaluate the outcomes of a Complete Street project that is based on a set of performance indicators. These performance indicators were organized and classified according to four broad goals that Complete Streets aim to achieve: 1) increased active and sustainable transportation, 2) increased safety, 3) improved level of service, and 4) improvements to the surrounding neighbourhood environment.

During the course of this previous research, consultations with local transportation experts identified a need for documenting Complete Street transformations in detail, including evidence of transportation outcomes. This book is the result of the next phase of our research, and includes nine examples throughout the GGH Region of street transformations that have been completed in the past few years.

No two street designs documented in this book are the same and the context for each is deliberately quite varied. We have featured projects located in both large and small municipalities, and in urban, suburban, and rural contexts.

1.2 METHODOLOGY

The Complete Street transformations that are featured in this book were compiled by contacting representatives from each of the municipalities who were interviewed and consulted during the course of researching our previous publications in our Understanding Complete Streets in the Greater Golden Horseshoe Region series: the Complete Streets Catalogue, and Complete Streets Evaluation. In the Complete Streets Catalogue, we featured a broad overview of Complete Streets projects throughout the

GGH Region, with a mix of projects at various stages of completion, with many that are still under construction (Smith Lea, Mitra, & Hess, 2014). However, for this current project, the goal was to identify Complete Street transformations, constructed in full or in part, for which some data or feedback had been collected that could be used for evaluation purposes. In order to compare outcomes to previous conditions, the transformation had to be to an existing street rather than a new build.

There is no agreed upon definition of what constitutes a Complete Street and what does not, so municipal contacts were asked to self-select any projects that they felt represented Complete Street transformations in their jurisdiction. In the case of projects featured in the Complete Street Catalogue that were not yet implemented, municipalities were invited to identify other, partially or fully implemented projects. All municipal representatives were asked about the types of data and information they collected before and after the redesign and construction of streets occurred.

Most of the data and photographs used in this book were provided by the municipalities or associated governmental agencies. In addition, our research team assembled additional information and photographs through research from secondary sources and site visits. The information and data collected was guided by the framework developed in our previous research (Smith Lea, Mitra & Hess, 2014; 2015).

Some municipalities who were included in the Complete Streets Catalogue were not included in this book. Some could not identify sufficiently implemented projects that they felt qualified as Complete Street projects. Other municipalities who had implemented Complete Street redesign projects were unable to provide sufficient data or information from before and after these projects were implemented within the timeline of our research.

The research team also made an effort to feature projects that are geographically dispersed throughout the region, and are located in communities of different sizes, densities, and urban characters. These goals, however, were secondary to finding projects with significant data to demonstrate clear outcomes.

As a result of this process, the projects featured in this book do not necessarily reflect 'best practice,' but were chosen in order to demonstrate the diversity and measurable outcomes of Complete Street transformations throughout the GGH Region.

For each Complete Street transformation project, we have provided information about the *outputs* of each project - the key measures of the enhancements that were built and are expected to have positive impacts. Project outputs can include bike lanes, sidewalk or intersection improvements, or other amenities.

The *outcomes* (to the extent that they are available) include the effects or impacts that are observed resulting from the outputs such as more people walking, cycling and/or using transit, reduced collision severity and frequency, an increase in perceived safety and comfort by cyclists and pedestrians, and improvements to the surrounding environment (e.g. increased property values and retail sales, improved air quality, increase in physical activity levels).

For each street, available data or feedback from before and after the completion of each project is provided in order to determine how the Complete Street concept is being applied in practice. This book provides a variety of photographs and other visualizations to illustrate the changes made on each street. The key outcomes are classified according to the key performance indicators from the Complete Streets Evaluation report.

Additional information is provided about the geographic and policy contexts of each project, and details about the process that each project needed to go through, from consultation, approval, design, and construction. The projects are described in Section 2, and are grouped according to the major street typology, namely - major arterial streets, minor arterial streets, and collector streets.

1.3 Evaluating Project Outcomes

EVALUATING PROJECT OUTCOMES ACCORDING TO COMPLETE STREET GOALS

Previous research in our Complete Streets Evaluation report conceptualized the results of a Complete Street in terms of *outputs* and *outcomes*. This conceptualization was informed by Complete Street research in the U.S. (McCann & Rynne, 2010; Center for Inclusive Design Environmental Access & GOBike Buffalo, 2014). Outputs of a Complete Street project are the enhancements that get built and are expected to have positive impacts, such as kilometres of bike lanes, or the distance of sidewalk or intersection improvements. Outcomes of a project are the effects or impacts that are observed resulting from these outputs, as experienced both by the people using the street, as well as more systemic changes. The Complete Streets Evaluation report identified a set of 21 performance indicators to evaluate the outcomes of a Complete Street project.

Commonly used performance indicators of the potential outcomes of Complete Street projects have been classified in this book according to four key goals of a Complete Streets approach: increased active and sustainable transportation; increased safety of the road users, improved level of service; and, improvements to the surrounding neighbourhood environment.



ACTIVE AND SUSTAINABLE TRANSPORTATION

An important measure of success of a Complete Street project is whether more people are walking, cycling, and using transit. Common measures include increased pedestrian and cycling counts, increased transit ridership, and decreasing motor vehicle counts, each of which demonstrate a potential mode shift toward more active and sustainable travel modes.



LEVEL OF SAFETY

Complete Streets should improve safe access for all road users, especially pedestrians and cyclists. A successful Complete Street project, then, should see a decrease in collision severity and frequency. Motor vehicle traffic speed is also used as a performance indicator for safety, since there is a strong relationship between lower speeds and improved safety, particularly for vulnerable road users such as pedestrians and cyclists.



LEVEL OF SERVICE

The performance of a street has typically been evaluated only from the perspective of delay experienced by motor vehicles, using a set of measures collectively known as “level of service” (LOS). On a Complete Street, the travel experience of pedestrians, cyclists and transit users also needs to be considered. In addition to measures relating to motor vehicle delays, there are other factors that need to be assessed to understand the level of service experienced by cyclists and pedestrians, such as perceived safety and comfort.

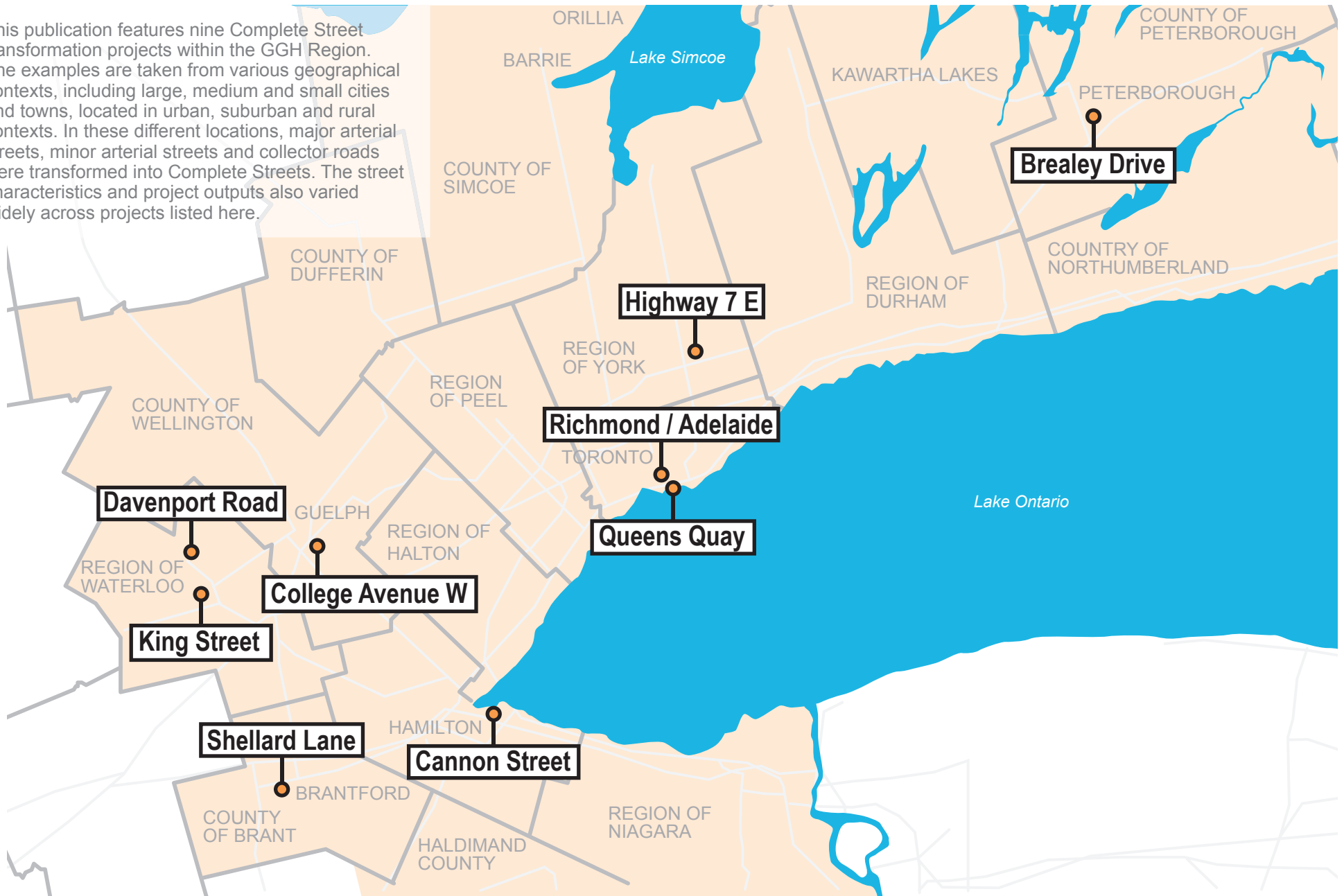


SURROUNDING ENVIRONMENT

As well as improving the safety and function of the street, a successful Complete Street project can also positively impact the surrounding area in terms of economic (e.g. property values, retail sales), environmental (e.g. air quality, noise pollution), and health benefits (e.g. changes in physical activity, rates of obesity and chronic illness, etc.).

1.4 Project Locations Map

This publication features nine Complete Street transformation projects within the GGH Region. The examples are taken from various geographical contexts, including large, medium and small cities and towns, located in urban, suburban and rural contexts. In these different locations, major arterial streets, minor arterial streets and collector roads were transformed into Complete Streets. The street characteristics and project outputs also varied widely across projects listed here.



The checklist is a snapshot of the key measures that were implemented in each of the 9 Complete Street projects.

Project Outputs Checklist 1.5

	Transit Improvement	Road Diet	Cycling Improvement	Pedestrian Improvement	Speed Reduction	Streetscaping	Accessibility Improvement
Hamilton Cannon Street							
Markham + Richmond Hill Highway 7 E							
Peterborough Brealey Drive							
Toronto Richmond Street Adelaide Street							
Brantford Shellard Lane							
Guelph College Avenue W							
Toronto Queens Quay							
Kitchener King Street							
Waterloo Davenport Road							

2.1

Cannon Street

City of Hamilton

BEFORE



AFTER

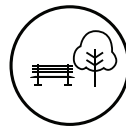


Cannon Street looking west.

Cannon Street is a truck route, but as downtown neighbourhoods transition to better accommodate residents, a road diet has defined space for cyclists and sheltered pedestrians on existing sidewalks.



Road diet reduced four traffic lanes to three during peak periods west of Victoria Ave., and three lanes to two east of Victoria Ave.



The cycle track is separated from one-way traffic lanes by planters and bollards.



A two-way cycle track was added between Sherman Ave. and Hess St.

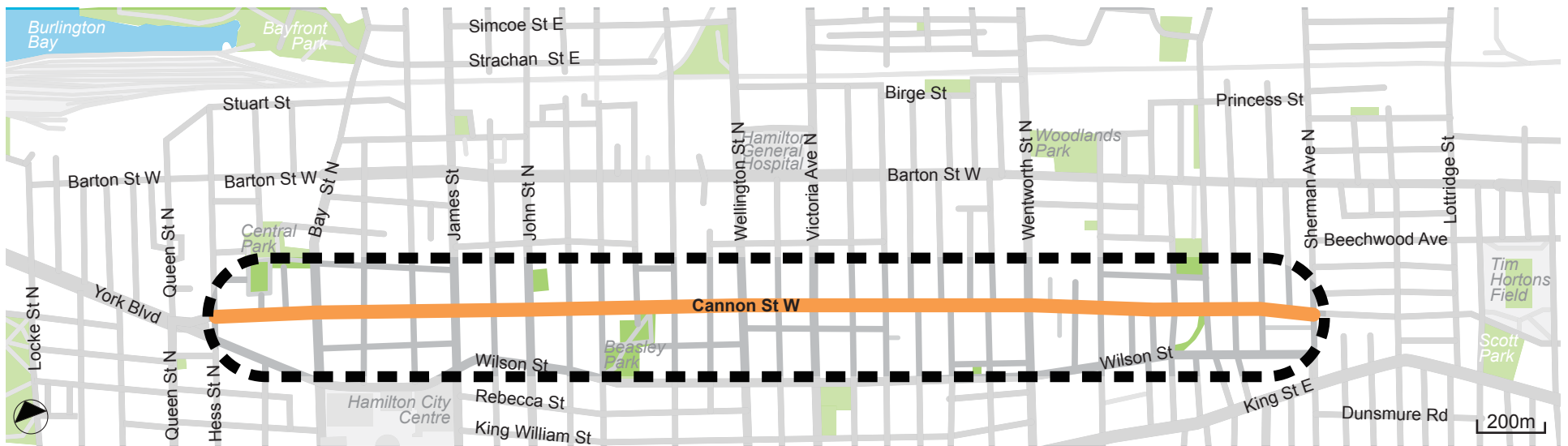


Bike boxes enabling right turns for cyclists have been added at certain intersections.



Cannon Street, City of Hamilton

City Population: 520,000



Context Map

GEOGRAPHIC CONTEXT

Hamilton is the historic industrial hub of Southern Ontario and the ninth-largest city in Canada. After some decline, recent years have brought renewed growth and intensification in the downtown core.

Cannon Street runs from east to west through much of the city, and is utilized as a one-way truck route between Sherman Avenue and Hess Street - the same length that the cycle track has been added to. The surrounding neighbourhoods support a mix of older residential and industrial uses, with the west end of the cycle track running along the north side of downtown. The eastern end of the cycle track is near Tim Hortons Field, a large football stadium.

POLICY CONTEXT

Cycling infrastructure development in Hamilton is overseen by a municipal body known as the Hamilton Cycling Committee (HCyC). The HCyC advises City Council on proposed infrastructure changes, promotes cycling and cycling safety within the City of Hamilton, and liaises between cyclists and the City. Another guide to municipal decision-making is the Hamilton Cycling Master Plan: *Shifting Gears*, initially adopted in 1999. There are also relevant policies in the overarching Hamilton Transportation Master Plan (2007). A goal of this plan is to increase cycling and walking from 6% of trips in 2001 to 15% of trips in 2031. To operationalize this, the Hamilton Cycling Network Strategy Working Paper (2007) was created. It also initiated an update in 2009 to *Shifting Gears*. The Cannon Street Cycle Track is identified as an important east-west connection in the updated

Shifting Gears (2009). A well-organized campaign led by area residents called “Yes We Cannon” was instrumental in a change in design, from the on-street bike lanes that were originally planned to the separated cycle track that was installed, and in building community support.

TIMELINE

- 2009** The road diet was identified in the updated Cycling Master Plan.
- 2013** Preliminary design commenced.
- 2014** Detailed design and implementation started in the spring, with construction completed in September.

