



FINAL REPORT - SEPTEMBER 2010

City of Mississauga

Mississauga Cycling Master Plan

September 2010 - Final Report



iTRANS Consulting Inc.

VICTOR FORD AND ASSOCIATES INC



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Leading today for tomorrow

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**In memory of
Qamar Khan**

This Master Plan is dedicated to the memory of Qamar Khan, who passed away on January 9, 2010. Qamar provided skilful leadership, insight and commitment to this project.

He will be missed.



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EXECUTIVE SUMMARY

1 Introduction

How can Mississauga create a more connected city, provide healthy recreational opportunities, support active transportation for all ages and stimulate tourism and economic growth?

The answer – focus on cycling.

Here is our vision:

“Cycling will become a way of life in the City of Mississauga that supports vibrant, safe and connected communities. Mississauga will be a place where people choose to cycle for recreation, fitness and daily transportation needs enhancing our overall health and quality of life.”

It is a bold objective – and one that will be achievable through the Cycling Master Plan.

This ambitious plan provides a framework for designing, constructing, and operating a safe, comprehensive and cost-effective cycling network in the City of Mississauga, to be implemented over the next 20 years. This plan will be supported by a sustainable financial, promotional and educational program.

In developing the Cycling Master Plan, the City drew on the input of over 1,000 Mississauga citizens and stakeholders; consulted with area municipalities, approval agencies and transit authorities; and examined national and international best practices for cycling networks. Leading the development was a team of active transportation planning specialists from iTRANS Consulting Inc. and Victor Ford & Associates Inc.

The result – a plan that will make Mississauga a leader in incorporating cycling into the fabric of a city.

Goals and Recommendations

The plan includes three goals, each supported by a series of recommendations — 17 in all.

GOAL 1

Foster a Culture Where Cycling is an Everyday Activity

1. Establish a "cycling office" to oversee the implementation of the Cycling Master Plan.
2. Monitor the increase in cycling use, including the transportation modal split for weekday trips (long-term goal of 10%).
3. Promote cycling to schools.
4. Increase awareness of cycling to the general population.
5. Foster community cycling events.
6. Develop a comprehensive network of organizations and agencies to implement the Cycling Master Plan.
7. Establish a tourism plan focused on cycling.

GOAL 2

Build an Integrated On-Road and Off-Road Cycling Network as Part of a Multi-Modal Transportation System

8. Establish a regulatory framework to implement the Cycling Master Plan.
9. Add an average of 30 km to the cycling network per year over the next 20 years, giving priority to:
 - Complete the primary routes.
 - Connect all nodes by cycling routes.
 - Complete network links to existing and future higher-order transit terminals.
 - Connect all major natural and cultural destinations by the cycling network.
 - Provide cycling routes within 500 m of all residents and publicly funded schools, where feasible.
 - Ensure that 95% of the population are within 1 km of a primary cycling route, where possible.
10. Develop and implement a comprehensive standardized signage and way finding system based on the three D's of: distance, direction and destination.
11. Incorporate bicycle parking at all City-owned major transit locations, libraries, community centres, and parks, where appropriate, and encourage trip-end facilities at existing private sector locations (e.g. office buildings, retail/commercial), where appropriate.

GOAL 3

Adopt a "Safety First" Approach for Cycling in Mississauga

12. Continually reduce cyclist incident rates (linked to recommendations 13. and 14.).
13. Develop a stronger working relationship with Peel Regional Police.
14. Establish an educational plan for motorists and cyclists.
15. Develop an infrastructure asset management plan for all cycling facilities.
16. Develop an operation and maintenance program for the cycling network.
17. Establish technical standards for cycling.

Implementation Strategy

To carry out all of the above, an accompanying Implementation Strategy has been prepared which contains 79 action items, grouped under the 17 recommendations. Staff will use the Implementation Strategy to inform annual planning exercises.

The implementation of individual cycling network facilities will be approved annually through the City's Business Planning and Capital Budget process. Routes will be prioritized based on a series of guiding principles, including opportunities, challenges and a Network Criteria Matrix. The plan will focus on a balance between the primary routes and their supporting secondary routes, including signed-only routes.

The Implementation Strategy is based on completing the cycling network within 20 years. That is consistent with the rate of implementation of other progressive cycling cities in Canada, like Montreal and Vancouver. However, the rate of implementing the cycling network will depend on the degree and rate of funding allocated through the City capital programs and external funding sources.

We recommend reviewing the 2010 Cycling Master Plan every five years.

2 Policy and Regulatory Framework

To achieve the vision for cycling in Mississauga, the City needs to consolidate and align policy.

The City recently completed its Strategic Plan and is moving forward with a new Official Plan and other strategic planning documents. The Cycling Master Plan reflects these documents, with direct links, for instance, to the three "Pillars for Change" in the Strategic Plan: 1) Developing a Transit-Oriented City; 2) Completing Our Neighbourhoods; and 3) Living Green.

These local planning initiatives, in turn, take guidance from several provincial and regional policies, which the Cycling Master Plan also embraces. That includes the *Provincial Policy Statement* (2005); the *Places to Grow Growth Plan for the Greater Golden Horseshoe* (2006); and the *Metrolinx Regional Transportation Plan* (2008). Collectively, these policies promote healthy communities, an efficient land use pattern, and a density and mix of uses that provide for more sustainable transportation. The Cycling Master Plan is consistent with these objectives.

In the end, the Cycling Master Plan brings together policies that will create a comprehensive and integrated cycling network, with on-road and off-road routes – all towards the result of more cycling-friendly communities and connected destinations that support the regional and municipal urban structure.

3 Cycling Demand

According to the 2006 Transportation Tomorrow Survey (TTS)¹, cycling demand in Mississauga is comparable to other municipalities in the Greater Toronto Area (GTA). The current level of cycling activity is low at 0.3% of all weekday trips made in Mississauga. However, there is a high potential for short-distance cycling trips given the characteristics of travel in Mississauga:

- Approximately 50% of cycling trips are less than 1 kilometre;
- Approximately 30% of cycling trips are between 1 and 5 kilometres;
- School trips represent the most common cycling trip purpose (approximately 50%), followed by leisure and work trips; and
- Cycling demand along major corridors is highest near destinations such as City Centre, neighbourhood centres, Clarkson, Port Credit and the Waterfront Trail and GO stations.

In the Master Plan's public engagement survey, residents say their main reason for not cycling more is the lack of safe routes. However, surveys also indicate a latent demand for cycling in Mississauga. For example, 13.4% of employees would be willing to cycle more regularly if they had secure bicycle parking, and shower and change room facilities at places of employment (source: Smart Commute Mississauga).

4 Staffing/Partnerships

Planning, designing, implementing, operating, and promoting the cycling network will all require dedicated City of Mississauga staff resources. Staff will provide day-to-day direction and management around:

- capital works planning and programming for cycling infrastructure, including trip-end facility design, construction and maintenance;
- off and on-road trail design;
- construction management;
- field inspection and rehabilitation;
- asset management;
- seasonal maintenance;
- cycling policies and by-laws;
- community consultation;
- bicycle demand monitoring and cycling demand count programs;
- business planning and programming for cycling infrastructure;
- website content related to cycling;
- risk and liability issues related to cycling; and
- formal reporting to council.

¹ www.transportationtomorrow.on.ca

In carrying out these tasks, there is a tremendous opportunity to build on the existing work with the Mississauga Cycling Advisory Committee, and to create new partnerships, event promotion and coordination, and training programs.

Mississauga will establish a dedicated “cycling office” to oversee and coordinate all cycling activities in the city.

5 Network Development

Under the Cycling Master Plan, the cycling network system will expand dramatically, from 374 kilometres today to 909 kilometres. **Table 1-1** illustrates the proposed increases.

Developing a city-wide cycling network includes establishing primary and secondary bicycle route networks, and supportive infrastructure such as bicycle parking and other trip-end facilities. Ongoing and anticipated studies will investigate the feasibility and appropriateness of cycling routes on certain corridors (e.g. Hurontario Street, Lakeshore Road, Dundas Street, and in the City Centre).

Table 1-1: Planned Cycling Facilities at 20-Year Planning Horizon

Facility Type	Existing Total Kilometres	Recommended Additional Kilometres	Recommended Total Kilometres	% Increase Over Existing	% of Total Network
Primary Routes (Bicycle Lanes, Shared Use Lanes, Multi-Use Trails)	48 km	220 km	268 km	558%	29%
Secondary Routes (Bicycle Lanes, Shared Use Lanes - sharrows, signed routes)	100 km	250 km	350 km	350%	39%
Off-Road Multi-Use Trails	226 km	65 km	291 km	129%	32%
Total	374 km	535 km	909 km	243%	100%

6 Cycling Route Design

Cyclists must co-exist with other vehicles and pedestrians. In design, the City will accommodate the range of cyclist skills and types of routes, while keeping safety as a key consideration.

7 Design Standards

Mississauga will base the design standards for the cycling infrastructure on best practices from other jurisdictions worldwide. Using a range of facility types – including bicycle lanes, multi-use trails, “sharrows”, and multi-use park pathways – will ensure a safe environment for cyclists of all ages, abilities and preferences.

The primary challenge for Mississauga is retrofitting the existing road network to accommodate cycling. It is a challenge as the city is substantially built out, and there is a need to balance the requirement for safe facilities with fixed standards that may be difficult to accommodate. These design issues are under review.

Crossrides: The Ministry of Transportation (MTO) is researching the ability to ride through an intersection (signalized and unsignalized) outside the travelled portion of the road (i.e. across a multi-use trail) without dismounting. Based on design guidelines outlined by the Transportation Association of Canada (TAC), staff working with the Mississauga Cycling Advisory Committee (MCAC) identified candidate locations for a crossride pilot project – two unsignalized intersections of the multi-use trail along Sheridan Park Drive at Homelands Drive and Fifth Line West. Additional intersections will be implemented in 2010.

Sharrows: A sharrow lane is an on-road cycling route delineated by signage and pavement marking. Cyclists there must share the road with motor vehicles in the curb lane, (i.e. there’s no separate bicycle lane). Sharrows are implemented if the curb lane is wide enough (4 metre minimum) to safely accommodate both cyclists and vehicles.

Edge Lines: These are solid white pavement markings, typically offset 1.2 to 1.5 metres from the edge of pavement. Edge lines are similar in design to on-road bicycle lanes. However, they are not regulated for bicycle use only (there is no “bicycle lane” signage or symbols), and on-street parking may be permitted within the edge line. The City is developing design guidelines for using edge lines.

8 Network Operation

The City has been able to provide outstanding recreational trails largely because of its commitment to constructing and maintaining high quality facilities. Mississauga will continue to implement sound construction and maintenance practices, and include on-road construction and maintenance practices.

9 Signage and Way Finding

Way finding information on cycling signage should be organized according to the three D's principle:

1. Destination (nearest or intermediate destinations, or less commonly, the end-of-the-line destination);
2. Direction (directional arrows, ahead, left and right); and
3. Distance (to destinations noted on sign).

Generally, way finding signs will be placed at significant locations (e.g. entrances/exits, intersections) and at regular intervals along the routes. These signs will aid cyclists by providing information at decision points, and confirming their location.

10 Bicycle Parking and Amenities

The provision of bicycle parking and amenities is essential to support and encourage cycling as a practical active transportation choice and to further develop recreational cycling.

Cyclists' needs for bicycle parking vary depending on the nature of the trip and destination. Both long term parking, for use by employees/occupants/tenants of a building, and short term parking, for use by visitors to a building, is necessary. Parking facilities must be designed to address appropriate security measures including personal safety, risk of vandalism and theft, and appropriate degree of shelter from weather conditions. Other amenities including shower/change facilities and clothing lockers for destinations drawing longer trips, such as trips to work, are also desirable.

The Cycling Master Plan seeks to inform the establishment of a regulatory framework to ensure that the appropriate provisions for bicycle parking are incorporated at major city destinations and on private lands through the development application process.

Mississauga will establish bicycle parking, shower facilities, change areas and clothing locker requirements within the Zoning By-law. Further, Mississauga will develop design standards and guidelines for bicycle parking facilities that address the quality of bicycle parking related to accessibility, safety and security and convenience.

11 Promotion and Education

Safety is everyone's responsibility – that's the premise as Mississauga will work with existing programs and partners, and seek new partnerships, to advance the education of cycling safety. Current and proposed programs and partners include:

- Education campaigns (e.g. "share the road" and "share the trail");
- City transit driver education;

- Commercial vehicle operator education;
- Stakeholder involvement, e.g. Traffic Safety Council, Road Safety Mississauga, Mississauga Cycling Advisory Committee;
- Outreach by Peel Regional Police;
- Bicycle theft prevention; and
- Bicycle safety education (e.g. CAN-BIKE course).

The City will consider a range of approaches to promote cycling as a viable transportation mode and a healthy activity:

- incorporate bicycle parking at prominent locations in new developments;
- increase visibility of bicycle infrastructure, such as bicycle lanes and signage; and
- conduct proactive marketing campaigns, coordinated with cycling partners, which highlight the benefits of cycling for specific user groups and target audiences.

1.0 INTRODUCTION

1.1 Mississauga's Vision for Cycling

How can Mississauga create a more connected city, provide healthy recreational opportunities, support active transportation for all ages and stimulate tourism and economic growth? These are critical objectives for any community, and one solution can help achieve them all – a focus on cycling.

Our vision:

“Cycling will become a way of life in the City of Mississauga that supports vibrant, safe and connected communities. Mississauga will be a place where people choose to cycle for recreation, fitness and daily transportation needs enhancing our overall health and quality of life.”

The Cycling Master Plan gives life and shape to this vision. This ambitious plan recommends a framework for designing, constructing, and operating a safe, comprehensive and cost-effective cycling network in the City of Mississauga, to be implemented over the next 20 years. This plan will be supported by a sustainable financial, promotional and educational program.

The plan includes three goals:

GOAL 1

Foster a Culture Where Cycling is an Everyday Activity

GOAL 2

Build an Integrated On-Road and Off-Road Cycling Network as Part of a Multi-Modal Transportation System

GOAL 3

Adopt a “Safety First” Approach for Cycling in Mississauga

To achieve these goals, the plan includes 17 recommendations which are listed in the **Executive Summary** and in **Chapter 12**. The beginning of each chapter also lists the recommendations that relate to that particular subject area.

1.2 Benefits of Cycling

Through implementation of the Cycling Master Plan, the City can increase bicycle use and ultimately realize several key benefits for residents and for Mississauga as a whole.

1. Integrate healthy, physical activity into everyday travel, fostering active lifestyles.

Cycling can minimize the risk of coronary heart disease, strokes, diabetes and cancer; help to manage blood pressure and stress; boost metabolism levels and reduce obesity; and increase

general well-being. Cycling can also lower health care costs by \$100 to \$400 per person (source: National Cooperative Highway Research Program Report 552, *Guidelines for Analysis of Investments in Bicycle Facilities*).

2. Reduce personal transportation costs. Cycling is a cost effective mode of travel.

3. Reduce traffic congestion and carbon dioxide emissions. Cycling will be developed and promoted as a viable means of transportation in Mississauga. Through a commuter cycling grid, and connections with other forms of transit, bicycles can compete with other modes for longer distance commuter travel.

4. Conserve energy resources. Cycling and other active transportation modes do not generate Greenhouse Gases (GHG) emissions. The City will encourage such travel through designing, establishing, and maintaining parks, trails and bicycle lanes.

5. Contributing to a more connected community. Cycling-friendly neighbourhoods can improve the liveability of streets and a public presence, contributing to a sense of place and belonging, as well as to safety and security. The City's Strategic Plan promotes active transportation to support Mississauga becoming a "complete community".

2.0 POLICY AND REGULATORY FRAMEWORK

RECOMMENDATIONS:

8. Establish a regulatory framework to implement the Cycling Master Plan.
11. Incorporate bicycle parking at all City-owned major transit locations, libraries, community centres, and parks, where appropriate, and encourage trip-end facilities at existing private sector locations (e.g. office buildings, retail/commercial), where appropriate.

2.1 Strategic Planning Initiatives

In order to achieve the vision for cycling in Mississauga, it is necessary to ensure that applicable City policies and regulations are aligned to implement the Cycling Master Plan. The City of Mississauga recently completed its Strategic Plan and is moving forward with a new Official Plan and other strategic planning documents.

The Cycling Master Plan reflects these documents with direct links to three Strategic Plan Pillars for Change: 1) Developing a Transit-Oriented City; 2) Completing our Neighbourhoods; and 3) Living Green. See **Table 2-1**.

These municipal planning initiatives have in turn been shaped by Provincial and Regional policy directives such as the Provincial Policy Statement (2005), Places to Grow Growth Plan for the Greater Golden Horseshoe (2006) and the Metrolinx Regional Transportation Plan (2008) which promote healthy communities, an efficient land use pattern, density and mix of uses to provide for more sustainable transportation. The Cycling Master Plan is consistent with these objectives and will contribute to the development of more cycling-friendly communities and connected destinations that support the regional and municipal urban structure.

Table 2-1: Strategic Plan Pillars for Change, Goals and Actions

Strategic Pillar for Change - Developing a Transit-Oriented City
<p>Action 1: <u>Provide “complete streets” that balance land uses and forms.</u> <i>We will pursue “road diets” and give priority to “complete streets” that accommodate cycling and/or transit.</i></p>
<p>Action 6: <u>Shorten the travel time to a transit stop.</u> <i>We will complete the pedestrian and cycling network in nodes and corridors within 500 metres (a 10 minute walk) of all transit stops.</i></p>
<p>Action 7: <u>Create mobility hubs.</u> <i>We will create community mobility hubs in nodes that will service an immediate catchment area, and then allow express transit service between other community hubs (e.g. bus, cycling and pedestrian traffic that can feed a community mobility hub in Malton, that would then offer express services to places such as downtown Mississauga, downtown Toronto and a subway station).</i></p>

Action 9:

Improve the transportation network for pedestrians, cyclists and automobiles.

We will explore opportunities to improve network connectivity for automobiles, cyclists and pedestrians.

Action 11:

Accommodate the needs of cyclists.

We will include cycling infrastructure when implementing higher-order transit.

Action 18:

Require development standards for mixed-use development to support infrastructure.

We will require development standards for mixed-use developments in all nodes, and in designated locations along higher-order transit corridors, as part of a transportation strategy.

Strategic Pillar for Change - Ensuring Youth, Older Adults and New Immigrants Thrive

Action 12:

Create “cool places” to attract youth and young adults.

We will create “cool places” in nodes and corridors, with a focus on appealing to ages 12-24.

Strategic Pillar for Change - Completing Our Neighbourhoods

Action 2:

Establish a library or community facility within a 10-15 minute walk for all Mississauga residents.

We will ease access to, and increase opportunities to use, community facilities and libraries (or other indoor facility), ensuring that every resident is no more than a 10-15 minute walk away.

Action 3:

Design streets around the idea of “pedestrian first”.

We will develop “complete streets” within nodes and corridors by putting a “pedestrian first” filter on projects.

Action 13:

Prohibit the addition of new automobile lanes to existing streets.

We will prohibit adding automobile lanes to existing streets, and revisit this prohibition every 20 years. The only exception to this prohibition will be in industrial areas, where we’ll consider additional lanes if they’re deemed essential to moving goods/services.

Action 14:

Create more bicycle-friendly facilities.

We will create more cycling facilities, meaning more on-street bicycle lanes and off-street trails.

Action 24:

Make streets safer.

We will redesign city streets to achieve safer speeds and promote cycling, walking, transit use and adjacent land uses.

Action 26:

Create a downtown “anchor hub”.

We will build a vibrant state-of-the-art “anchor hub” downtown, which will be the major mobility hub in the western GTA.

Strategic Pillar for Change - Cultivating Creative and Innovative Businesses

Strategic Goals: “Attract innovative business” and “Meet employment needs”.

Strategic Pillar for Change - Living Green

Strategic Goals: “Lead and Encourage Environmentally Responsible Approaches” and “Promote a Green Culture”.

These municipal planning initiatives have in turn been shaped by several provincial and regional policy directives – the *Provincial Policy Statement* (2005); *Places to Grow Growth Plan for the Greater Golden Horseshoe* (2006); and the *Metrolinx Regional Transportation Plan* (2008). These promote healthy communities, an efficient land use pattern, and a density and mix of uses that provide for more sustainable transportation.

2.2 Existing City Policies

Through its existing Official Plan (Mississauga Plan), the City articulates the current policy for planning the cycling and walking infrastructure in Mississauga. The policies in the Official Plan emphasize the development of the trail system to fulfill the need for recreational cycling and walking and, to some extent, for commuting.

The Mississauga Plan acknowledges that cyclists are also road users, and includes the following policies to accommodate cycling on a broader scale:

- Design standards for roadways will be reviewed to identify opportunities for encouraging the use of bicycles.
- The private sector will be encouraged to provide facilities to promote cycling.
- Access and parking facilities for cyclists will be incorporated into the design of all buildings, as appropriate.
- Secure parking facilities for bicycles may be provided for existing developments and as a condition of development.
- When reviewing development applications, regard will be given to allow for adequate rights-of-way for the development of a pedestrian and bicycle path system.

The effect of these policies has been to enable the City to act upon opportunities as they arise to expand cycling facilities.

Through the public survey on cycling in Mississauga it was determined that there is a growing demand for more direct and safe on-road cycling routes that connect key city destinations. Our road network is nearly built out. As a result, it will be more difficult to achieve new on-road cycling facilities – such as the bike lanes on Confederation Parkway – without appropriate strategic land use and transportation policies aimed at realizing a long term cycling infrastructure network.

To encourage cycling for purpose-oriented trips (e.g. school, shopping) and commuting to work, it is important to consistently provide bike parking and trip-end facilities at major destinations and within new developments. Currently, these facilities are only encouraged, not required in new development; as a result, cycling becomes a less optimal transportation choice, even for short distances.

In June 2009, Official Plan Amendment 95 (OPA 95) – *Conformity of Mississauga Plan to the Growth Plan for the Greater Golden Horseshoe* – amended Mississauga Plan to include objectives and policies that encourage cycling as a viable transportation alternative.

- Plan and manage a balance of transportation choices, to reduce the reliance upon any single mode and promote transit, cycling and walking.
- Develop a multi-modal transportation network.
- Ensure that pedestrian and cycling facilities are integrated into the transportation network to: provide safe, comfortable travel for pedestrians and cyclists; and provide linkages between intensification areas, adjacent neighbourhoods, and transit stations, including facilities for cyclists on the major road network, as determined through future studies.