STREET STATISTICS

STREET CLASSIFICATION

Major Arterial

RIGHT-OF-WAY WIDTH

19.2 m

LENGTH

3.4 km

COST

\$710,000

PROCESS DURATION

5 years

SPEED LIMIT

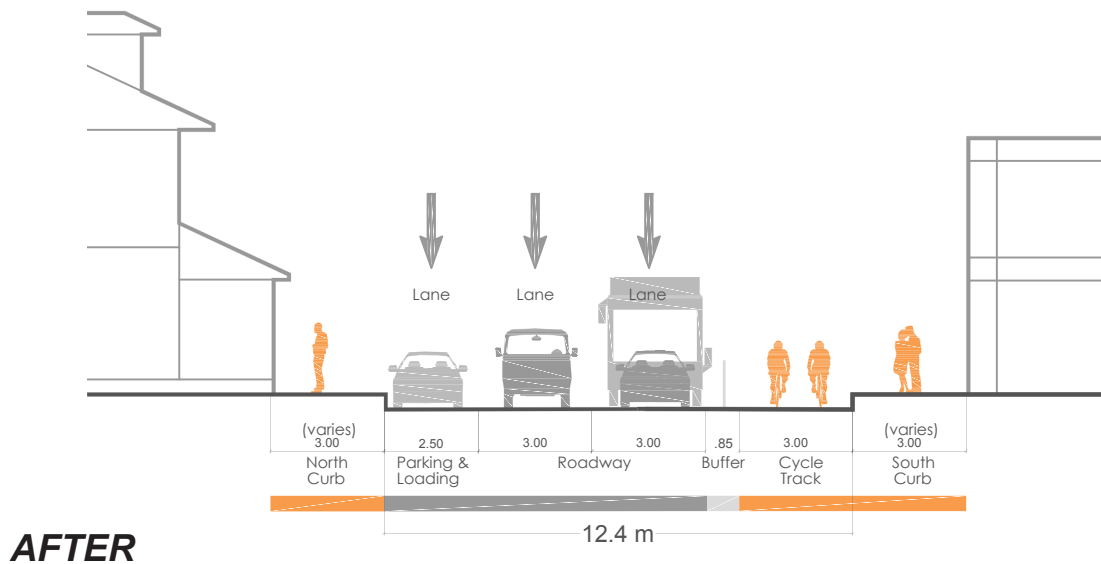
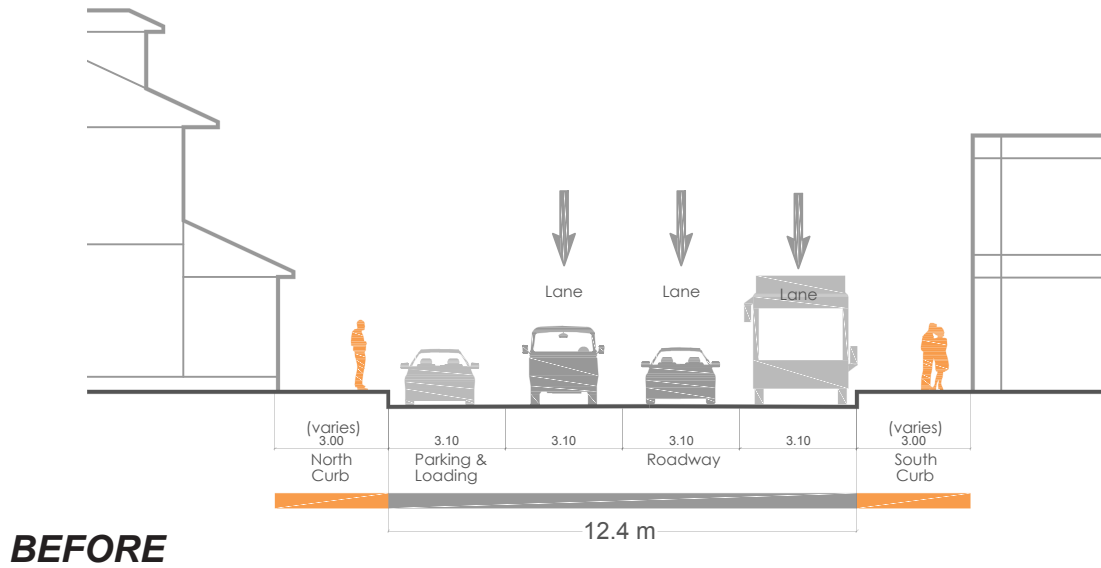
50 km/h

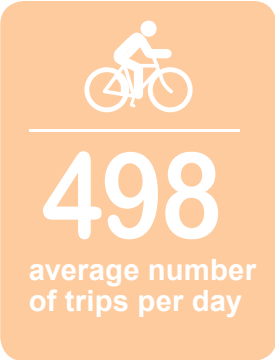
BEFORE

50 km/h

AFTER

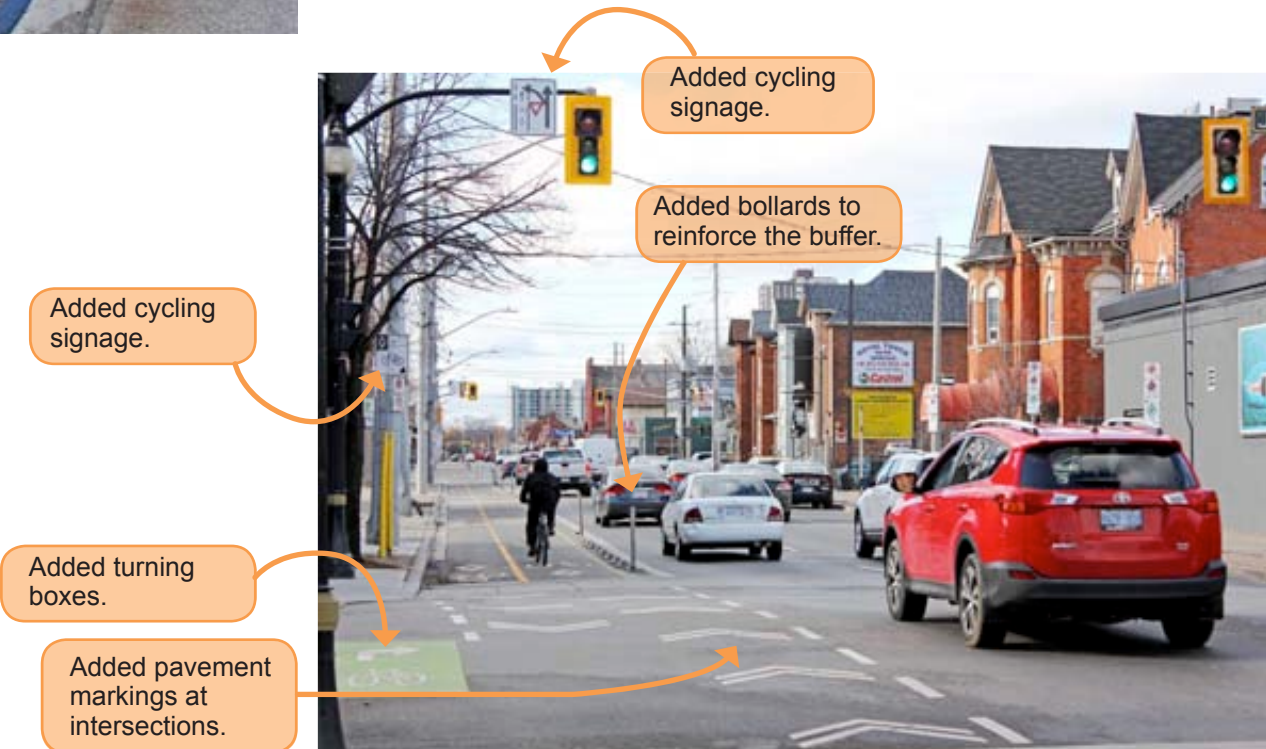
STREET SECTIONS





**A POPULAR
CYCLING ROUTE**

The Cannon Street Cycle Track has transformed a traffic artery dominated by motor vehicles into a street that makes room for all modes of travel. The street had previously been inhospitable to cyclists, as there were over 18,000 motor vehicles per day, including large trucks and trailers, passing through the intersection of Cannon and James Street North. The City of Hamilton did not conduct bicycle counts along this street before the construction of the cycle track as it was not deemed to be a route with significant cycle traffic. In 2015, the average number of cyclists per day was 498 each day (averaged over a 7-day period). A total of 582 trips were counted on the busiest day.



2.2

Highway 7 East

City of Markham and Town of Richmond Hill

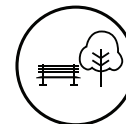


Showing improvements at intersection at Highway 7 and East Beaver Creek, as well as new BRT lanes.

Formerly a divided regional road oriented solely to motor vehicles, a complete redesign has brought bus rapid transit, bike lanes, and pedestrian improvements.



New dedicated right of way for bus rapid transit (rapidway) added along the middle of the street.



Street trees and lighting fixtures added to the streetscape.



The speed limit was lowered from 80km/h to 60km/h.



Sidewalks and expanded pedestrian space run along both sides of the redesigned street.



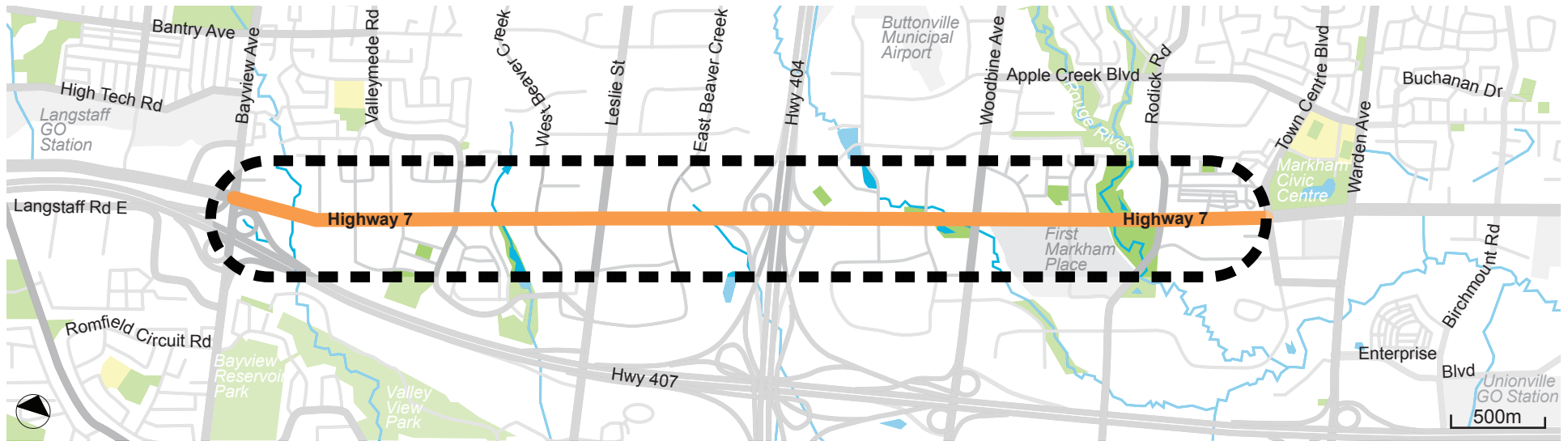
Buffered bike lanes and left turn bike boxes created space for cyclists.



Viva stations designed to be accessible for all users, with gently sloped ramps, wide, push-button doors, and way-finding signage.

Highway 7 East, City of Markham & Town of Richmond Hill

Markham Population: 301,709 | Richmond Hill Population: 185,540



Context Map

GEOGRAPHIC CONTEXT

Markham and Richmond Hill are two rapidly urbanizing municipalities that are the focus of much of the development in the GGH Region. Highway 7 connects the two municipalities as it runs across Southern Ontario from Sarnia to Ottawa. This featured segment of Highway 7 in York Region was transferred from the province to the Region in 1997. Increased intensification created an enabling environment to support rapid transit expansion and the development of walkable and bicycle-accessible urban spaces. The transformation of Highway 7 East into a Complete Street is a model that York Region is looking to replicate elsewhere, including Davis Drive in Newmarket and Highway 7 West in Vaughan.

POLICY CONTEXT

In 2002, York Region adopted its first Transportation Master Plan (TMP). At the same time, the York Region Centres & Corridors Strategy: Making it Happen (2002) identified Highway 7 as a Regional Corridor that has great potential for residential and mixed-use intensification, as well as higher order transit. The Big Move (2008), the Regional Transportation Plan for the Greater Toronto and Hamilton Area (GTHA), identified the project as a major east-west connection to happen in the next fifteen years. The TMP was updated in 2009 to add greater consideration and encouragement of active transportation as an important piece of the system. The TMP also highlighted the construction of rapid transit ways as an important goal for the expansion of the transportation system. Before the Highway 7 East rapidway was opened, a pilot bus rapid transit

system was developed between Warden Avenue and Birchmount Road including a new station at Warden Avenue. This pilot project was funded as a “Quick Win” initiative by the Province of Ontario.

TIMELINE

- 2010** Design commenced.
- 2011** Utility relocation begins, and raised medians are removed.
- 2013** The first segment from Bayview Ave. to Highway 404 is opened in August.
- 2014** The second segment from Hwy 404 to South Town Centre Blvd. in service in August.
- 2015** January: Construction complete and roadway open for service.

STREET STATISTICS

STREET CLASSIFICATION

Major Arterial

RIGHT-OF-WAY WIDTH

50 m

LENGTH

6 km

COST

\$308 million

PROCESS DURATION

5 years

SPEED LIMIT

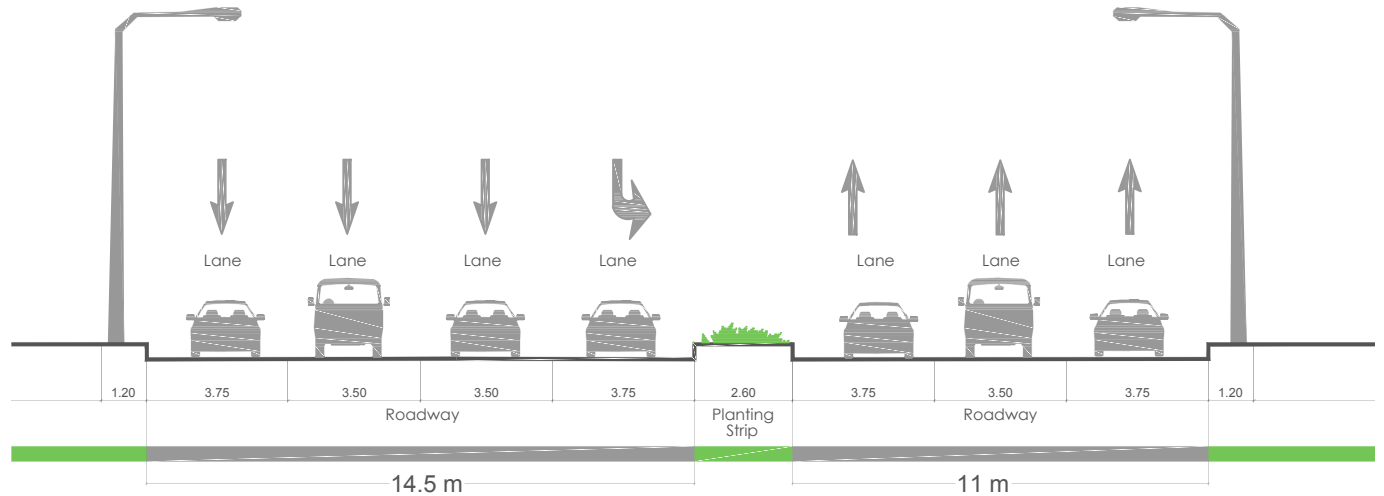
80 km/h

BEFORE

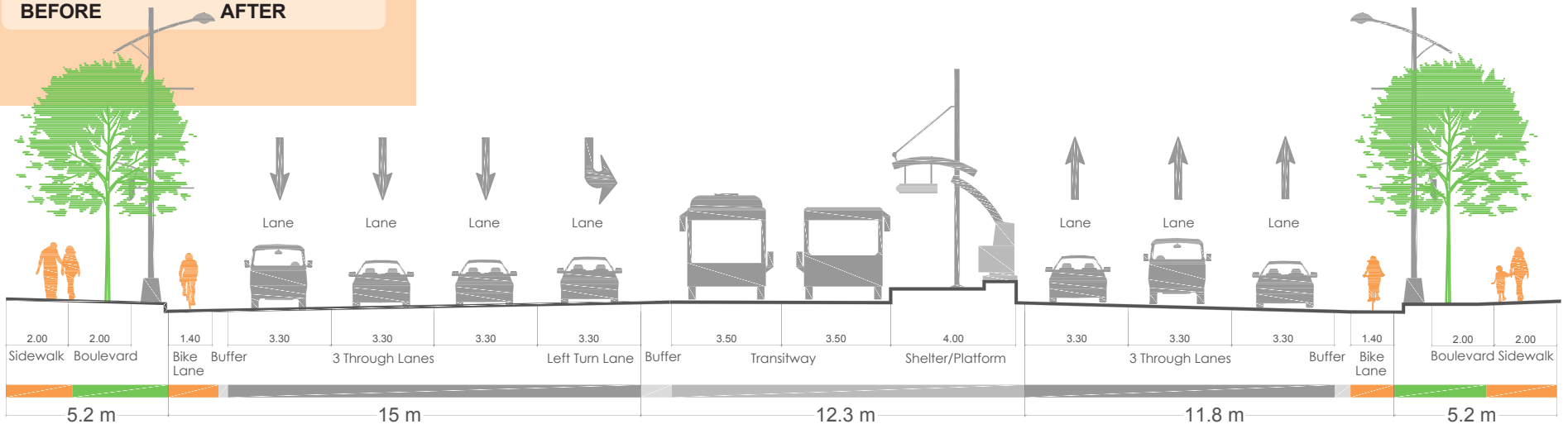
60 km/h

AFTER

STREET SECTIONS



BEFORE



AFTER



A SAFER STREET FOR ALL

Highway 7 East has dramatically improved safety for all users of the street. Collisions were previously between 250 and 350 per year. After partial completion of the project, collision rates were reduced to 214 in 2014. In 2015, the first full year since the transformation was fully implemented, the number of collisions had reduced to 104. This reduction in collisions includes those between motor vehicles, but also between motor vehicles and pedestrians and people on bikes.

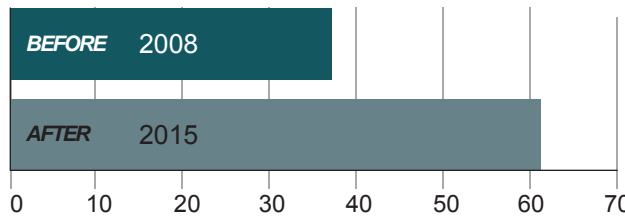


Highly visible bike lanes, bike boxes, crosswalks and intersections increase cyclist ridership, traffic safety, and contribute to streetscape beautification.

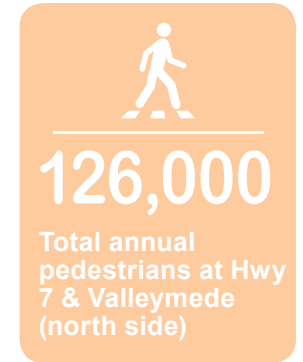
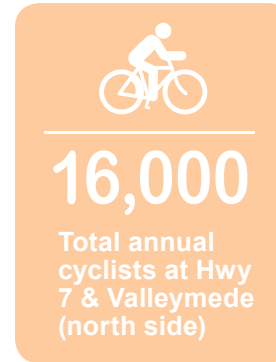


MORE SUSTAINABLE TRANSPORTATION

In 2015, pedestrian counts at certain points along Highway 7 East were up 61% compared to six years prior. Other bicycle and pedestrian count data shows that Highway 7 East at Valleymede - counting just on the north side of the street - saw 16,000 bicycle trips and 126,290 pedestrian trips in 2014. There was no data collected for these locations prior to the pedestrian and cycling improvements. Since the completion of this segment of the BRT route, transit ridership increased by 10% in one calendar year.



INCREASED PEDESTRIANS
PEDESTRIAN COUNTS



SHORTER TRANSIT TRAVEL TIMES

The bus rapid transit has shortened the average transit rider's commute by over 30%.



DECREASED COLLISIONS
BETWEEN DRIVERS, PEDESTRIANS & CYCLISTS



INCREASED TRANSIT RIDERSHIP
BETWEEN BAYVIEW AND TOWN CENTRE BLVD

2.3

Brealey Drive

City of Peterborough

BEFORE



Brealey Drive looking north to Landsdowne Street.

AFTER



Once a rural road with no sidewalks, Brealey Drive now includes a fully separated bicycle trail, sidewalks on both sides of the street, as well as new crossings for people on bikes and on foot, allowing better access to major destinations along this increasingly urbanized street.



Two-way bicycle trail installed along the west side of the street, fully separated from the roadway by a grass strip.



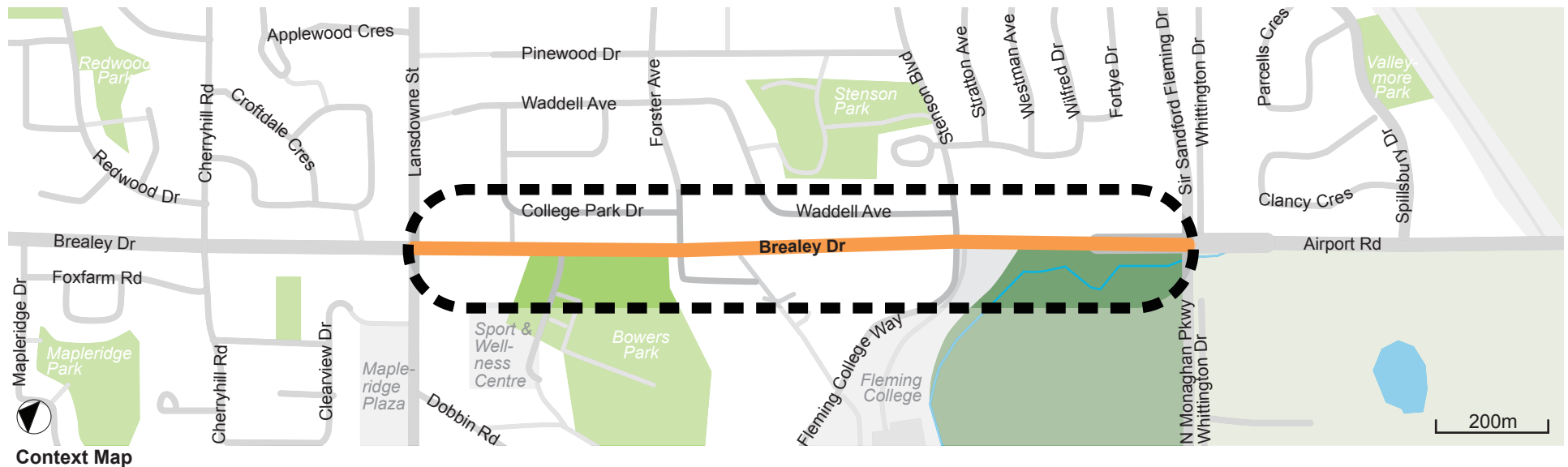
Two new signalized, mid-block crosswalks installed.



Sidewalks added on both sides of the street.



Curb ramps with tactile paving to improve accessibility.



GEOGRAPHIC CONTEXT

Peterborough is a mid-sized city located approximately 100 km northeast of Toronto.

Brealey Drive is located in the west end of Peterborough. The 1.3 km section of Brealey Drive that was redesigned runs from Lansdowne St. in the north to Sir Sandford Fleming Dr. in the south. Prior to reconstruction, Brealey Drive was a two-lane street with a rural cross-section with a four-way stop at the main entrance to Fleming College. The area has become increasingly urbanized in recent years, and the street now provides access to Fleming College as well as the city's only public recreation centre, and a nursing home. To the east of Brealey Drive is mostly low-density residential development, with commercial businesses located nearby along Lansdowne St.

POLICY CONTEXT

Peterborough's Comprehensive Transportation Plan (2012) included a draft Complete Streets Policy. Brealey Drive has been redesigned as a Complete Street, and supports many of the active transportation and other goals of Peterborough's Transportation Plan.

TIMELINE

2006 Municipal Class Environmental Assessment completed, recommending a design including 2 traffic lanes with on-street bike lanes and separate left turns at intersections. The project was subsequently delayed due to a desire from City Council to widen the road from 2 to 4 lanes.

2014 Council approves a design concept for reconstruction of Brealey Drive as a two lane arterial road with a concrete sidewalk on the east side and a multi-use trail on the west side, in response to public consultation in which cyclists stated a desire for better separation from motor vehicles.

2015 Design modified to replace the 4.5 metre wide multi-use trail with a separated 1.5 metre concrete sidewalk and a 3 metre wide two-way bicycle trail to provide dedicated space for both pedestrians and cyclists. Construction began in spring, 2015 and was completed in fall, 2015.

2017 Further reconstruction of Brealey Drive north of Lansdowne St. is planned.

STREET STATISTICS

STREET CLASSIFICATION

Major Arterial

RIGHT-OF-WAY WIDTH

24 - 36 m

LENGTH

1.3 km

COST

\$5.4 million

PROCESS DURATION

9 years

SPEED LIMIT

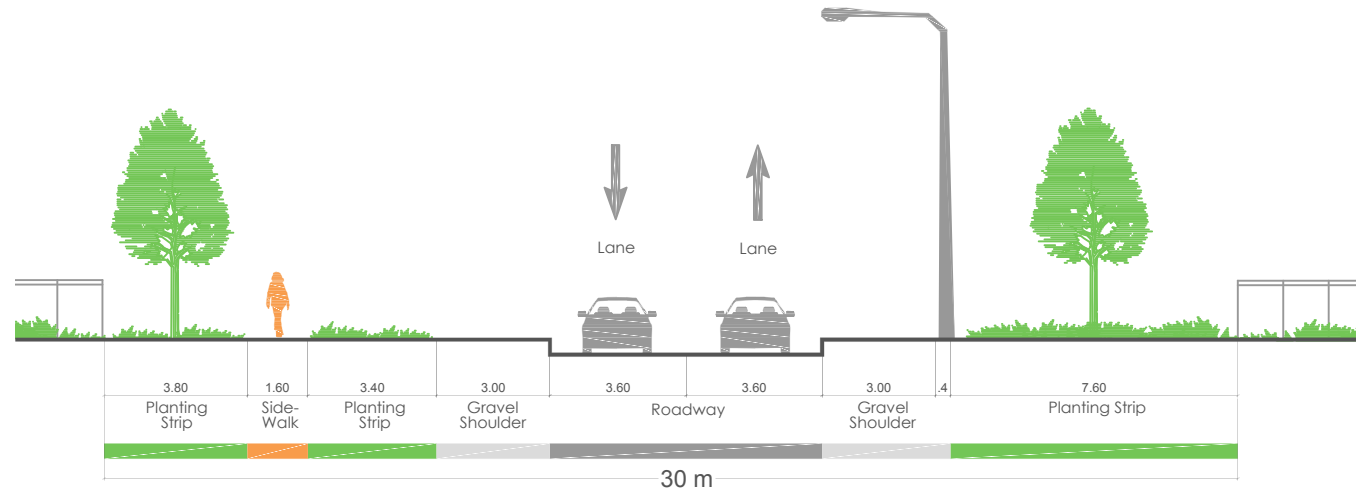
50 km/h

BEFORE

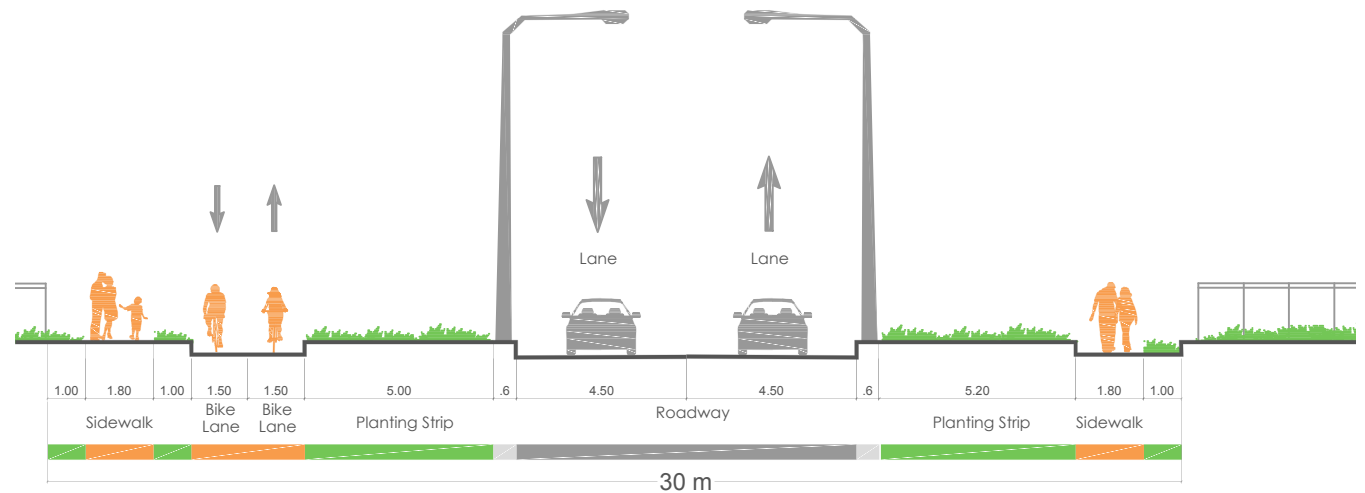
50 km/h

AFTER

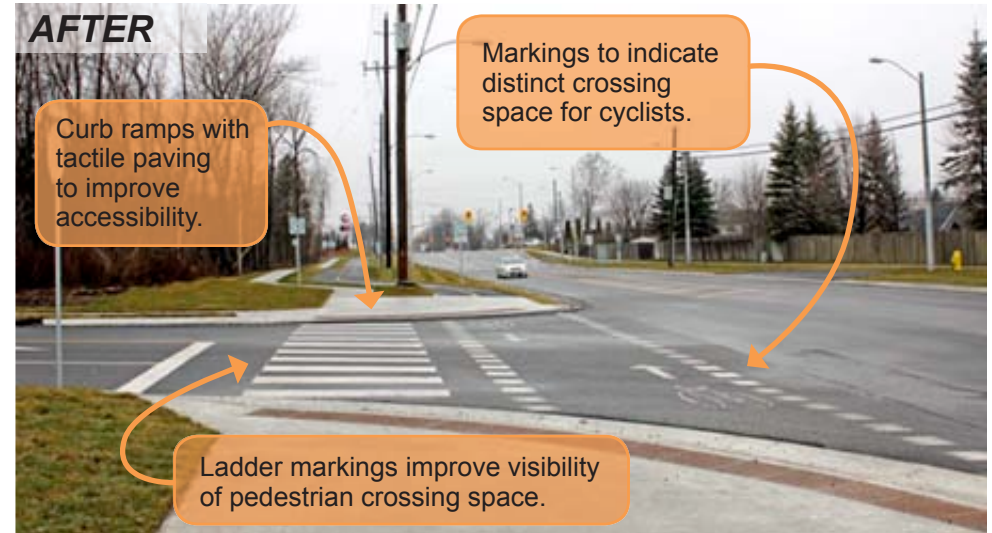
STREET SECTIONS



BEFORE



AFTER



Brealey Drive at entrance to park and recreation centre, looking north.



BETTER COMFORT FOR PEDESTRIANS AND CYCLISTS

Pedestrians appreciate the new pedestrian crossings that were created on Brealey Drive, an informal survey by City staff revealed. A City planner who biked on Brealey Drive prior to the reconstruction described her ride as “scary... the vehicles tended to move faster than normal for a city street and passed quite close to my bicycle. With the new facility, it feels like a trail and is easy to ride.”



SUFFICIENT SPACE FOR CAR TRAFFIC

Motor vehicle counts ranged between 10,000 to 11,500 cars per day in 2014. Although there is not yet data from after the reconstruction, these volumes are projected to remain the same, and be easily accommodated in the two lanes provided.



SAFETY TRENDS

Between 2009 and 2013, there were 56 collisions along this section of Brealey Drive, including two involving pedestrians. Collisions were trending downward before the project began, from 26 collisions in 2010 to three in 2014, although this may have been related to previous construction work. Longer term trends will need to be documented in future years before any potential safety benefits of the changes to Brealey Drive can be confirmed.



The two-way bike trail and sidewalk on the west side of the street is separated to avoid conflicts between pedestrians and cyclists.



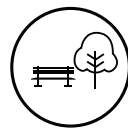
Adelaide Street facing east showing new cycle track.



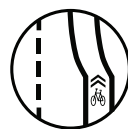
The addition of cycle tracks along this major corridor of parallel one-way arterial streets provides a key east-west bike route through the heart of Toronto's downtown core.



Addition of a uni-directional cycle track on each street.



Cycle track separated from motor vehicle traffic by a painted buffer and a combination of bollards and planters.

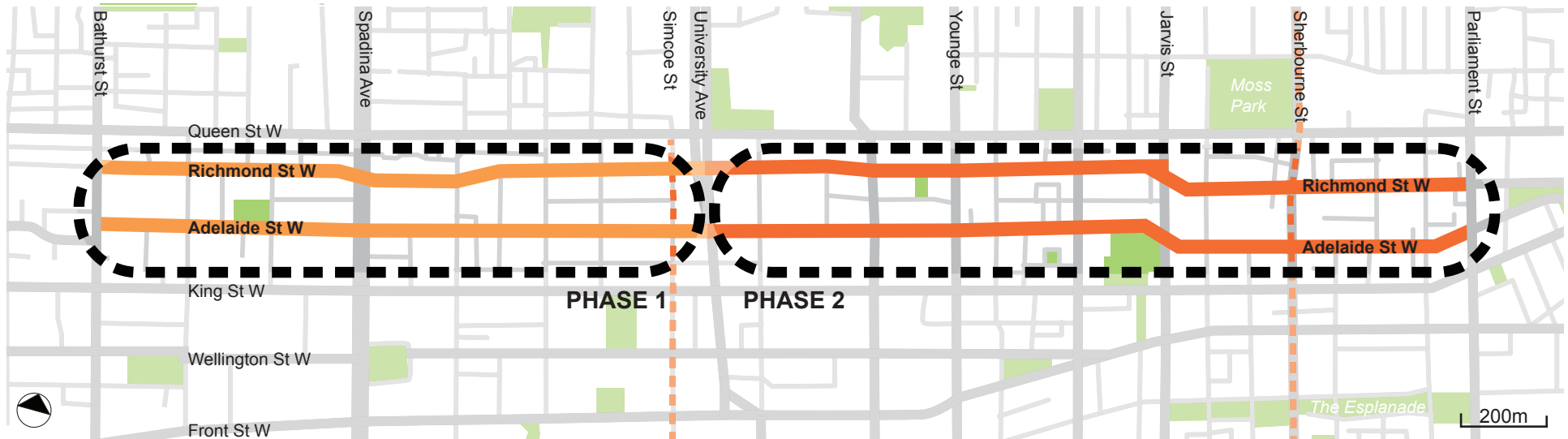


Four traffic lanes converted to three for most sections of the streets, with some areas reduced to two traffic lanes to accommodate off-peak parking or construction staging areas.