While not yet in effect, OPA 95 recognizes the need for a cycling network and infrastructure facilities that link key city destinations.

2.3 Draft Mississauga Official Plan and the Cycling Master Plan

In March 2010, the City released the new Draft Mississauga Official Plan, which fully embraces the concept of active transportation as viable transportation options.

- Mississauga will provide a range of mobility options (e.g. walking, cycling, transit, vehicular) for people of all ages and abilities, by connecting people with places through coordinated land use, urban design and transportation planning efforts.
- To improve air quality, Mississauga will promote alternative modes of transportation such as transit, cycling and walking.
- Through a multi-modal transportation system, Mississauga will provide transportation choices that encourage a shift in lifestyle towards more sustainable transportation modes, such as transit and active transportation (walking and cycling).
- Mississauga will create a multi-modal road network through a transportation system that provides mobility and accessibility to all users; opportunities for transit priorities; pedestrian and cycling access and routes; and priority truck routes for the efficient movement of goods.
- Mississauga will require that the design of all buildings and Major Transit Station Areas, as appropriate, incorporate access and parking facilities for cyclists.
- Roads may be widened to accommodate transit, cycling and pedestrian facilities, and to provide additional lanes in Employment Areas, if deemed essential to the movement of goods.
- Development will support transit and active transportation by providing cycling destination amenities (e.g. bicycle parking, shower facilities and clothing lockers), where appropriate.

The new Draft Mississauga Official Plan represents a long range plan intended to guide the growth and transformation of the city to 2031. The implementation of the Cycling Master Plan is planned to be achieved within a similar time frame.

The Cycling Master Plan proposes an extensive cycling network that, in addition to providing recreational cycling routes, will develop cycling as a viable transportation option over the next 20 years. This will be accomplished by providing safe and convenient connections to key community and City destinations identified by the public and a series of strategic government initiatives. The long term cycling network consists of two major types of routes: primary and secondary.

2.3.1 Primary Cycling Routes

Primary cycling routes are intended to serve as the backbone of the cycling transportation network, providing the most direct and safe access to key city destinations such as the Downtown or nodes, as well as existing and planned higher order transit stations.

The primary cycling route network will link to cycling facilities in adjacent municipalities and provide more efficient routes for commuter cycling. The cycling facilities located on primary routes are intended to be continuous and may be located on-road in the form of cycling lanes, or in shared travel lanes with pavement markings or located on an adjacent boulevard trail separated from vehicular traffic.

Primary cycling routes also include multi-use trails, such as those proposed along major water features, utility corridors or in major green spaces. These routes, while recreational in character, are also integral to the development of a well-connected and accessible cycling network.

Given the built-up characteristics of the city, the primary cycling route network is ambitious in its undertaking. For primary routes proposed on lands controlled by another jurisdiction, it will be necessary to enter into property agreements with the various land owners. For these reasons, it is recommended that the primary cycling route network be identified in the City's Official Plan, and that policies be developed to protect for its long term evolution.

2.3.2 Secondary Cycling Routes

Secondary cycling routes have more of a community focus, providing connections to the primary cycling network and off-road multi-use trail routes. They have been developed in response to the public's desire for a range of viable cycling options in their neighbourhoods.

On-road secondary routes will typically include pavement markings or be signed along major collector roads. Secondary cycling routes provide safe linkages to neighbourhood locations such as schools, community centres, parks, local shops and services. This will encourage people of all ages and abilities to cycle in Mississauga.

Secondary cycling routes are typically shorter, and are driven by local area conditions and opportunities. Therefore, they do not require the level of corridor protection needed for primary cycling routes, and do not need to be included in the Official Plan.

2.3.3 Draft Mississauga Official Plan – Schedule 7

In the Draft Mississauga Official Plan, Schedules 5, 6 and 7 depict the long-term road, transit and cycling networks that will form the basis for the transportation system in the city. Collectively these networks form the multi-modal transportation system.

To create the continuous primary cycling routes envisioned in the Cycling Master Plan, we need to secure adequate lands, infrastructure and amenities along these routes. This will be accomplished by introducing a new Schedule 7 that represents the long-term primary cycling network. Supporting official plan policies should also be introduced to:

- Clarify that the purpose of the Long-Term Primary Cycling Route Network is to connect key city destinations and locations, such as major transit stations, and provide cycling linkages to adjacent municipalities;
- Clarify that the Long-Term Primary Cycling Route Network may consist of cycling facilities located within or beyond the road right-of-way, as deemed appropriate by the Cycling Master Plan;
- Protect the corridors identified on Schedule 7 for establishing the primary cycling route network, in accordance with the goals of the Cycling Master Plan through the development approval process and capital works program;
- Require new development along these routes to support the establishment of the primary cycling route network, which may include the dedication to the City of private lands where the road right-of-way is insufficient to accommodate the desired cycling infrastructure;
- Add policies to require trip-end amenities such as bicycle parking, showers and clothing lockers for cyclists, where appropriate;
- Fine-tune cycling policies proposed in the new Draft Mississauga Official Plan to indicate that, in addition to intensification areas and major transit station areas, cycling facilities will be identified as a priority in a range of key city destinations and along routes identified through the Cycling Master Plan implementation process;
- Clarify that the detailed characteristics and development of primary and secondary cycling routes shall continue to be governed by the Cycling Master Plan.

2.4 Other Regulatory Considerations

In addition to the Official Plan policies, zoning by-law regulations and design guidelines are major tools for implementing the Cycling Master Plan. For development that does not require an official plan amendment, rezoning or minor variance application, zoning standards and design guidelines will provide direction for the provision of bike parking and other trip-end facilities, through site plan or building permit approval. In this regard, it is recommended that the following amendments be considered for the Zoning By-law and Site Plan Control By-law:

Zoning

- Introduce bike parking and other amenity requirements into the Zoning By-law for public and privately-owned lands as generally outlined in **Chapter 10** of the Cycling Master Plan.

Site Plan Control

- Develop design guidelines for trip-end amenities that can be applied through the site plan approval or building permit processes.
- Bill 51, which amended the *Planning Act* in 2006, introduced new municipal powers under Section 41 (Site Plan Control) to enable municipalities to require sustainable design elements on properties subject to site plan control or within the adjacent right-of-way. It is recommended that the City further investigate these enhanced jurisdictional powers with a view to securing cycling infrastructure and amenities as a condition of development.

Cycling Infrastructure Design Standards

Current implementation policies and practices for cycling Class I – Path (off-road trails both in the boulevard and in parks and greenbelts), Class II – Bicycle Lane (on-road bicycle lane) and Class III – Route (signed on-road shared route) are documented in *Mississauga Multi-Use Recreational Trail Study: 2001 Review of the Bicycle and Pedestrian Route Study*. Design practices are documented including: surface type, route width and grade and treatments at stairways.

The City of Mississauga has implemented other cycling treatments in an effort to encourage cycling in the city. These efforts have included the introduction of: bicycle sharrows, crossrides at unsignalized intersections, edge lines, bicycle parking at transit terminals, bicycle racks on buses and coordination of bicycle lanes with on-street parking. To date, the City has used TAC and MTO guidelines for developing bicycle infrastructure.

2.5 E-Bikes

On October 3, 2009, the Province of Ontario proclaimed amendments to the Highway Traffic Act (HTA) which set out the requirements for e-bikes to operate on public highways. The definition of “bicycle” under the HTA was amended to include “power assisted bicycle” or e-bike. Under the Act, e-bikes are permitted on public highways anywhere that bicycles are. This does not restrict the ability of a municipality to restrict the use of e-bikes on municipal roads, sidewalks, bike paths, bike trails, bike lanes or other areas under its jurisdiction through a by-law.

The City must balance the positive benefits of e-bikes in further advancing the promotion of alternative modes of transportation, with the need to ensure safety, especially on its multi-use

trail networks. We will review the current Parks By-law and the Traffic By-law in order to meet this objective.

2.6 Other Policy Initiatives

The *Ontario Places to Grow Act* references the need for integration between cycling and transit: “Major transit station areas will be planned and designed to provide access from various transportation modes.” That includes consideration of bicycle parking. The Cycling Master Plan will incorporate this requirement through the development of the cycling network.

Connections to GO stations, future BRT and future higher-order station locations and the City Centre Transit Terminal have been incorporated into the bicycle route network development. The design of cycling routes considers the interaction between bicycles, pedestrians and buses and lane width requirements. In addition, the City will integrate sheltered, secure bicycle parking to facilitate and encourage commuter trips.

Other initiatives include transit operator education to reinforce the “share the road” message. GO Transit has recently shown a commitment to cycling and transit integration through its GO-by-Bike campaign.

3.0 CYCLING DEMAND

RECOMMENDATIONS:

2. **Monitor the increase in cycling use, including the transportation modal split for weekday trips (long-term goal of 10%).**

What is the cycling demand in Mississauga? The answer comes from considering two categories:

- actual cycling activity – measured through observed or reported trips, including counts and surveys, and;
- potential cycling activity, reflecting latent cycling demand – estimated through attitudinal surveys and through measuring the effects of new cycling infrastructure on cycling activity.

The City of Mississauga, like most other jurisdictions, lacks a formal monitoring program for measuring cycling activity. However, the following sources provide insight into current and potential cycling demand within Mississauga:

- Transportation Tomorrow Survey (TTS) 2006 – Joint Program in Transportation.
- Census Canada (2001 and 2006) – Statistics Canada.
- Cordon Count Program – Region of Peel.
- Region of Peel Active Transportation Plan – Region of Peel.
- Mississauga Online and Public Engagement Session Survey – City of Mississauga.

3.1 Current Cycling Activity

Mississauga, the sixth largest city in Canada, is home to over 730,000 residents and the destination of 400,000 employees. Each weekday across Mississauga, there are approximately 3,500 cycling trips, or 0.3% of all trips (source: 2006 TTS). This is comparable to most other Ontario cities on a per capita basis.

Mississauga has invested in bicycle routes to encourage and accommodate cycling, and has made significant strides since the 2001 *Mississauga Multi-Use Recreational Trail Study*. Successes have included:

- Completing 200 kilometres of off-road multi-use trails.
- Completing 127 kilometres of on-road cycling routes.
- Equipping the Mississauga Transit fleet with bicycle racks.
- Installing bicycle racks at City Hall, libraries, community centres and parks.
- Establishing and implementing trail signage.
- Producing educational publications including the *Mississauga Bikeways and Trails Map*.

3.1.1 Level of Cycling Activity

The Transportation Tomorrow Survey (TTS) examines the travel behaviour of residents (over 11 years old) within the Greater Golden Horseshoe Area (GGHA). The survey is conducted every five years. Key findings of the most recent 2006 survey:

- Cycling represents 0.3% of all trips made by City of Mississauga residents.
- Approximately 50% of cycling trips are less than 1 kilometre.
- Approximately 80% of cycling trips are less than 5 kilometres.
- School trips represent the most common cycling trip purpose (approximately 50%), followed by leisure and work trips.

Cycling activity within Mississauga is in the middle of the pack when looking at the level of demand in other Greater Toronto Area (GTA) jurisdictions, as seen in **Table 3-1** (source: 2006 TTS). Note that survey data tends to understate the level of cycling activity.

Table 3-1: Comparison of GTA Municipalities Bicycle Mode Share in 2006

Municipality	Bicycle Mode Share
Toronto	1.04%
Hamilton	0.65%
Oakville	0.40%
Burlington	0.39%
Brampton	0.29%
Mississauga	0.27%
Pickering	0.21%
Vaughan	0.19%
Markham	0.17%
Mean	0.40%
Mean (excluding Toronto)	0.32%

3.1.2 Cycling Activity Trends

Per capita cycling activity appears to be increasing modestly in Mississauga. The 2006 Census reported that 3% of the labour force (15 years of age or older) choose to walk or bike to work as their main mode of transportation – a slight 0.2% increase over the 2001 census. The TTS says cycling activity rose from 0.26% to 0.27% between 2001 and 2006. This may be due partly to the investment in walking and cycling trails since the 2001 *Mississauga Multi-Use Recreational Trail Study*.

3.1.3 Distribution of Cycling Demand

The Region of Peel's Cordon Count Program tracks travel by all modes, on a typical clear weather weekday, crossing selected physical and geographic barriers. The data provides information on travel activity, including cycling activity, on specific corridors during daylight

hours (15 hours). The City of Mississauga has also conducted site-specific counts to assess cycling demand on high-activity corridors.

Figure 3-1 illustrates that the cycling volumes along major corridors are modest, 1% or less of travel by all modes (automobiles, transit, walking). The highest demand for cycling is along Burnhamthorpe Road, the Waterfront Trail, Lakeshore Road, Eglinton Avenue West, Aquitaine Drive, Thomas Street, and McLaughlin Road. We can see that higher demand for cycling in Mississauga appears to be linked to certain destinations:

- City Centre;
- Neighbourhood centres, e.g. Streetsville, Erin Mills Town Centre, Meadowvale Town Centre;
- Clarkson, Port Credit and the Lake Ontario waterfront; and
- GO Stations.

Image 3-1: Graphical Representation of Loop Traffic Counter in Mississauga



Older counters can be re-calibrated to perform counts every month for a one-week period, while newer counters can operate on a continuous basis, 24 hours a day, year round. Other technology such as pneumatic tubes and pyroelectric sensors can also be used to collect cyclist count data.

3.2 Potential Cycling Activity – Latent Demand

3.2.1 Measures of Latent Demand

Smart Commute Mississauga surveyed employees within Mississauga in 2008 to identify existing cycling levels and factors affecting demand. The results indicate a high potential for increased cycling demand – 13.4% of respondents would be willing to cycle more regularly. The factors most likely to encourage cycling are the constructing cycling routes and providing “trip-end” facilities including secure parking and shower and change room facilities. **Table 3-2** summarizes the survey results.

Table 3-2: Smart Commute Survey Results

Question	Number of Responses	Response
How do you normally commute to work?	6165	0.2% of respondents said cycling is their normal mode of travel to work.
How willing are you to try biking to work occasionally or on a regular basis?	5972	13.4% of respondents would definitely or probably be willing to try biking more on a regular basis.
Which of the following would encourage you to bike to work more often? (10 choices were provided)	5722	Top three responses: 1. Bicycle lanes and paths (18.7%) 2. Shower and locker facilities at work (16.9%) 3. Secure or sheltered bicycle parking (13.2%)

These results are consistent with surveys (online and public engagement) conducted as part of the Cycling Master Plan.

3.2.2 Priority Initiatives

The highest cycling demand in Mississauga is for short distance and school-oriented trips. Promoting cycling to schools and shops therefore represents key opportunities for increasing cycling demand and activity. Priorities include:

- Providing secure bicycle parking at schools, in addition to developing the community cycling network.
- Creating cycling connection to key destinations such as City Centre, Port Credit, the Waterfront Trail, neighbourhood centres and GO stations.
- Creating a “primary grid” spine to allow for continuous north-south and east-west routes to the City Centre and a continuous route along the lake shore.

3.3 Effects of Cycling Investment on Demand

Investing in cycling infrastructure – bicycle lanes, trails and trip-end facilities – will improve cyclist safety and sense of security, and reduce barriers to cycling. All of which will contribute to increased demand.

The ability to predict cycling demand on individual corridors in Mississauga requires two things – existing cycling ridership data, and established relationships between cycling demand and route characteristics. This information is limited. However, we can estimate cycling demand using other methods.

For instance, we can look at the demand in similar environments, adjusted to reflect our different population and land use characteristics. In Portland, Oregon, eight selected corridors showed a consistent increase in cycling after bicycle lanes were installed, resulting in a 137% average increase in ridership. And in San Francisco, California, the increase in ridership at eight locations post-cycling investment ranged from 23% to 83%.

Both of these municipalities are considered among the top cycling jurisdictions in the U.S. They have taken the “build it and they will come” approach to cycling investment – and it has paid off.

These results suggest that a significant increase in cycling demand is feasible, in the short-term, through improved cycling infrastructure. The findings were based on interim development of the cycling network; projected increases in cycling demand upon the completion of the cycling system range from 250% to 300%.

Investing in cycling-related infrastructure and programs – such as bicycle parking, promotion, grade separation projects, and upgrades to existing facilities – has also resulted in ridership increases throughout Europe as seen in **Table 3-3**.

Table 3-3: Increases in Cycling Activity – European Experience

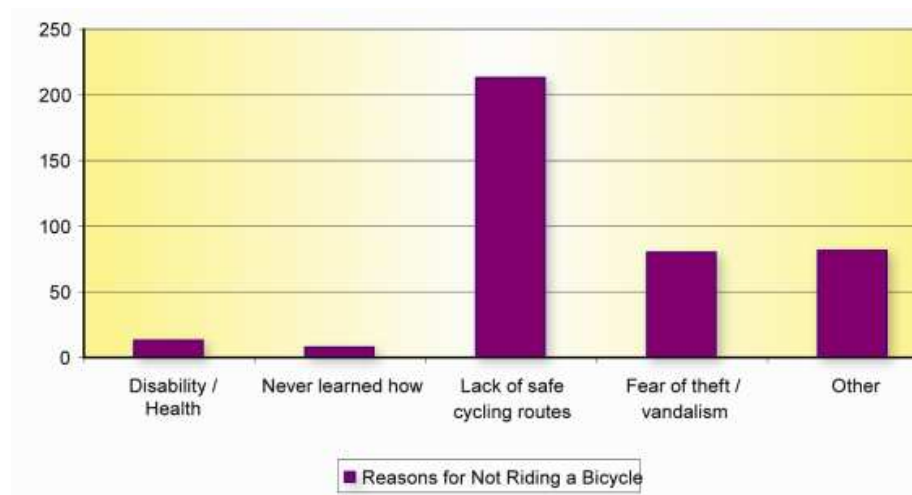
City	Number of Years	Baseline Mode Share	Average Annual Increase
Strasbourg	6	8%	+7.0%
Vienna	13	2%	+6.4%
Graz	12	7%	+5.9%
Munich	22	4%	+5.5%
Hanover	11	9%	+5.4%
Nottingham	10	3%	+4.8%
Freilburg	16	10%	+4.4%
Munster	11	29%	+3.6%
Berlin	13	10%	+3.2%
Zurich	20	7%	+2.3%
Delft	6	40%	+1.2%

Given Mississauga’s low urban density, suburban street patterns and urban form, our modal share for cycling may not meet levels of more successful European cities. However, the high percent of short-distance trips in Mississauga is conducive to cycling. Overall, the travel characteristics within Mississauga can contribute to high cycling demand and much higher levels of cycling activity.

3.4 Barriers Affecting Cycling Demand

The online and Public Engagement Session Surveys provided insight to the top reasons Mississauga residents do not ride bicycles. Access to a bicycle is not a barrier to cycling. Approximately 97% of respondents indicated that there are one or more bicycles in the home. The main reasons given for not riding a bicycle relate to safety of the cyclist and security of the bicycle. **Figure 3-2** illustrates the results.

Figure 3-2: Barriers to Increased Cycling Activity



While weather was not identified as a barrier to cycling, we know that temperature and seasonal conditions affect cycling demand. The surveys indicated that 14% of residents cycle in winter compared to 90% in spring, 99% in summer and 86% in fall.

4.0 STAFFING/PARTNERSHIPS

RECOMMENDATIONS:

1. Establish a “cycling office” to oversee the implementation of the Cycling Master Plan.
5. Foster community cycling events.
6. Develop a comprehensive network of organizations and agencies to implement the Cycling Master Plan.
13. Develop a stronger working relationship with Peel Regional Police.
14. Establish an educational plan for motorists and cyclists.

Planning, designing, implementing, operating, and promoting the cycling network will require dedicated City of Mississauga staff. The City has also been proactive in establishing and strengthening partnerships with other stakeholders to promote and fund opportunities to increase cycling. Beyond the City’s own staffing, we need such partnerships to implement the Cycling Master Plan.

4.1 Staffing and Administration

Mississauga should establish a corporate Cycling Coordinator to promote the objectives and strategies of the Cycling Master Plan, and maintain a cross-departmental team approach to ensure progress on implementing the plan. City staff will provide day-to-day direction and management around:

- Capital works planning and programming for cycling infrastructure.
- Off-road trail design and construction.
- Off-road trail field inspection and rehabilitation.
- On-road bicycle route and multi-use trail design and construction management.
- On-road bicycle route and multi-use trail field inspection and asset management.
- Off-road and multi-use trail spring maintenance contract administration.
- Off-road, multi-use trail and trip-end facility winter maintenance.
- Trip-end facility design, construction and maintenance.
- Establishing new partnerships and provide MCAC consultation.
- Promoting and coordinating of community events.
- Establishment and management of training programs.
- Maintaining website content related to cycling.
- Establishing cycling policies and by-laws and consultation with development community.
- Capital planning and programming for cycling infrastructure.
- Bicycle demand monitoring and incorporating cycling demand into count programs.
- Managing issues of risk and liability related to cycling.
- Formal reporting to Council.

4.2 Role of Stakeholders

City/stakeholder partnerships will play an important role in advancing cycling in Mississauga. These include corporate partnerships, which can foster community relationships and help offset some costs associated with constructing and operating the bicycle route network. Partnerships with school boards and individual schools are also vital to sustaining and increasing cycling ridership in Mississauga. Among the key players and the roles:

City Council: Approve the Cycling Master Plan, provide implementation approval for funding, and build partnerships to implement cycling infrastructure and programs.


City Staff: Facilitate development of bicycle route network and supportive initiatives with ongoing City projects (Community Services, Transportation and Works, and Planning and Building staff).

Mississauga Cycling Advisory Committee: Work with City staff on cycling issues, advocate cycling within the community, and provide feedback to politicians to provide appropriate funding for cycling infrastructure.

Stakeholders: Provide input on cycling issues and support for developing cycling infrastructure and programs. Stakeholders include but are not limited to: Ontario Ministry of Transportation; Ministry of Municipal Affairs; Metrolinx; Toronto, Credit Valley, and Halton Region Conservation Authorities; Trillium Health Centre; Credit Valley Hospital; Region of Peel; Cities of Brampton and Toronto; Towns of Oakville, Milton and Halton Hills; and cycling advocacy groups.

4.3 Partnership Opportunities

Through partnerships, we can improve safety awareness, route development, and the monitoring of cycling programs. The City will seek opportunities to partner with public, private, and not-for-profit agencies such as:

Partner(s)	Opportunities
CAN-BIKE courses	Promote bicycle riding skills, through CAN-BIKE courses to build confidence and increase competence of individuals riding bicycles.
GO Transit 	Promote cycling to GO stations.

Partner(s)	Opportunities
Active and Safe Routes to School (ASRTS) 	Promote the Walk-or-Wheel to school (WoW) program and work to expand the ASRTS programs, to encourage cycling to school as a viable active transportation alternative.
Bicycle clubs – e.g. the Healing Cycle Foundation, Mississauga Bicycle Racing Club	Support and promote such groups to enhance the cycling profile and different ways to get involved in cycling. These groups advocate cycling activity, and benefit from increased memberships and fundraising initiatives.
School boards and schools 	Involve individual schools and the Peel school boards to encourage and educate students and parents about cycling, both through the curriculum (e.g. physical education, social and environmental science classes) and participation in available programs (e.g. ASRTS and Eco-Schools). Secure bicycle parking on individual school sites is an important component.
Peel Region and associated agencies (e.g. Public Health, Police) 	Coordinate efforts between the City and Peel Region to promote active living and educate motorists and cyclists. Peel Regional Police can: promote safe driving and cycling practices; provide bicycle presence with police as cycling ambassadors; and contribute unclaimed bicycles for cycling skills, education, and promotional purposes. The latter can be done in partnership with local school boards and advocacy groups, similar to methods used by the Vancouver Police Department (http://vancouver.ca/ctyclerk/cclerk/documents/cs1_004.pdf)
University of Toronto – Mississauga Campus (UTM) 	Encourage students to expand the existing bike share program between campuses. Integrate student projects into additional marketing campaigns and/or video clips to document cycling in Mississauga – cost-effective promotion that also helps students gain valuable experience and skills.
Bicycle shops	These businesses have their finger on the pulse of the cycling community. Partnering with them would provide a win-win to increase ridership.
City bicycle fleet	Lead by example by sharing a City of Mississauga fleet of bicycles at the Civic Centre, for staff to attend meetings, make site visits, or conduct errands during personal time.
Mississauga Tourism, Ontario Tourism, Chamber of Commerce, and local BIAs	Integrate cycling with economic activity through promotional campaigns, tourism publications, and website information, e.g. bicycle-friendly businesses and commercial districts.
Adjacent municipalities	Coordinate programs, events and capital works between municipalities to support regional cycling initiatives, and promote cycling activity.
Smart Commute 	Work with Smart Commute – a partnership between Metrolinx and the cities of the Greater Toronto Area and Hamilton – to reduce congestion and climate change by promoting sustainable commuter choices to employers/commuters: carpooling, teleworking, transit, and cycling.

Partner(s)	Opportunities
Other public/private/not-for-profit agencies	<p>Several agencies could play a supportive role in cycling in Mississauga, through funding or service opportunities with the following partners:</p> 

5.0 NETWORK DEVELOPMENT

RECOMMENDATIONS:

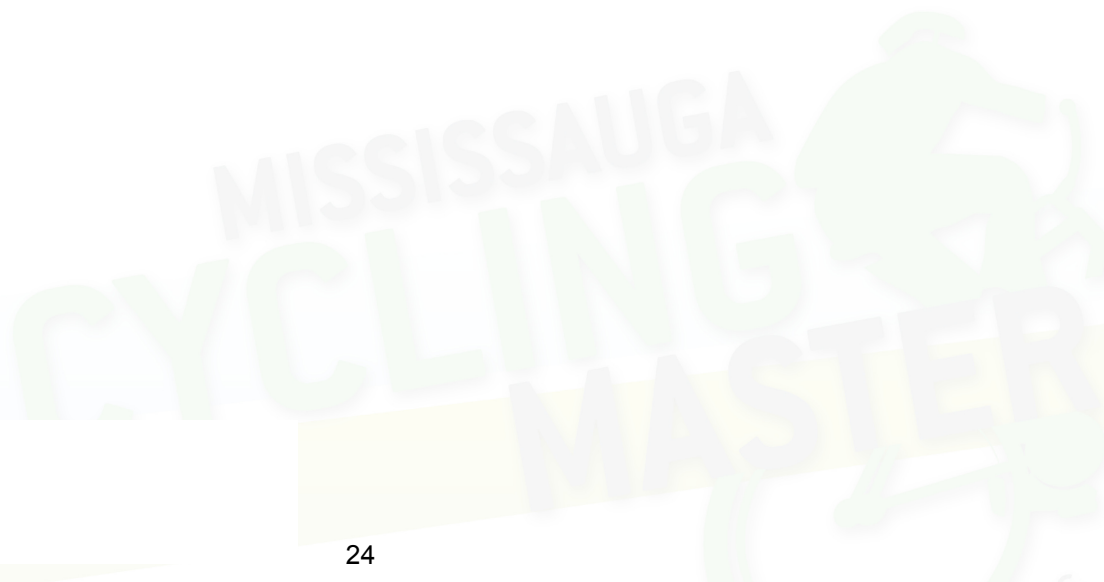
6. Develop a comprehensive network of organizations and agencies to implement the Cycling Master Plan.
9. Add an average of 30 km to the cycling network per year over the next 20 years, giving priority to:
 - Complete the primary routes
 - Connect all nodes by cycling routes.
 - Complete network links to existing and future higher order transit terminals.
 - Connect all major natural and cultural destinations by the cycling network.
 - Provide cycling routes within 500 m of all residents and publicly funded schools, where feasible.
 - Ensure that 95% of the population are within 1 km of a primary cycling route, where possible.
11. Incorporate bicycle parking at all City-owned major transit locations, libraries, community centres, and parks, where appropriate, and encourage trip-end facilities at existing private sector locations (e.g. office buildings, retail/commercial), where appropriate.

5.1 Existing Cycling Network

The existing cycling infrastructure in Mississauga owes its success to the achievement of the goals of the *Mississauga Multi-Use Recreational Trail Study: 2001 Review of the Bicycle and Pedestrian Route Study*. Much of the existing network is comprised of off-road multi-use trails, which has been the focus of network development. However, according to the online City survey, almost half (46%) of respondents indicated that they prefer to cycle on the road. This indicates the need for more diversity of cycling routes to increase cycling participation levels within the City. **Table 5-1** summarizes the existing cycling network as illustrated in **Map 5-1**.

Table 5-1: Existing Cycling Facilities

Facility Type	Existing Kilometres (2010)	% of Existing Network
Primary Routes (Bicycle Lanes, Shared-Use Lanes, Multi-Use Trails)	48 km	13%
Secondary Routes (Bicycle Lanes, Shared-Use Lanes - sharrows, signed routes)	100 km	27%
Off-Road Multi-Use Trails	226 km	60%
Total	374 km	100%



5.2 Proposed Cycling Network

Since much of the development of the existing network has focused on off-road multi-use trails, the City must plan new routes which provide a greater balance between on-road and off-road cycling.

To meet our network objective, the City envisions an additional 535 km of cycling routes, as summarized in **Table 5-2**.

Table 5-2: Planned Cycling Facilities at 20-Year Planning Horizon

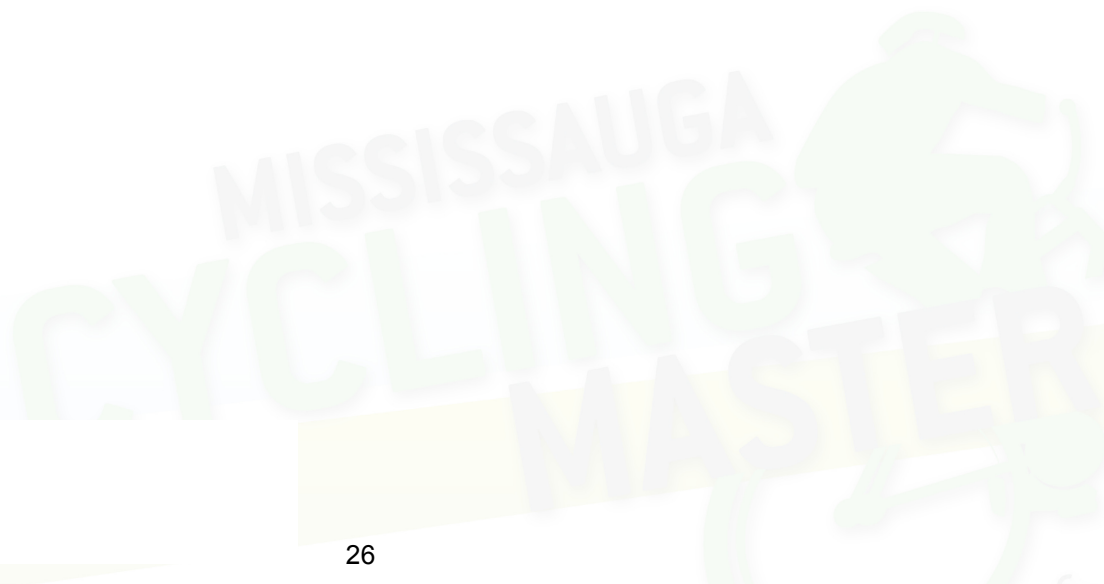
Facility Type	Existing Total Kilometres	Recommended Additional Kilometres	Recommended Total Kilometres	% Increase Over Existing	% of Total Network
Primary Routes (Bicycle Lanes, Shared Use Lanes, Multi-Use Trails)	48 km	220 km	268 km	558%	29%
Secondary Routes (Bicycle Lanes, Shared Use Lanes - sharrows, signed routes)	100 km	250 km	350 km	350%	39%
Off-Road Multi-Use Trails	226 km	65 km	291 km	129%	32%
Total	374 km	535 km	909 km	243%	100%

The development of the planned bicycle network had broad input, from an online survey; public engagement sessions (to identify preferred cycling routes), workshops with the Mississauga Cycling Advisory Committee, and City staff. The guiding principles:

- provide continuous north-south and east-west cycling routes throughout Mississauga;
- maximize continuous on-road and off-road bicycle routes;
- provide connections to Mississauga destinations and nodes; and
- provide safe bicycle routes.

In developing the network, the City considered cyclist preferences in route selection, and ease and cost of implementation. To assess alternative routes, we used a matrix of route characteristics – vehicle volume; speed; truck traffic; pavement width; boulevard width; route directness; access to transit; connections to community and City-wide destinations; and more. See the route assessment matrices and route recommendations in **Appendix C**.

The proposed comprehensive cycling network combines primary on-road and off-road route connections and secondary route connections, all supported by safe route connections, and amenities such as bicycle parking. **Map 5-2** illustrates this network in full (also see **Appendix D** for a larger scale map). When completed, all Mississauga residents will be within 500 metres from accessing the cycling network.

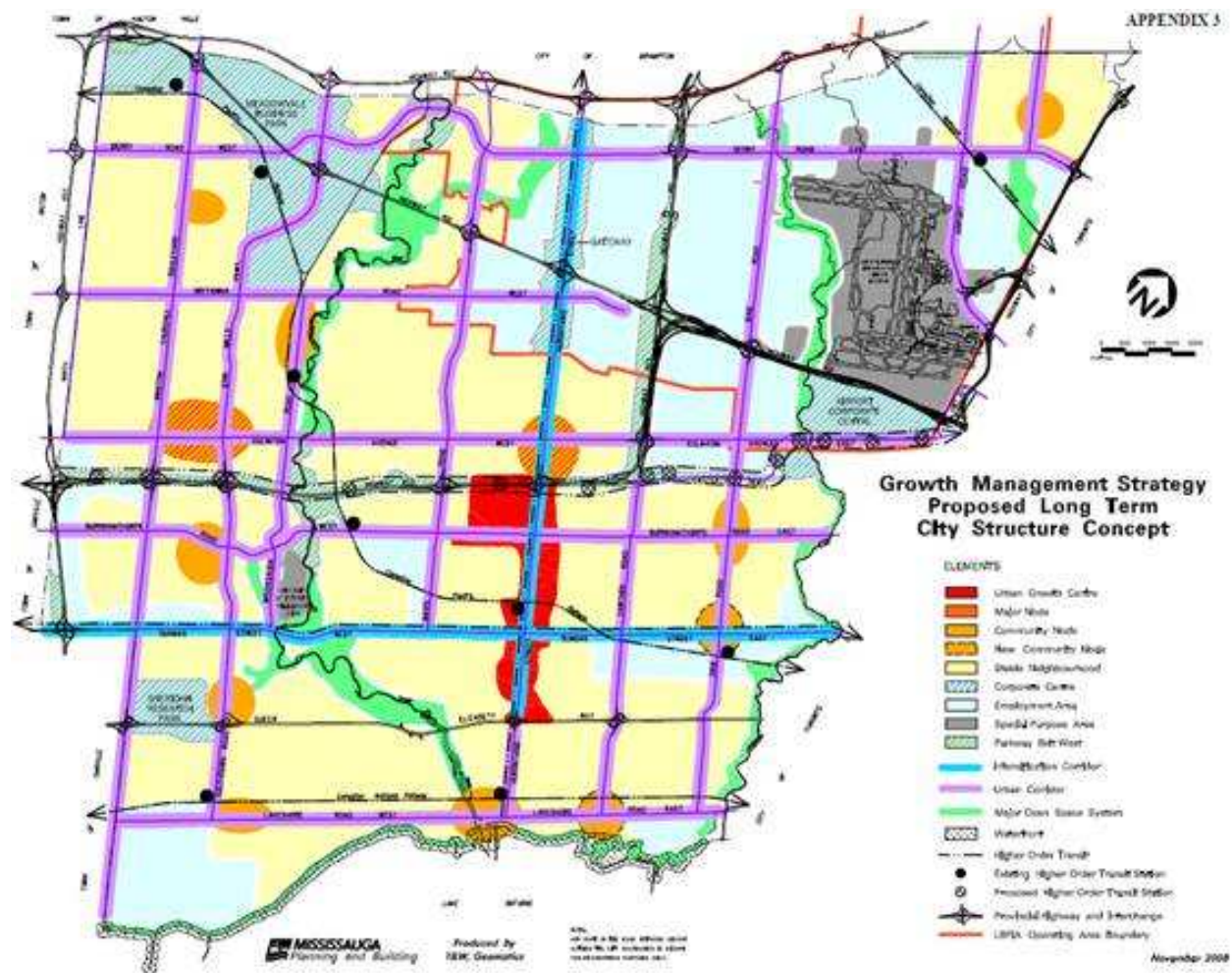


5.2.1 Primary Cycling Network

The City of Mississauga aims to develop cycling as a viable transportation option over the next 20 years. Thus far, the City has focused its existing cycling network mainly on providing recreational routes, rather than on routes for commuting. Residents have indicated that they would consider cycling to work, but a primary factor is the need for safe and direct routes. To make cycling a competitive mode of travel, we need to develop continuous and direct routes to cycling destinations within Mississauga and to neighbouring municipalities.

The City identified a number of key Mississauga cycling destinations based on both the Long-Term City Structure Concept and public consultation, as illustrated in **Map 5-3**. These destinations incorporate many commercial and employment centres along corridors that are attractive to both recreational and commuter cyclists, e.g. Eglinton Avenue, Burnhamthorpe Road, Lakeshore Road and “nodes” within future intensification areas.

Map 5-3: Long-Term City Structure Concept (source: City of Mississauga)



The primary route network presented in this Master Plan supports the City Structure Concept. All residential areas in Mississauga are within a 4 to 5 km bicycle ride to a major node or community node. Primary routes also provide continuous connections to transit hubs and major transit terminals and open spaces, and provide opportunities to link to adjacent municipalities (Image 5-1).

Nodes and major destinations served by the primary network include:

- City Centre
- Port Credit
- Streetsville
- Clarkson Village
- Cooksville
- Major transit stations
- Schools
- Community Centres
- University of Toronto – Mississauga
- Dixie Outlet Mall
- Meadowvale Town Centre
- Erin Mills Town Centre
- Westwood Mall
- Lester B. Pearson Airport
- Parks
- Employment Centres
- Lake Ontario Waterfront
- Central Library and Branch Libraries

The City needs to balance the feasibility and configuration of primary cycling routes against other corporate objectives or operational needs. For instance, current and anticipated studies of key corridors within Mississauga will investigate the accommodation of cycling in relation to the City's Growth Management Strategy and higher-order transit initiatives. Plans for developing these corridors (Table 5-3) will address how each corridor will help advance cycling through safe network connections and supportive amenities.

Table 5-3: Ongoing and Future Corridor Planning Studies

Corridor Name	Study Scope
Hurontario Street	The recently approved Hurontario-Main Street Corridor Master Plan includes provision for cycling facilities along the proposed LRT corridor. The treatment of cycling will be addressed in greater detail through the subsequent design phases of the LRT project.
Lakeshore Road	The Lakeshore Road Corridor Study, scheduled to be completed in 2010, is assessing the need and feasibility of higher-order transit and bicycle routes.
City Centre	The Downtown 21 Study, completed in 2010, provides direction on the configuration of the road patterns and cycling route opportunities. The treatment of cycling will be addressed in greater detail through the subsequent implementation phase of the Downtown 21 Master Plan.
Dundas Street	The Dundas Street Corridor Study will assess the need and feasibility of higher-order transit and bicycle routes.

Image 5-1: Examples of Major City Destinations



Lisgar GO Station (source: iTRANS)



Lake Ontario Waterfront (source: iTRANS)



Square One (source: iTRANS)



City Hall (source: iTRANS)

In selecting primary routes, the City has considered the characteristics of the corridor and the opportunities and constraints that affect their suitability, e.g. compatible traffic conditions and available space to provide a cycling route. Primary cycling routes should:

- Provide safe connections to major destinations and connections with other cycling routes.
- Integrate with the existing cycling network.
- Meet the travel patterns identified through public engagement sessions.
- Minimize exposure of cyclists to high truck volumes, traffic volumes, or traffic speed.
- Provide access to higher-order transit stations.
- Be available on-road and/or on boulevard space.
- Link to community origins and destinations.
- Support eco-tourism.

These priorities will form the basis of the Implementation Strategy Network Criteria Matrix. **Map 5-4** illustrates the proposed primary cycling route network.

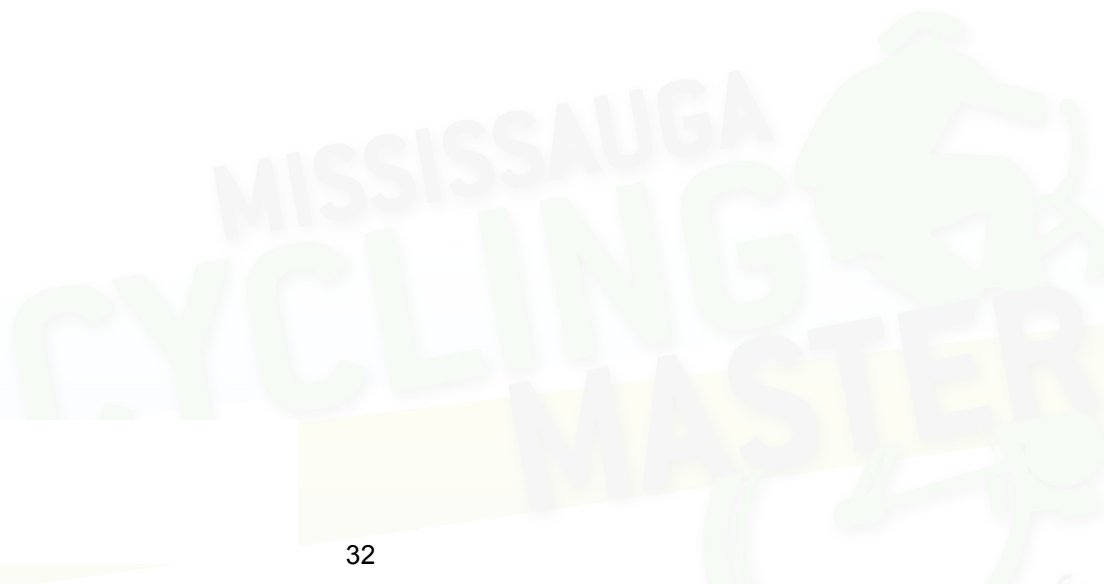
5.2.2 Secondary Cycling Network

As identified in **Chapter 3**, most cycling trips in Mississauga are short – approximately 80% are less than 5 kilometres and 50% are less than 1 kilometre – meaning these trips are to destinations or for leisure within the neighbourhood. So providing new cycling routes within neighbourhoods has a high potential for encouraging more trips, increasing cycling activity for all ages, and contributing to a cycling culture for future generations.

Map 5-5 illustrates the proposed secondary routes within the cycling network. These routes can:

- Provide safe connections to the primary and off-road multi-use trail routes.
- Provide parallel alternative routes to primary routes.
- Provide safe connections to neighbourhood destinations such as schools.
- Meet the travel patterns identified through public engagement sessions.
- Promote healthy and active living within communities.
- Improve access to safe, pleasant recreational cycling opportunities.

Further detailed assessment of feasibility, any community issues, or impacts to operations (e.g. street parking) will help determine implementation.



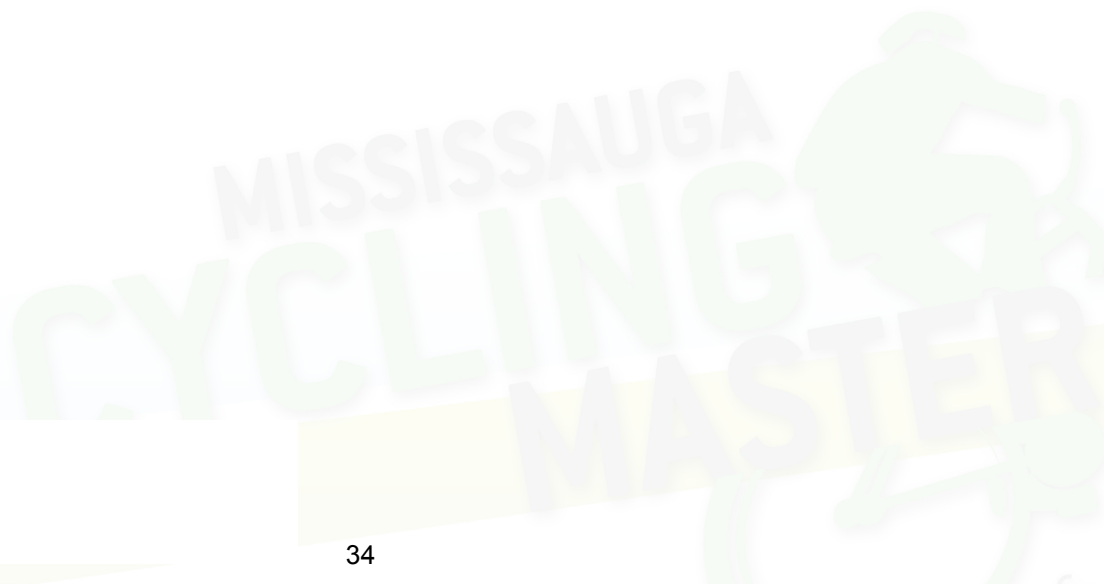
5.2.3 Off-Road Multi-Use Cycling Network

The off-road multi-use trail network provides an alternative for both less experienced cyclists and avid cyclists who seek a leisure experience. Mississauga has been highly successful in developing such trails through work completed in the 2001 *Mississauga Multi-Use Recreational Trail Study*. Expanding the multi-use trail network, through use of parks and open spaces, will enhance the existing off-road cycling network and support the proposed on-road routes.