GEOGRAPHIC CONTEXT

Toronto is the economic, political, and geographic centre of the GGH Region, and is the fourth most populous city in North America.

Richmond and Adelaide Streets are a pair of parallel, wide roadways, with Richmond Street running one-way west, and Adelaide Street running one-way east. Together, these two major arterial roads form a corridor that allows access for people and commercial/service vehicles to the downtown core. This corridor runs from the Don Valley Parkway and the Corktown neighbourhood in the east, through the Financial District of the downtown core, and to the Fashion and Entertainment Districts in the west. Development is very dense along the corridor, ranging from mid-rise mixed-use buildings along its eastern and western ends, to high-rise office towers in the downtown core.



Context Map

The Richmond-Adelaide corridor runs between Queen and King Streets, which are major retail and commercial streets and two of the busiest streetcar routes in the city. Significant historical buildings exist in the area, as do major destinations including Toronto City Hall, the Eaton Centre, and major theatres and hotels.

After two phases of implementation, nearly the entire length of this corridor is now a bicycle route.

POLICY CONTEXT

The City of Toronto is currently in the process of developing Complete Streets Guidelines to manage its approach for how it designs its streets. Toronto also has a Pedestrian Charter, Vibrant Street Guidelines, a Streetscape Manual, and a Wayfinding Strategy, in addition to its Official Plan, which was amended in 2014 to include Complete Streets principles. These documents all contribute to how Toronto is developing its streets and transportation systems. The City of Toronto Bike Plan (2001) identified Richmond and Adelaide as potential bike routes. Toronto is now in the midst of developing an updated 10 year Cycling Network Plan.

TIMELINE

- 2011** Toronto City Council initiated a Municipal Class Environmental Assessment study for cycle tracks within the Richmond-Adelaide corridor.
- 2014** After technical study, public and stakeholder consultation, and approval by City Council, the city installed 1.5 km segments of cycle tracks on Richmond and Adelaide Streets between Bathurst Street and University Avenue. This was installed as the first phase of a pilot project to form part of the Municipal Class EA study for demonstration, testing and evaluation before the cycle tracks are made permanent.
- 2015** The Richmond-Adelaide cycle tracks were extended eastward to Parliament Street as part of phase two of the pilot project.
- 2016** Evaluation of the pilot project will inform the final recommendations of the Municipal Class EA.

STREET STATISTICS

STREET CLASSIFICATION

Major Arterial

RIGHT-OF-WAY WIDTH

20 m

LENGTH

3.3 km

COST

\$780,000

PROCESS DURATION

5 years

SPEED LIMIT

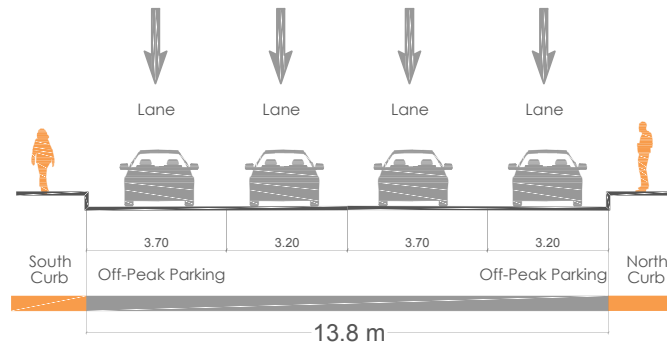
50 km/h

BEFORE

50 km/h

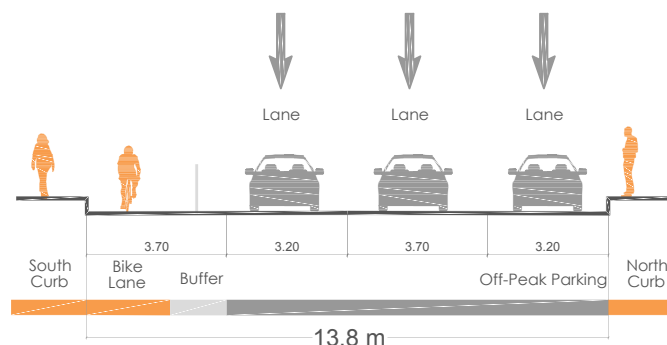
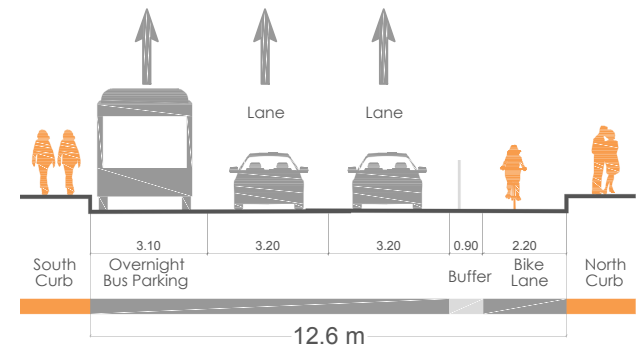
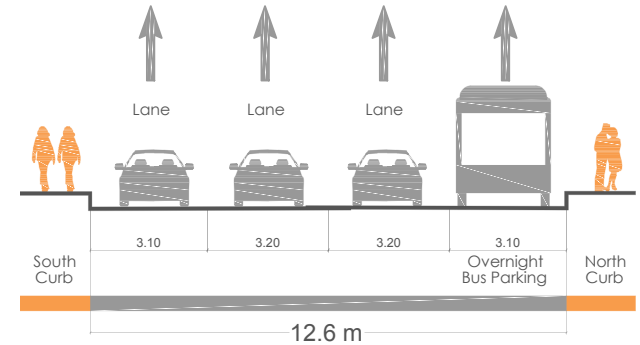
AFTER

STREET SECTIONS



BEFORE

Adelaide Street
(Jarvis St. - Berkeley St.)



AFTER

Richmond Street
(Jarvis St. - York St.)



Generous cycle track width allows for passing.

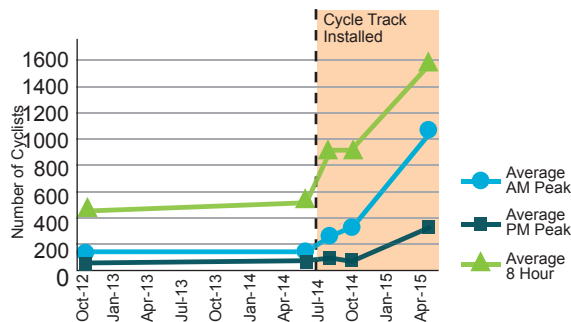


Signage added to indicate prohibition on stopping and associated penalty, and to solicit feedback on the cycle track pilot project.

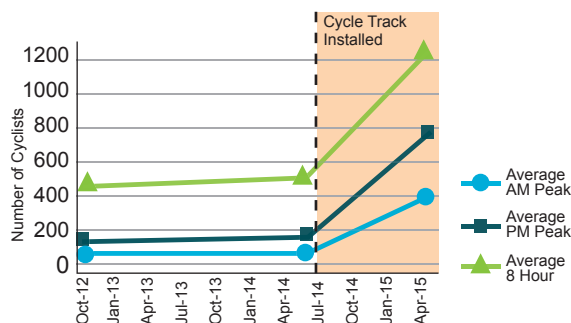


Planter boxes help improve separation of cyclists and motor vehicles while contributing to beautifying the streetscape.

EASTBOUND CYCLISTS ON ADELAIDE ST



WESTBOUND CYCLISTS ON RICHMOND ST



MORE CYCLISTS

Cyclist volumes increased significantly from June 2014 to May 2015, after the installation of the first phase of the pilot project. On Adelaide Street, the number of cyclists rose from 529 to 1,573 during an 8-hour period, and from 138 to 536 during the morning peak hour. On Richmond Street, cyclist counts rose from 504 to 1,296 in the peak hours.



IMPROVED SAFETY AND COMFORT

Among people who bike, perceptions of safety and comfort while biking on Richmond and Adelaide went from a score of 3.6/10 to 8.3/10 after the cycle tracks were fully installed. People who drive also noted an improvement in how comfortable they felt driving with cyclists, from 5/10 to 8.2/10 after the changes to the streets.



SHORTER TRAVEL TIMES FOR DRIVERS

Motor vehicle travel times generally declined along Richmond and Adelaide Streets in the first phase of the pilot project, despite the reduction in the number of travel lanes. The largest reduction in travel times was a reduction of one minute and 48 seconds on Adelaide Street during midday (11:00 am to 1:00 pm), a trip 30% faster than before the installation of the cycle track. The only increase in travel times for drivers occurred on Adelaide during the afternoon peak period, where travel times increased by 35 seconds, or 12%.

2.5

Shellard Lane

City of Brantford

BEFORE



AFTER



Shellard Lane before and after reconstruction.

The Shellard Lane conversion is the product of a proactive move to integrate infrastructure for cyclists and pedestrians into the right of way of an existing street that is the backbone of new and continuing residential development.



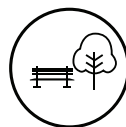
One side of the street lined with a pedestrian-only sidewalk and the other with a separated multi-use trail for cyclists and other users.



Two additional signalized pedestrian crossings near the schools allow the large student population to safely cross the street at more locations.



An added median and fence to divert crossings to the signalized intersections.



Added street trees on boulevard provide shelter and aesthetic improvement.



Improved crosswalk markings increase visibility of crossing area.



Context Map

GEOGRAPHIC CONTEXT

Brantford is a mid-sized city 40 km southwest of Hamilton. It features a historic core based around a tight street grid with short, walkable blocks.

Shellard Lane lies on the edge of town, running along suburban developments before extending out into the countryside. The surrounding greenfield sites are subject to upcoming low-density residential development that is generally oriented to automobiles. Multiple schools along Shellard Lane serve the expanding residential area. The street serves as an important connection as one of the few through-streets in the area running northeast towards the downtown.

POLICY CONTEXT

The City of Brantford adheres to a Transportation Master Plan (TMP), as well as the more specific Multi-Use Trail/Bikeway Implementation and Design Plan (2000) to direct infrastructure investment and respond to growth. The TMP was updated in 2014 with an added focus on Complete Streets principles and active transportation. The 2014 TMP update also includes updates to the City Bikeways and Trails Network, which recommends nearly 100 km of added active transportation infrastructure. The TMP emphasizes development pressures that are adding new users to Shellard Lane, and identifies the need to provide the infrastructure to accommodate them. In further detail, The North of Shellard Neighbourhood Recreation Plan, as part of the West of Conklin Secondary Plan, highlights the space along Shellard Lane as a multi-use trail that acts as the central spine of a network of

active transportation infrastructure planned for the future neighbourhood. Shortly after these policy documents were approved, construction began on the Shellard Lane corridor improvements.

TIMELINE

- 2012** Environmental Assessment begins.
- 2013** Environmental Assessment completed and detailed design begins.
- 2014** Detailed design completed, and construction begins.
- 2015** Construction completed.

STREET STATISTICS

STREET CLASSIFICATION

Minor Arterial

RIGHT-OF-WAY WIDTH

26.5 - 36 m

LENGTH

2 km

COST

\$7.8 million

PROCESS DURATION

3 years

SPEED LIMIT

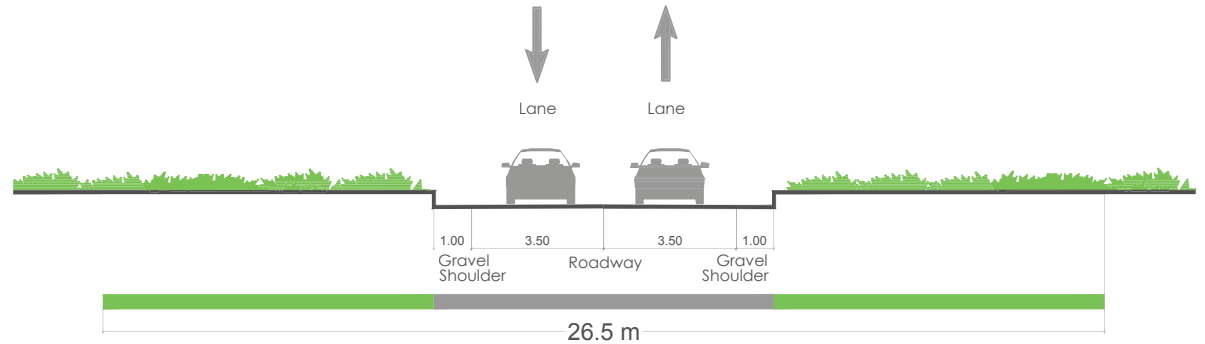
50 km/h

BEFORE

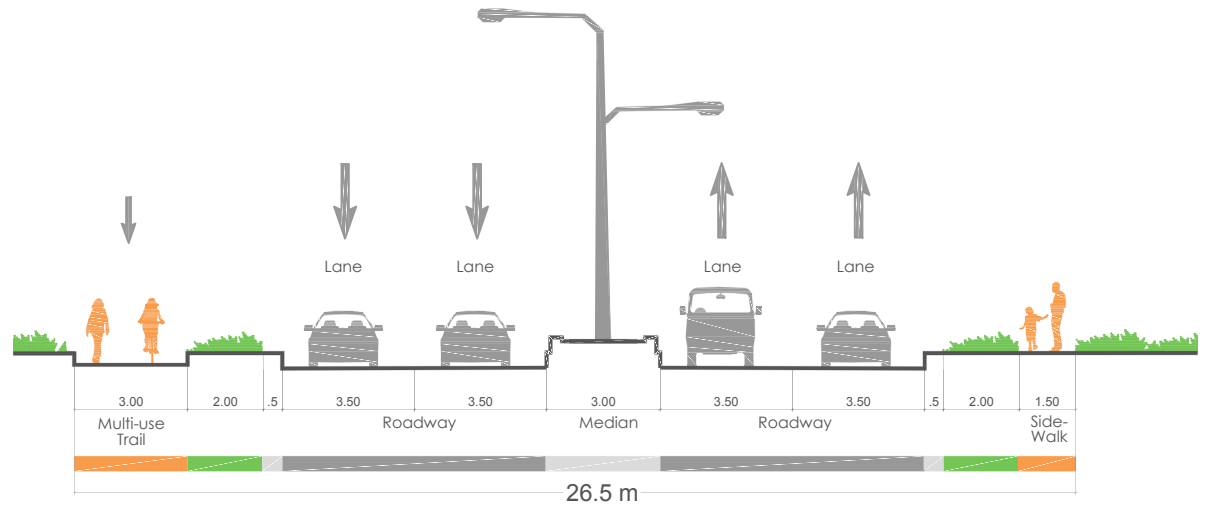
50 km/h

AFTER

STREET SECTIONS



BEFORE



AFTER



MORE CYCLISTS AND PEDESTRIANS

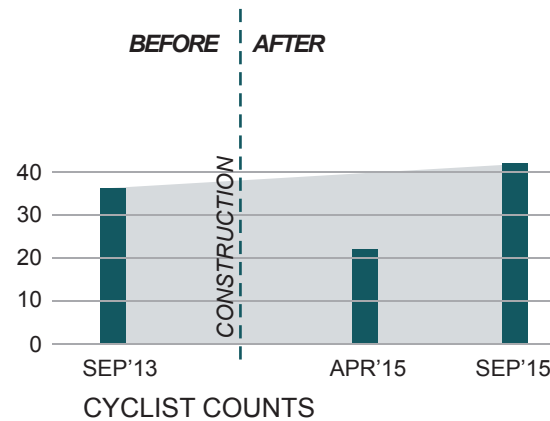
Traffic counts for pedestrians and cyclists were taken in September 2013 (before reconstruction), April 2015 (after reconstruction) and again in September 2015. Comparison of the September 2013 counts with the April 2015 counts showed a decrease in the amount of active transportation usage at multiple points along Shellard Lane, despite positive qualitative feedback from area residents. However, the counts from September 2015 are more suitable as a post-construction comparison as they were taken at the same time of year. These counts show a rebound in the number of pedestrians and cyclists, to levels that surpass the pre-construction counts.