In addition to the work completed in the 2001 trail study, the City assessed “missing links”, i.e. opportunities to provide connections using City lands, and hydro and rail corridors. This identified candidates for off-road multi-use trail connections. These off-road cycling routes should:

- Provide opportunities for continuous off-road multi-use trails.
- Maximize trail route connections to destinations.
- Integrate trail connections and crossings with on-road cycling routes.
- Provide alternatives to on-road routes.
- Maximize use of City-owned lands.
- Integrate natural/parkland corridors, and available spaces in utility or transportation corridors.
- Enhance access and use of parks and open spaces in an environmentally sensitive manner.
- Provide amenities and trip-end facilities.

Map 5-6 illustrates the proposed off-road multi-use cycling network. Short multi-use trail connections through neighbourhood parks are not explicitly assessed as part of the Cycling Master Plan and cycling network map. However, they provide key opportunities for the City to provide connections or “short cut” opportunities between cycling routes within the road right-of-way. Provided that a trail meets the minimum standards, we should include the short trail connection within the network.



5.3 Integration with Public Transit

How will the City integrate commuter cycling route links to transit stations? Part of the solution is “trip-end” infrastructure such as bicycle parking (see **Chapter 10**) and bicycle lockers. This will facilitate longer cycling commutes and integrate initiatives identified by Metrolinx. The result – we’ll create mobility hubs within the GTA, promote a reduction of automobile trips, and increase the cycling and transit modal share.

In June 2009 Mississauga Transit equipped its entire fleet with bicycle racks, which was made possible through funding from Metrolinx. Each rack can hold two conventional bicycles, and requires no additional fare for use. This allows residents to incorporate cycling into longer trips, and assists cyclists who may get caught in inclement weather and need an alternative mode of travel. **Image 5-2** illustrates ways of integrating bicycles into different forms of transit.

Image 5-2: Bicycle and Transit Integration




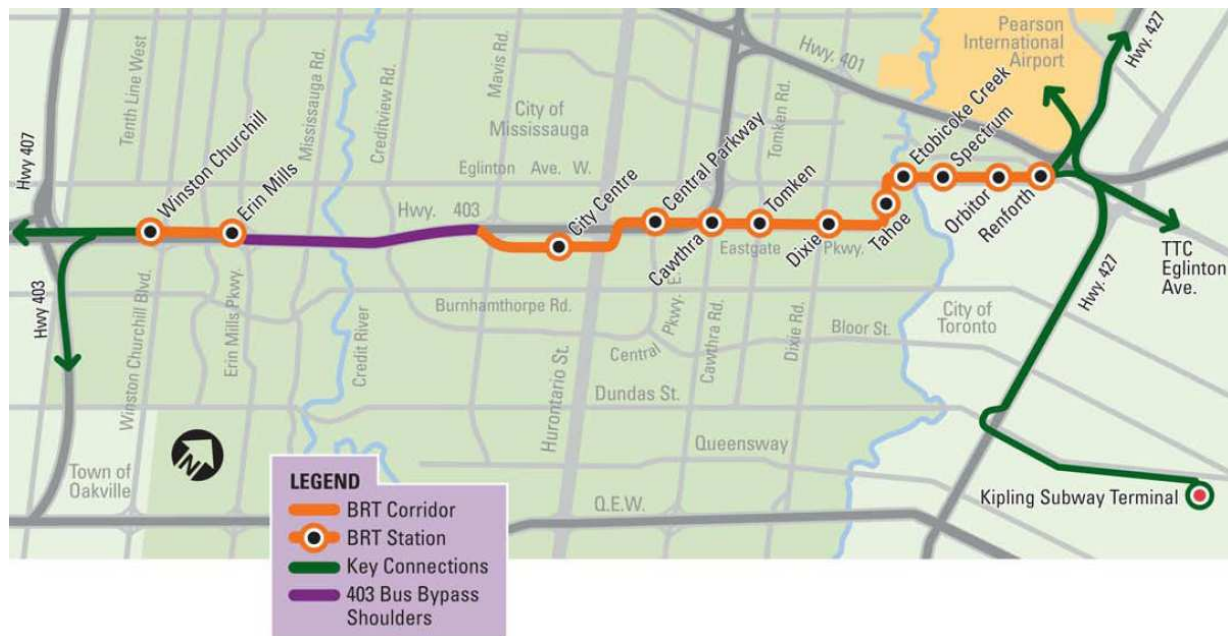
Approach	Example
<p>Bicycle Racks on Buses</p> <p>GO-by-Bike: (source: McMaster University)</p>	
<p>Bicycle Racks on Trains</p> <p>(left) Irish Rail (source: iTRANS)</p> <p>(right) France TER (source: FUBicy.org)</p>	<div>   </div> <p>Currently GO Trains allow bicycles on board during non-peak times, and have a pilot program allowing folding bicycles at all times.</p>

Image 5-2: Bicycle and Transit Integration (cont'd)

Approach	Example
<p>Sheltered Bicycle Parking at Transit Stations</p> <p>Clarkson GO Station: (source: iTRANS)</p>	
<p>Bicycle Rack on Mississauga Transit Bus</p> <p>(source: Smart Commute Mississauga)</p>	

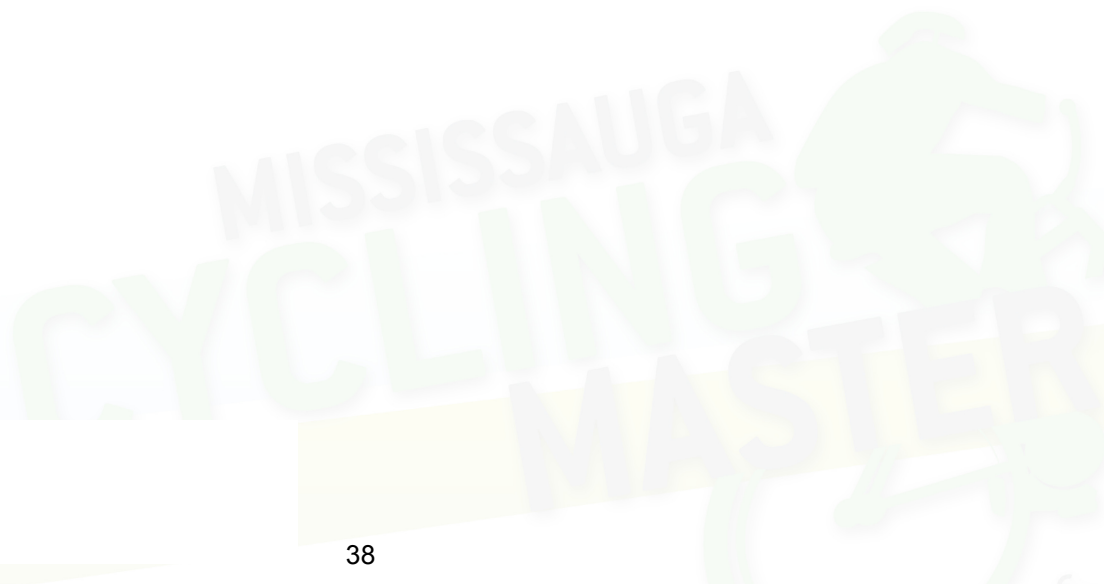
In developing the cycling network, an important consideration was providing route connections to Bus Rapid Transit (BRT) terminals. This will facilitate the integration of a seamless transportation system that accommodates multiple transportation modes. There is also an opportunity to use remaining Metrolinx funding to provide secure bicycle parking at mobility hubs, such as BRT stations. **Figure 5-1** shows the proposed BRT station locations in Mississauga.

Figure 5-1: Proposed Mississauga BRT Station Locations



The *Ontario Places to Grow Act* references the need for integration between cycling and transit: “Major transit station areas will be planned and designed to provide access from various transportation modes.” The Cycling Master Plan will incorporate this requirement through developing the cycling network.

Development of the bicycle route network also incorporates connections to GO stations, future BRT and future higher-order transit station locations, and the City Centre Transit Terminal. GO Transit, for one, has recently shown a commitment to cycling and transit integration through its GO-by-Bike campaign.



6.0 CYCLING ROUTE DESIGN

RECOMMENDATIONS:

12. Continually reduce cyclist incident rates.
17. Establish technical standards for cycling.

Cyclists must co-exist with other vehicles and pedestrians. The City will accommodate the range of cyclist skills and routes, while keeping safety as a key consideration.


6.1 Cyclist Types


The design of cycling routes in Mississauga must consider both the skill level of the cyclist and the purpose of the trip. That is what will ensure an infrastructure that accommodates the full range of capabilities and preferences.

In February 2009, the Ontario Professional Planner's Institute (OPPI) published a Call to Action on the *Plan for the Needs of Children and Youth*. This Call for Action focused on child- and youth-friendly land use and transportation guidelines, and other considerations for the development of cycling routes. This Cycling Master Plan reflects those guidelines and considerations, as well as several other best practices, in developing a range of cycling route networks.

The types of cycling routes aim to meet the needs of existing cyclists and encourage non-cyclists to participate. **Image 6-1** summarizes the range of cyclist skill levels.

Image 6-1: Cyclist Ability Type

Cyclist Type	Example
Experienced On-Road Cyclists – High skill level, comfortable interacting with traffic. Their primary interest relates to direct route and minimizing travel time. They often prefer on-road routes on major roadways.	

<p>Competent Cyclists – Have sufficient confidence and skills to ride on neighbourhood streets, off-road trails and in the boulevard. Their primary interest is safety. They may feel comfortable riding on major streets with a separate bicycle lane where the speed is moderate.</p>	
<p>Novice Cyclists – Typically children and beginner adults with low confidence cycling on-road. Their primary interest is safety and/or recreation. They feel comfortable riding on off-road trails and in the boulevard.</p>	

6.2 Safety Considerations

Our primary objective is cyclist safety. That involves a measure of anticipated frequency and severity of incidents, related to:

- The skill level required for cyclists to manoeuvre among other users along the bicycle route.
- The physical space allocated to cyclists and vehicles within shared roadways; and allocated to cyclists, pedestrians and disabled travellers within shared multi-use trails.
- The level of awareness of drivers and cyclists of potential conflicts given visibility and illumination.
- Vehicle speed and exposure to heavy vehicle traffic.
- The level of cyclist and driver understanding of rules of the road.
- The degree of care or disregard for safety exhibited by cyclists, pedestrians and drivers (where a low level of care may contribute to incidents).

The City will address pedestrian and cyclist safety through public awareness and education, and the design of roadway and cycling infrastructure.

The right cycling route designs and use of traffic control measures can lead to multiple benefits - maximize awareness of cyclist-vehicle interactions, minimize distractions and obstructions, and improve understanding of which road user has the right-of-way. Enhanced pavement markings on roadways, and maintaining and enforcing speed limits at 60 km per hour or less, can also increase comfort levels.

Developing design guidelines based on best practices will improve cyclist comfort and safety by:

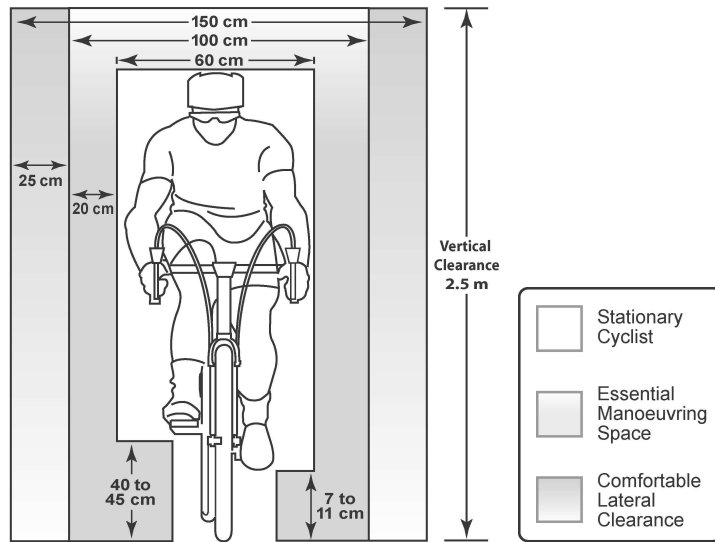
- Reducing the number and severity of conflict points at intersections and other areas (such as bridge crossings), by defining cyclist and vehicle space.
- Designating on-road cycling routes on corridors where speed limits do not exceed 60 km/hour.
- Improving design consistency, to contribute to driver and cyclist expectations that are appropriate for the road environment and potential hazards.

We will design on-road cycling routes to recognize that bicycles are vehicles, and that cyclists have the same rights and responsibilities as other users of our roadways. This design will reflect the cyclist “dynamic envelope” (**Figure 6-1**). This is the minimum profile required to safely move on all route types, factoring in the cyclist space, manoeuvring space, and comfortable clearance space (source: Ontario Bikeways Planning and Design Guidelines, 1996).

The actual space occupied by a cyclist (typically 0.6 metres wide by 2.0 metres high) allows for an operating space to accommodate natural side-to-side movement, plus variations in bicycle tracking (0.2 metres each side). Additional clearance is typically required to provide separation from lateral and overhead obstacles (0.25 metres lateral and 0.5 metres overhead).

Within multi-use trails, cyclists may encounter a range of other users, e.g. pedestrians, inline skaters and wheelchair users. The clear space for accessible routes, sidewalks, and paths typically requires about 1.83 metres to allow for two wheelchairs to pass (source: City of Brampton Accessibility Technical Standards and City of Toronto Accessibility Guidelines).

Figure 6-1: Dynamic Envelope



6.3 Cycling Route Types

The cycling route types identified in **Images 6-2, 6-3, 6-4, 6-5, and 6-6** will accommodate a wide range of cycling abilities, cyclist needs, and site-specific constraints. See **Chapter 7** for details on cycling design guidelines.

Image 6-2: Visually Separated Bicycle Lanes



Example	
<p>Bicycle Lane (visually separated)</p> <p>A painted linear line with bicycle and reserved lane (diamond) stencils visually separates a dedicated space for bicycles away from motorists. For cyclists, the separation of traffic increases a sense of security and safety.</p> <p>Visually separated lanes may require additional spring street sweeping maintenance.</p>	 <p>Confederation Parkway - Mississauga (source: iTRANS)</p>  <p>Erin Centre Boulevard – Mississauga (source: City of Mississauga)</p>

Image 6-3: Physically Separated Bicycle Lanes

Example	
<p>Bicycle Lane (physically separated)</p> <p>A physical barrier such as a dedicated median (physical or painted with vertical delineators) provides a high level of control between cyclists and motorists</p> <p>Such bicycle lanes can be implemented on one-way or two-way streets, and integrated with on-street parking.</p> <p>This type of route requires a high degree of cyclist and driver awareness at cross-streets. Turn prohibitions and dedicated bicycle signals help increase safety.</p>	<div data-bbox="540 310 950 856">  </div> <p data-bbox="540 863 950 894">Belfast, N. Ireland (source: iTRANS)</p> <div data-bbox="982 310 1380 856">  </div> <p data-bbox="982 863 1380 894">Amsterdam, Holland (source: iTRANS)</p> <div data-bbox="540 930 1419 1591">  </div> <p data-bbox="740 1598 1219 1625">Montreal, P.Q. (source: City of Mississauga)</p>

Image 6-4: Shared Use Lanes



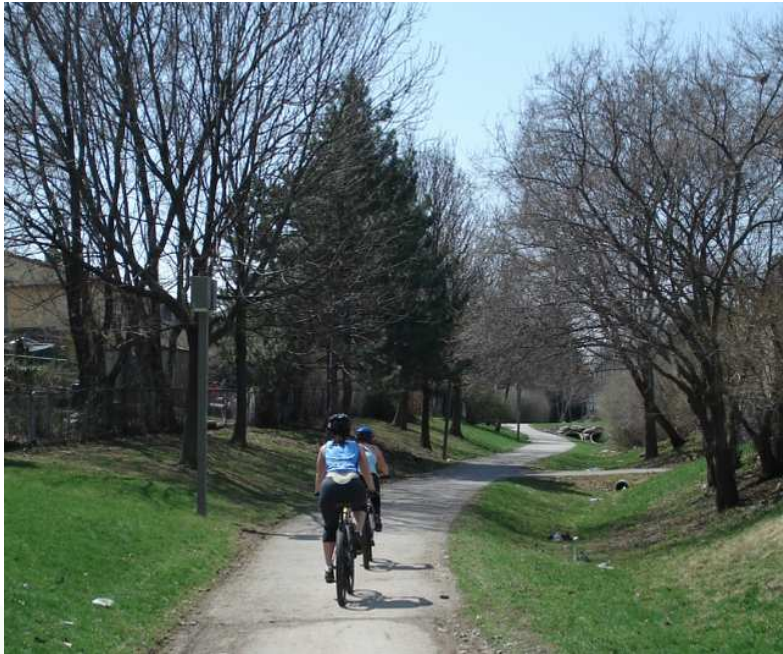
Example	
<p>Shared Use Lane ("sharrow")</p> <p>An on-road bicycle route that shares the outside general purpose travel lane with other vehicles. It is delineated by a combined bicycle and double chevron stencil, accompanied by signs.</p> <p>Cyclists and motorists are expected to share the road.</p>	 <p>Indian Road - Mississauga (source: iTRANS)</p>
<p>Shared Road ("signed route")</p> <p>Signed routes are delineated by a bicycle route sign. Cyclists and motorists are expected to share the road.</p> <p>Such routes are typically applied to residential streets with low traffic volumes.</p>	 <p>Avalon Drive - Mississauga (source: iTRANS)</p>

Image 6-5: Multi-Use Trail

Example	
<p>Multi-Use Trail</p> <p>A trail that is within the road right-of-way, and can accommodate pedestrians and cyclists.</p> <p>This type of route suits corridors with a limited number of driveway accesses and intersections. Turn prohibitions, crossrides and dedicated bicycle signals can help increase safety.</p>	 <p>Lakeshore Road - Mississauga (source: iTRANS)</p>

Image 6-6: Off-Road Multi-Use Trail

Example	
<p>Off-Road Multi-Use Trail</p> <p>Trails within open space or utility corridors (i.e. outside of road rights-of-way) provide continuous routes with few conflict zones.</p> <p>Such routes are well suited for recreational cycling, and may contribute to primary cycling routes.</p>	 <p>Lake Wabukayne Trail - Mississauga (source: iTRANS)</p>

Selection of the most appropriate cycling route type for each corridor depends on:

- traffic characteristics of the corridor (traffic speed, volume, percentage of heavy vehicles);
- anticipated cycling activity and cyclist skill level;
- constraints and opportunities within the road right-of-way;
- route type on connecting corridors;
- role of the corridor within the route network; and
- other planning objectives and operating requirements of the corridor.

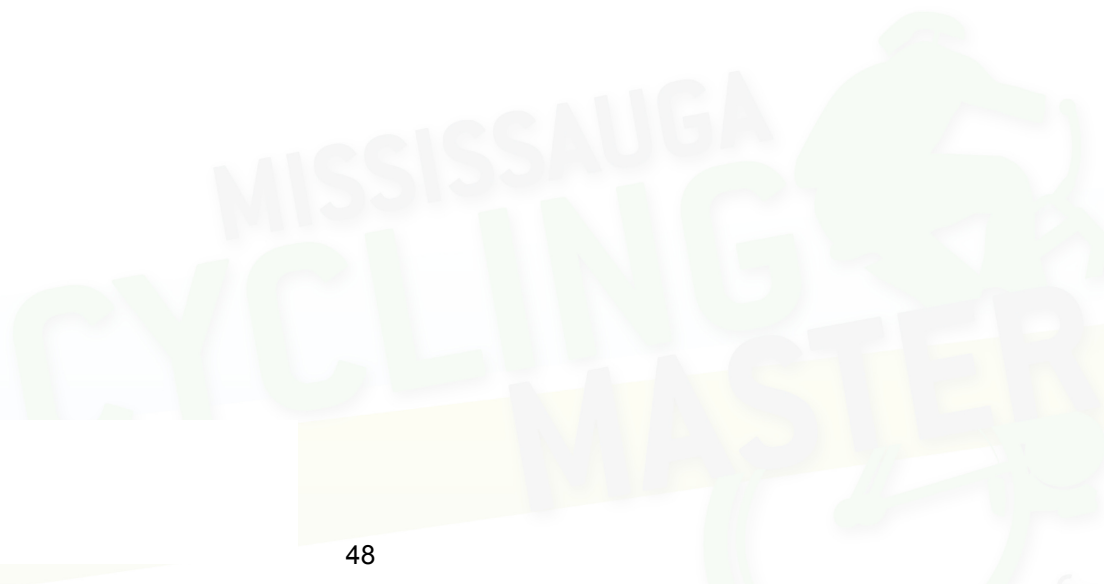
6.4 Route Design Best Practices

Guidelines from municipalities around the world were reviewed to establish best practices for cycling route design:

- | | |
|--------------------------|---|
| ➤ City of Mississauga | ➤ City of Chicago |
| ➤ Town of Richmond Hill | ➤ City of San Francisco |
| ➤ City of Windsor | ➤ City of Portland |
| ➤ City of Hamilton | ➤ City of London, United Kingdom |
| ➤ City of Vaughan | ➤ New South Wales, Australia |
| ➤ City of Ottawa | ➤ Waterfront Regeneration Corporation |
| ➤ City of Calgary | ➤ Ministry of Transportation of Ontario |
| ➤ Region of Waterloo | ➤ Transportation Association of Canada |
| ➤ Velo Quebec | ➤ American Association of State Highway and Transportation Officials (AASHTO) |
| ➤ CROW – The Netherlands | |

The best practices review also included innovative cycling treatments based on published references from the Institute of Transportation Engineers, and Transportation Association of Canada.

Design practices are fairly consistent between jurisdictions. The appropriateness of design practices for Mississauga was assessed relative to the City vision for cycling, the existing design practices and operating requirements in Mississauga, and traffic legislation in Ontario. For a comparison summary of best practices, see **Appendix B**.



7.0 DESIGN STANDARDS

RECOMMENDATIONS:

12. Continually reduce cyclist incident rates.
17. Establish technical standards for cycling.

Design standards for the City of Mississauga were developed based on the best practices review. Documented best practices were integrated with existing City design practices and strategic planning objectives to establish cycling route design standards best suited for Mississauga.

7.1 Best Practices: Multi-Use Trails

7.1.1 Multi-Use Trail Widths

Based on public engagement sessions and online surveys, 58% of Mississauga residents indicated that they ride on the sidewalk. While in many instances a sidewalk represents an environment with limited vehicle-cyclist conflict, Mississauga's sidewalks are not sufficiently wide to safely accommodate two-way cycling activity or pedestrian-cyclist interaction. The existing City of Mississauga Traffic By-law 555-00 prohibits riding a bicycle on a sidewalk, except for bicycles with a wheel diameter of 50 centimetres or less (most commonly children's bicycles). In locations where the boulevard is a feasible cycling option, an appropriately designed bicycle trail or multi-use trail should be planned and implemented.

The boulevard multi-use trail width should reflect the level of demand and potential for interaction with pedestrians. Corridors with high cycling activity should provide a wider travel area. One-way trails aren't recommended, except under special conditions such as linkages and connections where necessary for continuity of a facility. Note that cyclists and pedestrians frequently use these facilities in either direction, regardless of one-way designations. If trails aren't designed for two-way activity, cyclist-pedestrian conflicts may arise.

Multi-use trails will be designed to manage cyclist pedestrian conflicts. The recommended design widths for the city's off-road bicycle routes are summarized in **Table 7-1** and included in the best practices summary in **Appendix B**.

Table 7-1: Multi-Use Trails and Off-Road Recreational Trail Width Standards

Facility Type	Desired Width	Minimum Width
Bicycle Trail – One-way, exclusive*	2.0 metres	2.0 metres
Bicycle Trail – Two-way, exclusive	3.5 metres	3.0 metres
Multi-use Trail – One-way	Not Recommended	
Multi-use Trail – Two-way**	3.5 – 5.0 metres	3.0 metres

* Not recommended but may apply to special circumstances



** Recommend wider (4.0-5.0 metre) multi-use trails on high volume or along commuter cycling routes

7.1.2 Trail Pavement Markings

Separating pedestrians and cyclists on multi-use trails will depend on the usage and trail width. Generally, for trails with a width equal to or greater than 4 metres, pavement markings are recommended to delineate space for bi-directional cycling traffic and for pedestrians. Trails less than 4 metres wide will be reviewed individually for potential pavement markings.

All trails should have supporting signage that promotes “share the path/trail”, and other regulatory and warning signs as appropriate. **Image 7-1** illustrates examples of separation treatments in Montreal.

Image 7-1: Examples of Multi-Use Trail Pavement Marking Treatments

Municipality	Example
Montreal, PQ (source: City of Mississauga)	 <p>Physically separated treatments require a large amount of boulevard space. They may create conflict zones in constrained areas and need transition zones between the different pathway types. Typically used within wide boulevards and hydro corridors.</p>
Montreal, PQ (source: City of Mississauga)	 <p>Pavement markings that visually separate cyclists and pedestrians are used along primary routes, where high cyclist and pedestrian traffic volumes are anticipated.</p>

7.2 Best Practices: On-Road Routes

7.2.1 On-Road Lane Widths

Table 7-2 summarizes the recommended design widths for Mississauga's on-road bicycle routes to maximize comfort and safety. These are included in the best practices summary in **Appendix B**.

Table 7-2: On-Road Design Standards

Facility Type	Desired Width	Minimum Width
Bicycle Lane	1.8 metres	1.5 metres*
Bicycle Lane adjacent to a parking lane	1.8 metres	1.5 metres
Separated Bicycle Lane – One direction	1.7 – 2.0 metres	1.7 – 2.0 metres
Separated Bicycle Lane – Two directions	3.5 metres	2.7 – 3.5 metres
Parking Lane/Bay	2.8 metres	2.4 metres**
→ Shared Use Lane (Sharrow)	4.6 metres	4.0 metres
→ Arterial/Collector Road Vehicle Lane (transit route)	3.75 metres	3.35 metres
→ Local Road Vehicle Lane (transit route)	3.5 metres	3.35 metres
→ Arterial/Collector Road Vehicle Lane	3.75 metres	3.20 metres
→ Local Road Vehicle Lane	3.5 metres	3.20 metres
→ Single Turning Lane	3.5 metres	3.0 metres

Note: The above widths are measured from the edge of pavement and exclude curb and gutter widths.

* 1.2 m in certain situations

** 2.1 m when low speed, low traffic

→ under review

7.2.2 On-Road Pavement Markings

Pavement markings clearly identify the cyclist's space on-road. They reinforce the need for motorists and bicycles to share space and inform us of regulatory controls, like exclusive bicycle lanes. They provide warnings, like the presence of shared use lanes. On-road markings are governed by the Ontario Highway Traffic Act and the Ontario Traffic Manuals and TAC Guidelines. Standard applications are illustrated in **Figure 7-1** and **Figure 7-2**.

Figure 7-1: On-Road Bicycle Symbols

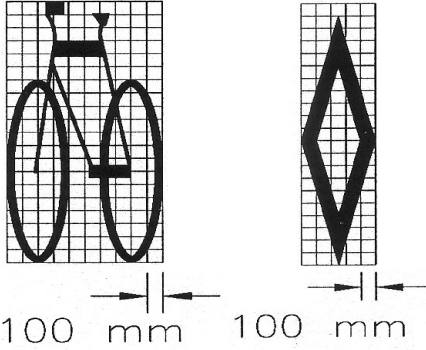
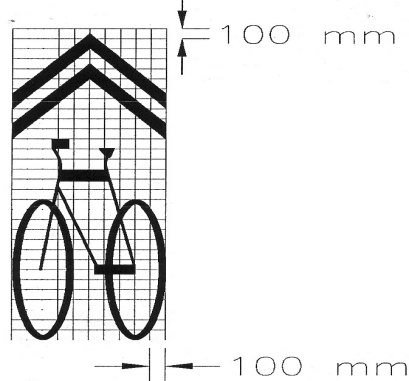

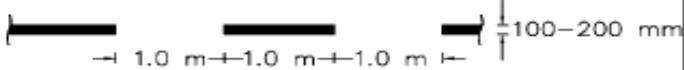

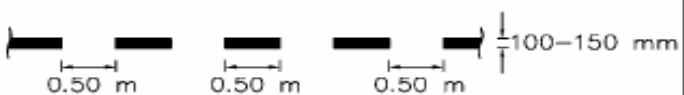
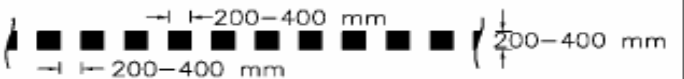

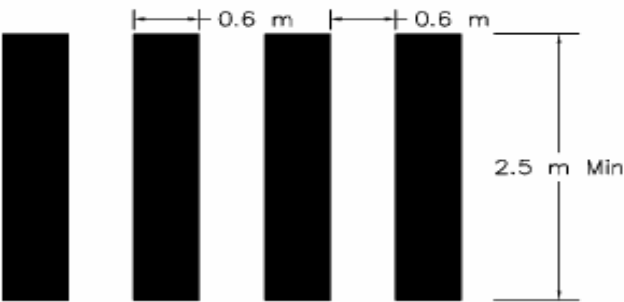
Symbols	Example
<p>Bicycle Lane Symbols</p> <p>200-250m intervals and at the beginning of intersections (blocks)</p>	 <p>Diamond symbol width = 0.5 metres height = 2.1 metres Bicycle symbol width = 1.0 metres height = 2.0 metres</p>
<p>Shared Used Lane (“Sharrow”) Symbol</p> <p>75m intervals and at the beginning of intersections (blocks)</p>	 <p>Diamond symbol width = 1.0 metres height = 3.0 metres</p>
Standard Application	Refer to the <i>TAC Guidelines for the Design and Application of Bikeway Pavement Markings</i>

Figure 7-2: Pavement Marking Dimensions

NAME OF LINE		DIMENSIONS
LONGITUDINAL	BICYCLE LANE (SOLID, WHITE)	
	BICYCLE LANE (DASHED, WHITE)	
	CONTRA-FLOW LANE (YELLOW)	
	GUIDING LINES (WHITE)	
TRANSVERSE	ELEPHANT'S FEET BICYCLE CROSSING (WHITE)	
	CROSSWALK (WHITE)	
	ZEBRA CROSSWALK (WHITE)	

7.2.3 Edge Lines

Edge lines are a solid white pavement marking, typically offset between 1.2 to 1.5 metres from the curb. Edge lines are similar in design to on-road bicycle lanes. However, they are not regulated for bicycle use only, as no “bicycle lane” signage or symbols are provided, and on-street parking may be permitted within the edge line.

The City is developing design guidelines for using edge lines. Historically, we implemented edge lines on local roadways as a traffic calming measure. A painted edge line aims to narrow the width of the travelled lane width, in an effort to reduce vehicle operating speeds.

7.3 Intersection Treatments

In 2007, the Transportation Association of Canada (TAC) developed *Guidelines for the Design and Application of Bicycle Pavement Marking*, replacing the 1999 TAC *Bicycle Control Guidelines*. These address various treatments to apply on-road, at intersections and elsewhere. The City should use good engineering judgement when considering alternative treatments at individual intersection locations.

7.3.1 Advanced Stop Bars/Bicycle Box

In Europe and parts of North America, advanced stop bars, also referred to as “bike boxes”, give cyclists advance priority and have proven to be very successful. **Image 7-2** and **Figure 7-3** illustrate their use in Amsterdam and Toronto and TAC’s recommended application.

Image 7-2: Advanced Stop Bars/Bike Boxes

Examples

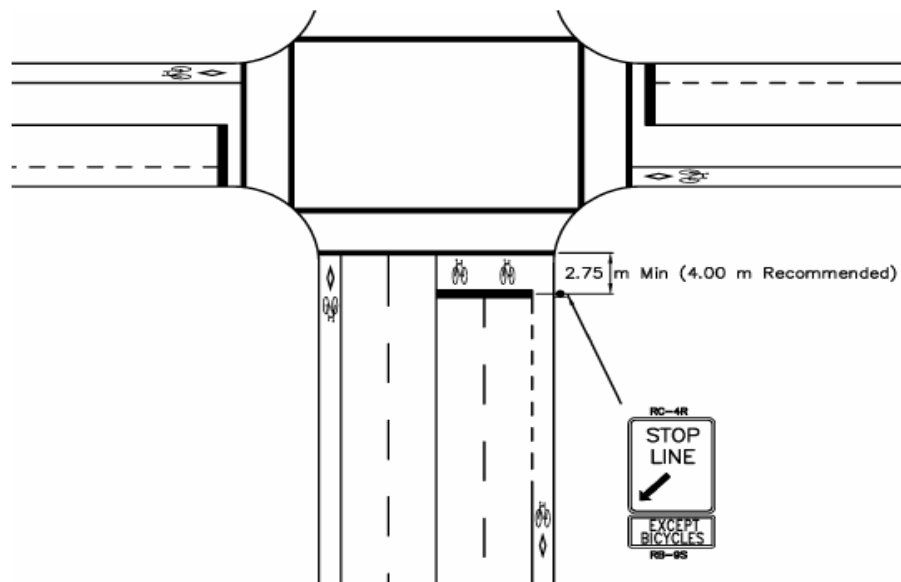


Amsterdam, Holland (source: iTRANS)



Toronto, ON (source: Urban Repair Squad)

Figure 7-3: TAC Recommended Advance Stop Bar (“Bike Box”) Treatment



7.3.2 Guide Markings

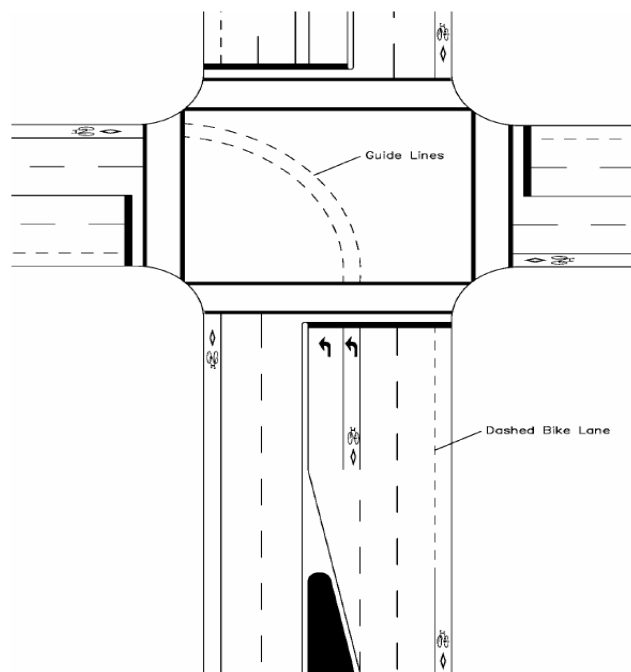
The TAC guideline recommends bicycle lane markings at intersections where cyclist guidance is a concern, and where there is a standard bicycle lane, on both entering and leaving opposite sides of the intersection.

Instances where guide markings may be applied include:

- roadway and bicycle lanes are offset on opposite sides of the intersection;
- skewed intersections (i.e. unaligned);
- more than four intersection legs; and
- sight line limitations (e.g. from significant grades or large, wide intersections).

Figure 7-4 illustrates TAC's recommended treatment, providing guidelines for left turning cyclists. The guidelines follow the bicycle lane from the left turn lane that connects to another bicycle lane on the cross street.

Figure 7-4: TAC Recommended Guide Marking Through Intersections



7.3.3 Crossrides

TAC provides guidelines for crossrides. Crossrides are defined as multi-use trails that cross through a road right-of-way at signalized and unsignalized intersections. Crossrides can be applied at any intersection between a multi-use trail and roadway. Here, cyclist movement is delineated through the use of elephant feet, while pedestrian movements are delineated by zebra markings.

The Ontario Ministry of Transportation (MTO) is considering the merits of crossrides. However, MTO has allowed the City of Mississauga to conduct a pilot project on a crossride treatment at unsignalized intersections. Crossrides at signalized intersections will be researched and developed further, in conjunction with other municipalities and MTO. **Image 7-3** depicts existing examples of crossride treatments, while **Figure 7-5** illustrates TAC designs for crossride treatments at signalized and unsignalized intersections.

Image 7-3: Example of Existing Crossride Applications



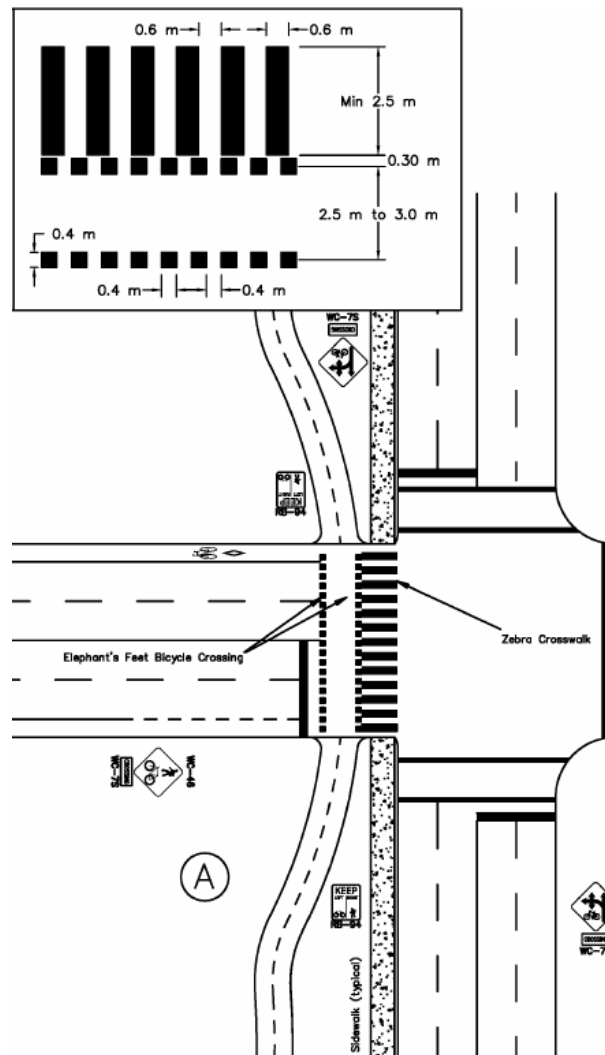
Municipality	Treatment
Mississauga, ON	 <p data-bbox="678 1039 1253 1102">Sheridan Park Drive & Homelands Drive pilot project (source: City of Mississauga)</p>
New York City, NY	 <p data-bbox="669 1669 1263 1690">Crossride Treatment on 12th Avenue (source: iTRANS)</p>

Figure 7-5: TAC Recommended Crossride Treatment (Option 1)




7.4 Bicycle Signals

Bicycle signals have not been adopted within the Highway Traffic Act in Ontario, but are addressed in the TAC *Guideline for Bicycle Signal Design, 2005*. These signals can enhance safety and contribute to improved movement of cyclists through advanced signal phases. On corridors with high cycling demand, traffic signals can be coordinated based on cyclists' speeds rather than motor vehicle speeds.

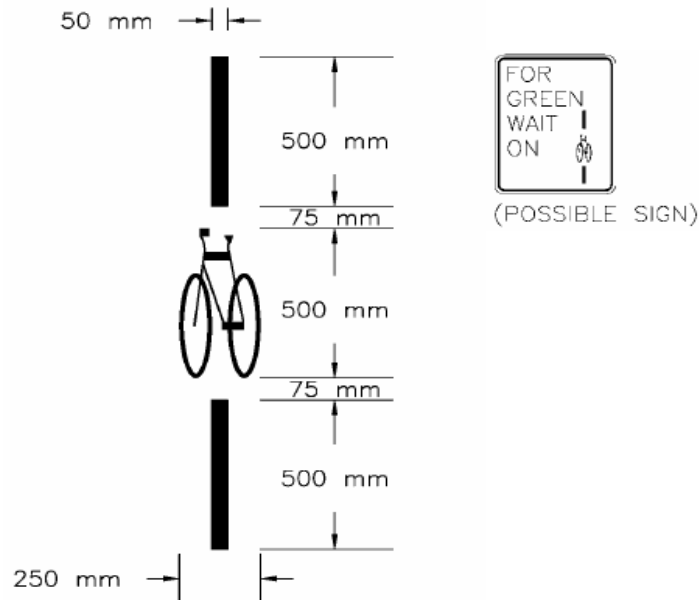
The City will consider applying the TAC bicycle signal guidelines upon adoption into the *Ontario Highway Traffic Act*. **Image 7-4** presents examples of bicycle signal devices.

Image 7-4: Bicycle Traffic Signal Devices

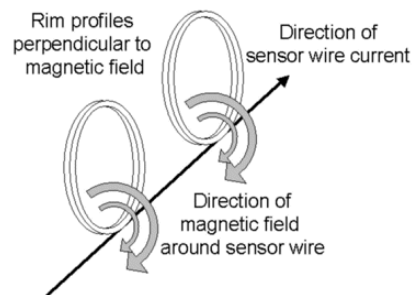
Examples	
 <p>TAC Recommended Signal Head (source: Transportation Association of Canada)</p>	 <p>Bicycle Countdown Signal, Amsterdam, Holland (source: iTRANS)</p>
 <p>Toronto Bicycle Signal Pilot Project (source: iTRANS)</p>	 <p>Ottawa Bicycle Signal Pilot Project (source: City of Ottawa)</p>

On corridors with high cycling demand, traffic signals can be coordinated with bicycle loop detectors. **Image 7-5** is an example of a bicycle loop detector.

Image 7-5: Bicycle Loop Detector



Loop Detector Pavement Marking and Sign (source: Transportation Association of Canada)



Bicycle Loop Detector (source: City of Berkley, California)

7.5 Mid-Block Crossings

Mississauga will consider mid-block crossings based on engineering judgement and operational conditions such as: roadway width/crossing distance; traffic volume; traffic speed and type; magnitude of and preferred routes for cyclist movement; and sight distance. Mid-block crossings will be designed with regard for: stopping sight distances; effects of grade; cross-slope; and the need for lighting.

For unsignalized mid-block crossing locations, refuge islands of sufficient width (1.8 metres) allow cyclists to focus on crossing one direction of traffic at a time. Refuge islands could be considered as part of a mid-block crossing when:




- The posted speed limit is 60 kilometres per hour or less;
- There are four lanes or fewer;
- There is appropriate refuge space within the boulevard on each side of the crossing;
- Parking and driveways are at least 30 metres set back from the crossing; and
- Bus stops are located on the far side of the crossing.