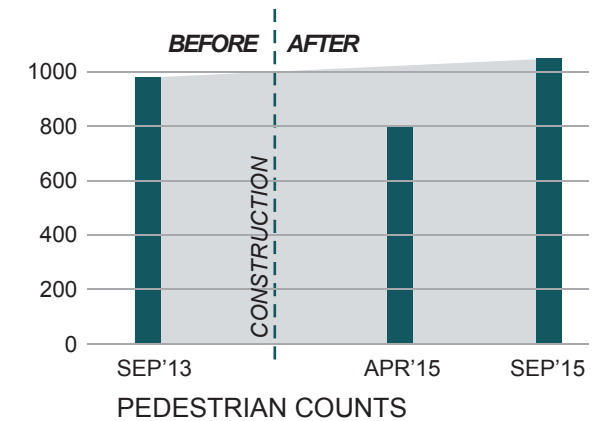
INCONCLUSIVE SAFETY IMPACTS

Intersection counts for motor vehicle collisions have been reported for the five year period before the start of the Shellard Lane transformation. The average number of collisions at intersections between Colborne Street West and the east intersection of Shellard Lane and McGuinness Drive was 10 per year from 2008 to 2013. Since the street improvements have been introduced there has only been one year of reporting. In 2015 the number of collisions at these intersections was 11. Future collision data will need to be analyzed to provide a clearer picture of the longer term impact of this new street design.

INCREASED CYCLISTS



INCREASED PEDESTRIANS



BEFORE



AFTER

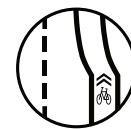


Looking west on College Avenue West, showing the added bike lanes and considerable student foot traffic.

College Avenue West was transformed by taking advantage of planned road resurfacing to include painted bike lanes and achieve an active transportation “quick win”.



Painted bike lanes added to both sides of the street.



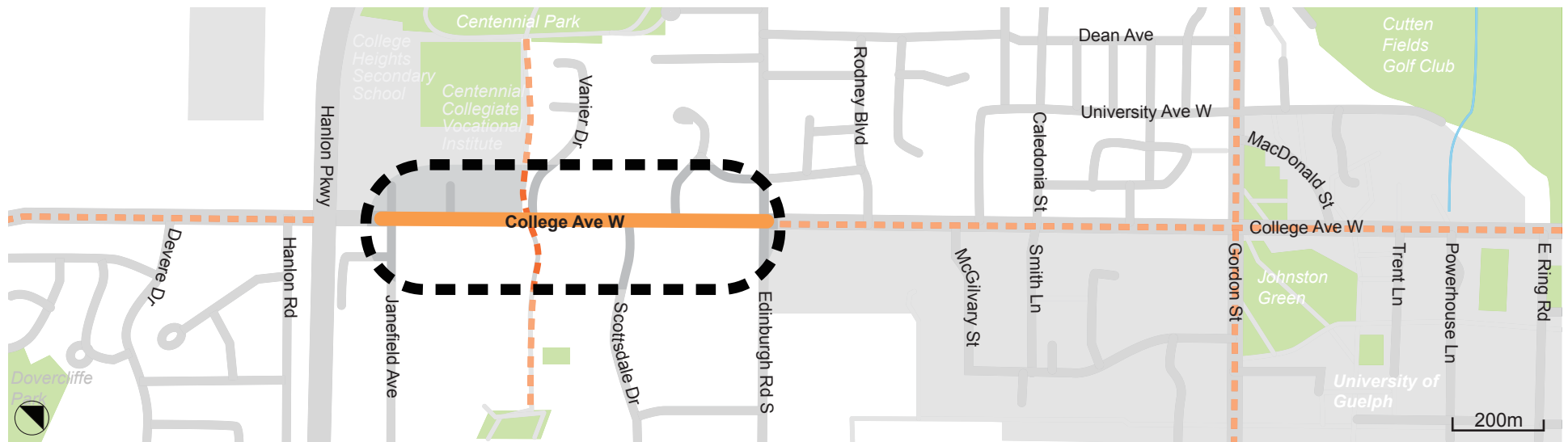
A road diet turned four traffic lanes into two and added one left-turn lane.



The posted speed limit reduced to 40km/h from 50km/h.

College Avenue W, City of Guelph

City Population: 121,668



Context Map

GEOGRAPHIC CONTEXT

Guelph is a mid-sized city situated 30 km east of Kitchener-Waterloo. It has a large student population due to the presence of post-secondary institutions such as the University of Guelph.

College Avenue West runs along the edge of the University of Guelph and is a minor arterial road serving much of the south part of the city. The street connects low-density residential neighbourhoods to the university campus and features on-street bike lanes for much of its length. The segment that was transformed in this project had been a missing link for bicycle infrastructure along College Avenue West. The need for the bike lane and road diet also arose not only out of the proximity of the street to the university, but also to an elementary school, a private school, and two secondary schools.

POLICY CONTEXT

In 2009, Guelph City Council adopted the Guelph Bicycle Policy, which supported converting bike routes into painted and/or separated bike lanes whenever road resurfacing work was being undertaken. To enact the policy objectives laid out in the Bicycle Policy, the Bicycle Friendly Guelph initiative was launched. This led to the Guelph Cycling Master Plan in 2012, which designated College Avenue West as one of many streets that would be upgraded to include a bike lane when the opportunity arrived. College Avenue West confirms the effectiveness of the strategic use of routine road work and is expected to be replicated throughout the city.

TIMELINE

- 2012** Guelph Cycling Master Plan recommends bike lane along College Avenue West.
- 2013** Routine road resurfacing planned for the street.
- 2014** Resurfacing begins, including addition of bike lanes and road diet. Construction complete by August, 2014

STREET STATISTICS

STREET CLASSIFICATION

Minor Arterial

RIGHT-OF-WAY WIDTH

25 m

LENGTH

800 m

COST

\$11,200

PROCESS DURATION

8 months

SPEED LIMIT

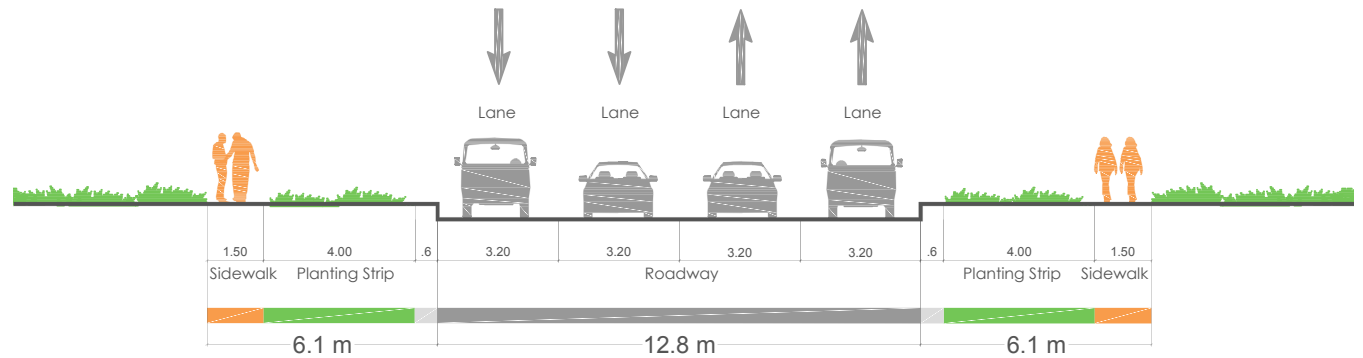
50 km/h

40 km/h

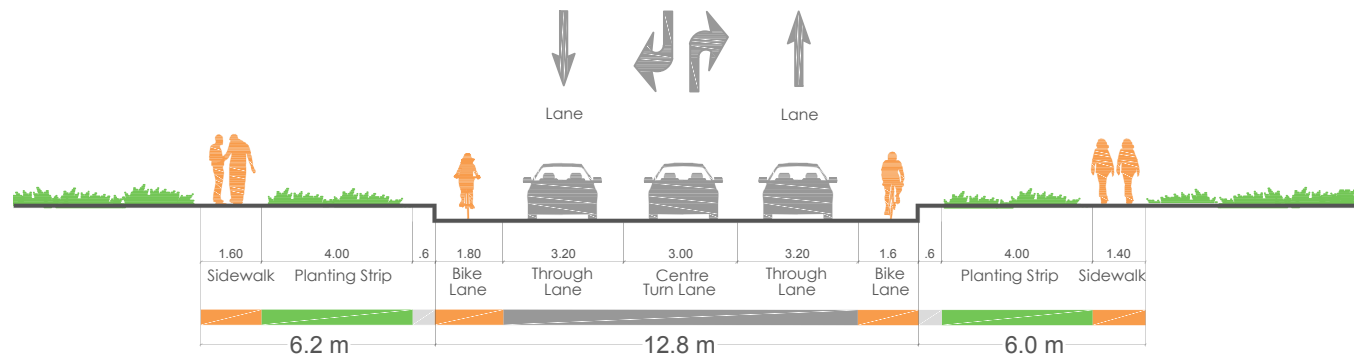
BEFORE

AFTER

STREET SECTIONS



BEFORE



AFTER



MORE PEOPLE ON BIKES, FEWER IN CARS

The addition of a bike lane along College Avenue West has had an immediate and measurable impact on commutes in this part of Guelph. Traffic counts after resurfacing recorded three times more cyclists compared with the same time of the year before resurfacing.

While cyclist numbers have increased dramatically, the number of motor vehicles on the same section of College Avenue has declined. Travelling eastbound, motor vehicle volumes have been reduced by 13%; while westbound there has been a 6.9% reduction.

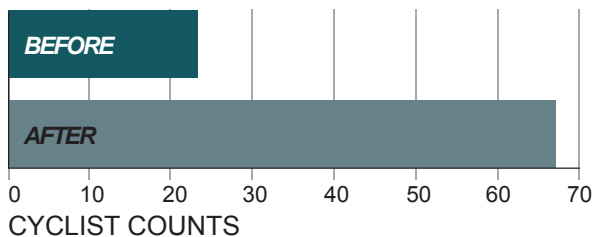


INCONCLUSIVE SAFETY IMPACTS

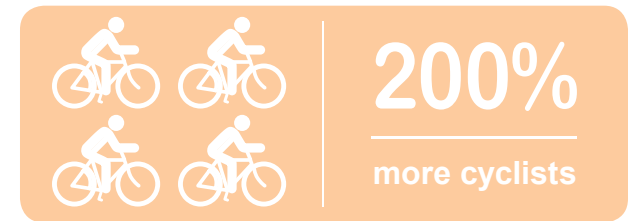
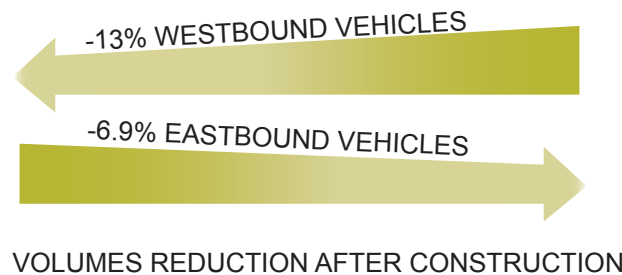
Collision records show that there were 6 motor vehicle collisions along the route in the 3 years prior to the road resurfacing. Since the conversion in 2014 there were 6 more collisions, an increase in the average annual rate. With only one year of data, future collision data will need to be analyzed to see if rates remain higher or drop back down to pre-construction levels.



INCREASED CYCLISTS



DECREASED MOTOR VEHICLES





Queens Quay viewing west.



AFTER

The revitalized Queens Quay along Toronto's central waterfront has been transformed from a wide roadway to a boulevard that prioritizes walking, cycling, transit, and public space.



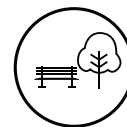
A new asphalt multi-use trail fills in a missing connection along the Martin Goodman trail.



A newly aligned and rebuilt dedicated streetcar right of way runs south of the traffic lanes, including shelters, and prioritized signaling.



An expanded, red granite pedestrian promenade installed.



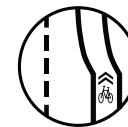
Streetscaping improvements, including benches and over 200 new trees.



Speed limit lowered from 50 km/h to 40 km/h.



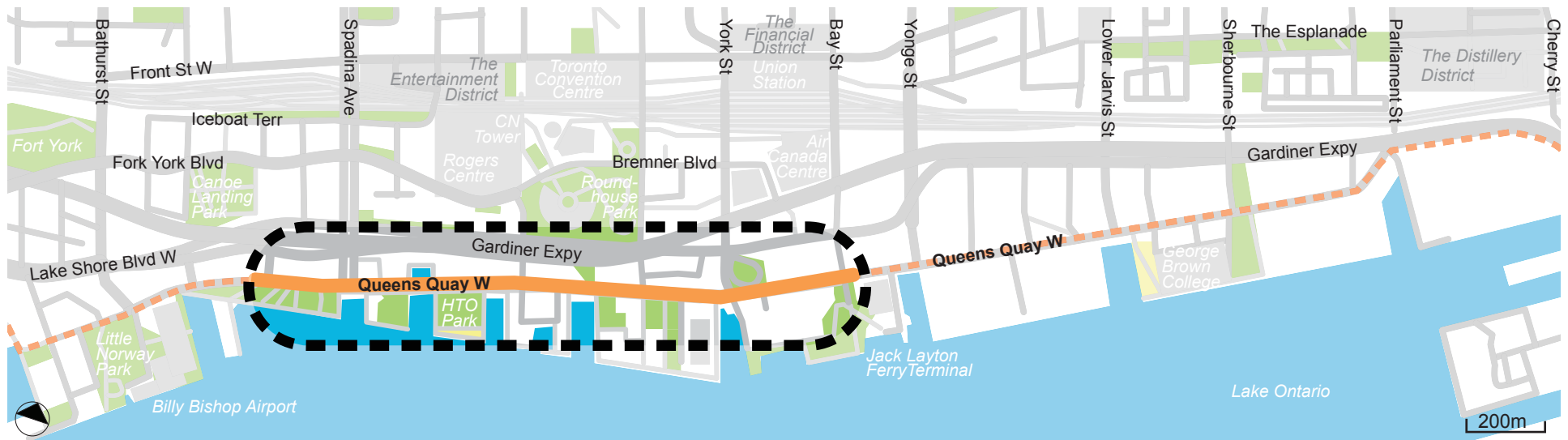
Accessible streetcar platforms and curb ramps installed.



Four traffic lanes reduced to two, with new dedicated turning lanes, signals, and lay bys for drop-offs.

Queens Quay, City of Toronto

Population: 2,615,000



Context Map

GEOGRAPHIC CONTEXT

Toronto is the economic, political, and geographic centre of the Greater Golden Horseshoe Region, and is the fourth largest city in North America.

Queens Quay runs along Toronto's waterfront just south of the downtown core. The section of the street that was redesigned runs from Bay Street to Yo-Yo Ma Lane, although improvements have also been made further along the street. The location is one of Toronto's most important tourist destinations, and is lined by high-rise buildings containing a mix of commercial, residential, and office uses. It is also home to a great deal of parkland and major destinations including Harbourfront Centre and the Jack Layton Ferry Terminal, which provides access to the Toronto Islands.

POLICY CONTEXT

The City of Toronto is currently in the process of developing Complete Streets Guidelines to manage its approach for designing its streets. Toronto also has a Pedestrian Charter, Vibrant Street Guidelines, a Streetscape Manual, and a Wayfinding Strategy, in addition to its Official Plan, which was amended in 2014 to include Complete Street principles. These documents all contribute to how Toronto is developing its streets and transportation systems. The City of Toronto Bike Plan (2001) identified Queens Quay as a bike route. Toronto is now developing an updated 10 year Cycling Network Plan.

The Toronto waterfront is subject to numerous renewal projects and area-specific plans, including the Central Waterfront Secondary Plan, the Downtown Waterfront Master Plan, the Lower Yonge Precinct Plan, and the East Bayfront Precinct Plan.

TIMELINE

- 2003** City Council adopts the Central Waterfront Secondary Plan to revitalize Queens Quay.
- 2006** Waterfront Toronto held an international design competition to improve the public realm along Toronto's central lakeshore. Over the next 8 years Waterfront Toronto held almost 100 public meetings and stakeholder consultation meetings.
- 2007** A Municipal Class Environmental Assessment was begun by Waterfront Toronto and the City of Toronto.
- 2009** The Class EA was approved.
- 2010** Detailed design work began.
- 2012** Major street redesign construction begins, including upgrades to underground power, gas, water, sewage, and telecommunications.
- 2015** Construction completed on schedule.

STREET STATISTICS

STREET CLASSIFICATION

Minor Arterial

RIGHT-OF-WAY WIDTH

28 - 34 m

LENGTH

1.7 km

COST

\$128.9 million

PROCESS DURATION

12 years

SPEED LIMIT

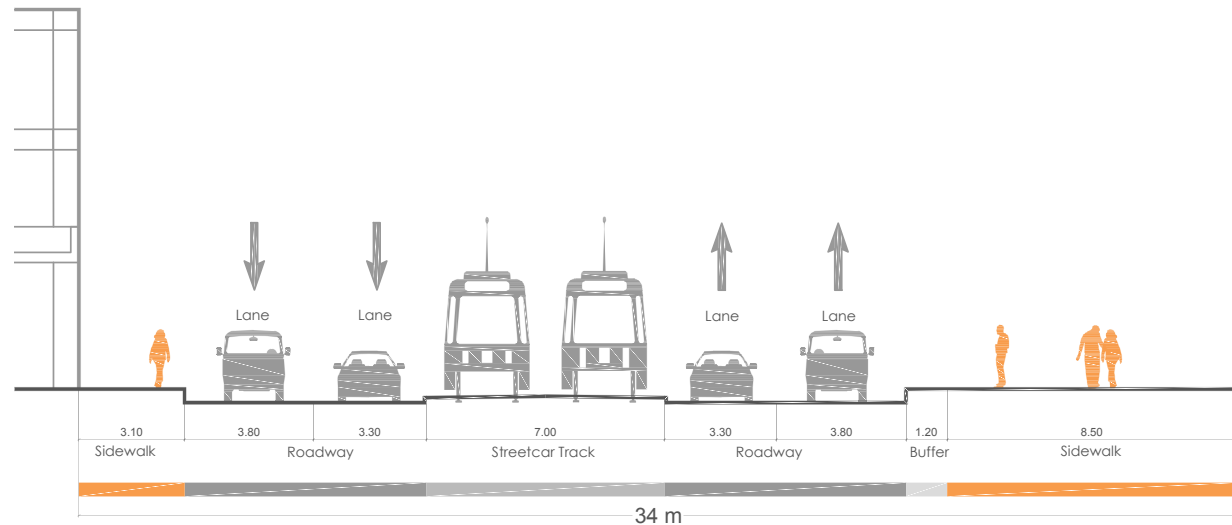
50 km/h

BEFORE

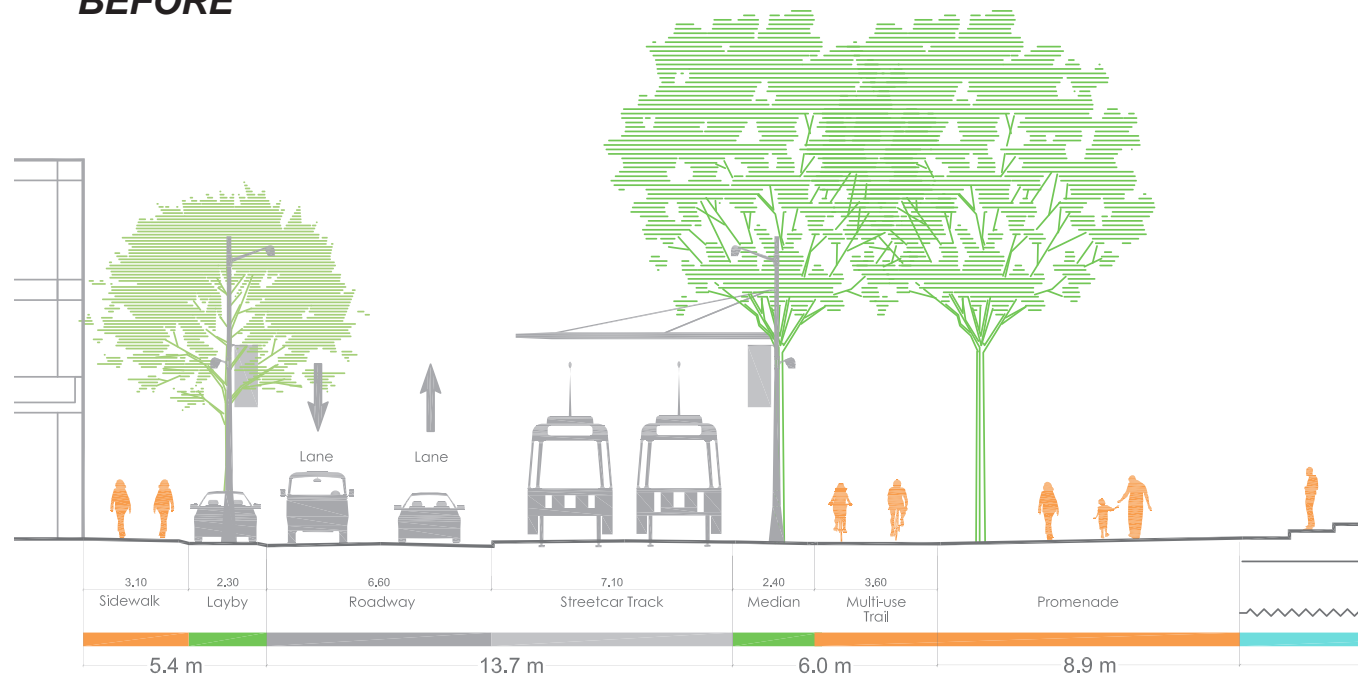
40 km/h

AFTER

STREET SECTIONS



BEFORE



AFTER

“ It is a pleasure to have the wide space in general including the separation from the car traffic when walking and cycling at the waterfront. ”

- Positive feedback from local resident. Source: Queens Quay Report.



Daily weekday counts have totaled as many as

6,000 cyclists.



POSITIVE PUBLIC FEEDBACK

Since Queens Quay has reopened after construction, there have been hundreds of comments recorded about the project, including those from a public survey. The most common piece of feedback received (30%) is from people praising the new design. Pedestrians and cyclists have commended the wider space and separation from car traffic. Shortly after the new Queens Quay opened, 79% of people responding to a survey said the new design enhanced their experience. Local businesses have also reported increased commercial activity and pedestrian traffic after the revitalization.

Cyclist counts, done in 2007 and again in August 2015 after the revitalization, found an overall average

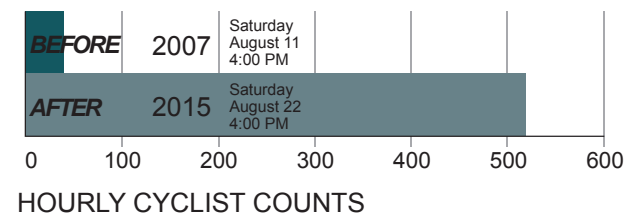
increase in weekend cycling traffic of:

888%



DRAMATIC INCREASE IN PEOPLE ON BIKES

Cyclist counts, conducted in 2007 and again in August 2015 after the revitalization, found an overall average increase in weekend cycling traffic of 888 percent. During evening rush hour, almost 600 cyclists were recorded along the Martin Goodman Trail on Queens Quay, and daily weekday counts have totaled as many as 6,000 cyclists.



2.8

King Street

City of Kitchener



BEFORE



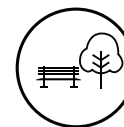
AFTER

King Street's new design resulted in a dramatic spike in pedestrian activity and street festival attendance.

An innovative redesign featuring seasonal flexibility, enhanced pedestrian features, and sustainable streetscaping has substantially improved this downtown main street in Kitchener.



Sloped curbs to improve universal accessibility.



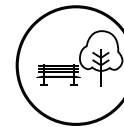
Environmentally friendly planter beds that collect and filter storm-water.



Added signature street lighting to enhance feeling of safety at night.



New bike racks to encourage cycling to destinations nearby.



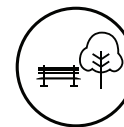
Addition of 120 street trees to enhance the human scale and provide shade.



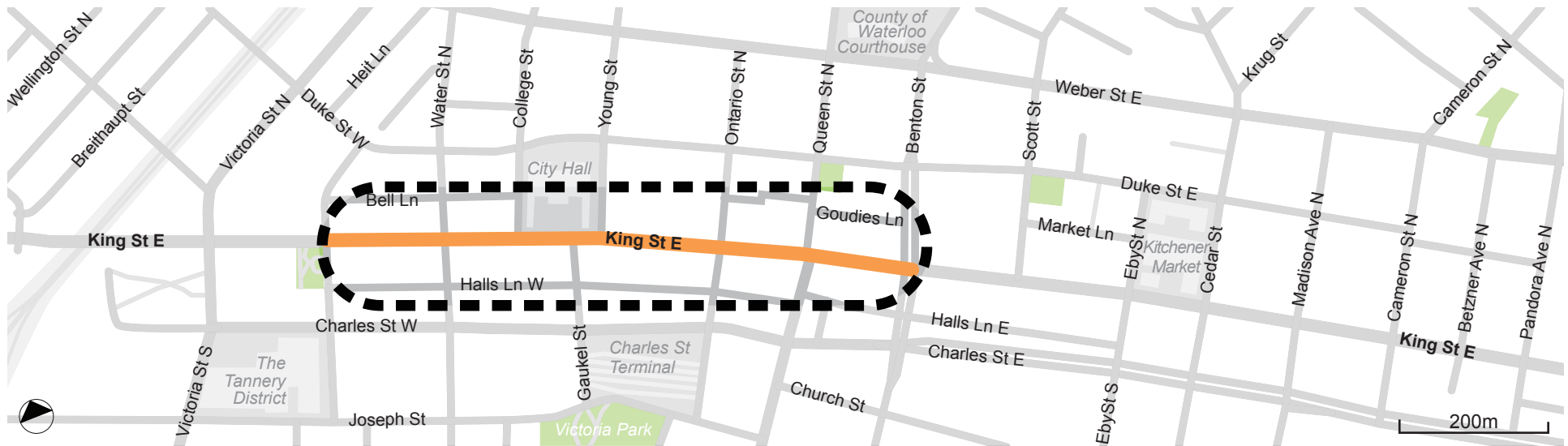
Bollards delineate on-street parking spaces in the winter and can also be used to close off the street for public events in the summer.



Improved transit shelters for greater comfort and visual appeal.



Increased amount of seating creates spaces for people to linger.



Context Map

GEOGRAPHIC CONTEXT

Kitchener is a growing city that joins neighbouring cities Waterloo and Cambridge (collectively known as the Tri-Cities) in a census metropolitan area of 507,096 - the fourth largest in Ontario.

King Street was the main thoroughfare connecting a number of towns in the area during Kitchener's early development, and today is the centre of the city's downtown and heritage districts. King Street continues from downtown Kitchener through to downtown Waterloo and beyond. Currently underway is the development of a future Light Rail Transit line running through downtown Kitchener and connecting to other rapid transit systems within the Tri-Cities. This investment in rapid transit is supported by the Region of Waterloo's official plan that not only meets, but exceeds, provincially mandated smart growth targets for intensification.

POLICY CONTEXT

The pedestrian improvements to King Street were the result of series of policy changes in Kitchener. In 2005 the City adopted a Pedestrian Charter which laid out Kitchener's commitment to respecting the rights of pedestrians to safe movement by providing improved infrastructure. The signing of this charter inspired the creation of the Pedestrian Charter Steering Committee that advocates for the adoption of the principles in future developments. As proposed in the Kitchener Strategic Plan, in 2011 City Council approved a Transportation Demand Management Strategy. This strategy outlined opportunities to reduce residents' automobile reliance and included hiring a staff member to oversee its implementation. The staff member is also responsible for ensuring the goals of the Kitchener Cycling Master Plan (2010) are met.

TIMELINE

- 2003** \$3.3 million earmarked for King Street improvements through the City's Economic Development Investment Fund.
- 2006** Design process for a more pedestrian-friendly King Street commenced.
- 2008** Construction begins.
- 2010** Construction completed.

STREET STATISTICS

STREET CLASSIFICATION

Collector

RIGHT-OF-WAY WIDTH

18 m

LENGTH

1 km

COST

\$14 million

PROCESS DURATION

4 years

SPEED LIMIT

50 km/h

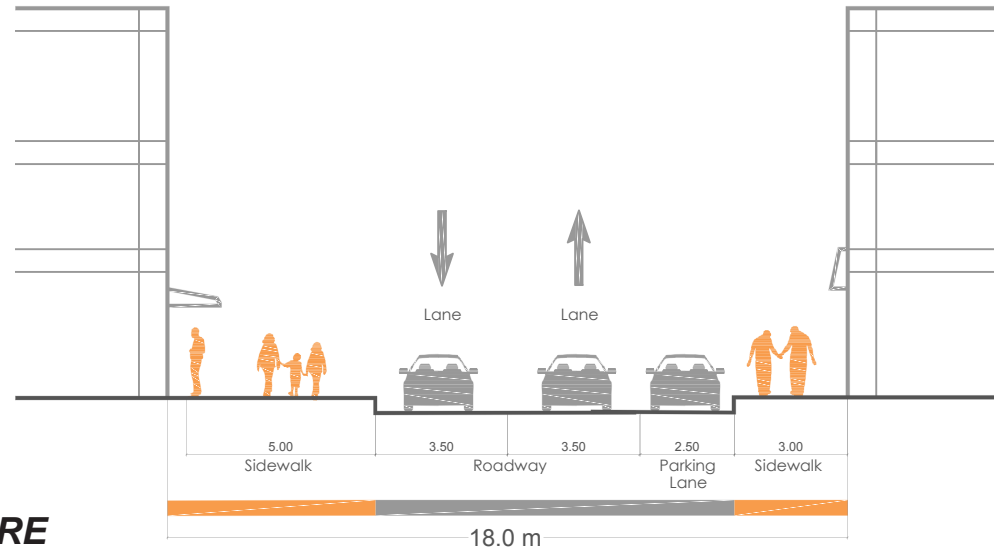
BEFORE

50 km/h

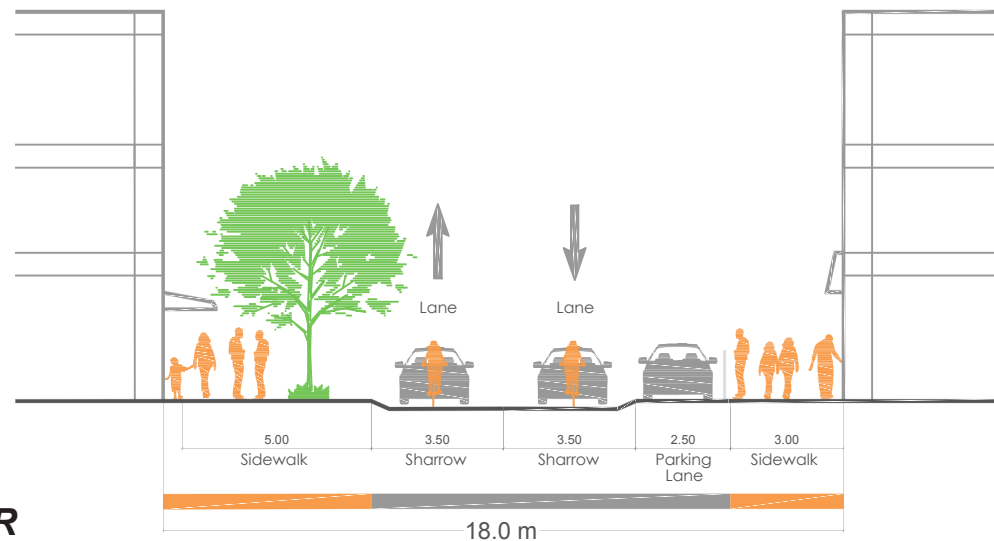
AFTER

STREET SECTIONS

BEFORE



AFTER





POSITIVE PERCEPTION OF SAFETY

According to a survey of people on King Street following the completion of the street reconstruction: 48% feel safe day and night; 27% feel safe but are bothered by panhandling, etc.; 17% feel safe during the day but not at night; 8% do not feel safe at all. While there is no such data available from before King Street was redesigned, these numbers are seen as positive news for a downtown that previously struggled with safety concerns.



REJUVENATED DOWNTOWN

In 2010, the International Making Cities Livable Council recognized the King Street transformation with its Community Places design award for bringing people back downtown.

Since the redesign, attendance for festivals on King Street has risen dramatically, from 250,000 before the reconstruction to 400,000 per year now.

There are indications that this increase in foot traffic has benefitted local business. There have been 59 façade improvements since construction finished and the number of summer patios has increased from 5 to 16 post-construction. This activity further improves street aesthetics and creates a more vibrant downtown.

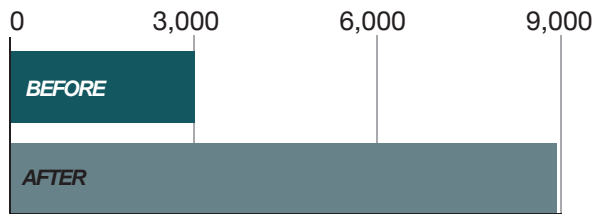
New trees and plantings filter stormwater, improve air quality and provide shade.

The new street furnishings (benches, bike racks, etc.) were made primarily from recycled materials.



Wide sidewalks and additional seating improve public realm.

INCREASED PEDESTRIANS



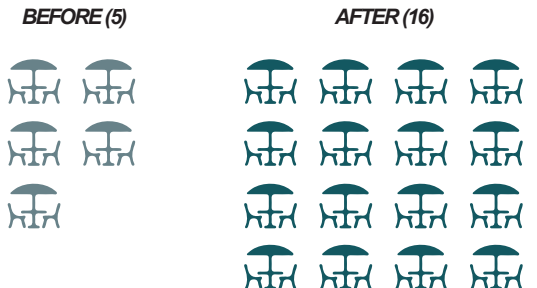
PEDESTRIAN COUNTS



INCREASED FOOT TRAFFIC

Since the pedestrian-friendly design was implemented, there has been a substantial increase in the amount of pedestrian activity along the street. Prior to construction King Street averaged 3,000 pedestrians per day and now averages 8,900. This is a nearly 200% increase in the amount of foot traffic along this street.