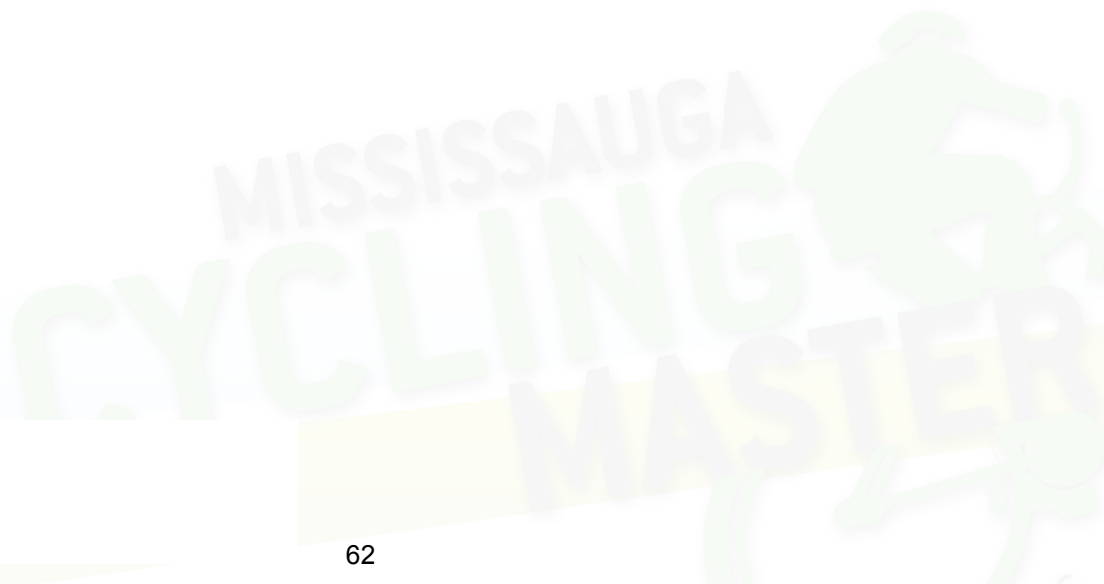
Where cycling routes intersect major roads, close to signalized intersections, the routes will be redirected to the signalized crossing. More detailed intersection treatments are provided in the 2007 TAC *Guidelines for the Design and Application of Bicycle Pavement Markings*.

7.6 Grade Separation

Grade separation crossings such as bridges and underpasses provide critical links for cycling. It is therefore important to design such structures with safe and adequate accommodation of cycling facilities, e.g. bicycle lanes or multi-use boulevard trails (especially on the cycling routes identified in the cycling network). See **Image 7-6**.

Image 7-6: Grade Separation Examples

Municipality	Treatment
Mississauga, ON Confederation Parkway (source: iTRANS)	
Montreal, PQ (source: iTRANS)	
Cambridge, ON (source: iTRANS)	



8.0 Network Operation

RECOMMENDATIONS:

12. Continually reduce cyclist incident rates.
13. Develop a stronger working relationship with Peel Regional Police.
14. Establish an educational plan for motorists and cyclists.
15. Develop an infrastructure asset management plan for all cycling facilities.
16. Develop an operation and maintenance program for the cycling network.

Mississauga will continue to implement sound construction and maintenance practices for off-road multi-use trails, and include on-road construction and maintenance practices oriented to the operation of the cycling infrastructure.

8.1 Construction

Design and construction practices for cycling routes in Mississauga are based on recommended practices from TAC; MTO; and the Credit Valley, Halton, and Toronto and Region Conservation Authorities. These practices include: sign installation; bicycle pavement markings; design and installation of catch basin covers; multi-use trail construction; and lighting. The City also references the National Cooperative Highway Research Program (NCHRP) Report 552, *Guidelines for Analysis of Investments in Bicycle Facilities*, which summarizes best practices for cycling route construction in the United States.

8.2 Accessibility

Multi-use trails and related amenities should be accessible to and useable by the broadest possible spectrum of potential trail users. Minimum accessibility requirements, i.e. the *Accessibility for Ontarians with Disabilities Act*, are applicable. Trail access and related amenities will comply with regulations regarding the surrounding surface and access routes. Clear space requirements around amenities and structures need to be designed to the same standard as the trail itself.

8.3 Maintenance

The level of service for regular maintenance of cycling facilities must take into account City standards, public expectations and safety, balanced with funding availability. Numerous issues affect both on-road and off-road cycling facilities: winter maintenance; sweeping; litter clean-up; vegetation and pruning; surface maintenance; and signage/pavement markings. To establish an appropriate level of service for existing and future cycling facilities, consider these guiding principles:

- Priority winter maintenance for the primary cycling network.
- Priority sweeping for the primary cycling network, which may include more frequent service.
- Regular inspections for all cycling facilities (e.g. cracks, potholes, surface distress).

9.0 SIGNAGE AND WAY FINDING

RECOMMENDATIONS:

4. Increase awareness of cycling to the general population.
10. Develop and implement a comprehensive standardized signage and way finding system based on the three D's of: distance, direction and destination.

Signs and pavement markings play an important role in promoting and supporting cycling. A complete signage system:

- provides regulatory messages to road users;
- communicates important route information or warnings;
- provides way finding information to help users navigate the system;
- plays an integral role in establishing an identifiable “brand” for the bicycle route network; and
- provides interpretive information relating to points of interest on or near the bicycle route facilities.

The City will apply signs in a manner to provide a clear and consistent message to cyclists, pedestrians and motorists.

9.1 Cycling Network Signing and Naming

The types of signage and markings can be categorized as: regulatory; warning; and information. Examples of bicycle-related regulatory and warning signs are provided in **Image 9-1**. All regulatory and warning signs are included in the TAC manual and are applied nationally.

Image 9-1: Examples of Signage

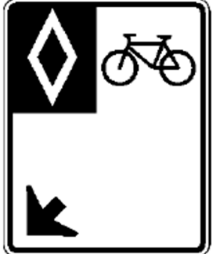



Sign Type	Example	Sign Type	Example
Regulatory (On-Road)		Regulatory (Off-Road Multi-Use Trail)	
Information		Warning	

Image 9-2 is an example of bicycle signage in Mississauga. This information sign is accompanied by a Waterfront Trail sign, which is a “branded” way finding system of the Waterfront Regeneration Trust. The Waterfront Trail system is similar to the *La Route Verte* program used in Montreal.

Image 9-2: City Bicycle Route Marker and Waterfront Trail Sign



Front Street (source: iTRANS)

Naming a route appropriately is an important component for way finding within the cycling system. The naming should be consistent with the road, corridor or park facility, and the name of the route should be as continuous as possible.

Where there is a desire to recognize an individual within the cycling system, a “dedication” is better than a “naming”; a “dedication” does not formally change the name of the route, but uses a plaque to recognize the individual (signs regarding the dedication can also be included within the route).

9.2 Way Finding

A way finding signage system has three general objectives, which should determine sign locations and messages:

1. **Get people to cycling routes and multi-use trails** – Promote the cycling network by linking people from the community to the neighborhoods. This promotes the cycling network as both a destination to enjoy and as an active transportation route.

2. **Educate motorists regarding cyclists on the roadway** – Use cautionary and safety messages to increase motorists’ awareness of cyclists. Cycling is an important component of the transportation system, to be respected by other modes of transportation.
3. **Inform people how to get around the network** – Guide cyclists through the network, assisting their decision-making ability at intersections and decision points. Show a route’s role in a larger network through maps.

Using the principle of three D’s to organize the way finding information, signs will provide a clear and consistent message to cyclists:

1. **Destination** (nearest or intermediate destinations, or less commonly, the end-of-the-line destination);
2. **Direction** (directional arrows, ahead, left and right); and
3. **Distance** (to destinations noted on sign).

Way finding signs are located at significant locations (e.g. entrances/exits, intersections) and at regular intervals along the routes. Additional information at transit shelters, such as cycling maps, will help way finding and promote cycling in the City. Elements to be incorporated on individual signs may include:

- Name of route (if applicable);
- Distance to destinations;
- Direction to destinations;
- Uniform colours or background (e.g. font type and logos);
- Contact information for emergency or maintenance issues;
- Sponsorship credits (where appropriate); and
- Other information as required (site specific).

Signs that integrate designation and branding into the way finding are preferred, rather than providing separate signs for each function. These recognizable signs generally include the travel directions and route number.

A consistent, legible way finding sign program will help to promote cycling in Mississauga and make navigating the cycling network more user-friendly. Way finding signs can also be used as a technique to “brand” cycling within the city.

Numbered routes are useful, but do not provide additional context to destinations and directions. Alternatively, naming cycling routes relates them to street names and other geographical features, which helps cyclists to orient themselves. Since the City has already established a “naming” convention on some existing routes, this practice should continue. Currently, Mississauga has approximately 25 named trails. Use of a “naming” convention lends itself well for integration into the on-road cycling network, since on-road routes are identified by street names.

As detailed in **Table 9-1**, consider four general characteristics in implementing a way finding program for a cycling network: 1) design; 2) placement; 3) location; and 4) frequency.


Table 9-1: Sign Implementation Practices

Characteristic	Practice
General Sign Design and Placement Guidelines	<p>The Ontario Traffic Manual (OTM) books are the guideline for the placement of signs for both roadways and trails in Ontario. OTM defines the practice for cycling sign setbacks from roadways and trails, horizontal clearance, and sign posting heights. The basic guidelines for sign placement are:</p> <ul style="list-style-type: none"> ▪ Way finding signs are placed before and after intersections, so as not to interfere with cyclists yet still remain visible. ▪ On multi-use trails, the lateral sign clearance must be at least 60 centimetres from the near edge of the sign to the near edge of the path. ▪ The mounting height for ground-mounted signs on a roadway/multi-use trail is a minimum of 1.5 metres and a maximum of 2.5 metres, measured from the bottom edge of the sign to the near edge of the path surface.
Optimal Sign Location	<ul style="list-style-type: none"> ▪ Place signs where they will be clearly visible. Placement depends on the sight lines (relative to user speed) of each trail. ▪ Place signs at a constant distance from the road/trail edge. ▪ Do not use text on regulatory or cautionary signs unless necessary. ▪ Multiple signs can be mounted on the same post, but the top sign should have the primary message.
Sign Frequency	<p>Way finding signs at regular, predictable intervals, between 400 and 500 metres where possible, or may be in the form of kilometre markers and/or destination signs. These ensure users of proper guidance and instill a sense of security to those unfamiliar with the trail. Ideally, the intervals for destination, direction, and kilometre marking signs are no greater than 1 kilometre.</p>

Note that providing too much signage can be confusing or contribute to visual pollution. Exercise caution and avoid placing too much signage along a roadway or trail.

The City currently has an official sign logo, adopted by Council, for the Mississauga Trail Network. Using this logo or other variation can “brand” cycling in Mississauga as part of the way finding system. **Image 9-3** shows how this may be accomplished.

Image 9-3: Example of Way Finding “Branding” for the Cycling Network

Way Finding “Branding”	
Mississauga Trail Network Logo – Directional Sign	

9.2.1 Information and Interpretive Signs

In addition to the typical way finding signs along cycling routes, more elaborate signs may be desirable at certain key locations. These signs typically include information such as:

- A route network map;
- “You are Here” markings;
- Key destinations marked on all maps;
- Warnings and advisories;
- Route etiquette; and
- Other interpretive information.

Trailheads (also known as identifier signboards) are important for indicating entrances (gateways) to the cycling network and directing users to select destinations. This makes the development of trailheads at strategic locations within the cycling network an essential element of the overall way finding system. Existing trailheads may be retrofitted to include identifiers with the branding of the bicycle route network, and to coordinate with the Region of Peel’s active transportation signing campaign.

These types of signs present much more detailed information than a typical way finding sign. Therefore, they are located in areas where cyclists have sufficient space to stop and leave the trail to read the sign. They can also be accompanied by other amenities such as shade, seating, waste receptacles, or water fountains.

The City will continue to install trail head sign panels within the Mississauga Trail Network. The current design – see **Figure 9-1** and **Image 9-4** – includes the City of Mississauga’s logo, name of the trail, an easy to read map of the trail, and text about the trail (e.g. its history, or nearby points of interest). In addition, signs provide information on trail etiquette, a map legend, and contact information. Room is also made available, when appropriate, for names and logos of any sponsoring organizations that can help reduce the cost of trail head sign provision.

Figure 9-0-1: Current City Trail Head Sign Layout (Typical)

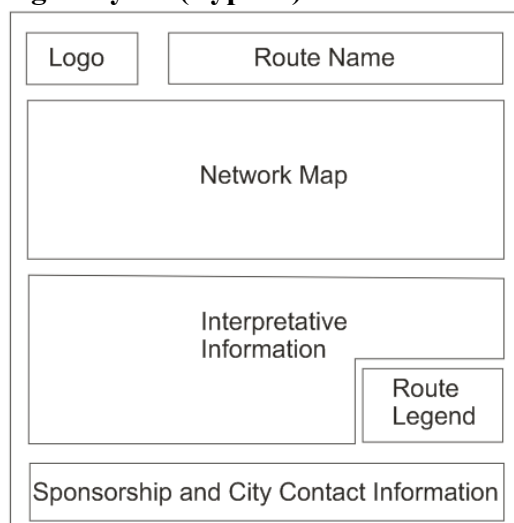


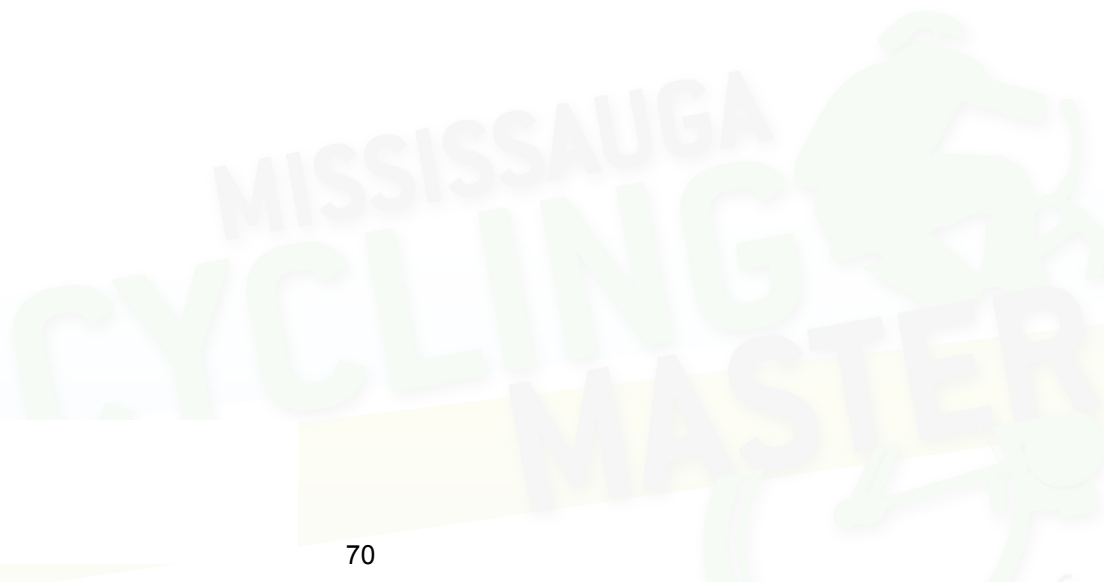
Image 9-4: Trail Head Sign Example



Ted Ho Trail (source: City of Mississauga)

9.2.2 Way Finding Priorities

In developing a city-wide way finding strategy, the goal is to create a safe and predictable environment for cyclists. Consistent application of way finding removes the notion that a cycling route is independent instead of part of a network. It also creates a common identity for the cycling network, despite passing through multiple neighbourhoods. The way finding system should be planned and installed to appear logical to cyclists and other road and trail users.



10.0 BICYCLE PARKING AND AMENITIES

RECOMMENDATIONS:

8. Establish a regulatory framework to implement the Cycling Master Plan.
11. Incorporate bicycle parking at all City-owned major transit locations, libraries, community centres, and parks, where appropriate, and encourage trip-end facilities at existing private sector locations (e.g. office buildings, retail/commercial), where appropriate.
13. Develop a stronger working relationship with Peel Regional Police.
14. Establish an educational plan for motorists and cyclists.

10.1 Destination Amenities

The provision of bicycle parking and other amenities is essential to support the development of cycling as a practical active transportation choice.

According to the Cycling Master Plan online survey and Public Engagement Session survey, the fear of bicycle vandalism and theft was the second most common reason for not riding a bicycle. Further, although today less than 0.15% of daily employment trips are made by bicycle, the 2008 Smart Commute Survey indicated that over 13% of employees would be willing to try cycling more regularly to work if secure bicycle parking, showers and change rooms were available at places of employment. Amenities such as bicycle parking, shower facilities and change rooms, clothing lockers, and rest areas with benches – collectively called trip-end facilities or destination amenities – are important ways to provide convenience and security for cyclists.

Cyclists' needs for trip-end facilities depend on the nature of the trip and the destination. Designs should consider:

- Duration of stay: Bicycle lockers or a limited-access enclosed area offer higher security and shelter in locations where bicycles will be parked over several hours or overnight.
- Trip length: Destinations drawing longer trips benefit from shower facilities, change rooms and clothing lockers.
- Risk of vandalism: At some locations, bicycle lockers or a secured-access enclosed area are desirable sheltered from public view, while at others (for short-stay visits) it is better to be in convenient, busy areas offering natural surveillance.
- Weather conditions: Sheltered parking is beneficial, offering protection from the elements.

As a result of these considerations two categories of bicycle parking emerge:

1. **Long-term** parking, often referred to as commuter parking, requires a high degree of security and weather protection, with well-designed racks in covered areas, storage

rooms, or fenced areas with restricted access. Long-term parking can also be provided in individual, secure enclosures like bicycle lockers.

2. **Short-term** parking requires a high degree of convenience (as close to destinations and building entrances as possible). Some short-term parking may require protection from the weather.

10.2 Parking Demand at Key Destinations

A number of key cycling destinations have been identified through public input at the Cycling Master Plan Public Engagement Sessions. Further, the City's Growth Management Strategy and draft Official Plan have proposed a long-term city structure which identifies Mississauga's downtown and key nodes and corridors. These areas will be focal points for providing a mix of uses to meet the daily living needs of the surrounding community, and will therefore be key locations for connecting to the cycling network.

Map 5-2, Proposed Mississauga Cycling Route Network, identifies major destinations such as the downtown including City Hall, the Living Arts Centre and the YMCA, large institutions such as the University of Toronto-Mississauga Campus (UTM) and hospitals, elementary and secondary schools, transit stations, parks, community centres, libraries, and major shopping and corporate office centres.

Approximately 90% of respondents to the City's online cycling survey indicated that they would ride their bicycle more often to parks, community centres, schools, commercial centres and work if secure bicycle racks or lockers were available. To encourage cycling, both the City and private land owners need to provide a bicycle parking supply that meets anticipated and future demand at major destinations

For instance, bicycle racks should be located at municipally-owned destinations such as libraries, community centres, major parks, City administrative offices and transit stations. Bicycle parking should also be provided in Business Improvement Areas. In mainstreet environments, visitor bicycle parking is typically provided in the municipal boulevard, and should be coordinated by the municipality. To encourage the use of bicycles as a regular mode of transportation, private commercial, institutional and residential land owners must also provide sufficient bicycle parking and amenities.

When estimating bicycle parking demand, consider the following factors:

- Alignment with current City policies;
- Modal split targets applied to estimates of trip generation;
- Modal split targets applied to employee density (number of employees/sq.m.);
- Surveys of cycling parking demand;
- Available industry standards from literature reviews (e.g. Victoria Transportation Policy Institute, American Association of State Highway Transportation Officials, and Ministry of Transportation Ontario);
- Best practices from other municipalities; and

- Data from various sources to identify trip patterns (e.g. census data, Transportation Tomorrow Survey).

Bicycle parking at transit stops and terminals and bicycle racks on buses significantly increase the transit catchment area and provide cyclists with increased mobility options for longer trips. This infrastructure has been successful in attracting new riders. For example, 30% of users of Vancouver's bicycle lockers at a transit station had not previously used public transit to commute (source: Victoria Transport Policy Institute, 2008). These amenities also give cyclists more transportation options for longer trips.

Bicycle parking at transit terminals should reflect the significance of the station, anticipated cycling demand, and level of security warranted. At major transit hubs, long-term parking will provide the highest degree of security and weather protection.

In June 2009, bus bike racks became available on all Mississauga Transit buses. As illustrated in **Image 10-1**, each rack can hold two conventional bicycles; no additional fare is required to use them.

Image 10-1: Bike Racks on Mississauga Transit Buses



(source: City of Mississauga, 2009)

As part of monitoring the Cycling Master Plan, the City should conduct a bicycle parking inventory at City-owned facilities. An initial bicycle parking demand count will provide a baseline, with updates to occur when resources permit. In addition, it is useful to include bicycle

parking counts as part of related traffic and parking impact study submissions to the City; this will assist with obtaining bicycle usage statistics and identifying supply and demand issues.

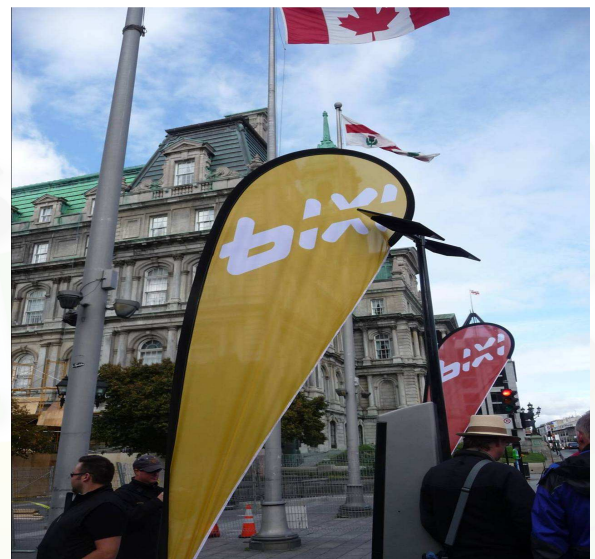
10.2.1 Public Bicycle Systems

Another way of encouraging bicycle use is through Public Bicycle Systems (PBS), also called Bicycle Sharing and Community Bike Programs. These provide convenient rental bicycles for short commuter trips (less than 5 km).

A typical PBS consists of a fleet of bicycles, a network of automated stations where they're stored, and bicycle redistribution and maintenance programs (see **Image 10-2**). The intent is to increase the modal share of bicycles for inner city neighbourhood trips, as opposed to tourist use. Since 2004, the University of Toronto-Mississauga has operated a volunteer bike-share program for students and the local community (<http://www.utm.utoronto.ca/bikeshare/about.html>). The City should conduct a business case assessment of PBS based on examples in **Table 10-1**.