INCREASE IN SUMMER PATIOS



Attendance for street festivals has risen annually to **400,000**

BEFORE



AFTER



Davenport Road, north of Foxhunt Road, viewing south

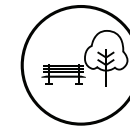
Once a barrier between an established residential community and adjacent commercial and residential areas, Davenport Road now connects neighbourhoods and encourages active transportation.



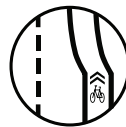
Painted bike lanes and bike box added for safer turns for cyclists.



New curb ramps improve accessibility.



Over 300 trees and other vegetation planted.



Converted four travel lanes to two, and introduced a centre turning lane.



Landscaped centre medians, pedestrian refuge islands, and roundabout installed.



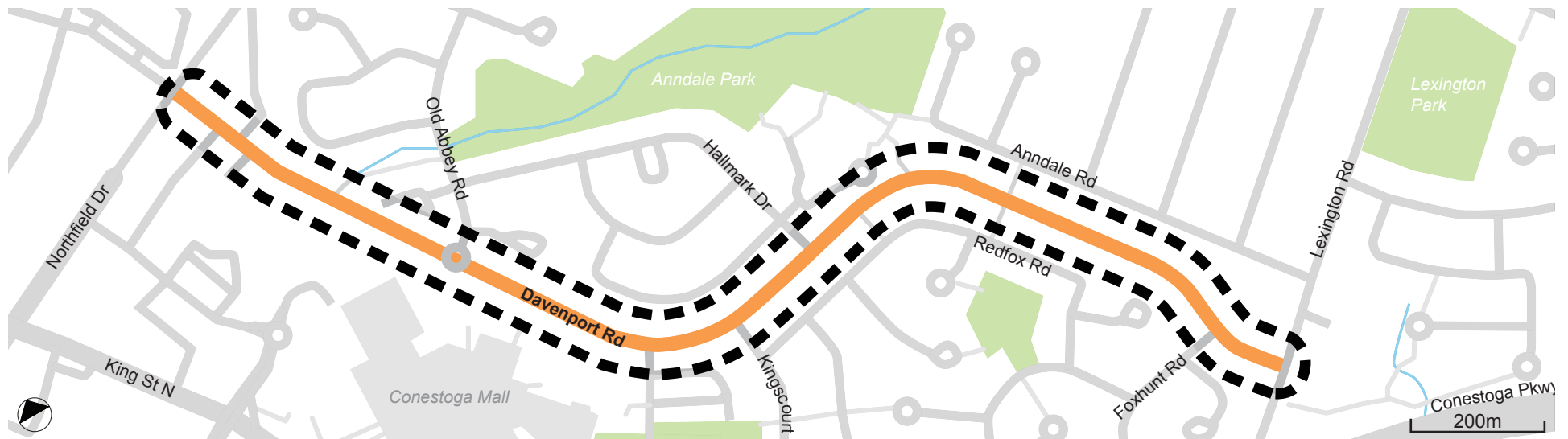
New bus shelters and transit pads.



Improved pedestrian crossings at intersections.

Davenport Road, City of Waterloo

City Population: 98,780



Context Map

GEOGRAPHIC CONTEXT

Waterloo is a mid-sized city located just over 100 kilometres west of Toronto. The City of Waterloo is one of three cities within the Regional Municipality of Waterloo.

Davenport Road is located in the northeast section of the City of Waterloo. It provides a key connection between a shopping destination - the Conestoga Mall - nearby parks, and the city's bus terminal. The surrounding neighbourhood mostly consists of low and mid-density residential uses.

POLICY CONTEXT

Turning Davenport Road into a Complete Street showcased and demonstrated the effectiveness of the concept before making it part of the community's official planning documents. The City of Waterloo has since endorsed Complete Streets principles in its Strategic, Official, and Transportation Master Plans to help foster urban intensification, encourage active transportation, and help reduce the city's dependence on single-passenger vehicles.

TIMELINE

- 2006** A comprehensive traffic study confirmed public concerns that high speeds on Davenport Road were a safety issue.
- 2008** The City of Waterloo successfully applied for funding from the provincial and federal government's Build Canada Fund to redevelop Davenport Road.
- 2009** Design work began, incorporating recommendations from the 2006 traffic study and feedback from public and stakeholder consultation
- 2010** Construction began.
- 2012** Construction completed.

STREET STATISTICS

STREET CLASSIFICATION

Collector

RIGHT-OF-WAY WIDTH

24.5 m

LENGTH

2 km

COST

\$2.9 million

PROCESS DURATION

6 years

SPEED LIMIT

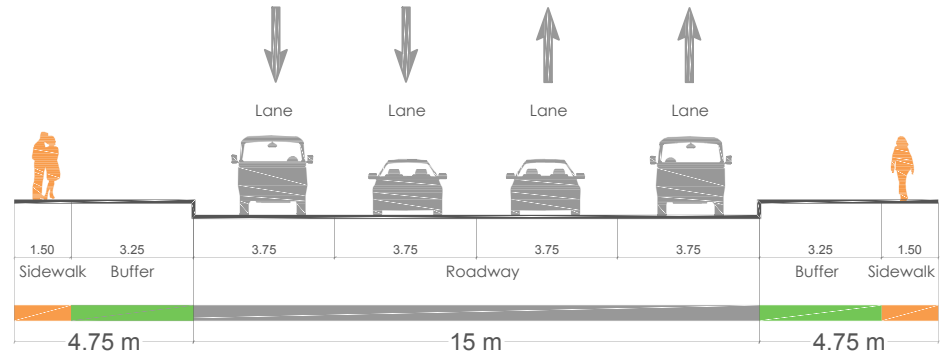
50 km/h

BEFORE

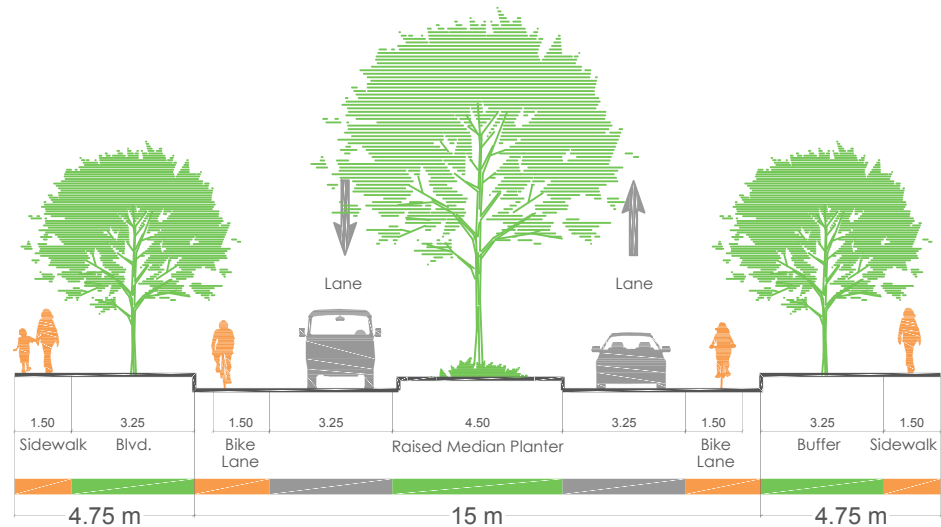
50 km/h

AFTER

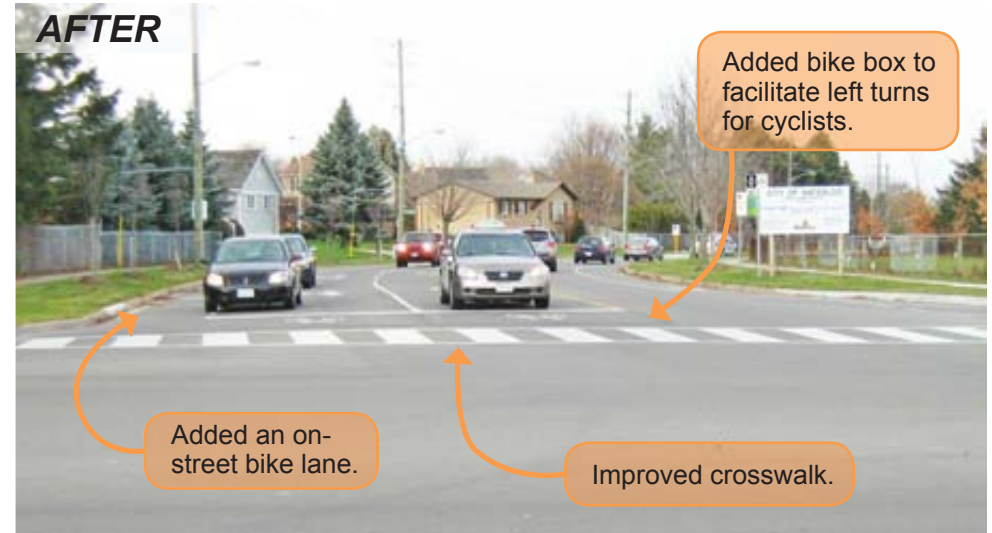
STREET SECTIONS



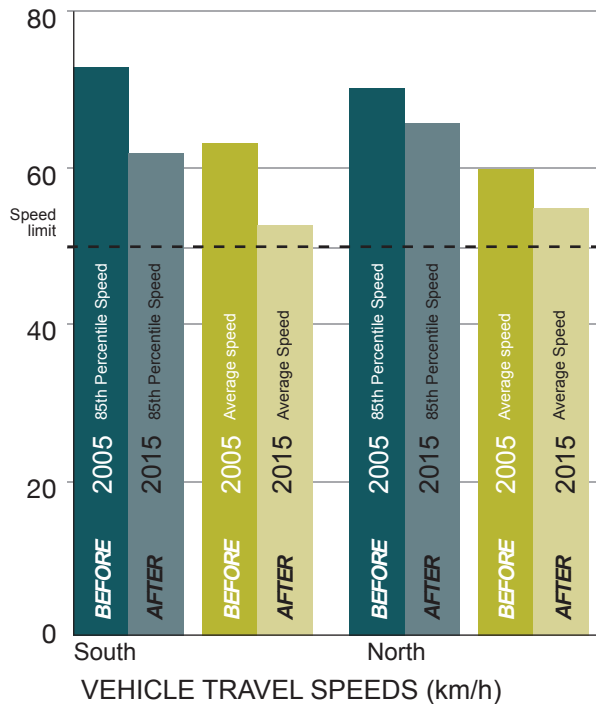
BEFORE



AFTER

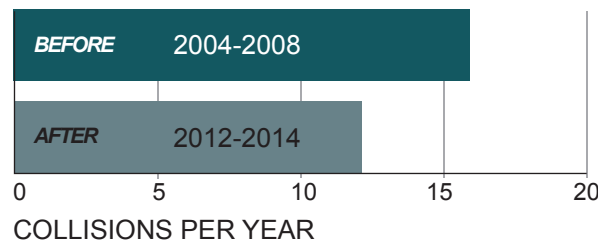


View of intersection of Davenport and Lexington Roads



REDUCED COLLISIONS AND TRAFFIC SPEED

The collision rate has declined along Davenport Road, from 16 collisions per year from 2004 to 2008, down to 12 collisions per year from 2012 to 2014 after the street redesign. Automobile operating speed (85th percentile) has also dropped, from over 70 km/h in 2005, to between 62 to 66 km/h in 2015. Average speeds have dropped as well, and are now closer to the posted 50 km/h speed limit.



AWARD WINNING DESIGN

Davenport Road was the co-winner of the 2012 Federation of Canadian Municipalities Sustainable Community Award for Transportation for the project's role to address traffic safety issues, reduce road maintenance costs, and promote healthy, active living in the community.



ENVIRONMENTAL IMPROVEMENTS

The 10% reduction in paved surface will cut salt use in winter and increase storm water infiltration year round. 300 new trees will provide shade and are expected to absorb almost 7,000 kg of CO2 annually, improve the appearance of the street, and improve local air quality.

3.0 Concluding Remarks

The examples of Complete Street transformations compiled in this book provide a snapshot of how the Complete Streets concept has recently been practically applied in the context of the GGH Region. This book documents the planning and implementation processes and design changes relating to nine street transformation projects across the region. To the extent possible by the available data, we have emphasized municipalities' efforts in evaluating the outcomes of these projects. With regard to outcomes, and building on our previous research (Smith Lea, Mitra & Hess, 2014; 2015), we have summarized improvements relating to (1) active and sustainable transportation, (2) traffic safety, (3) level of service, and (4) surrounding environment, as recorded by municipalities in which these projects are located. The list of projects featured in this book is not exhaustive; however, the nine street transformations highlighted here represent a diverse sample of current practices relating to planning, implementation and evaluation of Complete Streets projects.

During the course of our research, many of the Complete Street transformation projects we initially identified were soon eliminated. Finding data on project evaluation and outcomes was particularly challenging. Several projects could not be included because the municipalities had no information on their impacts on travel behaviour, traffic safety, level of service or the surrounding environment. Even many of the examples included in this book only have minimal information on their outcomes, and there was a great variation across the different projects and municipalities in terms of which outcomes were evaluated and how they were measured. From our research, it was evident that within the GGH Region, Complete Street projects are being undertaken without consistent, systematic, or sometimes any, evaluation of benefits.

While data on the outcomes is scarce, the details of the planning process and the outputs (i.e. what was built) for projects are well documented. The Project Locations Map (page 5) summarizes the nine Complete Streets projects featured in this publication. The determination of what constitutes a Complete Street was left to the individual municipalities, and when we compared across the projects we found that some features were more common than others. Each of the examples featured in this book includes a cycling facility of some type. Cycling seems to be integral to conceptions of Complete Streets by municipal transportation professionals in the GGH. In addition to cycling facilities, six out of nine projects involved improvements relating to speed reduction and/or a road diet. By contrast, one Complete Street project listed here transformed a two-lane

street to include four lanes of vehicular traffic, with additional facilities for pedestrians and cyclists (Shellard Lane). Improvements to the public realm (i.e., streetscaping) are relatively common across the nine projects as well. Four out of nine projects included transit improvements to the roadway in an effort to improve service. However only one project introduced dedicated rapid transit facilities (Highway 7 East) as part of a Complete Street transformation. Clearly, a great diversity exists in terms of project-level definition of a Complete Street within the GGH Region.

Regarding the outcomes of these Complete Street projects, we were encouraged by the fact that most of the projects we feature had at least some data on active and sustainable transportation after project completion. Six out of nine projects collected cycling count data; four of them demonstrated measurable increases in cycling, while the other projects did not have before-after data on cycling for comparison. Most of the streets we featured also included some improvements for pedestrians; five of these municipalities were able to provide pedestrian data, and out of these, four demonstrated an increase in pedestrian presence on streets after transformation. Highway 7 East is the only project that added a dedicated transit facility as part of its Complete Streets transformation and is also the only project that demonstrates a clear improvement in transit ridership. It should be noted, though, that travel data are almost exclusively collected on the facilities. As a result, the current measures do not reflect network level or neighbourhood level change in travel behaviour/ patterns, which is a key to creating active and sustainable communities. There is clearly room for further improvement with regard to systematic evaluation of active and sustainable transportation outcomes of a Complete Street.

Five of the Complete Street projects have some data on the level of safety, mostly measured through collision rates. Davenport Road and Highway 7 East. are two examples that showed significant safety benefits from the design changes on these streets, demonstrating that it is certainly possible for Complete Street projects to attain the goal of greater safety for all road users.

With regard to level of service, perceived safety and comfort among users of different modes, this data was collected by some municipalities, and evidence of improvement is common across these projects. However, the data is often inconsistent; while safety perceptions were sometimes quantified in survey form, several other projects documented subjective or anecdotal evidence of improved perceived safety. Highway 7 East was

the only project in our list that evaluated savings in transit travel time, and demonstrates a 30% improvement.

After a project is implemented, changes to the surrounding environment may take years to occur, and are difficult to systematically evaluate. Not surprisingly, such evaluations are the least common data that is collected by the municipalities. Of the examples presented in this book, one project showed clear evidence of improvements to the surrounding land use, as well as increased economic and social activities. In some other cases, the relevant data was often hypothetical, subjective and anecdotal in nature.

While the current practice relating to Complete Streets evaluation is less than ideal, this is by no means unexpected. Our previous research (Smith Lea, Mitra & Hess, 2015), which included a focus group discussion with municipal planners, engineers and urban designers, revealed a lack of understanding among professionals around the expected outcomes of a Complete Street project. Scarcity of resources, lack of communication between municipal departments, and more importantly, an absence of municipal mandate to evaluate active transportation projects, were identified as some key challenges in this regard.