Table 10-1: Bicycle Sharing Systems

	Paris	Barcelona	Lyon	Frankfurt	Montreal
Operator	JCDecaux	Clear Channel	JCDecaux	DBRent	Stationnement
Population	2,153,600	1,605,600	466,400	652,600	1,039,500
# Bicycles	20,600	3,000	4,000	720	2,400
# Residents per Bicycle	104	535	116	906	433
Technology	Smart Card	Smart Card	Smart Card	Mobile Phone	Smart Card
Business Model	For Profit	Local Government	For Profit	Local Government	Local Government
Funding	Subscriptions and Outdoor Advertising	Subscriptions and Parking Revenues	Subscriptions and Outdoor Advertising	Subscriptions and General Revenues	Subscriptions and Parking Revenues



Bixi Public Bicycle Sharing System in Montreal (source: City of Mississauga)

Image 10-2: Example of Bicycle Sharing System

10.2.2 Bikestation/Cycle Centre

To augment bicycle parking, the City should investigate opportunities for partnership with Bikestation®. This not-for-profit organization offers secure bicycle parking, with additional features, such as bicycle repairs, bicycle sales and accessories, rental bicycles for local and tourist needs, restrooms and changing rooms; see **Table 10-2**. Some Bikestation® locations include: Washington, D.C.; Seattle, Washington; and several throughout California (L.A. County, Long Beach, Berkeley, Palo Alto, Santa Barbara and Embarcadero).

Table 10-2: Cycle Centre Description

Service	Description
24-Hour Bicycle Parking	Use of membership card to access secure bicycle parking 24 hours a day, 7 days a week.
Rentals	Bikestation® members receive 50% off bicycle rentals for family and friends. (\$8 per hour or \$32 for the day).
Retail Sales	10% discount for members.
Bike-Sharing	Check out conventional and electric bicycles and electric scooters: \$3/hour or \$15/day for regular and electric bicycle rentals; \$5/hour or \$25/day for electric scooter rentals.
Car-Sharing	Bikestation® members receive \$10 off Flexcar memberships.
Indoor Attended Bicycle Parking	Free, available during business hours.
Air	Free air available on-site.
Bicycle Repairs	Tune-ups and adjustments.
Snacks/Cafe	Refreshments available on the go.
Information	Maps and safety related information.

The City of Toronto launched a Bicycle Station in May 2009 downtown at Union Station, the primary transportation hub (see **Image 10-3**), and plans to expand to other locations. The second planned location is Nathan Philip Square, in front of Toronto City Hall. The costs are:

- One-time membership fee: \$25
- Daily parking plan: \$2/day
- One-month parking plan: \$20
- Four-month parking plan: \$60
- Discounts are offered at local participating bike shops

Image 10-3: City of Toronto Bicycle Station Brochure



source: City of Toronto

10.3 Zoning By-Law Provisions for Bicycle Parking

Most municipal zoning by-laws require a minimum supply of automobile parking at buildings and other facilities. Increasingly, progressive municipalities are also developing standards for bicycle parking and associated amenities, such as shower, change room and clothing locker facilities.

Currently, Mississauga's Zoning By-law does not include bicycle parking or amenity requirements. The support of active transportation by the municipality and through the development approval process can ensure the provision of bicycle parking infrastructure. It is recommended that Mississauga develop bicycle parking and amenity standards to incorporate into the Zoning By-law, and that the information within **Section 10.3** be used to inform that process.

Development of zoning requirements for bicycle parking and amenities must consider a variety of factors. Some of these considerations are identified in **Table 10-3**.

Table 10-3: Zoning By-law Considerations for Bicycle Parking and Amenities

Zoning Considerations
<ul style="list-style-type: none"> ▪ Define long-term (employee/tenant/owner parking) and short-term (customer/visitor) bicycle parking. ▪ Establish long- and short-term bicycle parking requirements for appropriate residential and non-residential land uses. ▪ Determine applicability of one set of bicycle parking standards for the City as a whole, vs. separate, more stringent standards for selected areas (e.g. downtown). ▪ Identify bicycle parking space dimensions. ▪ Identify the minimum floor space for bicycle parking, and the potential monetary contribution from developers for small developments. ▪ Recognize which general locational criteria for parking spaces are appropriate for including in the by-law vs. the specific requirements to include in design guidelines. ▪ Establish shower, change room and clothing locker facility requirements. ▪ Determine applicability of new bicycle parking requirements to existing developments.

10.3.1 Preliminary Bicycle Parking Standards

Several Canadian municipalities have integrated bicycle parking within their respective zoning by-laws; seven municipalities are identified in **Appendix E**. This comparison of bicycle parking standards includes popular residential, commercial, institutional, and recreational destinations including community centres, libraries, schools, hospitals, retail, offices and restaurants. Having bicycle parking facilities at such a broad range of destinations will help to achieve the City's long-term vision "to make cycling a way of life". In addition to bicycle parking requirements identified in the Zoning By-law, parking will also be available in parks and public right-of-ways.

Appendix E also includes bicycle parking standards proposed by the Parking Strategy for Mississauga City Centre in January 2009. For non-residential uses, this strategy suggests providing enough long term parking for approximately 4% of the estimated employee density. For short-term parking, providing enough space for approximately 4% of visitors is recommended. The strategy also proposes bicycle parking standards for high- and medium-density residential buildings.

The potential bicycle parking standards in **Appendix E** are based on the recommendations of the Parking Strategy for Mississauga City Centre, a review of the recent City of Toronto study, and best practice information from other municipalities. The City should carry out consultation and further investigation of these standards prior to implementation.

10.3.2 Definitions and Minimum Dimensions

For incorporation into the Zoning By-law, consider these definitions of long- and short-term bicycle parking and parking space dimensions:

- **Long-term bicycle parking:** Parking spaces for use by the occupants or tenants of a building, to be located in a secure, weather protected area of the building. Should include bicycle racks in a monitored area, a limited-access room or garage, and bicycle lockers.
- **Short-term bicycle parking:** Parking spaces for use by visitors to a building, provided in the form of racks at-grade in highly visible locations, close to major building entrances and sheltered wherever possible. A percentage of these spaces may need to be located in a weather protected area.
- **Horizontal parking:** 1.8 metre length, 0.6 metre width, and 1.9 metre vertical clearance.
- **Vertical parking:** 1.2 metre length, 0.6 metre width, and 1.9 metre vertical clearance (not to exceed 50% of bicycle parking spaces provided as vertical parking).

10.3.3 Locational Requirements Appropriate for the Zoning By-law

The Zoning By-law should provide general guidance on acceptable bicycle parking locations. For example, bicycle parking for an apartment should not be within a dwelling unit, on a balcony

or in a storage locker; and bicycle parking for non-residential uses should be located within a maximum distance from a pedestrian entrance to a principal building.

10.3.4 Exemption for Buildings with Small Floor Areas and in Mainstreet Environments

For private developments, the bicycle parking required by the Zoning By-law would normally be on private property. However, in some instances the required bicycle parking may be better provided in the public right-of-way (on the sidewalk). For example, there may be inadequate space on private property (often the case in mainstreet areas such as Port Credit, Streetsville and Clarkson), or the public right-of-way is a more desirable location. Review these situations, including the possibility of a monetary contribution by the developer towards providing bicycle parking.

10.3.5 Shower and Change Facilities

Shower facilities, change rooms and clothing lockers make cycling a more viable mode of transportation for many. Over 50% of respondents to the City's online cycling survey indicated that the addition of showers and change room facilities at places of work would encourage them to use a bicycle as their primary form of transportation. Some progressive municipalities, including Toronto and Vancouver, have included requirements for such facilities within By-law provisions for non-residential uses. The Parking Strategy for Mississauga City Centre, January 2009, also proposed requirements for these facilities.

Standards for shower facilities and change rooms for each gender, as well as clothing lockers, should be incorporated into the Zoning By-law based on the number of long-term bicycle spaces required. Further, the City should seek input on the proposed preliminary standards noted in **Table 10-4**, and refine them prior to implementing the Zoning By-law. The requirements listed in **Table 10-4** are similar to those proposed by the new City of Toronto Zoning By-law and approximately half of what would be required in Vancouver.

Table 10-4: Minimum Required Shower/Change Facilities per Gender and Locker Facilities

Required Number of Long-Term Bicycle Spaces	Number of Shower Stalls per Gender
0-4	0
5-60	1
61-120	2
121-180	3
Over 180	4 plus 1 for each additional 60 long-term bicycle spaces

For clothing lockers, an amount equal to at least 0.5 times the number of employee parking spaces is proposed.

To put the suggested requirements in perspective, a 23,225 m² (250,000 sq. ft.) office building would be required to provide 35 long term bicycle spaces in a covered and secure location and 23 visitor spaces. It would also have to provide one shower for each gender, including 18 clothing lockers and washroom facilities. Single-employer buildings with a health club on site could meet the requirements by using the health club change/shower/locker facilities.

10.4 Design Guidelines for Bicycle Parking

A range of bicycle rack designs offer varying levels of quality and security. The recommended zoning standards primarily address the quantity of bicycle parking and amenities with basic requirements for space dimensions and design. However, quality of the facilities in terms of security and usability can be greatly influenced by several design and location features, such as those identified in **Table 10-5** and **Table 10-6**. Along with zoning standards, it is recommended that the City develop design guidelines for bicycle parking facilities. These should build upon the zoning standards by further detailing considerations for: rack design; anchoring; aisle spacing and layout configurations; location; signage; and access.

Table 10-5: Bicycle Parking Design Considerations

Bicycle Rack Design Criteria	Characteristics
Security	<ul style="list-style-type: none"> ▪ Theft-resistant material and anchoring. ▪ Materials are smooth so they do not scratch bicycles. ▪ Supportive wheel and frame locking devices (i.e. two points of contact). ▪ Prevents bicycle tipping over. ▪ Provides sufficient lighting. ▪ Short-term parking locations are busy and highly visible. ▪ Long-term parking locations are ideally in secured-access enclosed areas. ▪ Vertical bicycle space racks support the bicycle without the bicycle being suspended on its wheels. ▪ Monitoring by close-circuit or regular security patrols.
Usability	<ul style="list-style-type: none"> ▪ Convenient to access and use. ▪ No barrier to those with disabilities. ▪ Not located within walkway clear zones. ▪ Sufficient spacing from walls, stationary objects, parked vehicles, and other racks, so bikes can manoeuvre easily (without reducing bicycle parking capacity). ▪ Provides short-term parking near building entrances, and provides shelter where possible ▪ Provides long-term parking sheltered from weather. ▪ Shower and change facilities available for commuters. ▪ Signs to direct cyclists to designated bicycle parking areas. ▪ Warning signs for motorists and cyclists within parking garages. ▪ Provides sufficient grades on parking ramps.

Table 10-6: Preferred Short- and Long-Term Bicycle Parking Facilities

Bicycle Parking Term	Type
Short-Term	<ul style="list-style-type: none"> ▪ Inverted U-shape rack ▪ Post and ring ▪ Multiple-space bicycle rack
Long-Term	<ul style="list-style-type: none"> ▪ Bicycle locker ▪ Bicycle storage rooms with secure access and monitoring

Image 10-4: Bicycle Parking Options

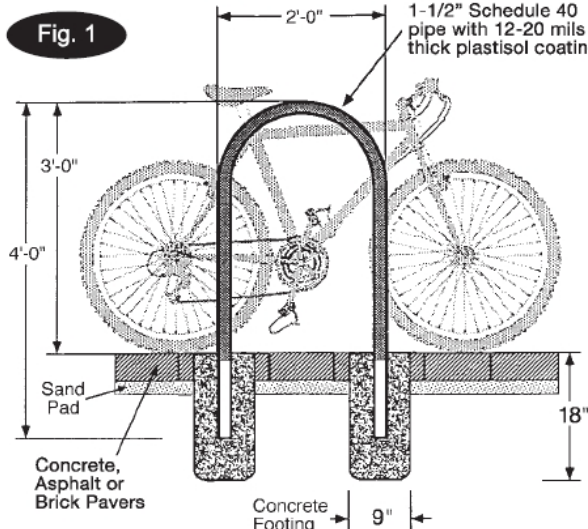



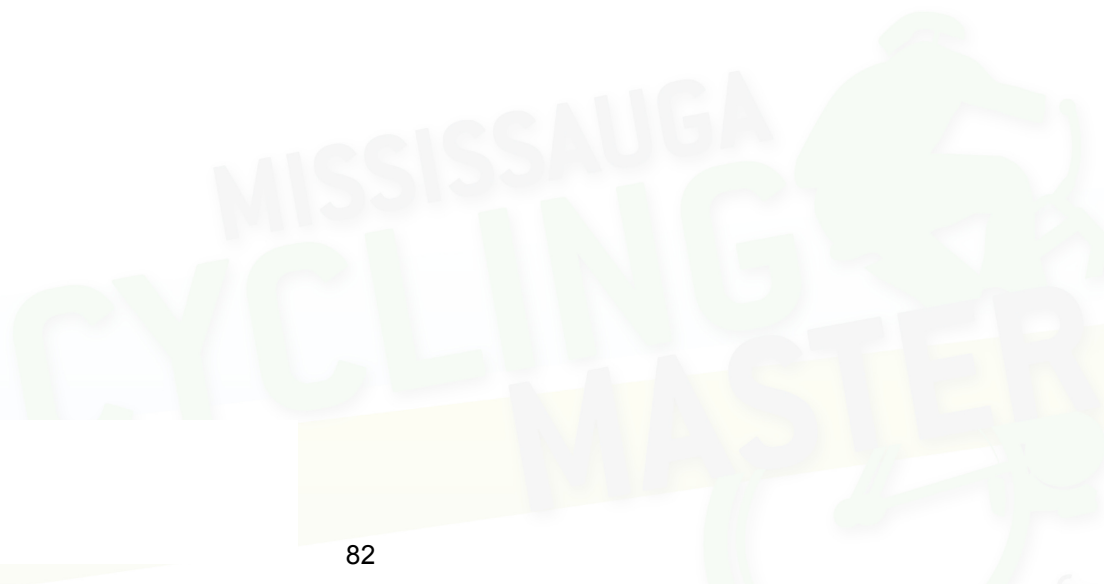
Bicycle Rack Type	Example
Bicycle Rack – Inverted “U” (Wisconsin - source: Wisconsin Department of Transportation)	
Post and Ring Bicycle Rack (Mississauga - source: iTRANS)	
Multiple-Space Bicycle Rack (Mississauga - source: iTRANS)	
Sheltered Bicycle Parking (Clarkson GO Station - source: iTRANS)	

Image 10-4: Bicycle Parking Options (cont'd)

Bicycle Rack Type	Example
<p>Stacked Indoor Bicycle Parking at Transit Station (Chicago - source: iTRANS)</p>	 <p>A photograph showing a row of metal bicycle racks in a transit station. The racks are stacked vertically, with bicycles parked on them. A green 'P' sign with a bicycle icon is visible on one of the racks. The racks are located near a large window that looks out onto a street.</p>
<p>Bicycle Locker (Toronto - source: iTRANS)</p>	 <p>A photograph showing a row of grey, rectangular bicycle lockers. Each locker has a small sign that says 'BIKE LOCKERS' and a green 'P' sign with a bicycle icon. The lockers are located in front of a building with large glass windows.</p>
<p>Secure Bicycle Parking Room (Toronto - source: bikerack.ca)</p>	 <p>A photograph showing a secure bicycle parking room. The room has a concrete floor and walls. Bicycles are parked on blue racks. The racks are enclosed by a metal mesh fence. The room is well-lit by overhead lights.</p>



11.0 PROMOTION AND EDUCATION

RECOMMENDATIONS:

3. Promote cycling to schools.
4. Increase awareness of cycling to the general population.
5. Foster community cycling events.
6. Develop a comprehensive network of organizations and agencies to implement the Cycling Master Plan.
7. Establish a tourism plan focused on cycling.
13. Develop a stronger working relationship with Peel Regional Police.
14. Establish an educational plan for motorists and cyclists.

What will encourage more people to ride their bicycles? The Mississauga Cycling Master Plan identifies two themes – awareness and accessibility.

1. **Awareness** – Given that people cycle relatively infrequently for active transportation, and many view it as an activity for the very young, the public may not fully appreciate the opportunities cycling provides. Education will reinforce the health, economic, and environmental benefits, and reintroduce the bicycle to many individuals.
2. **Accessibility** – Bicycle training, routes, and parking are all important requirements for anyone choosing to cycle. Safety and security is also a primary consideration for cyclists.

11.1 Awareness

The City of Mississauga will consider a range of approaches to promote cycling as a viable transportation mode and a healthy activity:

- Incorporating bicycle parking in prominent locations in new developments.
- Increasing visibility of bicycle infrastructure such as bicycle lanes and signage.
- Launching proactive marketing campaigns, coordinated with cycling partners, which highlight the benefits of cycling for specific user groups and target audiences.

11.1.1 Recreation Cycling

Cycling for recreation can be marketed to a broad segment of the population. This requires different messages for the various skills and interests of current and potential cyclists. The themes may include:

- Cycling as a family activity.
- Cycling for physical activity.
- Cycling as a community activity (e.g. social networking).
- Cycling to explore (e.g. to access the City's Lake Ontario waterfront).
- Bicycle touring or eco-tourism.

11.1.2 Active Transportation

Mississauga aims to make active transportation a competitive mode of travel to work, school, shop and visit. Marketing initiatives can be coordinated with large employers and groups such as Smart Commute. The health, environmental and economic benefits of active transportation modes can serve as the marketing themes.

The greatest opportunity for a cultural shift toward cycling in Mississauga will come by focusing on school-age children. Why? Because the proposed cycling network will connect to over 90% of all Mississauga schools. The City and school boards can coordinate efforts to encourage students to cycle. Some goals and benefits include:

- Educating and influencing a generation of potential cyclists before they are committed to travelling by car;
- Providing a consistent message of the personal and community benefits of cycling; and
- Offering bike-to-school programs, which can also address issues like parking and traffic circulation at schools (and the resultant vehicle idling and emissions).

By launching marketing efforts, we can learn from several community awareness campaigns that have been coordinated with school programs, such as environmental awareness and drug awareness.

The Region of Peel is committed to promoting sustainable transportation, energy and environmental practices, as stated in their Official Plan: “the Region will have a safe, convenient, efficient, multi-modal, sustainable, integrated transportation system that supports a vibrant economy, respects the natural and urban environment, meets the diverse needs of residents and contributes to higher quality of life.”

Working with the area municipalities, the Region has launched a two-phase Peel Region Active Transportation Initiative:

Phase 1: A Communication and Social Marketing Strategy (completed in January 2009) to raise awareness of the benefits of active transportation and of existing bicycle and pedestrian facilities. Regional staff are working on implementing the Strategy, including the development of an active transportation website and Region-wide interactive web-based active transportation map (expected to launch in spring 2010).

Phase 2: An integrated, comprehensive Peel Region Active Transportation Master Plan is anticipated to be completed in 2011. This Plan, and subsequent improvements to make the Region more conducive to alternative modes of transportation, will be one means of achieving long-term growth and a more healthy, liveable community.

11.2 Marketing Messages and Events

The City of Mississauga can develop its own marketing messages and initiatives. However, the opportunities for a cultural shift toward cycling – something that could benefit

municipalities across the GTA – could encourage coordinated mass media campaigns with leadership from the provincial government and Metrolinx. Slogans to lead the identified campaigns could include:

- **Stay Healthy and Fit!** – Biking is a great cardiovascular workout and does wonders for circulation and muscle tone.
- **Save Time!** – Cycling is often faster than driving, and you don't waste time looking for parking. Exercising while commuting can also save you a trip to the gym!
- **Save Money!** – No gas, no car payment, no insurance, no parking. (Provide information on the cost of car ownership versus other transportation modes).
- **Have Fun!** – Biking is lots of fun! Mississauga is a beautiful city to cycle, with 374 kilometres of on-road and off-road bicycle routes.
- **Keep it Green!** – Bicycles do not use fossil fuels, cause ozone depletion, or emit pollutants.
- **Exercise to Work!** – It's easier to stay fit when you work cycling into your daily routine.
- **Walk + Roll Peel** – Region of Peel initiative to promote walking and cycling for everyday transportation.

The campaigns themselves can focus on a range of bicycle trip purposes and themes, as outlined in **Table 11-1**.

Table 11-1: Proposed Campaign Themes

Campaign	Recommendations
Be Active	Coordinate with the Region of Peel's Active Transportation Plan strategy and become an active partner to promote cycling.
Bike to Work	Coordinate a bike to work campaign with Zip Car [®] , AutoShare, Smart Commute, GO Transit, and Mississauga Transit. These partners will help the campaign to succeed, as they would form the nucleus of providing a guaranteed ride home. The campaign should also encourage bicycling to transit stops and hubs as a viable alternative.
Bike to School	Coordinate a Bike to School campaign with the Peel Region school boards and become an active partner with the Peel Safe and Active Routes to School (PSARTS) Program. Integrate campaign into the curriculum and/or school events (e.g., Walk and/or Wheel Wednesdays - WoW) through discussions with the Peel Region school boards and individual schools.
"Share the Road/Trail" Campaign	Promote safe cycling and motorist and cyclist behaviour through street signs, media coverage, City publications, and advertising throughout Peel Region.
Car-Free Days	Promote Car-Free Sundays.
Tourism Campaign	Market Mississauga as a cycling tourist destination, promoting publicly or privately operated bicycle tours and rentals.

11.2.1 City-Initiated Communication

Building on its current communication methods, the City can use additional approaches and programs to assist with promoting cycling as summarized in **Table 11-2**.

Table 11-2: City Cycling Programs

Method	Recommendations
Information Briefs	A series of information briefs on topics such as riding in inclement weather, benefits of bicycle commuting, and creating a bicycle use group (BUG) in the workplace. These briefs aim to increase awareness of cycling and its associated benefits.
Annual Survey	To assist in soliciting feedback on cycling and ways to continually improve the cycling network, design, and maintenance of facilities; and amenities and programs. This can play an integral role in continually improving the state of cycling infrastructure.
Bulletins/Magazine Articles	Distribution of quarterly bulletins to update the community on cycling events and progress. In addition, feature articles in magazines can increase the profile of cycling in Mississauga.
Bicycle Hotline	A City phone number and e-mail address that receives information from the general public regarding cycling issues, such as facility maintenance and safety concerns.
Real-Time Display Signs	Attention-catching cycle trip counters that regularly measure cycling volumes and publicize rising levels of cycling, and/or display signs along bicycle routes that measure the speeds of passing cyclists.
Bicycle Ambassador Program	Ambassadors serve as role models of safe cycling and help with cycling promotion in neighbourhoods throughout the City, distributing newsletters and information about cycling events. Establish a program to promote cycling by having ambassadors in every school and all businesses with over 100 employees.
Signing System and Cycling Infrastructure	In addition to traffic regulation and safety, signs can contribute to the promotion of cycling. A highly visible way finding system can help to “brand” cycling in Mississauga. In addition to the operational benefits of bicycle lanes and trails, the mere presence of bicycle routes aids public recognition of cycling as an accessible mode.

11.2.2 Cycling Events

Numerous existing bicycle events in Mississauga and the Greater Toronto Area (GTA) present opportunities for the City to provide cost-effective promotion. The City can also partner with other agencies to expand these events and create new events. Any cycling event should include incentives such as prizes of free services (e.g. bicycle accessories, bicycle tune-ups). Events can include activities in **Table 11-3** and depicted in **Image 11-1**.

Table 11-3: Cycling Events

Event	Recommendations
Bicycle Camps	Include bicycle camps as part of summer recreation programs to provide youth with cycling skills and safety awareness.
Bike Week/Festivals	<ul style="list-style-type: none"> ▪ Become part of Bike Week in Toronto, or partner with Toronto and other municipalities to create Bike Month within the GTA. ▪ Initiate an ongoing festival with several events throughout the summer. Partner with new organizations and businesses to stage more events and increase sponsorship. ▪ Increase media coverage and involvement – focus on events that attract many people or encourage occasional bicyclists to ride more frequently.
Earth Day	As part of Earth Day (www.earthday.net), events could include walking and cycling activities, as the number one action to help the environment.
Bike Fridays	Further promote Mississauga Bike Fridays event across Mississauga and to City employees, major employers, small businesses, and schools.

Event	Recommendations
RONA Multiple Sclerosis (MS) Bike Tour	The RONA MS Bike Tour is a pledge-based fundraising event that provides Canadians with the opportunity to ride through scenic and often spectacular parts of the country. Over 10,000 cyclists are expected to participate in the 22 one and two-day tours taking place across Canada between June and September.
Healing Cycle Foundation	This cycling event through the Foundation has raised \$480,000 towards a \$1 million commitment to the palliative care unit at Credit Valley Hospital.
Other City Events	Bicycle safety demonstrations at City events and festivals to boost the cycling profile.
Car-Free Day	Encourage families to engage in physical activity Sunday mornings and early afternoons. A ride linking Mississauga's City Centre with the lakefront is an ideal introductory route. Closing cross streets is unnecessary since participants, with the help of volunteer marshals, will stop at signalized intersections. Could include fitness and health events in parks and other locations along the route. Gradually expand to other streets connecting the City Centre to various other locations, such as industrial areas on weekends.
Bicycle-Friendly Awards	As a means to promote business partnerships within the community, and a tool to help attract new employees, several communities have used a bicycle-friendly awards program. For guidelines used by Niagara Region, see http://www.niagararegion.ca/living/health_wellness/physicalactivity/pdf/BFA-Guidelines.pdf
Tour de Mississauga	In the second annual Tour de Mississauga in 2009, over 400 cyclists of all ages and fitness levels participated – way up from 30 in 2008.
Phil Green Recognition Award	Since 2003, the City has presented the Phil Green Recognition Award to the person(s) who demonstrate an exemplary effort to promoting and furthering cycling or other forms of sustainable transportation in Mississauga.

Image 11-1: Mississauga Leaders Active in Promoting Cycling in the City



Mayor Hazel McCallion and Councillor Pat Mullin leading the way on car-free day in Mississauga with Phil Green (source: www.philgreen.ca)

11.3 Education

Safety is everyone's responsibility. The City has been proactive in providing programs to help educate cyclists, pedestrians and motorists on safety and road and trail etiquette. With existing and new partnerships, the City can further advance cycling safety through:

- Education campaigns (e.g. "share the road" and "share the trail");
- City transit driver education;
- Commercial vehicle operator education;
- Stakeholder involvement, e.g. Traffic Safety Council, Road Safety Mississauga, Mississauga Cycling Advisory Committee;
- Outreach by Peel Regional Police;
- Bicycle theft prevention; and
- Bicycle safety education (e.g. CAN-BIKE course).

12.0 RECOMMENDATIONS

GOAL 1

Foster a Culture Where Cycling is an Everyday Activity

1. Establish a "cycling office" to oversee the implementation of the Cycling Master Plan.
2. Monitor the increase in cycling use, including the transportation modal split for weekday trips (long-term goal of 10%).
3. Promote cycling to schools.
4. Increase awareness of cycling to the general population.
5. Foster community cycling events.
6. Develop a comprehensive network of organizations and agencies to implement the Cycling Master Plan.
7. Establish a tourism plan focused on cycling.

GOAL 2

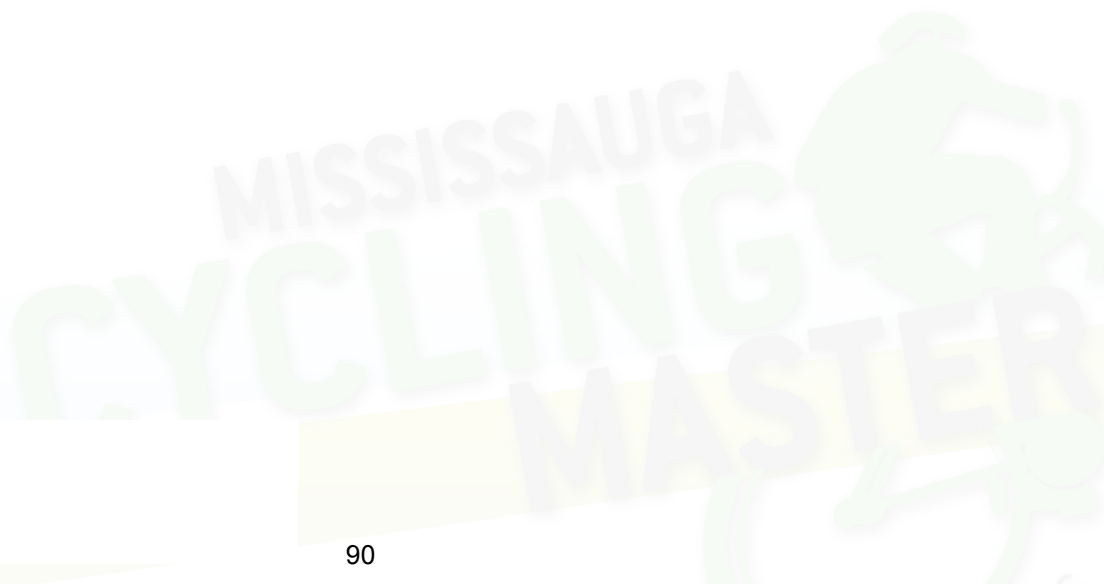
Build an Integrated On-Road and Off-Road Cycling Network as Part of a Multi-Modal Transportation System

8. Establish a regulatory framework to implement the Cycling Master Plan.
9. Add an average of 30 km to the cycling network per year over the next 20 years, giving priority to:
 - Complete the primary routes.
 - Connect all nodes by cycling routes.
 - Complete network links to existing and future higher-order transit terminals.
 - Connect all major natural and cultural destinations by the cycling network.
 - Provide cycling routes within 500 m of all residents and publicly funded schools, where feasible.
 - Ensure that 95% of the population are within 1 km of a primary cycling route, where possible.
10. Develop and implement a comprehensive standardized signage and way finding system based on the three D's of: distance, direction and destination.
11. Incorporate bicycle parking at all City-owned major transit locations, libraries, community centres, and parks, where appropriate, and encourage trip-end facilities at existing private sector locations (e.g. office buildings, retail/commercial), where appropriate.

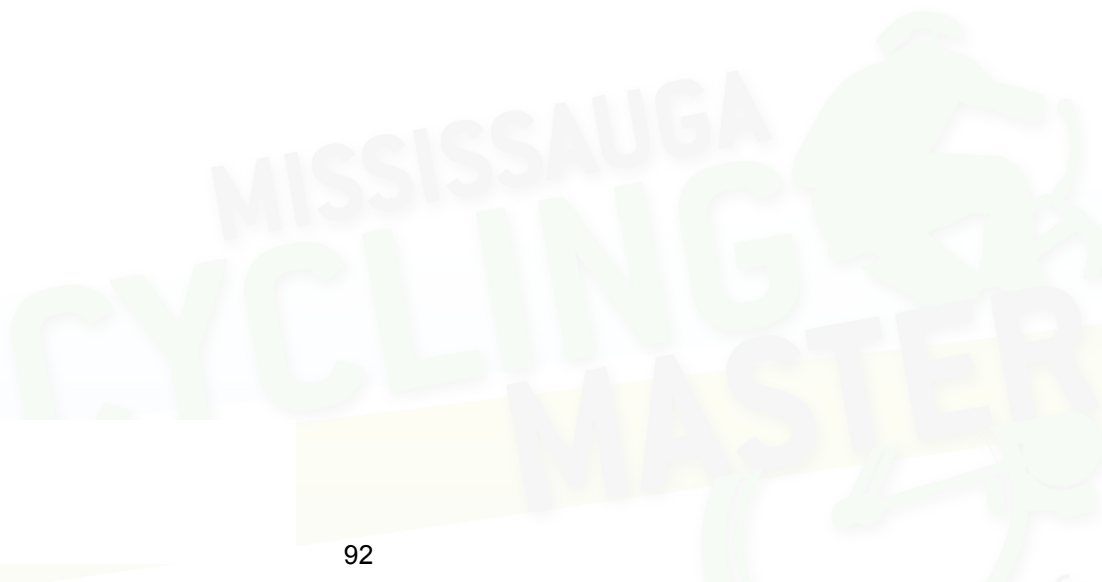
GOAL 3

Adopt a "Safety First" Approach for Cycling in Mississauga

12. Continually reduce cyclist incident rates (linked to recommendations 13. and 14.).
13. Develop a stronger working relationship with Peel Regional Police.
14. Establish an educational plan for motorists and cyclists.
15. Develop an infrastructure asset management plan for all cycling facilities.
16. Develop an operation and maintenance program for the cycling network.
17. Establish technical standards for cycling.



Appendix A: Definitions

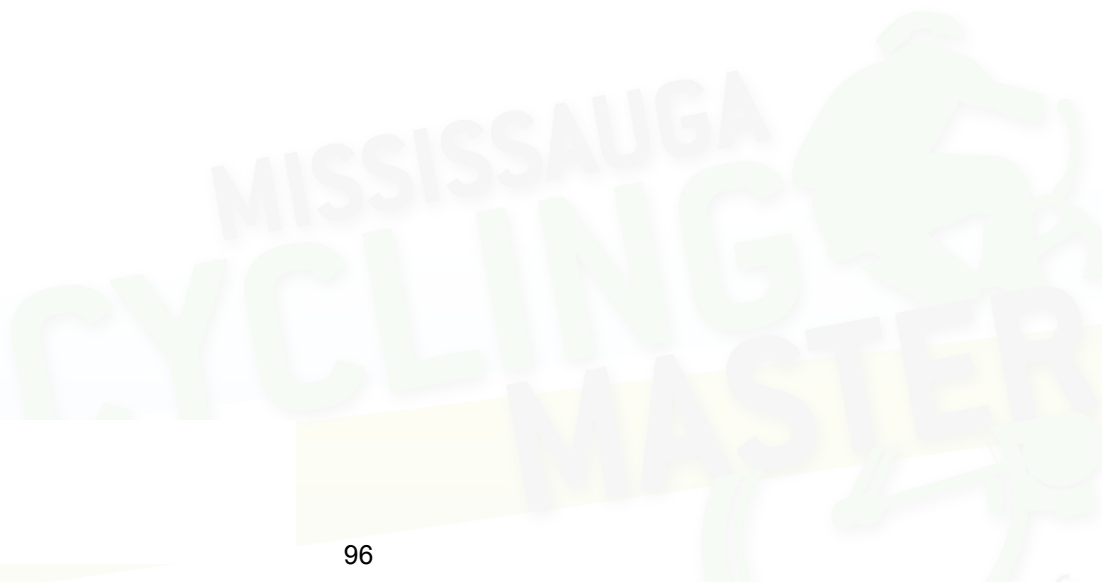


Appendix A: Definitions

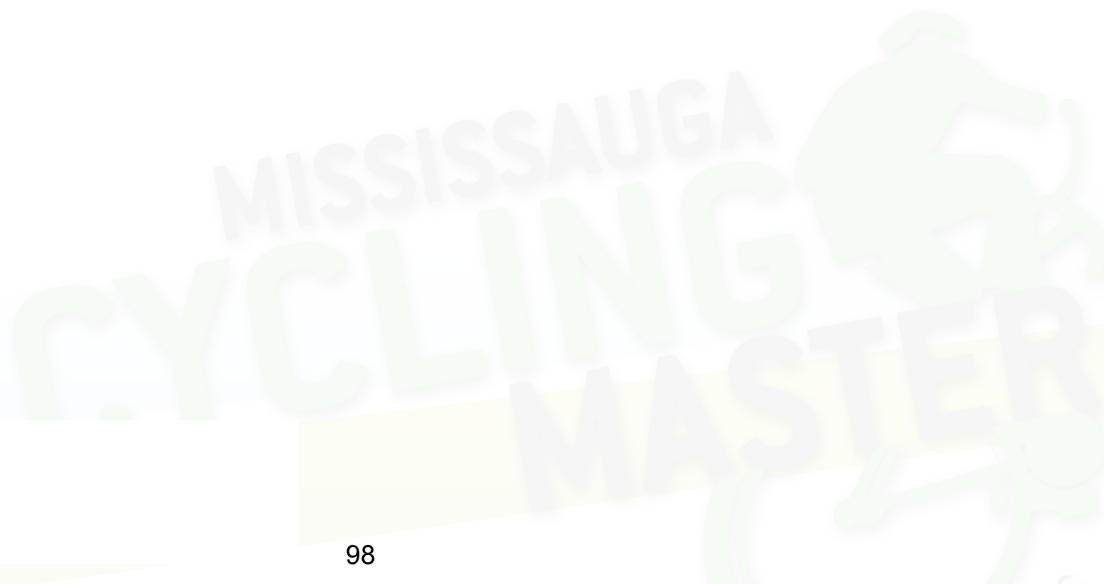
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| 1. AASHTO | American Association of State Highway Transportation Officials, the leading source of technical information for development, construction and maintenance of highways and other transportation facilities. |
| 2. Active transportation | Human-powered transport, e.g. walking and cycling. |
| 3. Amenities and trip-end facilities | Bicycle parking, bicycle lockers, showers, etc. |
| 4. Bicycle box/advanced stop bar | Road marking facility at intersections to allow cyclists to advance ahead of other traffic. |
| 5. Bicycle lane (visually separated) | Separate dedicated space for bicycles on the road identified by a painted linear line with bicycle and diamond reserved lane symbol. |
| 6. Bicycle lane (physically separated) | Physical barrier separating the dedicated bicycle space from the vehicular traffic. |
| 7. Bicycle-sensitive inductive loop traffic counter | Cyclist counter imbedded in the asphalt of a road or multi-use trail. |
| 8. Bicycle traffic signals | Signals that direct cyclists through an intersection. |
| 9. Cordon Count Program | Part of the TTS (see #30), administered by the Province of Ontario and the Region of Peel. It provides counts of travel by all modes crossing selected physical and geographic barriers. |
| 10. Crossride | Bicycle crossing, separate from the pedestrian crosswalk that allows for cyclists to ride through a signalized and un-signalized intersection. |
| 11. Edge line | Solid white pavement marking, typically offset 1.2 to 1.5 metres from the curb. It is not regulated for bicycle use only, as on-street parking may be permitted within the edge line. |
| 12. Grade separation | Bridge or underpass. |

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| 13. Higher-order transit | Includes transit that generally operates in its own dedicated right-of-way, outside of mixed traffic, and includes heavy rail (such as subways), light rail and buses in dedicated rights-of-way. |
| 14. Highway Traffic Act (Ontario) | Governs the rights and responsibilities of vehicles within the road right-of-way. |
| 15. Metrolinx | Formerly the Greater Toronto Transportation Authority. An agency mandated to develop an implement a seamlessly integrated, multi-modal Regional Transportation Plan (RTP) for the Greater Toronto Area and Hamilton. |
| 16. Mid-block crossing | Location where a multi-use trail crosses a road, but not at an intersection. |
| 17. Ministry of Transportation Ontario (MTO) | Governing body in Ontario for transportation. |
| 18. Mississauga Cycling Advisory Committee (MCAC) | Citizen committee that advises the Mississauga City Council and staff on issues affecting cycling in Mississauga. |
| 19. Mississauga's Strategic Plan | Plan for the City's development over the next 40 years. |
| 20. Mobility hub | Major transit station area. A place where transportation modes come together, including local transit service, cycling and pedestrian networks. |
| 21. Modal split | Percentage of trips using different types of transportation (e.g. walking, cycling, bus, car). |
| 22. Multi-use trail | Trail shared by bicycles and pedestrians. |
| 23. Node | Mixed-use area well served by public transit. It will be the focus for a range of day-to-day activities for one or more communities, and may contain specialized employment or cultural services. |
| 24. Places to Grow Growth Plan for the Greater Golden Horseshoe (2006) | Provincially-mandated plan providing direction on several aspects of growth management, including transportation. |

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| 25. Primary bicycle routes | Traverse the City from north to south and east to west. |
| 26. Provincial Policy Statement (2005) | Provides policy direction on matters of provincial interest related to land use planning and development. It also supports the provincial goal to enhance the quality of life for the citizens of Ontario. |
| 27. Secondary bicycle route | Cycling routes within a community. |
| 28. Sharrow | Combined chevron and bicycle symbol that identifies the outside general purpose travel lane is to be shared with bicycles. |
| 29. Smart Commute | Partnership between Metrolinx and the cities of the Greater Toronto Area and Hamilton. It aims to reduce congestion and climate change by helping employers and commuters explore commuter choices, e.g. carpooling, transit, and cycling. |
| 30. Transportation Association of Canada (TAC) | National association that promotes the provision of safe, secure, efficient, effective, and environmentally and financially sustainable transportation services in Canada. It is a centre of expertise on technical guidelines and best practices for road and related transportation matters. |
| 31. Transportation Tomorrow Survey (TTS) | Cooperative effort by 21 local and provincial government agencies to collect information about urban travel. |



Appendix B: Comparison Summary of Design Criteria Best Practices

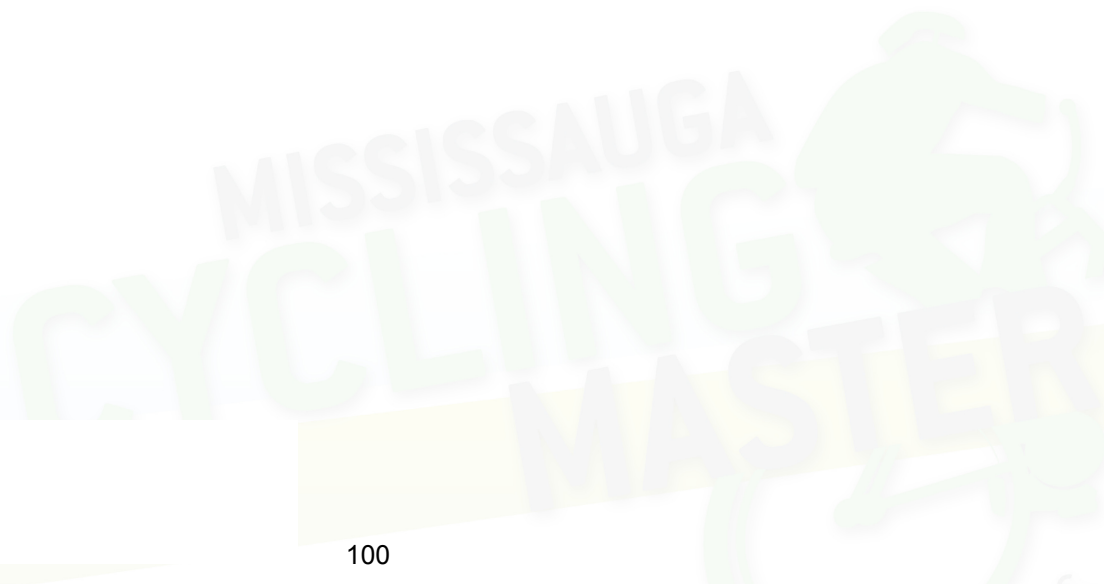


Appendix C: Cycling Route Assessments

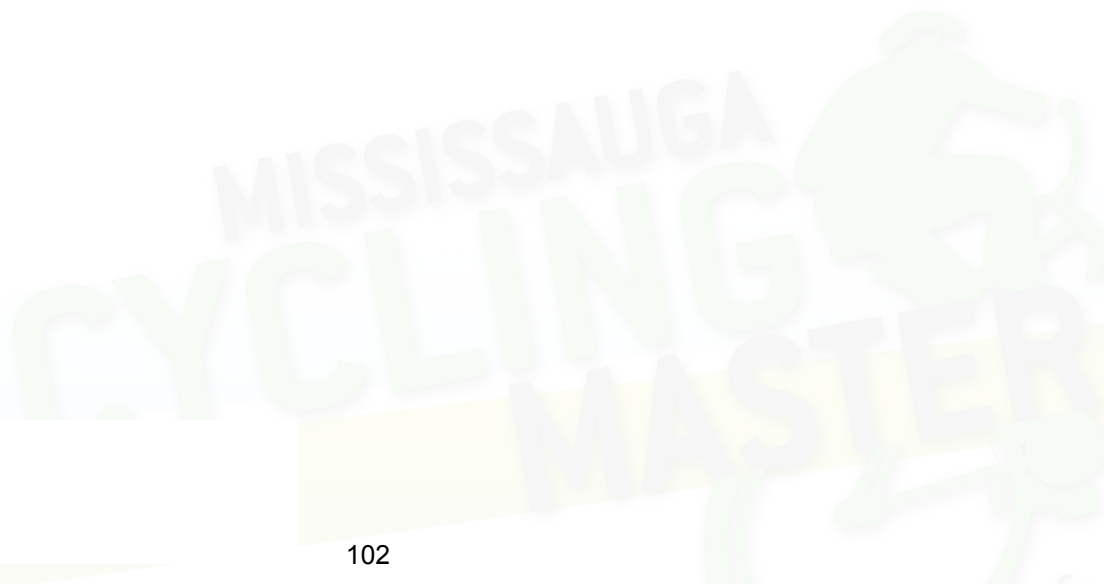
Tables C1-C4: Route Recommendations

Table C5: Off-Road Route Assessments

Table C6: On-Road Route Assessments



Appendix D: Cycling Route Maps



Appendix E: Comparison of Bicycle Parking Zoning By-Law Standards