Our findings in this present research are similar to what we had previously identified. While compiling the information for this book, we often found it difficult to identify who is responsible for collecting information and evaluating infrastructure projects. In our consultation with municipalities, we also found that information was often spread among different departments, municipal tiers, or governmental agencies. However, some of the featured Complete Street transformations have public reports associated with them, including Richmond/ Adelaide and Queens Quay. This practice of releasing public reports associated with projects, although it may not always be feasible with smaller infrastructure projects, is a good model to follow to ensure that data is collected, and is shared as part of a transparent public process.

In summary, a broad observation of the nine Complete Streets examples throughout the GGH Region makes the case that Complete Street transformations are likely to achieve the key goals of increased active and sustainable transportation, improved levels of safety and service, and improvements to the surrounding environment in which they are located. However, the types, variety, and quality of evidence collected for each of these individual Complete Street transformations were inconsistent, and as

a result, it is difficult to make conclusive comments about the magnitude of the benefits of these roadway improvements. This indicates an important gap in terms of effectively measuring municipal adherence to provincial policy goals for the GGH Region, as noted in Section 2.1 of the Growth Plan for the Greater Golden Horseshoe (Ontario Ministry of Municipal Affairs and Housing, 2013). Clearly, more work can be done to ensure Complete Streets are evaluated more systematically and using comparable measures. A more coordinated effort to collect and share data on the key performance indicators that align with Complete Street and sustainable transportation goals is important in advancing the Complete Street concept in the GGH Region. More broadly, such evidence can be used to evaluate development goals outlined in the Growth Plan.

Based on the evidence presented in this publication, our key recommendations to the municipalities are - first, to consider at the outset of these projects what outcomes they are expecting to see, to establish a plan for collecting and sharing data that measures these outcomes, and to include this plan within the overall capital budget process, and second, to increase the number of Complete Street projects. Complete Streets support key provincial policy goals, including those in the Places to Grow Act, and as more projects are built, stronger evidence will emerge around the benefits of such projects for the GGH Region and beyond.

4.0 Glossary of Key Concepts

Terminology used in Complete Street projects may not be widely known among the general public, and can vary among different jurisdictions. Referring to documents and guidelines in current use in Ontario, we compiled these definitions for the concepts and infrastructure that are referred to in this book.

BICYCLE (BIKE) LANE

A *bike lane* is "a portion of a roadway which has been designated by pavement markings and signage for the preferential or exclusive use of cyclists" (Ontario Ministry of Transportation, 2014). Pavement markings generally include a diamond followed by a bicycle symbol as well as a single stripe of paint to separate the space from motor vehicles. A **buffered bike lane** expands the separated space between cyclists and motor vehicles through the use of hatched pavement markings.

BICYCLE TRAIL AND MULTI-USE TRAIL

Bicycle trails or *multi-use trails* are off-street paths that are physically separated from the roadway by a strip of grass or boulevard. Bicycle trails are marked for the exclusive use of cyclists, while multi-use trails are intended to accommodate multiple uses including cycling, walking, in-line skating, skateboarding, wheelchair use, and jogging.

BIKE BOX

A *bike box* is a designated area for cyclists to stop in at signalized intersections. Bike boxes increase the visibility of cyclists, allowing them to move in front of motor vehicles at red lights. Bike boxes also allow cyclists to position themselves in the appropriate lane to proceed through the light or make turns before other vehicles. Pavement markings generally include a bicycle symbol and are sometimes painted green or blue.

BOLLARD

A *bollard* is a short post, usually about waist high. Bollards are often installed on roadways to control traffic movements or speed, or to separate different uses, such as avoiding conflicts between motor vehicles, bicycles and pedestrians.

BUS RAPID TRANSIT (BRT)

BRT is a form of public transit in which buses operate in dedicated travel lanes, fully separated from other motor vehicles. BRT routes also usually include stations where fare payment is made in advance of boarding the bus, not unlike a subway or LRT station, as well as priority for buses at traffic signals. In York Region, the BRT lanes are referred to as **rapidways**.

ENVIRONMENTAL ASSESSMENT

A provincial *Environmental Assessment (EA)* is "a study which assesses the potential environmental effects (positive or negative) of a proposal." (Ontario Ministry of the Environment, 2014) EAs in Ontario are guided by the Environmental Assessment Act (1990). There are two main types of EAs: Individual EAs and Streamlined EAs, which include Class EAs. The Class EA for Municipal Infrastructure Projects sets out a self-assessment process for routine municipal infrastructure projects, without having to obtain project-specific approval. Road reconstructions that change motor vehicle capacity warrant a higher level of review, even when these projects are intended to improve conditions for pedestrians and cyclists.

LAYBY

A *layby* is a designated paved area, either on or off the roadway, for motor vehicles to stop or park.

OPERATING SPEED (85TH PERCENTILE)

Currently, most posted speed limits are set based on the observed speed of 85% of motor vehicles traveling along a given section of a roadway. This is referred to as the operating speed of the roadway. It is usually determined by the roadway characteristics, such as street width, geometry, and intersection frequency.

RIGHT OF WAY

This is the area of a street that is publicly owned and maintained between properties. It includes roadways, sidewalks, bike lanes/cycle tracks, rapid transit lanes, boulevards, and planting areas, as well as traffic signs and signals, street furniture, and other public infrastructure.

ROAD DIET

A *Road Diet* is a transportation planning technique wherein the number of traffic lanes and/or the lane width is reduced to improve roadway safety and level of service for all road users. Typically, the reclaimed space is used to accommodate other uses including turn lanes, pedestrian refuge islands, bike lanes and landscaping.

SEPARATED BICYCLE LANE OR CYCLE TRACK

An on-street cycling facility that includes many of the features of a conventional painted bike lane, but is distinguished by a clear separation between motorists and cyclists through a buffer with physical barriers such as a line of bollards, a median, parked vehicles, or some combination of these. Additional separation can be attained by raising the lane above the curb.

STREETCARS

Sometimes referred to as *trams*, these electrically-powered rail vehicles operate on streets, usually in mixed traffic. Toronto was one of the few cities in North America to retain their streetcar system past the mid 20th century. *Streetcars* have some similarities to **Light Rail Transit (LRT)**, but LRT systems typically cover longer distances more quickly due to more widely-spaced stations and operate, like BRT, in their own fully dedicated travel lanes with advance fare payment, stations, and signal priority.

TACTILE PAVING & SURFACES

Tactile paving (also called *tactile walking surface indicators*, *detectable warning surfaces*, or *gripping domes*) is used to alert people with vision impairment of hazards such as a curb adjacent to motor vehicle traffic or the edge of a transit platform. In keeping with the Accessibility for Ontarians with Disabilities Act (2005; 2012), municipalities are installing tactile surfaces as part of curb ramps at pedestrian crossings.

TRAFFIC LANE

Traffic lanes are for the use of vehicle travel. Bicycles are recognized as vehicles under Ontario's Highway Traffic Act. Cyclists are permitted to use traffic lanes even when bicycle lanes are provided.

TURN LANE

A *turn lane* is a designated lane at signalized intersections for vehicles to move into when turning left or right.



Bike lane on Davenport Rd



Layby on King St



Bikes boxes on Davenport Rd



Bikes boxes on Highway 7 E



Bollards in buffer zone in Toronto; bollard in Kitchener



Tactile paving on Brealey Dr



Road diet on College Avenue West in Guelph reduced four travel lanes to two plus a centre turn lane, and made space for a bike lane.

5.0 Bibliography

- AMEC Environment and Infrastructure. (2013, March). Shellard Lane, City of Brantford Class Environmental Assessment: Transportation and Traffic Report. Retrieved from: bit.ly/1RvtN1b
- Center for Inclusive Design and Environmental Access and Go Bike Buffalo (2014). Evaluating the Impacts of Complete Streets Initiatives. Retrieved from: http://gobikebuffalo.org/wp-content/uploads/2014/06/Evaluating_ImpactsofCompleteStreets.pdf
- City of Brantford. (2000, March). Multi-use trail/bikeway implementation and design plan. Retrieved from: bit.ly/1Pn23Ee
- City of Brantford. (2014, November). Transportation Master Plan Update. Retrieved from: bit.ly/1SdvQDV
- City of Guelph. (2012, February). Bicycle-friendly Guelph: Cycling Master Plan. Retrieved from: bit.ly/22srqB
- City of Hamilton. (2007). Transportation Master Plan. Retrieved from: bit.ly/1QNsMwc
- City of Hamilton. (2009). Hamilton's Cycling Master Plan: Shifting gears. Retrieved from: bit.ly/1Rb6hEp
- City of Hamilton: Public Works Department, Transportation Division. (2014, February 19). Cannon Street Bi-directional Cycle Track Pilot Project: Feasibility Assessment and Functional Design.
- City of Hamilton. (2014, March 19). Presentation: General Issues Committee - Cannon Street Bi-directional Cycle Track Pilot Project: Feasibility Assessment, Functional Design, and Cost Estimates.
- City of Kitchener. (2010, August 18). City of Kitchener Cycling Master Plan for the 21st Century. Retrieved from: https://www.kitchener.ca/en/livinginkitchener/resources/CMP_Final.pdf
- City of Peterborough. (2012). City of Peterborough Comprehensive Transportation Plan. Retrieved from: bit.ly/1T4jgcr
- City of Toronto. (2001). City of Toronto Bike Plan: Shifting gears. Retrieved from: <http://bit.ly/1ttcLhW>
- City of Toronto. (2003). Central Waterfront Secondary Plan. Retrieved from: <http://bit.ly/1RHwJnS>
- City of Toronto. (2004). City of Toronto Accessibility Design Guidelines. Retrieved from: <http://bit.ly/24b2Djv>
- City of Toronto. (2015, June 5). Richmond-Adelaide cycle track planning and design study: Pilot project preliminary evaluation. Retrieved from: toronto.ca/cycletracks
- City of Toronto. (2015, June). Toronto Official Plan. Retrieved from: <http://www1.toronto.ca/planning/chapters1-5.pdf>
- City of Waterloo. (2011, April). Transportation Master Plan. Retrieved from: <http://www.waterloo.ca/en/government/transportationmasterplan.asp>
- City of Waterloo. (2014, October). Official Plan. Retrieved from: <http://www.waterloo.ca/en/government/officialplan.asp>
- Department of Transportation, New York City (2012). Measuring the Street: New Metrics for 21st Century Streets. Retrieved from: <http://www.nyc.gov/html/dot/downloads/pdf/2012-10-measuring-the-street.pdf>
- Diceman, J. (2015, June 10). Richmond, Adelaide and Simcoe Street pilot cycle tracks: Public consultation December 2014 to May 2015 summary report. Retrieved from: toronto.ca/cycletracks
- Federation of Canadian Municipalities (FCM). (2012). FCM sustainable community awards 2012 winner - transportation: Davenport multi-use corridor improvement. Retrieved from: <http://bit.ly/24fXyz>
- Government of Ontario. (2005). Accessibility for Ontarians with Disabilities Act. Retrieved from: <https://www.ontario.ca/laws/statute/05a11>
- Government of Ontario. (1990). Environmental Assessment Act. Retrieved from: www.ontario.ca/laws/statute/90e18

-
- Government of Ontario. (2005). Places to Grow Act. Retrieved from: http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_05p13_e.htm
- McCann, B. and Rynne, S. (2010). Complete Streets: Best Policy and Implementation Practices. American Planning Association.
- Metrolinx. (2009). The Big Move: Transforming transportation in the Greater Toronto and Hamilton Area. Retrieved from: http://www.metrolinx.com/en/regionalplanning/bigmove/big_move.aspx
- National Association of City Transportation Officials (NACTO). (2014). Urban bikeway design guide. Retrieved from: <http://nacto.org/publication/urban-bikeway-design-guide/>
- Ontario Ministry of the Environment. (2014). Preparing and Reviewing Environmental Assessments in Ontario. Retrieved from: bit.ly/1TviDZU
- Ontario Ministry of Municipal Affairs and Housing. (1990). Ontario Planning Act, S.2(q). Retrieved from: <https://www.ontario.ca/laws/statute/90p13>
- Ontario Ministry of Municipal Affairs and Housing. (2013). Growth Plan for the Greater Golden Horseshoe, 2006. Office Consolidation, June 2013. Retrieved from: bit.ly/1m2o14K
- Ontario Ministry of Municipal Affairs and Housing. (2013). Public Realm Improvements: King Street Reconstruction. Retrieved from: bit.ly/1JAoveO
- Ontario Ministry of Municipal Affairs and Housing. (2014). Provincial Policy Statement. Retrieved from: <http://www.mah.gov.on.ca/Page10679.aspx>
- Ontario Ministry of Transportation. (2014). Ontario Traffic Manual Book 18: Cycling Facilities. Retrieved from: <http://bit.ly/1QJPMEN>
- Schlossberg, M., Rowell, J., Amos, D., & Sanford, K. (2013). Rethinking Streets: An Evidence-Based Guide to 25 Complete Street Transformations. Retrieved from: www.rethinkingstreets.com
- Sinke, D. Di Pietro, D. (2015). Presentation: A Complete Streets Approach to Shellard Lane Reconstruction, City of Brantford. Conference of the Transportation Association of Canada.
- Smith, S. (2014, October 6). Presentation: Transforming Highway 7 into a Complete Street: Toronto Centre for Active Transportation 2014 Complete Streets Forum. Retrieved from: bit.ly/1VweW6d
- Smith Lea, N., Mitra, R., & Hess, P. (2014). Complete Streets Catalogue: Understanding Complete Streets in the Greater Golden Horseshoe Region. Toronto, Clean Air Partnership. Retrieved from: <http://www.tcat.ca/knowledge-centre/complete-streets-catalogue/>
- Smith Lea, N., Mitra, R., & Hess, P. (2015). Complete Streets Evaluation: Understanding Complete Streets in the Greater Golden Horseshoe Region. Toronto, Clean Air Partnership. Retrieved from: <http://www.tcat.ca/knowledge-centre/complete-streets-evaluation-tool/>
- Waterfront Toronto. (2015, October). Queens Quay revitalization: Public report. Retrieved from: bit.ly/1RwfVNZ
- York Region. (2002). York Region Centres & Corridors Strategy: Making it Happen. Retrieved from: <http://bit.ly/21DMbtK>
- York Region. (2009, November). Moving on Sustainability: Transportation Master Plan Update. Retrieved from: bit.ly/1Ug7hdn
- York Region. (2015, December). Presentation: Transportation Master Plan: Your Community, Your Say. Retrieved from: bit.ly/1RvxlUM
- York Region Rapid Transit Corporation (2011). Highway 7 East Rapidway Updates. Public Open House Presentation. Retrieved from VivaNext: bit.ly/21DUmk9
- York Region Rapid Transit Corporation (2016). Highway 7 East / Markham and Richmond Hill. Retrieved from VivaNext: <http://www.vivanext.com/highway-7-east-markham>

Photo Credits

Cannon Street

p. 7 - Before: www.mikegoodwin.ca

p. 7, 10 - All other photos: Brandon Quigley, TCAT

Highway 7 East

All Photos: York Region

Brealey Drive

p. 15, 18 - Before: City of Peterborough

p. 15, 18 - All other photos: Brandon Quigley, TCAT

Richmond & Adelaide Streets

p. 19 - Before: City of Toronto

After photos: Brandon Quigley, TCAT

p. 22 - Left & middle photo: City of Toronto

Right photo: Brandon Quigley, TCAT

Shellard Lane

p. 23 - Before: Google Streetview

p. 23 - After: City of Brantford

p. 26 - All other photos - AMEC Foster Wheeler

College Avenue West

p. 27 - Before: Google Streetview

p. 30 - All other photos - City of Guelph

Queens Quay

p. 31 - All photos: Waterfront Toronto

p. 34 - Left: Brandon Quigley

p. 34 - Right: Waterfront Toronto

King Street

p. 35, 38 - All Photos: City of Kitchener and IBI Group

Davenport Road

p. 39, 42 - All photos: City of Waterloo

Glossary of Key Concepts

Bike lane on Davenport Road (top left): City of Waterloo

Layby on King Street (top right): Google Streetview

Bike boxes on Davenport Road: City of Waterloo

Bike boxes on Highway 7: York Region

Bollards in buffer zone on Simcoe Street (City of Toronto) & King Street (City of Kitchener & IBI Group)

Tactile paving: Brandon Quigley, TCAT

Road Diet - College Ave Before Photo: Google Earth

Road Diet - College Ave After Photo: Google Maps

Front Cover

Richmond Street, Toronto: Brandon Quigley, TCAT

Back Cover

King Street, Kitchener: Sean Marshall



AWESOME
HAPPENS
HERE

THE
NEW YORK
PITA
CO.

NORTHERN CASH
www.northerncash.com
PAYDAY LOANS • CHEQUE CASHING

AWESOME
HAPPENS
HERE

Bicycle symbol